



COMPLETION OF THE PATHE MOTORWAY CONNECTIONS WITH THE PORT AND THE CITY OF PATRAS

Quick Appraisal Report

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QUICK APPRAISAL REPORT

**COMPLETION OF THE PATHE MOTORWAY
CONNECTIONS WITH THE PORT AND THE CITY OF
PATRAS**

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Prepared for

European Commission – Directorate General Regional Policy

Unit G5

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1 INTRODUCTION

1.1 Project Appraisal Fundamentals

This Quick Appraisal (QA) is prepared in accordance with the *QA Check List* for major transport investments agreed with the EC – Directorate General Regional Policy Financial Greffe REGIO.

The objective of this QA is to support a constructive dialogue between the EU and the Applicants providing recommendations and suggestions, based on an in depth analysis of the application form and annexed documentation.

The structure of this report is in line with the sections and headings of the Quick Appraisal Check List and the Investment Application Form.

Along with the description of the findings of the analysis in each Chapter or Section of Chapter in relation to which: a) the quality of the information provided and available is not satisfactory, or b) the quality of the project is deemed to be improved, or c) the methodological and technical solutions adopted to undertake the CBA analysis, demand studies and project design are deemed as not adequate or reliable, the comments are highlighted in a recommendations and suggestions box.

In the concluding remarks Chapter we summarize the main findings of our appraisal commenting on the essential elements of the project, and suggesting any potential solution that can improve its quality according to the findings of the analysis as appropriate. This section highlights any important issue that should be considered before the Commission can approve the project.

1.1.1 Applicant and Project Managing Authority

The Applicant is the Greek Management Authority responsible for the implementation of the 2007-2013 ERDF Regional Operational Programme, Improvement of Accessibility (2007-2013 *Ε.Π./ Ενίσχυση της Προσπελασιμότητας*). The project subject of this quick appraisal is included in this programme under the Priority Axis A - Road Transport.

The Beneficiary of the project is the Greek Ministry of Infrastructure, Transport and Networks/Department of Public Works “Major Projects of Western Greece” (*Ειδική Υπηρεσία Δημοσίων Έργων «Μεγάλα Έργα Δυτικής Ελλάδας»*).

1.1.2 Documentation Available

The application dossier made available in electronic format through the CIRCABC Library of the European Commission includes the following documentation:

- Application Form;
- Natura 2000 declaration;
- Cost-Benefit Analysis (updated);
- EIA compliance declarations including their extension;
- Non-technical summary of the EIA.

The project dossier is overall complete and complies with the EC Regulations. The information provided is consistent with Art. 40 Reg. 1083/2006, Annex XXI and Commission Regulation 1828/2006. It is in any case worth noting that the application dossier presents some inconsistencies regarding the information included in the application form and the related annexes (and even internal to the application form) and relating to project costing, project timetable (i.e. first year of full operation), EIA related information. These incongruences have been commented in this report, depending on their relevance to the scope of the analysis and assuming in any case that these are probably due to the fact that the application form have been updated over the course of the time, since its original preparation and that the information in the application form is the most updated one. In the event another application form/dossier will be requested, we suggest asking the applicant and beneficiary to submit a consistent application dossier.

2 PROJECT STRATEGY AND OBJECTIVES

2.1 Project Description and Strategic Objectives of the Project

The investment under appraisal is a "bridge project" with the Third Community Support Framework and relates to the Completion of PATHE motorway connections with the Port and the City of Patras. The project involves the construction of the Interchange connecting the Glaykos River arteries (from both sides) with the port, the technical settlement works for Diakoniaris stream and the completion of the main arteries.

The project is included in Priority Axis A – A'- *Οδικές Μεταφορές - Διευρωπαϊκό Και διαπεριφερειακό Οδικό Δίκτυο Περιφερειών Αμιγούς Στόχου Σύγκλισης* – and aims to the completion of specific PATHE motorway connections with the city and the new port of Patras. It is a high priority project due to the absence of alternative roads capable to sustain both current and future traffic volumes in the city and to and from the port. The proposed investment is expected to improve the accessibility to and from the PATHE Motorway from the city centre, also allowing a better interconnection between the Patras port and the National Road Network. The project is expected to reduce traffic congestion and road accidents in the road city network as well as contribute to the development of combined transport.

Figure 1 TEN-T network – Priority Project 7



Source: TEN-T Executive Agency

Source: http://tentea.ec.europa.eu/download/project_fiches/greece/fichenew_2007el07040s_final_3.pdf

The completion of the PATHE motorway is deemed to contribute to the realization of specific objective 5 of the priority axis A of the 2007-2013 ERDF Regional Operational Programme (*Ενίσχυση της Προσπελασιμότητας*) – *Οι παρακάμψεις των κύριων αστικών κέντρων και οι συνδέσεις των λιμένων τους με το Διευρωπαϊκό Οδικό Δίκτυο*. The specific objective of Priority

Axis A is consistent with the first general objective of the Operational Programme "*Improvement of Accessibility*" which is "Improving accessibility of the country areas through the development of a Trans-European road network including connections with the main gates of the country (border stations and ports), and the development of the national and regional road network, while ensuring environmental protection".

