

**RIJEKA BY-PASS**  
**SECTION VITOSEVO-KRIZISCE**  
**ENVIRONMENTAL IMPACT ASSESSMENT UPDATE**  
**SCOPING REPORT**

## **1. INTRODUCTION**

The section of the state road D-8 Sv. Kuzam – Križišće along the stretch Matulji – Diračje – Škurinje – Orehovica – Vitoševo – Križišće is the part of international traffic line E-65 Trst-Rijeka-Split and it is defined in the space from Rupe to Žuta Lokva.

Up to day section Matulji – Orehovica is constructed in length of 13,5 km as a motorway with all crossings in two levels. The section Orehovica – Sv. Kuzam is under construction in length of 6,3 km. The main design necessary for obtaining the building permit is being developed and after obtaining such building permit construction can begin.

The section Sv. Kuzam – Križišće starts at km 6+355.00 and ends at km 14+720.00 and is 8.365 km long. Two interchanges have been planned on the section, at Hreljin and at Križišće. At the Hreljin interchange a road connects to state road D501. At the Križišće interchange there is a road diverging to state road D102 to the island of Krk (to the newly built intersection of the county road Ž5064 and the state road D102) north of the interchange Šmrika to D8 (The Adriatic Tourist Road).

The section of the motorway Sv. Kuzam – Križišće pass through municipalities of Bakar and Kraljevica. It is a replacement for the existing Adriatic Tourist Road running through the Bakar Bay and Kostrena and bypassing the urban areas of the eastern part of Rijeka (Kostrena, Bakar, Bakarac, Kraljevica and Šmrika).

This section will connect tourist destinations of island Krk through connection road D-102, as well as settlements on coastal area at highway to Zagreb.

The Rijeka By-pass motorway with its branches directing towards Trieste, Ljubljana, Zagreb and Split is an arterial road route of wider international significance and forms part of the Trans-European road network.

## **2. PROJECT**

### **2.1 Project description**

The Project involves the construction of a 10,62 km long section of the Rijeka By-pass between Sveti Kuzam (Vitoševo) and Križišće. The project will complete the eastern By-pass of Rijeka, relieving traffic in the heavily congested city centre.

The By-pass will be constructed to a dual two-lane standard, with a high structural content, including five viaducts (total length of 2.47 km) and three tunnels (combined length of 1.33 km). There will also be works associated with the Hreljin interchange. Approximately 45% of this section of the mainline motorway will be constructed either on viaduct or in tunnel. At straight Sections the corridor comprises width of 100 m, with extensions in the interchange areas.

Croatian Roads ("CR") has requested the European Bank for Reconstruction and Development ("EBRD" or the "Bank") to participate in the funding of the construction of the Project. The World Bank is providing financing for other sections of the By-pass section between Orehovica and Sv. Kuzam and the port connector road D404.

## 2.2 Project Background

A corridor (reserved area) for the By-pass along the stretch Matulji – Diračje – Škurinje – Orehovica – Sv. Kuzam – Križišće was included in the Physical Plan of Rijeka Town already in 1974.

Since 1974 a series of documents and master/land use plans have been issued reaffirming the relevant corridor as optimal for construction of the arterial, international highway routes A6 (M12) (E-65, E-63, E-71) Budapest – Zagreb – Rijeka and D8 (M2) (E-65, E-751, E-80) Trst – Rijeka – Split –Dubrovnik – Skopje.

An Environmental Impact Assessment (EIA) Study for a 14.6 km long section of the By-pass between Orehovica and Križišće (*Orehovica – Sv. Kuzam – Križišće, with a link to Krk Bridge, Mainland – the Island of Krk*) was carried out in 1986. The EIA was evaluated and approved, and the land use planning and construction permits were obtained with anticipation that the Orehovica – Križišće Section would be constructed during 1990 – 1995. At that time, law did not require public consultation.

## 2.3 Project Status

The current stage of the project is a result of a long-term process of formal procedures concerning location of the By-pass/motorway. Decisions in respect of the location of the corridor for the By-pass section Sv. Kuzam – Križišće were taken during 80s. The run of the motorway corridor at this section is decided and legally valid. Requirements under Croatian law have been met and approvals for the Project have been obtained.

The construction of state road D8 is planned in accordance with the relevant physical planning documentation: (a) the Physical Planning Program of the Republic of Croatia; (b) the Physical Plan of the Primorsko Goranska County, and (c) the Physical Plans of local communities, Town of Bakar, and Town of Kraljevica.

