



HRVATSKE AUTOCESTE d.o.o.

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ZAGREB – SISAK MOTORWAY

Report on Environmental Impact and Protection Measures

Zagreb, February 2009



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ADMINISTRATIVE PROCEDURE FOR ZAGREB - SISAK MOTORWAY

A request for the implementation of the environmental impact assessment for the Zagreb – Sisak motorway was submitted on June 11, 2003. Along with the request the Environmental Impact Study prepared by the Civil Engineering Institute of Croatia IGH, d.d., Janka Rakuše 1, Zagreb in June, 2003, was enclosed.

The permanent Commission for the Assessment of Environmental Impact Studies for major roads and motorways with service areas in the Republic of Croatia was appointed by the Government of the Republic of Croatia with the Decision Class: 022-03/96-02/22, File No: 503011-96-I of October 24, 1996.

On the first session held on July 3, 2003 the permanent Commission passed the decision on forwarding the Study to public disclosure procedure. The public disclosure took place from September 1, 2003 to September 21, 2003 in the Zagreb County and in the Sisak-Moslavina County, in the towns of Sisak and Velika Gorica and in the municipality of Lekenik. During public disclosure public hearing took place on September 18 2003 in Sisak and on September 16 in Velika Gorica. During public disclosure and public hearing procedure written comments by general public were received.

On the second session held on November 12, 2003 the permanent Commission concluded that the planned motorway from Zagreb to Sisak was environmentally acceptable with the application of environmental protection measures and environmental monitoring programme.

The Ministry of Environmental Protection and Zoning passed the Decision on environmental acceptability of the Zagreb-Sisak motorway with the condition of application of environmental protection measures and monitoring programme, Class: 351-02/03-06/0082, File No: 531-05/4-AM-03-5.

Environmental impact assessment was also conducted for the **Jakuševac- Velika Gorica (South) section**, on the Zagreb to Sisak motorway. Along with the request for EIA the Environmental Impact Study for the Zagreb – Sisak Motorway Section Jakuševac- Velika Gorica (South) was also enclosed. The Study was prepared by the Civil Engineering Institute of Croatia ("Institut građevinarstva Hrvatske" d.d.), Zagreb, Janka Rakuše 1, in March 2006.

The permanent Commission for EIS assessment for major roads and motorways with service areas in the Croatia was appointed by the Government of the Republic of Croatia with the Decision, Class: 022-03/96-02/22, File No.: 503011-96-I of October 24, 1996.

The Commission held three sessions. On the first session held on May 11, 2006 the permanent Commission concluded that the Study contained some deficiencies that might be removed within legal period and requested that the Study should be revised in accordance with the Commission members' objections.

On the second session held on June 26, 2006 the Study authors presented the amended Study and the Commission members evaluated that the Study was completed and decided to submit it to the public disclosure and hearing procedure. The notice of the public disclosure and hearing was published in daily papers and on notice boards of the towns of Zagreb and Velika Gorica and of Zagreb County.



The public disclosure took place from August 24 to September 14, 2006 in Zagreb and Velika Gorica. The hearing was held on September 7, 2006 in Velika Gorica and on September 5, in Zagreb (Novi Zagreb – East, residential area). During both the public disclosure and hearing written comments of the general public were received.

On the third session the Study authors presented the Study amendments and replies to comments received during public disclosure and hearing. The Commission accepted the Study amendments and issued a conclusion that the Zagreb-Sisak Motorway Section Jakuševac - Velika Gorica (South) was environmentally acceptable with the application of environmental protection measures and environmental monitoring.

On May 25, 2007 the Ministry of Environmental Protection and Zoning passed the Decision on environmental safety of the project of construction of the application of environmental protection measures and environmental monitoring, Class: UP/I 351-03/06-02/65, File No.: 531-08-3-1-AG-07-7.

ADMINISTRATIVE PROCEDURE FOR ZAGREB – SISAK MOTORWAY – per sections

SECTION: JAKUŠEVAC – VELIKA GORICA (SOUTH)

Environmental Impact Study – for Zagreb – Sisak Motorway (prepared by the Civil Engineering Institute of Croatia, Zagreb, in May 2003);

Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway, Class: 351-02/03-06/0082, File No: 531-05/4-AM-03-5 of December 5, 2003.