The implementation of the project will contribute to the following development priorities in the regions of Western Greece, Peloponnese and Ionian Islands, as also identified in the application form:

- Attractiveness of the area as a place to invest, work and live;
- Mitigation of intraregional and interregional disparities;
- Financial restructuring and modernization.

The project is coherent with the objectives set by the National Reform Programme (NRP) 2008 - 2010 on strengthening regional cohesion by improving the country's transport network.

The total intervention regards the construction of two arteries which will become an integral part of the TEN-T corridor (Priority Project 7) and connect a TEN-T node (port of Patras) with PATHE motorway, which is part of TEN-T.

2.2 Project Description

The investment subject of this appraisal regards the completion of the *Connection of PATHE Motorway with the Port and the City of Patras*. The overall object of the total project involves the construction of:

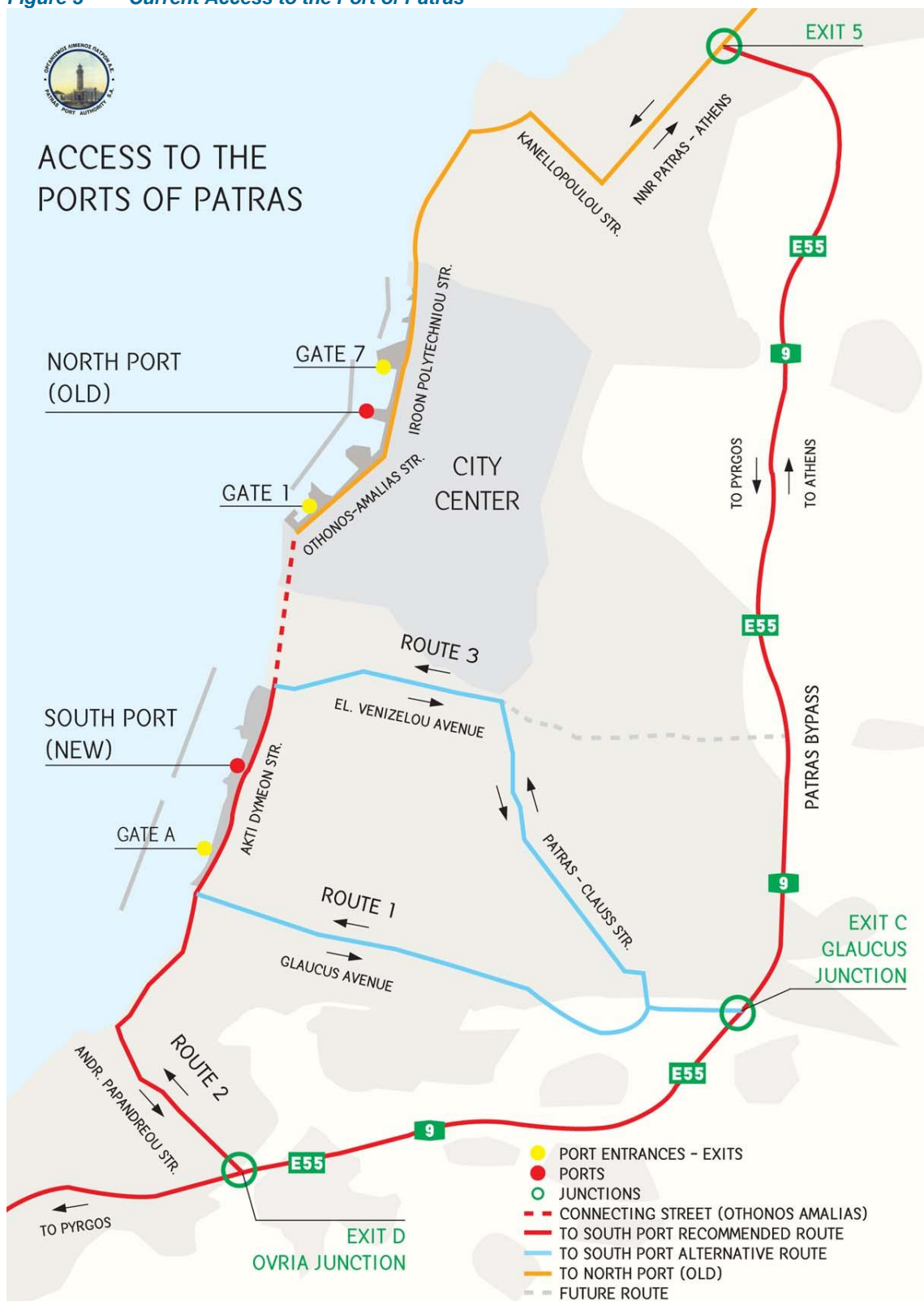
- An artery covering the Diakoniaris watercourse, of 5km length, extending from the end of Patras Bypass node (K4) to Eleftherios Venizelos Avenue in the city of Patras, and the necessary settlement works of the watercourse. The construction of the artery is a four-lane section with two (2) lanes and an emergency lane per direction;
- Arteries on either side of Glaykos River (*παραγλαύκιες*), of 3.76km length, spanning from the end of Patras Bypass node (K5) to Akti Dymaion Street in the city of Patras and settlement works of the river. The construction of each artery is a two-lane section for a single direction;
- The Interchange connecting the Glaykos River arteries (from both sides) with the port.

