Ex post evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000 and 2013

Construction of Saulkrasti bypass on the Latvian main road A1

Latvia

EUROPEAN COMMISSION

Directorate-General for Regional and Urban Policy
Directorate Directorate-General for Regional and Urban Policy
Unit Evaluation and European Semester

Contact: Jan Marek Ziółkowski

E-mail: REGIO-B2-HEAD-OF-UNIT@ec.europa.eu

European Commission
B-1049 Brussels

Ex post evaluation of major projects supported by the European Regional Development Fund (ERDF) and Cohesion Fund between 2000 and 2013

Construction of Saulkrasti bypass on

the Latvian main road A1

Latvia

Directorate-General for Regional and Urban Policy

2020 EN

Europe Direct is a service to help you find answers to your questions about the European Union.

Freephone number (*)**:**

00 800 6 7 8 9 10 11

(*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Manuscript completed in 2018

Luxembourg: Publications Office of the European Union, 2020

ISBN 978-92-76-17417-2
doi: 10.2776/495002

This report is part of a study carried out by a Team selected by the Evaluation Unit, DG Regional and Urban Policy, European Commission, through a call for tenders by open procedure No 2016CE16BAT077.

The consortium selected comprises CSIL – Centre for Industrial Studies (lead partner, Italy), Ramboll Management Consulting A/S (Denmark), Significance BV (The Netherlands), TPLAN Consulting (Italy).

The Core Team comprises:

- Scientific Director: Massimo Florio (CSIL and University of Milan);
- Project Manager: Silvia Vignetti (CSIL);
- Scientific Committee: Ginés de Rus, John Nellthorp, Emile Quinet;
- Task managers: Silvia Vignetti (CSIL), Gerard de Yong (Significance), Roberto Zani (Tplan), Emanuela Sirtori (CSIL), Xavier Le Den (Ramboll), Julie Pellegrin (CSIL);
- Thematic Experts: Gianni Carbonaro (CSIL), Enrico Bernardis (Tplan), Mario Genco (CSIL), Eric Kroes (Significance), Kim Ruijs (Significance), Barry Zondag (Significance).

A network of National Correspondents provides the geographical coverage for the field analysis.

The authors of this report are Kristīne Malnača, Chiara Pancotti, and Gatis Kristaps. The authors are grateful to all the project managers, stakeholders and beneficiaries who provided data, information and opinions during the field work.

The authors are grateful for the very helpful insights from the EC staff and particularly to Mariana Hristcheva, Daria Gismondi, Jan Marek Ziółkowski, Jerome Glantenay and other members of the Steering Group. They also express their gratitude to all stakeholders who agreed to respond to the team's questions and contributed to the realisation of the case study. The authors are responsible for any remaining errors or omissions.

Cover picture source: Authors' own picture taken on 28/11/2017.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

B/C	Benefit/Cost ratio
CBA	Cost-benefit analysis
DG REGIO	Directorate-General for Regional and Urban Policy
EC	European Commission
EIA	Environmental Impact Assessment
ENPV	Economic Net Present Value
ERDF	European Regional Development Fund
ESIF	European Structural and Investment Funds
ERR	Economic Rate of Return
EU	European Union
EUR	Euro
FNPV/C	Financial Net Present Value of the investment
FNPV/K	Financial Net Present Value of national capital
FRR/C	Financial Rate of Return on investment
FRR/K	Financial Rate of Return on national capital
FS	Feasibility Study
GDP	Gross Domestic Product
GHG	Greenhouse Gas
HGV	Heavy goods vehicle
LSR	Latvia State Road
NPV	Net Present Value
MoF	Ministry of Finance
MoT	Ministry of Transport
NUTS2	Nomenclature of Territorial Units for Statistics
O&M	Operating & Maintenance
TEN-T	Trans-European transport networks
ToRs	Terms of References
VAT	Value Added Tax
VOC	Vehicle Operating Cost
VOT	Value of Time

EXECUTIVE SUMMARY

This case study illustrates the story of the construction of Saulkrasti bypass on the Latvian State main road A1 connecting Riga to the Estonian boarder (further called major project), a major infrastructure investment co-financed by the EU over the programming period 2000-2006. More specifically, this is an ex-post evaluation assessing the long-term effects produced by the project and disentangling the mechanisms and determinant factors that have contributed to producing these effects. The analysis draws from an ex-post Cost-Benefit Analysis (CBA)[1] and from an extensive set of qualitative evidence, both secondary (technical reports, official reports, press articles, books and research papers) and primary (interviews with key stakeholders and experts have been carried out in the period from November 2017 to March 2018[2]).

OVERALL APPROACH AND METHODOLOGY

The overall approach and methodology followed in the evaluation study is briefly recalled hereafter and more extensively in Annex I.

The Conceptual Framework delivered in the First Intermediate Report has been developed to answer the evaluation questions included in the ToR, and further specified and organised in accordance with the study team's understanding. In particular, there are **three relevant dimensions of the analysis**:

- **The 'WHAT'**: this relates to the typologies of long-term contributions that can be observed. The Team classified all the possible effects generated by transport projects (including road, rail, and urban transport projects) under the four following categories: 'Economic growth'; 'Quality of life and well-being' (i.e. factors that affect the social development, the level of social satisfaction, the perceptions of users and the whole population); 'Effects related to environmental sustainability' and 'Distributional impacts'.
- **The 'WHEN'**: this dimension relates to the point in the project's lifetime at which the effects materialise for the first time (short-term dimension) and stabilise (long-term dimension). The proper timing of an evaluation and the role it can have in relation to the project's implementation is also discussed here.
- **The 'HOW'**: this dimension entails reasoning on the elements, both external and internal to the project, which have determined the observed causal chain of effects to take place and influenced the observed project performance. To do this the Team identified six stylised determinants of projects' outcomes (relation with the context; selection process; project design; forecasting capacity; project governance; managerial capacity). The interplay of such determinants and their influence on the project's effects is crucial to understand the project's final performance.

[1] Data, hypotheses and results are discussed in Annex II.

[2] See Annex III for a detailed list of interviewees.

The methodology developed to answer the evaluation questions consists of ex-post Cost Benefit Analysis complemented by qualitative techniques (interviews, surveys, searches of government and newspaper archives, etc.), **combined in such a way as to produce a project history**. CBA is an appropriate analytical approach for the ex-post evaluation because it can provide quantification and monetisation of some of the long-term effects produced by the project (at least those also considered in the ex-ante CBA). However, the most important contribution of the CBA exercise is to provide a framework of analysis to identify the most crucial aspects of the projects' ex-post performance and final outcome. It is worth noting that the purpose of this evaluation is not to compare ex-ante and ex post CBAs and that the results of these assessments are not easily comparable, because even if they rely on the same principles and draw from the established CBA methodology, there are often important differences between how the ex-ante and ex-post assessments were scoped and what data were taken into account. Qualitative analysis on the other hand is more focussed on understanding the determinants and causal chains of the delivery process as well as to assess effects that may be difficult to translate in monetary terms.

MAIN PROJECT FEATURES

The project under assessment is located on the Via Baltica Route, which is part of Transport Corridor N.1 within the Trans-European Transport Network, the most important highway connecting the Baltic States. In particular, the project concerns the upgrade of the Via Baltica on the Latvian state main road A1 on the section passing through the settlement of Saulkrasti. Located at 45 km north of Riga, the Latvian's capital city, Saulkrasti town forms part of a popular and attractive area for summerhouses and holiday residents. During the summer season the town population increases by ten times.

The project consisted of the construction of a 20 km long bypass to divert long-distance traffic away from Saulkrati town (including rehabilitation of sections of six roads of state significance to incorporate the new bypass into the existing road network) as well as the rehabilitation of 14.8 km of the existing road A1 passing through the settlement of Saulkrati (now downgraded to local road V101). Before the project implementation the existing road A1 (2 lane carriageway with a speed limit of 50 km) was the only road in the full length of the town serving local traffic, public transport, as well as international and transit traffic. As confirmed by traffic studies carried out by the Ministry of Transport in the mid-Nineties, Saulkrasti town was one of the main bottlenecks of Via Baltica in Latvia.

The project forms part of a multi-stage scheme to rehabilitate and upgrade the Latvian section of the Via Baltica which was a priority not only at national but also at European Level. Actually, the project is in line with both the First (1996–2000) and the Second (2001-2006) Investment programs for Via Baltica prepared on the basis of the Memorandum of Understanding on the Development of Via Baltica (signed by the Transport Ministers of the Baltic countries and the European Commission).

The project involved a total initial investment of EUR 130.5 million, in nominal prices, 42.2% of which co-financed by the Cohesion Fund (CF). The remaining investment cost was covered by national contribution. In particular, the EU grant co-financed the construction of the new bypass as well as its integration into the existing road network, while all the works related to rehabilitation of existing road A1 were financed

by State Budget of Latvia. The preparatory works were undertaken between 2002 and 2007 and the construction phase took place between 2005 and 2008, while the new bypass was opened for traffic in October 2007.

PROJECT PERFORMANCE

Based on the different findings produced by the project analysis, the final assessment of the project performance is presented hereafter, along a set of evaluation criteria.

Project relevance and coherence

The project was highly relevant in the context where it was implemented and in line with the policy goals reflected in strategic documents both at national and European levels. Its primary objective was to solve a traffic bottleneck in one of the main state road connecting Riga with the Estonian border, which negatively affected both the travel conditions of long-distance travellers and the quality of life of Saulkrasti's inhabitants and tourists. With the construction of a bypass, the Saulkrasti town was expected to be relieved from traffic congestion, thereby leading to a reduction in noise, air pollution and collisions.

Moreover, the project contributed to the integration of the transport infrastructure of Latvia into the European Transport network which was one of the main objectives of both the Accession Partnership and the National Programme for Adaptation of the acquis. By meeting the requirements set in these two documents with regards to transport network access and inter-connection the project was given the highest priority.

The project components are coherent with all the stated project objectives. The rehabilitation of existing A1 (including construction of new wearing course, reconstruction of 37 bus stop platforms, rehabilitation of sidewalks street lightning) was indeed carried out in line with the mobility and safety needs of the municipality and the bypass was constructed in order to be integrated with the existing road network and to meet the EU road standards, with particular attention to the necessary load-bearing capacity. Also, the project is consistent with the other phases of the multi-stage scheme to rehabilitate and upgrade the Latvian part of the Via Baltica, in line with a structured prioritisation system endorsed by the Ministry of Transport and underpinning the implementation of the entire investment scheme.

Project effectiveness

Overall, the project achieved the expected objectives. The different effects generated by the investment are briefly resented in what follows:

- **The project generated a positive economic return due to cost savings** (in the form of VOC and time) **for travelers of the new bypass, reduction in accidents, noise and air emissions due to shift of traffic from an urban road to a suburban road**. All these effects have been quantified in the ex-post CBA. The analysis points to an Economic Net Present Value (ENPV) amounting to EUR 103.1 million in the baseline case[3], with an internal rate of return of 9.4%. The risk analysis indicates that there is a probability of nearly 50% that the ENPV is lower than the baseline one but a nil probability for the

[3] With the applied discount rates of 6.67% backward and 6.25% forward. See First Interim Report.

ENPV to be less than zero. Such results confirm that the project had a positive socio-economic impact and it is not subject to high risk in the future evolution. If fact, even with variations of critical variables in a negative direction, the economic performance of the project remains positive.

- **A positive effect on the living conditions of both Saulkrasti's citizens and tourists is also recognized**, as evidenced by interviews with local stakeholders and data on numbers of tourists. As a matter of fact, traffic jams are no more an issue in Saulkrasti – even in summer season – and Saulkrasti is a quite a peaceful place where to live or spend holidays.
- Losses of profits for the small economic activities (gas stations, bars, cafeterias, etc.) located along the existing A1 soon after the bypass opening were mentioned by local stakeholders as one of the possible drawbacks of the project. However, due to overlap of the bypass's initial operating phase with the economic crisis of 2008-2010, such losses cannot be fully attributable to the investment. In any case, few years after the crisis such negative effect has been more than outweighed by the increase in tourism, which was encouraged by the reduction of transit traffic going through Saulkrasti town and its improved accessibility.
- Another remarkable benefit of the project is the **learning effect enjoyed by the Ministry of Transport and the Latvian Road Administration** as Saulkrasti bypass was the first new construction project of such scale in Latvia since the nation's independence of 1991. The project was a useful experience for the development of project management system within the road administration. It stimulated the improvement of existing technical know-how as well as system development on how to plan, develop, implement and operate road construction projects in Latvia. In addition, thanks to this project a land acquisition unit was established within the Latvian State Road administration and new procedures were set at the national level for land pricing.
- **The project contributed to strengthen territorial cohesion in Riga region as well as in the country**. As a consequence of the reduction in travel time and costs, connectivity between the Estonian border and Riga have been facilitated. However, at European level the effects on territorial cohesion are expected to be wider in the future, when all the remaining bottlenecks on Via Baltica will be addressed.

Project efficiency

Although the project was well prepared and designed, it experienced challenges and delays during its implementation. In particular, the tendering procedures turned out to be longer and more troublesome than expected. Actually, the project was implemented soon after Latvia joined the EU. This resulted, firstly, in changes in the binding tendering procedures (from PRAG rules[4] to national procurement law) and, secondly, in a sudden transformation of the country's

[4] PRAG stands for "Procedures and practical guide" which explains the contracting procedures applying to all EU external actions financed from the EU general budget (the EU budget) and the European Development Fund (EDF).

macroeconomic situation, especially impacting on price increase. As a result, the start of the project implementation was delayed by one year and the investment cost significantly increased: from 48.81 million to EUR 130.5 million, in nominal values. Nevertheless, thanks to a good managerial capacity of stakeholders involved in the project implementation the commissioning of the bypass was delayed only of three months and cost overrun was promptly covered by the State Budget.

Resources from the State Budget also guarantee the financial sustainability of the project in the operational period. Indeed, maintenance activities on the bypass (which is not tolled) are financed by the State budget, while maintenance of the old A1 (now V101) crossing Saulkrasti is now under the responsibility of the municipality.

EU added value

The project has contributed to the development of the Trans-European Transport network. It has facilitated mobility, especially for cargo traffic, on Via Baltica route which is an important artery among the Baltic States and the rest of Europe. At the same time the project contributed to reduce negative externalities in Saulkrasti town, in line with European priorities and requirements. All these effects would not have been achieved without the support from the EU. As a matter of fact, the state of Latvia did not have the financial capacity to implement big and desirable investment such as Saulkrasti bypass, which was the first road construction project since Latvia's independence in 1991.

Apart from the financial support, the European Commission had a lot of power to oversee the preparation process and the project benefitted from the EC technical assistance through the pre-accession instrument (ISPA), mainly for the elaboration of the project documentation such as the feasibility study.

In the absence of the EU support, the bypass would not have been constructed. The Ministry of Transport would have only carried out extraordinary maintenance on the existing A1 passing through Saulkrasti, which would not be enough to solve the traffic bottleneck. Accession to EU funds allowed the Ministry of Transport, the Latvian State administration and the Saulkrasty town to have an extra chance to meet their needs in terms of connectivity, accessibility and quality of life.

The EU support has been crucial not only for Saulkrasti project but also for all the other investments on Via Baltica route carried out in the same and in the subsequent years. Nowadays, it continues to remain a significant source of financing for road improvement projects, thus ensuring connectivity and quality of the road network.

MECHANISMS AND DETERMINANTS

In terms of mechanisms and determinants explaining the project performance a number of findings can be drawn from the project assessment.

- **Context is without doubts one of the most important pre-requisite of the project performance.** The bypass was in fact in line with the context needs and the objectives of both the Accession Partnership and the National Programme for Adaptation of the *acquis* with regards the transport sector by facilitating the integration of the transport infrastructure of Latvia into the European Transport network. The time played a twofold role. On the one hand, the project was timely conceived as soon as EU financial resources become available to Latvia. On the other hand, the project implementation coincided with the EU accession, which radically changed the country's situation in

financial and labour markets, thus creating an unfavorable condition for the bypass construction.

- The whole project definition and option **selection process managed by the Latvian Road Administration – with the support of different consultants – has played a positive role in the project's final performance**. The process was based on sound feasibility studies and involvement of all the stakeholders, including the municipalities and citizens through two public consultations.
- **Forecasting capacity can be considered satisfactory** given the uncertain and changing situation that Latvia was facing when forecasts were made. A prudential approach was taken with respect to traffic forecasts, this resulted in actual traffic being higher than expected on the new bypass. However, investment cost increase was huge, which partially reflects an underestimation of the financial consequences of the EU accession.
- **The project governance and the managerial capacity had positively contributed to the satisfactory performance achieved by the project**. The institutions involved in the project preparation and implementation did their best to overcome the difficulties brought about by such a new and complex project with respect to road construction experience in Latvia at that time. Also, it is worth noting that the Saulkrasti bypass project is considered by both the Ministry of Transport and the Latvian Road Administration an important step in terms of capacity building in the public transport sector.

CONCLUSIONS

In conclusion, the ex-post assessment of this project points towards an overall positive outcome from the Saulkrasti bypass. It represents an example of infrastructural project in the road transport sector which managed to deliver net positive benefits in spite of the considerable cost increase experienced in the investment phase. As a matter of fact, the investment was the right and necessary initiative to implement to avoid traffic bottlenecks on one of the main artery of Latvia's road network as well as to sustain the local development of Saulkrasti. That said, it must be acknowledged that the future performance of the project is subject to possible changes due to the implementation of the Rail Baltica project, co-financed by the EU TEN-T budget, which is expected to divert the major freight transport in the Baltic region from road to rail.

The story of the Saulkrasti bypass illustrates that a major project can play a pivotal role in developing technical, legal and administrative capacities within the public authorities involved in the project conception, selection, and implementation, which should be capitalised for future projects. At the same time, the institutional capacity needed to implement such kind of projects should be acknowledged since the beginning in order to avoid adverse negative events such as delays, cost overrun or benefit shortfall.

1. PROJECTS DESCRIPTION

The project "Improvement of Via Baltica Route. Construction of Saulkrasti bypass on the Latvian State Main road A1 Riga (Baltezers) – Estonian boarder (Ainazi) from km 21.05 (Lilaste) to km 40.57 (Skulte)" (No 2002/LV/16/P/PT/008) is a stage of a wider investment scheme aimed at rehabilitating and upgrading the Via Baltica – part of the Pan European Corridor N.1.

On November 14, 1995 the Cabinet of Ministers of the Republic of Latvia approved the National Transport Development Programme for the period of 1996-2010 which stressed the importance of upgrading the transit corridors of Latvia to European road standard. Via Baltica route is indeed a strategic artery not only for Latvia's road network but also for transit traffic in north-Europe. As a consequence, **Via Baltica Route was given the highest priority in National ISPA Strategy for Transport Sector.** In this context, the Ministry of Transport elaborated a Public Investment Programme where construction of Saulkrasti bypass was included.

In particular, the project under assessment concerns the construction of a new road with long-term capacity to bypass Saulkrasti town. The project also includes the rehabilitation of the existing road A1 passing through the residential area. The project cost amounts to EUR 130.5 million in nominal term.

This section contains a brief description of the project. The socio-economic context, the target population and key structural features of the infrastructure and service delivered are outlined in order to give a general description of the project context and objectives.

1.1. *Context*

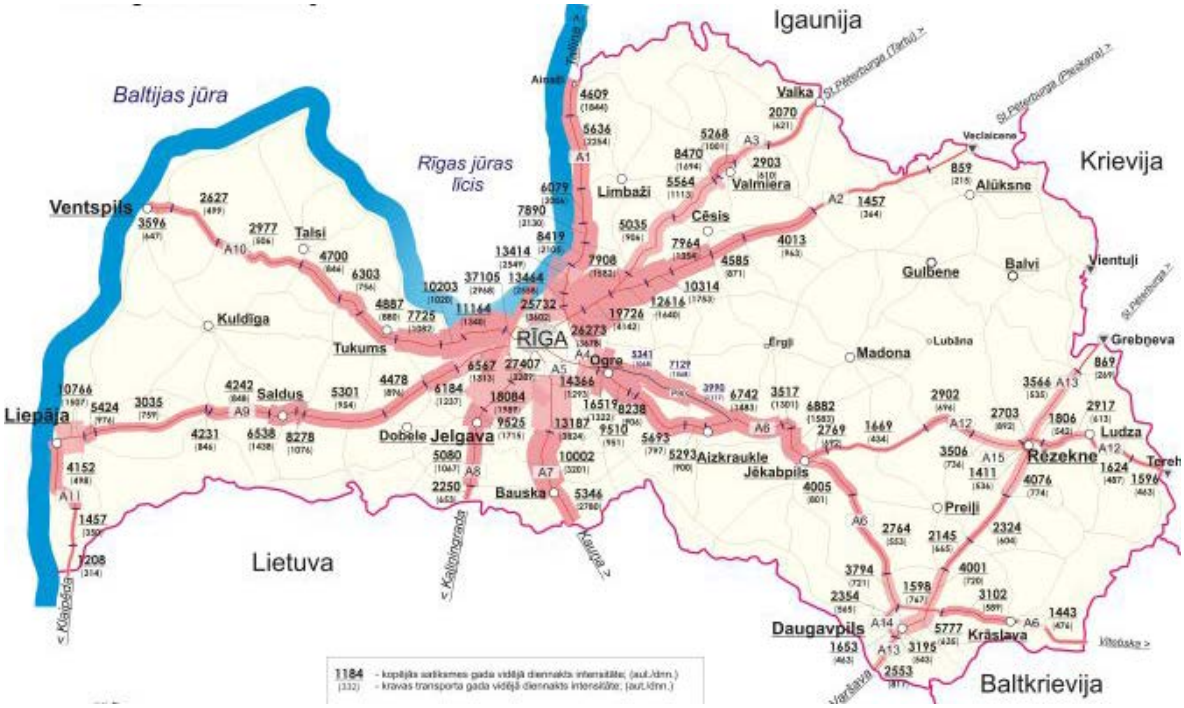
The project is located on the state main road A1 connecting Riga, the capital of Latvia, to Ainaži, which is a Latvian town on the border with Estonia. The A1 is part of the Via Baltica route, which runs from Estonia to Poland (Figure 1).

Figure 1. Location of the project on Via Baltica route

Source: Balticmaps.eu, authors

Via Baltica is the most important highway between the Baltic States with high traffic volumes (see Figure 2). It is also part of the European Route E67 running from Prague to Helsinki through Poland, Lithuania, Latvia, Estonia.[5] From Tallinn to Warsaw E67 is part of Transport Corridor N.1 within the Trans-European Transport Network (TEN-T).

Figure 2. AADT on the state main roads in Latvia (2016)



Source: Latvian State Roads

The project is located in Saulkrasti town and the interrelated villages Zvejniekciems and Skulte, which are about 45 km north of Riga.

The territory of Saulkrasti stretches across 17 km from Lilaste river to Zvejniekciems village. Saulkrasti district consists of 2-5 km wide territory, including the forests on the coast line, the Lilaste lake, the territory with summer cottages on the east from the railroad, and Zvejniekciems where port of Skulte is located. Skulte parish borders with Saulkrasti district in the north. Its territory stretches for 5.8 km along the coast. **Before the bypass construction the Saulkrasti town was crossed by the national road A1.** After that, the road passing through Saulkrasti has been downgraded to local road (V101).

