



FWC BENEFICIARIES 2009 - Lot 2: Transport & Infrastructures  
EuropeAid 127054/C/SER/Multi



Support in the Preparation of the Strategic Environmental  
Assessment (SEA) for the Republic Of Croatia's Transport  
Development Strategy

IPA 2007/HR/16/IPO/002-0215

# STRATEGIC ENVIRONMENTAL IMPACT STUDY FOR TRANSPORT DEVELOPMENT STRATEGY OF REPUBLIC OF CROATIA

June 2014

This project is funded by The European Union



A project implemented by



<b>Programme :</b>	European Union IPA 2007
<b>Partner Country:</b>	Republic of Croatia
<b>Competent Authority:</b>	Ministry of Maritime Affairs, Transport & Infrastructure Prisavlje 14 , 10000 Zagreb, Croatia
<b>Project Reference No:</b>	IPA 2007/HR/16/IPO/002-0215
<b>Contractor</b>	Planet S.A
<b>Title</b>	<b>Strategic study of the Environmental impact of Transport Development Strategy of Republic of Croatia</b>
<b>Project Leader</b>	<b>Demetrios Economides,</b> Chemical Engineer MSc, Team Leader – Environmental expert
<b>Working Team</b>	<b>George Emmanoulopoulos,</b> MSc in transport planning engineering, Transport Expert

#### Main assessment of on Ecological Network, Annex 1

<b>Team Leader</b>	<b>Demetrios Economides,</b> Chemical Engineer MSc, Team Leader – Environmental expert
<b>Consultation and information</b>	<b>Ministry of Maritime Affair, Transport and Infrastructure</b>

*This report has been prepared with financial assistance from the Commission of the European Communities. The views expressed herein are those of the consultant and therefore in no way reflect the official opinion of the European Commission.*

## **Table of contents**

1. The SEA process and methodology .....	2
2. The Transport Development Strategy .....	3
3. Current state of the environment in Croatia.....	5
4. Environmental objectives .....	6
5. Assessment of TDS objectives and alternatives .....	8
5.1 Assessment of TDS objectives .....	8
5.2 Assessment of TDS alternatives .....	9
6. Assessment of environmental impacts of the Strategy .....	10
7. Mitigation of environmental impacts of the Strategy - Recommendations .....	11

## 1. The SEA process and methodology

The Ministry of Maritime Affairs, Transport and Infrastructure (MMATI) of the Republic of Croatia is currently preparing the 20-year Transport Development Strategy of the Republic of Croatia, aiming at setting the development goals for transport in the country in coherence with the transport policy of the European Union.

The Transport Development Strategy (TDS), as a Strategic Transport Plan of the country, is subject to Strategic Environmental Assessment, according to Environmental Protection Act (Official Gazette 80/13), which is compliant to the SEA Directive 2001/42/EC and the relevant Croatian Regulation on Strategic Environmental Assessment of Plans and Programmes (Official Gazette 64/08)

**Strategic environmental assessment (SEA)** is a systematic, pro-active and participative process that aims at ensuring that environmental aspects are given due consideration in planning and decision making above the project level, frequently referred to as 'strategic action' or 'policies, plans and programmes (PPPs)'. In the European Union, SEA Directive 2001/42/EC, (the 'SEA Directive') lays down the principles, methods and fields of application of SEA.

The Strategic Environmental Assessment is a parallel and interactive process with the TDS development. The main phases of the approach include:

Screening phase: aiming at consultation of the environmental authorities about the need of strategic environmental impact assessment for the TDS. The screening phase was conducted prior to the commencement of the present assignment by MMATI. The decision on the need of SEA was issued on November 5<sup>th</sup> 2013.