In addition the project includes all necessary expropriations and network utilities costs.

As already mentioned above, the major project under appraisal represents a "bridge project" with the Third Community Support Framework; as such, the value subject of the application for co-financing under the current ERDF programming period is limited to the works needed to complete the whole investment, which began during the 3rd CFS also including the completion of the arteries and the Interchange. More in detail Section B.2.4 of the application form describes the works to be implemented within the present ERDF programming period. These include the construction of the Interchange interconnecting the Glaykos River arteries (from both sides) with the port, the technical settlement works for the Diakoniaris watercourse and the completion of the main arteries. These specific interventions totals nearly €78 million and as also stated in the application form – page 5 – the works are not going to be implemented per phases.

Section B.2.4 – pages 8 and 9 – of the application form also provides the share of works and costs between the 3rd CFS and the current ERDF (see also Section 3.2 of this report).

Figure 3 Current Access to the Port of Patras



Source: [http://www.patrasport.gr/?section=1892&language=el_GR&tmpvars\[0\]\[action\]=getFile&tmpvars\[0\]\[file\]=file-368&tmpvars\[0\]\[moduleid\]=kernel&tmpvars\[0\]\[modidforfile\]=491&tmpvars\[0\]\[realfilename\]=OLPA+XARTIS+EN.pdf](http://www.patrasport.gr/?section=1892&language=el_GR&tmpvars[0][action]=getFile&tmpvars[0][file]=file-368&tmpvars[0][moduleid]=kernel&tmpvars[0][modidforfile]=491&tmpvars[0][realfilename]=OLPA+XARTIS+EN.pdf)

The table below summarizes the units of analysis adopted in the preparation of the application dossier; which are acceptable.

Table 1 Units of analysis

Engineering works including technologies	<i>Connection of PATHE Motorway with the Port and the City of Patras</i>
Procurement and contracting	<i>Connection of PATHE Motorway with the Port and the City of Patras:</i> <ul style="list-style-type: none"> ▪ Contract for <i>Construction of the Interchange connecting the Glaykos River Arteries (from both sides) with the new port of Patras and Construction works of the technical outfall for Diakoniaris stream</i>, Date June 23 2011, Reference N° 2011/S 119-195578; ▪ Contract for the <i>Remaining Construction Works of Connecting Patras Bypass with the City of Patras and coverage of Diakoniaris Stream</i>, Date June 1 2012, Reference N° 2012/S 103-171468.
Development consent and environmental certifications	For EIA and Natura 2000 related procedures, the unit of analysis is the whole <i>Connection of PATHE Motorway with the Port and the City of Patras</i> project.
Infrastructure management and operation	<i>Connection of PATHE Motorway with the Port and the City of Patras</i> managed and maintained by the Department of Public Works "Major Projects of Western Greece" (<i>Ειδική Υπηρεσία Δημοσίων Έργων «Μεγάλα Έργα Δυτικής Ελλάδας»</i>).
Economic and financial analysis	<i>Connection of PATHE Motorway with the Port and the City of Patras</i>

2.3 Functional Objectives of the Project

The Completion of PATHE motorway connections with the Port and the City of Patras is expected to contribute to all the strategic and functional objectives as indicated in the application form pages 10 to 13, as well as to the achievement of the targets of the Priority Axis A, identified with reference to its quantitative output and result indicators:

- The output indicator of Priority Axis A "Improvement of Accessibility - Construction and completion of TEN-T motorways" with a base rate of 237.0 km and a target rate of 817.0 km;
- The result indicator of Priority Axis A "Improvement of Accessibility - Travel Time" with a base rate of 19:06 hours and a target rate of 11:21 hours.
- The result indicator of Priority Axis A "Improvement of Accessibility - Accessibility" with a base rate of 46.5 km/ h and a target rate of 82.0 km/ h; and
- The result indicator of Priority Axis A "Risk" – with a base rate of 0.816 deceased/100*10⁶ vehicle-km and a target rate of 0.568 deceased/100*10⁶ vehicle-km.