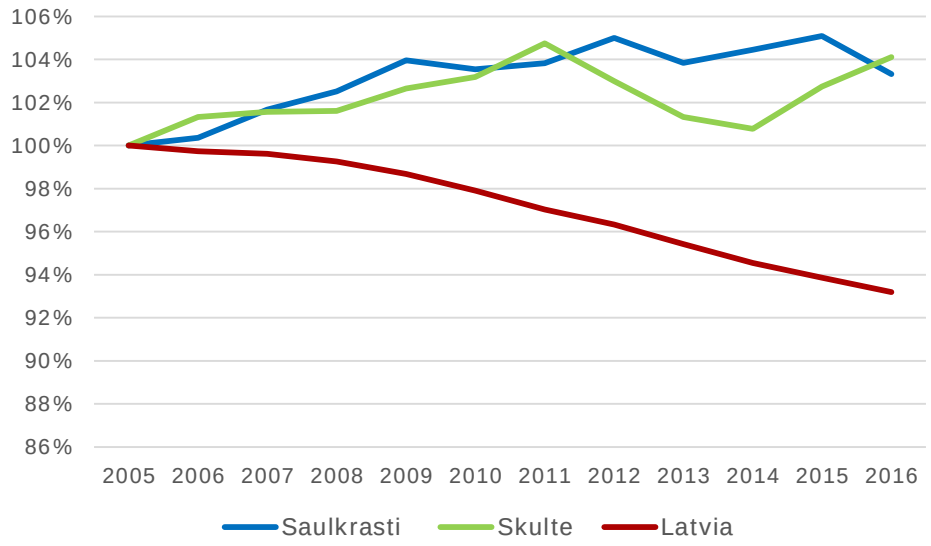
The historic settlements of Saulkrasti, including Pabaži in the south and Zvejniekciems in the north, **have developed as seaside resorts** and form about 12 km long stretch of residential area along the coast. During the Soviet epoch, several allotment cooperatives with summer cottages were established within the adjacent forest areas (east of coastal settlements).

According to the data from the Office of Citizenship and Migration Affairs, 2,126 inhabitants lived in Skulte parish and 6,127 inhabitants lived in Saulkrasti district in 2016. Over the years, the population in Saulkrasti and Skulte has not followed the

[5] Road E67 from Warsaw to Tallin is known as Via Baltica.

overall negative tendency in Latvia but has even slightly increased comparing with year 2005. This can be explained by labour migration within the country and agglomeration trends towards the capital city. As in Riga the job offer is higher than in the rest of the country, people choose a place of residence in close vicinity of their workplace in the capital city (usually within 1 hour travelling distance).[6] The population density in Saulkrasti is 128.34 persons/km^2 (2016) which corresponds to the average density in Riga agglomeration for sub-urban territories of similar size and with private houses.

Figure 3. Population dynamics in Saulkrasti, Skulte and Latvia (base year 2005)



Source: The Office of Citizenship and Migration Affairs, Authors

Due to the convenient location in the vicinity of Riga and being on the sea coast, Saulkrasti town has become an attractive resort destination in Latvia. The recreational vocation of the town is also evident from its motto – "The town closer to the Sun".

Figure 4. Photos of Saulkrasti beach and forest

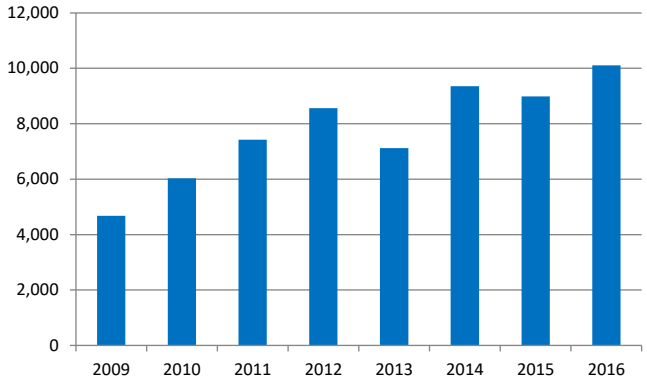
Source: Authors' picture and www.latvia.travel.en

During the summer, population in Saulkrasti increases of nearly 10 times because allotment cooperatives and summer cottages fill in with summer vacationers.

[6] More than 2/3 of the value of the Latvian economy are created in Riga and Riga region. (Source: Sustainable Development Strategy of Riga Planning Region 2014-2030).

The number of tourists using accommodations in Saulkrasti has more than doubled during the last 8 years (see figure below).

Figure 5. Number of persons served in Saulkrasti's touristic accommodations



Source: Central Statistical Bureau data, authors

The development of entrepreneurship in Saulkrasti is mainly related to services in trade and tourism. The majority of enterprises are small local companies (up to 10 employees) focused on catering or hospitality activities which mainly depend on revenues earned during the summer season. Unemployment level is low – 4.1% in 2016 (see table below).

Table 1. Unemployment level in Latvia

UNEMPLOYMENT LEVEL	2014	2015	2016
Saulkrasti	4%	4.8%	4.1%
National average	10.6%	9.9%	9.6%

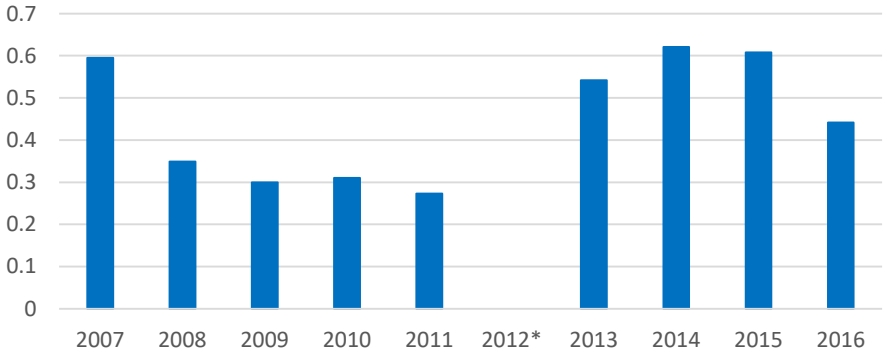
Source: Central Statistical Bureau, Latvia

The overall socio-economic development of Saulkrasti can be assessed using a territorial development index (TDI)[7], which demonstrates higher or lower development of a territory from the average social economic development level of the state in the relevant year. As presented in the figure below, the index shows that Saulkrasti development level has been higher than the average level in the country.

[7] TDI is a generalised indicator which is calculated with determined weight coefficients by summing up standardised values of the most important basic indicators of statistics which characterise the development. In the TDI calculation the standardized values of eight different indicators are used and each of them has its own weight (influence) as follows:

- Number of economically active individual entrepreneurs and commercial companies per 1000 inhabitants, (weight 0.25);
- Unemployment rate,%, (weight 0.15);
- Low-income persons to the total population,% (weight 0.1);
- Total number of criminal offenses per 1000 inhabitants, (weight 0.05);
- Natural changes in population per 1000 inhabitants, (weight 0.1);
- Long-term migration surplus per 1,000 inhabitants, (weight 0.1);
- Population over working age per 1000 working age persons (weight - 0.05);
- Personal income tax per capita, in euro, (weight - 0.2).

Figure 6. Territorial development index for Saulkrasti district



**Data not available*
Source: Authors

About two third of economically active persons work outside Saulkrasti (mainly in Riga). People commute to Riga using private cars or public transport – rail, bus. There is a good rail connection with a service every 30 minutes in the morning and less frequent service during the rest of the day. The journey by train takes 58 minutes, bus is slightly longer (65 minutes) while by car requires on average 45-50 minutes.

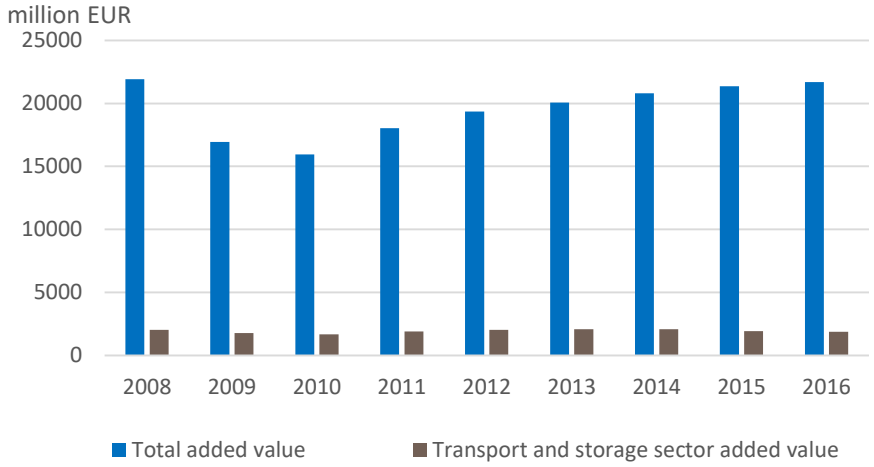
Mobility and transport infrastructure are of great importance for the development of the territory of Saulkrasti as well as for the well-being of its inhabitants. First of all, adequate road infrastructure is important to ensure comfortable, safe and fast connectivity for those living in Saulkrasti agglomeration and working in Riga. Secondly, a fast connection to Riga and to the neighbouring countries is key for tourism development, which is one of Saulkrasti's main drivers of economic development. Via Baltica road is indeed used for interregional and international bus connections, and it is a link to Riga passenger port and Riga airport for those coming from the northern part of the country and Estonia. At the same time, a safe and quite environment is another important aspect spurring tourism, especially in view of the Latvian Tourism Marketing Strategy 2010-2015 which promotes Latvia as the place to slow down the lifestyle pace and enjoy calm, harmony and discover truth values[8].

Adequate long-distance roads are also fundamental for the economic development of the country as a whole. As a matter of fact, Latvia's geographic location at the center of the Baltic region and at the external boarder of the European Union allows for rapid distribution of goods via roads not only in the Baltic States and even Helsinki, Stockholm or Warsaw within 24 hours but also access to Russian Federation and the Republic of Belarus. This favourable circumstance has been exploited by the country since its independence in 1991 (see box below) although at that time the road infrastructures were suffering from poor maintenance and needed to be integrated with the Trans-European transport network. Over the years, the transport sector has taken a stable position in the Latvian economy. The transport and storage sectors contribute roughly 9% to the total added value and employ around 9% of Latvia's working population.[9]

[8] https://www.interregeurope.eu/fileadmin/user_upload/tx_tevprojects/library/file_1508254284.pdf

[9] Data refers to 2016.

Figure 7. Transport sector contribution to the Latvian economy



Source: National statistical office

Box 1. Latvia's history in a nutshell: from independence to EU accession

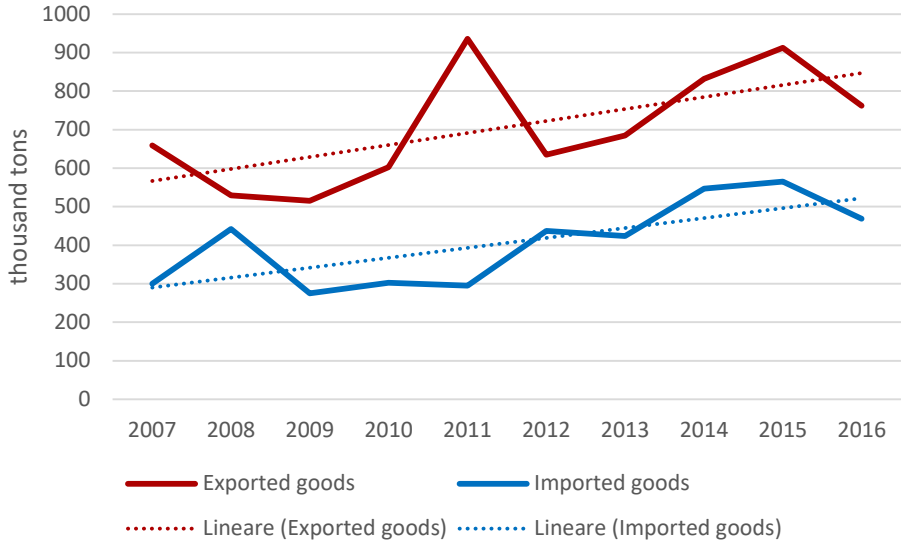
Latvia restored its independence after the collapse of the Soviet Union in 1990, when it started the transition from a centrally planned to a market economy. The Latvian national currency (lats; LVL) was introduced in 1993. In the first half of 1995, Latvia faced a major banking crisis which hampered Latvia's economic renaissance until 1997. In the same year of the crisis, Latvia formally applied for EU membership and, at the end of 1999, the European Commission recommended that member states open negotiations with Latvia. In 2003 Latvia held a referendum on EU membership. It joined the European Union in 2004, and the Economic and Monetary Union on 1 January 2014.

Source: Authors based on Latvia's post-soviet transition (www.piie.com)

In the context of freight traffic, Via Baltica transport corridor plays a significant role for goods transportation among the Baltic countries. Most of freight carried towards Estonian border comes from Latvia, Lithuania and Poland with a final destination in Estonia or Finland.[10] Goods carried from north mainly come from Estonia or Finland and are transported to Latvia, Lithuania or Poland. Statistical data show that freight flow to and from Estonia has a tendency to increase (see figure below). Around 75% of all freight traffic on the main road A1 are transit traffic (destination outside Latvia). This indicates that the road A1 is relevant not only at national level, but also for cross-border trade.

[10] Study on transit freight by road transport through Latvia, 2014.

Figure 8. Freight transported to and from Estonia[11]



Source: Central Statistical Bureau, Latvia

1.2. *Project objectives*

Saulkrasti bypass project was one of the projects listed in the investment program of Ministry of Transport of Latvia (1997), which task was to upgrade the transit corridors of Latvia to European road standard. At that time most of the state main roads were in bad technical conditions and did not provide satisfactory level of service for road users.

Box 2. Condition of road infrastructure in 1995

In Latvia, the process of collapse of the relatively well-developed transport infrastructure already started in the Soviet epoch. At the time when the National transport development program (1996-2000) was carried out, the country had 77.3 km of roads with collapsed black pavement. According to the assessment of the Road Administration, more than half of all black pavements in the country were over 11 years old, so they were in a critical phase. The surface of black pavement should be renovated on about 700 km long sections every year, but in reality, due to the lack of financial resources, the renovation of black pavements took place in around ten kilometers only. It was concluded that if the situation would have not changed radically, then the Latvian state road network would have become practically inoperative in the coming years and the society would have suffered heavy losses.

Source: National transport development program 1996-2000 (www.piie.com)

Saulkrasti was identified as a bottleneck on Via Baltica route which greatly hindered the transit traffic flow. In addition, the city was severely affected by the negative impact of traffic flow on the environment, population and traffic safety.

[11] Goods transported to and from Estonia mainly use Via Baltica route.

The main problems for traffic on the state main road A1 and Saulkrasti town were as follows:

- Being A1 part of the Via Baltica, connecting Riga to Estonia, **the road was used both for passenger and road cargo traffic between the Baltic countries, and by local traffic,** as well as by public transport. Since it was the only road in Saulkrasti that stretches throughout the town, traffic on it was particularly heavy, especially during the summer season due to holiday travelers. Being in an urban environment, the speed limit for the most part of this road section (10.1 km) was 50 km/h which clearly prolonged the travel time on Via Baltica.
- The road stretching throughout Saulkrasti runs concurrent to coastal line and on average the distance to the shore is less than 500m. In a section of km 33.1 the road is less than **10 meters away from the beach and approximately 5 meters above the sea level, so during winter time part of the embankment used to be washed away** to such a degree that strengthening measures of the embankment were needed.
- **Due to heavy traffic it was not easy for local traffic to enter the main road in Saulkrasti as well as it was difficult for pedestrians to cross the road.** This problem was particularly troubling during summer time when the number of holiday-makers by far exceeded the number of residents. Pedestrians were systematically crossing the road in full length of Saulkrasti zone in both directions to get to and from the seaside. It was very hard to organize such dissipated pedestrian flow with heavy traffic on the main road.
- Transit traffic, especially HGV, caused **local air pollution and increased noise level** in the local environment along the road.
- **Safety level on the old road A1 was not adequate** neither for pedestrians crossing, especially for elderly people and children, nor for vehicles transit. Actually, mix of local and transit traffic with many exits and entrances to adjacent streets and properties created a high risk for traffic accidents.

In light of the above, **the purpose of the bypass was threefold**. First of all, it was meant to separate the cargo traffic from the traffic serving local residents in Saulkrasti, thus improving safety and reducing travel time and vehicle operating costs. Secondly, the project was aimed at bringing Via Baltica section from km 21.05 (Lilaste) to km 40.57 (Skulte) in compliance with European road standards. Thirdly, the project was expected to contribute to development of the Pan-European transport network, removing a bottleneck on corridor 1 and thus strengthening territorial cohesion at EU level.

The project contributed to the objectives of both the Accession Partnership and the National Programme for the Adoption of Acquis by meeting the requirements set out in these two documents with regards to transport network access, inter-connections and inter-operability by facilitating the integration of transport infrastructure of Latvia into the European Transport network.

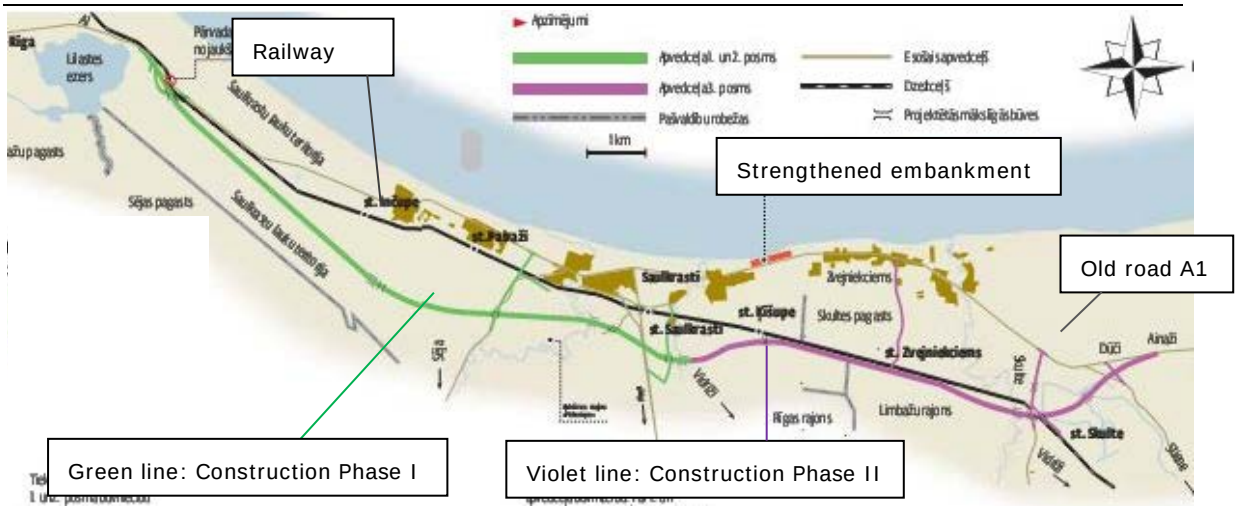
1.3. *Structural features*

The total scope of the project includes two different components which are further described in what follows:

1. Constuction of a new road with long-term capacity to bypass Saulkrasti center;
2. Improvement of existing road A1 from Lilaste to Skulte.

Saulkrasti bypass is a 20.2 km long, with two lane carriageway (width of the roadway – 14 m, carriaageway –11.5 m) from Lilaste to Dūči (Figure 9). The designed speed on the bypass is 100 km/h.

Figure 9. Alignment of Saulkrasti bypass



Source: www.celuprojekts.lv

The bypass includes 17 different road structures, including 7 grade-saparated junctions, 6 new bridges, 2 pedestrian tunnels, 2 railroad bridges. All road structures are detailed in the table below. For the comfort of pedestrians and cyclists, two tunnels were built - at the Inčupe and Ķīšupe station, and the sidewalks of 4.4 km on the roads crossing the bypass.

Table 2. Constructed road structures

NUMBER	TYPE OF STRUCTURE
Structure No 1	Grade-separated junction in Lilaste
Structure No 2	Railroad bridge in Lilaste
Structure No 3	Bridge over Inčupe river
Structure No 4	Grade-separated junction with state road Sēja – Ragana
Structure No 5	Bridge over Pēterupe river
Structure No 6	Grade-separated junction with access road to summer cottage cooperative "Saulainā ieleja"
Structure No 7	Grade-separated junction with state road Saulkrasti-Bīriņi
Structure No 8	Grade-separated junction Vidrižu ielā
Structure No 9	Bridge over Ķīšupe river
Structure No 10	Pedestrian tunnel at Ķīšupe railway station

Structure No 11	Bridge over Aģe river
Structure No 12	Grade-separated junction with state road Vidriži – Skulte
Structure No 13	Railroad bridge in Skulte;
Structure No 14	Grade-separated junction with access road to Skulte
Structure No 15	Bridge over Mazupīte river on access road Vidriži-Skulte
Structure No 16	Bridge over Mazupīte river
Structure No 17	Pedestrian tunnel at km 45

Source: www.celuprojekts.lv

The road pavement structure is 1 m thick including drainage layer 0.50 m, mineral aggregates 0.28 m and three layers of asphalt pavement in total 0,22 m. In line with the European road standards, the design of the roadway structure was done in order to ensure the necessary load bearing capacity, i.e. the standard truck axle load bearing capacity of 11.5 t. Lightning is installed in all junctions. Rainwater drainage and collectors were built to mitigate the impact of ground compression on inflitration of surface waters. Reconstruction of power transmission line and communication networks was also performed.

In order to minimize environmental impact, noise protection walls in the total area of 3,936.76 m^2, 152 double-pane windows, wire mesh fences are installed, as well as hedges are planted in some sections.

Figure 10. Noise protection walls

Source: own picture

To incorporate the new bypass in the existing road network and to make traffic between the bypass and the existing road A1 attractive in order to reduce traffic volume on road A1 through Saulkrasti town, reconstruction of 6 state roads (these are connecting roads classified as second-class roads) were included in the scope of the activities, co-financed by EU funds. In total, 13 km of access roads were constructed.

Figure 11. Grade-separated junction with access road and railroad in Skulte

Source: www.binders.lv

The bypass received an award as “The best structure of 2007 in Latvia” in the nomination of “Engineering structure”. The competition for the best structure is organized every year by 16 non-governmental organizations from construction industry in Latvia. The aim of the competition is to promote the quality of the construction process by identifying and promoting the best structures and good practice examples in the construction process in Latvia, to promote professional growth and quality of work in the sector, to express recognition and motivate the industry representatives to highlight the final result of the construction process.

Figure 12. Saulkrasti bypass

Source: www.celuprojekts.lv

In addition to the baypass construction, the improvement of the existing road A1 section km 21.05 - 40.57 was done, i.e. rehabilitation of road 14.8 km, including construction/reconstruction of sidewalks 5.55 km, reconstruction of 47 bus stops and 11.6 km of street lighting. All works related to rehabilitation of existing A1 were planned and were actually financed by State Budget of Latvia.

Figure 13. Reconstructed bus stop and sidewalk

Source: Authors' picture

2. ORIGIN AND HISTORY

2.1 BACKGROUND

The history of Via Baltica's rehabilitation and upgrade dates back to the mid-Nineties when the First Via Baltica Investment Programme 1996-2000, prepared on the basis of the Memorandum of Understanding on the Development of Via Baltica[12], was approved with the aim of implementing infrastructure maintenance projects, i.e., pavement restoration, bridge reconstruction and an improvement in traffic safety.[13]

Soon after the approval of this Programme, in 1996-1997 a group of European and Latvian consultants[14] prepared a Master Plan for Latvian road network maintenance, development and operation and a programme for improving road safety[15] on the main state roads on behalf of the Ministry of Transport (MoT).

The main emphasis in the Master plan was put on the following issues:

- Road safety strategy and road safety improvement programme;
- Traffic modelling and defining long-term development priorities;
- **Feasibility study of improving Via Baltica (Saulkrasti, Iecava, Bauska);**
- An overview of environmental aspects in relation to the development of the road network.

Taking into account the actual traffic flows, the most important transport corridors passing through Latvia were identified: North-South corridor (Via Baltica) and East-West transport corridor (see figure below). Accordingly and in view of the EU accession, the Master Plan highlighted the integration into the TEN-T network as the most important task on the road network. In other words, the need to upgrade transit corridors of Latvia to E-road standards was set as a priority. The National ISPA Strategy for Transport sector (issued in October 1999 by the MoT) stated that in the selection of projects the European Commission's priority would have been given to measures facilitating the development of connections with the EU countries and projects included in the TINA network[16], in particular the Helsinki Pan-European Corridors.