**Scoping phase** aiming at (i) Presenting a review of the current state of the environment in the country, as well as the evolution of environmental status without the realisation of the Strategy, (ii) Determining the environmental elements that are likely to be affected by the Strategy, (iii) Setting up the environmental objectives that will be the basis for the assessment of the Transport Strategy and (iv) Enabling consultation with stakeholders on the scope of the planned SEA work. The scoping phase was conducted in the period September 2013 – January 2014. The Draft Scoping report was elaborated in September 2013.

**Environmental Assessment Phase**, aiming at assessing the impacts of the TDS on the environment, proposing measures for mitigating adverse effects, as well as monitoring procedures, and formulating recommendations for the improvement of the environmental performance of the TDS.

The Environmental Assessment phase started after finalisation of the Scoping phase. The SEA was conducted in parallel with the TDS development and the SEA findings are based on the Draft TDS finalised in April 2014.

Based on the Draft TDS, the potential environmental impacts from the implementation of the Strategy were identified and respective mitigation measures were proposed.

The procedure is ongoing, since the TDS, as well as the SEA will be subject to Public Consultation in June – July 2014 and amended according to the results of the Public Consultation.

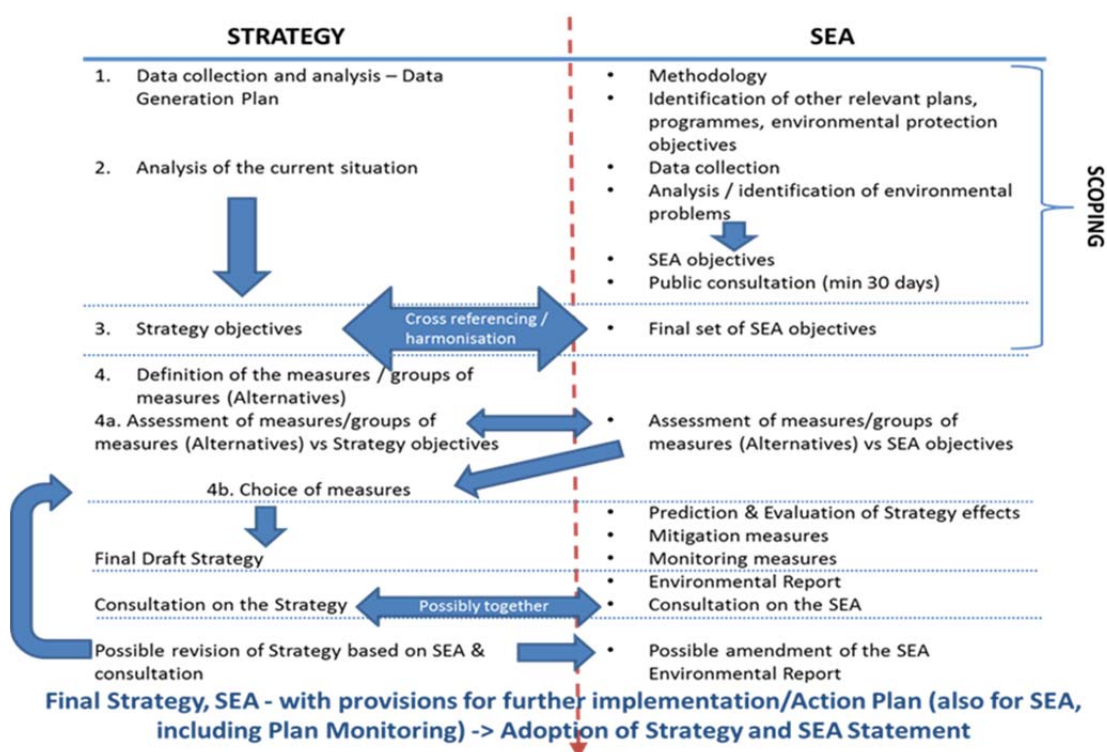
The Draft TDS will then be assessed again against SEA objectives.

After the fulfilment of this interactive procedure, the Final SEA Report (presenting how SEA results and public and stakeholders comments were addressed in TDS) will be submitted to the MoENP for positive opinion.