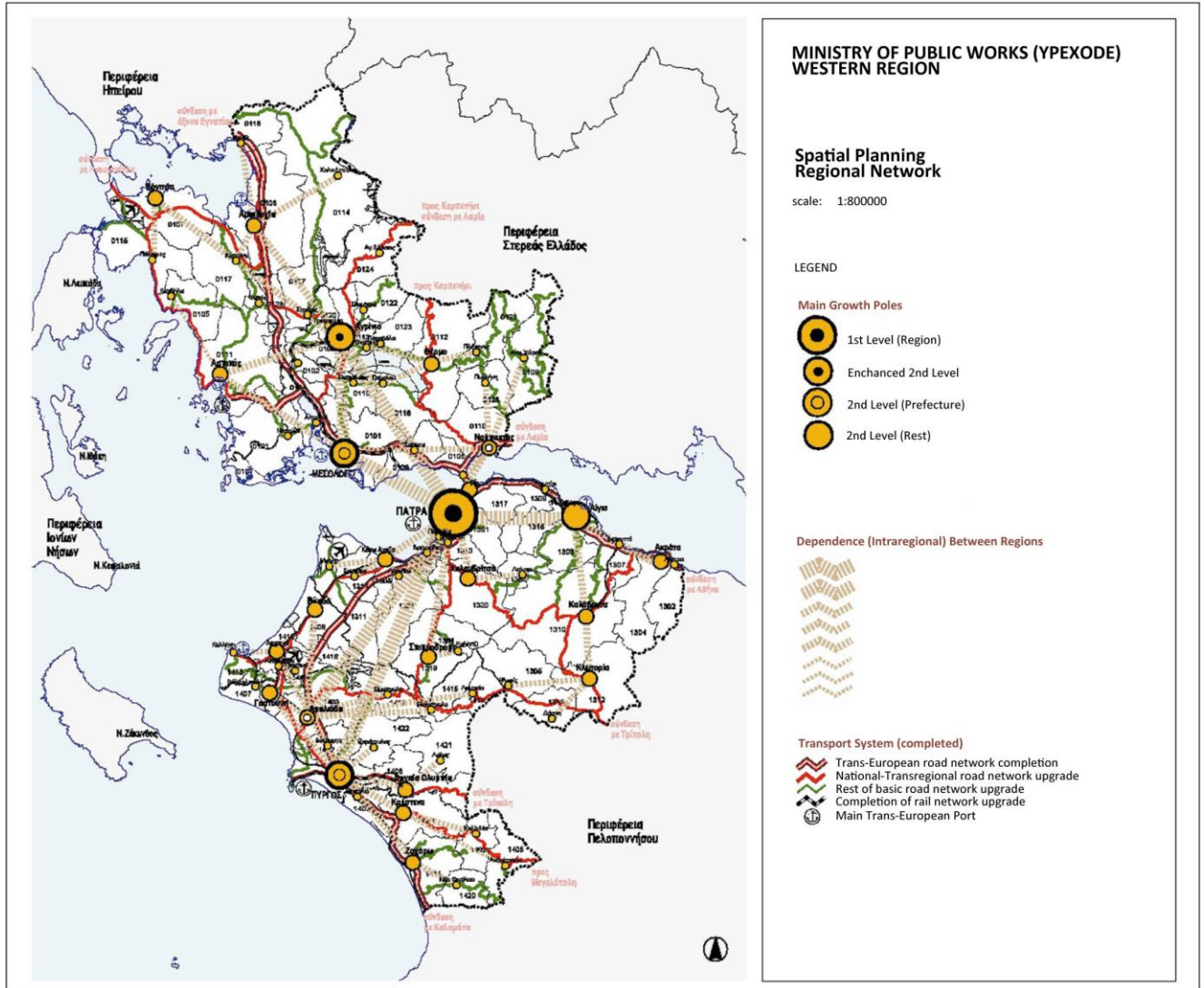
The direct objective of the project is to improve the mobility of the resident population and thus the quality of life of the residents and the travellers from and to the port of Patras, with regard to the travel time and cost savings and the reduction of traffic accidents. Additionally the completion of the project is also deemed to reduce environmental pollution and improve the city environment.

It is indeed worth noting that until today the city of Patras is connected to PATHE Motorway through the existing road network which presents very poor geometric features creating problems in the urban road network (congestion, noise, pollution). Moreover the port traffic is served through the same road network, which emphasises these problems relating to road traffic and network congestions.

The investment under appraisal will improve and facilitate the interconnection between the Patras Bypass and the city centre and the new port. The construction is expected to accommodate incoming/outgoing traffic from the North (Charandros watercourse), South (Glaykos River), East (from Patras Bypass) and West (from the Gulf of Patras), and improve accessibility at a larger scale, between the port and the city centre and the other counties in the region of Southwest and Central Peloponnese (Prefectures of Ilia, Arcadia, Messinia and Lakonia).

Figures 4 and 5 show to this respect how the transit and the incoming/outgoing traffic from the nearby regions and the National Road Network is expected to cross the city network to reach the port – thus confirming the strategic importance of the *Connection of PATHE Motorway with the Port and the City of Patras* to release the city centre from traffic congestion.

