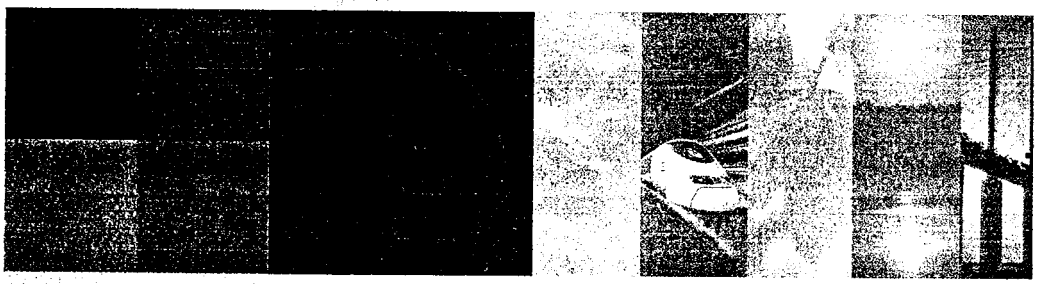
Halcrow Fox

M5 Motorway, Hungary : Phase II
Environmental Impact Assessment



Volume 1
Executive Summary

Prepared for

EBRD

April 1999

Halcrow

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Forward

The Environmental Impact Assessment (EIA) for Phase II of the M5 Motorway, Hungary prepared by Halcrow Fox for the European Bank of Reconstruction and Development (EBRD) comprises three volumes. Volume 1 is the Executive Summary of the EIA, Volume 2 sets out the Action Plan for the project and Volume 3 presents the proposed Outline Monitoring Plan for the M5 Phase II.

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- The Environment Impact Assessment (EIA) of the planned tolled Phase II of the M5 Motorway from Kiskunfélegyháza to Szeged (Km 113.5 to 161.0) has been prepared for the European Bank for Reconstruction and Development (EBRD) in accordance with the Bank's Environmental Procedure and Disclosure of Information Policy and Hungarian Law. Issues for inclusion in the EIA were 'scoped' at the Scoping Meeting held in Szeged on the 23 July 1998.

- The EIA is based on the Modified Design for Approval and accompanying EIAs prepared by UVATERV Rt. for Bács-Kiskun and Csongrád Counties. The latter will be submitted to the Lower Tisza Environmental Protection Inspectorate to obtain the Environmental Licence required for the Csongrád County Section (Km 126.4 – 161.0).

- A programme of consultation has been undertaken on M5 Phase II by UVATERV and this is documented in Section 2 of the Executive Summary, together with a description of the alternatives considered.

- The EIA comprises of 3 volumes: Volume 1 is the Executive Summary of the EIA; Volume 2 is the recommended Action Plan; and Volume 3 is the proposed Outline Monitoring Plan for M5 Phase II.

- Beneficial effects of building Phase II are expected in the 'indirect impact area' along existing roads, particularly Trunk Road No. 5, with predicted significant reductions in noise, air pollution and severance due to reductions in traffic of up to 64% with 10 HUF/km toll and up to 36% with 20 HUF/km toll in 2015. This will significantly improve the quality of life for people living in the area currently affected by high traffic flows and congestion. The greatest benefits are achieved with a 10HUF/Km toll scenario which brings the greatest transfer in traffic to the M5. Phase II will improve transport in the region supporting policies for encouraging economic growth in the region, bringing both social and economic benefits.

- In the 'direct impact area' of the M5 alignment, the EIA identifies the key negative impacts on people as increases in traffic noise, air pollution and agricultural severance and on the natural environment as potential water pollution and effects on wildlife. Other impacts identified were effects on the landscape, impact of borrow areas and construction impacts (temporary). These negative impacts have been mitigated wherever possible through measures incorporated into the design.

- Mitigation measures amounting to about 5 billion HUF are proposed. Measures include noise barriers, game fences, game and amphibian passes, planting, engineering geo-textile fabric (to

protect groundwater) and oil traps. Archaeological investigations are in progress by the County Museums in advance of construction starting.

- The Action Plan in Volume 2 contains details of the mitigation and also proposals for environmental management during construction and operation of the motorway. This includes a programme of monitoring, the proposals for which are contained in the Outline Monitoring Plan in Volume 3.

- A summary of the main findings of the EIA are given in Section 8 of the Executive Summary. Recommendations of further investigations required for the Detailed Design Stage are also given in Section 8. These recommendation can be summarised as follows:

1. It is strongly recommended that further analysis of water quality issues is carried out. In particular the potential for surface and groundwater pollution of existing water resources due to contaminated stormwater, saltwater (from de-icing) and accidental spillages. This is to ensure that appropriate protection measures are incorporated into the design of the motorway.

2. At the Detailed Design Stage, it is essential that there is a demonstrable integrated approach to the design of surface/ground water protection, planting plans and wildlife protection to ensure there are no conflicts of interest.

3. It is recommended that an Environmental Management Plan is developed and implemented during the construction phase of the project. As a development of this, a Pollution Incident Plan should be prepared for management of the environment during the operation of the motorway.

1 Introduction

1 Introduction

Halcrow Fox was commissioned in 1998 by the European Bank of Reconstruction and Development (EBRD) to prepare an Environmental Impact Assessment (EIA) for Phase II of the tolled M5 Motorway south of Budapest in Hungary. EBRD are the funding agency for the project and it is a requirement under the Bank's 'Environmental Procedures' (1992, revised 1996) to prepare an EIA for Category 'A' projects, which includes the construction of new motorways such at the M5. Halcrow Fox prepared the EIA for Phase I of the M5 for EBRD in 1994.

Phase II involves constructing a new dual two-lane motorway between Kiskunfélegyháza South Interchange (at Chainage 113.5) and Szeged North Interchange (at Chainage 161.0), a distance of 47.5 kilometers. Phase II forms the southern extension of Phases 0 and I of the M5, which have already been constructed and are open to traffic, between Budapest and Kiskunfélegyháza.

The EIA has been prepared in accordance with the EBRD's Environmental Procedures and Disclosure of Information Policy and Hungarian Law. It takes into account issues raised during formal consultations with local authorities and other consultees required under Hungarian law and, in particular, issues raised during the Scoping Meeting for Phase II held at the request of EBRD in Szeged on 23 July 1998 which included participants from non-government organisations in Hungary.

Halcrow Fox has prepared the EIA in association with their two Hungarian sub-consultants, UVATERV Rt. and FRAMA 01 dBH. The full list of the consultant's team including those responsible for preparing specialist topic sections is given in Appendix A. UVATERV Rt. has a long history of working on the project and are currently preparing the Modified Design for Approval for Phase II which includes preparation of the Detailed Environmental Impact Assessment required to obtain an Environment Licence to build the motorway. FRAMA 01 dBH are currently undertaking the environmental monitoring programme on Phase I and have prepared the outline monitoring plan for Phase II.

The EIA comprises three volumes, as required by the Terms of Reference:

Volume 1	Executive Summary
Volume 2	Action Plan
Volume 3	Outline Monitoring Plan

Volume 1 is an executive summary which draws together the findings of the two EIAs prepared by UVATERV to the standard required under Hungrian law; one for the Bács-Kiskun County section and one for the Csongrád County section of Phase II. The EIA for Csongrád County Section was commissioned by the Motorway Development Department of Hungary as part of the application process for a new Construction Permit for this section of the route. The EIA for Bács-Kiskun County was prepared under this commission for the EBRD.

Volume 1 of the EIA thus covers the entire route of Phase II and contains a description of the project, project history and public consultation process; a description of existing environmental conditions; an assessment of significant environmental impacts; a summary of proposed mitigation measures and their costs; an outline monitoring plan; and recommendations and conclusions arising from the EIA.

Volume 2 contains the recommended Action Plan for M5 Phase II. The plan has three components: a description and costing of the mitigation measures incorporated into the planning and design of the project; environmental management proposals for the construction phase; and environmental management proposals once the motorway is operational through a Monitoring Plan and Pollution Incident Plan. The mitigation measures and costs have been taken from the UVATERV Modified Design for Approval.

Volume 3 contains the proposed Outline Monitoring Plan for M5 Phase II and draws on the experience gained during monitoring on Phase I. It has been prepared by FRAMA 01 dBH in consultation with Halcrow Fox.

The two EIAs prepared by UVATERV are referred to in the EIA and form an annex to this EIA. References are made to the relevant sections of the UVATERV EIAs and the same numbering system is used in each of their EIAs. The documents referred to are as follows:

M5 Motorway Bács-Kiskun County Section II/A (Between Chainage 113.5 and 126.4 km) : Environmental Impact Assessment in Detail. UVATERV Ltd.. Budapest, February 1999. Main Report and Annexes.

M5 Motorway Csongrád County Section II/B (Between Chainages 126.4 and 161.0 km) : Environmental Impact Assessment in Detail. UVATERV Ltd.. Budapest, February 1999. Main Report, Summary and Annexes.

Reference was made to other technical engineering design documents prepared by UVATERV, including plans and cross-sections.

2 Description of Operational Context

2 Description of Operational Context

This section sets the context for the M5 Motorway Phase II Environmental Impact Assessment (EIA). The purpose and need for the project is described first, followed by a section describing the Hungarian legal and institutional framework relating to the preparation of EIAs. A short history of the project and the design process is then given, together with a description of alternatives considered. The final section sets out the public consultation process and results of consultation, both for the project as a whole and most recently for Phase II.

2.1 *Purpose and Need for the Project*

Phase II of the M5 motorway forms an important part of route E75 within the European road network, the so-called Helsinki Corridor No.IV. It provides a North-South connection through Hungary, between the northern, north-west European countries and those in the south–east, while at the same time linking Budapest with southern areas of the country (see Figure 1).

Under the Hungarian expressway network development process, at its northern end Phase II will join the motorway section already completed between Budapest - Újhartyán (Phase 0) and Újhartyán - Kiskunfélegyháza (Phase I.). At its southern end it leads to the planned motorway section between Szeged and a new border station (forming Phase III), connecting to the existing Novi Sad-Belgrade motorway. The total length of Phase II of the motorway is 47.5 km from Kiskunfélegyháza South Interchange (km 113.5) to Szeged North Interchange (km 161.0). Between km chainages 113.5 and 126.35 the motorway lies in Bács-Kiskun County, while between km chainage 126.35 and 161.0 it lies in Csongrád County.

At the northern end (Kiskunfélegyháza South interchange), the M5 connects to the existing secondary Road No. 5402, which in future will form the 451 Kiskunfélegyháza-Csongrád-Szentes-Hódmezővásárhely main road. At Kistelek interchange (km 139.0), the motorway joins secondary Road No.5411, which connects Kiskunhalas, Kistelek and Ópusztaszer. At the southern end of Phase II is Szeged North Interchange which will cross and join the planned M9 Sopron-Kaposvár-Szekszárd-Szeged and M43 Szeged-Makó-Nagylak motorway. At the end of Phase II there will be a 3.0 km long connecting road between the M5 motorway and Road No.5, which connects the M5 motorway to Szeged (see Figure 2).

The M5 motorway was constructed to be a toll motorway (except for the Kecskemét bypass section). According to Cabinet Decree No. 2119/1997. (V.14.) covering construction of new sections, Phase II (and possibly Phase III) will be financed under concession in the same way as for the earlier phases.

The private company AKA Rt. (Bouygues, Bauholding, SCREG, Magyar Aszfalt being the main shareholders) hold the concession to finance, build, maintain and operate the M5 Motorway from Budapest to the State border (157 kms) which was awarded in 1994 by the Bureau for Motorways in Concession on behalf of the Ministry of Transport, Communication and Water Management.

The Design for Approval (DFA) for the M5 Motorway including environmental protection was prepared in 1991 following public consultation. The alignment was approved in 1992 and construction permits issued. A modified DFA has now been prepared for the Phase II Section by Hungarian consultants UVATERV Rt. to take into account new standards and guidelines in order to renew the permits and approvals needed.

It is now a requirement under Article 67 of the Hungarian Act LIII, 1995 On the General Rules of Environmental Protection, to prepare 'an environmental impact assessment prior to commencement of activities having a considerable effect on the environment'. The type of activity 'having a considerable effect on the environment' is defined in Cabinet Decree No. 152/1995 (XII.12) which implements the above Act ('On the Scope of Activities Subject to the Performance of Environmental Impact Assessment and on the Detailed Rules of the Related Official Procedure'). In its Annex 1, 'List of Activities Subject to Impact Assessment', Item 62 states that the environmental impact assessment procedure is mandatory for motorways and expressways.

Therefore, in accordance with Act LIII of 1995 an environmental impact assessment concerning Phase II of the M5 motorway has been prepared by UVATERV Rt. and their subcontractors under contract to the Road Management and Co-ordination Directorate, Motorway Development Department of Hungary. Since a valid Construction Permit exists for the Bács-Kiskun County section, the Directorate only commissioned UVATERV to provide an EIA for the Csongrád County Section for which a new permit is required.

2.2 *Hungarian Legal and Institutional Framework*

Hungarian EIA Regulations

In 1995, the Hungarian Environmental Act, Act L III On the General Rules of Environmental Protection (Act 53 of 1995) (hereinafter known as the Act) was passed by Parliament (on 30 May). It sets out the scope for environmental protection (of land, air, water, biosphere etc.), the administrative and economic bases for protection, the roles and responsibilities of national and local government and the procedures for public participation. In Chapter VII of the Act it sets out the requirements for environmental impact assessment (Sections 67 to 71), the contents of the Environmental Licence (Section 72), environmental standards (Sections 87-89) and procedures for the public hearing of EIAs (Section 93-94). The Act is enforced through Cabinet Decree No.152/1995 (XII.12) On the Scope of Activities Subject to the Performance of Environmental Impact Study and on the Detailed Rules of the Related Official Procedure.

The first Hungarian Regulations on EIA were issued in draft form on July 1 1993, as a precursor to the Act, Government Decree No.86/1993 (VI.4) For Provisional Regulation of the Assessment of the Environmental Impact of Certain Activities. Prior to this Decree, only guidelines existed for EIA of large investments, produced in 1990, Guideline No. MI-13-45-1990: General Content and Methodology for EIAs of investments. The Hungarians first started to introduce procedures for EIA in 1985 and EIA studies were carried out voluntarily for some non-government projects such as coal mines. The Act is given in Appendix B in English.

The EIA for Phase II of the M5 Motorway has been prepared in accordance with the requirements of Act LIII of 1995 and will be submitted for approval to obtain the Environment Licence required for the Csongrád County section of Phase II.

Hungarian EIA Procedures

The Ministry for Environmental and Regional Policy has overall responsibility for the EIA process. The Minister is the co-chairman of the National Council of Environmental Protection, set up under the Act. The Ministry has 4 departments; Environmental Protection, Nature Protection, Regional Policy and Architecture/Heritage. The Environmental Protection Department is responsible for EIAs.

There are 12 Regional Environmental Protection Inspectorates (EPI) set up in 1990, which act as the regional authority of the Ministry. The Lower Tisza EPI located in Szeged is the regional authority for the M5 Motorway. In the first two years after they were established the EPIs were only responsible for issuing permits for noise and air pollution. In 1993 responsibility for water permissions was added but with no clear division of responsibility with the Ministry for Traffic, Communications and Water. Later in July 1993 responsibility for EIA permissions was added with the passing of Government Decree 86/1993 and this is carried through to Act LIII of 1995.

The Hungarian EIA procedures are set out in Sections 67 to 71 of the Act. An EIA is required for all activities with 'significant impacts on the environment' as defined in the Act and Cabinet Decree No.152/1995 (XII.12). The Act added further requirements so that the formal EIA procedure in Hungary now is:

Scoping Phase

The Act requires consultation with expert authorities during the Scoping (preparatory) phase of the EIA, including the nature conservancy or national park directorate and public health authorities. The significant issues and potential impacts should be 'scoped' at this stage to decide what issues are included in the Preliminary EIA.

Preliminary Environmental Statement

This is obligatory for all national roads. An EIA is submitted to the regional EPI for approval and a decision is made within 30 days as to whether a detailed EIA is required. The EPI can prescribed the issues to be included in the Detailed EIA. It may at this stage also decide to approve or refuse authorisation for the project. Alternatives are considered and public consultation is held. It is not necessary to recommend a 'preferred route', the EPI makes this decision.

Detailed Environmental Impact Statement

This is a more detailed assessment of a single route, the 'preferred route'. The EPI has to hold a public hearing at this stage in the areas affected, advertised at least 30 days prior to the date of the public hearing. Consultations with local authorities should be carried out and minutes of the hearing have to be prepared by the EPI within 15 days of the hearing. After the hearing a decision can be given. If approved, the EPI issues an Environmental Licence.

The Act requires that the EIA must include a description of: the project; existing environmental conditions; impact areas (on a map); prediction and evaluation of change in the state of the environment due to the project; (i.e. the situation 'with' and 'without' a project) and to assess the effect of the changes predicted on environmental health, economic and social impacts; measures to prevent or mitigate pollution or damage; assessment methodology and data sources; measures for monitoring during the construction phase and post-project analysis. It must also include a non-technical summary for the public.

The regional EPI organises the public hearing involving local authorities, affected and interested parties. The EPI also consults with the Mining Authority, Water Inspectorate and Public Health Authority and other relevant agencies such as the Nature Protection and Heritage Departments within the Ministry. If the detailed EIA is approved an Environmental Licence is issued by the EPI. Before a development can proceed in Hungary other permits are also required from the water authority and land use authority but the Environmental Licence is required before these can be obtained.

2.3 *Project History*

M5 Motorway

UVATERV undertook the original environmental studies for the M5 Motorway in 1990-1992 prior to Government Order No.86/1993 and Act LIII of 1995 coming into force. There were no mandatory requirement for an EIA at that time, however, UVATERV introduced EIA and public consultation into the 4 main stages of the Hungarian highway planning process on a voluntary basis. The 4 stages are as follows:

Stage 1	*Study* of the proposal including preparation of the *Plans for Discussion* and accompanying *Environmental Protection Plan.*
Stage 2	Preparation of *Plans for Approval* and accompanying *Environmental Protection Plan.*
Stage 3	Granting of *Construction Permit*

Stage 4 Preparation of the *Final Design* including assessment of construction impacts and a *Final Environmental Protection Plan.*

The *Study* in Stage 1 looks at alternative alignments, selecting a 'preferred' alignment and undertaking an assessment in engineering, economic and environmental terms. During Stage 1, UVATERV undertook consultations with local authorities, official agencies and the local inhabitants based on *Plans for Public Discussion* which they prepared. An *Environmental Protection Plan* was also prepared by UVATERV to accompany the *Plans for Public Discussion.* The *Study* was undertaken for the Motorways Directorate.

At the second stage, engineering *Plans for Approval* are prepared. UVATERV incorporated the suggestions and modifications arising from the consultation in Stage 1 into these plans. The plans then accompany the application to the supervising highway authority to build the road. The supervising highway authority is the Motorways Directorate for motorway schemes and the Roads Administration for trunk roads and national roads. An *Environmental Protection Plan* was prepared by UVATERV to support the Plans for Approval.

The next stage is for the supervising authority to review the Plans for Approval and make a decision within 15 days as to whether to grant a *Construction Permit* or not. Objections can still be made at this time which the supervising authority have to take into account. Construction Permits were granted for the M5 in 1992 (and are appended in Appendix C):

Ch. 73+250 to 126+340 km	• Permission granted 11 May 1992 by Public Road Supervision of General Communication Supervision, Budapest
Ch. 126+340 to 174+500 km	• Permission granted 31 June 1992 by Public Directorate Road Supervisor of General Communication Supervision, Budapest

Once a Construction Permit has been granted a contractor is appointed. The contractor is then responsible for producing the *Final Design* for the road, i.e. the detailed design. As part of the Final Design, details for the mitigation measures are drawn up, e.g. the design and precise location of noise fences and game crossings. These are based on the negotiations with inhabitants about land acquisition and the relocation of properties. The construction impacts of the scheme also are evaluated at this stage. A *Final Environmental Protection Plan* can be produced but this does not require approval from any authority.