The Preliminary design has been developed as the bases for obtaining location permit. The **Location permit** for construction of the road Sv. Kuzam – Križišće including connection road from Križišće junction to state road D102 – Kraljevica (D8) – Krk – Baška has been obtained (November 2002.). Making of the main design necessary for obtaining Building permit is in progress now.

## 3. LEGAL FRAMEWORK

Basic relevant /applicable laws:

Law on Spatial/Physical Planning  
Law on Environmental Protection  
Law on Protection and Preservation of Cultural Heritage  
Law on Protection of Nature

and necessary permits:

Location Permit  
Construction Permit

#### **4. SUMMARY OF THE 1986 EIA STUDY**

The 1986 EIA Study on the By-pass between Orehovica and Križišće was prepared by an interdisciplinary expert team specialised in regional planning, traffic development, ecology, designing, hydrology-geology, nature conservation, etc. The Study has been divided into 10 basic chapters and various subchapters, the scope of which is summarised below.

##### **Chapter 1 - Findings and Conclusions**

Summary of the key findings of the EIA study concerning various development, technical and analytical indicators of each particular scientific-professional field as well as the mitigation measures and conclusions intended to minimise the harmful impacts of the By-pass on human and natural environment.

##### **Chapter 2 - Reasons for Elaboration of an Assessment Study**

The objective of the EIA Study is to define the basic parameters for land use within the planned Corridor and in its imminent vicinity as well as for the technical and technological solutions that would minimise the adverse impacts on human and natural environment.

##### **Chapter 3 – Description of By-pass Function within the Arterial, Regional and Local Roads Network**

Outline of the function and the importance of the By-pass. The By-pass is positioned on the two most important road route directions; Letenje – Zagreb – Rijeka – Trieste and Koper – Pula – Rijeka – Split – Dubrovnik. These roads are international highway routes and form part of the Trans-European road network. The By-pass also complements the integration of the regional and local road network.

##### **Chapter 4 - Regional and Technical Characteristics of the Alignment in the Section Orehovica – Križišće**

The constructional and technical characteristics of the alignment as well as the regional relations within and surrounding the Corridor are described. The broader alignment area has been particularly analysed as well as the attitude towards natural and created values, in accordance with the valid land use plans. The key characteristics include:

- The alignment in this Section crosses the steep slopes of the Draška valley where it shall be necessary to carry out significant cuts in terrain, construct big supporting walls and intervene in the delicate natural landscape.
- There are no family housing projects within a corridor of 100 m from the alignment axis. Interweaving of the By-pass with the housing projects in the village of Vitoševo (Sv.Kuzam) has been resolved by directing the alignment through a tunnel passing under the village and under the existing and planned railway routes.
- From the interchange Sv. Kuzam to Križišće the alignment is positioned within very unfavourable topographic conditions. Due to the occupation of suitable terrain by the future marshalling yard on the Krasnik plateau, the alignment is directed either over steep slopes or through a tunnel under the "Rebar" and "Crni Vrh" mountains.
- Due to terrain characteristics the design speed of motorway amounts to  $V_f = 90$  km/h for which the technical elements of alignment have been prepared.
- The inter-regional interchange "Križišće" has also been designed by which the arterial road Mainland - the Island of Krk is deviated from the Adriatic Motorway.

- The regional road Čavle – Sv. Kuzam – Bakar is connected to the By-pass by the interchange “Sv. Kuzam”, while the villages Krasnica, Hreljin and Praputnjak are linked with the Motorway by the interchange “Meja”.
- All existing local and pedestrian roads shall be resolved by grade-separated structures in accordance with the Conditions of Land Development or pursuant to the valid Land Use Plans.
- Since the Motorway is positioned at distance from the local villages and runs across hardly accessible terrain, local traffic diversions are not often required.

## **Chapter 5 - Land Use and Planning Indicators**

Review of the Land Use Plans. After a public debate, the relevant Plans accepted the alignment and the Corridor of the specified traffic route. The basic Land Use Documents include the Master Plan of the Rijeka Municipality, the Master Plan of the Rijeka Municipality Association and the Master Plan of the Republic of Croatia.

The function of the Rijeka By-pass is to efficiently interconnect the complex economic system of the Rijeka area linking it with the world particularly through the inter-regional road routes towards Trieste, Pula, Ljubljana, Zagreb and Split.