Figure 4 Regional Network



Source: <http://www.ypeka.gr/LinkClick.aspx?fileticket=6PEuFLE9BoE%3D&tabid=514&language=el-GR>

Figure 5 Road Works (2007-2013 ERDF – Improvement of Accessibility)



Source:

<http://www.mindev.gov.gr/wp-content/uploads/2012/08/28-8-%CE%A7%CE%91%CE%A1%CE%A4%CE%97%CE%A3-%CE%9F%CE%94%CE%99%CE%9A%CE%A9%CE%9D-%CE%95%CE%A1%CE%93%CE%A9%CE%9D.jpg>

The population directly benefiting from the completion of the works part of the major project under appraisal belongs to the Municipal Districts of Patras (161,114), Elikistras (1,378), Moiras (79) and Souli (875) (see also Table 2 overleaf). This totals about 163,000 inhabitants which is an acceptable assumption.

Table 2 Total area and Population in Municipal Districts of Patras – 2001 Census

Municipality	Total Area km ²	Total population 2001 - Kapodistrias	0-15	Working age	Non-working age	Male Total	Female Total	Density (Population / km ²)
Patras Municipality	334.86	163,446	25,775	116,038	21,633	80,343	83,103	488.11
Consists of Municipal Districts								
M.D. Patras		161,114	25,355	114,405	21,354	79,102	82,012	
M.D. Elikistras		1,378	238	968	172	743	635	
M.D. Moiras		79	19	44	16	43	36	
M.D. Souliou		875	163	621	91	455	420	

Source: Census 2001, http://el.wikipedia.org/wiki/Δήμος_Πατρέων

These Districts were established by legislation 2539/1997 (*Kapodistrias* programme). On January 1st, 2011, the Kallikratis regional programme was implemented causing changes in the total area (km²) of the Municipality of Patras, expanding the Districts and increasing the density of the population per km². Therefore no direct comparison between the population in 2001 (Census 2001) and the population in 2011 (Census 2011¹) can be made.

The application form (page 10) notes that Patras is the capital as well as largest and most populated city of the Prefecture of Achaia and ranked third (2001) in population in Greece. This information is partially confirmed in the official study published by the Greek Statistics Department (*Ελληνική Στατιστική Υπηρεσία*)². Apart from these considerations, the application form does not provide a specific population trend, since it only considers the 2001 census.

Table 3 Total area and Population in Patras – 2011 Census

Municipality	Total Area km ²	Total population 2011	0-15	Working age	Non working age	Total	Total	Density (Population / km ²)
Patras Municipality	333.14	214,580	33,839	152,340	28,401	105,870	108,710	644.11

Source: Census 2011,

http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/General/A1602_SAM01_DT_DC_00_2011_02_F_GR.pdf;
http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/General/resident_population_census2011.xls

Table 3 below shows the population trend for the expanded municipality of Patras, following the changes introduced by the mentioned Kallikratis regional programme. Although this does not constitute a fully reliable term of comparison, when examining the legal population in the municipality of Patras (Table 4), it actually seems that the population slightly decreased (0.93%) over the last ten years. A consideration also confirmed by other public available sources³.

Table 4 Legal Population in Patras - Comparisons 2001 & 2011 Census

Municipality	Population 2001	Legal Population 2001	Total Area sq km / 2001	Legal Population 2011	Difference legal Pop. 2001-2011
Patras Municipality	202,757	178,900	334,858	177,245	-1.655

Source: Census 2011,

http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/General/A1602_SAM01_DT_DC_00_2011_02_F_GR.pdf;

Despite the negative trends in the population growth and the effects of the economic crisis, further commented at Section 3.3 below, the project is reasonably expected to reach the functional objectives assumed in the application dossier and generate the type of benefits considered in the CBA, namely reducing traffic congestion and travel times and costs, as well as road traffic pollution and traffic accidents.

¹ http://www.statistics.gr/portal/page/portal/ESYE/BUCKET/General/resident_population_census2011.xls

² <http://www.statistics.gr>

³ http://www.eetaa.gr/anakoinoseis/20130111_sygritika_plithismou_2011.pdf

2.4 Consistency with Other Union Policies

The sources for the financing of the project are detailed at Section D.2.3 of the application form. The project is included for funding under Axis A of the Operational Programme "Improvement of Accessibility" by Decision no. 3126/23-06-2010 of the General Secretary for Public Works. The project is also included in the Public Investment Programme (PIP), according to Decision No. 23056/ΔΕ-4122/27-05-11 of the Ministry of Development, Competitiveness and Shipping.

The co-financing rate adopted in the application form is 85%, consistently with the 2007-2013 Operational Programme.

As stated in the Sections above, the investment under appraisal concerns the remaining construction works for the completion of PATHE Motorway connections with the city and the port of Patras. All previous works were co-financed by the 3rd CFS. Section Θ.1 of the application form – page 40 to 41 – adequately and correctly presents the co-financing certification procedures under the 3rd CFS.