If during the Final Design significant modifications are made to the Construction Permit then a *Modified Construction Permit* has to be obtained. The supervising highway authority may invite inhabitants affected by the modifications to comment.

The current situation is that UVATERV under contract to the Road Management and Co-ordination Directorate, Motorway Development Department, are preparing the Modified Design for Approval for Phase II. This is required in order to take into account changes in design standards and other legal requirements since the Construction Permit was first issued in 1992. The Permit for Ch. 126+340 km to 174+500 km was extended by the Motorway Directorate in 1994 to September 1995. Approval is being sought from Csongrád County for their section of Phase II, Bács-Kiskun County gave their approval in 1992.

Design Process

Design for the M5 motorway began early in the 1970ies. UVATERV prepared the preliminary design of the Kecskemét - state border section in the second half part of the '70ies. However, due to the decrease in investment funds in the early '80ies design work was decelerated until 1988 when the *Public Perception Designs* were drawn up for the Kecskemét-Szeged section followed by public meetings held with every involved community, along the alignment. The Design for Approval reached completion in 1991, dividing the section up to the state border into four sub-sections:

- Section I — from Ch 73,0 km to Ch 101,5 km
- Section II — from Ch 101,5 km to Ch 126,3 km
- Section III — from Ch 126,3 km to Ch 156,5 km
- Section IV — from Ch 156,3 km to Ch 174,8 km

At Design for Approval, sections dealing with preliminary environmental protection were included. These plans were discussed with, and then accepted by, the competent authorities. At the previous design stage the environmental authority took part at every consultative meeting and procedure, whether legal or official.

Since completion of the Design for Approval in 1991, the phasing of the motorway has undergone some changes, currently they are as follows:

Section 0:	Ch 18.0 – 44.3 m
Section I:	Ch 44.3 – 113.5 km
	Including:
	Section I/A: Ch 44.3 – 73.5 km
	Section I/B: Ch 73.5 – 90.5 km
	Section I/C: 90.5 – 113.5 km
Section II:	Ch 113.5 – 161.0 km
	Including:
	Section II/A: 113.5 – 126.4 km
	Section II/B: 126.4 – 161.0 km
Section III:	Ch 161.0 – 174.5 km

Sections 0 and I are now complete and open to traffic. Effective permits exist for the Section which lies within Bács-Kiskun County, Section II/A. UVATERV have prepared in accordance with Act LIII of 1995 the Detailed Environmental Impact Statement for Section II/B, the Csongrád County Section, to support the Modified Design for Approval for submission to Csongrád County authorities. However, this EIA covers the entire length of Phase II, both Sections II/A and II/B.

2.4 *Alternatives*

Background to Alternatives

Alternatives in the motorway corridor were considered in the original study in 1977; 7 or 8 alignments were assessed. The basis of the assessment, however, was only in terms of engineering feasibility and construction costs. No separate environmental protection study was prepared which was typical of most highway projects at that time. Further alternatives for the bypass of Kecskemet were studied in 1979 but there was no conclusion as motorway construction came to a halt in Hungary.

During the consultation of the *Plans for Public Discussion* in 1990, it was apparent that land owners objected to the M5 route at two locations: Kecskemet and Domaszek. In response, UVATERV undertook a separate study of possible alternative alignments in each of these locations. However, neither of these

locations affect Phase II of the motorway: Kecskemet lies in Phase I and Domaszek in Phase III.

A further alternative was considered at Kiskunfélegyháza which partly affected Phase II but after detailed investigation this was not accepted because there were no advantages to either the road network or settlement structure and the expenditure was not justifiable in economic terms.

Assessment of Alternatives

At Kecskemet, the objections were strategic in nature and alternatives lying to the east and west of the city were proposed. Three main alternative alignments were proposed, plus a number of variants. Two options lay to the west of the Preferred alignment "O" (A and variant A1), three options to the east of the city (B and variants B1, B2) and one option further east of the city bypassing both Kecskemet and Kiskunfelegyhaza (C). The six alternatives were assessed on a number of criteria some of which were environmental and responses from the Public Consultation as Kecskemet were included in the decision-making process.

Option A was deemed the favourite because it was more efficient and had advantages in terms of road network and settlement structure. However, the detour with Option A compared with "O" was not felt justified due to the increase in length and higher associated costs with no significant benefits. Option B would have been a feasible alternative, except that the distance for the airport safety zone could not be achieved other than by making a long detour to the east, i.e. Option C. Option C was rejected on the grounds that economically it was not possible to justify constructing 9 km more of motorway. The conclusion of the assessment of the alternatives at Kecskemet was that the original preferred alignment "O" was the best solution. This decision was reached in consultation with local authorities and local people.

At Domaszek, a village immediately west of Szeged, objections were mainly of local concern: new farms had been constructed within the protected line of the route, raising objection from the new residents. As a result, alternatives involving minor shifts in the alignment were proposed.

On Phase II, no major alternatives have been considered. Minor modifications to locations for crossing roads and game passes however have been made, in discussion with local landowners and residents.

2.5 *Public Consultation*

Background

UVATERV were appointed to carry out a traffic study in the M5 corridor in 1972. In 1977, they prepared a Study of the M5 Motorway between Kecskemet and the state border where they considered 7 or 8 alternative alignments. There was no public consultation at this stage. The Government selected one of these alignments for the M5 Motorway, although it was not given formal approval, which became the preferred alignment "O" for which Building Permission was granted. After 1977 this route became a Protected Line and was shown as such on the Master Plans.

Options for by-passing Kecskemet were reviewed by UVATERV in 1979 but again there was no public involvement. Plans for Approval were prepared in 1981 and 1982 between Km 74.5 and 150. However, from the early 1980's to 1990 there was a moratorium on all motorway construction in Hungary and little progress was made with the M5, although land was protected for the route for a short section between Km 102 and 150 in 1988.

In 1990 work resumed on the M5 Motorway and UVATERV were commissioned by the Motorway Directorate to prepare the Plan for Approval and accompanying Environmental Protection Plans. Prior to 1 July 1993 there was no legal requirement to consult the public (see section 2.2). However, UVATERV decided to hold public meetings and consultations with relevant local authorities and interested parties and were the first to conduct public consultation for highways in Hungary.

Public Consultation for the M5 Motorway

UVATERV voluntarily introduced public consultation at three stages in the project's design process:

- Plans for Public Discussion -1990
- Plans for Approval -1991
- Construction Permits -1992

The main consultation took place during the first stage when UVATERV produced *Plans for Public Discussion* together with Environmental Protection Plans for each town and village in the M5 corridor at 1:10,000 scale with detailed maps at 1:2000 scale. It included settlements within Phase II section. Consultation meetings took place in the following settlements:

- Kecskemet
- Varosfold and Kunszallas
- Kiskunfélegyháza
- Petőfiszállas
- Csengele
- Kistelek
- Balástya
- Szatymaz
- Szeged
- Domaszek and Roszke

The voluntary consultation programme carried out by UVATERV included: letters being sent to all inhabitants living within 300m of the alignment explaining the proposal, requesting their views and informing them of the time and place of the public meeting or 'forum'; and public meetings held in the evenings in the main towns and villages in the corridor involving a presentation from UVATERV, a question-and-answer session and exhibition of plans at, 1:2000, 1:10,000 and 1:100,000 scale. TV and press were present. Meetings were held with local government officials in Kecskemet, Kiskunfélegyháza and Szeged and with other interested groups prior to the public meetings.

The written responses and comments from the public meetings were collated into a 'Protocol' or report of the public consultation. Included were suggestions made by residents of modifications, such as location of over-passes and diversions for farm tracks. This was approved by the Motorway Directorate and Roads Administration. UVATERV prepared a Summary of the key points arising from the consultation for each county which was approved by the Motorways Directorate. This led to modifications to the Plan.

The second stage of the consultation was held after the Plans for Approval were produced in 1991, accompanied by Environmental Protection Plans. Formal discussions were held with local government officials to agree technical details of

the Plans as part of the official process. Local inhabitants were also consulted again. Following consultation, the detailed design plans were produced and submitted to obtain the Construction Permit.

At the third stage, objections could be made within a 15 day period after submission of the application to the central and local supervising highway authorities. Evidently there were no objections and consequently the Construction Permit was granted in 1992.

In summary, UVATERV initiated a major consultation exercise for the whole M5 route between 1990-1992 involving all the relevant local authorities, affected communities and interested parties. It was a through process where information about the M5 proposals was disseminated and views of the public and authorities were received, analysed and reviewed in a formal way. Each of the city authorities of Kecskemet, Kiskunfélegyháza and Szeged were asked about their involvement in the consultations and were very positive, there was no criticism that they had not been consulted properly.

In some cases, modifications were made to the Plans for Approval as a result of the consultations. Given that this was not a legal requirement and that there were no procedures in place at that time, UVATERV carried out a very valuable piece of work. The only shortcoming, if any, at this stage was that NGOs were not involved as much as they could have been.

Public Consultation for the Phase II Modified Design for Approval

UVATERV initiated a new set of consultations for the Modified Design for Approval for Phase II in November 1998 with representatives from the main communities. The alignment is fixed following consultations in 1992, therefore discussion focused on design modifications not on changes to the alignment.

The Mayor (or representative) for Kiskunfélegyháza, Petőfiszállás, Csengele, Kistelek, Balástya, Szatymaz, Kiskundorozsma and Domaszek all attended the inaugural general meeting on 12 November 1998 called to consult on the Construction Permit. Discussions focused on three main topics: local roads, interchanges and access for farmers onto the motorway. Follow-up meetings were held in December 1998 and January 1999 to agree any necessary modifications, such as:

at Kiskunfélegyháza	amendments to local service roads
at Petőfiszállás	access to certain plots of land

at Csengele	relocate overpass for farm road to 128.3 km instead of 126.8 km.
at Balástya	omission of 3 earth roads

Minutes of these meetings were obtained by the consultants and are appended in Appendix D.

Environmental Scoping Meeting for Phase II EIA

It is now a requirement under the Hungarian Act LIII of 1995 to carry out 'scoping' of the main environmental issues in preparation for producing an EIA. It is also a requirement of the EBRD who are funding the M5 Motorway Project to scope the issues to be included in the EIA , as set out in the Bank's 'Environmental Procedures' (1992, revised 1996). For these reasons, a Scoping Meeting was organised by the project sponsors AKA Rt. and held in Szeged on 23 July 1998. The meeting was chaired by Dr Tibor Major, the Director of the Lower Tisza Region Environmental Inspectorate and the Closing Speech was made by Mr Istvan Lehmann, the Chairman of Csongrád County General Assembly. Contributions were encouraged and welcomed from all those attending.

The meeting was attended by 46 people (the attendance list is given in Appendix E), representing: the local area, for example representatives from the Mayor's Office of towns in the M5 corridor and various County organisations (Bács Kiskun and Csongrád Counties); regional environmental organisations, such as the Lower Tisza Environmental Inspectorate, Water Directorate, Museums and Kiskunsag National Park; and at the national level, Government Ministries and Bureau. In addition, 15 non-government environmental organisations (NGO's) were invited of which 8 attended – one of which, Levego (AIR) Workteam (national organisation of 70 members), acted as the spokesman for 10 organisations. A Member of Parliament for Csongrád County Szeged area, Peter Fritz, was present. Representatives of the Environmental Appraisal Unit and the Project Manager of EBRD and representatives of the shareholders (Bouygues and Bau Holding) also were present, as were the team of consultants (Halcrow Fox, UVATERV and FRAMA 01 dBH Rt.). An information Package prepared by the consultants was sent to participants in advance of the meeting, to inform them of the purpose of the meeting.

A report of the meeting was prepared by Halcrow Fox, 'EIA Scoping Meeting at Szeged', 1998.

Issues raised at the Scoping Meeting

Overall, participants expressed general support for construction of the M5 Motorway and it was seen as important for the growth and development of the region. Two issues arising from this were:

- first, a desire to see the completion of the M5 Motorway to the State (Yugoslav) border, i.e. to construct Phase III, in order to complete the primary transport route through Hungary known as the Helsinki Corridor and to provide a bypass for Szeged (to at least a half-motorway standard); and

- second, the inclusion in the EIA of the socio-economic impacts of constructing the M5, covering the anticipated economic growth in the region, the effect on communities in the M5 corridor and the effects on existing roads and the communities along them. A particular concern was whether there would be an improvement or worsening in the quality of life for people living in the area.

The issues raised at the meeting which it was agreed would be carried forward into the EIA were as follows:

- **Borrow Pits** – the Mining Authorities advised that a Preliminary EIA would be required to obtain approval for any new borrow pits needed for the M5. Csongrád County recommended any new pits should be in areas of low value environmentally. The Museum archaeologists asked to be given early notice of any new pits to be opened so that they can carry out their investigations.

- **Protection of Flora and Fauna** – attention should be given to flora and fauna outside the nationally protected areas, for example, birds at Péteri Lake Bird Sanctuary, protected flowers such as the Veiled Flag (Fatyolos nószirom) found in the Dorozsma – Nagyszek area (at the edge of Phase II), and protected amphibians such as the Green Toad near Kistelek.

- **Sand Storms and Erosion** – Geo-Environ Environmental Association were concerned about the high potential for sand erosion and storms across the Hungarian Plain, due to the geology, soils and climatic of the region, causing deposition of sand onto the M5.

- **Surface and Ground Water** – the Lower Tisza Water Directorate requested that the same system for drainage as adopted on Phase I (in discussion with the Directorate) that is to soakaways, is used on Phase II.

- **Socio-economic impacts** – the local MP, ministry and municipality representatives requested that the regional importance of the M5 should be covered and reference made to the latest Regional Development Programme and Master Plans.

- **Effects on existing roads and communities** – a general concern of attendees was that the beneficial and negative effects on the existing road network and communities along these roads should be covered.

The EIA for Phase II has taken into consideration these matters raised at the Scoping Meeting.

3 Description of the Project

3 Description of the Project

3.1 *Description of the Alignment*

Phase II of the M5 Motorway starts at Chainage 113.5 where Phase I of the M5 presently ends at Kiskunfélegyháza-South Interchange, located in the administrative area of Bács-Kiskun, and ends at Chainage 161.0 at the Szeged-North Interchange in Csongrád County. Phase II of the M5 Motorway comprises two sections:

Section II/A 113.5 – 126.4 km

Section II/B 126.4-161.0 km

Section II/A lies in Bács-Kiskun County and Section II/B lies in Csongrád County. The section south from Chainage 161.0 to the state border forms Section III, the final phase of the M5. The alignment is shown in Figure 2.

Phase II concerns the administrative territory of 7 communities altogether:

• Kiskunfélegyháza	Ch 113.5 km - 118.55 km
• Petőfiszállás	Ch 118.55 km - Ch 126.34 km
• Csengele	Ch 126.34 km - Ch 132.44 km and Ch 137.5 km - Ch 139.1 km
• Kistelek	Ch 132.44 km - Ch 137.5 km
• Balástya	Ch 139.1 km - Ch 149.57 km
• Szatymaz	Ch 149.57 km - Ch 156.5 km
• Szeged-Kiskundorozsma	Ch 156.5 km - Ch 161.0 km

The motorway is located to the west of the existing trunk road No. 5, and west of the Cegléd - Szeged railway line. It bypasses Csengele on the east side, and Petőfiszállás, Kistelek, Balástya, Szatymaz, Szeged communities on the west.

Due to the flat terrain, the motorway is of the 'rural flatland type', and is characterised by long smooth curves, and gentle gradients. In general its layout was not influenced by the topographic conditions, rather it was governed by the

creation of regional interconnections and taking an alignment that bypasses communities and small farms with the aim of avoiding demolition, as far as possible, of the small farms, farming and industrial facilities in the area.

In the vicinity of Petőfiszállás and Csengele, the motorway crosses an area of fairly densely built small farms. Only a short stretch of the alignment is located in the territory of Kistelek, crossing mainly fruit gardens and plough-lands. Along the Balástya section, most of the motorway runs across agricultural areas, involving a few small farms only. The motorway passes to the west of Lake Őszeszék at a distance of 50-150m.

In the Szatymaz region the motorway crosses a densely built pattern of small farms, therefore it is necessary to carry out a considerable number of demolitions along this section. Due to the large number of small farms there are more road crossings over this section than elsewhere.

On the Dorozsma section the alignment crosses mainly grazing and plough-lands. At chainages 158.5 - 159 the motorway crosses a liquid manure plant.

The key design features of the motorway include:

- a dual two-lane carriageway (4 x 3.75m) and median (3.6 m) with emergency lanes (2 x 3.0 m)
- 3 new junctions – at Kistelek, Balástya and Szeged North (Kiskundorozsma) [Note: construction of the junction at Balástya may be postponed but it is included in the DFA design];
- 26 road crossings and structures;
- 3 Rest Areas – at Petőfiszállás, Csengele and Szatymaz;
- an Operating and Maintenance Centre just south of Szeged North Interchange; and
- Toll Plazas at Kistelek and Szeged North interchanges. [Note:based on the latest information from the concessionaire].

The location and description of these features is given in Table 3.1.

The rest areas will comprise car and lorry parking for a small number of vehicles together with toilet facilities in a landscaped setting immediately next to the

motorway, accessed via slip roads. They require water and electricity supplies and it is proposed to bore new wells to supply water to the rest areas as they are remote from the piped water network. The estimated water demand is $5m^3$/day at each site. Sewage water will be stored in $50m^3$ collecting basins next to the toilets and then transported to the nearest waste water treatment plant. The estimated output of sewage water is $4m^3$/day/site.

The Operating and Maintenance Centre is located near the Szeged North Interchange and will provide facilities for: repair and maintenance vehicles and equipment (workshops); storage of materials for maintenance; waste and hazardous material storage areas; storage of salt (for de-icing treatment in winter); reservoirs for storage of fire water, storm water and salt water; and offices. This Centre will service Phase II of the motorway. A plan showing the layout of the centre is given in Figure 3.

A separate Environmental Protection Report has been prepared for the Operating and Maintenance Centre by UVATERV (November 1998). Protection measures have been incorporated into the design of the Centre and include:

- separation of rainwater, oily water and salt water using a segregated drainage system leading to separate storage reservoirs;
- storage reservoir for saltwater (brine), in winter from de-icing process, in a closed container for disposal off-site if cannot be re-used;
- oil traps and sand traps;
- treatment of wastewater using PURATOR systems such as MOA-6/III-2-9-7, MOA-3/III-1-1-62;
- re-cycling of water, wherever possible;
- disposal of waste, such as oily materials, antifreeze liquid, batteries, cleaning detergents, off-site to a licensed disposal site; and
- special design of foundation of generator room to minimise vibration.

Toll Plazas are proposed at Kistelek and Szeged North interchanges. Their design will be similar to and based on the toll plazas on Phase I of the motorway.