[12] signed in Helsinki, 1 December 1995 by the Transport Ministers of the Baltic countries and the European Commission.

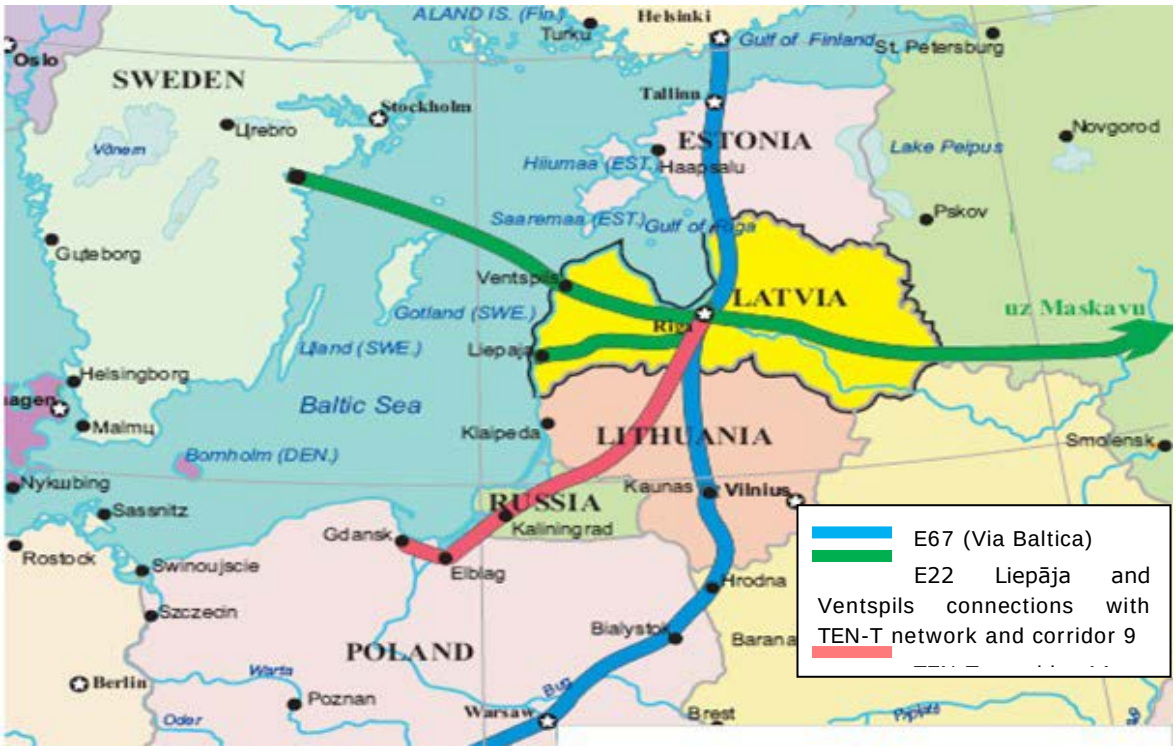
[13] The First Via Baltica Investment Programme has been financed through the loans from the World Bank, European Bank for Reconstruction and Development, EU PHARE programme and the State Road Fund.

[14] Viatek Group LTd (Finland), SweRoad (Sweden), Celuprojekts (Latvia) and LT-Consultants (Finland).

[15] The Master plan for the maintenance, development and operation of the road network and highway safety programme (June 1997).

[16] In preparation for the enlargement of the European Union to the east, in 1996 the European Commission set up the Transport Infrastructure Needs Assessment (TINA) to oversee and co-ordinate the development of an integrated transport network in the 11 countries that have applied for EU membership and to ensure coherence with the Trans European Transport Network within the EU. In the TINA process, the Transport Ministries, the Commission and the TINA Secretariat have worked to define the precise transport links that should make up the eastern transport network. Projects were initially financed by the PHARE programme. From 2000 onwards, further money become available - through the Instrument for Pre-Accession Aid (ISPA).

Figure 14. Main transport corridors in Latvia



Source: Transport and Telecommunication Institute

A number of traffic studies[17] carried out by Latvian road administration in the period of 1996-2000 allowed to identify, at national level, the road sections where travel time increased and traffic safety significantly reduced. Among the results of these studies, Saulkrasti together with other towns such as Iecava and Bauska was identified as a "bottleneck" for transit traffic on Via Baltica route.

The project forms part of an overall scheme to rehabilitate and upgrade Via Baltica route on the state main road A1 between Riga and Ainazi near to the Estonian Border – part of the Pan-European corridor N.1 (see table below). Therefore the measure has been given the highest priority in the National ISPA Strategy for Transport Sector.

[17] 1) Feasibility study for the improvement of State main road A10 Rīga – Ventspils, 2) Feasibility study for the improvement of State main road A9 Rīga (Skulte) – Liepāja, 3) Study of West – East road transport corridors in section Rīga – Jēkabpils, 4) Feasibility study for traffic safety improvement on State main road A1 Rīga (Baltezers) – the Estonian border (Ainaži).

Table 3. Improvement of the Via Baltica route: the overall scheme until 2007

SUB-SECTION	KM	LOCATION	COMMENTS
1 (*)	0.0 – 6.3	**Baltezers – Adazi**	**ISPA 2001**
2 (*)	6.3 – 12.8	**Riga – Adazi** **Adazi - Gauja**	**ISPA 2003**
3 (*)	12.8 – 13.0	**Gauja Bridge**	**Phare COP'97**
4 (*)	13.0 – 21.2	**Gauja - Lilaste**	**ISPA 2000. Completed in November 2001.**
5	21.2 – 41.0	**Lilaste – Skulte** **Saulkrasti bypass**	**Project under assessment**

*Note: * these projects were started and completed between 2000-2006, i.e. before Saulkrasti bypass project. Source: Authors based on information provided in the Application for assistance under the ISPA financial instrument*

2.2 FINANCING DECISION AND PROJECT IMPLEMENTATION

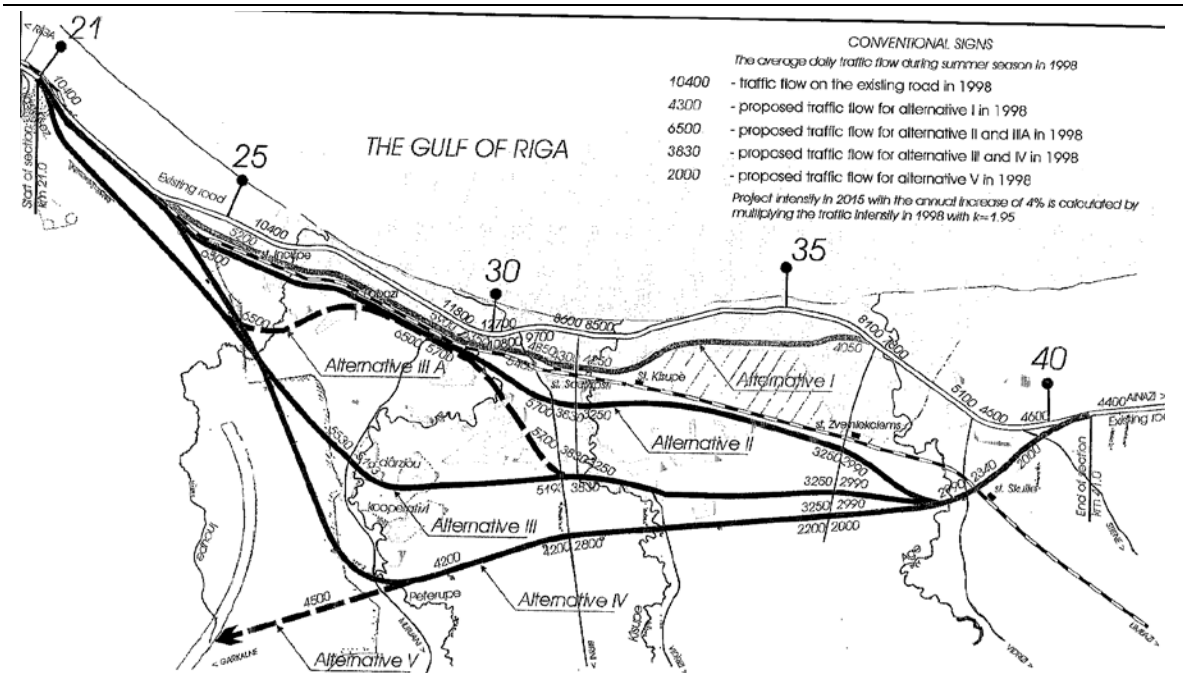
The project under consideration was prepared by the Latvian Road Administration in cooperation with the Ministry of Transport. Initially, to solve the bottleneck in Saulkrasti the options were either to widen the existing 2-lane road to four lanes or to construct a bypass for transit traffic.

Saulkrasti municipality declined the widening of the road which goes through the town. Also the designers considered this solution an impossible option due to densely located residential buildings (part of which historical buildings) along the road. Moreover, such an option would not reduce traffic through Saulkrasti town and would not reduce the environmental impact in residential area, and the high risk of traffic accidents.

In 1998 the first *Feasibility study for Traffic Safety improvements on Road A1 Riga – the Estonian Boarder* was prepared by a consortium of consultants composed by an international company and a Latvian one.[18] **The study proposed six alternatives for bypassing route**, two of which were accepted by involved municipalities (see figure below). One alternative (II) proposed a bypass along the existing railroad, and the other one (IV) offered a bypass quite at a distance from Saulkrasti town through the forests.

[18] The international consultant was COWI, the national one was ProVIA.

Figure 15. Locations of Saulkrasti bypass alternatives



Source: Improvements of Via Baltica route. Consturction of Saukrasti bypass on the Latvian State main road A1 Riga (Baltezers) –Estonian border (Ainaži) from km 21.05 (Lilaste) to km 41.57 (Skulte). Environmental Impact Statement, May 2002.

In 1999-2000, another feasibility study[19] was specifically performed for the two selected alternatives. Technical, financial and environmental aspects were assessed for each option and the results were in favour of alternative II (taking into account alignment, territory of land required, costs, impact on natural resources and residential areas). According to the "Construction law" of the Republic of Latvia and the "Regulations on public hearing of construction"[20], a first public hearing was organised in May-June 2000 as a part of EIA. Taking into account the view of local residents, Saulkrasti municipality supported alternative II adding mandatory requirements for the corrections to bypass the territories for which the opposition was the greatest due to their proximity to the new road.

Two amended alternatives IIA and IIB were proposed by the designer and offered for public hearing in August 2001 in Saulkrasti and in Skulte[21]. Alternative IIA was closer to the existing railway and therefore closer to the residential areas. Alternative IIB was along the existing high-voltage power line, which entailed that less forest needed to be cut and less inhabited territories would have been affected by the bypass. In total, 1,057 opinions were received, of which 62.2% supported alternative IIB, 0.1% supported alternative IIA and 20.9% supported both alternatives. Clearly, the most active residents were those who had real estate close

[19] Study for Road A1 Riga – the Estonian boarder potential road alignment alternatives in the section Riga-Skulte (prepared by COWI/ProVIA).

[20] Regulation N. 309 of the Cabinet of Ministries of the Republic of Latvia.

[21] On behalf of Latvian Road Administration the hearing procedure was organized and implemented by JSC "Celuprojeckts", "Eirokonsultants" Ltd. And Real Estate Formation Board of State Land Service.

to the proposed road alignment IIA and IIB. Less interest were shown by residents living between the coast and the railroad.

Main benefits foreseen by residents from alternative IIB were the following:

- Existing road through Saulkrasti would be released from heavy traffic;
- Light traffic on existing road would reduce by approximately 50%;
- Road alignment would go east from settlements "Pabaži" and "Veselība". Summer residents would not have to cross the bypass heading towards the sea and the centre of Saulkrasti.

After a comprehensive analysis concerning all environmental factors in the research area[22], both alternatives were compared with regard to their prospective environmental impact. The EIA resulted in calculating the potential conflict density (quantified environmental risks) for both options. **Based on the results of the EIA and the public hearing, variant IIB was accepted by the authorities for further promotion**.

Concerning the source of funding, in 2000, **when EU pre-accession funds[23] become available for Latvia, it was decided to use these funds for the reconstruction of the Via Baltica** sections, starting with the "bottlenecks" in Saulkrasti and Baltezers. **Accordingly, the project** (like the others co-financed by ISPA) **was required to be prepared, approved, implemented and supervised in line with the ISPA procedures**[24]. Saulkrasti bypass was the first new construction project since the independence of Latvia to follow these procedures.

The opening of the first construction works procurement procedure in line with the Financial Memorandum was set for March 2003. At first, tendering documents were prepared in accordance with the Practical Guide to PHARE, ISPA and SAPARD and in a co-ordinated manner by all the involved institutions (LSR, MoT, MoF and EC). **The coordination of the Project procurement documentation was a long process**, which was further influenced by changes in regulations governing the tender procedure. The procurement documentation was redone several times (the ISPA rules changed, and in 2004 the transition to the Latvian Law on Public Procurement[25] took place). **As a result, the actual project implementation was delayed by two years**. This was due to both the lack of experience in drawing up the necessary documents and the complex and lengthy administrative procedure for document coordination.

[22] I.e. population, inhabited areas, landscape, cultural heritage and material assets, flora/fauna/biotopes, climate/air, surface water, soil.

[23] Instrument for Pre-Accession Aid (ISPA).

[24] As per Regulations of the Cabinet of Ministers of Latvia No.1 adopted on 2 January 2001. Procedures by which Projects Financed from Resources of the Financial Instrument for European Union Structural Policies for Pre-accession are Prepared, Approved, Implemented and Supervised.

[25] In 2004 the Ministry of Finance, as a public administration body, procured purchases in accordance with the Law on procurement for the needs of State or Local Government, later – the Public Procurement Law, which transposed the European Parliament and Council Directives 2004/18/ EC on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts.

The first construction works procurement was announced in March 2004 but then cancelled after all the received bids were above the available budget. The second procurement for the now joint first and second sections of the construction works was tendered and the contract was concluded on 26 July 2005. The remaining procurements were arranged simultaneously.

The accumulated delay affected the costs of construction. The increase in project costs was also affected by changes in the macroeconomic indicators in the country soon after the EU accession (see Table 4). In particular, the general increase in prices, stimulated by the growth of the national economy, and especially the increase in construction costs and wages, significantly affected the final project cost.

Table 4. Percentage change of macroeconomic indicators against the previous year in Latvia (%)

	BEFORE EU ACCESSION		AFTER EU ACCESSION				
Indicator	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
GDP growth rate	7.1	8.4	8.3	10.7	11.9	10.0	-3.5
Consumer price changes	1.9	2.9	6.2	6.7	6.5	10.1	15.4
Wage changes	8.5	11.3	9.1	26.4	3.1	31.6	20.7
Wage changes in construction sector	3.0	13.5	9.4	21.0	32.0	34.0	18.0
Construction cost changes	-3.5	-1.6	5.9	16.6	20.3	24.4	13.8

Source: Central Statistical Bureau, Latvia

Another factor which affected the cost increase relates to the payments for works. While the co-financing from the EC was received in *euro,* the local constructors were paid in *lati* (national currency) as at that time Latvia was not in the Eurozone[26]. The changes in the currency exchange rate affected the difference between the cost increase in *lati* and in *euro*[27]. As a result, the increase in the eligible costs of the project in *lati* was 64%, while converted into *euro* units the increase was 30%.

Despite the cost increase the scope of works remained the same but the shortage of funding resulted in a delay of two years in the project timeline (see figure below) and a postponement of the deadline for the project's implementation by one year. **The project was indeed implemented from 2005 to 2008[28], whereas the planned timeline was 2003-2007.** Several amendments were made to the Financial Memorandum to reflect the price increase, nonetheless the construction costs still exceeded the revised financial plans. **The initial planned total cost was EUR 48.81 million, but the final total project cost was EUR 130.5 million**, including eligible project costs of EUR 94.8 million (all figures are in nominal terms). While the

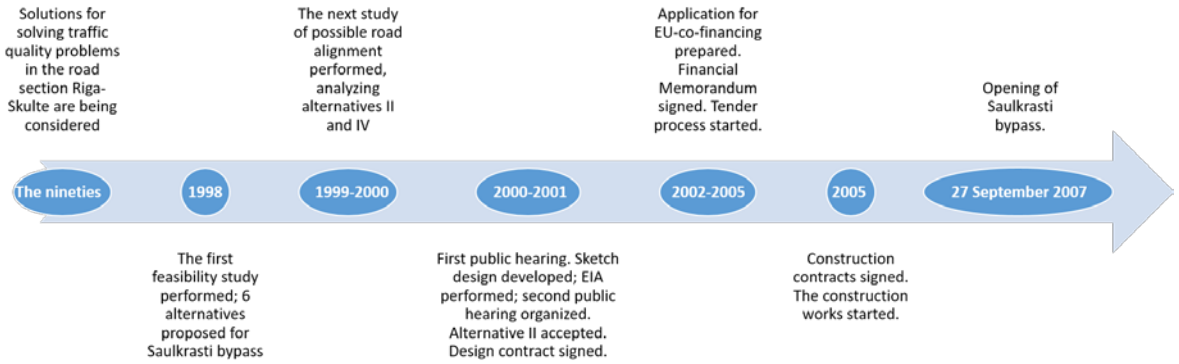
[26] Latvia joined the Eurozone in 2014.

[27] In 2002 currency exchange rate was 1EUR=0.558 LVL. Since 1 Januray 2005, currency exchange rate was 1EUR=0.702804 LVL.

[28] Finally, the bypass was commissioned in two tranches: phases I and II on 31 October 2007 and phase III on 20 November 2007. After that, works on connecting roads were completed by the end of 2008.

construction of the bypass was co-financed by Cohesion Fund, all the works related to the rehabilitation of existing road A1 were financed by the state budget of Latvia. The CF financing initially was planned at EUR 30.79 million but, due to cost increase, the actual CF co-financing reached EUR 40.03 million. The state budget covered the extra eligible costs of the project above the available CF co-financing. The project delays did not affect the socio-economic benefits envisaged by the project.

Figure 16. Time line of Saulkrasti bypass

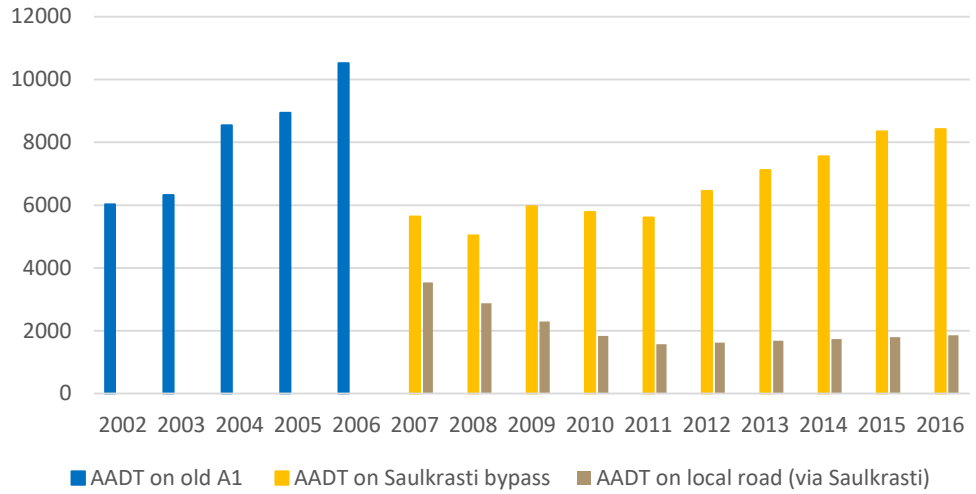


Source: Authors

2.3 CURRENT PERFORMANCE AND OTHER INVESTMENT NEEDS

As already observed by the update of ex-ante CBA carried by DEA Baltika on behalf of the Ministry of Transport in 2009, **as soon as the Saulkrasti bypass was opened, it took all international transport away from the settlements**. This alone was a significant relief since transit traffic mostly means heavy trucks (7.5-32 t gross weight), which cause the most serious vibration effects as well as the highest rates of noise and also air polluting emissions.

Figure 17. AADT on the state main road A1 before and after Saulkrasti bypass



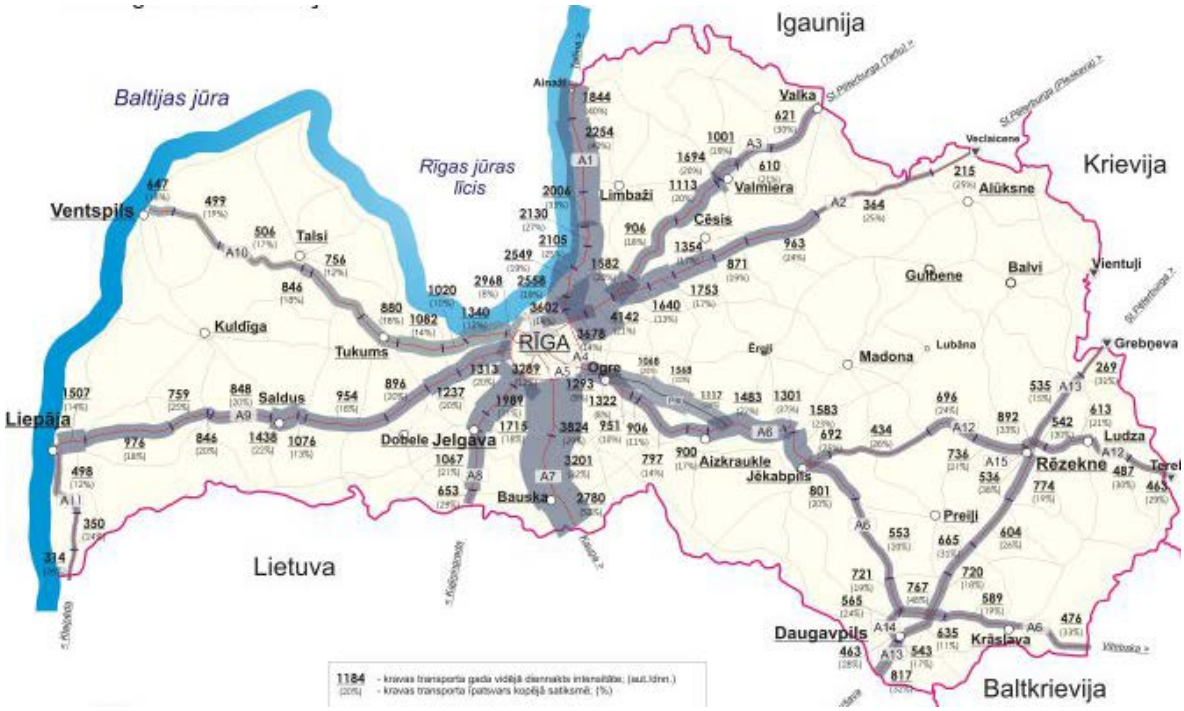
Source: Latvian State Road

Saulkrasti town and Skulte were relieved not only from noise but also from polluting air-emissions. As a matter of fact, the new road mainly strains through forests in the rural area of Saulkrasti. From the traffic safety point of view, about 2 m high grid

fence are installed along the east edge of the road to protect wild animals from crossing the road. The local traffic remains on the existing old road with the settlement further on, cumulating in the central part of Saulkrasti.

State main road A1 is currently one of the busiest roads in the country with the highest proportion of HGV (22% in 2016, see figure below).