After finalisation of the above procedure, Government Adoption of the TDS will be launched. Expected time frame for the finalisation of the above procedures is September 2014.

The procedure of the SEA approach and its relationship with the Transport Strategy Development is summarised as follows:

**Figure 1: Key strategic Decision Making steps and parallel SEA stages.**



## 2. The Transport Development Strategy

The vision of the TDS is the enhancement of the country's economy and development through the provision of an intermodal, sustainable, efficient and safe transport system.

The general goal of the Strategy is to achieve an efficient and sustainable transport system in the territory of the Republic of Croatia, taking into account the new role of the country after

its accession to the European Union in July 2013. The objectives of the TDS are the following:

**Table 1: Objectives of the TDS**

OBJECTIVES	SUB-OBJECTIVES
<b>1 Improvement of transport connectivity and coordination with neighbouring countries</b>	1a Border bottlenecks elimination
	1b Improvement of international passengers long distance accessibility (including transit traffic)
	1c Improvement of international freight accessibility (including transit traffic)
<b>2 Improvement of passengers long distance accessibility inside Croatia</b>	2a Improvement of passengers long distance accessibility - Central Croatia (Zagreb)
	2b Improvement of passengers long distance accessibility - Northern Adriatic (Rijeka)
	2c Improvement of passengers long distance accessibility - Eastern Croatia (Osijek - Slavonski Brod)
	2d Improvement of passengers long distance accessibility - Northern and Central Dalmatia (Split - Zadar)
	2e Improvement of passengers long distance accessibility - Southern Dalmatia (Dubrovnik)
<b>3 Improvement of the passenger regional connectivity in Croatia enhancing territorial cohesion</b>	3a Improving the regional connectivity on the mainland
	3b Improving the regional connectivity to/from/between the islands
<b>4 Improvement of the passengers accessibility to and within the main urban agglomerations</b>	4a Improvement of the passengers accessibility - Zagreb node
	4b Improvement of the passengers accessibility - Rijeka node
	4c Improvement of the passengers accessibility - Zadar node
	4d Improvement of the passengers accessibility - Split node
	4e Improvement of the passengers accessibility - Osijek node
	4f Improvement of the passengers accessibility - Dubrovnik node
<b>5 Improvement of freight accessibility inside Croatia</b>	5a Improvement of freight accessibility - Central Croatia (Zagreb)
	5b Improvement of freight accessibility - Northern Adriatic (Rijeka)
	5c Improvement of freight accessibility - Eastern Croatia (Osijek - Slavonski Brod)
	5d Improvement of freight accessibility - Northern and Central Dalmatia (Split - Zadar)
	5e Improvement of freight accessibility - Southern Dalmatia (Dubrovnik)
<b>6 Improvement of the Transport System Organisational and Operational setup to ensure the efficiency and sustainability of the system</b>	6a Adaptation of the legislation, rules and standards to the European requirements and best practice
	6b Improvement of the system organisational setup and cooperation between relevant stakeholders
	6c Improvement of the system operational setup
	6d Improvement of the safety of the transport system
	6e Reduction/mitigation of the environmental impact
	6f Improvement of the energy efficiency
	6g Financial sustainability of the transport system

Based on the previous diagnosis, reflection, analysis and definition of the intermodal and specific objectives, a set of intermodal measures have been defined to address each objective.

### **3. Current state of the environment in Croatia**

Air quality is generally good with some exceedences occurring in cities or near large point sources. The most widespread problem is the atmospheric pollution of particulate matter, due to transport, large combustion plants and large point sources. Air quality is systematically monitored by a network of monitoring stations.

Noise is not systematically monitored in Croatia, with the exception of measurements having been made at local level by local authorities as well as by Zagreb airport. Areas with increased noise levels include highways, urban agglomerations (due to traffic), ports and airports. The strategic noise mapping is under development. The main disadvantage of conducting systematic noise protection measures and reduce the harmful effects of noise on human health is the lack of funding for noise mapping at the local level and at the level of other taxpayers noise mapping, as well as the inclusion of data from noise maps and action plans in space planning documents.