According to the application form – Sections ΣΤ.3 to ΣΤ.6– the project is in line with the policies concerning environmental protection. An environmental impact monitoring programme will also be implemented after completion of the construction works, at the operational stage.

The publicity measures are sufficiently described in the application form (Section Θ.3). It is stated that the contractor is responsible for the project's publicity in accordance with the requirements of the EU regulation. Yet their costs are not specified, although these are deemed to be included in the construction costs.

3 TECHNICAL FEASIBILITY, PROJECT COSTS AND DEMAND ANALYSIS

3.1 Technical Feasibility

3.1.1 Feasibility Study

The need for the construction of the Glaykos and Diakoniaris arteries was assessed in the following studies: *Στρατηγική Μελέτη Ανάπτυξης Λιμένα Πατρών και Αναγκαίες Τεχνικές Μελέτες* (TRITON, ADK., 1992) and *Γενική Μελέτη Μεταφορών και Κυκλοφορίας για την πόλη της Πάτρας* (Γραφείο Doxiadis, 1996). It is worth noting that both arteries are also included in the *Γενικό Ρυμοτομικό Διάγραμμα του σχεδίου πόλεως Πατρών* (January 2005).

The comments in the application form – page 17– relating to the description of the project layout alternatives considered in the feasibility studies are sensible.

The demand analysis is commented at Section 3.3 below.

3.1.2 Technical Concept

Under the operational/functional stand point, the proposed technical solution – two arteries (with two lanes each) of a total 8.76 km length and an interchange connecting the Glaykos River arteries with the new port of Patras – is deemed adequate to serve both the existing and future demand, specified that the traffic forecasts for the long term as presented in this application dossier are implausible and more conservative growth rates should be considered as further commented at Section 3.3 below. As already stated at Section 2.3 above, the proposed investment is deemed appropriate to improve accessibility to and from the city of Patras and the Port, reducing urban congestion and improving travel times and road safety standards. It is furthermore worth noting that no valid alternative to this road exists at present, whereas the existing network is not adequate for the existing traffic. The project will finally reduce air and noise pollution and enhance protection from floods (that occur in the area) due to the works relating to the covering and/or arranging of the two rivers, Glaykos and Diakoniaris.

Although omitting the detailed data on the exact size and dimension of the proposed arteries, interchanges and technical river settlements, the application dossier includes details on types and quantity of proposed infrastructure works such as excavation, paving, asphalt works, planting, electromechanical works, signs-safety works and hydraulic (drainage) works etc. This information on the proposed technical structural arrangement is considered sufficient to conclude that the project is technically sound regarding the proposed solutions and construction techniques.

3.1.3 Environmental Assessment

Environmental Impact Assessment. An Environmental Impact Assessment process has been undertaken and its related procedures completed for the whole investment (*Connection of PATHE motorway with the Port and the City of Patras*). The investment under assessment belongs to the category of works included under Annex 1 of EIA Directive and therefore EIA was compulsory.

The relevant Authorities consulted during preparation of EIA programme are:

- The Ministry of Environment, Energy & Climate Change/Special Office for the Environment (Υπουργείο Περιβάλλοντος, Ενέργειας και Κλιματικής Αλλαγής/ Ειδική Υπηρεσία Περιβάλλοντος);
- City Development & Environment Department of Western Greece Regional Authority (Περιφέρεια Δυτικής Ελλάδος, Δ/ση Περιβάλλοντος και Χωροταξίας).

Section ΣΤ.3.1.2., page 31 of the application form, states that three Environmental Impact Assessments were implemented for Diakoniaris Artery, Glaykos River Arteries (from both sides) and the Interchange of Glaykos River Arteries. However, the application dossier (Annex 1) does not include the EIA compliance declaration for the Interchange. Given that the application form (Section ΣΤ.3.1.2.) states the official protocol for the EIA development consent was undertaken, we assume that the EIA declaration for the Interchange was mistakenly omitted from the application dossier; however this should be confirmed with the Applicant and the Beneficiary.

The first EIA compliance declaration of Diakoniaris Artery works was issued in 1997. In 2009 an extension was granted until 31/03/2019. The EIA compliance declaration of Glaykos River Arteries (from both sides) works was issued in 1999 and in 2011 an extension was granted until 31/05/2021. According to the application form the EIA compliance declaration for the Interchange of Glaykos River Arteries works was issued in 2006 but we do not have any more information on extensions and/or amendments (as mentioned above).

Also non-technical summaries of the EIAs were correctly included in the documentation available – See Annex I of the application dossier.

The application form – page 29, point (b) – refers to compensation measures; the costs for the identified environmental impact related preventive, mitigation and compensation measures have been estimated to be equal to the 2% of the total investment. According to Section ΣΤ.6 of the application form, the percentage of 2% is calculated as proportion of the cost of environmental protection measures to the total construction cost. However, these costs are not detailed in the application form or the CBA Study.