TABLE 3.1 - Key Design Features

PROPOSED JUNCTIONS	
• Kiskunfélegyháza South Interchange (completion of south-facing slip roads)	113+500 km (Road No.5402)
• Kistelek junction	139+065 km (Road No. 5411)
• Balástya junction (construction postponed)	146+595 km (Road No. 5422)
• Szeged North (Kiskundorozsma) junction	159+720 km (Road No. 430)
PROPOSED ROAD CROSSINGS AND STRUCTURES	
• Underpass beneath earth road	115+700 km
• Underpass beneath road No.5441	118+507 km
• Underpass beneath road No.54103	121+189 km
• Underpass beneath earth road	125+080 km
• Overpass above Dong-ér canal	126+600 km
• Underpass beneath earth road	126+850 km
• Underpass beneath road No. 54121	129+138 km
• Underpass beneath earth road	131+603 km
• Overpass above game pass	134+360 km
• Underpass beneath paved farm road	134+860 km
• Overpass above game pass	137+280 km
• Underpass beneath road No. 5411	139+065 km
• Underpass beneath paved farm road	140+135 km
• Underpass beneath paved farm road	142+558 km
• Overpass above game pass	145+320 km
• Underpass beneath road No. 5422 at Balástya junction	146+600 km
• Overpass over Fehértó-Maja principal canal	147+354 km
• Underpass beneath earth road	147+956 km
• Overpass above game pass	149+200 km
• Underpass beneath road No. 5423	151+140 km
• Underpass beneath earth road	152+250 km
• Underpass beneath road No. 5425	154+700 km
• Underpass beneath earth road	155+780 km
• Underpass beneath earth road	157+042 km
• Overpass above game pass (rejected)	158+450 km
• Underpass beneath road No. 5405	160+240 km
• Overpass above Algyõ principal canal	160+464 km
• Overpass above game pass	160+720 km
REST AREAS	
• Petőfiszállás rest area	121 - 122 km, both sides
• Csengele rest area	129 - 130 km, both sides
• Szatymaz rest area (may be developed into service area in the future)	151 km, both sides
OTHER FACILITIES	
• Operating and Maintenance Centre	159+750 - 160+000 km
• Toll Plazas at Kistelek and Szeged North	

The engineering parameters of the M5 motorway and related realignment of roads comply with those specified in Hungarian Standard ME 07-3713-94: Design of Public Roads. The motorway falls under design class K.I.a.A, 'rural, flatland-type motorway'. The horizontal and vertical characteristics of the alignment are given in Table 3.2.

Table 3.2 - Horizontal and Vertical Characteristics of the Alignment

For M5 Motorway:		
• Design speed	120 km/h	
• Stopping sight distance	270 m	
For V_d = 120 km/h:	as permitted	As used
• Minimum curve radius	750 m	6.000 m
• Minimum parameter	300 m	1,761.81 m
• Maximum gradient	4%	0.6%
• Minimum crest curve	15,000 m	100,000 m
• Minimum sag curve	6,000 m	100,000 m
The road geometry, with 2 traffic lanes, an emergency lane both ways and a central median, was designed to have the following features:		
• Width of subgrade	26.5 m	
• Width of traffic lane	3.75 m	
• Width of emergency lane	3.0 m	
• Width of median	3.6 m	
• Width of shoulder	0.95 m	
• Cross - fall of pavement	2.5 %	
For acceleration and deceleration lanes:		
• Width of subgrade	30.00 m	
• Width of acceleration/deceleration lane	3.75 m	
• Width of shoulder	1.95 m	
For other roads the following characteristics apply:		
• The realignment of secondary trunk roads (road No. 50) falls under design class K.II.a.A and was designed to conform to a design speed of V_d = 100 km/h.		
• The realignment of connecting roads (roads No. 5402, No. 5403, No. 5441, No. 5411, No. 5422, No. 5423 No. 4525 and No. 5405) falls under design class K.II.b.A which were designed to conform to a design speed of V_d = 80 km/h.		
• Access road No.54103 and 54121 fall under design class K.III.b.A.		

3.2 *Drainage*

Drainage will be into toe ditches either side of the alignment with soakaways at five locations. The toe ditches will be lined over a 3 metre long section at the point where the drainage chute from either the motorway median or road edge (embankments over 3m height on crossing roads) intersects the toe ditch, to prevent erosion and pollution. Drainage chutes occur at 200m intervals on the motorway and 40m interval when on embankment. Oil trap/interceptors are provided at 5 locations along the alignment at the request of the Lower Tisza Water Authority.

3.3 *Earthworks*

The proposed motorway is located on embankment over the entire length. Prior to carrying out earthworks the topsoil, should be stripped to a minimum depth of 20 cm and placed in stockpiles with a maximum height of 1.5 m along the motorway.

The earth for constructing the embankment should be secured from borrow areas. (An appropriate number of these already exist in the vicinity of the proposed alignment, so preference should be given to these existing pits). It is estimated that the total earthworks will be about 3 million cubic metres; only about 5% can be obtained from cuttings the rest will have to be imported. Only a small volume will need to be disposed of off-site (about 10%).

Soil replacement needs to be carried out in the area between Ch 158.46 km and Ch 159.06 km, as there is a liquid manure plant here at present. The plant is to be relocated, but the site needs to be made free of the existing contamination in compliance with the regulations. The soil removed will be disposed of to a spoil area licensed for contaminated soil.

The desired rate of compaction is 85 % for the entire mass of the embankments. In the top 0.5 m of the embankments and in the top 25 cm of cuttings a compaction rate of 90 % is required. The mass of the median and shoulders should be compacted to a compaction rate of 95%.

The slope ratio is 1:2.5 for the motorway embankment and 1:1.5 for ramps at junctions and roads other than the motorway. The standard CBR is 5 % at the surface of the earthwork. It can be secured by providing a 20 cm deep course of

sandy gravel. This protective layer is intended to prevent damage due to frost and thaw.

At places where the maximum ground water level is located close to the ground level, it is recommended that engineering fabric and geo-grate is used to prevent potential contamination of the groundwater. The sensitive areas are listed in section 4.4.

All of the median, shoulder and side slope surfaces should be covered with topsoil to a minimum thickness of 10 cm, and turfed.

3.4 *Existing and Forecast Traffic*

For the environmental assessment design hourly traffic (DHT) flows have been used to calculate the effects of constructing Phase II of the M5 Motorway (effects on noise, air quality etc). Traffic flows have been estimated for the existing situation, taking a base year of 1996, and future design year, 2015, with and without M5 Phase II.

The traffic flows are taken from the UVATERV EIA (Feb. 1999) and are based on forecasts by TRANSMAN (July 1998). Revised forecasts were prepared by Booz-Allen & Hamilton in February 1999 but for the purposes of environmental assessment they were not found to significantly differ from the TRANSMAN figures. Flows have been estimated for the M5 and existing connecting and crossing roads in the road network, as follows:

M5 Motorway:	Kiskunfélegyháza – Kistelek
	Kistelek – Balástya
	Balástya – Szeged North
	M43 connecting road to Road No.5
Trunk Road No.5	
Local Road No.5411	
Local Road No.5422	

For the future design year 2015, two toll scenarios have been assumed for the environmental assessment. A toll of 10 HUF/km represents the 'worst' case situation (regarding the impacts of M5), in terms of attracting the maximum amount of traffic from existing roads to the M5. (This is the lowest realistic toll

that can be considered). A toll of 20 HUF/km represents the situation if a higher toll is charged.

The intention in the EIA is to look at a range of possible traffic flows on the motorway and surrounding local roads and thereby a range of possible environmental impacts. This means that in terms of providing mitigation (e.g. noise barriers) the highest predicted noise levels can be mitigated for by taking traffic flows with a 10 HUF/km toll on the M5 Motorway. Similarly, assuming a 20 HUF/km toll means that the worst situation on existing roads can be considered, i.e. the case when the transfer of traffic from local roads (Road No.5) to the M5 is limited.

The predicted traffic flows for 1996 and 2015, with and without the M5 Phase II, and for the two toll scenarios are given in Table 3.3, together with an estimate of change in traffic. A breakdown of the traffic by vehicle type (hourly and daily) is given in the UVATERV EIA section 1.5.

Traffic growth is forecast to increase significantly on certain roads, ranging between 20-86% (1996 to 2015). The highest increases are predicted on the Road No.5 section Kistelek to Balástya (70-80%) and Road No.5411.

With the motorway and a toll of 10 HUF/km, the motorway can accommodate this natural traffic growth so that traffic flows on existing roads can remain at or below 1996 levels. With a 20 HUF/km toll, traffic flows on existing roads do not benefit from the reduction due to transfer of traffic and traffic flows increase over the 1996 levels by up to 50%.

On Road No.5, the effect on traffic flows in 2015 with the M5 is as follows:

10 HUF/km	25-64% reduction (with v without M5)
20 HUF/km	14-36% reduction (with v without M5)

This is matched on the M5 feeder roads (5411 and 5422) by an increase in traffic of 30-50%.

Therefore, in 2015 constructing the M5 Phase II does bring significant benefits to those living alongside Road No.5 through a reduction in traffic of up to 64% with a 10 HUF/km toll and up to 36% reduction with a 20 HUF/km toll.

3.5 *Construction Programme*

The construction period for Phase II of the M5 Motorway is 2.5 to 3 years. The planned completion date is no later than 2003. The Hungarian state has already started to acquire land for the motorway. In Bács-Kiskun County almost 95% of the land has been acquired and in Csongrád County more than 55%.

Before construction can start the outstanding permits need to be obtained and the Detailed Design carried out.

Table 3.3 : Comparison of the Predicted Design Hourly Traffic Flows in 1996 and 2015 with and without M5 Phase II Motorway

In case of toll rate 10 HUF/km							
rd. No.	Section	1996 (1)	2015 without (2)	2015 with (3)	2 - 1 %	3 - 1 %	3 - 2 %
50	M5 mway – Kistelek	1560	1944	697	+24	-55	-64
50	Kistelek	1187	2108	756	+78	-36	-64
50	Kistelek – Balástya	1095	2006	1207	+83	+10	-40
50	Balástya – Szatymaz	1399	2085	1346	+47	-4	-35
50	Szatymaz - M43 junctn.	1542	2085	1350	+35	-12	-35
50	M43 junctn. – Szeged	1542	2085	1561	+35	+ 1	-25
M5	Kiskunf. – Kistelek			2335			
M5	Kistelek – Balástya			2360			
M5	Balástya - Szeged N			2272			
M43	M5 mway, rd 50			2161			
5411	Kiskunmajsa - M5 mway	109	128	123	+17	+12	-4
5411	M5 mway, Kistelek	109	128	168	+17	+54	+31
5422	Forráskút - M5 mway	232	165	243	-29	+5	+47
5422	M5 mway – Balástya	232	165	200	-29	-14	+21
In case of toll rate 20 HUF/km							
50	M5 mway – Kistelek	1560	1827	1177	+17	-25	-36
50	Kistelek	1187	1981	1276	+67	+7	-36
50	Kistelek – Balástya	1095	1925	1637	+76	+49	-15
50	Balástya – Szatymaz	1399	1990	1716	+42	+23	-14
50	Szatymaz - M43 junctn.	1542	1990	1716	+29	+11	-14
50	M43 junctn. – Szeged	1542	1990	1702	+29	+10	-14
M5	Kiskunf. – Kistelek			1299			
M5	Kistelek – Balástya			1297			
M5	Balástya - Szeged N			1260			
M43	M5 mway, rd 50			995			
5411	Kiskunmajsa - M5 mway	109	192	92	+76	-16	-52
5411	M5 mway Kistelek	109	192	98	+76	-10	-49
5422	Forráskút - M5 mway	232	174	247	-25	+6	+42
5422	M5 mway – Balástya	232	174	220	-25	-5	+26

4 Description of the Existing Environment

4 Description of the Existing Environment

4.1 *Assessment Methodology*

Before describing the characteristics of the existing environment through which the M5 passes, it is relevant to explain the overall approach to the EIA. The assessment method followed by UVATERV is set out in chapters 2, 3 and 4 of their EIA report and it can be summarised as involving the following four steps:

Step 1 - An 'Influence Flow Chart' was prepared first (in Table 4.1) identifying all the likely influence factors (24) and processes that construction of the M5 Phase II might create, classified by environmental issues – air, water, soils, ecosystems, construction, living areas and landscape – and giving the resulting direct and indirect effects occurring and who or what would be affected, essentially either humans or ecosystems. This chart is similar to an impact matrix and is a usual method for identifying at the outset the potential environmental impacts and effects of a project.

Step 2 - The impact areas were defined for both negative and positive impacts, i.e. within the M5 corridor and areas adjacent to the existing road network relieved of traffic respectively. For each environmental issue, an impact 'zone' (or study area) was defined for the assessment of impacts and effects. For example, for air quality a zone 200-300 metres wide either side of the M5 is defined for the 'negative impact area', including connector roads. For noise, a wider zone of 300-500 metre is defined. These impact areas are illustrated in Figure 4. The negative impacts mostly lie within a 200m zone, but all lie within a 500 metre zone of the M5 alignment apart from landscape impacts which extend over a wider area and feeder roads and channels to storm water drains. The positive impact area is approximately a 50 metre wide zone along Road No.5.

Steps 1 and 2 essentially define the scope of the EIA in spatial and temporal terms as well as by environmental issues. They take into account issues identified at the Scoping Meeting.

Table 4.1 : Potential Environmental Influence Process of Phase II of the M5 Motorway

Effected env't. element/system		Influence factor		Direct effect	Indirect effects	Man as final bearer of effects
Air	1	Construction	→	Temporary change of air quality		
		Influence factor	→	Direct effect		
	3	Traffic attracting impact	→	Steady improvement of air quality along parallel roads		As expected, favorable health impacts in aggregate
	4	Emergency-type accident	→	Temporary change in air quality		
Surface and subsurface waters	5	Construction of water engineering structures	→	Hydrodynamic changes in surface waters		
	6	Setting up and/or operation of borrow areas	→	Hydrodymamic changes in subsurface waters		
	7	Presence of roadway, fills, cuts and drainage structures	→	Changes in drainage conditions of surface and subsurf. Waters, deterioration in quality	Groundwater pollution	Decreasing possibilities of utilization
	8	Emergency-type accident	→	Temporary deterioration in quality of surface waters		
Land	9	Land occupation	→	Decrease in quantity		
	10	Setting up of borrow areas	→	Decrease in quantity	Increase of soil pollution along motorway due to sedimentation	Limited utilization
	11	De-icing in winter	→	Soil pollution		
	12	Emergency-type accident	→	Soil pollution		Decreasing possibility of utilization
	13	Waste generation during construction, then during operation	→	Soil pollution		
Wild-life ecosystems	14	Land occupation	→	Habitat decrease		
	15	Roadway and fills, traffic,	→	Severance effect	Deterior. Of life conditions along mw. Unfavourab. Biologic.....changes along the motorway	Degrad Migrat
	15	Running over	→	Perish of single beings		Gene erosion along mw.
	16	Annoying impacts of traffic (optical, noise, heat, etc.)	→	Habitat annoyance		
	17	Planting	→	Decrease of unfavourable effects		
Made elements	18	Appearance of new made el.	→	Change of value	Deterioration of sub-stance along mw.	Increase of maint. Demand at mw.
Community environment	19	Construction	→	Temporary increase of noise level		
	20	Traffic	→	Increase of noise level along motorway		
	21	Traffic attracting effect	→	Decrease of noise at other places		Favourab. Change in life conditions in entirety
	22	Appear. Of new infrastr. el.	→	Decrease of traffic at other places		
	23	Appear. Of new infrastr. el.	→	Change in inter-com. Connetc., innov. Ef.		
Landscape	16	Appearance of new linear infrastructure element	→	Change in landscape	Change in land utilization	Change in mode of life and living conditons

Step 3 - The environmental sensitivity of the study area from Step 2 was investigated to identify those features of the human and natural environment that might be affected by negative or positive impacts and should be protected. The investigation identified the following sensitive features:

Table 4.2 : Sensitive Features in the M5 Phase II Corridor

Settlements:	Petőfiszállás* Csengele* Kistelek Balástya Szatymaz* Kiskundorozsma (close to connector road No.430) Farms within 200m either side of M5 *Closest to the M5	
Features within 200m of M5: -	Small farms	- 94 occupied - 29 abandoned
	Small gardens	- 5 occupied (at Km 116 and Km 138/139)
	Schools	- abandoned school at Km 115.9 - Petőfiszállás school at Km 118.1 - Szatymaz Primary III.219 (at Km 152.2)
	Working Farm	- at Km 160.3
Sensitive Habitats for Wildlife (no. of locations):	Grasslands	9
	Dehydrating Grasslands	2
	Drier Grasslands	2
	Natural Wetlands	3
	Natural Habitats (incl. Lake Őszeszék at Km 147.3 to 148.3)	3
	Nesting avifauna (locally protected area of Dorozsmai – Nagyszék at Km 159.8-161.0)	1
Groundwater near to surface:	13 locations	
Soakaways for stormwater	5 locations (3 in grasslands)	

Step 4 - Evaluation criteria were then set for the classification of impacts using the 'qualification system' set out in "Environmental Impact Study and Supervision" by Emöke Magyar, Peter Szilágyi, dr. Endre Tomáz (1997). The system uses two types of qualification categories:

- Categories for change in conditions – 7 categories: Terminating, Detrimental, Aggravating, Tolerable, Neutral, Improving, Enhancing.

- Categories of change occurring in use – 6 categories: Terminating, Restrictive, Annoying, Neutral, Improving, Enhancing

The first is the more important and takes into account property or areas affected, whether limit values are exceeded, whether temporary or permanent change occurs and the reversibility of the change. The second refers to how the use of the environment has been changed, e.g. the case of a water resource no longer being able to be used for drinking water due to change. This classification was applied to the assessment of each environmental issue in chapter 4 of the UVATERV's EIA.

The following sections now describe the characteristics of the existing environment and conditions within the M5 corridor, focusing on the features lying within the impact zones (defined in Step 2) as appropriate. Photographs characterising the M5 corridor are given in Figure 5.

4.2 *Geology, Soils and Climate*

The M5 Phase II alignment runs north/south across the macroregions of the Alföld Plains, within the Dorozsma-Majsai sandy plateau which in turn forms part of the flatlands between the Danube and Tisza rivers. The general geography and geophysical characteristics of the microregions are shown in Table 4.3. The microregions are documented as per the 'Microregions Atlas of Hungary', Geographical Research Institute of the Hungarian Academy of Sciences, Budapest, 1990, as:

- Dorozsma-Majsai Sandy Plateau which includes the administrative urban areas of Kistelek and Balástya;

- Kiskunsági Loess Plateau covering the administrative area of Csengele;
- South Tisza Valley covering the administrative areas of Szatymaz and Szeged-Kiskundorozsma.

The geology of the region between the Danube and Tisza has three characteristic sections which are:

- The Danube valley, which is a wide flatland stretching along the left side of the river.
- The northern half of the sand plateau, which is backed by the Gödöllõ downs, and slopes in a SE direction. A central ridge is located in the line of Nyáregyháza, Lajosmizse and Kecskemét. From here the terrain slopes to the west and to the east in the direction of the Danube and the Tisza.
- A definite saddle between Solt and Kiskunfélegyháza separating the southern sand plateau from the northern one.

The UVATERV EIA gives a detailed description of the region in Section 4.4.. The main features are summarised below.

The alignment of the M5 lies within the third geological area, having an elevation of 160 to 170 m relative to the Danube valley with a steep gradient aligned in a W-NW direction and with a shallow slope in E direction towards the Danube (90 m) and towards the Tisza (80 m)

The geomorphologic formation of the region consists of bedrock at 400 m to 2200 m beneath the plateau. Pannonian formations are situated at a thickness of 200 to 2000 m over the bedrock. An important geological formation is the Quaternary alluviums remaining from the alluvial deposits of the ancient Danube River which has moved westwards over 1.5 to 2 million years. Of particular importance to the M5 is the upper layer of the plateau which consists of drifting sand to a depth of up to 10 m. Other geological formations of significance are loess layer which is prominent in the southern section of the plateau.