The selected alignment was positioned at low ground elevations and in the vicinity of town settlements in order to achieve:

- the shortest possible connections to the port terminals and the industrial zones for the origin - destination traffic;
- the accommodation of local traffic by interchanges linking wider gravitational areas and their interconnecting, particularly in the east-west direction.

Respective traffic projections have been analysed in detail in the Traffic Study of Rijeka, Opatija and Crikvenica and they form the basis for designing of the By-pass as well as of the network linking the By-pass with the town roads.

## **Chapter 6 - Assessment of Environmental Impacts**

### **Air pollution**

The relevant air pollutants from the road traffic include carbon monoxide (CO), hydrocarbon (CnHn), nitrogenous oxides (NO<sub>x</sub>), lead compounds (Pb) particles and sulphur dioxide (SO<sub>2</sub>). The factors that influence air pollution have been clearly analysed; such as the automobile circulation, standstill of vehicles, driving style, traffic regulations, structure of vehicles, etc.

In 1986 the situation concerning the air pollution caused by vehicles in the town of Rijeka was not satisfactory and exceeded the limit values, particularly in the downtown area where the streets were crowded by cars and trucks. Ten year monthly concentrations of SO<sub>2</sub> in the F.L.Guardia street amounted to 109 g/m<sup>3</sup> nearing GVTd = 110 g/m<sup>3</sup>.

Since the By-pass will adhere to high traffic standards envisaged for the speed of no less than 40 km/h and since it will take over the majority of the town traffic, it is anticipated that the general situation regarding the air pollution should improve.

### **Probable impacts of wind, fog, ice and the temperature regime**

According to the data collected on the ten-year basis, the area is affected by strong winds. Winds over 11 m/s appear on average in 148 days of a year and stronger winds are also frequent. The analysis indicates that mitigating measures should be taken concerning strong wind squalls, particularly on high structures, which should in general be avoided.

The impact of fog is not a significant issue within the By-pass region.

Appearance of ice on elevations below 1,000 m is very rare, every 4-5 years.

### **Noise**

The general progress in motor vehicles has resulted in significantly reduced vehicle noise. Similarly, there are design features to be installed on roads that aim at minimising the harmful impact of noise over the environment.

Implementation of the regional planning criteria to prohibit construction of residential or working structures within the By-pass corridor is considered to be an efficient act in preventing the traffic noise impact.

Residential settlements located in the motorway's imminent vicinity should be protected by special technical fittings to be installed directly on the relevant structures, or by creating the acoustic barriers along the motorway. When designing each macro-section the relevant solutions should be specified.

### **Traffic safety**

It has been generally stated that frequent traffic jams in the Rijeka city area often cause severe traffic accidents. Evidently, the safety of people involved in traffic is rather low. In this aspect the construction of the By-pass shall improve the capacity of the town road network as well as its safety. The remote transit origin-destination vehicles shall be diverted to the By-pass and enforcement of various traffic regulation measures shall be obligatory in order for the level of safety be increased.

### **Underground streams**

The construction of the By-pass, including cuts and fills, will disrupt the natural water streams and their directions are diverted from the stream basin. A traffic road, as a construction structure, passes through four zones of sanitary protection where the prescribed protective environmental mitigation measures for the quoted zones are to be implemented pursuant to the "Ruling on Spring Waters Sanitary Protection Zones within the Rijeka Municipality".

### **Existing infrastructure**

The existing infrastructure (water, gas, sewerage, electric installations, phone installations) interferes with the designed road drainage, which should be taken into consideration when elaborating the technical documents.

### **Potential impacts on the surrounding vegetation and wildlife**

Detailed presentation of vegetation and wildlife, their structure and significance, are set forth as well as the repercussions of transition from natural environmental setting to a man-made character of future landscape.

Over a relatively narrow area, from Križišće to Matulja and towards Rupa, stretches a very interesting segment of Dinara Karst with its typical vegetation.

The lithographic structure includes lime and dolomite rocks with their specific forms; karst valleys, sinkholes, limestone cracks, rocky ground, caves, "pock marked" karst, swallow holes and similar.

Local continental variant of Mediterranean climate abounds with specific vegetation and wildlife analysed in detail together with the probable resulting modifications that could occur after the route is constructed. As far as humans are concerned, the forests east and west from the river Rječina are extremely valuable (they function as soil stabilizers, air filters, regulators of air humidity and temperature, accumulators of

water in soil, producers of oxygen, shields from winds and snow, etc.). In addition, the forests with their aesthetic characteristic function as tourist resorts and could serve for possible defence purposes in case of a war.