The Republic of Croatia is abundant in water resources available for use for various purposes, and the quality of ground water is characterized as good / moderate compared to the oxygen and nutrients, and in some cases the problem is in relation to microbiological contamination. The main pressures are discharging untreated waste water, pollution, hazardous substances, excessive water use in individual cases and water pollution by nitrates from agricultural sources. State waters are regularly monitored. Croatia continues with the implementation of the provisions of the Water Framework Directive and other water directives in accordance with the River Basin Management Plan.

Sea bathing is in most cases of excellent quality. The main pressures to Adriatic Sea are the disposal of solid waste and wastewater by municipal and industrial sources.

Although there are limited relevant data, soil faces threats such as erosion, increased soil acidity, reduced nutrient bioavailability, contamination by heavy metals etc., while there still mine suspected areas, although their total area decrease due to mine clearance programs. Contaminated lands generally include landfills, industrial sites and power generation facilities (black spots).

Concerning biodiversity, Croatia possesses a great diversity of terrestrial, marine and underground habitats and is home to a considerable part of the populations of many species endangered at the European level. The main threats are conversion of natural habitats into building or agricultural land, as well as construction of roads and other communications, which frequently causes habitat fragmentation. Croatia has many protected areas, categorised under 10 different categories, of a total area of 689.709,65 ha . The final list of Natura 2000 sites contains 744 pSCIs (proposed Sites of Community Interest) (of which 208

sites are caves and pits) and 40 SPAs (Special Protection Areas), while Croatia has 5 sites designated as Wetlands of International Importance (RAMSAR list).

Croatia has important cultural heritage of all periods of the European history with 6 cultural sites inscribed in the World Heritage List, while 17 more are in the Tentative List.

Although the population of Croatia is declining there is a trend of urbanisation. Tourist sector is increasing and poses additional pressure to the environment especially at the coastal areas.

Croatia's legislation is compliant to the EU. The country, through sectorial strategies developed in the last years, has set environmental targets according to the EU principles.

Taking into consideration the environmental state of Croatia, the priorities for assessing the Transport Strategy are:

- Preservation and / or improvement of quality of inland waters
- Preservation and / or improvement of quality of sea water (with special emphasis on the degradation of the coastal waters at ports due to water stagnation and eutrophication)
- Preservation of biodiversity, protection of species and habitats
- Achievement of low noise levels especially in urban areas
- Low levels of particulate matter emissions both during construction and operation of the transport infrastructure

## 4. Environmental objectives

The objectives set in the SEA are presented in the following table:

**Table 2: Environmental objectives and indicators for Strategic Environmental Assessment of the Transport Development Strategy in Croatia**

CATEGORY	OBJECTIVE	INDICATOR	TARGET
<b>Air quality</b>	Preservation of good air quality and reduction of transport emitted PM10	NOx emitted PM10 emitted Number of exceedences	Directive 2008/50/EC on ambient air quality and cleaner air for Europe  Directive 2001/81/EC on National Emission Ceilings (NECD) (EC, 2001a).
<b>Climate change</b>	Reduction of GHG emissions	CO2-eq emitted Application of Sustainable Urban Drainage Systems in new and improved	Reduction of GHG emissions by 20% in comparison to 1990 For the application of drainage systems: To be