Table 4.3 - Summary of Existing Geophysical Environment in Region of M5 Motorway

Land use						
Feature / Microregion	Dorozsma-Majsai sand plateau 1700 km²		Kiskunsági loess plateau 1350 km²		South Tisza Valley 1000 km²	
	%	Ha	%	Ha	%	Ha
Built-up area	3,1	5.270	3,1	4.185	6,0	6. 000
Plough-land	57,6	97.620	76,9	103.815	73,2	73.200
Garden	1,0	1.700	0,8	1.080	0,4	400
Vineyard	4,7	7.990	2,0	2.700	0,6	600
Meadow, grazing land	14,1	24.570	10,0	13.500	6,7	6.700
Forest	17,3	29.110	5,1	6.885	7,2	7.200
Water surface	0,8	1.360	1,5	2.025	4,4	4.400
Miscellaneous(flood plain, abandoned area, mining area)	1,1	2.380	0,6	810	1,5	1.500
Including protected areas of	3,1	5.347	0,5	714	24,8	24.860

Topographical conditions			
Feature / Microregion	Dorozsma-Majsai sand plateau	Kiskunsági loess plateau	South Tisza Valley
Elevation above sea level	80 - 140 m	82 – 140 m	77 –91 m
Type	¾ part of slightly undulating flatland, 1/4 part of lengthways bordered basin	Slightly divided alluvial talus Flatland	flatland at flood plain level
Average relief	Below 0.5 m/km²	5 m/km²	0 - 2 m/km²

Geological conditions			
Feature / Microregion	Dorozsma-Majsai sand plateau	Kiskunsági loess plateau	South Tisza Valley
Subsurface and shallow layers	Quaternary alluvial talus from the ancient Danube on Pannonian alluvium	60 % of typical flooded infusion loess and sandy loess, drifting sand on alluvial talus of the ancient Danube	Pliocene series, kms thick in certain places, overlain by hundred metres of fluvial, Pleistocene and Holocene deposits
Surface layers	Sand, drifting sand, loessy sand	covered with loess and sand	Holocene alluvial silt, meadow clay, clayey silt

Soil conditions			
Feature / Microregion	Dorozsma-Majsai sand plateau	Kiskunsági loess plateau	South Tisza Valley
Main types	Humus-containing sands 36%, drifting sand 20%, alkaline 19%, meadow 12%, chernozem type sand soil 9%	Chernozem type soils 45%, alkaline 24%, humus holding sand 11%, chernozem type sandy soils 10%, drifting sand 8%,	alluvial meadow 43%, meadow 28%, chernozem 13%
Productivity	Mostly poor productivity, Classes VII and VIII	Chernozem on loess has a medium productivity (Class IV-V), the rest is generally poor	mostly medium or poor

Major climatic characteristics			
Feature / Microregion	Dorozsma-Majsai sand plateau	Kiskunsági loess plateau	South Tisza Valley
General characterisation	warm - dry	temperate warm - dry	warm - dry
Duration of sunshine annually	2080 - 2090 h	slightly below 2100 h	N 2050, S 2080-2090 h
Annual mean temperature (amt)	10.5 - 10.7 C°	É 10,2-10,4; D 10,5-10.7 C°	10.5 – 10.6 C°
Vegetation period amt	17.5 C°	17.2 C°	17.6 C°
Annual average precipitation	570 - 590 mm	540 – 560 mm	S 520, other places 540-580 mm
Precipitation in vegetation period	310 - 330 mm	310 – 320 mm	320 mm
Duration of snow cover, days	30 - 32	30 - 32	28 - 30
Aridity index	1,19 - 1,24	1,26 - 1,30	S and N around 1.35, other places 1.21-1.30
Prevailing wind direction	in sequence of frequency: N, NW, SE	NW (also significant: S)	in sequence of frequency N-NW, S-SE
Average wind velocity	3 m/s	2.5 - 3.0 m/s	3 m/s

Hydrological characteristics			
Feature / Microregion	Dorozsma-Majsai sand plateau	Kiskunsági loess plateau	South Tisza Valley
Features	Dry, lacking in water	dry, with poor discharge, strongly lacking in water	dry, with poor discharge, strongly lacking in water
Water courses	Only canals to Tisza: Dongér, Fehértó-Majsai main canal, Dorozsma-Majsai main canal, Domaszéki main canal, Szikséstói-Paphalmi main canal, Körösséri main canal, general water quality Class II	canals to Tisza: Alpár-Nyárlőrinci canal, Csukáséri main canal, Gátér, Félegyházi water course, Fehértó-Sóstói main canal, Dongér, Felső canal., Vidre stream, Algyő main canal, general water quality Class II.	from left: Cibakházi-Holt-Tisza, Hármas-Körös, Kurca, Vekeréri main canal, Kórógyéri main canal, Hódtó-Kistiszai main canal, Kósdi main canal, Maros, it has only minor water courses from the right: Pejtsik canal, Alpári-Holt-Tisza, Alpár-Nyárlőrinci-canal, Vidre stream, Dongér main canal, Percsorai main canal, Algyői main canal, Tápéi main canal, Szillér-Baltó-Fertői main canal, Gyálaréti-Holt-Tisza. Tisza and Hármas-Körös Class II, Maros and canals Class III

Lakes	14 lakes having mostly permanent water, total area, 310 ha (e.g. Nagysziksós lake - 99 ha, Madarász lake - 37 ha, Öszeszék - 50 ha)	38 natural lakes having an area of 245 ha, the largest being Fülöp-Szabó lake (58 ha), 7 artificial reservoirs, 440 ha	many lakes, 14 natural lakes 49 ha, the largest being Szeged-Rókusi (12 ha), 33 dead branches 690 ha, the largest being Gyála-réti-Holt-Tisza (116 ha), 29 reservoirs 5500 ha, the largest being Fehértó in Szeged (1324 ha)
Groundwater	Mostly above 2 m, its quantity is not significant, chemical nature being calcium-magnesium-hydrogen carbonate, hardness is generally 15-25 nk°, sulphate content 60-300 mg/l	generally between 2-4 m its quantity is not significant, chemical nature being calcium-magnesium-hydrogen carbonate, hardness is generally 15-25 nk°, sulphate content 60-300 mg/l	its quantity is not significant, chemical nature being calcium-magnesium-hydrogen carbonate, hardness is generally 15-25 nk°, sulphate content 60 mg/l, even over 300 near the settlements
Aquifers	Gen. quantity below 1 l/skm² many artesian wells, from a great depth with larger water yields, thermal waters – utilisation in spas	around 1 l/skm² (N below, S above), many artesian wells with variable depth and water yield , thermal water at a number of places	1-1,5 l/skm², water yield is generally 200 l/p, many artesian wells and thermal wells (temperature and water yield are decreasing because of the substantial extraction)
Utilisation of surface and subsurface waters	Surface about 80 %, subsurface 20 %, wells about 60 %	surface about 80 %, subsurface 20 %, wells about 60 %	surface about 80 %, subsurface 20 %, wells about 60 %

Vegetation			
Feature / Microregion	Dorozsma-Majsai sand plateau	Kiskunsági loess plateau	South Tisza Valley
District	Between Danube-Tisza (Praematricum)	Between Danube-Tisza	Beyond Tisza (Crisicum)
Major potential forest associations	Pain land -, lily-of-the-valley - and salt oak	pain land -, lily-of-the-valley - and salt oak	willow woods and shrub willows, oak- elm woods, flatland oak
Forestry	Young sclerophyllous forests (annual growth: - 3,0 m³/ha)	young sclerophyllous forests (annual growth: 2.1 - 3.0 m³/ha)	young and middle aged mostly soft foliage forests (annual growth - 4,5 m³/ha)
Characteristic agricultural crops	Rye (15-20 q/ha), autumn barley (15-25 q/ha), maize (25-30 q/ha), fodder beet (200-400 q/ha)	wheat (20-30 q/ha), maize (25-30 q/ha), alfalfa (25-50 q/ha)	autumn barley (20-25 q/ha), maize (25-50 q/ha), alfalfa (30-70 q/ha), onion (75-100 q/ha)

Borehole testing (422 in number) along the alignment of the M5 indicates that the geological formation close to the surface, at a depth of 2 m and above, include medium, small and fine particle sand. This has implications for drainage and soakage of runoff from the motorway and dust from drifting sand. The estimated physical parameters of the filtering layers, which have been used in the assessment to estimate seepage rates are as follows:

	Grain Size mm	Permeability m/s	Porosity (volume of voids) %
course sand	0.980-0.150	3.4×10^{-3} - 9.2×10^{-5}	0.30-0.28
small, medium size sand	0.150-0.018	9.2×10^{-5} - 2.6×10^{-5}	0.28-0.25
fine, small particle sand	0.018-0.085	2.6×10^{-5} - 1.2×10^{-6}	0.25-0.11
clayey sand, silty sand	0.085-0.005	1.2×10^{-6} - 9.0×10^{-8}	0.11-0.05
sandy clay, clay	< 0.005	< 9.0×10^{-8}	< 0.05

The rate of flow of groundwater is about 0.01 m/day in the sand layers.

With regard to soils, Chernozem type sandy soils can be found in the vicinity of the motorway south of Kiskunfélegyháza to just north of Szatymaz, with intermittent areas of marshy meadow soils and drifting sand at Csengele. Loamy, loessy meadow soils and solonetz meadow soils can be found in the vicinity of Szatymaz.

No information is available on the chemical composition and pollutants of the soils, however, the route of the motorway runs across an area which is not, or only slightly, affected by pollution due to traffic. Therefore, either no or very low pollution is expected along the new alignment.

The loamy meadow soils and the marshy, sandy meadow soils have been ranked in the productivity class VII with a credit ranking of 30.1 - 40 % (indicating the percentage relative to the most productive soils in the country). The rest belong to productivity Class VIII with a credit ranking 20.1 - 30 %, while the drifting sands appearing in small sections south of Csengele are ranked in the worst category X with credit ranking of 0.1 - 10 %.

The sensitivity of the soils to water pollution, particularly sandy soils, depends largely on the thickness of these layers, their ability to facilitate infiltration, the level of groundwater and the water course levels. In terms of the sensitivity of the soils to water pollution, particularly groundwater pollution, the alignment of the motorway runs mostly across areas having layers sensitive to pollution. These

layers and soil type enable surface water to infiltrate down to the groundwater, thus the areas most sensitive are where the groundwater is closest to ground level.

With regard to climatic conditions, the following table gives the meterological data for the region as an average over a 30 year period and during dry periods. The latest year with an average precipitation was 1980, since then dry, often arid, years have followed.

Parameter	30 years average	Dry period
Precipitation (mm)	533	496
Temperature (C°)	10.1	10.4
Evaporation (mm)	412	399
Infiltration (mm)	150	124
Quantity of heat (C°)	3869	3977
Duration of sunshine (hours)	2185	2011

Some characteristic ranges in meterological parameters are:

Average precipitation in winter	225-250 mm
24 h average precipitation	75 mm
Average annual max. temperature	35-36 C°
Average annual min. temperature	-17 to -18 C°
Prevailing wind direction	NW

4.3 *Land Use and Settlements*

Phase II of the M5 Motorway, will be located within the Kiskunsagi loess plateau and Dorozsma-majsai sand plateau on the plain between the Danube and Tisza Rivers. The existing terrain is characterised by a generally flat plain, slightly undulating with minor elevations, containing marshlands and alluvial flood plains. The area through which Phase II will pass has soils and conditions ideally suited to agricultural production and is mostly under cultivation.

Within a 400 m corridor, 200 m either side of the motorway, the distribution of land use is approximately as follows:

0.1 % residential area

65.6 % arable land

1.6 % fruit garden

9.8% covered by a mixture of small gardens, fruit gardens, vineyards, hayfields, grazing lands

2.2 % forest

1.1 % shrubby, habitats turning into forests

19.6 % grasslands and marshes with variable water supply ranging from dry to wet, including drying marshy meadows of wildlife valuable.

Six settlements would be effected by the routing of the M5 – Petõfiszállás, Csengele, Kistelek, Balástya, Szatymaz, and Kiskundoroszma (part of Szeged). A general description of existing land uses, conditions, services and facilities, and land use policy, where known, is provided in Table 4.4 extracted from the UVATERV EIA (Section 4.6.4). The characteristics of these settlements are summarised below:

Petőfiszállás – is classified as a village. The area is under agricultural cultivation with many small farms. The M5 would run to the west of the settlement. A Rest Area is proposed at Ch. 121-122 Km.

Csengele – area around the built up urban is of dense small farms with a mixture of crop production and pastures. The M5 would run to the east of the urban settlement and the west of the Budapest-Szeged railway line. No direct access to the M5 will be provided for Csengele but Road No. 54121 will remain and cross the M5 on an overpass. Some small farmhouses will need to be demolished to create the overpass. In consultation with the local authority, the alignment of the M5 does not contradict land use plans and policies for the local area.

Kistelek – the motorway is proposed to be located 3 km west of the urban settlement, west of the Budapest-Szeged railway line. Access to the M5 is provided along Road No's 5411 and 5421. Land surrounding the settlement consists of small farms with farm buildings in good condition, small gardens and ploughed fields in cultivation most of the year. While the alignment conforms with plans for the local area, slight adjustments have been made to the alignment published in 1994, in discussion with the local municipality.

Balástya – the motorway will run 3 to 4 km to the west of the urban settlement, and west of the Budapest-Szeged railway line. Access will be provided to the M5 via a junction at Road 5422. Land uses surrounding the urban area and within the alignment consist of small farms with farm buildings. Some of these will be required to be compulsorily acquired and farm buildings demolished. The routing of the M5 does not contradict local land use plans.

Table 4.4 : Condition Indices for the Environment of Settlements

Condition indices		Csengele	Kistelek	Balástya	Szatymaz	Kiskundorozsma Part of Szeged
Human	Population	2100 people	7855 people	3765 people	4027 people	Data common with Szeged
Area		88 ha 5978 ha	422 ha 6497 ha	230 ha 10765 ha	176 ha 5196 ha	
Air quality	General state of air pollution, flying dust, dust pollution	low traffic load (under the limit)	high traffic pollution on the urban section of road No 5, significant emission along road No. 5411	significant traffic emission along urban section of road No.5	low traffic pollution load	medium traffic emission along roads Nos 5405 and 5408
	Ventilation conditions	adequate	adequate	adequate	adequate	adequate
Water	percentage of dwellings with running water	99 % in urban area	99 % in urban area	90 % in urban area	52 %	
	percentage of dwellings with sewerage	Intent to built in small reagent co-operation	10 % in urban area	10 % in urban area	a first priority in their development plan is sewerage construction	
	Rate of soak-away of sewage	100 % with pumping not solved	90 % with pumping drained into central treating plant	90 % in urban area	100 %	
	Drainage of run-off from pavement	into soak-away ditch	generally to open ditch, drained to Kistelek canal	to open ditch	to open ditch	to open ditch
Greenery	State of green area along the roads	well-kept, large lawn for gardens with flowers	young row of trees	very nice gardens, large green strips in each street	very nice gardens, wide green strips in each street	no continuous green strip, but nice well-kept gardens with flowers
Landscape	Natural values to be protected in urban areas affected by transportation	none	none	none	none	none

Table 4.4 continued

Noise and vibration	percentage of population affected by noise	not typical	about 30% along road No 5 and the urban section of road No 5411	Residents along road No 5	no noise impact	about 20 %
	Daytime noise level in urban area	low, under the limit value	high, above the limit value	above limit value along road No 5	no noise impact	medium high along roads Nos 5405 and 5408
	Night time noise level	low, under the limit value	high, due to transit traffic on road No 5	above limit value along road No 5	no noise impact	limited
Cleanness of settlement	Percentage of dwellings linked to garbage collection	to own dump	100 %	100 % in urban area	100 %	100 %
	Cleaned urban sections of national roads	adequate	adequate	adequate	adequate	adequate
	Appearance of settlement	well-kept, nice	well-kept	adequate	adequate	adequate
Built environment	Number of dwellings	405 in urban area; 614 farms	3290	540 in urban area 1347 rural farms	1712 incl rural farms	settlement data common with Szeged
	Rate of corrosion damage to road-side buildings	no damage	no damage	no damage	no damage	not typical
	Number and state of affected monuments	none	the rehabilitated Roman Catholic church is a monument	none	none	none
	Endangered buildings along designed motorway	residential area with farm houses	residential area with farm houses	residential area with farm houses	residential area with farm houses	residential area with farm houses
	Town-scape, settlement aesthetics	clean any tidy	clean and tidy	adequate	adequate	adequate
Technical condition and lay out of Investigated Urban sections	Pavement condition	Adequate	adequate	adequate	adequate	adequate
	Cross-section, traffic capacity	sufficient	road No. 5 has insufficient transit capacity	No 5 has low capacity	adequate	-
	Drainage	to open ditch	ditches and sewers in combination	to open ditch	to open ditch	to open ditch
	Number and site of already dangerous intersections on the investigated section	not related to motorway construction	entire urban section of road No 5	entire urban section of road No5 is hazardous from traffic aspect	not related to motorway construction	junction of roads Nos 5404 and 5408 (near the church)

Table 4.4 continued

Local transport Characteristics	Bicycle traffic	typical, no separate track	Typical	separate paved bicycle track, heavy traffic	no separate track, but intense bicycle traffic	intense bicycle traffic, separate paved track at some locations
	Safety of bicycle traffic	adequate	on road No 5, mostly on paved separate track	not safe on road No 5, but safe in other parts of the village	not dangerous	not dangerous in urban area
	Safety and crossing of pedestrian traffic	adequate	unsafe	not safe on road No 5 but safe in other part of the village	not dangerous	not dangerous in urban area
	Local bus service	-	-	none	none	exists
	Bus service between settlements	exists	exists	exists	exists	exists
	Railroad link (MÁV)	exists	exists	exists	exists	exists
	Percentage of commuters among employed people	minimum commuters, mainly locally employed	30 % main directions to Szeged and Kiskunfélegyháza	10-20 %; main directions to Szeged and Kistelek	10-20 %; main directions to Szeged and Kistelek	not typical
Public utility Services	Percentage of dwellings provided with: Gas mains supply	90 % in urban area	90 % in urban area	85 %	54 %	100 %
	Electricity supply	100 % in urban area	100 % in urban area	100 %	100%	100 %
	Telecommunication (phone) supply	100 % in urban area; rural area mainly cellular phones	according to demand	30 %	30 %	according to demand
Basic institution supply	Commerce, small trade of food products	19 shops: incl. 7 for food products, catering: 4 units	169 small trade shops: incl.: 38 for food; catering 35 units	34 shops; incl.: 11 for food; catering: 8 units, adequate;	35 shops: incl.; 13 for food, catering 13 units; adequate	adequate
	Primary school	10 class rooms; adequate	2 schools 32 class rooms; 1 secondary school 8 class rooms; adequate	18 class rooms; adequate	16 class rooms; adequate	adequate
	Nursery- kindergarten	No nursery; kindergarten for 63 children	nursery - for the youngest babies, accommodated in one of the kindergartens; kindergartens to accommodate 246	Nursery -; kindergarten for 118 children	Nursery-; kindergarten for 130 children	adequate
	Panel doctor, pharmacy	2 panel doctors; 1 dentist; 1 pharmacy; adequate	4 panel doctor; 2 children's doctor; 8 specialised practices; 2 pharmacies	2 panel doctors; 1 dentist; 1 children's doctor; district nurse; adequate	Adequate	adequate

Szatymaz – the route of the M5 will be located only 500m from the existing urban settlement. The land uses within the immediate alignment consist of intensive agricultural farms consisting of orchards, vegetable produce and pastures. The area is renowned for peaches. Around half the population lives in the rural area surrounding the village, earning a living from agricultural production. No junction with the M5 is proposed but three overpasses over the M5 are proposed to be constructed to reduce severance for farm owners and workers. Some properties will be acquired and farm buildings demolished to construct the M5 and overpasses. The alignment of the M5 is in accordance with local land use plans.

Kiskundorozsma – this urban settlement is located to the west of Szeged and is surrounded by agricultural land uses and larger scale farms and ploughed lands. The M5 is proposed to be located 2 km west of the settlement. High voltage transmission lines cross the alignment of the M5 motorway. A food processing factory is located within 100m of the alignment. The M5 motorway alignment accords with local land use policies for the area. With access to Szeged from the M5 motorway residents of Kiskundorozsma will have improved transport connections.