Figure 18. AADT of HGV on the state main roads in Latvia (2016)

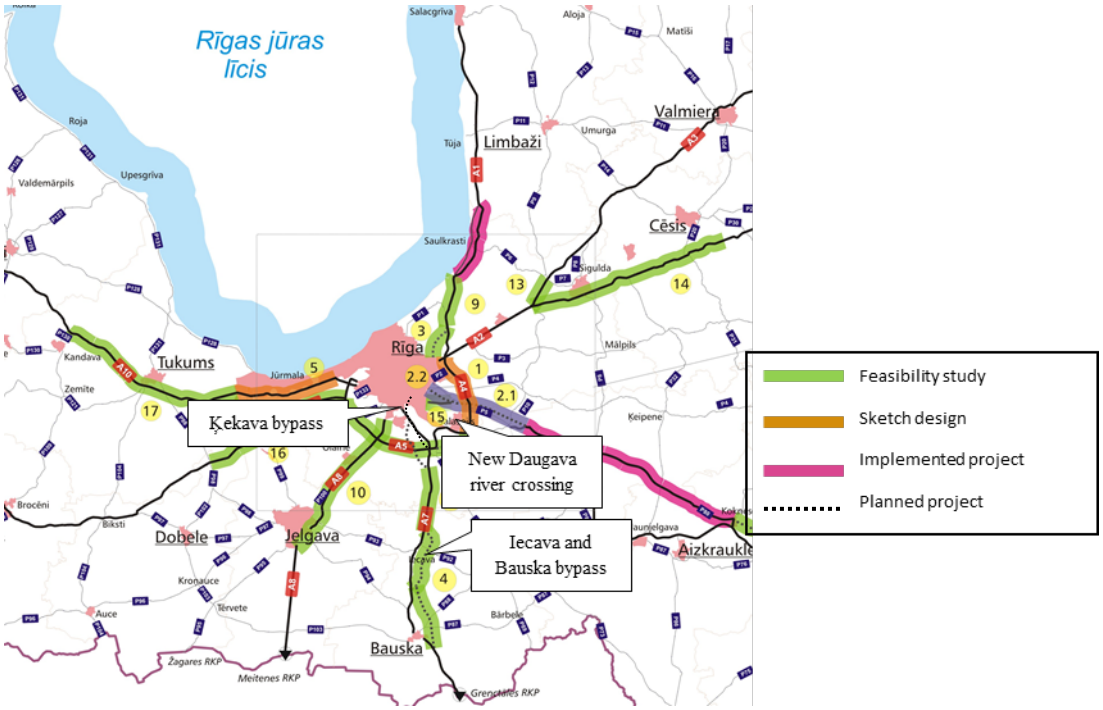


Source: Latvian State Road

Saulkrasti bypass has significantly reduced transit traffic in Saulkrasti, Zvejniekciems and Skulte. The only permanent cargo flow concentration point has remained Skulte port in Zvejniekciems. After the bypass construction, there is about 2-5% of heavy gross vehicles in total traffic flow on the local road via Saulkrasti.

While the traffic situation from km 0 to km 41 is currently solved thanks to improvements financed in the period 2001-2007, there are still some bottlenecks remained on Via Baltica route namely Ķekava, Iecava and Bauska towns, as well as Riga bypass and Daugava river crossing on Riga bypass through the hydroelectric power station.

Figure 19. Development projects in the Latvian state road network



Source: Ministry of Transport

In order to solve such bottlenecks the Ķekava bypass, the new Daugava river crossing on the state main road A5 (Riga bypass) and the upgrade of the state main road A4 section Baltezers-Saulkrasti were included in the transport development guidelines 2014-2020. This is in line with the effort put in the last two decades to ensure development of road infrastructure in the most important transport corridors.

The mentioned future improvements may affect the traffic level on the entire Via Baltica Route in Latvia, including the Saulkrasti bypass. As a matter of fact, the easiness of transit along the road could stimulate the road traffic. On the other hand, the use of Via Baltica Route could be negatively influenced by the new Rail Baltica project (see box below) which envisages to build high-speed train line for both passenger and freight traffic throughout the Baltic States along Via Baltica route. As a consequence of this project, part of road users such as point-to-point travellers and intra-Baltic traffic could shift from road to rail.

Box 3. Rail Baltica project

Rail Baltica is one of the priority projects of the European Union (TEN-T). It is a green field infrastructure (870 km) which envisages a continuous rail link from Tallinn (Estonia) to Warsaw (Poland), going via Riga (Latvia) and Kaunas (Lithuania). The project is considered a symbolic return of the Baltic States to Europe. Actually, since the middle of 20th century the Baltic countries have been mainly linked to an East-West railway axis using the Russian gauge 1520 mm rails, reflected in current rail traffic flows. Unfortunately, the 1520 mm gauge system makes it difficult and costly to interconnect the Baltics with the rest of EU via Poland, where 1435 mm gauge system is in place. The estimated cost of this mega project is EUR 5 billion and the completion date should be 2025 for the Baltic section, 2030 for the link to Warsaw.

Source: Authors based on information available at www.railbaltica.org (accessed on 01/02/2018)

3. DESCRIPTION OF LONG-TERM EFFECTS

In this chapter the main long-term effects produced by the project are presented and discussed. First, a summary of the effects produced along the four categories identified in Volume I of the First Interim Report is briefly described. Then, the most significant ones are discussed and supported by available evidence.

3.1 KEY FINDINGS

The long-term contribution of this project shall be considered under the following four main categories: economic development as well as quality of life and well-being, environmental sustainability and distributional effects.

The **economic growth** aspect includes the quantifiable benefits derived from faster and less costly travelling on the state main road A1 (Via Baltica) bypassing Saulkrasti town. These effects are incorporated in the CBA in the form of travel time savings as well as vehicle operating costs savings.

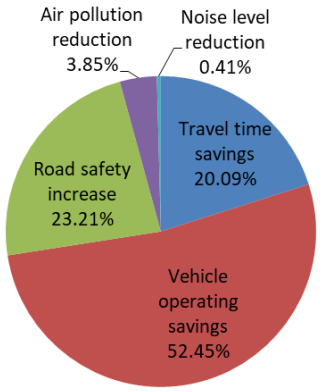
Under the heading of **social well-being and quality of life** the increased road safety is considered together with effects related to the noise level. The increase in travel safety and the reduction of noise are confirmed by the ex-post CBA.

Among the **environmental sustainability effects**, reduction of air pollution can be observed. The effect quantitatively measured and included in the CBA is positive.

As for the **distributional effects**, a positive effect on territorial cohesion is visible with the network extension and associated development of adjacent districts. Also, the project facilitated the connectivity between the regions and the states linked with Via Baltica road.

The results of Cost-Benefit Analysis, as included in the Annex II to this report indicate that the project adds value to the European society under the social and economic points of view. In the baseline case, the Socio-Economic Net Present Value (ENPV) equals EUR 103.1 million, with the applied discount rates of 6.67% backward and 6.25% forward, whereas the Economic Internal Rate of Return is at the level of 9.4%. Also, the risk analysis indicates that there is a nil probability for the ENPV to be less than zero and a probability of nearly 50% that the expected ENPV is less than the reference one. These results show that the project yields positive socio-economic net benefits and it has a low level of risk. The distribution of benefits in the CBA is presented in the figure below.

Figure 20. Main socioeconomic benefits (% of total benefits)



Source: Authors

In addition to these measurable impacts, there are also other effects which are however difficult to be captured in monetary terms, but relevant for the comprehensive assessment of the project, which are discussed in the following sub-chapters.

The table below summarises the nature and strength of the project's effects classified under the above referred four categories (economic growth, quality of life and well-being, environmental sustainability and distributional issues), as well as the territorial levels where these are visible, and the time-horizon of their materialisation.

Table 5. Summary of nature and strength of effects (the effects highlighted in green are those included in the ex-post CBA)

CATEGORY	EFFECT	STRENGTH*	LEVEL
Economic growth	Travel time	+4	Local – regional – cross-border
	Vehicle operating cost	+5	Local – regional – cross-border
	Reliability journey time	+5	Local – regional – cross-border
	Income for the service provider	N.R.	
	Wider economic impacts	N.R.	
	Institutional learning	+2	National
Quality of life and well-being	Safety	+4	Local – regional
	Service quality	+3	Local – regional
	Crowding	N.R.	
	Security	N.R.	
	Noise	+3	Local
	Aesthetic value	N.R.	
	Urban renewal	N.R.	
Environmental sustainability	Local air pollution	+3	Local
	Climate change	0	
	Biodiversity	N.R.	
	Water pollution	N.R.	
Distributional effect	Social cohesion	N.R.	
	Territorial cohesion	+3	Local – regional – cross-border

**Note: the strength score reflects the weight that each effect has with respect to the final judgment of the project. In particular:*
-5 = the effect is responsible of the negative performance of the project;
-4 = the effect has provided a negative contribution to the overall performance of the project;
-3 = the effect has contributed in a negative way to the performance but it was outweighed by other positive effects;
-2 = the effect has a slightly negative contribution to the project performance;
-1 = the effect is negative but almost negligible within the overall project performance;
0 = the effect has no impact on the project performance;
+1= the effect is positive but almost negligible within the overall project performance;
+2 = the effect has a slightly positive contribution to the project performance;
+3 = the effect has contributed in a positive way to the performance but it was outweighed by other positive effects;
+4 = the effect has provided a positive contribution to the overall performance of the project;
+5 = the effect is responsible of the positive performance of the project;

N.R. = The effect is not relevant for the specific project;
No data = The effect is potentially relevant, but no evidence on impacts is available. This shall be used only for relatively low significant effects whose inclusion would in no case dramatically affect the overall assessment.

The following sub-chapters include some more detailed description of the effects incorporated in the ex-post CBA and/or supported by available qualitative evidence either from documental sources or interviews.

3.2 EFFECTS RELATED TO ECONOMIC GROWTH

Measurable effects

With regard to the socio-economic consequences of the investment, **the most significant effect is savings in vehicle operating costs for traffic diverted to the bypass** as a result of a higher quality road infrastructure. Improved road technical condition, less forced speed reductions and accelerations due to entering/exiting vehicles, and increased road capacity substantially reduce trip costs for vehicles using the new bypass.

Another relevant effect for traffic diverted to the bypass is the reduction of travel time. On the bypass there are no single level intersections, no roadside activities which reduce the speed of the traffic, and the speed limit is 90 km/h on the whole section. Under normal traffic conditions, it allows to save 7 minutes of travel time as compared to the old road A1. Travel time benefits are not only relevant for transit traffic but also for Saulkrasti residents who commute every day to Riga. Thus, the project has a relevance which is local, regional, national and European at the same time, as part of the Trans-European Transport Network.

Savings in VOC and reduction of travel time are incorporated in the Cost-Benefit Analysis (see Annex II) in which, respectively, 52% of total benefits arise from savings in VOC and 20% arise from savings in travel time for transit traffic. To obtain the value of benefits in terms of time savings, it has been assumed that 43% of the total car traffic are business travellers, 21% are commuters and 36% are other travellers.

> ***"Thanks to the bypass I gain up to half an hour per day when driving in both directions. In the past, Saulkrasti was a real obstacle for me: I was literally forced to crawl at 50 km/h and could not even think about overtaking. The situation has improved dramatically". Driver from Skulte[29]***

Non measurable effects

An observed economic benefit after completion of the bypass is **reliability** of travel time, especially for transit traffic. Before the bypass was constructed, the old state road A1, being the main and only road running through the town of Saulkrasti, was used for both local and transit traffic in 11 km long section causing inconvenience for locals due to high transit traffic volumes and causing delays for transit traffic due to low speed and frequent entry/exit of local vehicles to/off the main road. In case of an accident, often there was no alternative route to bypass the accident due to lack of connecting road network in Saulkrasti. Now the risk of additional delay due to low

[29] See: http://ec.europa.eu/regional_policy/en/projects/latvia/seaside-resort-benefits-from-big-bypass

speed and congestion in Saulkrasti is eliminated. It increases the reliability of road users.

> ***"The bypass has created an alternative route for Saulkrasti citizens. In the past in case of accident there was the risk of remaining stacked in the traffic for hours" Interviewed citizen from Saulkrasti***

Moreover, the interviews with local entrepreneurs revealed that, at local level, the construction of the motorway has led to an **initial loss of profits for the small economic activitie**s (gas stations, bars, cafeterias, etc.) located along the existing A1 from which traffic has been diverted. However, it must be noticed that this short-term effect has also been negatively affected by the economic crisis of 2008-2010, which makes the loss of profits not fully attributable to the construction of the bypass. Currently, the local stakeholders claim that this negative effect has been more than outweighed by the increase in tourism, thanks to the reduction of transit traffic going through Saulkrasti town and improved accessibility to areas of tourist interest.

Finally, another remarkable economic benefit is the **learning effect** as Saulkrasti bypass project was the first new construction project of such scale in Latvia since the nation's independence of 1991. With this project, the land aquisition unit was established within the Latvian State Road administration and the procedures were set at national level including the methodology for land pricing.[30] After the project, changes in legislation were also initiated to speed up the land aquisition processes. Morover, the project was a useful experience for development of project management system within the road adminsitration. It was necessary to reconcile the interests of several stakeholders, coordinate large-scale construction works and supervision, as well as manage cash flow from different financing sources. For contractors, it was the first large scale construction project in Latvia where nearly all major national contractors were involved. According to interviewees, this project was a great experience for mutual cooperation. It stimulated the improvement of existing technical know-how as well as system development on how to plan, develop, implement and operate road construction projects in Latvia.

3.3 EFFECTS ON QUALITY OF LIFE AND WELL-BEING

Measurable effects

Road safety has improved significantly in Saulkrasti since 2008 when the transit traffic was diverted to the bypass as it can be seen from the historical accident data on the old A1 going through Saulkrasti (see table below). Traffic safety has improved due to increased road capacity, local and transit traffic separation, constructed separate infrastructure for pedestrians and cyclists, eliminated single level intersections, installed lightning, improved road visibility.

[30] I.e. a methodology to determine fair compensation for expropiated real estate for public purposes.

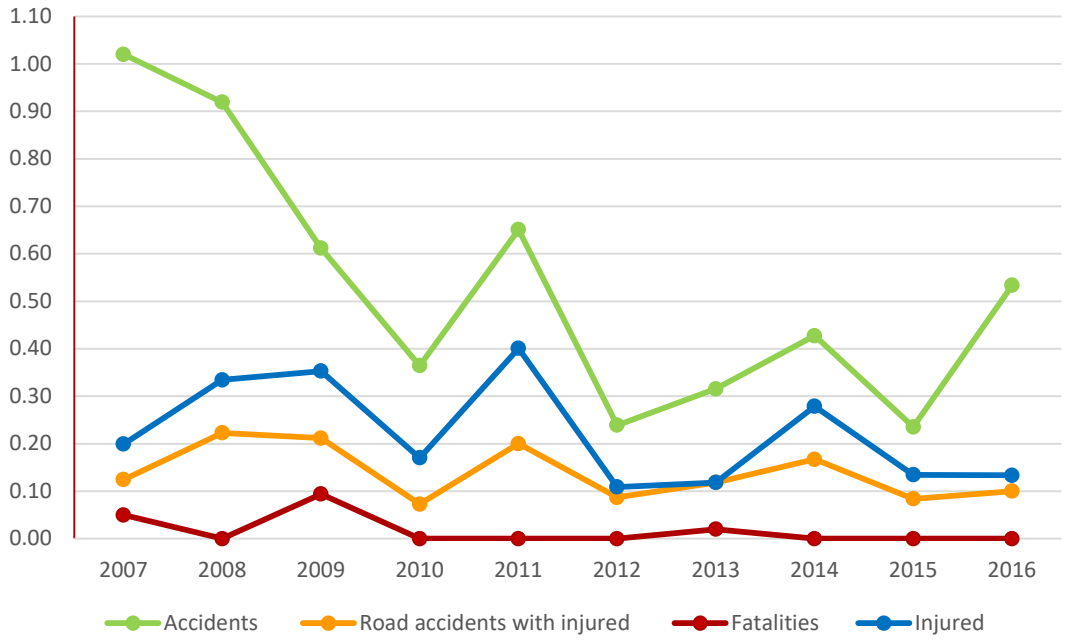
Table 6. Road accidents on road V101 in Saulkrasti

	YEAR	ROAD ACCIDENTS	FATALITIES	INJURED PERSONS
Before the project	2005	15	0	2
	2006	14	1	1
	2007	14	0	2
After the project	2008	8	0	1
	2009	8	0	6
	2010	5	0	2
	2011	5	0	1
	2012	6	0	15
	2013	6	0	3
	2014	5	0	0
	2015	10	0	7
	2016	8	0	1

Source: Road Traffic Safety directorate

Similarly, number of road accidents has decreased on the state main road A1 section km 21.05-41.57 (Figure 21). No fatalities have been reported on the road A1 during the last 6 years except one in 2013.

Figure 21. Road accident rate per million vehicle-km on the state main road A1 section km 21.05-41.75



Source: Road Traffic Safety directorate

The safety benefit which is included in the Cost-Benefit Analysis (see Annex II) **is valued at EUR 89 million per year**. Overall, it constitutes 23% of total project socio-economic effects.

Another effect included in the ex-post Cost-Benefit Analysis (see Annex II) is the **noise reduction effect, equalling EUR 1.6 million at present level**. Taking transit

transport away from the settlements, the bypass has relieved all inhabitant areas in Saulkrasti, Zvejniekciems and Skulte from increased noise level. This alone is a significant relieve since transit traffic mostly means heavy trucks (7.5-32t gross weight), which cause the most serious vibration effects as well as the highest rates of noise.

> ***"The vibrations caused by heavy traffic were so loud that it was difficult to talk on the phone" Interviewed real estate agent***

The new road mainly strains forests in the rural area of Saulkrasti. Along the bypass route, the impact caused by vibration and noise on a few built-up areas (primarily south of Kisupe river) is by far less severe than previously in Saulkrasti before the bypass was built. Moreover, noise barriers are constructed separating the road from the nearby inhabitant areas in order to mitigate the possible negative effect of the bypass.

Non measurable effects

It is agreed among Saulkrasti inhabitants that the construction of the bypass and the parallel rehabilitation of the existing road A1 (now road V101) has greatly improved living conditions of residents. Diverting transit traffic away from the town has allowed to create an urban environment more suitable for the needs of the residents and holidaymakers. The main street has changed a lot: a number of pedestrian crossings are marked to ease the access to the sea, sidewalks are adjusted for the use of cyclists and pedestrians. The local businesses have gradually changed and adopted their activities more to recreational services, as well as to needs of local residents. A positive effect on infrastructure quality is also recognised. Widening of the state main road, lightning, easy entry/exit to and from the main road and reconstruction of local roads make travelling more comfortable and safe. Moreover, the project and improvements on other road A1 sections has increased accessibility and connectivity to Saulkrasti. This, in turn, has increased the town attractiveness as a destination for nature and hiking lovers as proved by the increase in tourists shown in Figure 5.

3.4 EFFECTS ON THE ENVIRONMENTAL SUSTAINABILITY

Measurable effects

As it often happens for this kind of projects, the bypass construction has generated both negative and positive effects on the environment. Negative impacts concerned the increase in air pollutant emissions related to the generation of new traffic, as well as the negative externalities usually associated with construction of large infrastructures. However, despite the generation of these negative effects, the overall environmental impact of the highway is positive. This judgment relies on the fact that by diverting transit traffic to the bypass, meaning less congestion in Saulkrasti, **the project contributes to a net reduction in air pollution in town, so where it can affect the population**. This effect is incorporated in the Cost-Benefit Analysis (see Annex II) and constitute 3.8% (EUR 14.7 million) of total socio-economic benefits.

According to the studies carried out by the State Environmental Center in 1998, during the summer season the proportions of benzene, lead nitrogen dioxide, carbon and monoxides levels detected in the vicinity of the old state road A1 were significantly higher than the maximum permitted levels laid down in the legislation. Although no measurements have been undertaken after the bypass construction, it is reasonable to

affirm that the air pollution level within the urban area has decreased significantly after the construction of the bypass because the main pollutants – emitted by heavy gross vehicles – have been diverted from Saulkrasti town to a less populated area (mainly forest).

As regards the greenhouse gas emissions, the project has made no difference because the distance travelled by shifted vehicles on the bypass is the same as on the old road A1. Differently from air pollutions, GHG emissions have a global impact, and therefore the related cost is not dependent on the investment location.

3.5 EFFECTS RELATED TO DISTRIBUTIONAL ISSUES

Non measurable effects

One of the main objectives of the development policy in Latvia has been to tackle the major sources of regional disparities in the areas of infrastructure and rural development. Latvia's territory is relatively small and the travelling distances usually are no longer than 250 km. Therefore, road transport – which is characterized by a quite dense network – remains the dominant mode of transport in the country. As a result, the quality of road infrastructure plays an important role in the context of employment and mobility within the country.

In this regard Saulkrasti bypass project has contributed significantly towards the development of more accessible and connected populated areas in the northern part of Latvia and as well as towards connecting Baltic States. Thus, the project had a positive effect on **territorial cohesion** providing opportunity for people to make the most of inherent features of connected territories.

Good road infrastructure is also important for international competitiveness of Latvia, especially as a transport hub. Transit development also contributes to the expansion of other economic sectors in Latvia supporting foreign trade. The Saulkrasti bypass links different territories closer to effective cooperation.

3.6 TIME-SCALE AND NATURE OF THE EFFECTS

The project was completed in 2008, therefore most of the discussed observed effects materialised in the short-run and continued in the long-run with some of them diluting their magnitude due to the evolving context. With reference to the spatial scale of the effects all of them are of local nature, however, some of them affecting also the region and the country given the role played by Via Baltica route in the national road network. Right after the bypass was opened for traffic, transit travellers chose the new route which was an immediate short-term response to the project. Some of the effects related to economic growth and distributional issues have wider cross-border impact, especially when combined with the complementary investments on Via Baltica route.

Table 7. Temporal dynamics of the effects

CATEGORIES OF EFFECTS	SHORT RUN (1-5 YEARS)	LONG RUN (6-10 YEARS)	FUTURE YEARS	COMMENT
Economic growth	+++	+++	++	Relevant time savings, reduced VOC, reduced congestion, increased reliability.
Quality of life and well-being	++	+++	++	Improved road safety, reduced noise level, good level of satisfaction of Saulkrasti residents and holidaymakers.
Environmental sustainability	++	+	+	Reduction in level of air pollution due to diverted trucks; no impact on biodiversity.
Distributional issues	++	++	++	Improved connectivity between regions on Via Baltica route.

Note: + = slight positive, ++ = positive, +++ = strongly positive, +/- = mixed effect.

4. MECHANISMS AND DETERMINANTS OF THE OBSERVED PERFORMANCE

In this section the key mechanisms and determinants of the long-term effects discussed in the previous chapter are illustrated and discussed along the different phases of the project cycle. Finally, the importance of each determinant for the project's final performance and the interplay between them and the observed outcomes is discussed.

Table 8. Determinants of project outcomes

DETERMINANT	STRENGTH*
Relation with the context	+5
Selection process	+4
Project design	+4
Forecasting capacity	+2
Project governance	+4
Managerial capacity	+5

*Note: * the strength score reflects the weight of the role that each determinant played with respect to the final judgment of the project. In particular:*
-5 = the determinant is responsible of the negative performance of the project;
-4 = the determinant provides a negative contribution to the overall performance of the project;
-3 = the determinant contributes in a moderate negative way to the overall performance of the project;
-2 = the determinant has a slightly negative contribution to the project performance;
-1 = the determinant plays a negative but almost negligible role to explain the overall project performance;
0 = the determinant does not play a role on the project performance;
+1= the determinant plays a positive but almost negligible role to explain the overall project performance;
+2 = the determinant has a slightly positive contribution to the project performance;
+3 = the determinant contributes in a moderate positive way to the performance;
+4 = the determinant provides a positive contribution to the overall performance of the project;
+5 = the determinant is responsible of the positive performance of the project.

4.1 RELATION WITH THE CONTEXT

As mentioned before, the project is part of a larger investment plan – the upgrade of the Via Baltica, part of the Pan-European Corridor I, during the period of 2000-2007.