		infrastructure projects	defined by the National Strategy for Climate Change
<b>Energy</b>	Promote sustainable energy use	Total energy consumption of transport Fuel consumption per passenger-km Alternative fuel consumption	Decrease of final energy consumption by 10% in relation to average consumption for the period 2001-2005  10 % share of renewable energy in the transport sector, final energy consumption for each Member State (Directive 2009/28/EC on renewable energy (RED))  White Paper on Energy strategy of the Republic of Croatia (2009)
<b>Water</b>	Minimise pollution of surface waters and groundwater	Evaluation of water state	Directive 2000/60/EC
<b>Sea Water</b>	Minimise pollution on marine waters	Sea bathing water class	Directive 2006/7/EC
<b>Biodiversity and habitats, flora and fauna</b>	Minimise negative impacts on biodiversity & habitats	Land take in sensitive areas (km <sup>2</sup> ) Changes in traffic (pass.-km) in sensitive areas  Number of biodiversity enhancement schemes implemented through transport related activities (e.g. native species planting on roadsides, implementation of green/bio bridges)	0 land take in sensitive areas, excluding foreseen and regulated activities
<b>Noise</b>	Avoidance of exposure to levels which endanger health or quality of life	Population exposed to transport noise	Directive 2002/49/EC on environmental noise
<b>Soil</b>	Reduce negative impacts on soil damage (pollution, displacement)	The number of cases of pollutions	Agricultural Land Act (Official Gazette, 39/13) and safety measures of projects  The goals for the Regulations on the methodology for monitoring the status of agricultural land
<b>Cultural heritage</b>	Minimise impact on cultural and historic environment	Proximity of transport infrastructure	Minimisation of visual

		Number of designated buildings and cultural monuments at risk from transport	and aesthetic impact
<b>Land use</b>	Minimise adverse effects on land use- change of use	Land take by transport infrastructure mode (km2)	The goals are set by the Law on Agricultural Land (Official Gazette, 39/13) Objectives are set zoning and urban planning
<b>Material assets</b>	Make best use of existing infrastructure and promote the sustainable development of new infrastructure	Rate of reuse and recycle of materials Ratio of environmental friendly construction materials Land property affected (km2)	Targets of waste management strategy of Croatia
<b>Waste production</b>	Minimisation of waste production Adoption of integrated environmental friendly waste management practices (including hazardous waste management, such as asphaltic material)	Change of quantity of construction waste Proportion of construction / deconstruction waste that is reused / recycled. Increase of the service rate of the waste / wastewater infrastructure	Targets set by EU waste management directives. Targets of waste management strategy of Croatia
<b>Population</b>	Promotion of sustainable transport modes	Population using Public Transport and environmental friendly transport means. % of freight being transported by sustainable transport modes such as rail or water.	50% shift of medium distance intercity passenger and freight journeys from road to rail and waterborne transport (EU White paper on Transport)
<b>Human health</b>	Protection against recognised health risk for air pollution Minimise transport accidents	Population exposed to air pollution  Traffic accidents involving personal injury	Targets of the Directive 2008/50

## 5. Assessment of TDS objectives and alternatives

### 5.1 Assessment of TDS objectives

As far as the assessment of the compatibility of the TDS objectives with the SEA objectives, the main conclusions the following:

In general, the TDS objectives are in the spirit of development of sustainable transport and compliant to the European relevant policy.

None of the TDS objectives is incompatible with the SEA objectives.

All objectives are partly compatible with the SEA objective of the promotion of sustainable transport modes, since they promote accessibility and territorial cohesion.

There is a high percentage of uncertainty, especially for the TDS objectives 2, 4 and 5 due to the fact that the fulfilment of these objectives will most likely entail the construction and/or expansion of transport infrastructure, and thus will probably have negative impacts on the biodiversity, habitats and land uses, as well as impacts (positive or negative) on air quality, noise and climate change that cannot be foreseen at this stage. The potential impact of these interventions strongly depends on several factors, such as how the intervention will be realized, the modal shift that is probably promoted by them, the new transport pattern after the completion of them, etc. More detailed analysis that would reduce the level of uncertainty is not feasible at this stage, since the measures servicing these objectives should be assessed. This assessment is done at a further stage (see Chapters 6 and 7) Measures for addressing / offsetting that adverse impacts of the TDS measures are presented in the Chapter 8. By the adoption of such measures these objectives of the TDS can be fulfilled in an environmental friendly way.