In addition to these built-up areas, rural residences and small farms are also considered as sensitive areas, particularly from the points of view of air pollution and noise exposure. UVATERV carried out a detailed survey of a 200m wide zone either side of the M5 Motorway alignment (coinciding with the finalised noise and air pollution impact area), in order to find out what facilities not intended for demolition are located in this zone. Section 3 of the UVATERV EIA lists the properties by chainage and their distance from the motorway. This information is summarised in Table 4.2, at the beginning of this chapter.

4.4 *Water Quality*

Surface Water

The M5 Phase II alignment does not cross any natural streams or rivers however it does cross 18 canals or branches of canals. The canals are used for drainage and irrigation and are classified as either Class II or Class III water courses. Of greatest importance are the Dong-eri and Kistelek main canals, which act as receiving waters for storm water drainage and run off. The canals which the M5 will cross are as follows:

• Kővágó-ert Canal	at chainage 117+132 km
• Szenkút Canal	at chainage 120+090 km
• Galambos Canal	at chainage 125+094 km
• Dong-er main Canal	at chainage 126+350 km
• Kisteleki main Canal	at chainage 130+894 km
• Canal	at chainage 133+454 km
• Canal	at chainage 134+287 km
• Balástya – Csengelei Canal at ramp B of Kistelek junction	at chainage 139+540 km
• Balástya – Csengelei Canal	at chainage 141+390 km
• Fehértó-Majsai Canal	at chainage 147+354 km
• Balástya II. Canal	at chainage 150+010 km
• Dékány Canal	at chainage 151+000 km
• Balástya I. Canal	at chainage 152+144 km
• Gavallér-branch	at chainage 153+286 km
• Lápostói Canal	at chainage 157+466 km
• Hosszúháti irrigation Canal	at chainage 158+667 km
• Külső-Matyéri Canal	at chainage 160+386 km
• Algyői main Canal	at chainage 160+464 km

Of key concern is the effect of runoff and air borne pollutants on other surface water features outside the direct alignment of the M5.

The most important waterbodies (due to their ecological value) within 500m of the M5 Motorway are Péteri Lake (123-126km), Bitó Lake (141km), Őszeszék Lake (146-147km) and Fehér Lake (156-160km) which all lie to the east, i.e. downstream, of the M5 Motorway. It is essential that the canals which the M5 crosses do not become polluted since most of them feed into one or other of these lakes and it is important that the good water quality of these lakes is maintained.

Within the wider geophysical regions (described in Table 4.3) there lies the Tisza River, 66 natural lakes, 33 artificial lakes/dead branches of water bodies and 36 reservoirs. These water bodies are used for recreational, agricultural, and industrial purposes as well as sources of potable water supply for the urban and rural settlements within the county. Surface water considerations, given the flat terrain, are a significant feature of the landscape and a key element of the ecology of Bács-Kiskun and Csongrád Counties.

The main canals and waterbodies in the M5 corridor are shown in Figure 2.

Groundwater

The geology and soils of the region are described in section 4.2. The area is generally covered by Chernozem type sandy soils overlying a sand plateau. The sensitivity of these soils, in the context of groundwater level and potential pollution, is dependent on the thickness of the soils and their ability to be infiltrated. Based on surveys documented in the UVATERV EIA (section 4.4 and Annex 5) the alignment of the motorway runs mostly on areas having cover layers sensitive to pollution, where infiltration down to the groundwater can only be hindered by a longer flow path.

The most sensitive locations are those where the groundwater is closest to the ground level. The average groundwater level in the vicinity of the M5 is 1-4m below ground level, but around Csengele, Szatymaz and Balástya the groundwater levels are highest at only 1-2m below ground surface. Those sections where groundwater levels are at shallow depths are as follows:

- between chainages 119.37 km and 120.68 km
- between chainages 123.62 km and 124.85 km
- between chainages 126.02 km and 126.35 km
- between chainages 126.35 km and 126.97 km
- between chainages 127.10 km and 128.30 km
- between chainages 128.60 km and 128.80 km
- between chainages 137.60 km and 137.80 km
- between chainages 150.57 km and 151.02 km
- between chainages 152.20 km and 153.60 km
- between chainages 154.40 km and 155.20 km
- between chainages 157.50 km and 157.80 km
- between chainages 158.62 km and 158.93 km
- between chainages 160.78 km and 161.00.

The groundwater flow is from west to east, therefore any pollution infiltration occurring in the vicinity of the motorway will be propagated in an eastern direction. There are about 26 water producing wells (shown in Annex V/I of UVATERV EIA) along this section of the motorway, within 300m, which would be vulnerable to any pollution.

4.5 Air Quality

In order to establish the existing air quality in the M5 Motorway corridor, monitoring data was collected from three sources: two existing monitoring

networks and one new survey set up for this project. The results from these three sources (given in 4.2.1 and 4.2.2 of the UVATERV EIA) are summarised below.

- **Csongrád County Public Health Authority** – continuous monitors at Kistelek and Szeged provided data on ambient nitrogen dioxide (NO_2), deposited dust, airborne dust and lead (Pb) levels in summer 1997 and winter 1997-98. NO_2 levels exceeded the limit at Szeged, particularly in winter (by 26%), airborne dust levels were high at both locations (70-85% above the limit) and the lead content in dust was high at Szeged in summer (43% above the limit) due to traffic.

- **Lower Tisza Region Environmental Authority (ATIKŐFE)** – 12 month continuous monitoring in 1997 of roadside (approx. 15m from kerb) levels next to Road No.5 in Szeged for NO_2, nitrogen oxides (NO_x), carbon monoxide (CO), deposited dust and ozone (O_3) provided information about roadside pollution levels. Only exceedance of limits was NO_2 and NO_x levels in February and October (3-17%) and dust in January and November (3%). The discrepancy with the Csongrád County results was primarily due to a different measurement method and location.

- **KRONA Ltd. Environmental Bureau** – undertook new sample (10-12 hr) measurements next to Road No.5 at Kistelek and Szeged (kerbside) and on the alignment of the planned M5 at Szatymaz and Kiskundorozsma for CO, NO_x, airborne dust and benzene. At Szatymaz and Kiskundorozsma levels were well below the limits. NO_x and dust levels exceeded the limits in Kistelek and Szeged. Monitoring locations are shown in Figure 6.

The Hungarian standards for air quality are set out in MSZ 21854 – 1990: Purity Requirements of Air Quality, in the form of annual, 24 hr and 30 min limit values and are given below for Category 1 Protection Areas(i.e. M5). They are not easily comparable to other international standards, but they are based on the World Health Organisation Air Quality Guidance, European Series No.23.

MSZ 21854-1990 Purity Requirements of Ambient Air

Degree of hazard of pollutant	Tolerable excess over limit				
	Extent	Number of events annually		Annual duration in %	
	24 h and 30 min	24 h	30 min	24h	30 min
1	1.1 multiple	0	9	0.0	0.05
2	1.5 multiple	1	18	0.3	0.10
3	2.0 multiple	4	35	1.0	0.20
4	2.5 multiple	7	53	2.0	0.30

Pollutant	Degree of hazard	Limit (microgram/m^3)		
		Annual	24 h	30 min
Carbon monoxide	2	2000	5000	10000
Nitrogen oxides	2	100	150	200
Airborne dust	3	50	100	200
Lead	1	-	0.3	0.3
Hydrocarbons	4	-	1500	5000

Note: The air quality within an area is acceptable if the concentration of a pollutant does not exceed the short time and long time air quality limits.

Based on this data the two main issues concerning existing air quality are the current high levels of dust and NO_2. Dust levels are typically high in the Hungarian Plain region due to dust blown from exposed soil but some contribution is made by traffic levels as demonstrated by the lead levels is dust in Szeged. The annual limit value was exceeded at all sampling points and at Kistelek the 24 hour limit value was also exceeded (next to Road No.5). NO_2 levels are exceeded part of the time next to Road No.5. In Szeged and Kistelek NO_x levels exceed the annual and 24 hour limit values. In Kistelek the 30 minute limit value is exceeded part of the time, in Szeged it is exceeded all the time. For CO and lead, the limit value is not exceeded at any sampling point.

4.6 *Noise and Vibration*

The direct impact area, defined as 200m either side of the proposed M5 alignment, includes the settlements of Petőfiszállás, Csengele, Szatymaz and Kiskundorozsma closest to the M5, and : -

On II/A section	16 small farms –	13 occupied 4 abandoned
	Abandoned School south of Kiskunfélegyháza	
	School near Petőfiszállás	
On II/B section	110 small farms –	85 occupied 25 abandoned
	Primary School at Szatymaz	

The indirect impact area, which follows Route No.5 and other existing connecting roads, such as No.5411 and 5422, extends 80m both sides of existing roads. The settlements affected are Kistelek, Balástya and Szeged.

Measurements have been made of existing noise levels within both these impact areas in accordance with Hungarian standards MSZ 18150/1-83: Determination of Standard A-weighted Acoustic Pressure Levels at Dwellings, Resorts and Public Buildings and MSZ 13-183/1-92: Measuring Road Traffic Noise. Measurement locations are shown in Figure 6.

The results of the measurements are summarised in Table 4.5. Details of the measurement sites are given in the UVATERV EIA 4.6.2.3 and Annex 2. These levels should be compared with the standards set out in the Ministry of Health Decree 4/1984 (I.23) Noise from Road Traffic:

Dense urban development:	day-time	L_{Aeq}	65dB
	night-time	L_{Aeq}	55 dB
Sparse development and resort areas:	day-time	L_{Aeq}	60 dB
	night-time	L_{Aeq}	50 dB

This first standard applies to external noise levels at dwellings and institutions (including schools) near main roads. The Health Authority has the dispensation to authorise exceedance of these limits by 5 or 10 dB on the advice of the environment protection authority. These standards are comparable with international standards, except for schools where a lower standard of the order 55-60 dB (day-time) would normally be expected.

For those sites away from main roads at present, sites 1-3 and 8-9, they should be compared with the 60/50 dB limits. In the direct impact area of the planned M5, existing noise levels exceed the limits both day-and night-time at Kiskundorozsma (by 4.5 dB and 7.4 dB) and at Csengele night-time (by 2.0 dB). Away from connecting roads, noise levels are low, 45 dB during the day, 40 dB at night which

is typical of rural areas. For sites 8 and 9 next to connecting roads 5411 and 5422, limits are exceeded only slightly in Balástya at night (by 1.8 dB)

For those sites next to Road No.5, sites 4-7, noise levels should be compared with the 65/55 dB standards for urban areas. In the day-time, levels are close to or above the limit (up to 5dB) and at night all levels exceed the limit (by 3.2 to 10 dB)

In summary, existing noise levels are either close to or above the limits next to Road No. 5. In the corridor of the planned M5, noise levels are generally lower but at Csengele and Kiskundoroszma limits are exceeded, particularly at night-time.

Table 4.5 : Noise Measurement Results, July 1998

Site	Settlement	L_{Aeq} dB	
		Day-time	Night-time
Direct Impact Area			
1	Csengele	59.0	52.0
2	Kiskundorozsma	64.5	57.4
3	Szatymaz	54.3	48.0
Indirect Impact Area			
4	Kistelek (Road No.5)	66.1	62.2
5	Szeged, Kossuth L.út	69.9	64.8
6	Szeged, Petőfi S. út	64.2	58.2
7	Szeged, Szabadkai út	66.3	60.3
8	Kistelek (Road No. 5411)	56.3	48.3
9	Balástya	59.5	51.8

Notes: L_{Aeq} – equivalent A-weighted noise level. Day-time – 0600-2200 hours. Night-time – 2200-0600 hours

4.7 *Landscape*

The landscape in the M5 corridor is typical of the Great Hungarian Plain (Alföld) region, mainly flat with gentle undulations orientated in the direction NW to SE, at an elevation of 81 to 94m. The area lies between the Danube and Tisza rivers crossing the Kiskunsági loess plateau and the Dorozsma – Majsa sand plateau. It is interspersed with marshland, lakes and minor elevations. The area is largely under agriculture but some of the original vegetation cover remains as a mixture of groves and forests (oak forests), sand 'puszta', swamp meadows and salt grasses.

These now form nature conservation areas, such as the Péteri Lake Nature Conservation Area. The region supports considerable amounts of game and birdlife.

The main features of the landscape in this region are:

- The mosaic of small private farms with orchards, groves, market gardens, pasture for livestock (there is no large-scale cultivation)
- A dense network of small earth roads which provides access to farms and link the connecting roads with Road No.5.
- Overhead electricity cables, in the vicinity of Szeged only
- Forest zones scattered throughout the region but more in the north and to the east, mainly of non-native species, a few areas of native willow and white poplar
- Views are generally limited with many 'edges'; a wide area can be viewed between 140-159 km
- Marshland and waterbodies, namely Péteri Lake (near 123-126km), Bitó Lake (near 141km), (Őszeszék Lake (near 147km) and Fehér Lake (near 156-160km)
- A network of canals cross the M5 corridor in a NW to SE direction feeding into the various lakes along the route and into the River Tisza

In addition to the nature conservation areas in the M5 corridor , the Pusztaszer Landscape Protection Area lies to the east of the M5 corridor, coming closest to the M5 at the southern end of the corridor to the east of Szatymaz and Kiskundorozsma. The western boundary of the Landscape Protection Area can be seen on Figure 6. A set of photographs characterising the route are given in Annex 8 of the UVATERV EIA. Hungarian standard MSZ-13-195:1990 'General Landscape Protection – Definitions', defines those areas of landscape value in Hungary.

4.8 *Natural Environment*

New surveys were undertaken to establish the nature conservation value of the flora and fauna within a 400m zone along the M5 Motorway corridor. The investigation took place in May-August 1998 in accordance with the General National Habitat Classification System which forms part of the National Bio-diversity Monitoring System. The results of the surveys are mapped in Annexes 7/I and 7/II of the UVATERV EIA. Within the alignment, only about 20% of the land use is of wildlife value.

Nature reserves within the wider corridor are located at:

Ch. 123-126	Péteri Lake, 200 – 400m east of alignment
Ch. 141.5	Bitó Lake, immediately east of alignment
Ch. 147-148	Őszeszék Lake, immediately east of alignment
Ch. 150-160	Féher Lake

The alignment also skirts the Dorozsmai-Nagy Szek Nature Reserve of local significance to the west of Szeged North Interchange.

There are three main areas of regional significance for nature conservation which can be affected by the M5 alignment:

- Grasslands between chainages 126+332-127+500 km are marshy areas, which are ex lege protected on a national basis. At the same time, all the natural habitats within this section are also connected to the nature reserve of Péteri Lake and it vicinity, forming together a large and highly valuable habitat association, which are mostly fresh saline in nature.

- Natural habitats between chainages 147+300-148+300 km are parts of the saline habitat association, which is ex lege under national protection together with the Őszeszék Lake of Balástya.

- The grasslands between the chainages 157+400-157+800 km are the members of the saline habitat association connected with the Fehér Lake of Szeged.

Marshes are saline habitats are ex lege under national protection under section 23 of the Act L III 1995.

The flora and fauna in the motorway alignment (400m zone) has been classified by chainage. The detailed analysis is given in section 4.5.6 of the UVATERV EIA and is summarised here in Table 4.6.

The main protected species of flora are several types of orchids: marsh orchids (Orchis laxiflora ssp. palustris) and bug-orchids (Orchis coriophora); and thistles (Cirsium brachycephalum). There is a greater diversity of flora toward the southern end of the route (157+400-161+000 km) near the Dorozsmai-Nagy Szek nature reserve. Species include the transylvanian plantain (Plantago schwarzenbergiana) and unprotected but important spear-leaved scullcap (Scutellaria hastifolia).

The importance of the fauna is mainly the birdlife, shore and water birds in particular, and amphibians. Protected bird species found along the route are the roller (Coracias garrulus), and lesser hen herrier (Circus pygargus) together with great white heron (Egretta alba), squacco heron (Ardeola ralloides) and night heron (Nycticorax nycticorax), bee-eater (Merops apiaster), lapwing (Vanellus vanellus), common redshank (Tringa totanus), black-tailed godwit (Limosa limosa), blackheaded gulls and brown harrier.

The area is important for birds as both a feeding area and nesting area. In particular the lapwing, black-tailed godwit, sand martin (Riparia riparia) and lesser grey shrike (Lanius minor) nest here between April and June. Péteri Lake is a bird sanctuary supporting abundant nesting and migrating avifauna. It belongs to Kiskunság National Park. Őszeszék Lake is important during the migration of birds as a resting and feeding place. Dorozsmai is important as a feeding and nesting area.

Game found in the area include roe deer, wild boar and red deer, based on records from the local Hunting Associations.

Amphibians are found along the route in association with the wetlands. Species include Emys orbicularis (pond tortoise). Reptiles are also found in the vicinity of Őszeszék Lake (147+300 – 148+300 km), an area rich for plain land amphibians and reptiles that like to live close to water.

4.9 *Archaeology*

There are no ancient monuments directly affected by the alignment of the M5 motorway.

However, the motorway alignment does affect archaeological sites. The Directorate of Museums in Bács-Kiskun and Csongrád Counties have identified that the alignment of the M5 Motorway will affect the following archaeological sites:

Bács-Kiskun County

at Ch. 113.0 – 114.0 km	archeological excavation completed
at Ch. 116.7 – 116.8 km	
at Ch. 116.9 – 117.0 km	
at Ch. 117.1 km	
at Ch. 123.97 – 124.15 km	archeological excavation will be performed in 1999
at Ch. 118.7 km	
at Ch. 120.9 – 121.6 km	
at Ch. 121.5 – 123.0 km	
at Ch. 122.7 – 123.0 km	
at Ch. 123.7 km	
at Ch. 123.8 km	
at Ch. 124.45 – 125.60 km	

Csongrád County

- Csengele 12/6: A settlement from the late Bronze Age and the late Middle Ages
- Csengele 12/16: A settlement from the prehistoric, Sarmatian and Arpadian ages
- Csengele 12/13: A settlement from the late Bronze Age and the Arpadian age

Table 4.6 : Protected Flora and Fauna in the M5 Phase II Corridor

Areas significant in terms of wildlife protection	Habitat type	Protected Species
124+000 – 127+500	Grassland – drying saline meadows (near Péteri Lake nature reserve)	Flora: Orchis laxiflora ssp. palustris (marsh orchid), Cirsium brachycephalum (thistle) Fauna: Limosa limosa (black-tailed godwit), great white heron, squacco heron and night heron
127+500 – 128+300	NH – Aqueous and grassland	Flora: Marsh orchid Fauna: breeding ground for amphibians, Emys orbicularis (pond tortoise)
130+700 – 131+000	NH – Protected flora and saline meadows	Flora: Marsh orchid, thistle Fauna: Coracias garrulus (roller) feeding ground
133+300 – 133+800	Grassland	Flora: Thistle, Marsh orchid, Orchis coriophora (bug-orchid) Fauna: -
134+600 – 135+300	NH – Marshlands	Flora: Thistle, Marsh orchid Fauna: Coracias garrulus (roller) nesting area, Merops apiaster (bee-eater) feeding ground
137+250 – 137+500	Grassland – Saline meadows	Flora: Bug-orchid, Marsh orchid Fauna: -
139+300 – 139+700	Grassland – Saline vegetation	Flora: Bug-orchid, Marsh Orchid Fauna: Garganey, lapwing, common redshank observed
140+500 – 141+500	Grassland	Flora: Bug-orchid Fauna: Vanellus vanellus (lapwing), Tringa totanus (common redshank), Limosa limosa (black-tailed godwit), white heron, black – headed gull, brown harrier
141+900 – 143+300	NH – Saline vegetation (near Bitó Lake)	Flora: Bug-orchid ,thistle Fauna: Roller, common redshank observed
144+300 – 145+400	Grassland	Flora: Marsh orchid, Bug-orchid, thistle Fauna: Amphibians, Circus pygargus (Lesser hen harrier)
145+600 – 146+400	Grassland	Flora: Bug-orchid, Marsh orchid Fauna: -
146+600 – 147+000	NH – Saline vegetation	Flora: - Fauna: Amphibians, nesting shore birds
147+300 – 148+300	NH – aqueous, saline vegetation and grasslands (near Õszeszék Lake)	Flora: Bug-orchid, March orchid Fauna: Nesting birds include purple heron, red-necked grebe, egrets, bearded tit. Migrating birds and ducks use Õszeszék Lake. Amphibians, reptiles
149+200	Recommended game pass by Õszeszék Hunting Assoc.	Fauna: 200-250 roe-deer, wild boar, red deer
149+200 – 149+600	Grassland	Flora: Marsh orchid, Bug-orchid Fauna: -
150+500 – 151+200	Grassland	Flora: Marsh orchid, Bug-orchid Fauna: -
153+200 – 154+700	Grassland	Flora: Marsh orchid, thistle Fauna: -
157+400 – 157+800	Grassland	Flora: Plantago schwarzenbergiana (transylvanian plantain), Iris spuria (iris), Bug-orchid, Marsh orchid and unprotected but important spear-leaved scullcap (Scutellaria hastifolia). Fauna: Bee-eater, sand martin, lesser grey shrike nesting grounds
158+400	Proposed game pass by Domaszék Hunting Assoc.	-
159+800 – 161+000	Grassland (near Kiskundorozsma Nagy-szék)	Flora: Ophrys sphegodes (orchid), Transylvanian plantain, Spirantes spiralis (autumn lady's – tresses), Colchicum erenarium (sand crocus). Fauna: Water and shore birds nest here

- Csengele 12/14a: A settlement from the Sarmatian age, a cemetery located around a church from the Arpadian age
- Balástya 7/7: A settlement from the Sarmatian age
- Balástya 7/17: A settlement from the age of great migrations and the late Middle Ages
- Szatymaz 51/7: A settlement from the Sarmatian age, a cemetery from the age of the Avar people
- Kiskundorozsma 26/54: A settlement from the Sarmatian age
- Kiskundorozsma 26/55: A settlement from the prehistoric age and the late Middle Ages
- Kiskundorozsma 26/60: A settlement from the late Bronze Age
- Kiskundorozsma 26/72: A settlement from the Sarmatian age
- Kiskundorozsma 26/73: A settlement from the early Bronze Age

Investigations have been carried out under the supervision of the respective Museums. Most were completed during the summer/autumn of 1998. There are 7 sites in Bács-Kiskun County where investigations will take place in 1999.