The *polluter pay principle* applies indirectly through the payment by users of annual circulation taxes as described at page 30 of the application form.

Strategic Environmental Assessment. The application form redirects to the SEA report developed for the 2007-2013 ERDF regional operational program *Ενίσχυση της Προσπελασιμότητας*. A link to the site of the 2007-2013 ERDF related SEA report is provided in the application form. However, the link is not working as the page cannot be found⁴.

Natura 2000. A certificate from the national environmental authority – *Υπουργείο Περιβάλλοντος, ενέργειας και κλιματικής αλλαγής – Γενική Διεύθυνση Περιβάλλοντος* has been enclosed to the application form (Annex I) stating that the project will not cause significant impacts on Natura 2000 sites, taking into account the Environmental Impact Assessments and the 92/43/EC Directive.

B.3.1.3 Recommendations and suggestions

The application dossier omits to include the EIA certificate for the Interchange of Glaykos River Arteries. The EIA process for this infrastructure was undertaken in 2006 and the application form does not specify whether an extension would be required. The costs for the impact mitigation measures are not detailed. In addition the application form provides an incorrect link to the SEA report. These omissions and inconsistencies should be clarified and the application dossier amended, as appropriate.

⁴ <http://www.epep.gr/content/environmental-study>

3.1.4 Project Implementation Scheme and Time Schedule

The project is not going to be implemented as a public private partnership. After its completion it is going to be operated and managed by the Beneficiary of the project, Department of Public Works "Major Projects of Western Greece" (*Ειδική Υπηρεσία Δημοσίων Έργων «Μεγάλα Έργα Δυτικής Ελλάδας»*).

According to Table D.1 (page 17) and Section D.2.4 (page 19) of the application form, the implementation status of the project is currently in progress. Table 5 below, shows the real and planned "start" and "completion" dates of the project phases:

Table 5 *Project calendar*

Project Phase/Contract		Start	Completion
1	Feasibility Studies	29/06/2005	24/11/2005
2	Cost benefit analysis (including financial analysis)	21/08/2012	21/11/2012
3	Environmental Impact Assessment		
	▪ Diakoniaris Artery	18/06/1997	14/07/2009
	▪ Glaykos River Arteries (from both sides)	31/12/2001	21/09/2011
	▪ Interchange of Glaykos River Arteries	03/06/2006	13/06/2006
4	Design Studies		
	▪ Diakoniaris Artery	17/01/2006	30/04/2009
	▪ Glaykos River Arteries (from both sides)	03/03/2003	30/03/2009
	▪ Interchange of Glaykos River Arteries	19/07/2004	27/08/2009
5	Preparation of Tender documentation		
	▪ Diakoniaris Artery	26/09/2002	03/10/2002
	▪ Glaykos River Arteries (from both sides)	03/11/2005	10/11/2005
	▪ Interchange of Glaykos River Arteries	13/12/2010	22/12/2010
6	Expected launch of tender procedure:		
	▪ Diakoniaris Artery	03/10/2002	23/12/2003
	▪ Glaykos River Arteries (from both sides)	10/11/2005	29/12/2005
	▪ Interchange of Glaykos River Arteries	22/12/2010	22/02/2011
7	Land acquisition	18/06/1997	31/03/2014
8	Construction phase/ Contract		
	▪ Diakoniaris Artery	05/07/2005	31/03/2013
	▪ Glaykos River Arteries (from both sides)	15/03/2006	31/03/2014
	▪ Interchange of Glaykos River Arteries	09/06/2011	08/06/2013
9	Operational phase	01/04/2013	31/12/2036

Source: Application Form, pages 17 to 18

Section Θ.5 of the application form (page 42) presents details of the contracts already signed for the implementation of the project.

The application dossier, Annex IV, provides a detailed time schedule (Gantt chart) including the construction works for the total project. Although all the works are properly included and detailed, the time schedule presents some inconsistencies when comparing it to the one in the application form (Section D.1), regarding the Glaykos River Arteries (from both sides) construction works.

According to the application form, Section D.2.2 (page 19), all the necessary decisions concerning land acquisition have been issued (for implementing the expropriations) and gradually the relevant court decisions are also adopted. In addition, the procedures anticipated by the relevant Archaeology Departments have also been fulfilled.

B 3.1.4. Recommendations and suggestions

The proposed time-table is acceptable and there should be limited risks regarding the completion of the construction works by end of year 2013. This will mostly depend on the timely and positive solution of any land acquisition procedures that might be currently pending.

Provided the project works will not change and that all EIA related procedures are completed and updated (See Section 3.1.4), we do not see risks of delay in the implementation of the project or compliance with national and community environmental protection related legislation.

The application dossier shows some minimal inconsistencies between the time-table of the Glaykos River Arteries (from both sides) construction works presented respectively in the application form and Annex IV. We understand the application form is more updated than the Annex.