Objective 6 is fully or partly compliant with the SEA objectives, since it refers to ensuring the sustainability of the transport in the country, the adoption of European Standards and the improvement of the organization structure of the sector. Objective 6 is an “horizontal objective”, which one could say presents the spirit of the TDS, which is the improvement of the transport system of the country, according to the EU legislation, standards and best practice.

In conclusion, even though a level of uncertainty exists (which can be offset by the specification of the interventions to be promoted), the TDS is focusing on the improvement of the Croatian transport in a sustainable way.

## **5.2 Assessment of TDS alternatives**

The methodology applied for the preparation of the TDS has led to the definition of measures which can contribute to the fulfilment of each TDS objective. For each objective, measures that clearly show a high degree of internal compatibility, are complementary with each other and proved to be necessary independently of the final decision on the preferred(s) mode(s), will be implemented since they do not compete with any other group of measures. These measures were grouped under the name “GENERAL”. There are however, other measures that could allow progress to the fulfilment of a TDS objective. These constitute a second group of measures (alternatives) per transport mode.

In the framework of the SEA, these “alternative packages” per TDS objective are examined in order to comment on their compatibility with the SEA objectives, and to formulate recommendations for their implementation.

The main conclusions of the assessment of the alternatives are the following:

- Public transport, the rail and the inland waterways alternative are the ones with the better environmental performance.
- Public Transport alternative is the one that should be considered as priority alternative

- Rail transport is the most environmental friendly alternative for the fulfillment of objectives where no Public Transport alternative exists, while it can be synergistic to the PT where such alternative exists.
- Inland water alternative has in general good performance and can act synergistically to the rail alternative.
- Maritime transport alternative should be carefully examined. Although it has a relative good environmental performance, it should be considered within a broader perspective for the development of the coastal zone, in order to avoid overexploitation of the coastal area.
- Road alternative presents uncertainty. It comprises infrastructure construction works that may have adverse effects on the environment.
- Aviation alternative is not a “stand - alone” alternative and should be considered mainly as a supplementary to the other alternatives, as it mainly covers different transport needs.

## 6. Assessment of environmental impacts of the Strategy

In general the TDS is in the spirit of the EU policy promoting modes such as rail, maritime and inland navigation, which are considered more environmental friendly. The significant environmental impacts of the TDS can be summarised as follows:

- **Air quality:** In general, the overall impacts of the TDS on air quality are considered to be positive, taking into account the spirit of promotion public transport, rail, inland and water navigation. Air emissions (mainly PM10 and exhaust emissions) are expected during the construction phase of the infrastructure.
- **Climate change:** In general, the overall impacts of the TDS on air quality are considered to be positive, taking into account the spirit of promotion public transport, rail, inland and water navigation. GHG emissions during the construction phase of the infrastructure
- **Energy:** the TDS has positive impacts on energy efficiency, since it promotes measures such as modernisation of fleets, use of alternative fuels
- **Water:** The most significant adverse impacts expected during construction and operation of measures concerning inland navigation relate to dredging and other engineering works, water pollution due to spillages or discharges,, sedimentation, water thermal pollution, etc. Land transport modes may have adverse impacts due to spillages and run-off of hazardous substances
- **Sea:** The most significant adverse impacts are expected during construction and operation of measures and relate to dredging and other engineering works, water pollution due to spillages or discharges,, sedimentation, water thermal pollution, etc.
- **Biodiversity, flora and fauna:** Inland water and maritime navigation will have adverse impacts on habitats mainly due to physical modification of water bodies, species disturbance and displacement caused by river engineering works and increased shipping traffic, barriers to migration and dispersal of species, introduction of invasive and non-native species. For land transport, the most

important impact is the species fragmentation due to construction of transport network elements.