There is one other site of historical value close to the M5 motorway, a church at Szentkut near Petőfiszállás at Chainage 121.5.

4.10 *Socio-Economic Factors*

Background

Hungary in recent years has been characterised by political stability, modernising of its physical and economic infrastructure and its preparation for joining the European Union. Underpinning this transition process has been a growth in the country's exports and investments with exports exceeding imports and investments growing by 8.2% in real terms ('General Information about Hungary', South Great

Plain Regional Development Agency, 1997). There has been some polarisation of growth within the country with the west developing faster than the east. The national government has responded with policies promoting investment in the west with Csongrád County prioritised as a southern gateway to the EU. The extension of the M5 Motorway is implementing these growth and development policies by providing infrastructure to encourage further investment (Ibid).

Csongrád County forms part of the Southern Great Plain Region of Hungary. This region reflects some of the economic growth being experienced in the country. Traditionally the region's economic base has been agriculture and food processing with the arable land used for growing grapes, fruits and vegetables and agricultural production incorporating wine production, wood processing, and paper and printing industries. The Hungarian red pepper (paprika) is produced in Szeged and is exported worldwide. The arable soil of the region is an important renewable resource and a key factor in the economic viability of the area (Ibid).

The construction of the M5 motorway has been planned for by the central government since the 1970s. The remaining section to be completed is approximately a 70km stretch from Kiskunfélegyháza to the Hungarian-Yugoslavian border. The development of the M5 motorway is seen to serve both Hungarian and international interests. These interests include:

- Enabling development in the region to match the rate of growth of the regions within western Hungary;
- Promoting Csongrád County as a gateway to Eastern Europe and enabling stronger bonds between Hungary and its neighbouring countries;
- Providing a road network and transport corridor comparable to other countries within the EU;
- Enabling Csongrád County to compete with other counties and regions promoting a more balanced pattern of economic development; and
- Improving the environment and economic vitality of the existing townships in the area by removing traffic congestion from the existing road network thus improving the living conditions of rural and urban residents in the region.

Socio-Economic Policy Context

The development of the M5 motorway is supported by national economic and development policies particularly in regard to joining the EU and with providing a more balanced pattern of economic growth throughout the country.

Csongrád County Regional Planning Draft Development Strategy (January, 1999) contains policies on socio-economic matters. The fundamental objective of this strategy is to improve international and national competitiveness by expanding and intensifying external relations within a secure economic and social environment capable of continuous renewal. Strategic objectives proposed to achieve these goals relate to

- achieving a high standard of human capital by increasing the inflow of capital, strengthening the industrial and service sectors to generate more dynamic growth;

- improving living conditions of rural and urban residents through improving networks between settlements, improving the functioning of urban areas and developing the international functions of Szeged;

- providing a healthy and attractive natural and man-made environment in which to grow but conserving existing social, cultural and landscape values.

Certain developments are prioritised to achieve social and economic development within the county. Of particular relevance to the M5 are:

- improving the conditions for the flow of capital, commodities, people and information;

- intensifying and improving regional connections; and

- providing a healthy human environment.

The Development Strategy for Bács-Kiskun County contained in their Regional Planning Concept is similar to that for Csongrad. Key development objectives and priorities relate to:

- improving the competitiveness of the county with other counties by investing in and prioritising road, rail and waterway transportation.

- maintaining and enhancing the county's agricultural activities and diversifying its economic base; and

- improving the county's human resources

Existing Socio-Economic Issues

The potential of the Csongrád Region is not being realised with the lack of adequate transport corridors with neighbouring countries and counties reducing the county's external economic relations exacerbating their export earnings (currently the county lags behind the national average).

The potential of the region is unbalanced with information and databases on the existing economic situation unknown or unpublished. Policies for economic growth have a limited information base on which to assess the socio-economic impact of the M5.

Issues which do affect the region and are relevant to the M5 include:

Tourism - currently has a minor role but the natural features of the area, such as the waterways and lakes including thermal springs, the historic memorial place of Ópusztaszer, the geographical location which could facilitate business, congress and conference tourism, and the larger town of Szeged, provide opportunities if road connections were improved;

Congestion - Route 5 (the current road network) has deficiencies - it is congested, its capacity is exceeded, there are extra costs with time delays and deteriorating environmental conditions, user dissatisfaction and image concerns due to the road's inefficiencies. The communities through which Route 5 passes are suffering from unreasonably high traffic flows and loss of economic benefits. Infrastructure to European standards is required to overcome these problems and assist in improving transport networks and the environment within communities on Route 5.

Regional Development - only minimal resources have been allocated over the past few years to improving arterial transport systems in the region, with Csongrád County's investment below the national average. The lack of investment is considered to have hampered the county's economic growth. With an improved motorway network, logistics centres (bulky goods depots, warehousing, goods transfer centres) may become viable and goods could be better transported to other regions.

Foreign Economic Relations – new border crossing points particularly with a recovering and increasingly stabilising Yugoslavia, could improve economic relations with surrounding countries facilitating cross border trade. [Note: This does not take into account current events in the region].

5 Assessment of Significant Impacts

5 Assessment of Significant Impacts

5.1 *Introduction*

This section provides the findings of the assessment undertaken of the likely significant environmental effects of building Phase II of the M5 motorway. Both beneficial and negative effects have been identified, indicating whether they are direct or indirect, permanent or of a temporary nature (i.e. occur only during the construction phase). The methodology used to assess the possible effects has followed Hungarian guidance for each of the environmental issues under consideration and these are referred to, where relevant, and inter alia Hungarian standards have been used to asses the 'significance' of the effects. Section 4.1 described the method followed.

The assessment is based on the work reported in the UVATERV EIA. The Design for Approval 1998/99 produced by UVATERV is the one which has been used. The assessment therefore reflects the level of details and information provided at this stage. At the Detailed Design Stage more information will be available and the design will be modified to cover the issues raised in this EIA.

5.2 *Land Use and Settlements*

The M5 Phase II alignment does not directly affect any settlements. Settlements it passes closest to are Petőfiszállás (1.5 to 2km), Csengele (1km), Szatymaz (500m) and Kiskundorosma (2km). The area is densely covered by small farms and it is not possible to avoid all of them. There are 123 small farms within a 200m zone either side of the M5, and farms lying either on the alignment or within 30m will be expropriated and demolished.

The motorway will have a severance effect on a large number of people living in the small farms in rural areas along the route. This will change their transport connection with the urban areas and the cultivation of agriculture areas. However, to reduce the severance effects, over passes crossing the motorway are included in the design of M5 Phase II at regular intervals. This, together with the proposed provision of an extensive network of earth roads parallel to the motorway to provide farm access, will significantly reduce the severance effect. These same

measures were employed on Phase I after detailed discussions with local residents and landowners.

The following paragraphs summarise the effects on the main settlements within the M5 corridor:

At Petőfiszállás, the proposed alignment runs about 1.5 to 2 km to the west of the settlement in between the Budapest – Szeged railway line and Road No.5402. The motorway runs through an area of small farms. There is no connection with the motorway therefore access to other areas is not improved. Two underpasses, together with parallel earth roads, are proposed to reduce severance effects for landowners accessing their farms, however journey times for some farmers will increase. Land will be taken for the Rest Area at Ch. 121-122 km.

At Csengele, the proposed alignment runs between the eastern boundary of the urban built-up part of the settlement and the Budapest – Szeged railway line, thus the railway station will be located on the other (eastern) side of the Motorway. The motorway will run through a region with small farms, with small farm gardens and agricultural areas broken up by areas of forests and groves, or by areas used as pasture. The connecting road 54121 will cross the motorway on an overpass, SE of the settlement. Some small farmhouses may need to be demolished in the vicinity of the proposed crossing. A Rest Area is proposed in the vicinity of the overpass, without an opportunity to exit the motorway. The M5 will not offer any opportunity for residents of Csengele to exit or enter the Motorway. Some severence effects are expected due to time spent accessing cultivated land from one side of the M5 to the other. However, most of the agricultural produce is taken to Kiskunmajsa for processing, further to the west of Csengele, and not effected by the routing of the M5.

At Kistelek, the distance between the urban built-up areas of Kistelek and the route of the motorway is approx. 3 km. An exit ramp junction has been proposed at the crossing of the motorway alignment and Roads 5411 and 5421, towards Kistelek-Ópusztaszer, Kiskunmajsa, Balástya/Csengele, respectively. Occupied small farms in good repair are located in the vicinity of the junction. Densely scattered small farm buildings, small farm gardens and cultivated agricultural land lie in the intermediate zone between Kistelek and the M5. With access provided to the M5 and crossing roads retained, trip times will be reduced in 4 directions. Some severance effects for farmers will occur with the M5 severing small farms. The severance effects caused by traffic currently passing through Kistelek would be reduced. Land use changes are expected in the rural land surrounding Kistelek due to changes in ownership, alterations to boundaries and resumption of vegetable gardens on the alignment of the M5.

At Balástya, the motorway will be located approx. 3 to 4 km west of the urban built-up area. The settlement will be accessible through a separate exit ramp junction at the crossing of Road 5422 and the motorway. Traditional agricultural cultivation is performed in the intermediate zone between the settlement and the motorway. Small farm properties in the vicinity of the junction will be expropriated, and the buildings demolished. The M5 will improve transport connections for the residents of Balástya and should reduce congestion in the existing urban area. Some severance between small farms will occur and the acquisition of properties would change the nature of agricultural uses in the immediate area of the M5.

At Szatymaz, the motorway will border the western edge of the built-up area at a distance of some 500 m. In the intermediate zone, the alignment touches a rural area with dense and scattered small farms: agricultural cultivation comprises a mixture of orchard, vegetables and plough-land. The area has high agricultural activity and is famous for peach production. At least half the population of the village lie in the small farms and earn their living by agriculture. Connection of the small farm areas with the urban built-up area of the settlement will be provided by three overpass across the motorway. No separate exit ramp junction has been proposed. Prior to construction, it will be necessary to expropriate and demolish a couple of small farms. With no access to the M5 provided for the residents of Szatymaz transport connections will not be improved. Severance of the motorway between the small farms and the village will be partly overcome by the construction of three overpasses however distances for some farmers are expected to increase. Traffic conditions within the existing village will be marginally improved with some through traffic displaced by the M5.

At Kiskundorozsma, (in the administrative area of Szeged), the southern most extent of the motorway at Szeged North Interchange lies north-west of the settlement at a distance of about 2 km. The intermediate zone is plough-land agriculture. High voltage transmission lines cross the area. No change is expected to existing traffic conditions in Kiskundorozsma as the existing congested Route 5 does not pass through this urban settlement. Some small farms will be acquired to construct the motorway although the severance is not considered to be an adverse impact. Environmental mitigation measures for the food processing plant will be required and realignment of the transmission wires will slightly impact on agricultural land uses in the immediate area of the M5 route. Most larger scale agricultural activity will be unaffected.

5.3 *Water Quality*

Surface Water

The quality of the water in the canals which the M5 crosses will be significantly influenced by the quality of the storm water which drains off the motorway into the canals. Factors which can cause pollution of storm water run-off from motorways (in general) relate to the density of traffic, road surface and climatic conditions (rainfall etc). Some of the main contributors to water pollution, directly or indirectly, are:

- Solid and liquid materials caused due to wear by vehicles, such as sulphur containing organic polymers/compounds, black carbon and small amounts of heavy metals (lead, chromium, copper, nickel and zinc) found in grit salts from friction with tyres;

- Materials leaking from vehicles, such as petrol, diesel fuel, engine oil, transmission oil, brake fluid, chassis protection agents, and anti-freeze liquid (although with improved technology by 2015 the effect should be negligible);

- Wearing of vehicle parts where lubricant is not used, such as brake linings, asbestos fibres from old vehicles and metals such as lead and other metals listed above together with dust particles (consisting mostly of insoluble inorganic compounds) from the wearing of the road surface;

- Contaminated dust sediments on the road surface deposited during dry and windy periods (this region is characterised by sand storms occurring during the dry months of the year);

- Chemical reactions of vehicle exhausts creating toxic NO_x; and

- Contaminates within salts used during winter for de-icing, anti-skid purposes (regulations control the amount of salt used to 1200g/m^2/year which is equivalent to 20g/m^2/day.

Contaminants, dust, metals and the like will be mostly discharged into the canals along the length of the alignment. The existing canals and inland waters into which some canals flow are sensitive to contamination due to their size and small water yield (although many of the canals are already polluted due to untreated sewage discharges). Some canals could experience a decrease in water quality from the runoff. This could create problems through limiting water for agricultural use

and increasing the expense of irrigation in the future. However, most of the canals collect water from short stretches and this combined with the diluting effect of other runoff is considered to lead to a tolerable level of contaminants entering the canal systems. Special conditions are proposed in certain sections to accommodate game passes.

The proposed method of drainage is to soakaways. This method was used on Phase I and the Lower Tisza Water Authority has requested the same for Phase II drainage. Soakaways are proposed along the following sections:

chainage 121+200-124+000

chainage 133+450-137+700

chainage 143+475-145+300

chainage 147+350-148+200

chainage 154+000-154+500

Where these occur near areas of nature conservation value special measures may be required to protect surface waters from contamination while ensuring the drainage does not have a dehydrating effect on the surrounding area.

Emergency generated water pollution could occur when vehicles crash into the canals or close to their vicinity. If sluices are installed in the storing trenches up-stream within the canal, damage can be minimalised. Where sluices are not installed the damage to the canal's water quality could be serious. Risk of damage is greatest where nature conservation areas lie close to the motorway or the groundwater level is high. The risk of this sort of emergency is considered low however, with the effect on water quality classed as tolerable. The Action Plan in Volume 3 recommends the preparation of a Pollution Incident Plan to deal with such events.

Groundwater

The main factors which can have a detrimental effect on groundwater quality are vehicle emissions of lead and oil and brine (used for de-icing) which can be carried in run-off water into the ground immediately next to the motorway. The UVATERV EIA assesses the transport of these pollutants and the risk to groundwater.

Regarding lead, it is predicted that the maximum lead content value in the soil after the motorway has been operational for 10 years is estimated to be 20mg/kg (assuming current lead emission volumes) which is well below the permissible lead

in soil content for agriculture of 100mg/kg. This is comparable to the measured levels next to the existing M1 motorway. These levels will reduce over time as leaded petrol is phased out. But based on current emissions, no land should be lost due to the sedimentation of airborne lead emissions from vehicles.

Regarding oil pollution, an estimate has been made of the time it takes oil to wash into the ground, assuming sandy soils: 0.26 days to a depth of 1m, 0.6 days to a depth of 2m and 0.99 days to a depth of 3m. This demonstrates that in the event of an oil spillage, the groundwater in this area is very vulnerable to oil pollution. It would require a very quick response to an emergency to prevent pollution occurring. The most sensitive areas are those sections of the route where the ground water is closest to the surface. At such locations protection measures are recommended, to avoid pollution in the event of a vehicular accident. This approach is also applicable to other chemicals or liquids that could pollute groundwater

Brine (salt water) used in de-icing treatment can also infiltrate groundwater. For example, monitoring of wells next to the MO motorway on Csepel island shows a considerable increase in salt content. It has been estimated for the M5 that the quantity of salt to be applied would be 77g/m^2/year. This is only twice the amount that can be spread on a single occasion. The opinion in the UVATERV EIA is that salt pollution of groundwater is likely and therefore it is necessary to treat the salt laden water before it enters the ground.

In addition to the potential pollution of groundwater by contaminated storm water run-off from the motorway, construction of the motorway could also affect the hydrogeological pattern in the area. The opinion in the UVATERV EIA is that the motorway will not cause any detectable change in groundwater levels. It is considered that any reduction in infiltration of water due to the loss of open ground (by constructing the motorway hard surface) will be balanced by the prevention of evaporation of water from the same land in summer.

Summary

In summary, those sections of the route where groundwater level is close to the surface are the most sensitive and vulnerable to pollution from polluted storm water runoff from the motorway and any accidental spillages. There are 13 short sections (a few hundred meters long generally) where groundwater is at a shallow depth. The low discharge streams that receive storm water are similarly sensitive due to the poor dilution potential. However, drainage will not be into any natural streams or rivers but mainly canals which are only sensitive in terms of the usage

of the water (for irrigation etc). Storm waters will go to soakaways at certain locations and these are only sensitive if situated in ecologically valuable grasslands.

5.4 *Air Quality*

Future air pollution levels have been calculated for the year 2015 for three scenarios: the do-nothing situation with no M5 Motorway; M5 Motorway with 10 HUF/km toll; and M5 Motorway with 20 HUF/km toll. Daily average emission levels were predicted for CO, NO_x, formaldehyde and carbon black (soot) based on the forecast traffic figures in Table 3.3 and assumptions about the improvement in vehicle and fuel technology by 2015 provided by the Transport Research Institute (KTI). For example, the assumption is that CO emissions will reduce by 70-80% for trucks and 90-95% for cars conforming to EU guidelines. Lead emissions will drop significantly over the next 10 – 12 years as only unleaded fuel has been available since January 1998.