After the dissolution of the Soviet Union, the existing national system of financing the road infrastructure maintenance and reconstruction collapsed. While the level of financing for the state road network reached EUR 85.5 million in 1990, it decreased by seven times in three years' period (EUR 6.6 million in 1993). The situation became critical: a large amount of timely unperformed reconstruction works started to accumulate in the state road network and more and more roads deteriorated without being repaired. Even the main state corridors connecting the capital and regional centres of the country were in bad condition. Therefore, new ways were sought to address the problems affecting road financing, operation and maintenance, and development.

As a first intervention to tackle these issues, the State Road Fund – administered the State Road Administration – was established in 1994 together with Municipal Road Funds **which were planned to be financed by the Annual Vehicle Tax**, a new tax levied by the Latvian government. More specifically,

70% of the tax revenues were allocated to the State Road Fund and the remaining 30% to municipal road funds.

Although the idea was good, it struggled because of the fund's limited resources. As a matter of fact, the money levied by the Annual Vehicle Tax was not enough to meet the country's financing need. For this reason the Latvian government decided to increase the fund's revenue base and to allocate to the fund 50% of revenues from the excise duty on oil products in 1995. This manoeuvre reached the desired financing effect: the financial envelope of the State Road Fund reached USD 80 million (EUR 81.6 million) in 2002 (the last year before the EU funds were available to the Latvian road sector), i.e. 68% of year 1990 level in nominal prices.

Besides financial problems addressing the operation of maintenance of the road network, the Latvian national economy faced a challenge of public road service accessibility and quality. Such backlog resulted in dissatisfaction of road users (both private and business) due to long travel time, high vehicle operating costs and low level of traffic safety.

In line with the need to adopt a more strategic approach to the management of the national road system, the Ministry of Transport decided in 1995 to elaborate the Master Plan for Latvian road network maintenance, development and operation together with the Road Traffic Safety Programme (the Master Plan). As already mentioned, a team of international and local consultants elaborated the Master Plan between 1996 and 1997 where the most important transport corridors were identified including the Via Baltica route which in any case was already under the spotlight of the First Via Baltica Investment Programme 1996-2000.[31] In addition to an evaluation of the technical conditions of the road network, the Master Plan included the analysis of the road capacity and the traffic flows as well as road safety and environmental aspects. Together with the steering group of the Master Plan, the experts identified the Saulkrasti town as a problem area for both transit traffic and local inhabitants. In fact, the town equipped with a single two-lane road was a bottleneck which caused significant increase of travel time for both long-distance travellers and Saulkrasti's inhabitants commuting every day to Riga. On the other hand, the traffic prevented the town from remaining an attractive environment for citizens and holidaymakers and promoting Saulkrasti as a tourism destination development. As a matter of fact, due to road congestion, Saulkrasti was unable to make a full use of the opportunities offered by the location on the seaside.

The Master Plan was an important step to set a long term strategic vision for development of Latvian roads. However, revenues from the State Rod Fund was not sufficient to finance the capital investment of road reconstruction and development. The Ministry of Transport had to look for external funding sources in order to implement the foreseen improvements of the Via Baltica. The most feasible and realistic option was to apply for the EU financial instruments (ISPA) available to the pre-accession EU member states.

[31] This programme was worked out on the basis of the Memorandum of Understanding on the Development of Via Baltica signed in Helsinki, 1 December 1995 by the Transport Ministers of the Baltic countries and the European Commission.

4.2 SELECTION PROCESS

The mentioned Master Plan included a priority investment programme based on a multi-criteria analysis. International consultants provided the analysis methodology following the best industry standards. The multicriteria methodology included the following criteria:

- Visual inspection data;
- Roughness and bearing capacity data;
- Traffic data.

In addition, a cost-benefit analysis was prepared for each investment project. The multi-criteria analysis methodology was needed for national authorities, including the Latvian State Road, to make rational decisions about allocation of limited financial resources.

In this regard, it is worth noting that since the adoption of the Master Plan the road administration authority followed the established practice and carried out visual inspection as well as collection of technical measurement and traffic data on annual basis. As a result, the Master Plan's methodology proved to be a sustainable and useful tool for the Latvian State Road Administration's continuous analysis of the condition of the Latvian state roads' network.

After a thorough road network analysis in the framework of the Master Plan, the national authorities concluded that improvements were needed throughout the entire length on the state main road A1. The reconstruction works were started sequentially in sections starting from the first kilometre of road A1 (see table 3 in section 2). In total, 41 km out of 101 km (total length of the main road A1) were upgraded in the period of 2000-2007 including construction of the Saulkrasti bypass.

At this stage, the Ministry of Transport commissioned the feasibility study of the bypass to COWI AS and Pro Via Ltd., a consortium of international and local consultancy companies, in order to identify the optimal track layout of the planned bypass. **The elaboration this feasibility study[32] and the selection process of the most feasible project option took three years** (including the environmental impact assessment and public hearing) **and involved the participation of different stakeholders. Firstly, the Latvian Road Administration**, which was the project implementing body, administered the contract of consultancy services and governed the entire selection process. **Secondly, the local municipality of Saulkrasti and the neighbouring Skulte municipality** (a small section of the bypass goes through this administrative territory) were involved in the process as privileged stakeholders. **Thirdly, the inhabitants living in the catchment area** were taken in the process. In particular, two public consultations (which is a standard procedure in Latvia) were organized until the final agreement was reached on the best option.

As mentioned in section 2.2, at an initial stage both the possibilities of enlarging the existing road and constructing a bypass were taken into account. However, according

[32] Different studies were carried out from 1998 to 2002, among which: Feasibility Study for Traffic Safety Improvements on Road A1 Riga (Baltezers) – the Estonian boarder (Ainazi); Study of road A1 Riga (Baltezers) – the Estonian boarder (Ainazi) potential road alignment alternatives in the section Riga – Skulte.

to the opinion of municipal authorities and local inhabitants, the bypass was the only credible solution for eliminating problems in the town caused by HGV transit traffic. Accordingly, the first project's feasibility study included several alternatives for the new alignment of the bypass.

As a result of the entire selection process, the selected location of the bypass was along the existing railroad which was considered the option minimising the impact on residential areas in the Saulkrasti and Skulte districts.

The whole project identification and option selection process was undertaken without major pending issues. The process was well organized at the very beginning as the project's development objective was clearly defined and acceptable to all key stakeholders: the Ministry of Transport, Latvian Road Administration, Saulkrasti and Skulte municipalities and population in general. The task of stakeholders was to find out the most feasible technical alternative to reach the objective of common interest.

At the final stage of the project preparation the EC (DG REGIO) reviewed the project application together with the feasibility study. The EC made its decision concerning the grant of assistance from the ISPA on 20 December 2002. The Government of Latvia signed the Financing Memorandum on 17 March 2003.

4.3 PROJECT DESIGN

After the selection of the best bypass track layout option a detailed (technical) design was carried out during the period 2002-2005. The technical design was prepared in stages.

The project was considered to be rather complex vis-à-vis the existing road construction experience in Latvia after restoration of national independence in 1990. As a matter of fact, the project includes 17 different road structures including 7 grade-separated junctions and 2 railway bridges (e.g., multimodal transport). Also, the project was the first road construction to follow the EU standards in the technical design according to the EU directives (including the legal acts governing environmental protection). As such, the project design included some innovative approaches in the technical design, for example, the establishment of noise barriers, protection fences for animals and rainwater collectors, which were not a common practice in the country until that moment.

The design contract was awarded — through an open tender — to JSC "Ceļuprojekts" (in English "Road design"), a national company which is very experienced in technical design of roads and structures.

After ten years from the bypass opening, the designed width of the roadway is still sufficient for the existing traffic in 2017. All interchanges are in two levels (grade-separated junctions) which significantly decrease the number of conflict points. Acceleration lanes are foreseen for traffic entering the bypass. Transport vehicles on the bypass do not have to reduce speed due to entering traffic. The road is well visible.

The reduced number of road accidents indicates that technical solutions included the technical design are well-suited for road users. No accidents with animals have been reported on the state main road A1 after 2007 which can be explained by the fences installed along the forest edge.

No complaints have been received neither from the road users nor from the residents living along the bypass regarding the bypass functionality. In

conclusion, there are evidence that the project planning and design was properly done.

4.4 FORECASTING CAPACITY

The forecasting capacity is understood as the possibility and capacity to predict future trends and forecast the demand level and estimate the technical challenges, thus estimating correctly the required resources (e.g. looking at the dangers of over-predicting demand and under-predicting construction costs).

With regard to the traffic forecast which was part of the feasibility study, **the total number of vehicles forecasted (on the old road A1 and the bypass together) was higher in the ex-ante analysis than actually counted in 2002-2016**. This can be explained by too high estimation of traffic in the base year of forecast 2002. However, the growth rates applied in the ex-ante analysis turned out to be lower than those actually observed.

In the ex-ante, the forecasted total traffic then was split between the new alignment (bypass) and the existing alignment. In this regard, **the forecasts of vehicles using the new bypass were more conservative than the actual trend**. Indeed, in the first year of operation the traffic on the bypass was by 6.5% higher than forecasted in the ex-ante analysis and it continued to grow faster than expected (reaching 24% difference in 2015). **In contrast, vehicles using the old road via Saulkrasti are much less than forecasted in the ex-ante analysis**. According to the field interviews one explanation for this situation is that even residents prefer using the new bypass instead of the old A1 road when they have to cross the town or travel to the capital city Riga.

Also, the difference between the traffic forecast and the actual data can be explained by the changing political and economic situation which Latvia encountered after joining the European Union. Rapid economic development facilitated the movement of people, led to greater movement of goods which in turn changed traffic flows. Such increase was difficult to predict in 2002 when the project's feasibility study was elaborated. The effects of the Latvia's possible accession to the EU were encountered in the traffic forecast. However, they were rather conservative considering the uncertainty of country's future performance in a very different economic environment, which in any case was a good approach to avoid possible optimism bias.

Regarding the original investment cost estimates provided in the feasibility study, the total project cost increased by 167% (in nominal terms) comparing to the initially planned in the project application. Several reasons are behind the cost overrun. First, for reasons explained in section 2.3, the construction of the bypass started later than originally planned. This delay to some extent contributed to the escalation of investment costs because a number of road investment projects were tendered out in the period 2005-2007, thus impacting on the price increase due to a sudden increase in demand.

Apart from delays, three main macroeconomic factors affected the increase of project costs: construction cost increase; wage increase; and depreciation of the national currency (Latvia joined the Eurozone only in 2014, ten years after its accession to the EU). The accession of Latvia in the EU radically changed the country situation in financial and labour markets. The opening of the borders for free flows of finances and capital yields two opposing consequences. On the one hand, it set lower prices for financial resources, increased the lending amounts and domestic demands.

On the other hand, the freedom of labour movement offered new opportunities for inhabitants of Latvia to get incomes and experience in other EU countries, which in turn caused rapid labour force outmigration and rise of salary and inflation (Skribane and Jekabsone, 2013). As a matter of fact, over a period of three years (2005-2007), the construction costs for transport infrastructures increased on average by 75% cumulatively and the cumulative wage growth was around 90%. As said above, during the planning process (before the EU accession) given the high uncertainty about the future it was too challenging to fully anticipate fiscal and macroeconomic trends that took place after Latvia joined the EU in 2004, they were rather unpredictable.

The project had a very high investment cost increase creating a headache to the European Commission (DG REGIO, geographical desk officer) [33]

Finally, it should be noted that the economic crisis of 2008 had a little impact on the implementation of the project because the financing decisions of the extra investment costs were taken and procurement procedures were carried out before 2008. However, the crisis affected the traffic flow only in the first phase of operation - as shown in figure 17.

4.5 PROJECT GOVERNANCE

The project's governance structure as well as the number of stakeholders to be involved in the project's preparation and implementation were known and rather clear since its early development stage as the structure mirrored the requirements set in the EU ISPA regulations (see box below).

Box 4. On co-ordination in the country

In the general report on pre-accession assistance (PHARE – ISPA – SAPARD) of 2000 it is reported that: "At the country level and in line with the objective of decentralisation, the Commission strongly encourages the candidate countries to enhance inter-ministerial co-ordination which is a key pre-condition for the candidate countries' successful future management of the Structural Funds."

Source: General report on pre-accession assistance (PHARE – ISPA – SAPARD)

The transition from the ISPA to the CF financing and implementation rules did not negatively affect the project's governance since procedures are rather similar, with the exception of the procurement rules. In fact, the major challenge for the Ministry of Transport in the role of the procurement authority was at first to learn the ISPA (PRAG) rules[34], which changed during the course of the project's

[33] At the very beginning DG REGIO was suspicious because it was difficult to understand the reasons for the cost increase. However, the Latvian Ministry of Transport provided a special cost analysis study to explain and justify the investment cost increase. This study was presented to DG REGIO in Brussels and after a long discussion the EC finally accepted Latvia's position. The parties agreed on the compromise that the Latvian state would finance the cost increase.

[34] PRAG stands for "Practical guide to Phare, ISPA and SAPARD" which explains the contracting procedures applying to all EU external actions financed from the EU general budget (the EU budget) and the European Development Fund (EDF).

implementation and they had to be streamlined with the national procurement regulation. Then, to shift from PRAG to the new Public Procurement Law adopted in 2004 following the EU procurement legal framework. All these factors contributed to delay of the project for two years.[35] Delay due to procurement procedure was a well-known problem in Latvia, which affected a lot of projects, as revealed by the Ex-post evaluation of Cohesion Fund for the period 2000-2011 (see box below).

Box 5. Procurement and delays

Significantly delays associated mainly to procurement procedures were identified by the Ex-post evaluation of Cohesion Fund (including ISPA) for the period 2000-2011 as one of the most serious issues affecting the performance of ISPA/CF delivery system. Under the PRAG rules, the contracting period tended to be very long due to long procedures and very strict and detailed ex-ante controls by the EC Delegation. Instead, once the national legislation was adopted, the main reason for delay was appeals by unsuccessful tenderers. The delays in tendering procedures were then exacerbated by insufficient knowledge of the PRAG rules, on one hand, and the limited wok experience of many employees in the ISPA/CF administrating institutions, on the other hand. Actually, there were very few projects of such size and complexity implemented prior to the ISPA programme.

Source: Authors based on Ex-post evaluation of Cohesion Fund (incl. ISPA) – Work package D: Management and Implementation. Country Report: Latvia (2012)

During the implementation phase, the project was directly managed by the Latvian Road Administration (currently, the state joint stock company "Latvian State Roads", see Box 1 below), which was acting as implementing body in the name and for the benefit of the Ministry of Transport. On the signature date of the Financing Memorandum the Latvian Road Administration was responsible for the whole project life cycle including the project preparation (elaboration of feasibility study), implementation and operation phases.

Box 6. Latvian State Roads

State Joint Stock Company "Latvijas valsts ceļi" (in English "Latvian State Roads") is the legal successor of the former Latvian Road Administration and now fulfils the same road administration and management functions. Since 26 October 2004, the Latvian State Roads is a State Joint Stock Company that operates according to Company Statutes and the Agreement "On Road Sector Management" signed with its main client – the Ministry of Transport of the Republic of Latvia. It performs the management of the state road network, administration of the State Road Fund and organisation of public procurement in order to provide the public with profitable, durable, safe and environmentally friendly state road network.

Source: Latvian State Roads

The Ministry of Finance acted as the Managing Authority and was responsible for effective and transparent implementation of the EU funds according to the

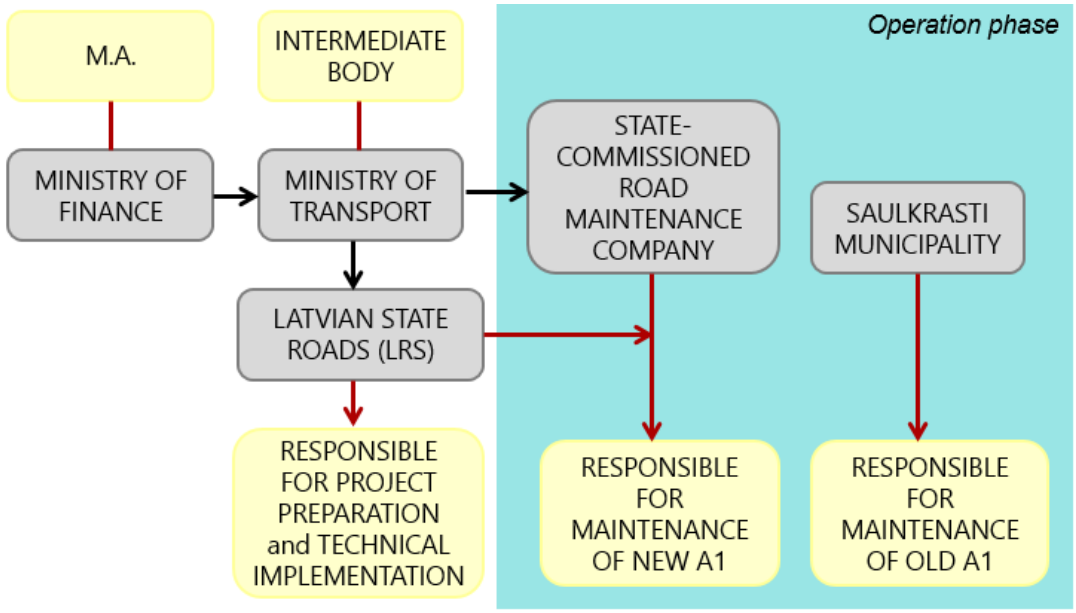
[35] It was known that – after the EU accession - the tenders will be procured according to the national legislation. However, the Ministry could not predict that the co-ordination of tender documents prepared in accordance to PRAG between the Ministry of Finance and the Delegation of the European Commission in Latvia will take so long that the procurement will have to be tendered after May 1, 2004.

principles of sound financial management. The Ministry of Finance also performed functions of the EU funds management and ex-post update of the project CBA.

The Ministry of Transport was the Intermediate Body involved in the administration of the project and the Beneficiary of the project. The MoT was responsible for procurement including signing of Works and Works supervision contracts.

Finally, during the project's design phase Latvian road administration worked in close cooperation with the Saulkrasti municipality, as it was necessary to reconstruct some sections of local roads ensuring access to the bypass and to reconstruct old road A1.

Figure 22. Project implementation structure



Source: Authors

A professional project management team within the LRS with experience and knowledge gained in another Via Baltica reconstruction projects (implemented until 2005) ensured successful project management. This, in turn, allowed for the capitalisation of developed know how with positive effect on the implementation of future road infrastructure rehabilitation and reconstruction projects. Also, sound institutional arrangements and effective share of responsibilities between the institutions involved resulted in successful project implementation.

As regards the operation phase, **maintenance of the Saulkrasti bypass is performed by the state joint stock company "Latvijas autoceļu uzturētājs"** (in English "Maintainer of Latvian State Roads"). This state owned company executes routine maintenance works 24 hours per day in the whole state road network according to requirements of national legislation. Besides, the company monitors weather conditions on the roads (especially important during winter time for de-icing operations), collects information about the road accidents and handles user complaints. The maintenance company has persons in duty around the clock who follow road conditions, weather conditions, receive up-to-date information about road accidents and receive road user complaints.

In conclusion, the governance structure set up in accordance with the EU requirements to manage EU funds proved to be effective. A shared objective, a clear

allocation of responsibilities and close cooperation among the different actors assured a good project implementation in spite of the transition period.

4.6 MANAGERIAL CAPACITY

The managerial capacity refers to the professional ability to react to changes in the context/needs as well to unforeseen events during the project implementation and afterwards as well as to the professional capability to manage the project ensuring the expected level of service in the operational phase.

Two project managers were appointed by the Latvian Road Administration to lead the project implementation – each managing one construction phase. **The biggest challenge was to manage the land acquisition process because this was the first construction project in Latvia since 1991.** The Land acquisition unit was established within the Latvian Road Administration and experienced professionals with local knowledge of land administration and sales were hired. Specialists of the Land acquisition unit acquired the land needed for construction. It was the first project in the road sector, which was subjected to the law on the forced expropriation of real estate for public purposes. No specific procedures on land acquisition were elaborated at that time therefore Saulkrasti project had a precedent character for these matters.

Another issue faced by the project management team was the tendering process. All tender documents, prepared by LSR, had to be approved by the MoT, MoF, and finally, by the European Commission Delegation. This administrative procedure took a lot of time and was in force until Latvia joined the EU. Long coordination of tender documents and, in the end, terminated tender process because of offers exceeding the available budget made it necessary to look for ways to speed up the implementation process. The decision to combine construction of phase I and phase II into one contract was made based on this consideration. Thus the opening of Saulkrasti bypass was delayed only by three months.

Regardless of the scope and complexity of works, no substantial technical changes occurred during the project implementation.

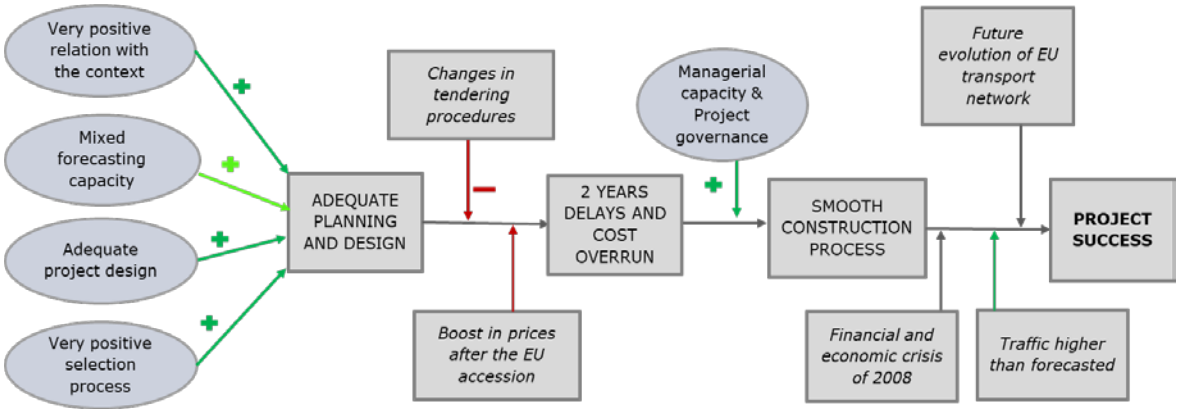
4.7 PROJECT BEHAVIORAL PATTERN

Following the identification of the typical determinants of project performance and the main project outcomes, the final step entails describing the chain of interlinked causes and effect determining the project performance over time.

The behavioural pattern of the project under assessment is provided in the following figure. The round boxes in light blue indicate the projects' determinants, the rectangular boxes in light grey refer to the observed events, the "+" signs next to the green arrows indicate that the factor has positively influenced the project performance, the "-" sign next to the red arrows indicate factors that has negatively influenced the project performance. In particular, arrows in dark green indicate factors that had a stronger influence on the project, arrows in light green instead indicate factors that had a positive but less strong influence.

The project can be characterized as the "rising sun" project.

Figure 23. Behavioural pattern of Saulkrasti bypass: rising sun



Source: Authors

The Saulkrasti bypass is the first project of its kind being implemented in Latvia since 1991. The project's **overall positive performance** is the result of a combination of several factors: a very good context, a fair selection process and an adequate project design. Nevertheless, the project **experienced challenges during its implementation** — due to slow procedures and unexperienced administration to deal with such big and complex projects — **which were counteracted by successful project management and governance.**

The Saulkrasti bypass **was perfectly in line with the context needs and the objectives of the Master Plan**. Definition of the project scope and selection of the best option was done according the best internationally accepted practices and active involvement of stakeholders including the Saulkrasti and Skulte municipalities and its population. Besides, the most experienced road design company elaborated the technical design of the project in line with EU road infrastructure and environmental standards.

Limited (mixed) forecasting capacity partially explains the encountered problems during the project's implementation phase. It refers to assessment of human resources and institutional framework needed for implementation of the project (procurement procedures, land acquisition) as well as macroeconomic factors affecting the project's performance.

However, forecast of the macroeconomic factors like increase of construction costs and salaries in the national economy was very difficult to predict considering the situation after Latvia's accession to the EU on May 1, 2004. The project planning phase was completed before this date. It should be noted that the Ministry of Transport and the State Road Administration were very prudent in traffic forecast. In the ex-post evaluation the actual traffic volume (AADT) on the Saulrasti bypass is 24% higher compared to the year 2015 of the ex-ante analysis.