Environmental Impact Study – for Zagreb – Sisak Motorway Section Jakuševac – Velika Gorica prepared by the Civil Engineering Institute of Croatia, Zagreb, in March 2006);

Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway Section Jakuševac – Velika Gorica (South) – the route variant of crossing over the railway switchyard by means of a structure, Class: 351-03/06-02/65, File No.: 531-08-3-1-AG-07-7 of May 25, 2007;

Location permit, Class: UP/I-350-05/04-01/120, File No.: 531-06-05-55 NK of September 29, 2005;

Location permit (for the project in the area of the town of Zagreb), Class: UP/I-350-05/06-01/181, File No: 531-06-07-47 NK of July 27, 2007;

Location permit (for the project in the area of the county of Zagreb), Class: UP/I-350-05/06-01/80, File No.: 531-06-07-33 NK of July 20, 2007;

Preliminary permit – for the section Jakuševac – Velika Gorica (South) from km 0+000,00 to km 8+400,00, Class: UP/I-361-03/05-01/420, File No: 531-10-2-1-1-157-06-24 of April 4, 2006;

Preliminary permit – preliminary permit amendment – Jakuševac – Velika Gorica (South) section from km 0+000,00 to km 8+400,00, Class: UP/I-361-03/06-01/523, File No.: 531-10-2-1-1-157-06-3 of December 30, 2006;

Preliminary permit – for the section Jakuševac – Velika Gorica (South) from km -1+275,00 to km 5+656,79, Class: UP/I-361-03/07-01/434, File No: 531-10-2-1-1-372-07-23 of December 18, 2007;

Construction permit – relocation, reconstruction and protection of the existing telecom lines, water pipelines, sewage and gas lines and railway utility lines – main route from km 6+300,00 to km 8+400,00, V. Gorica bypass, V.Gorica-South interchange, Kolareva road crossing, relocation and protection of the existing electric power lines from km 3+300 to km 8+400, V.Gorica bypass, Kolareva road crossing, TS Lomnica Donja 3, TS Grič, TS Lomnica Donja 5 and Gradičić 3, Class: UP/I-361-03/07-01/183, File No.: 531-10-2-1-1-157-08-26 of April 15, 2008;



Construction permit – main route from km 6+300 to km 8+400; V. Gorica bypass 0+159,51 to 3+440,00; V. Gorica-South interchange at 7+485,00; Kolareva road crossing at km 0+000 to km 1+750,00, Class: UP/I-361-03/07-01/672, File No: 531-10-2-1-1-07-7 of November 20, 2007;

Construction permit – Landscaping and noise protection for the part of the section from km 6+300 to km 8+400, Class: UP/I-361-03/07-01/662, File No.: 531-10-2-1-1-08-12 from April 18, 2008;

Construction permit – Relocation, reconstruction and protection of the existing telecom lines, water pipelines, sewage, gas lines and railway utility lines on the following parts: main route from km 4+440,00 to km 6+300,00, road crossing "Željeznička" from km 0+000,00 to km 1+740, pedestrian underpass "Gradičić" from km 0+000 to km 0+095, extension of A.K. Miošića Str. from km 0+000 to km 1+557, parallel road Gradičić from km 0+000 to km 1+730, as well as the relocation of existing electric power lines in the area of the main route from km 4+440 to km 6+300, extension of A.K. Miošića od km 0+000 to km 1+557 and road crossing "Željeznička" from km 0+000 to km 1+740, Class: UP/I-361-03/08-01/74, File No.: 531-10-2-1-1-157-09-16 from January 20, 2009;

Construction permit – Landscaping and noise protection for the part of the motorway section from km 4+440 to km 6+300, Class: UP/I-361-03/08-01/55, File No.: 531-10-2-1-1-157-08-14 from October 30, 2008;

Construction permit – Odra viaduct at km 2+070,50 with structures on the ramps of Velika Gorica slip roads, Class: UP/I-361-03/07-01/534, File No: 531-10-2-1-1-372-08-25 of January 28, 2008.

SECTION: VELIKA GORICA (SOUTH) – LEKENIK

Environmental Impact Study – for Zagreb – Sisak Motorway (prepared by the Civil Engineering Institute of Croatia, Zagreb, in May 2003);

Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway, Class: 351-02/03-06/0082, File No: 531-05/4-AM-03-5 of December 5, 2003;

Location permit, Class: UP/I-350-05/06-01/182, File No: 531-06-07-41 NK of May 10, 2007;

Preliminary permit, Class: UP/I-361-03/07-01/352, File No: 531-10-2-1-1-066-07-22 of November 15, 2007;

Construction permit – Bridge Sava canal – Odra at km 1+096,55 including internal drainage system, Class: UP/I-361-03/07-01/420, File No: 531-10-2-1-1-1467-07-22 of December 31, 2007;

Construction permit – The motorway route from km 0+000 to km 9+000, traffic areas and building of toll gates, link road from state road D30 and county road Ž3116, all structures, drainage, traffic signs and road furniture, relocation, reconstruction and protection of electric power lines, telecom lines and water supply system, and the protection of the future sewerage, Class: UP/I-361-03/07-01/684, File No: 531-10-2-1-1-1467-08-39 of August 16, 2007;

Construction permit – electric power supply, new transformer stations, telecom lines, lighting, water supply system for service areas on the section from km 0+000 to km 9+000 of the motorway route, Class: UP/I-361-03/08-01/7, File No.: 531-10-2-1-1-1467-08-22 of September 16, 2008.