The emission values were then used to calculate concentrations of CO, NO_x and carbon black at a distance of 10m, 20m and 50m from the edge of the road in accordance with Hungarian standard MSZ 21459/2-81: Determining Transmission of Air Pollutants for Area and Linear Sources. The prediction model assumes typical conditions: wind speed of 2 m/s, normal stability, wind direction of 15° and plain terrain. Due to the variability of the monitored data it was not possible to add measured background concentrations to the calculated levels.

The M5 motorway will create a new linear source of air pollution in a presently unpolluted area. However, for all pollutants there are no exceedances of the 24 hour limit value beyond a distance of 10m. The 30-minute limit situation was also examined considering 'worst case' weather conditions and peak traffic (design hourly traffic) flows. Factors were applied to the 24-hour average concentrations to derive 30-minute concentrations at distances of 10m, 20m and 50m from the motorway and Road No.5. For No_x, the limit values are met within 50m of the carriageway with a 10 HUF/km toll and 20m with a 20 HUF/km toll. Higher pollution occurs with the 10 HUF/km toll scenario as traffic volumes are higher. Carbon monoxide and carbon black do not exceed limit values beyond 10m. Thus significant air pollution is confined to a narrow band either side of the motorway, not extending beyond 50m with either scenario. Predicted 24 hour average pollution concentrations are given in the UVATERV EIA section 4.2.3.

No residential area is situated within the 50m zone but there are 10 farms at 50m distance and 7 within 50m. Some of these are unoccupied; there are only 10 small farms occupied and affected and they lie at:

At 50 m:	Ch. 116.3	Within 50 m:	Ch. 128.7
	Ch. 132.3		Ch. 130.0
	Ch. 152.6		Ch. 141.2
	Ch. 156.2		Ch. 156.0
	Ch. 156.25		
	Ch. 157.1		

A noise screening wall can reduce air pollution (by 20-50%) and is recommended at these locations to mitigate the pollution effects.

Along the existing Road No.5, in the do-nothing situation pollution levels are expected to increase by 2015 at Kistelek, 1.17 times with 10 HUF/km toll, 1.96 times with 20 HUF/km toll leading to a further deterioration of existing poor air quality. However, at Szeged, based on the traffic data provided pollution levels are predicted to reduce in the do-nothing 2015. Overall, pollution levels will be exceeded within 30m of Road No.5.

In summary, with construction of the M5, traffic levels will reduce on Road No.5 resulting in a significant reduction in air pollution bringing benefits to those living in the vicinity of Road No.5. The impact area will be reduced to within 20m of Road No.5 with either toll scenario. The M5 Motorway impact area will be limited to within 20m with the 20 HUF/km toll scenario and within 50 m with the 10 HUF/km toll, affecting only 10 occupied farms.

At the Scoping Meeting concern was expressed about the high potential for sand erosion and sand storms across the Hungarian Plain due to the geology and soils of the area, the low precipitation and north, north-westerly direction of the winds which would be perpendicular to the motorway blowing sand across the motorway leading to deposition on the motorway. Sand deposition was a problem, for example, on the M7 motorway west of Budapest where the winds do blow perpendicular to the motorway. But with the M5 the wind should blow along the alignment as the motorway is orientated north-west to south-east, i.e. in the direction of the prevailing wind. For this reason, it is not anticipated that sand deposition will be a problem along the M5 Motorway.

5.5 *Noise and Vibration*

Noise levels have been predicted in accordance with Hungarian standard MSZ 07-3720-1991: Calculation of Road Traffic Noise, taking into account traffic volumes (given in Table 3.3) and speeds and road features, such as number of traffic lanes, road surface etc.

Do-Nothing Situation

For the do-nothing situation without the M5 Motorway in 2015, calculations were made for the 6 sites used in the existing situation (see section 4.6 and Table 5.1). A negligible increase in noise is predicted in the direct impact area of 0.5 to 1 dB in the region of Csengele, Kiskundorozsma and Szatymaz, elsewhere (eg. at small farms) conditions should remain similar to present. In the indirect impact area, a significant increase in noise of 2 to 2.8 dB is predicted, both day and night, along Road No.5 raising levels even higher above the acceptable standards: by 0.5 to 7 dB during the day and 4 to 12 dB at night above the standards. This will result in a further deterioration of conditions for people living near Road No.5. Increases are predicted to be less next to connecting roads 5411 and 5422, about 0.5 dB.

Do-Something Situation

Noise levels have been calculated for the two toll scenarios, 10 HUF/km and 20 HUF/km, for the future year 2015.

In the direct impact area, noise calculations have been made for all the receivers (dwellings, farms and schools at Petőfiszállás and Szatymaz) within 200m of the M5 motorway. A design speed of 120 km/hr was assumed for the M5. The results are given in Annex F. The noise exposure limits of 65 day-time and 55 dB night-time apply and are exceeded for small farms by the following amounts:

2015 10 HUF/km scenario:	day-time	0 to 6.5 dB (71.5 dB max)
	night-time	0 to 11.5 dB (66.5 dB max)
2015 20 HUF/km scenario:	day-time	0 to 4.3 dB (69.3 dB max)
	night-time	0 to 9.3 dB (64.3 dB max)

The higher noise levels occur with the 10 HUF/km scenario. Day-time levels are nearly all above 60dB, with about 25% above the standard. In almost all cases night-time levels exceed the standard, most are in the range 55-60dB.

In terms of the number of properties/farms affected, the following breakdown by noise bands can be expected once the M5 is operational (shaded figures exceed the standards 65/55 dB):

No. of Properties/Farms by Noise Band, 2015:

Noise Level Band	10 HUF/km		20 HUF/km	
	Day	Night	Day	Night
50-55 dB	1	2	0	60
55-60 dB	2	91	60	57
60-65 dB	92	32	57	11
65-70 dB	29	3	11	0
>70 dB	4	0	0	0

With regard to noise control, the UVATERV EIA recommends that 8 small farms situated at 30-40m distance from the M5 should be demolished:

Left side:		Right side:	
Chainage 132.3 km	(40 m)	Chainage 150.2 km	(30 m)
Chainage 135.95 km	(30 m)	Chainage 157.1 km	(40 m)
Chainage 152.6 km	(30 m)		
Chainage 155.8 km	(40 m)		
Chainage 156.2 km	(30 m)		
Chainage 160.13 km	(40 m)		

In the indirect impact area, there is a significant reduction in noise with the M5 motorway. Properties along existing Road No.5 through Balástya, Kistelek and Szeged would experience reductions of:

2015 10 HUF/km scenario: 2.4 to 5.6 dB

2015 20 HUF/km scenario: 2.2 to 3.3 dB

This is demonstrated in the Table 5.1. Noise limits would still be exceeded at night but during the day, levels would be below the limit in Szeged (Site 6) in both toll scenarios and at Kistelek with 10 HUF/km toll. However, no change in noise levels is forecast on the connecting roads in Balástya and Kistelek (sites 8 and 9).

Table 5.1 : Predicted Noise Levels 2015

Site	Settlement	2015 Without Motorway		2015 with M5 Motorway			
				10 HUF/km		20 HUF/km	
		Day	Night	Day	Night	Day	Night
4	Kistelek Road No. 5	68.9	65.0	63.3	59.4	65.9	62.0
5	Szeged, Kossuth L. ut	71.6	66.5	69.2	64.1	69.5	64.3
6	Szeged, Petőfi S. ut	64.7	58.2	62.0	55.5	62.2	55.7
7	Szeged Szabadkai ut	69.1	63.1	65.6	59.6	65.8	59.8
Limit Value		65.0	55.0	65.0	55.0	65.0	55.0
8	Kistelek (Conn. Rd 5411)	56.7	48.7	56.7	48.7	56.7	48.7
9	Balástya	60.0	52.3	60.0	52.3	60.0	52.3
Limit Value		60.0	50.0	60.0	50.0	60.0	50.0

Benefits will be experienced by the following estimated number of properties alongside Road No. 5:

Kistelek 184 family houses

Balástya 40 family houses

Szeged 255 2-5 storey blocks

At the two operating schools, near Petőfiszállás at Ch. 188.1 (140m from M5) and the primary school in Szatymaz at Ch. 152.2 (90 m from M5) day-time noise levels predicted are as follows:

	Petőfiszállás School	Szatymaz School
2015 10 HUF/km scenario:	60.5	63.4 dB
2015 20 HUF/km scenario:	58.3	61.2 dB

These levels are below the day-time standard of 65 dB and therefore acceptable.

Overall, the construction of the M5 Motorway will, on balance, benefit a larger number of people as those living next to the existing Road No.5 will experience significant noise reductions. In the direct corridor of the M5 alignment, just over

100 small farms will experience noise increases. More properties have noise levels in excess of the limits with the 10 HUF/km toll scenario.

With regard to vibration, at present there is no vibration exposure in the direct impact area. According to the Hungarian standard in Decree 4/1984 (I.23) vibration levels with the M5 motorway are not predicted to exceed the standards of 20mm/s^2 by day and 10mm/s^2 at night. Vibration exposure next to Road No.5 is noticeable at the moment although the standards are not exceeded. However, a reduction in vibration is anticipated due to a reduction in traffic with the M5, particularly heavy goods vehicle traffic.

5.6 *Landscape*

The M5 Motorway Phase II does not affect any Landscape Protection Areas; the Area nearest to the M5 corridor, the Pusztaszer Landscape Protection Area lies 300m east of the M5 alignment at its closets point, near Kiskundorosza.

However, the M5 Phase II will have a number of significant direct and permanent impacts on the landscape and they are as follows:

- Loss of agricultural land and some natural habitats due to the formation and earthworks for the M5
- The motorway will form a new linear feature in the landscape as it is on low embankment throughout, about 1-2m in height
- The connecting roads will pass over the M5 at about 6m height and the new interchanges will be about 9m above ground level together with associated earthworks forming a significant visual impact on the landscape: there are – connecting roads crossing the M5 and three new interchanges – at Kistelek, Balástya and Kiskundoroszma
- New structures will be built alongside the motorway adding new development into the landscape – rest area facilities, toll plazas and associated control rooms etc, and the Operating and Maintenance Centre near Szeged
- Traffic on the motorway will also form a visual impact

- Environmental protection measures in the design of the road – noise barriers, game fences, game passes – will all create a visual intrusion

- New planting designed to mitigate the visual impact of the motorway and connecting roads will change the landscape by introducing new planted areas

- Borrow areas can be a major cause of visual impact, depending on their location and how sensitively they are developed – it is not known at this stage whether any new barrow areas are required.

An indirect impact of the motorway is that it is likely to attract new development to the area and in this respect will bring about long-term changes to the landscape.

The stated opinion in the UVATERV EIA is that Phase II of the M5 Motorway will not cause any unmanageable conflict with the landscape of the area. The present land uses and character of the area, together with the relatively limited ecological value of the M5 corridor mean that the impacts can be accommodated within the landscape if suitable landscape protection measures are included in the Detailed Design Stage. The proposed mitigation is given in section 6.

5.7 *Natural Environment*

The variety and value of the wildlife in the corridor of the M5 Motorway Phase II was described in section 4.7. The grasslands and saline habitats (marshlands) are important throughout this area for supporting protected species of flora (especially orchids) and birdlife. Other types of fauna also found in the area are amphibians, reptiles and game.

The direct impact of the M5 alignment on both flora and fauna is catalogued in the UVATERV EIA and is summarised in Table 5.2.

The main loss is marsh orchid and thistle stock, especially on the section 130+700 – 131+000 km where one hectare of 50,000 stocks of protected Cirsium brachycephalum (thistle) and about 2,000 stocks of Orchis laxiflora ssp. palustris (marsh orchid) will be taken. On the section 157+400 - 157+800, an estimated 1,000 stock of the protected. Plantago schwarzenbergiana (transylvanian plantain) will be lost. Overall, approximately 8 ha of saline grassland will be lost along the route.

Table 5.2 : Flora and Fauna Directly Affected by the M5 Motorway Phase II

Large areas significant in terms of wildlife protection	Habitat Type	Amphibians present	Marsh Orchid (No. of stocks lost)	Bug Orchid (No. of stocks lost)	Thistle (No. of stocks lost)	Saline Grassland	Roller nest holes	Lapwing breeding	Black-tailed godwit nesting
124+000 – 127+500	Grassland – drying saline meadow near Péteri Lake nature reserve	✓	10	-	10	-	-	-	✓
127+500 – 128+300	NH-Aqueous and grassland	✓ breeding	-	-	-	-	-	-	-
130+700 – 131+000	NH – proteted flora and saline meadows	-	2,000	-	50,000	-	-	-	-
133+300 – 133+800	Grassland	-	-	-	-	-	-	-	-
134+600 – 135+300	Marshland	-	1-20	-	20	-	✓	✓ (April - June)	-
137+250 – 137+500	Grassland – saline meadows	-	1-200	50	-	-	-	-	-
139+300 – 139+700	Grassland – saline vegetation	-	1-20	50-60	-	-	-	-	-
140+500 – 141+500	Grassland	✓	1-20	10	5	-	-	✓	✓
141+900 – 143+300	NH – saline vegetation (near Bitó Lake)	-	-	-	-	-	-	-	-
144+300 – 145+400	Grassland	✓	1-200	-	50	3 ha	-	✓ (April – June)	✓
145+600 – 146+400	Grassland	-	-	-	-	-	-	-	-
146+600 – 147+000	NH – saline vegetation	✓ Loss of amphibian breeding ground and shore bird nesting areas							
147+300 – 148+300	NH – aqueous, saline vegetation and grassland	✓ Loss of amphibian breeding ground	200	200	-	2ha	-	✓	✓
149+200	Recommended by Őszeszék Hunting Assoc.	-	-	-	-	-	-	-	-
149+200 –149+600	Grassland	-	100	-	50	-	-	-	-
150+500 – 151+200	Grassland	-	500	20	-	✓	-	-	-
153+200 – 154+700	Grassland	-	50	-	10	-	-	-	-
157+400 – 157+800	Grassland	✓ 1,000 stock of Transylvanian plantain lost	-	-	-	3 ha	-	-	-
158+400	Proposed game pass by Domaszek Hunting Assoc.	-	-	-	-	-	-	-	-
159+800 – 161+000	Grassland (near Kiskundorozsma Nagy-szek)	-	-	-	-	-	-	✓	✓

Abbreviations: NH = Natural Habitats

On section 146+600 - 148+300 there will be loss of breeding grounds for amphibians and shore birds, in the vicinity of Őszeszék Lake. For all breeding birds in the area, construction will affect nesting birds between the months April - June therefore construction should aim to avoid these months at the affected areas. Those birds most likely to be affected are lapwing (at 134+600 - 135+300, 140+500 - 141+500 and 144+300 - 145+400 km), black tailed godwit (at 126+332 - 127+500, 140+500 - 141+500, 144+300 - 145+400) and roller (at 134+600 - 135+300).

The most damage to wildlife will occur during construction of the junctions at Kistelek and Balástya since there is more land taken. The Balástya junction will take land from an area valuable for amphibian breeding and nesting shore birds. Information from the local Hunting Associations on the number of game, their distribution and pattern of movements has been used to determine where game passes across the motorway should be provided (see section 6 on mitigation measures).

5.8 *Archaeology*

Bács-Kiskun and Congrád County Museums identified a total of 23 known sites of potential archaeological significance. Most of these sites were investigated by the Museums in summer/autumn 1998; a remaining 7 sites will be investigated in 1999. Under Hungarian Law a developer is required to provide time (period of 6 months) to allow archaeological surveys and evaluations to be undertaken.

The results of the investigations have not been reported yet but the records and any finds will be held by Bács-Kiskun and Csongrád County Museums.

5.9 *Socio-Economic Impacts*

The Csongrád Region has an arterial road system that is congested. The 5 towns through which the existing arterial road network passes are experiencing environmental degradation and economic disbenefits from this congestion. The Region's economic base is agriculture and agriculture products which is reliant on the rapid movement of produce to markets and factories. The Region is also well located geographically to become the south-eastern gateway to the European

Union and to enable Szeged to have international status with regard to the movements of goods throughout Europe and border control functions.

The M5 Motorway construction between Kiskunfélegyháza and the state border would enable policies encouraging economic growth in Csongrád Region to be realised and would assist in overcoming the issues raised above. Without the M5 Motorway, infrastructure and economic development within the region would be difficult to achieve. The M5 Motorway can:

- assist in overcoming traffic related environmental problems of the five towns on the existing Route 5 highway;

- address the physical separation effects of the River Tisza by providing new river crossings increasing transport movements east and west within the region;

- facilitate international road transport, strengthen connections within the Europe and allow a permeability of borders to strengthen economic development not only of the Csongrád Region but Hungary as a whole.

The alignment of the proposed M5 Motorway is basically in harmony with the master plans concerning each settlement in the region, and the concepts of municipalities of the settlements concerning land use of rural areas.

The anticipated socio-economic impacts on local communities can be summarised as follows:

- the transport load on the urban built-up part of the settlements resulting from through traffic on Trunk Road 5, together with the resultant detrimental environmental impacts, will decrease at Kistelek, Balástya and Szeged. In addition, for the same settlements traffic safety will improve.

- the transport connections will be significantly improved in the N-S direction, with trip times decreasing. (Considering a trip between Budapest and Szeged it means a time saving of almost an hour.)

- transport connections between settlements will not change significantly as all road crossings have been maintained in the design

- the severance effect of the motorway will have an unfavourable effect on a considerable number of citizens living in the small farms in the rural area of the

region, changing the transport connections with in the built-up areas, and in the cultivation of the agricultural areas.

- as to the employment conditions of the region, the motorway is expected to improve economic conditions by enabling easier movement of workers from one area to another.

The possible favourable changes associated with the economic situation of communities investigated may only arise for those settlements where an entry and an exit junction will be formed on the motorway. This is because the economic enhancement presents itself more directly than it does at settlements not provided with any junction, for example by offering a better position for businesses.

5.10 *Construction Impacts*

Potential Impacts

The period for construction is estimated to be 2.5 to 3 years with completion of Phase II planned for 2003. During construction of the M5 Phase II a number of potential impacts can occur due to the activities involved, which can cause disturbance to local residents and the natural environment if not properly controlled:

- noise impacts from construction equipment used and heavy goods vehicles transporting materials along the haul route of the alignment which can affect residents living near the alignment
- air pollution caused by emissions from equipment and vehicles, and dust generated from dry soil and dried mud, which can affect people and vegetation near the alignment
- pollution of water courses through accidental spillages of fuel, oil or other noxious liquids and deposition of materials, such as waste, or soil which either cause contamination or increased levels of sediment, which damage the condition of living waters
- unnecessary loss of natural vegetation at the boundary of the alignment due to works extending beyond the limits shown in the design

- pollution of soils and potentially groundwater as well either by accidental spillage of fuel, oil and other noxious materials or seepage from fuel storage tanks, liquid waste tanks at construction sites.

- disturbance from construction traffic (heavy goods vehicles and workers) on the local road network accessing the site causing noise, air pollution, mud on roads and damage to roads and verges.

At this stage there are no details about the proposed method of working or the location of construction sites (for storage of materials, equipment, offices and facilities). Therefore, it is not possible to predict the scale of impacts which may occur. However, if there is proper management of the construction works then most of the above potential impacts can be controlled and reduced to acceptable levels. This is discussed in the Action Plan (Volume 2 of the EIA).

Affected Groups

As stated elsewhere, the alignment is some distance from the nearest settlements, the closest being Petőfiszállás (1.5 to 2km), Csengele (1km), and Szatymaz (500m). The main impacts will probably be during the construction of the overpasses near these settlements as more work is involved in earthworks and structures required. In general experience, however, construction impacts are not usually a cause of nuisance beyond 100m from the works. This means that the people most likely to be affected are residents of the small farms lying between 30-100m of the alignment. Properties within 30m will be expropriated and demolished. There are a total of 65 small farms within 30-100m and one school, the Szatymaz Primary School III . 219 at 90m distance from the alignment. Protection measures given in the Action Plan should be directed at these most affected properties.