A good governance of the project (broad involvement of stakeholders has to be noted) allowed to solve the key problems during the project's implementation phase: project delay and cost overrun. Definition of clear responsibilities of project governance among the key stakeholders – the Ministry of Transport (Beneficiary), the Ministry of Finance (Managing authority), Latvian Road Administration/LSR (Implementer), SJSC "Latvijas Autoceļu uzturētājs" (Operator) and the Saulkrasti and Skulte municipalities significantly contributed to successful implementation of the project and maintaining of the project results during the operational phase. A good sign of governance is also a decision of the Latvian government to finance the

unexpected investment cost overrun and increase the national co-financing of the project.

The project management was based on **successful co-operation between the Latvian Road Administration providing technical** (engineering expertise, land acquisition, contract administration) **capacity and the Ministry of Transport providing procurement and financial management capacity**.

In conclusion, the project cost overrun and implementation delay due to effective project governance and management did not adversely affect the project's planned socio-economic benefits.

On the top of that, **the external factors which have (in the past) and may affect the project performance in the future should be mentioned**. In respect to past events, the macroeconomic disruption after Latvia's accession into the EU and the economic the crisis of 2008 have negatively affected, respectively, the project investment cost and the traffic flows in the first phase of operation. With respect to the future, the project performance could be affected in a positive way by the further improvement of the road network, in which Via Baltica route is an important artery, and in a negative way by rival investments in the rail sector (i.e. the rail Baltica project).

5. FINAL ASSESSMENT

Based on the different findings produced by the project analysis both in terms of effects generated and measured through the CBA or qualitatively discussed as well as of factors affecting the generation of those effects, the final assessment of the project performance is presented here after along a set of evaluation criteria.

5.1 PROJECT RELEVANCE AND COHERENCE

The project was relevant in the context when it was implemented, as the state main road A1 was in bad technical condition and caused inconvenience and additional costs for road users. The Saulkrasti bypass was the right initiative to implement in order to upgrade the Via Baltica section from km 21.05 (Lilaste) to km 40.57 (Skulte) to European standard and to divert transit traffic from Saulkrasti town, thus benefiting to reduced congestions, improved road safety and reduced negative environmental impact.

The project was launched at the time when Latvia was preparing to join EU. It contributed significantly towards development of northern part of Latvia and improved connectivity and mobility among the Baltic States.

The project was not only **coherent with the TEN-T initiative but also with an overall national scheme to rehabilitate and upgrade Via Baltica route** on the state main road A1 between Riga and Estonian Border, which was and still is the busiest route in the country. After reconstruction, Via Baltica became more attractive in the regional, national and international context as shown by statistical traffic data.

5.2 PROJECT EFFECTIVENESS

The project was useful to implement because, despite of significant cost increase from EUR 48.8 million to EUR 130.5 million (nominal value), the socio-economic NPV of the project is EUR 103.1 million, with an EIRR of 9.40%. Benefits in terms of savings (in terms of time and VOC) and externalities clearly outweigh the investment and operating costs, so the performance indicators confirm that the project was desirable and increased welfare. The positive performance was ensured by the following interrelated factors: traffic increase on the new bypass was actually higher than forecasted in the ex-ante analysis and, at the same time, traffic reduction on the existing A1 was higher than expected, thus leading to a considerable reduction in travel time, VOC, accidents, air pollution, noise.

Besides, the risk analysis shows that under the socio-economic perspective the project has a low risk level, i.e. with negative variations from the reference case of the values of critical variables, there is a nil probability that the ENPV of the project become negative and a probability of nearly 50% that the expected ENPV is less than the reference one.

In respect to the time frame of effects, it is reasonable to consider that most of the benefits are likely to have already materialised and stabilised.

The upgrade of Via Baltica route to the European standards and increased road capacity contributed significantly to connectivity and territorial cohesion. More specifically, it has facilitated the workforce mobility to and from Riga, international trade and tourism.

As a positive long-term effect shall be mentioned the development of Saulkrasti town, which thanks to the project has reinforced its image as an attractive resort destination

in Latvia. It has taken a few years for the local businesses to adapt to the situation when transit traffic is not passing through Saulkrasti anymore. Some initial losses of profits were mentioned as an initial drawback of the project. However, nowadays the local entrepreneurs have redirected their activities more towards tourism and have adjusted to seasonal variations, as the population in summer time increases nearly 10 times in Saulkrasti.

In terms of mechanisms and determinants explaining the project outcomes, the first finding is that the institutional, economic and political context played a relevant role in the project's success. As explained earlier, there was an accumulated deficit of unperformed road reconstruction works and also, there was a strong desire to integrate into the trans-European network. **The project benefited from well-established institutional arrangements for the management of the pre-accession structural funds. This facilitated good decision-making capacity with long-term vision** and enabled the completion of the project in a rapid-changing economic context, which followed after Latvia joined the EU in 2004.

The success of the project was also largely due to managerial capacity. Considering that the project was the first new road construction project in the country since 1991, the road administration successfully coped with difficulties encountered during the implementation process (cost increase and changing procurement procedures) as well as with new tasks such as land acquisition process, which created a basis for procedures of future projects.

Another factor that made positive effect on the project's outcomes was successful project governance. The roles and responsibilities were clearly defined among the government institutions and the road administration. Also, fruitful cooperation with Saulkrasti municipality and extensive public consultations ensured successful integration of the bypass into the existing road network.

5.3 PROJECT EFFICIENCY

The project was well prepared and designed but experienced challenges during its implementation, in particular, during the tendering process, which happened to coincide with the time when Latvia joined the EU. It resulted in significant investment cost increase and overall project delay by 1 year. Nevertheless, a committed project management and governance allowed to solve the key problems with the cost overrun and time delay. The commissioning of the bypass was delayed only for three months, and after that the commissioning of remaining sections of local roads followed. The results of the ex-post CBA proves that the project was cost-efficient even with increased investment costs (ENPV at the level of EUR 103.1 million and ERR equal to 9.4%).

Financial sustainability of the project was met constantly matching disbursements on a year-by-year bases in the investment period. In the operational period, maintenance activities on the new bypass are financed from the state budget, while those on V101 are under the responsabilities of Saulkrasti municipality.

5.4 EU ADDED VALUE

The project as a part of the state main road improvement programme has **contributed to the development of Trans-European transport network**. It has facilitated mobility at regional and national level, and improved connectivity among the Baltic States and with the rest of Eastern Europe. The project has supported the

increased cargo traffic volumes on Via Baltica and at the same time reduced negative environmental impact in the vicinity of Saulkrasti.

Overall, the analysis of the performance of the Saulkrasti bypass and its impacts on socio-economic environment show that the implementation of **the project generated positive effects and impacts, which could not be achieved without the support from the EU**. As a matter of fact, the state of Latvia did not have the financial capacity to support big scale but socially desirable projects such as Saulkrasti bypass (see the financial indicators of the ex-post financial analysis — FNPV and FRR — both below zero). Therefore, **without the EU support the project would not have been implemented**.

The EU support has been crucial in all subsequent years and continues to remain significant source of financing for road improvement projects in Latvia. The Structural Funds have made it possible to continue improvements in the state road network, thus ensuring overall development of the road sector, which can be considered as an indirect EU added value. It helps to improve road construction quality assurance system by strengthening the management capacity, accumulating construction experience and improving supervision system.

Apart from the financial aspects, at the moment when the project was selected and **implemented the EU support acted as a catalyst to improve internal administrative procedures and capacity**, which contributed to streamline the delivery system. The latter is understood as the combination of legal requirements and procedures that support the effective and efficient investment of EU and national resources, and of the outlining of roles and responsibilities in planning, management and implementation of investment projects. As a matter of fact, the EC provided technical assistance through the ISPA, mainly for the elaboration of project documentation, and DG REGIO had a very close cooperation with the Latvian transport authorities. Representatives of DG REGIO made several visits to the construction site including verification of environmental protection measures.

5.5 FINAL ASSESSMENT

In conclusion, the Saulkrasti bypass project is a success story taking into an account the unforeseen macroeconomic changes during the project implementation. The challenges with the tendering process and cost overrun have been successfully overcome by good managerial capacity and effective project governance. Being the first new construction project in Latvia since 1991, it has served as a basis for creating the land acquisition procedures. The project has also been a good example of mutual cooperation between all stakeholders - governmental institutions, municipalities, road administration and contractors. Evidence gathered within this ex-post evaluation shows that the Saulkrasti bypass has served well the first 10 years, the road capacity is adequate to the current traffic, and the long-term effects outweigh the benefits initially foreseen.

Table 9. Evaluation matrix

CRITERION	EQ	ASSESSMENT	SCORE (*)
Relevance	To what extent the original objectives of the examined major project matched: • the existing development needs, • the priorities established at the programme, national, and/or EU level.	The project was and over the years remained fully in line with the development needs and the priorities established at various levels.	5
Coherence	• Are the project components in line with the stated project objectives? • To what extent the examined the project were consistent with other national and/or EU interventions carried out in the same field and in the same area?	Fully consistent.	5
Effectiveness	• Has the examined major project achieved the objectives stated in the applications for Cohesion policy support? • Was the actual implementation in line with the foreseen time schedule? • What factors, including the availability and the form of finance and to what extent influenced the implementation time and the achievement observed? • What has changed in the long run as a result of the project (for example, is there evidence showing contribution of the project to the private sector investments)? • Were these changes expected (already planned at the project design stage, e.g., in terms of pre-defined objectives) or unexpected (emerged, for instance, as a result of changes in the socio-economic environment)? • How have these changes matched the objectives set and addressed the existing development needs, the priorities established at the programme, national and/or EU level? • Did the selected project turn out to be the best option among all feasible alternatives?	The project has achieved the expected objectives with a one year delay. The project has contributed to the development of Saulkrasti as an attractive residential and recreational town.	4
Efficiency	• Are there any significant differences between the costs and benefits in the original cost-benefit analysis (CBA) and what can be observed once the project has been finalised? • To what extent have the interventions been cost effective?	The project performance is cost effective even with significantly increased investment costs. Benefits are greater than initially expected in the ex-ante evaluation.	4
EU added value	• What is the EU added value resulting from the examined major project (in particular, could any of the major projects examined, due to its risk profile, complexity or scope, have not been carried out if not for the EU support)? • Did the examined major projects achieve EU-wide effects (e.g. for preserving the environment, building trans-European transport networks, broadband coverage etc.)? • To what extent do the issues addressed by the examined interventions continue to require action at EU level?	High EU added value, i.e. the project achieved positive effects which would have not been achieved without the EU support	4

Note: scores range from 1 to 5. Source: authors

6. CONCLUSIONS AND LESSONS LEARNED

According to the ex-post assessment the project can be considered as a success. The project was implemented in a complex macroeconomic environment, in particular:

- The project planning phase took place before accession of Latvia to the EU.
- Complexity and scope of the project being the first new motor road construction project in Latvia since 1991.
- Capacity constraint of national economy to handle simultaneous large scale investment projects including the road sector.
- Global economic crisis of 2008 which had severe effect on Latvia's public spending.

Such complexities led to investment cost overrun and delay of the project implementation. However, good project's governance and management were the key determinants to face the above-mentioned challenges. Also, favourable context variables were key for the project to bring about positive socio-economic benefits to society given the increased investment costs and the extension of the implementation phase for one year. As a matter of fact, additional spending from the Latvian state budget to cover investment cost overrun was positively offset by increased user benefits because the traffic growth turned out higher than forecasted in the feasibility study.

The following lessons can be learned from the project:

- **Big infrastructural projects are somehow able to influence the context in which they took place**, by changing the surrounding socio-economic and legislative environment. **The Saulkrasti bypass project** – the first of its nature to be implemented in Latvia since 1991 – **played a pivotal role in developing technical, legal and administrative capacities** related in particular to land acquisition and environmental protection measures. The experience gained thanks to the project was then used to elaborate and improve the legal basis in Latvia for other public road investment projects.
- **Institutional capacity even if it requires additional spending on staff costs is crucial for successful implementation of a major project**. It is particularly important when a pipeline of projects is planned to be implemented in a given sector. In this regard, the Saulkrasti bypass project gave to the Ministry of Transport and the Latvian Road Administration the opportunity to enhance capacity in the public sector for the benefit of subsequent projects. This is the result of a mix of factors: i) the hiring of national and international consultant firms to carry out jointly the feasibility studies, the elaboration of technical solutions and documentation; ii) the hiring of professionals from the private sector to form a new unit within the Latvian road administration in order to deal with land acquisition processes; iii) the continuous exchange between the Latvian administration with the EC in order to obtain ex-ante validation of their decisions before taking actions.
- The ex-post assessment demonstrated **that adequate attention to trying to compound all stakeholders' interests, especially local community, positively contributes to the selection process and the quality of the project.** While, wide consultations are advisable from an early stage in order to avoid negative reactions and unexpected problems during implementation, their organization needs to be carefully prepared in order to be really

worthwhile and avoid delays in the implementation with negative effects on investment costs.

The Managing Authority of the EU Structural Funds and the Cohesion Fund has used the lessons learned to the possible extent in implementation of the following major infrastructure projects in Latvia which are financed by the EU structural funds and the Cohesion Fund.

ANNEX I. METHODOLOGY OF EVALUATION

This Annex summarises the methodological approach undertaken for carrying out the project case studies and presented in the First Intermediate Report of this evaluation study. The main objective is to provide the reader a concise account of the evaluation framework in order to better understand the value and reach of the results of the analysis as well as to enable him/her, if interested, to replicate this methodology.[36]

The Annex is divided into four parts, following the four building blocks of the methodological approach (mapping of effects; measuring the effects; understanding effects; synthesis and conclusions) laid down in the First Intermediate Report. Three evaluation questions, included in the ToR, guided the methodological design. They are:

- **What kind of long term contribution** can be identified for different types of investment in the transport field?
- **How is this long term contribution generated** for different types of investments, i.e., what is the causal chain between certain short term and log-term socio-economic returns from investments?
- **What is the minimum and average time** needed for a given long term contribution to materialise and stabilise? What are these time spans for different types of investments in the transport field?

A I.1 Mapping the effects

The Team developed a classification of long-term effects, with the aim of identifying all the possible impacts of transport investments on social welfare. Under four broad categories, a taxonomy of more specific long-term development effects of investment projects has been developed. The definition of each type of effect is provided in the Table below.

Far from being exhaustive, this list is intended to guide the evaluators in identifying, in a consistent and comparable way, the most relevant effects that are expected to be identified and included in the analysis. Additional effects could possibly be relevant in specific cases and, if this is the case, they can be added in the analysis.

In researching all the possible long-term effects of project investments, it is acknowledged that there could be a risk of duplication. In addition, the allocation of some effects under different categories is to some extent arbitrary and thus it may happen that categories overlap. That said, caution will be paid in order to avoid double counting when performing the ex-post CBA.

[36] Specific recommendations which may enable application of the same evaluation methodology to future projects are discussed in the Final Report of this evaluation study.

Figure 24. Taxonomy of effects

	DIRECT EFFECTS	DESCRIPTION
EFFECTS ON ECONOMIC GROWTH	Travel time	Reduction in travel time for business travellers, shippers and carriers (including the hours gained because of a reduction of congestion) is a typical positive outcome of transport project, except those that specifically aim at environmental or safety benefits.
	Vehicle operating cost	Vehicle operating cost savings for the travellers (fuel costs, fares) and for transporters of goods (this refers to the distance-dependent transport costs) are relevant if the project aims at reducing congestion and/or the journey distances.
	Reliability of journey time	It means reduced variation in journey times. Reliability benefits are potentially important for many projects, unless journey times are already quite reliable. However, often forecasting models or other information for the impacts on and through reliability are missing (de Jong and Bliemer, 2015)
	Income for the service provider	It includes the revenues (e.g. rail ticket income increase) accrued by the producer (i.e. owner and operators together) as well as the operational cost savings. To some extent it can reflect the previous aspects (i.e. the service fare is increased to reflect a better service allowing for significant time saving for the users) so double counting shall be avoided. This aspect might be particularly relevant for public transport projects or toll road projects, especially if the project is expected to feature significant traffic (generated or induced) or a substantial change in fares.
	ADDITIONAL EFFECTS	**DESCRIPTION**
	Wider economic impacts	It refers to the agglomeration effect on productivity (the productivity of the economy is increased because the project leads to a clustering of economic activities together in a core city which makes these sectors produce more or better goods and services together than before). Agglomeration effects are unlikely to occur for small projects and even for large projects there are specific pre-conditions (see for instance Chen and Vickerman, 2017). Wider economic impacts (agglomeration effects) depend on whether the project makes a potential economic cluster location substantially more accessible. This is only possible if the infrastructure network before the project had important missing links which the project effectively removes.
	Institutional learning	It refers to wider spillover effects that any investment project may bring to the Public Administration and other institutions at national or regional levels in terms of expertise gained by working on large scale projects. Learning may lead to productivity gains by stimulating the improvement of existing technical know-how, improved policy-making, competitive tendering and divert resources towards the most growth enhancing projects.

EFFECTS RELATED TO QUALITY OF LIFE AND WELL-BEING	**DIRECT EFFECT**	**DESCRIPTION**
	Travel time	Leisure time saving relates to projects that provide a reduction in travel time for non-business travellers.
	Safety (accident savings)	It relates to the amount of fatalities, serious and slight injuries, damage-only accidents. Safety impacts should possibly be included in all project evaluation.
	Security	Safety of travellers in the vehicle and at stations, platforms and stops, safety of the goods transported (often damaged or stolen). Security impacts are often neglected in project evaluation, but for public transport projects (both urban and intercity) they can be of considerable importance.
	Noise	It refers to the exposure of population to noise measured in dB
	ADDITIONAL EFFECT	**DESCRIPTION**
	Crowding	A reduction of crowding in public transport is mainly relevant for projects that provide significant additional capacity in public transport.
	Service quality (other than crowding)	It refers mainly to the availability of specific service features increasing the journey comfort e.g. smoother movement of the vehicles, more comfortable seats, provision of electricity, Wi-Fi, catering.
	Aesthetic value	This relates to projects that provide infrastructure with positive visual effects (e.g. a beautifully constructed bridge) or when public transport provide a better image in the eye of the public. Also, it refers to projects that lead to a less attractively looking landscape (e.g. constructing high walls).
	Urban renewal	It refers to the spillover effects of urban transport projects on residents (not necessarily users of the project) due to an improved local context and possibly reflected in an increase in real estate values.
EFFECTS ON THE ENVIRONMENT	**DIRECT EFFECT**	**DESCRIPTION**
	Local air pollution	Local air pollutants are typically small particles, NO_x, VOCs and SO_2. The increased/decreased volume of local air emissions is a typical effect of transport projects.
	Climate change	Climate change refers to the volume of greenhouse gases (GHG) emitted by transport infrastructure. The increased/decreased volume of GHG emissions is a typical effect of transport projects.
	ADDITIONAL EFFECTS	**DESCRIPTION**
	Biodiversity	This refers to the reduction of biodiversity through the extinction of species in a specific area. It is not a common effect but it can be relevant in selected cases.
	Water pollution	Emissions of substances, e.g. from the road, into watercourses, that are harmful for people (as drinking water) or for life in the water

EFFECTS RELATED TO DISTRIBUTIONAL ISSUES	ADDITIONAL EFFECTS	DESCRIPTION
	Social cohesion	It encompasses the allocation of the main benefits over income and social groups
	Territorial cohesion	It encompasses the allocation of the main benefits over central (core) and peripheral areas

Source: Authors

A I.2 Measuring of effects

Because of the variety of effects to be accounted for, a **methodological approach firmly rooted on CBA (complemented by qualitative analysis** when necessary) is adopted in order to grasp the overall long-term contribution of each project.

In terms of their measurement level, the effects can be distinguished into:

A. **Effects that by their nature are already in monetary units** (e.g. transport costs savings). These can therefore be easily included in a cost-benefit analysis (CBA).
B. **Effects that are quantitative, but not in money units, and that can be converted into money units in a reasonably reliable way** (e.g. transport time savings, accidents, air pollution)[37]. These effects can also be included in the CBA.
C. **Effects that are quantitative, but not in money units, for which there are no reasonably reliable conversion factors to money**. We propose not to try to include such effects in the CBA, but to discuss them in a qualitative way together with the overall outcome of the CBA.
D. **Effects that are difficult to measure in quantitative (cardinal) terms, but do lend themselves for ordinal measurement** (a ranking of the impact of different projects on such a criterion can be provided, such as very good, good, neutral, bad, very bad). We propose to discuss these effects in qualitative terms.
E. **Effects that might occur but that are subject to a high degree of uncertainty:** these will be treated as part of the risks/scenario analysis that will be included in the CBA.
F. **Effects that might occur but that we cannot even express in an ordinal (ranking) manner:** they are residual effects that can be mentioned in qualitative description in case study report.

In short, all the projects' effects in A and B are evaluated by doing an ex-post cost-benefit analysis (CBA)[38]. Reasonably, these represent the most significant share of long-term effects. Then the outcome of the CBA (e.g. the net present value or benefit-costs ratio) is complemented by evidence from C and D, while E is used for descriptive purposes. Moreover, qualitative techniques are used to determine why certain effects are generated, along what dimensions, and underlying causes and courses of action of the delivery process (see below).

Section 3 of each case study includes a standardised table in which scores are assigned to each type of long-term effect. Scores ranging from -5 to +5 (5 = very strong negative effect; 0 = no effect; 5 = very strong positive effect) are given in

[37] Methods to establish such conversion factors include: stated preference surveys (asking respondents about hypothetical choice alternatives), hedonic pricing or equating the external cost with the cost of repair, avoidance or prevention or with the costs to achieve pre-determined targets

[38] More details on the approach adopted to carry out the ex-post CBA exercise and, in particular, indications on project identification, time horizon, conversion factors and other features are extensively described in the First Intermediate Report of this evaluation study.

order to intuitively highlight which are the most important effects generated for each case study.

A I.3 Understanding the effects

Once the project effects have been identified and measured, and the causal chain linking different categories of short-term and long-term effects has been investigated, the third building block of the methodological approach entails reasoning on the elements, both external and internal to the project, which have determined the observed causal chain of effects to take place and influenced the observed project performance.

Taking inspiration from the literature on the success and failure of projects, and particularly on costs overruns and demand shortfalls, and on the basis of the empirical evidence which develops from European Commission (2012) six stylised determinants of projects' outcomes and their development over time have been identified (see table below).

The interplay of such determinants may reinforce or dilute one effect over the other. Moreover, each determinant may contribute, either positively or negatively to the generation/speed up/slow-down of certain short-term or long-term effects. For this reason it is important not only to understand the role that each determinants has on the observed project outcome, but also their interplay in a dynamic perspective.

In doing this, it is useful to refer to stylised, typical "paths" of project behaviours outlined in the following table. Such patterns capture common stories and reveal recurring patterns of performance, as well as typical problems that may arise and influence the chronicle of events. Case studies test the validity of such archetypes and are used to specify in better nuances or suggest possible variations or additions.

Section 4 of each case study includes standardised tables in which scores are assigned to each determinant. Scores ranging from -5 to +5 are given in order to intuitively highlight which are the most relevant determinants explaining the project outcomes (5 = very strong negative effect; 0 = no effect; 5 = very strong positive effect). Moreover, section 4 of each case study includes a graph describing the project's behavioural pattern, i.e. describing the chain of interlinked causes and effect determining the project performance over time.