Motorway construction shall create a bordering line between the town and its surroundings resulting in specific communication conditions. Significant interventions into the traffic regime, municipal utilities and other elements of town structure shall have to be done.

At the Section Draga – Krasnica, in the vicinity of town districts, the processes of disrupted natural environment shall require intensified activities to be carried out in order to mitigate the new situation. During the designing process a whole series of protective measures, such as sanitary, municipal and horticultural, shall be envisaged and developed.

Mitigation measures should be intensified by inserting as much biomass as possible within the town and its surroundings in order to minimise the adverse impact of constructing this linear structure inside the very tissue of the town.

### **Geology, hydrogeology and seismology**

Geologic characteristics of terrain through which the motorway passes are reflected in the soil composition, which is mainly stable, composed of limestone fine-grained clastic rock (flysch mainly sandstones). The stability of natural soil shall minimise the negative impact at slope fills and cuts.

The "Hydrologic Study" and the "Theses for Establishing and Maintaining of the Sanitary Protection Zones" form the basic grounds for solving the problems concerning the protection of town water basins and water supply structures.

By Decision that stipulates establishing and maintaining of the sanitary protection zones and by the protective measures that refer to the potable water spring areas, water regimes have been defined and protected from pollution. The hydro-geological terrain characteristics per each section are described.

The legal basis and a short review of characteristics and applicability of seismology per each section have been carried out in accordance with the "Rijeka Seismic Micro-Division" issued by the Zagreb Geologic Institute in 1974.

### **Modified communal infrastructure**

The motorway alignment cuts a whole series of the existing communications and the utility lines (municipal infrastructure), such as water supply, sewerage, gas-lines, electricity installations and phone lines throughout the city area. The existing infrastructure shall be replaced at all locations where it coincides with the new and the new installations shall be placed into special culverts, if activated immediately. If not, spaces shall be left for future construction.

## ***5. POTENTIAL ENVIRONMENTAL IMPACTS AND PROPOSED MITIGATION MEASURES***

The conclusions of the 1986 EIA Study constitute basic elements for establishing the land development conditions. They also determine provisions for mitigation measures intended to prevent or minimise adverse impacts of the construction and the operation of the By-pass on the human and natural environment. Specific measures for the protection of water yielding area and sources, noise mitigation and roadside restoration and landscaping have been developed. The key conclusions include:

1. Construction of the motorway is a very complex regional and engineering project having major impact on the environment. Such an impact will be mainly reflected in villages at locations of motorway crossings, in traffic and infrastructure system patterns, in change of air polluting levels, noise, vegetation and wildlife, environmental characteristics, as well as the landscape scenery.
2. With respect to changes of traffic regime and communication systems, construction of the By-pass and its opening for traffic shall significantly improve the standards of the whole traffic system by re-routing the heavy transit traffic around the Rijeka town and its street network. Origin-destination traffic directed to the By-pass shall minimally burden the town street network, as it will reach the targeted city zones by shortest possible routes.
3. High standards of motorway equipment, central automatic traffic control with video monitoring shall enable high driving speeds of 70-100 km/h, significantly reducing transport costs and saving travel time.
4. All transitions within the road network and the municipal infrastructure and all design solutions for interchanges and pedestrian and vehicle roads shall be adjusted with the urban development plans. The existing municipal infrastructure as well as the one envisaged across the By-pass route shall be put into function, or other technical solutions shall be determined for its unhindered implementation.
5. Protection of water basins and potable water springs in I and II water protection zones shall be implemented by watertight sewerage system along the alignment and by oil and grease separators directed into town sewerage. In III and IV zones, from separators through soak ways it shall be discharged into soil.
6. The impacts of noise on the residents in the existing housings shall be resolved during the process of development of technical documents. Technical solutions shall be applied and all available noise protection barriers shall be installed, either on the source of noise or on the relevant structure. Within the route corridor no new residential structures shall be built.
7. With regard to any structure construction within the corridor, the provisions of the land use plan of the Rijeka municipality shall be enforced.
8. Landscaping and restoration of environment surrounding the future motorway is obligatory in order to remedy the disrupted conditions. It shall be implemented through construction and engineering works (hard restoration) and through forestry – planting measures including the horticultural works (soft restoration). The Motorway scene shall be maximally cleared from the existing insignificant objects (shrubs, garbage, bushes, barrack remains, etc.) and actions shall be taken to restore vegetation, in the best possible manner. This is going to be achieved only by permanent maintenance of the structure positioned within the described scenery.
9. When elaborating the urban development plans for the wide By-pass area, legal measures and the provisions specified by the land use plan shall be obeyed, while the urban structures surrounding the By-pass shall be permanently harmonized. As a result, the planned corridor of 200 m shall be narrowed to the legally defined distances. Functional objects within the corridor shall be located strictly in accordance with various motorway requirements.