SECTION: LEKENIK – SISAK

Environmental Impact Study – for Zagreb – Sisak Motorway (prepared by the Civil Engineering Institute of Croatia, Zagreb, in May 2003);

Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway, Class: 351-02/03-06/0082, File No: 531-05/4-AM-03-5 of December 5, 2003;

Location permit, Class: UP/I350-05/08-01/70, File No.: 531-06-08-32 NK of August 21, 2008;



Construction permit – Odra bridge, Class: UP/I-361-03/08-01/172, File No: 531-10-2-1-1-1467-09-22 of January 19, 2009.

ENVIRONMENTAL PROPERTIES OF THE PROJECT SITE & ENVIRONMENTAL IMPACTS*

Hydro-geological and engineering geological properties of the terrain

The Zagreb-Sisak motorway route runs through the area with neogene and quaternary sediments with predominating inter-grain and different permeability. The sediments are:

- Coarse-grained (loose or non-coherent soil),
- Fine-grained (coherent soil),
- High – organic soil.

The planned motorway route runs through the river basins of Sava, Odra and Kupa.

In a wider and closer motorway zone there is one active pumping area of ground water Mala Mlaka and Velika Gorica (legally protected water pumping areas) and the potential pumping areas Mičevac (one of the sites of the future Črnkovec well area) and Peščenica.

Climate

The area of the future motorway route climatically can be classified into moderate continental climate. The mean annual temperature is between 10,5⁰ and 10,8⁰C, with maximum temperatures in July and August and with the mean maximum temperature between 27 and 28⁰C. On average the coldest months are January and February with the minimum temperature of – 4,0⁰C. The precipitation consists of rain and snow and determine the micro-climate of the area and are very important in determining the sizes of drainage facilities. Most precipitation is reserved for the warmer time of the year with the maximum quantities of 96,2 mm to 99,6 mm in June. The average quantity of annual precipitation is from 843,4 mm in the Zagreb area to 879,1 mm in the Sisak area.

Soil and agricultural land

The Zagreb – Sisak motorway route runs through the area with a very prominent role of the relieve and substrate. About three quarters of the land in a wider corridor is used in agriculture and one quarter in forestry.

Forest ecosystems and forestry

The forests in the route area belong to the European and Northern American region of sub-Pannonian and Pannonian vegetation zone. In the project area there are 271 ha of forests and forest land and in the area of the works 83 ha.

* taken from Environmental Impact Study for the Zagreb-Sisak Motorway (prepared by the Civil Engineering Institute of Croatia, in May 2003) and from Environmental Impact Study for the Zagreb-Sisak Motorway Section Jakuševac-Velika Gorica (South), (prepared by the Civil Engineering Institute of Croatia, in March 2006)



Flora and fauna

In a wider area of the motorway there are the following types of habitats: arable land, meadows, forests, marshland and rivers.

Considering the variety of habitats in the area there are a great number of animal species.

Protected areas

The forest park Kotar – Stari gaj is situated between Petrinja and Sisak and has been protected ever since 1975. The motorway in its final portion runs through the forest edges, however the construction works will not affect the conditions for which the subject forest was proclaimed the special purpose forest.

Landscape

From a wider perspective the subject project of the construction of the Zagreb – Sisak motorway is situated in the flat country of Turopolje that is surrounded from the north by the conurbation of Zagreb, Velika Gorica and smaller rural settlements and from south-west by the Vukomeričke gorice slopes and from the east by the Sisak town area with the Kupa river. The basic distribution of area into landscaping units is determined by dominating spatial elements: urban – rural agglomeration (beginning of the project), the area of the Turopolje flat country with the continuous alternation of agricultural and forest land and characteristic longitudinally laid villages (the greatest area of the project), and the ending south part in the Kupa river valley with the wider area of the town of Sisak. The greatest environmental impact is expected on the locations of high structures (viaducts and overpasses) as well as on the flat country relieve with high embankment and the effect on visual impression of the river landscape of the Kupa river.

Cultural heritage

The cultural heritage of the stated area is extremely rich and has been recorded and evaluated in conservatory studies and documents that were used as a basis for the development of zoning plans of the Zagreb and Sisak-Moslavina counties, as well as for the towns of Zagreb and Velika Gorica. The data on archaeological heritage are largely based on accidental findings from the first half of the 20th century.