Table 10. Stylised determinants of projects' outcomes

DETERMINANT	DESCRIPTION
Relation with the context	It includes the considerations of institutional, cultural, social and economic environment into which the project is inserted, was the project appropriate to this context?; is there a problem that the project can solve?; does the project remain relevant over the years?
Selection process	It refers to the institutional and legislative framework that determines how public investment decisions (and especially those co-financed by ESIF) are taken, i.e. which is the process in place and the tools used to select among alternative projects. The selection process is influenced by incentive systems that can lead politicians and public institutions to either take transparent decisions or strategically misrepresent costs and/or benefits at the ex-ante stage.
Project design	it refers to the technical capacity (including engineering and financial expertise) to properly design the infrastructure project. Under a general standpoint, we can distinguish: • the technical capacity to identify the most appropriate conceptual design, which best suits the need of a specific context. Even when a region really is in need of the project, it usually requires a well-designed project to solve the observed problems. This, in turn, involves that different alternatives are considered and the best option in terms of technical features and strategical considerations is identified; • the technical capacity to develop the more detailed level of design (preliminary and detailed), thus identifying most effective and efficient detailed infrastructure solutions and construction techniques, thus avoiding common pitfalls in the construction stage (such as introducing variants that are not consistent with the original conceptual design) and the risk of cost overruns during the construction phase by choosing inappropriate technical solutions.
Forecasting capacity	It regards the possibility and capacity to predict future trends and forecast the demand level and estimate the technical challenges, thus estimating correctly the required resources (e.g. looking at the dangers of over-predicting demand and under-predicting construction costs). In particular, technical forecasting capacity is related to the quality of data used and forecasting/planning techniques adopted. At the same time, forecasting capacity includes the ability of the project promoter and technical experts not to incur in the planning fallacy (the tendency to underestimate the time or cost needed to complete certain tasks) and optimism bias (the systematic tendency to be overly optimistic about the outcomes of actions).
Project governance	It concerns the number and type of stakeholders involved during the project cycle and how responsibilities are attributed and shared. This is influenced by the incentive mechanisms. If bad incentives exist, this can lead different actors involved in the project management to provide benefits for their members, thus diverting the funds away from their optimal use, or forcing them to delegate responsibilities according to a non-transparent procedure.
Managerial capacity	It refers to the: • professional ability to react to changes in the context/needs as well as to unforeseen; • professional capability to manage the project ensuring the expected level of service in the operational phase. To ensure a project success, it is not

	enough that it is well planned and designed, but also that the organizations in charge of the management and operations provide a good service to the end users (e.g. ensuring a good maintenance of the infrastructure).

Source: Authors

Table 11. Behavioural patterns archetypes

Behavioural patterns are illustrated by use of diagrams linking determinants and project outcomes in a dynamic way

TYPE	DESCRIPTION
Bright star	This pattern is typical of projects where the good predictions made ex-ante (both on the cost side and demand side) turn out to be accurate. Proper incentive systems are in place so that the project actually delivers value for money and success. Even in the event of exogenous negative events, the managerial capacity ensures that proper corrective actions are taken and a positive situation is restored.
Rising sun	This pattern is typical of projects which, soon after their implementation, are affected by under capacity issues because of a combination of low demand forecasting capacity, weak appropriateness to the context, and weak technical capacity to design the infrastructure. However, due to changed circumstances or thanks to responsible management and good governance the project turns around to reap new benefits.
Supernova	This pattern is typical of projects for which the good predictions made ex-ante (both on the cost and demand side) turn out to be accurate. However, due to changed circumstances or because of weak management capacity and/or governance the project eventually turns out to be unsuccessful.
Shooting star	This pattern is typical of projects starting from an intermediate situation and resulting in a failure. This outcome can be explained by a low forecasting capacity affected by optimism bias which yields a cost overrun. Then during project implementation, because of low managerial capacity and/or poor governance (also due to distorted incentives) corrective actions are not implemented, this leading to project failure. The situation is exacerbated if unexpected negative events materialise during the project implementation.
Black-hole	This pattern is typical of projects that since the beginning of their life fail to deliver net benefits. This is a result of a combination of ex-ante bad factors (i.e. low technical capacity for demand forecasting, optimism bias, inappropriateness to the local context and bad incentives affecting both the selection process and the project governance) and careless management during the project implementation or bad project governance (e.g. unclear division of responsibilities, bad incentive schemes).

Source: Author

A I.4 Synthesis and conclusions

Qualitative and quantitative findings are integrated in a narrative way, in order to develop ten project 'histories' and to isolate and depict the main aspects behind the project's long-term performance. A final judgment on each project is then conveyed in the case studies with an assessment structured along a set of evaluation criteria, as suggested in the ToRs. Evaluation criteria are the following:

- Relevance (were the project objectives in line with the existing development needs and the priorities at the programme, national and/or EU level?);
- Coherence (with other national and/or EU interventions in the same sector or region);
- Effectiveness (were the stated objectives achieved, and in time? Did other effects materialise? Were other possible options considered?);
- Efficiency (costs and benefits relative to each other and to their ex-ante values);
- EU added value (was EU support necessary, EU-wide effects, further EU action required?).

ANNEX II. EX-POST COST-BENEFIT ANALYSIS REPORT

This Annex illustrates the ex-post CBA of the project under consideration, undertaken to quantitatively assess the performance of the project. The methodology applied is in line with the guidelines provided in the First Interim Report and, more generally, with the EC Guide (European Commission, 2014). This annex aims to present in more detail the assumptions, results of the CBA and the scenario analysis for the project under consideration.

A II.1 METHODOLOGY, ASSUMPTION AND DATA GATHERING

In what follows, the main assumptions and the procedure of data gathering are described in detail.

- *Project identification*

  The unit of analysis of this CBA is the Saulkrasti bypass project. As explained in Section 1 of the main report, the project was included in the Master Plan for Latvian road network maintenance, development and operation (1997) and a programme for improving road safety on state main roads (1997). The project under assessment comprise the following components:

  - Construction of new road to bypass Saulkrasti 20.15 km;
  - Construction of grade-separated junctions (15 structures);
  - Improvement of the existing road A1 section km 21.05 - 40.57, i.e. rehabilitation of road 14.8 km, including construction/reconstruction of sidewalks 5.55 km, reconstruction of 47 bus stops, including bus-stop pavilions (4 items) and 11.6 km of street lighting.

The project was implemented from 2002 to 2008 as detailed below.

Table 12. Synthesis of the interventions

ACTIVITY	IMPLEMENTATION PERIOD
Preparatory phase (design, FS)	2002 – 2007
Phase I	
Land acquisition	2002 – 2006
Construction	2005 - 2007
Phase II	
Land acquisition	2002 – 2006
Construction	2005 – 2007
Phase III	
Land acquisition	2003 – 2008
Construction	2005 – 2008

Source: Project final report, LSR

- Time horizon

In line with the First Interim Report, the time horizon for the CBA of the project is set at 26 years (2002-2027). The investment period for Saulkrasti bypass construction runs from 2002 to 2008. The operational period of newly constructed Saulkrasti bypass starts in October 2007 when the road was open to public. Some sections of local roads were finished in 2008 therefore the investment period ends in December

2008. A mix of historical data from 2002 to 2016 (covering 15 years) and forecasts from 2018 to 2027 (covering 10 years) is used.

- *Constant prices and discount rates*

  In line with the guidelines of the First Interim Report, the CBA was performed using constant prices. Historical data have been adjusted and converted into Euro at 2017 prices by using the yearly average percentage variation of consumer prices provided by the International Monetary Fund. As for data from 2017 onwards, they have been estimated in real terms (no inflation is considered).

  Consistent with the choice of using constant prices, financial and social discount rates have been adopted in real terms. Specifically, inflows and outflows of financial analysis - for both the backward and forward periods of analysis – have been discounted and capitalised using a 4% real rate, as suggested in the EC CBA Guide (2014). With regard to the economic analysis, a real backward social discount rate of 6.67% and a real forward social discount rate of 6.25%, specifically calculated for Latvia (see the First Interim Report for the calculation), have been adopted.

- *Without the project scenario*

  As explained in Section 2 of the main report, *without-project scenario* comprises continued use of the existing state main road A1 with present road standard. No measures are implemented to increase capacity of the road and to improve road safety. On that basis, the reference scenario for the CBA (Without the project scenario) is a “Business as usual” scenario. Only routine and periodic maintenance of the road and the existing structures is carried out.

- *Data sources*

  The analysis relied on data provided by the Latvian State Roads, the EC and on the opinions of the experts interviewed. Moreover, information has been gathered from a review of documents available online and on the local press.

- *Technical features*

  The project includes a new road constructed to bypass Saulkrasti centre, with two lane carriageway (width of the roadway - 14 m, carriageway -11 m, total length - 20.22 km) in accordance with European road standards, i.e., the standard truck axle load bearing capacity of 11.5 t. In total 15 bridges and overpasses are built, as well as 2 pedestrian underpasses, 4 railway at-grade level crossings and a cycle path.

  In addition, the project includes rehabilitation of connecting roads sections (12.97 km) to incorporate the new bypass into the existing road network, and a construction of a section of 11 kV electrical power transmission line. Along the roadside, there are noise protection walls with a total area of 3 936.76 m^2 installed, wire mesh fences with a total length of approximately 7.2 km, street lighting with a total length of 32.84 km, and 152 double pane glass windows for dwellings near to the road installed. New pedestrian sidewalks of 4.5 km constructed.

  Also, the old main road A1 (currently local road V101) via Saulkrasti is reconstructed in the length of 14.8 km, including reconstruction of sidewalks 5.5km, 47 bus stops (including 4 bus-stops pavilions) and 11,6 km of street lighting.

A II.2 Future scenario

In order to assess the project's performance in the future, hypotheses have been made regarding the future trends of variables, in particular the evolution of traffic. To develop the demand analysis, the original demand analysis and assumptions included in the ex-ante analysis have been revised based on the available information.

The traffic analysis for the ex-ante analysis was prepared based on visual counting data in 1996-2000, and the traffic forecast took into account automobilization level in European countries. In the ex-post analysis, historical traffic data on the main road A1 and the local road V101 (former main road A1 via Saulkrasti) are instead used (available in the database of Latvian State roads for the period 2003-2016) because the construction of the Saulkrasti bypass has split the traffic on the main road A1 into bypassing traffic and local traffic still using the old road via Saulkrasti.

Road A1 is one of the busiest roads in the country where traffic has increased on average by 9% annually in the last years. For the period 2017-2027, the traffic growth forecast on the main road A1 is based on LSR projections for high scenario (see table below), while projections for moderate increase scenario is used to forecast traffic on local road V101. The choice of using an optimistic scenario for the new road and a moderate scenario for the old one reflects the trend of traffic growth since the opening of the bypass. Actually, the observed total traffic on the bypass is systematically higher than the ex-ante expectation, while traffic on local V101 is lower. This suggests that more vehicles than expected are diverted to the new road.

Table 13. Traffic growth forecast

PERIOD	MODERATE SCENARIO (used for local road V101)	HIGH SCENARIO (used for main road A1)
2017-2019	3.5 %	5.0%
2020-2027	2.0%	2.5%

Source: LSR

For the *with-project scenario* the following assumptions are used:

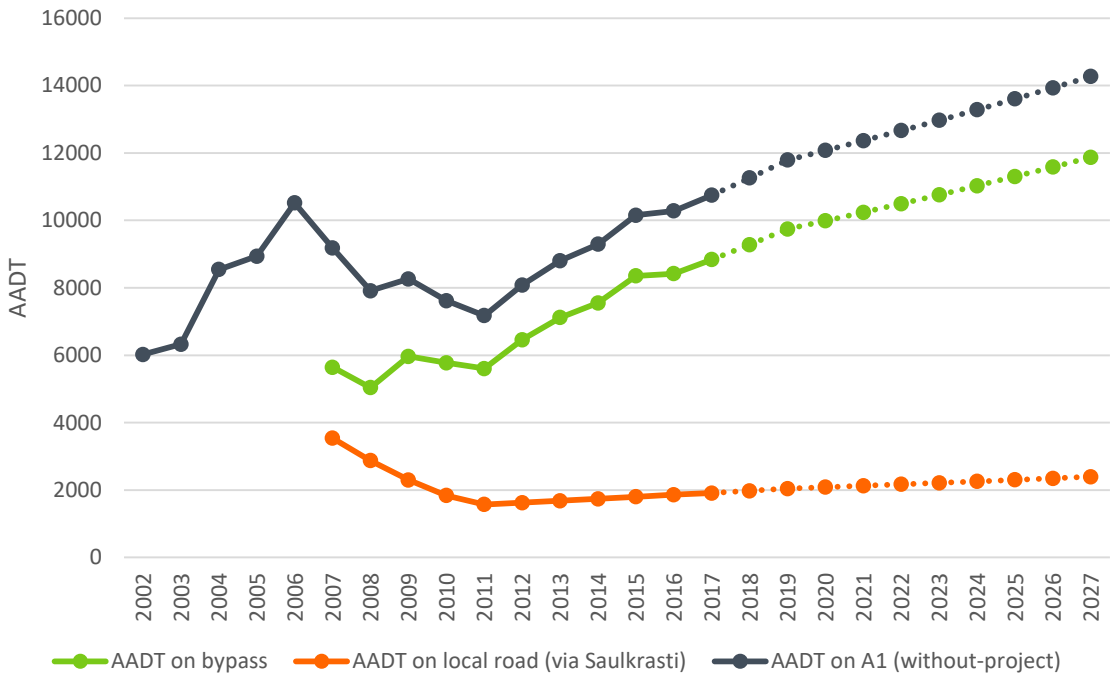
- Traffic split between bypassing traffic and traffic using state local road V101 via Saulkrasti (old road A1) from October 2007;
- Historical traffic counting data on the main road A1 and the local road V101 used till 2016;
- The growth rate is based on LSR projections for the period 2017-2027.

For the *without-project scenario* the following assumptions are used:

- All traffic remains on the old road A1;
- Historical traffic counting data on the main road A1 and the local road V101 used till 2016 are combined;
- The growth rate is based on LSR projections for the period 2017-2027.

The historical and future traffic is shown in the Figure below.

Figure 25. Historical and future traffic on Saulkrasti bypass and old main road A1 via Saulkrasti (2002-2027)



Source: LSR, Authors

According to traffic count data, nearly all heavy gross vehicles have shifted to the bypass where truck traffic forms 22% of total traffic in the last five years. The same proportion is maintained in the future projections. Historical data show that only 2% of all vehicles using local road V101 have been trucks in the period 2007-2014. The situation has slightly changed in 2015-2016 when the share of HGV increased to 5% and 8% accordingly which can be explained by increased economic activities in Saulkrasti and increased cargo turnover in Skulte port. In the future, it is assumed that 5% of all traffic on local road will be truck traffic.

As a final remark on traffic demand, it must be notice that for caution reasons no induced traffic or switch from other modes is expected, since the project is not located in a major urban area and no specific changes in population, employment and land use pattern are expected.

A II.3 FINANCIAL ANALYSIS

Investment cost

The table below summarizes the breakdown of the investment according to the main cost categories and shows the financial cost of the investment in nominal value and updated to 2017 values.

Table 14. Investment cost breakdown by work component (EUR)

PROJECT ITEM	NOMINAL VALUE	PRESENT VALUE (2017)
Eligible investment costs		
Road construction	92 785 000	131 925 926
Supervision	2 019 000	2 787 875
Total eligible investment costs	**94 804 000**	**134 713 801**

Non-eligible investment costs		
Planning, design	2 474 000	4 204 663
Land	861 000	1 361 481
Land aquisition costs	34 000	48 323
Construction costs	12 811 000	15 781 512
Supervision	228 000	302 991
Project management costs	2 014 000	2 230 407
Designer's supervision	210 000	294 046
VAT for eligible costs*	17 065 000	24 295 669
Total non-eligible investment costs	**35 697 000**	**48 519 093**
Total investment costs	**130 501 000**	**183 232 894**

**VAT is not recoverable*

Total project costs are 130.5 million EUR. Costs for project components which were eligible for EU co-financing (construction and supervision) are 72.65% of total project costs.

Residual value

The income methodology was applied to the residual value calculation and was based on the assessment of net present value of financial flows at the end of project reference period.

Operating & Maintenance costs

The ex-ante analysis does not provide calculation of road maintenance costs or input data used in O&M costs calculations. Therefore, values from LSR methodological guidelines are used.

Due to improvements made in the project, as well as downgrading the road class of old road A1 from the main road to local road, road maintenance costs for old road via Saulkrasti are reduced. Instead, additional expenditures are needed to maintain the newly built bypass. In line with the LSR methodological guidelines, the average routine maintenance cost for the bypass is assumed to be 21,440 EUR/km and for the local road V101 – 12,843 EUR/km. In total, routine maintenance costs increased after the project.

Periodic maintenance of the bypass is estimated on the basis of the expected schedule of periodic maintenance works. The timing of the works was determined on the basis of the observed maintenance cycle for state roads in the country, e.g. re-pavement after 10 years. Average cost of pavement renovation is also based on cost observed in the past.

Operating revenues

A toll is not collected from the vehicles using the bypass therefore there are no revenues from the project.

Project's Financial Performance

On a financial basis, the profitability of the project is negative. The Financial Net Present Value (NPV) on investment is equal to EUR -240 million (at a discount rate of 4%, real), with an internal rate of return of -4.8%. Also, the Financial Net Present Value on capital is negative with the level of EUR -153 million and with the internal rate of return for capital of -2.96%. These negative values confirm that the project was in need of EU funding since no private investor would have been motivated to

implement it without an appropriate financial incentive. The results of the project financial performance are presented in the following table.

Table 15. Financial performance indicators of the project

INDICATOR	EUR
FNPV/C	**-240,461,780**
FRR/C	-4.61%
FNPV/K	**-152,933,457**
FRR/K	-2.96%

Source: Authors

Table 16. Financial return on investment (EUR)

IT.		PRESENT VALUE	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	**Operational income**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	**CAPEX**	**-281 995 414**	-2 113 053	-1 027 620	-2 948 726	-41 384 253	-83 301 448	-41 110 143	-11,347,650	**0**	**0**	**0**	**0**	**0**
2.1	Preparatory phase (design, FS)	**-7 284 192**	-2 113 053	-646 827	-1 110 070	-104 148	-56 034	-155 291	**0**	**0**	**0**	**0**	**0**	**0**
2.2	Land acquisition	**-2 230 771**	0	-380 793	-150 629	-732 101	-77 585	0	**0**	**0**	**0**	**0**	**0**	**0**
2.3	Land acquisition services	**-74 082**	0	0	0	0	-43 103	-5 220	**0**	**0**	**0**	**0**	**0**	**0**
2.4	Construction costs	**-226 460 296**	**0**	**0**	**-1 615 987**	**-34 601 715**	**-66 970 490**	**-33 519 297**	**-10 999 950**	**0**	**0**	**0**	**0**	**0**
2.5	Supervision	**-4 688 502**	**0**	**0**	**-60 579**	**-82 706**	**-1 682 452**	**-1 132 709**	**-132 420**	**0**	**0**	**0**	**0**	**0**
2.6	LSR costs	**-3 400 580**	0	0	-3 275	-449 408	-914 469	-687 588	-175 667	**0**	**0**	**0**	**0**	**0**
2.7	Designer's supervision	**-450 936**	0	0	-8 186	-91 895	-51 724	-142 241	0	**0**	**0**	**0**	**0**	**0**
2.8	VAT for eligible costs	**-37 406 056**	0	0	0	-5 322 280	-13 505 591	-5 467 798	0	**0**	**0**	**0**	**0**	**0**
3	**OPEX**	**-8 349 118**	**0**	**0**	**0**	**0**	**0**	**-71 271**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**
3.1	Road maintenance	**-5 840 538**	**0**	**0**	**0**	**0**	**0**	-71 271	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084
3.2	Pavement renovation	**-2 508 580**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
4	**Residual value**	**49 882 752**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
5	**Total (1+2+3+4)**	**-240 461 780**	-2 113 053	-1 027 620	-2 948 726	-41 384 253	-83 301 448	-41 181 414	-11 632 735	-285 084	-285 084	-285 084	-285 084	-285 084

IT.		2014	2015	**2016**	**2017**	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1	**Operational income**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	**CAPEX**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.1	Preparatory phase (design, FS)	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.2	Land acquisition	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.3	Land acquisition services	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.4	Construction costs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.5	Supervision	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.6	LSR costs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.7	Designer's supervision	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2.8	VAT for eligible costs	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
3	**OPEX**	**-285 084**	-285 084	-285 084	-285 084	-285 084	-2 998 364	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084
3.1	Road maintenance	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084
3.2	Pavement renovation	**0**	**0**	0	0	0	-2 713 280	0	0	0	0	0	0	0	0
4	**Residual value**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	73 838 659
5	**Total (1+2+3+4)**	-285 084	-285 084	**-285 084**	**-285 084**	**-285 084**	**-2 998 364**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**73 553 575**

Table 17. Financial return on national capital (EUR)

LP.		PRESENT VALUE	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
1	**Inflow**	**49 882 752**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
1.3	Residual value	**49 882 752**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
2	**Outflow**	**-202 816 210**	**-2 113 053**	**-1 027 620**	**-2 948 726**	**-27 888 357**	**-54 453 447**	**-26 649 498**	**-11 632 735**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**
2.1	National contribution	**-196 975 672**	-2 113 053	-1 027 620	-2 948 726	-27 888 357	-54 453 447	-26 578 227	-11 347 650	**0**	**0**	**0**	**0**	**0**
2.2	OPEX	**-8 349 118**	0	0	0	0	0	-71 271	-285 084	-285 084	-285 084	-285 084	-285 084	-285 084
3	**TOTAL (1+2)**	**-152 933 457**	**-2 113 053**	**-1 027 620**	**-2 948 726**	**-27 888 357**	**-54 453 447**	**-26 649 498**	**-11 632 735**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**

LP.		2014	2015	**2016**	**2017**	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1	**Inflow**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	73 838 659
1.3	Residual value	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	73 838 659
2	**Outflow**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**
2.1	National contribution	**0**	0	0	0	0	2 713 280	0	0	0	0	0	0	0	0
2.2	OPEX	-285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084
3	**TOTAL (1+2)**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-2 998 364**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**-285 084**	**73 553 575**

Financial Sustainability

The project financial sustainability is presented in the table overleaf; the analysis shows that the sources of financing had consistently matched disbursements on a year-by-year basis in the investment period. Concerning operating and maintenance activities of the new road A1, they are financed by the the state budget, while O&M costs for the old road passing through Saulkrasti town are civered by the municipality budget. The cumulated net cash flow is positive for all the years considered, the project sustainability is then met.

Table 18. Financial sustainability of the project (EUR)

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
National sources	**2 113 053**	1 027 620	2 948 726	27 888 357	54 453 447	26 649 498	11 632 735	285 084	285 084	285 084	285 084	285 084	285 084
EU grant	**0**	0	0	13 495 896	28 848 001	14 531 916	0	0	0	0	0	0	0
Total revenues	0	0	0	0	0	0	0	0	0	0	0	0	0
Total inflows	**2 113 053**	**1 027 620**	**2 948 726**	**41 384 253**	**83 301 448**	**41 181 414**	**11 632 735**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**
Initial investments	2 113 053	1 027 620	2 948 726	41 384 253	83 301 448	41 110 143	11 347 650	0	0	0	0	0	0
Replacement costs	0	0	0	0	0	0	0	0	0	0	0	0	0
Total operating costs	0	0	0	0	0	71 271	285 084	285 084	285 084	285 084	285 084	285 084	285 084
Total outflows	**2 113 053**	**1 027 620**	**2 948 726**	**41 384 253**	**83 301 448**	**41 181 414**	**11 632 735**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**
Net cash flow	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cumulated net cash flow		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
National sources	285 084	285 084	285 084	285 084	2998 364	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084
EU grant	0	0	0	0	0	0	0	0	0	0	0	0	0
Total revenues	0	0	0	0	0	0	0	0	0	0	0	0	0
Total inflows	**285 084**	**285 084**	**285 084**	**285 084**	**2998 364**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**
Initial investments	0	0	0	0	0	0	0	0	0	0	0	0	0
Replacement costs	0	0	0	0	2713 280	0	0	0	0	0	0	0	0
Total operating costs	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084	285 084
Total outflows	**285 084**	**285 084**	**285 084**	**285 084**	**2998 364**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**	**285 084**
Net cash flow	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
Cumulated net cash flow	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

A II.4 Economic analysis

From market to accounting prices

In line with the CBA Guide (2014), the social opportunity cost of the project's inputs and outputs has been considered in the economic analysis. For this purpose, market prices have been converted into accounting prices by using appropriate conversion factors. In line with the First Interim Report, backward and forward conversion factors of labour are used to correct investment costs. The table below summarises the conversion factors applied for each cost item.