- **Acoustic environment:** Increased noise levels are anticipated during the construction phase of the foreseen infrastructure. Additionally, increased noise levels are expected in the vicinity of transport infrastructure and at ports.
- **Soil:** Negative impacts are expected due to accidental spillages during construction and operation of the infrastructure, as well as due to deposition and precipitation of the air pollutants produced from the various transport modes. Moreover, measures foreseen for inland water and maritime navigation may cause soil erosion.
- **Cultural heritage:** Since the TDS mainly foresees the rehabilitation and expansion of existing infrastructure no significant additional effects are anticipated. Negative Impacts may occur in the phase of construction of the infrastructure, which should be carefully assessed during the environmental permitting phase of the works.
- Additionally, improvement of accessibility of cultural and historical areas leads to increase of visitors and consequently to secondary impacts, such as waste generation, noise, etc.
- **Land use:** Since the TDS mainly foresees the rehabilitation and expansion of existing infrastructure no significant additional effects are anticipated. However, the effects on land use should be examined in combination with other development policies such as spatial development policy.
- **Material assets:** Most of the measures foreseen in the TDS concern the rehabilitation, improvement and modernisation of existing infrastructure. This is in line with the SEA objective of make best use of existing infrastructure and thus the impact is considered positive. Concerning the promotion of sustainable development of new infrastructure, the impacts might be negative, due to the fact that the necessity of construction materials will result to an increase of the demand of construction primary materials (such as sand, limestone etc.), that may downgrade certain areas (quarrying areas).
- **Waste production:** The main impacts on waste production concern the construction of the foreseen infrastructure for all sectors, during which large quantities of construction/ demolition waste will be produced. Negative impacts are also anticipated by the operation of rail transport, as well as inland and maritime port activities.
- **Population:** The TDS promotes sustainable transport modes and it is expected to reduce the risk on human health due to air pollution.
- **Safety:** The TDS has positive effects on the transport safety due to amelioration and rehabilitation of the transport network, renewal of fleets, as well as the promotion of specific measures that ensure transport safety.

## 7. Mitigation of environmental impacts of the Strategy - Recommendations

The main guidelines for the mitigation of the adverse environmental impacts and recommendations for the improvement of the environmental performance of the TDS include:

- Careful design of all planned infrastructure. The provisions of the TDS for studies assessing the necessity and feasibility of infrastructure (especially for the road sector) should be prioritised.
- Measures of the TDS enhancing the environmental performance, such measures promoting energy efficiency, use of alternative fuels as well as measures for the reorganisation of the transport sector must be prioritised.
- The TDS and its implementation should be in coordination with other development strategies of the country such as Spatial Development and Tourism Development strategy.
- Adoption of good construction management practices for all construction works, in order to minimise air emissions, greenhouse emissions, contamination of water and soil by spillages, excessive noise levels etc.
- Adoption of European and international environmental standards and know-how on the prevention and mitigation of the adverse environmental impacts
- Adoption of measures to prevent / minimise the impacts on protected areas and cultural heritage. The protection of the outstanding natural and cultural environment of Croatia should be the corner stone for the interventions.
- Detailed mitigation measures should be presented at the environmental permitting phase of each intervention resulting by the TDS implementation. Special emphasis should be given in case of proximity to protected areas.
- The TDS and its environmental performance must be monitored via a **monitoring program** that:
  - Takes advantage of procedures that already exist in the country in the framework of other policy and legislation requirements
  - Makes best use of the implementation of the foreseen measures for data collection
  - Is compliant to the provisions of the Croatian and EU environmental legislation.

The main difficulty encountered is the fact that the development of the TDS has not been accompanied by an analysis with the use of a transport model (currently under development). It is necessary that this analysis is made in order to examine alternative scenarios of the TDS implementation, and predict transport patterns that may arise with the implementation of each scenario. A more quantitative assessment of the impacts of the TDS alternatives and measures will then be feasible.