ENVIRONMENTAL IMPACT OF THE PROJECT**

The environmental impacts of the planned project are divided into the ones during design development, preparation and construction and those during exploitation i.e. traffic:

- **Water impact** (the impact of polluted pavement water on the ground water; the motorway runs through the area with the highly permeable deposited gravel and sandy layers and in which large volumes of ground water is accumulated and used for the water supply of Zagreb, Velika Gorica



and the surrounding areas. A sufficient number of culverts are foreseen on motorway route that is intersecting many brooks, streams and drainage canals in order to protect the natural water courses).

- **Impact on noise levels** (increased noise levels in residential areas)
- **Impact on landscape** (impact on the aesthetic value of landscape during the works as well as upon the works, degraded areas of the sites, excavation and dumping areas for the surplus construction material, impact brought by the changed purpose of areas...)
- **Impact on flora and fauna** (fragmentation of habitats, direct killing of animals...)
- **Impact on game and hunting** (direct loss of hunting-productive areas, impact on game migration...)
- **Impact on natural heritage** (impact on the protected parts of nature...)
- **Impact on cultural heritage** (direct and indirect impacts)
- **Impact on air quality** (impact on the mean daily concentration of pollutants...)

It shall be noted that all defined environmental impacts are assessed as acceptable with the application of the prescribed environmental protection measures.

ENVIRONMENTAL PROTECTION MEASURES***

The following environmental protection measures have been prescribed for the subject route:

- **General environmental protection measures** (restricted movement of heavy machinery, frequent and controlled disposal of waste material.....)
- **Water protection measures**, pa controlled drainage system shall be foreseen:
 - *collecting system* that comprises water intake structures, impermeable collectors for the drainage of collected water to the treatment plants,
 - *treatment system* that includes grease traps and lagoons,
 - *disposal system* that comprises outlet of the treated water into the receiving body of water;Regular cleaning and quality maintenance of the water protection system shall be ensured.
- **Landscape protection measures** (development of the landscaping design as part of the final design; natural autochthonous vegetal species shall be predominant...)
- **Fauna protection measures** (mounting of safety fences on both sides, ensuring game migration by building sufficient number of game crossings that must be adjusted in height and width, landscaping design shall also be adapted to game species...)
- **Noise protection measures** (when developing engineering documents the assessment of noise levels shall be conducted and where necessary noise barriers shall be foreseen and upon opening of the motorway to traffic control measuring of noise levels on critical points shall be performed...)
- **Measures for the protection of cultural heritage** (archaeological supervision during the works and implementation of additional measures when encountering unclassified sites...)
- **Measures for the prevention and mitigation of potential environmental incidents** (in the event of traffic accidents the actions shall be undertaken according to the Plan of interventions for environmental impact protection in the areas of the Zagreb and Sisak-Moslavina Counties, the town

*** taken from the Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway with the application of environmental protection measures and environmental monitoring, Class: 351-02/03-06/0082, File No: 531-05/4-AM-03-5 of Dec 03, 2003 and from the Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway Section Jakuševac- Velika Gorica (South), with the application of environmental protection measures and environmental monitoring, Class: UP/I 351-03/06-02/65, File No: 531-08-3-1-AG-07-7 of May 25, 2007.



of Zagreb and in line with the National plan for the protection of water i.e. according to the provisions of the Operating plan of intervention measures in the event of unforeseen pollution).

ENVIRONMENTAL MONITORING PROGRAMME****

The Environmental Monitoring Programme is implemented during construction and exploitation that is traffic.

Monitoring of the following environmental components is foreseen for the subject route:

- **Water quality monitoring**,
(monitoring of the quality of waste water that is discharged into water courses, monitoring of the ground water quality especially in the well areas)
- **Monitoring of conditions of natural communities – including hunting game**,
(monitoring the frequency and distribution of possible killing of animals and game in traffic)
- **Noise levels monitoring**,
(within a year upon opening of the motorway to traffic noise levels shall be checked. i.e. the efficiency of the implemented protection measures shall be verified on all structures and in the event of exceeded values, protection measures shall be intensified).

All stated environmental measures have been elaborated and verified by special requirements issued by the competent institutions within location permit issuance procedure and then adopted and included in design documents and their inclusion in the final design engineering documents has been verified by approvals issued by the same competent institutions within construction permit issuance.

**** taken from the Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway with the application of environmental protection measures and environmental monitoring, Class: 351-02/03-06/0082, File No: 531-05/4-AM-03-5 of Dec 03, 2003 and from the Decision on Environmental Safety of the Project of construction of the Zagreb – Sisak Motorway Section Jakuševac- Velika Gorica (South), with the application of environmental protection measures and environmental monitoring, Class: UP/I 351-03/06-02/65, File No: 531-08-3-1-AG-07-7 of May 25, 2007.