Another factor is the timing and duration of construction activities. For most activities hours of working will generally be controlled to daytime, weekday working with exceptions for specific activities. The duration of activities will in general be short-term so that at any one location exposure is temporary and for a short period. Those activities requiring longer durations are, for example, construction of interchanges, overpasses and structures. A particular concern, is the protection of watercourses and the wetland or grassland habitats of ecological value located along the route (described in earlier sections). The Action Plan should give particular consideration to measures to protect these areas.

Borrow Pits

Another issue of concern which was raised at the Scoping Meeting is borrow pits. These can cause a significant environmental impact if they are not sensitively located and properly managed. They are also a major source of dust and truck traffic. The UVATERV EIA has reviewed the capacity and type of materials available at existing borrow pits and made a preliminary assessment against the materials required for the project (in UVATERV EIA Annex 6). At this stage the indications are that no new borrow pits need be created, although this will be reviewed at the Detailed Design Stage. Existing borrow areas have been identified by the Szolnok District Inspectorate of Mines and permits exist for the following (further details are given in UVATERV EIA Annex 6):

- Kiskunfélegyháza IV (15 ha) sand — Authorised
- Kiskunfélegyháza V sand — Authorised
- Petőfiszállás I (44 ha) sand — Authorised
- Petőfiszállás II (30 ha) sand — Authorised
- Petőfiszállás III sand — Authorised
- Csengele I (15 ha), sand — Authorised, excavation not started yet
- Balástya I (15 ha), sand — Authorised, excavation not started yet
- Szatymaz I (51 ha), sand — Authorised, excavation not started yet
- Szeged II, sand — Authorised
- Szeged III (16 ha), sand — Authorised
- Rőszke II, sand — Authorisation is in progress
- Rőszke III, sand — Authorisation is in progress

All the borrow areas lie within the M5 corridor within either Bács-Kiskun or Csongrád County, therefore the transport distances are reasonable.

Efforts should be made to use the listed authorised borrow areas for borrowing materials for constructing the motorway and unless these borrow areas are exhausted, no new borrow areas should be opened.

Contaminated Land

Along Phase II of the M5 there is only one area with know contaminated soils. This is near Szeged in the vicinity of Ch. 158.46 to 159.06 km where the alignment crosses a liquid manure plant (which will be relocated next to a waste water treatment plant). The plant is used by PICK Salami Factory to discharge liquid manure of a pig production unit by pipes. The soil will need to be removed and disposed of to a spoil area licensed for contaminated soil. It will need to be handled according to requirements of the regulations, to avoid damage to the environment and to workers. Any other sites discovered during construction should be treated in the same way.

6 Mitigation Measures

6 Mitigation Measures

6.1 *Introduction*

The UVATERV EIA has identified a number of measures to be undertaken to mitigate the predicted adverse impacts of the M5 Motorway Phase II. These measures have been incorporated into the planning and design of the Modified Design for Approval of the project where possible and costed, and are shown on the engineering drawings as appropriate.

Details of the planned mitigation are contained in the Action Plan which forms Volume 2 of this EIA. It includes a set of drawings at 1:10,000 scale covering the route showing the location of mitigation.

6.2 *Proposed Mitigation Measures*

The planned mitigation measures which have been incorporated into the motorway design can be summarised as:

- Installation of reflective noise barriers, set at 1.5m from the right of way limit, on both sides of the motorway at specific locations varying in height between 2.0m and 4.5m
- Installation of 2.5m high game fence on both sides of the motorway, as a continuous fence except at junctions, to protect animals from collision with vehicles
- Planting of trees, shrubs and grasses for landscaping purposes adjacent to the motorway and in the carriageway medium and also to provide protective forest belts next to the nature reserves of Petéri and Őszeszék Lakes (for landscape protection)
- Creation of game passes and culverts for amphibians under the motorway to allow passage of animals across the motorway

- Protection measures incorporated into the design of drains and bridges to prevent pollution of surface and groundwater, including provision of 'geotextile' at areas of shallow groundwater

- Other mitigation measures considered in the planning of the motorway are: careful siting of borrow areas; suitable disposal of waste arising from facilities associated with the motorway (rest areas, toll plazas, Operation and Maintenance Centre); and minimising the air pollution impact on residents.

The design of these measures has benefited from the experience gained on Phase I. Designs have been modified to overcome either installation or maintenance problems found to occur on Phase I. Each of the above measures is described in the Action Plan (Volume 2), covering

- noise protection
- protection of wildlife
- landscape protection
- water quality
- air quality
- borrow areas
- waste disposal at Rest Areas, Toll Plazas and the Operation and Maintenance Centre.

6.3 *Estimated Costs of Mitigation*

The estimated costs of providing mitigation are given below. These are preliminary costs which are based on unit cost rates provided by UVATERV Rt. (19.3.99) and are expressed in January 1999 prices. They will be reviewed and modified as necessary at the Detailed Design Stage. The total cost of mitigation for the M5 Motorway Phase II is about 5 billion HUF.

Mitigation Measure	Quantity	Unit Cost HUF	Cost HUF in millions
Noise Barriers (reflective)	57,925.5m²	42,700/m²	2,473.42
Game Fences	97,860m	9,150/m	895.42
Game Passes	5	88,000,000/pc	440.00
Amphibian Passes	5	2,500,000/pc	12.50
Planting (see Table 4)	-	-	953.58
Geotextile fabric	330,000 m²	2,000/m²	660.00
Oil traps	20	300,000/pc	6.00
TOTAL COST			5,440.92

6.4 *Action Plan*

An Action Plan has been prepared for the M5 Phase II Motorway. It has three components which are intended to cover the design, construction and operational phases of the M5 Motorway Phase II. The three components are:

- mitigation measures incorporated into the planning and design of the project;
- environmental management of the construction phase; and
- environmental management once the motorway is operational.

The first part of the Action Plan has already been described above. The second part covers the management of environmental concerns during the construction period with the purpose of controlling, avoiding and mitigating potential damage and disturbance to the human and natural environment. The third part of the Plan concerns management of the environment once the motorway is operational which essentially involves implementation of a Pollution Incident Plan and a Monitoring Plan.

The Action Plan forms Volume 2 of the EIA.

7 Outline Monitoring Plan

7 Outline Monitoring Plan

7.1 *Background*

A programme of environmental monitoring is currently in progress on Phase I of the M5 Motorway, between Chainages 17.4 and 113.5 km. It is being carried out by the Hungarian company FRAMA 01 dBH Environmental Protection Ltd under contract to AKA Ltd. The purpose of the Phase I monitoring is to monitor the effects of constructing the M5 Motorway on following elements:

- Air quality
- Soil quality
- Surface and Ground Water quality
- Pollution of roadside vegetation (heavy metal content)
- Noise
- Flora and fauna

This programme is based on the monitoring recommendations made by Halcrow Fox in their Phase I EIA report to the EBRD in 1994 which were then developed into an Environmental Monitoring Plan by Arup/UTIBER in March 1996.

7.2 *Proposals for Phase II Monitoring*

The proposal is to monitor the same elements as for Phase I. This will provide consistency in data collection but also the monitoring programme on Phase I has been found to be both successful and worthwhile, therefore it is appropriate to adopt the same approach on Phase II.

The proposed outline for an Environmental Monitoring Plan for Phase II is set out in a separate part of the EIA, in Volume 3, where further details are provided.

The approach taken has been to review the Phase I monitoring programme in terms of the relevance and appropriateness of:

- the elements which should be monitored
- the number, location and type of sampling points
- the parameters to be measured and monitored
- the sampling/monitoring durations
- the frequency of sampling.

This review has resulted in a few modifications to the programme for Phase II but no major changes in approach.

As for phase I, monitoring will be required at 3 stages;

- prior to the start of construction, to establish the baseline conditions;
- during the construction period; and
- during the first year of operation.

For all elements, the measurements will be conducted in accordance with the latest Hungarian standards (listed in Appendix A to Volume 3) and will be taken generally twice a year in spring and autumn.

The only significant changes proposed for Phase II monitoring are:

- inclusion of measurements designed specifically to test the performance of noise barriers once installed (due to problems with performance of some barriers on Phase I)
- formaldehyde should be used as an indicator for hydrocarbons (HC) rather that total HC (a Hungarian standard exists for formaldehyde)
- measurements of water quality should be taken both up and down stream of the motorway crossing

- due to the lack of available open wells for monitoring groundwater, it would be desirable to drill new boreholes to set up permanent monitoring stations for the M5
- a plant other than grass (which is mown) should be used as an indicator of effects on vegetation
- sites for monitoring effects on flora must be segregated (fenced off) from agricultural activities to isolate the effects of the motorway
- wildlife crossings should be monitored to observe animal movements and use of the game and amphibian passes.

7.3 *Outline Monitoring Programme*

The conclusion of the review of monitoring on Phase I, taking into account lessons learnt, is to recommend the following programme of monitoring for Phase II, given in Table 7.1. Details of the monitoring programme including the proposed sampling locations are contained in Volume 3 of this EIA.

The monitoring programme extends to the first year of operation. It would, however, be very useful to continue the monitoring beyond the first year (perhaps as a limited programme) with the aim of collecting pollution data over a period of time for any of the mitigation measures to be taken by the motorway concessionaire.

The Sponsors of the M5 Motorway Phase II, AKA Ltd., will be responsible for implementing the Monitoring Plan.

Table 7.1 : Summary of the Proposed M5 Phase II Outline Monitoring Plan

Elements	Number of Sampling Points	Parameters	Frequency
Air	11	CO, NO_x, SO_2, Suspended Dust and its Lead Content, HC, later Formaldehyde, Deposited Dust	Baseline: 2 Construction: 1 Operation: 2
Soil	7	pH, Specific Conductivity, Chloride Content, Lead, Cadmium, Zinc Content	Baseline: 1 Construction: none Operation: 2
Ground Water	4	pH, Specific Conductivity, Chloride Content, Chemical Oxygen Demand, Sulphate, Nitrate Content, Lead, Cadmium Content, Organic Solvent Extracts, Total Diluted Material	Baseline: 1 Construction: 1 Operation: 2
Surface Water	8	pH, Specific Conductivity, Chloride Content, Chemical Oxygen Demand, Sulphate Content, Nitrate Content, Lead, Cadmium, Organic Solvent Extracts, Total Diluted Material	Baseline: 1 Construction: 1 Operation: 2
Noise	11	Day-time L_{Aeq}, Night-time L_{Aeq} Sound Insulation of Barriers	Baseline: 2 Construction: 1 Operation: 2
Vegetation	7	Lead, Cadmium, Zinc	Baseline: 2 Construction: 1 Operation: 2
Archaeology	1	Watching Brief	Construction: Continuous
Flora	6	Number of Toxins, Degradation, Changes	Continuous
Fauna	6	Number of Species, Changes	Continuous

8 Recommendations and Conclusions

8 Recommendations and Conclusions

8.1 The EIA has considered a wide range of potential environmental impacts on the human, natural and built environments which may occur as a result of building Phase II of the M5 Motorway; considering effects both during the construction and operation of the motorway. Impacts have been assessed in both the 'direct impact area' alongside the M5 alignment and the 'indirect impact area' alongside existing roads in the network, in particular Trunk Road No. 5 through Kistelek and Balastya. For the former the effects are mainly negative, for the latter the effects are mainly beneficial.

8.2 The following sections highlight the key issues raised during the assessment and summarise the consultant's recommendations, including the identification of any further investigations considered appropriate.

Land Use and Settlements

8.3 The main impacts of the M5 Phase II on landuse are severance of agricultural land and demolition of properties. Properties within 30m of the M5 alignment will be demolished as they lie within the main noise and air pollution impact areas. No settlements are directly affected by the M5 but communications (journey times and routes) to the existing road network and neighbouring settlements are affected, especially for the numerous small farms which are characteristic of this area. These problems have been largely overcome by the provision of overpasses over the M5 to maintain the local road network and creation of new earth roads parallel to the M5 (similar to those implemented on Phase I) to improve access to agricultural holdings. A concern raised in the Csengele area, was that the existing road to Kiskunmajsa which joins Road No. 5402 should be improved (it is presently part earth road) to facilitate transport of agricultural produce to market, to compensate for no junction being provided with the M5.

Water Quality

8.4 Protection of surface and groundwater quality is a key issue in this area. Although polluted stormwater run-off from the motorway will not drain directly into any natural rivers or streams it will drain into the many man-made canals that cross the M5 alignment. Dilution of contaminants to acceptable levels is considered

achievable in most cases. However, maintaining good quality surface water is particularly important in this area because the canals feed into some critical wildlife habitat including protected marshlands and wetland nature reserves (e.g. Péteri Lake) important for birdlife and flora, which generally lie to the east, i.e. downstream, of the alignment.

8.5 Groundwater protection is also important due to the high sensitivity of the area. Groundwater is relatively shallow in the area, averaging 1 to 4 metres below the ground surface. Mitigation is proposed in the form of engineering geo-textile fabric placed along the most sensitive sections to increase percolation time.

8.6 The main causes of ground and surface water pollution are contaminated stormwater run-off from the motorway, brine (salt water) used in de-icing treatment and accidental spillages of toxic chemicals or other liquids such as oil. The UVATERV EIA calculated the likely levels of **contamination in stormwater** but this was not carried through into estimating how existing water quality might be affected taking into account dilution factors and the quality and capacity of receiving waters. It is recommended that further analysis is undertaken to address this matter which is critical to the finalisation of the detailed design for the drainage system. The UVATERV assessment concluded that **brine** was likely to pollute groundwater (as found in wells next to the M0 Motorway). This should be re-examined and appropriate treatment facilities included in the design if necessary. The potential effects of an **accidental spillage** estimated by UVATERV indicate pollution of groundwater is likely due to the rapid percolation of oil through sandy soils. This should be re-examined to take into account the probability of an accident occurring, which the risk assessment at present fails to do. This may lead to modifications to the proposed mitigation. The proposed monitoring of surface and groundwater is a critical element of the Phase II Action Plan.

Air Quality

8.7 Air pollution generated by traffic on the motorway is predicted in 2015 to be confined to a narrow band, about 50m either side of the M5 and its connecting roads. This distance is determined by the limit value for nitrogen oxides; carbon monoxide and carbon black do not exceed limit values beyond 10m. For the few properties within this 50m zone, noise screening walls are recommended to help reduce pollution at these locations. Significant improvements in air quality are predicted next to Road No.5, reducing the impact area to within 20m of the road. Presently, nitrogen oxides levels exceed the standard in Kistelek and Szeged, and

dust levels exceed the standard in Kistelek. The assessment was based on worst case weather conditions and peak traffic (design hourly traffic) flows and compared against the more stringent 30-minute limit value (rather than the 24-hour or annual values). The 'worst case' was derived from the 24-hour average concentration calculated at distances of 10m, 20m and 50m from the motorway and Road No.5. Taking the 24-hour average concentrations, no pollutants would exceed the limit values at a distance of 10m. Monitoring of air quality is recommended to check the change in pollution levels as traffic transfers to the M5.

Noise and Vibration

8.8 The direct noise impact area lies within 160m of the M5 Phase II, based on exceedance of the night-time noise standard of 55 dB L_{Aeq} and assuming the highest traffic flows in 2015, i.e. with a 10 HUF/km toll. An estimated 130 properties lie within this zone, including two operating schools, one at Petőfiszállás (140m) and one at Szatymaz (90m). In contrast, alongside Road No.5 significant benefits can be expected for residents with noise reductions of 2.4 to 5.6 dB in the 2015 10 HUF/km scenario and 2.2 to 3.3 dB in the 20 HUF/km scenario.

8.9 To meet the night-time standard of 55 dB (with 10 HUF.km toll) at all properties within 30-160m of the motorways, reflective noise barriers have been included in the design at the relevant locations ranging from 2 to 4.5 meters in height and 50 to 750 m in length (properties within 30m of the alignment will be expropriated). The installation of noise barriers is considered a far more effective method of mitigating noise than the noise protection forest belts used initially on Phase I, these have been rejected on Phase II. A concern raised on Phase I was that the noise barriers did not in all cases perform to the required specification. It has been recommended in the Outline Monitoring Plan that measurements are taken to test the effectiveness of noise barriers post-installation to overcome this problem.

Landscape

8.10 The M5 Phase II will have a direct impact on the landscape, forming a new linear feature which will be visible as it is on low embankment of 1-2m in height throughout. Connecting roads and interchanges will pass over the motorway at about 6m and 9m height, respectively. New buildings associated with the motorway - rest area facilities, toll plazas and the Operating and Maintenance Centre near Szeged - will also form new features. Although, Phase II does not directly affect the Pusztaszer Landscape Protection Area which lies 3km east of the

alignment (at its closest point) it does cross the relatively flat Great Hungarian Plain and will be visible. Therefore, the landscape protection measures developed at the Detailed Design Stage will be crucial to 'fitting' the motorway into the landscape.

Natural Environment

8.11 Within the corridor of the M5 alignment there are a number of protected habitats and species, including saline marshlands, nature reserves at Péteri, Bitó, Őszeszék and Fehér Lakes, protected birds and flora. Protection of the wildlife value of the corridor is important. Proposed mitigation includes installation of game fences alongside the motorway, passes for game and amphibians and forest protection belts next to Péteri and Őszeszék Lakes. An integrated approach is recommended when developing the detailed design of surface and groundwater protection, planting plans and wildlife protection measures. Understanding the interaction between these factors is essential, and must be taken into consideration when further developing the mitigation proposals. Protection of wildlife during both construction and operation of the motorway is very important. The Action Plan recommends that an Environmental Management Plan is prepared to manage and protect sensitive resources during construction, including flora and fauna.

Archaeology

8.12 The M5 alignment passes through an area of known archaeological interest. Therefore, field investigations were started in summer of 1998 well in advance of construction to allow proper surveys and evaluation procedures to be carried out A total of 23 sites are to be investigated under the supervision of Bács-Kiskun and Csongrad County Museums. Work on all but 7 sites has been completed; the remainder will be completed in 1999. It is recommended in the Action Plan that a 'watching brief' is maintained during construction, particularly during earthworks, to monitor any further finds or 'unknown' discoveries and take the necessary remedial action.

Socio – Economic Issues

8.13 Construction of Phase II of the M5 Motorway is supportive of both local plans and the Regional Development Plan for the Southern Great Plain Region. It would enable policies encouraging economic growth in Csongrád County to be realised. The Csongrád Region has lagged behind in economic development and

national policies now promote this region as a southern gateway to the EU with the aim of restoring the economic balance between west and east Hungary. Lack of adequate transport corridors with neighbouring countries and counties has been the main obstacle to development. Construction of Phase II will bring significant benefits by reducing congestion on the existing road network and providing a new motorway network, thus improving accessibility within the region (e.g. encouraging the development of logistics centres). These transport improvements should foster economic growth and possibly develop tourism and foreign economic relations in the area. The overall socio-economic effect on the region should be beneficial.

Construction Impacts

8.14 The incidence of detrimental impacts occurring during the construction phase can best be minimised and controlled through increasing environmental awareness amongst the contractor's team and by proper management of construction processes. It is recommended that once the detailed design is available and the method of working is known (e.g. location of construction camps, type and duration of activities, number of truck movements) a detailed study of possible construction impacts should be undertaken. There is insufficient information to do this at this stage. Mitigation measures should then be identified and incorporated into an Environmental Management Plan which should be implemented during the construction of the project.

Environmental Management during Operation

8.15 Environmental management should be carried through to the operational phase of the motorway and it is recommended this is done through implementing the Monitoring Plan outlined in Volume 3 of the EIA and developing a Pollution Incident Plan (as recommended in the Action Plan in Volume 2) to deal with any accidents and spillages that might occur. The monitoring will identify any immediate design problems requiring corrective action and the Pollution Incident Plan should prevent any major pollution events or damage occurring to the environment alongside the M5.