10. The authorities of municipalities through which the motorway passes shall supervise implementation of the requirements stipulated by this study. The above supervision shall primarily include the elaboration of urban plans, definition of the land use plan conditions and issuing of construction permits for the objects and structures located along the By-pass.

## **6. MONITORING**

An Environmental monitoring programme should be developed, including at least:

- periodic noise measurements in the vicinity of the construction site, as well as in any housings areas during the operation,
- systematic measurements of selected transport pollutants during operation,
- periodic monitoring of soil and surface and ground water quality during construction and operation, and,
- periodic monitoring of changes in local ecosystems.

## **7. THE ENVIRONMENTAL IMPACT ASSESSMENT UPDATE**

### **7.1. Objectives**

The main objective of the EIA update is to amend the 1986 EIA study to correspond the current environmental and social status within and in the vicinity of the By-pass and the detailed technical design as well as to meet the EBRD's EIA and public consultation requirements for the Project. The EIA update will also identify any subject areas not adequately covered in the 1986 EIA Study and carry out such additional investigations and analysis as found to be necessary.

### **7.2. Scope**

The EIA update will analyse the 1986 EIA Study and other available environmental and technical and physical planning information that have relevance to the Project. It will verify and update, as needed, the description of the existing environment (baseline) in accordance with the current status of the areas that may be affected by the Project.

The EIA update will provide information on potential environmental, cultural, socio-economic and land use, settlement and traffic pattern changes and impacts (both positive and negative) resulting from the Project, taking into consideration the specific issues associated with the construction of tunnels and viaducts. It will address issues that may not have been adequately covered in the 1986 EIA study, such as soil pollution and degradation, land take, flora and fauna, microclimate, visual pollution, consumption of energy and resources, traffic accidents and socio-economic impacts.

It will assess the adequacy of the mitigation measures and emergency response plans and, where needed, determine further mitigation measures to ensure the Project will meet Croatian and European Union environmental standards.

### **7.3. Draft Table of Contents**

A Draft Table of Contents of the EIA update is presented in Annex 1.

## **8. PUBLIC DISCLOSURE AND CONSULTATION**

According to the existing laws and regulations, international conventions and good practice, the public has the right of being properly and timely informed about any type of project that can cause an impact on the environment. The EBRD pays particular attention to informing the public on the Project and believes that meaningful public consultation is a way of improving the quality of the Project.

The representatives of the governmental and self-governmental authorities, local residents and people that may be affected by the project, ecological and non-governmental organisations as well as of academic or scientific bodies have been invited to take part in the public discussion (scoping meeting) for determining the scope of the EIA update .

Details on the public involvement can be found in the Public Consultation and Disclosure plan.

## **ANNEXES**

Annex 1      Environmental Impact Assessment, Draft Table of Contents

**Environmental Impact Assessment**

**Draft Table of Contents**

**Executive Summary**

**1.0 Operational context**

- 1.1 Purpose and need
- 1.2 Legal and institutional framework
- 1.3 History of the operation including alternatives considered

**2.0 Description of the Project**

**3.0 Description of the existing environment**

- 3.1 Climatic conditions
- 3.2 Geomorphology and geology
- 3.3 Surface and ground water quality
- 3.4 Landscape
- 3.5 Ecology and biotic resources
- 3.6 Air quality
- 3.7 Noise
- 3.8 Ground conditions
- 3.9 Socio-economic and cultural issues
- 3.10 Land use and settlement patterns

**4.0 Description and assessment of the significant environmental impacts of the proposed operation at the local, regional and global levels**

- 4.1 Impacts associated with construction
- 4.2 Impacts associated with operation
- 4.3 Identification of key uncertainties and data gaps
- 4.4 Comparison of impacts associated with alternatives, including the do-nothing alternative

**5.0 Description of mitigation measures and/or measures to enhance environmental benefits**

**6.0 Outline of an environmental monitoring plan**

- 6.1 Monitoring during the construction phase
- 6.2 Monitoring during operation