Table 19. Conversion factors for input

ITEM	CONVERSION FACTOR	SOURCE
Labour cost under investment costs and operating costs	0.90 backward 0.81 forward	First Interim Report
Land	1	Own assumptions
Other costs	1	Own assumptions

Source: Authors based on cited sources

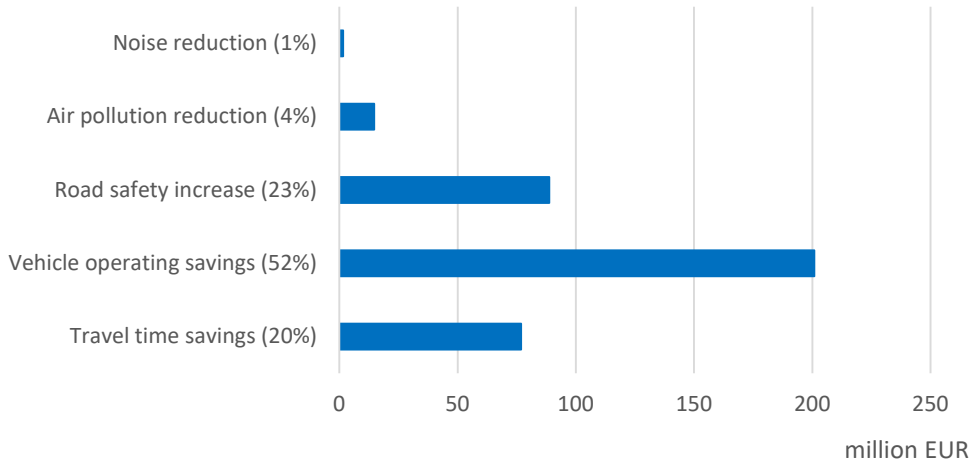
Project's effects

Benefits generated by the implementation of the project can be distinguished into:

- Change in consumer surplus, represented by the time savings;
- Changes in producer surplus, represented by vehicle operating cost savings for road users;
- Reduction in negative externalities as a result of the transit traffic diverted from Saulkrasti to the bypass, including air pollution savings, GHG savings, reduction of traffic noise, and reduction of collisions and accidents.

Main socioeconomic benefits expressed as a reduction in costs are depicted in the figure below.

Figure 26. Main socioeconomic benefits (present value)



Source: Authors

Travel time savings

The travel time savings result mainly from changes in travel speed. Average speed on old main road A1 was 59 km/h on a section 19.52 km long which included 11.06 km with speed limit of 50 km/h in Saulkrasti and 1km with speed limit 70km/h. According to LSR data, average speed on the bypass is 90 km/h (18.01 km long section). The ex-post time savings are calculated as hours saved due to project implementation * unit time cost for Latvia for cars and trucks, according to the methodology described in the First Interim Report, Volume I. Taking into account the average proportion of journey types for cars, the weighted average cost per passenger car is calculated.[39] The time savings represent 20% of total socioeconomic benefits in the ex-post analysis.

Vehicle operating cost savings

The savings in vehicle operating costs are based on changes in road conditions. LSR Methodological guidelines provide VOC unit costs for different types of vehicles under different road conditions taking into account traffic volumes. These unit costs are converted in 2017 values and used in the ex-post analysis.

Table 20. Vehicle operating cost (EUR per km in 2017 values)

PROJECT ITEM	OLD ROAD A1	NEW ROAD A1
VOC for cars	0,400	0,3216
VOC for HGV	1,258	1,0380

Source: authors

As the condition of old road A1 (via Saulkrasti) improved and traffic volumes decreased, VOC reduced for remaining traffic. Costs reduced also for diverted vehicles due to better travelling conditions. VOC savings appear to be the biggest share of all economic benefits.

Road safety increase

Historical road accident data show that the split of traffic between old main road A1 (currently local road V101) and the bypass has significantly reduced the number of road accidents and fatalities. In the ex-ante analysis, the estimated change in accident rate was based on evaluation of historic accident statistics in 1995-2000 for the analysed road section. The ex-post assessment was made based on actual statistical data provided by Road Safety Traffic Directorate of Latvia for the time period 2002-2016. Number of accidents in the period 2017-2027 was projected based on historic accident data. The unit values of social accident costs provided in the First Interim Report were used in calculations[40]. The ex-post analysis results show that the road safety benefits were underestimated in the ex-ante analysis (11% of total economic benefits vs 23%).

Environmental impact reduction

Environmental impact reduction have not been calculated in the ex-ante analysis as monetarized benefits. In the ex-post analysis noise and local air pollution are

[39] Commuting traffic 21%, bussiness traffic 43%, other traffic 36%.

[40] Fatality cost 1,103,010 EUR; severe injury cost 149,344 EUR.

considered to be the most important and relevant environmental cost categories. GHG are not included in the analysis because there is no variation in vehicle-km caused by the project.

- *Noise*

  The amount of noise harm depends on the surrounding environments (urban or rural), type and volume of traffic, as well as time of the day when the noise is made. Diverting transit traffic to the bypass has reduced the level of noise in Saulkrasti town significantly. Calculation of noise cost reduction follows the methodology stated in the First Interim Report. Noise reduction benefits represent a minor share – 1% of total socioeconomic benefits.

- *Local air pollution*

  Air pollutants emitted from the vehicles have local effects and therefore have impact on inhabitants of Saulkrasti. Calculation of local air pollution cost reduction follows the methodology stated in the First Interim Report. The unit parameters are differentiated for cars and HGV in suburban environment.

  The environmental benefits in terms of reduced air pollution represent 4% of total economic benefits of the project.

Project's economic performance

The results of the project economic performance are presented in the following table.

Table 21. Economic performance indicators of the project

INDICATOR	EUR
ENPV	103,143,152
B / C	1.32
EIRR	9.4%

Project economic net present value is much higher than initially expected in the ex-ante evaluation which can be related to higher actual traffic volumes on the bypass, higher accident rate decrease, and higher VOC unit costs used in the ex-post analysis. The socio-economic ex-post indicators confirm that the project was desirable for Saulkrasti society and transit traffic on Via Baltica, and increased welfare.

Table 22. Economic return of the project (EUR)

IT.		PRESENT VALUE	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	...
1	**CAPEX**	**-310 114 725**	**-1 611 651**	**-874 136**	**-2 665 950**	**-34 914 219**	**-68 876 363**	**-35 303 996**	**-11 040 979**	**0**	**0**	**0**	
1.1	Preparatory phase	**-7 935 044**	-1 611 651	-493 343	-846 664	-79 435	-42 738	-118 442	-14 675	0	0	0	
1.2	Land acquisition	**-3 072 148**	0	-380 793	-150 629	-732 101	-77 585	0	-20 372	0	0	0	
1.3	Land acquisition services	**-74 479**	0	0	0	0	-32 875	-3 981	0	0	0	0	
1.4	Construction costs	**-289 728 581**	0	0	-1 567 507	-33 563 664	-64 961 375	-32 513 718	-10 669 951	0	0	0	
1.5	Supervision	**-5 442 182**	0	0	-46 204	-63 081	-1 512 431	-1 017 467	-100 999	0	0	0	
1.6	LSR costs	**-3 408 540**	0	0	-2 498	-342 769	-697 476	-524 432	-133 984	0	0	0	
1.7	Designer's supervision	**-453 752**	0	0	-6 244	-70 090	-39 450	-108 489	0	0	0	0	
2	**OPEX**	**-7 864 709**	**0**	**0**	**0**	**0**	**0**	-67 494	-269 975	-269 975	-269 975	-269 975	
2.1	Road maintenance	-5 616 060	0	0	0	0	0	-67 494	-269 975	-269 975	-269 975	-269 975	
2.2	Pavement renovation	-2 248 649	0	0	0	0	0	0	0	0	0	0	
3	**Residual value**	**37 990 468**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	
4	**Socio-economic benefits**	**382 945 347**	**0**	**0**	**0**	**0**	**0**	**2 666 254**	**12 946 619**	**8 589 823**	**13 983 118**	**12 444 850**	
4.1	Travel time savings	**76 956 105**	0	0	0	0	0	639 246	2 304 824	2 679 858	2 636 456	2 586 716	
4.2	VOC savings	**200 844 552**	0	0	0	0	0	1 906 158	6 926 876	6 893 131	7 018 625	7 079 355	
4.3	Accidents savings	**88 828 441**	0	0	0	0	0	0	3 218 667	-1 418 379	3 777 544	2 155 229	
4.4	Pollution savings	**14 738 882**	0	0	0	0	0	109 051	448 336	392 090	497 207	563 860	
4.6	Noise	**1 577 367**	0	0	0	0	0	11 799	47 915	43 123	53 286	59 689	
5	**Total (1+2+3+4)**	**103 143 152**	**-1 611 651**	**-874 136**	**-2 619 745**	**-34 851 138**	**-67 363 931**	**-31 687 769**	**1 736 664**	**8 319 849**	**13 713 144**	**12 174 875**	

IT.		...	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1	**CAPEX**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**
1.1	Preparatory phase		0	0	0	0	0	0	0	0	0	0	0	0
1.2	Land acquisition		0	0	0	0	0	0	0	0	0	0	0	0
1.3	Land acquisition services		0	0	0	0	0	0	0	0	0	0	0	0
1.4	Construction costs		0	0	0	0	0	0	0	0	0	0	0	0
1.5	Supervision		0	0	0	0	0	0	0	0	0	0	0	0
1.6	LSR costs		0	0	0	0	0	0	0	0	0	0	0	0
1.7	Designer's supervision		0	0	0	0	0	0	0	0	0	0	0	0
2	**OPEX**		-269 975	-269 975	-269 975	-2 814 999	-269 975	-269 975	-269 975	-269 975	-269 975	-269 975	-269 975	-269 975
2.1	Road maintenance		-269 975	-256 376	-256 376	-256 376	-256 376	-256 376	-256 376	-256 376	-256 376	-256 376	-256 376	-256 376
2.2	Pavement renovation		0	0	0	-2 558 623	0	0	0	0	0	0	0	0
3	**Residual value**		**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	72 459 878
4	**Socio-economic benefits**		**19 981 731**	**20 612 931**	**21 612 407**	**22 659 585**	**23 214 652**	**23 783 329**	**24 366 961**	**24 963 873**	**25 575 427**	**26 201 985**	**26 844 926**	**27 502 612**
4.1	Travel time savings		3 850 827	4 043 368	4 245 537	4 457 814	4 569 259	4 683 490	4 800 578	4 920 592	5 043 607	5 169 697	5 298 939	5 431 413
4.2	VOC savings		9 985 754	10 408 448	10 911 909	11 438 768	11 718 389	12 004 834	12 299 282	12 599 886	12 907 832	13 223 302	13 547 490	13 878 567
4.3	Accidents savings		5 316 029	5 290 537	5 540 855	5 803 192	5 943 198	6 086 603	6 233 490	6 383 943	6 538 050	6 695 899	6 857 583	7 023 194
4.4	Pollution savings		749 066	786 519	825 845	867 138	888 816	911 036	933 812	957 158	981 087	1 005 614	1 030 754	1 056 523
4.6	Noise		80 055	84 058	88 261	92 674	94 990	97 365	99 799	102 294	104 852	107 473	110 160	112 914
5	**Total**		**19 711 756**	**20 356 554**	**21 356 031**	**19 844 585**	**22 958 276**	**23 526 953**	**24 110 585**	**24 707 497**	**25 319 051**	**25 945 609**	**26 588 550**	**99 706 113**

A II.5 Sensitivity analysis

A sensitivity analysis has been carried out on the key variables in order to determine whether they are critical or not. The procedure requires to make them vary one at a time by a +/-1%, and then to assess the corresponding change in the Economic NVP and IRR.[41] A variable is referred to as "critical" if the corresponding variation in the economic output is greater than 1% in absolute value.

The Authors tested the sensitivity of a number of different variables. As a result of the sensitivity test (see table below), the following 2 critical variables have been identified: *traffic growth on bypass; traffic growth on old A1; Speed on old A1 (without the project) and average saving in VOC.*

Table 23. Results of the sensitivity analysis

INDEPENDENT VARIABLE	VARIATION (in % or percentage points) of the ENPV due to a ± 1% variation (or variation of 1 percentage point)	CRITICALITY JUDGEMENT *
Traffic growth on bypass	7 percentage points	Critical
Traffic growth on old A1	1 percentage point	
Speed on old A1	2 percentage points	Not critical
Savaging in VOC	6%	Critical
Annual number of accidents	0.1%	Not critical
Noise	0%	Not critical
Air pollution	0%	Not critical
OPEX	0.1%	Not critical

Very critical: ΔNPV > +5% (or 5 percentage points); Critical: ΔNPV > +1% (or 1 percentage point); Not critical: ΔNPV < +1% (or 1 percentage point).

A II.6 Risk assessment

The risk assessment has been conducted on the two critical variables as a result of the sensitivity analysis: *traffic growth on bypass; traffic growth on old A1; Speed on old A1 (without the project) and average saving in VOC.* For the sake of simplicity, it was assumed that the probability distribution of each of these variables is triangular, with the value with the highest probability being the reference one – that is, the "base value" adopted for carrying out the CBA – and the lower and upper bounds being the "pessimistic" and "optimistic" values defined in the scenario analysis.

The analyses have been elaborated using the Monte Carlo simulation technique with 10,000 random repetitions. In brief, at each iteration it is randomly extracted a value from the distribution of each of the independent variables. The extracted values are

[41] In case of variables expressed in percentage, the variation applied in this case study is of 1 percentage point.

then adopted for computing the ENVP and IRR. Finally, the 10,000 estimated values of ENPV and IRR are used to approximate the probability distribution of the two indicators.

The risk assessment shows that the expected value of the ENPV is equal to EUR 103.7 million (almost equal to the reference case), and that the expected value of the ERR is 9.4% as in the reference case. The probability that the ENPV will become negative and that the ERR will be lower that the SDR adopted in the analysis is 0%. However, there is a nearly 50% probability that the two indicators assume a lower value than in the reference case. Hence, the CBA outputs appear to be robust to future possible variations in the key variables. Overall, the risk analysis shows that the project has a negligible risk level.

Figure 27. Results of the risk analysis for ENPV (left-hand side) and ERR (right-hand side)

CBA Reference value	
103,143,152	

Estimated parameters of the distribution	
Mean	103,776,077
Median	103,282,685
Standard deviation	30,892,190
Minimum	6,679,106
Maximum	211,146,241

Estimated probabilities	
Pr. ENPV ≤ base value	0.498
Pr. ENPV ≤ 0	0.000

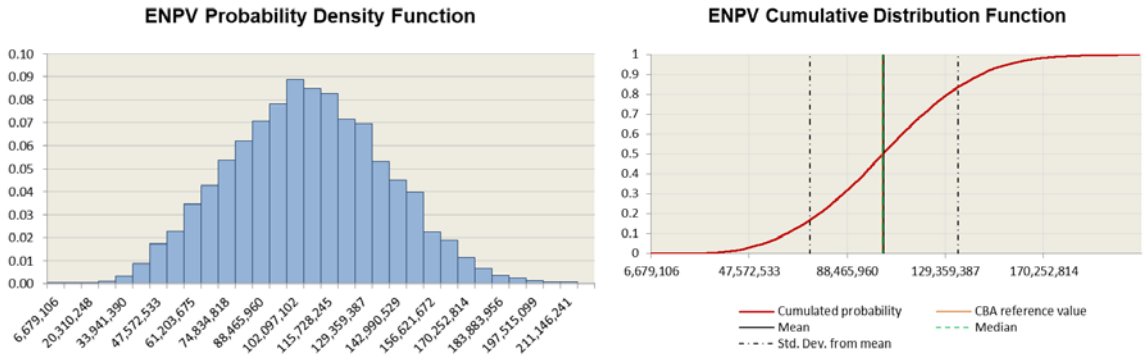
CBA Reference value	
9.40%	

Estimated parameters of the distribution	
Mean	9.40%
Median	9.40%
Standard deviation	0.75%
Minimum	6.86%
Maximum	11.80%

Estimated probabilities	
Pr. ERR ≤ base value	0.498
Pr. ERR ≤ Social discount rate	0.000

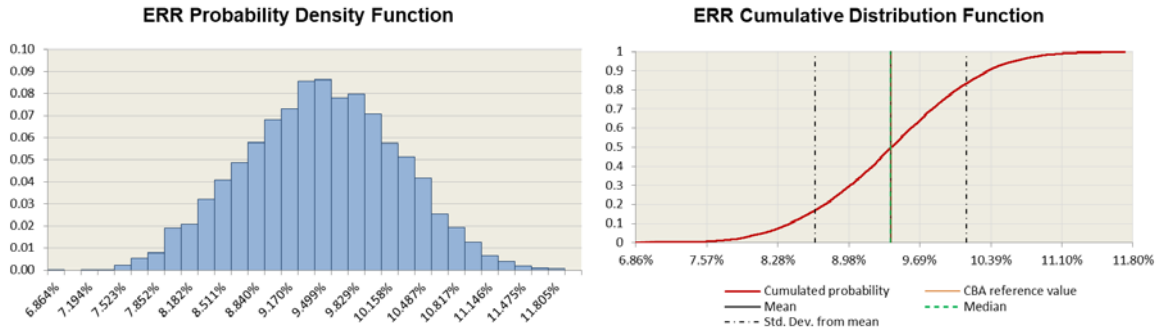
Source: Authors

Figure 28. Probabilistic distribution of the Economic Net Present Value (EUR)



Source: Authors

Figure 29. Probabilistic distribution of the Economic Internal Rate of Return



Source: Authors

ANNEX III. LIST OF INTERVIEWEES

The following table provides details on the stakeholders that have been interviewed as part of the ex-post assessment. The stakeholders have been identified based on the authors referenced in the documents included in the application dossier provided by the European Commission. The institutions approached through these referenced contacts have been consulted in order to confirm the most appropriate and relevant persons to be involved in this ex-post analysis. Additional stakeholders have been identified on the basis of the review of articles and Web Sites, which have been consulted as part of this evaluation.

NAME	POSITION	AFFILIATION	DATE
Rūdolfs Cimdiņš	Head of special planning department	Riga Planning Region Administration	27.11.2017
Ilze Aleksandroviča	Deputy State secretary	Ministry of Transport, Responsible authority	27.11.2017
Olga Stoļarova	Head of Investment programme management system	Ministry of Transport, Responsible authority	27.11.2017
Inese Zālamane	Inhabitant (commuter)	Saulkrasti	27.11.2017
Jānis Lange	Chairman of the Board	SJSC "Latvian State Roads" (LSR), Project beneficiary	28.11.2017
Mārtiņš Kišuro	Executive director	Bakery "Bemberi"	28.11.2017
Ervīns Grāvītis	Mayor	Saulkrasti amalgamated municipality	28.11.2017
Ineta Zīberga	Real estate agent	Arco real estate, Saulkrasti branch	28.11.2017
Mārtiņš Brutāns	Chef	Hotel "Minhauzena unda"	28.11.2017
Jānis Melnalksnis	Project manager of Saulkrasti bypass project	Former LSR employee	23.11.2017
Diāna Rancāne	Director of the Monitoring Department of the EU funds	Ministry of Finance, Managing authority	08.12.2017
Dace Bērziņa	Head of Strategic planning decision	Latvian State Roads	16.11.2017
Māris Zaļaiskalns	Head of Road Safety Department	Latvian State Roads	16.11.2017
Sanita Valnere	Head of Contract department	Latvian State Roads	various phone and e-mail exchanges
Mārtiņš Dambergs	Inhabitant	Skulte	16.11.2017
Māra Cimdiņa	Designer	JSC "Celuprojekts"	01.12.2017
Linda Sproģe	Regional Desk Officer, Estonia, Finland,	DG Regional and Urban Policy	01.03.2018

	Lithuania and Latvia		
Valdis Felsbergs	Environmental specialist	Eirokonsultants	05.12.2017
Andulis Židkovs	Transport expert	Former Deputy State Secretary at the Ministry of Transport	05.12.2017
Valdis Trēziņš	President and member of the Board	The Association “Latvijas Auto”	01.12.2017

REFERENCES

- EPRC and Fraser Associates (2012) Ex-post evaluation of Cohesion Fund (incl. ISPA) – Work package D: Management and Implementation. Country Report: Latvia.
- Skribane, I. and Jekabsone, S. (2013) Structural Changes in the Economy of Latvia After it Joined the European Union, *Intellectual Economics*, Vol. 7, No. 1(15), p. 29–41.
- European Commission, 2012-2015. *Project dossier: Application form with the annexes*
- Commission of the European Communities (2003). General report on pre-accession assistance (PHARE – ISPA – SAPARD) in 2000.
- DEA Baltika (2009) Update of Cost-Benefit Analysis for the project "Improvement of road Via Baltica. Construction of Saulkrasti bypass on the main road A1 section km 21.05 (Lilaste) to km 40.57 (Skulte)".
- European Commission (2014) Guide to Cost-Benefit Analysis of Investment Projects.
- Gadal, S. and Gražulevičiūtė-Vileniškė, I. (2014). Impact of the Via Baltica on the Urbanisation in Lithuania by Multi-level Remote Sensing Analysis, *Environmental Research, Engineering and Management*, 2014. No. 3(69), p. 17-28.
- Ministry of Transport of the Republic of Latvia (1995). National transport development programme 1996-2000. Published in the official publisher of the Republic of Latvia "Latvijas Vēstnesis", 1.12.1995., No. 187 (470) https://www.vestnesis.lv/ta/id/38194
- Garkalns A. (2006, July 19) Saulkrastu apvedceļš ieguvis reālus apveidus, *Neatkarīgā Rīta Avīze.*
- Lazdiņa I. (2001, September 28) Pašvaldības atbalsta Saulkrastu apvedceļu, *Dienas Bizness*.
- Saulkrasti municipality development programme 2014-2020.
- Saulkrastu avīze (2001, July) Tuvojas jaunais apvedceļš, *Saulkrastu avīze*.
- The World Bank (1997). Staff appraisal report. Republic of Latvia. Highway project.
- United Nations, Economic and Social Council (2002). Development Regarding Transport Policies, Replies to the questionnaire on transport development, Addendum 2, Transmitted by the Government of Latvia.
- Vanzovičs S. (2007, September 24) Šoferi pamāj Saulkrastiem ardievas, *Neatkarīgā Rīta Avīze*.

Getting in touch with the EU

In person

All over the European Union there are hundreds of Europe Direct information centres. You can find the address of the centre nearest you at: https://europa.eu/european-union/contact_en

On the phone or by email

Europe Direct is a service that answers your questions about the European Union. You can contact this service:

– by freephone: 00 800 6 7 8 9 10 11 (certain operators may charge for these calls),

– at the following standard number: +32 22999696 or

– by email via: https://europa.eu/european-union/contact_en

Finding information about the EU

Online

Information about the European Union in all the official languages of the EU is available on the Europa website at: https://europa.eu/european-union/index_en

EU publications

You can download or order free and priced EU publications at: https://publications.europa.eu/en/publications. Multiple copies of free publications may be obtained by contacting Europe Direct or your local information centre (see https://europa.eu/european-union/contact_en).

EU law and related documents

For access to legal information from the EU, including all EU law since 1952 in all the official language versions, go to EUR-Lex at: http://eur-lex.europa.eu

Open data from the EU

The EU Open Data Portal (http://data.europa.eu/euodp/en) provides access to datasets from the EU. Data can be downloaded and reused for free, for both commercial and non-commercial purposes.

KN-04-20-150-EN-N

ISBN: 978-92-76-17417-2