3.2 Project Costs

The application dossier – Table H.1 – states the costs for the *Completion of PATHE motorway connections with the Port and the City of Patras* project are € 77,999.70 (including VAT). This value is consistent with that presented at Section B.4.2 of the application form (division of construction works). The total cost presented at Table E.1.2 of the application form and the CBA Report (€ 151,434,807) refers to the cost of whole project, as appropriate.

Table 6 Cost analysis

	Description	Total Project Cost (EUR '000)	Non-eligible Project Cost (EUR '000)	Eligible Project Cost (EUR '000)
1	Planning and Design Expenditures			
2	Land	21,005	15,463	5,542
3	Building and Infrastructure	46,312	5,796	40,516
4	Installations and Equipment			
5	Contingency			
6	Revisions			
7	Technical Assistance			
8	Publicity			
9	Supervision			
10	Sub-total	67,317	21,259	46,058
11	Vat	10,683	1,319	9,363
12	TOTAL	77,999	22,578	55,421

Source: Application Form (page 37)

The overall construction costs are presented in Section B.4.2 of the application form, consistently with the values included at Table H.1 of the application form. The application also provides the breakdown of the costs per different type of categories (See Table 7 overleaf) and gives the details of the share of works funded by the 3rd CFS and the ERDF respectively.

Table 7 Division and Distribution of costs

	Description	Total Budget	3 rd CFS Budget	ERDF Budget
		Cost (EUR)	Cost (EUR)	Cost (EUR)
TEAM A	Excavation	100%	72%	28%
	Total	5,918,509.61	4,242,185.04	1,676,324.57
TEAM B	Technical Works	100%	59%	41%
	Total	51,508,611.31	30,373,192.05	21,135,419.26
TEAM C	Paving	100%	57%	43%
	Total	1,335,062.04	757,557.15	577,504.89
TEAM D	Asphalt	100%	17%	83%
	Total	3,577,881.48	621,926.84	2,955,954.64
TEAM E	Signs - Safety	100%	26%	74%
	Total	1,700,521.80	442,593.18	1,257,928.62
TEAM F	E/M –Traffic Signs	100%	14%	86%
	Total	1,622,655.02	220,707.78	1,401,947.24
TEAM G	Planting	100%	1%	99%
	Total	598,426.51	7,378.11	591,048.40
TEAM H	Hydraulic (Drainage)	100%	53%	47%
	Total	1,300,934.96	689,280.52	611,654.44
TEAM I	Port Works	100%	89%	11%
	Total	475,234.81	421,952.07	53,282.74
	Studies - Research	100%	68%	32%
	Total	6,011,263.72	4,062,678.44	1,948,585.28
	Other construction costs (GE & OE18%, Contingency, Revision, etc)	100%	53%	47%
	Total	27,975,001.67	14,688,327.06	13,286,674.62
	Total of Construction Works (without VAT)	102,024,102.94	56,527,778.24	45,496,324.70
	Expropriation	26,521,463.42	5,516,130.79	21,005,332.63
	Utilities	1,736,752.38	921,349.01	815,403.37
	Total (without VAT)	130,282,318.74	62,965,258.04	67,317,060.70
	VAT	21,152,488.47	10,469,686.46	10,682,802.01
	Total (with VAT)	151,434,807.21	73,434,944.50	77,999,862.71

Source: Application Form, page 9

The unit cost per km for the road section of 8.76 km (including the interchange with 0 km) amounts €17.3 million per km – 11.7 excluding expropriation and utilities – which is extremely high for this type of infrastructure. This is due to the fact that road is located in a urban, densely populated context and especially to the inclusion of the technical works relating to the covering and/or arranging of the two rivers Glaykos and Diakoniaris.

B 3.2. Recommendations and suggestions

The information provided regarding the project costs is overall acceptable. However we suggest:

- Confirming that the high cost of the road project subject of analysis, including the work part of the major project under appraisal, are due to the technical works needed for the two rivers (Glaykos & Diakoniaris) and the interchange, by providing the details of the costs by type of infrastructure (i.e. road sections, the interchange and covering and/or arranging of the two rivers);
- Confirming with the beneficiary that the investment includes all infrastructure works necessary to complete the whole project including the major project under appraisal and also the costs relating to technical supervision and planning, as the description provided regarding the project budget is not entirely clear; although we assume all these costs are considered.

3.3 Demand Analysis

The results of the demand analysis are presented under item Γ.1.1 of the application form. More detailed information both relating to the *do something* and *do nothing scenario* is presented in the CBA Study, Chapter 4, pages 14-20. It is however worth noting to this respect that the values of the traffic demand presented in the application form are inconsistent with those presented at Table 2.3 (page 17) of the CBA Study. Specifically, the AADT presented in the application form remains constant for the year 2014, whereas it increases in the CBA Study. This is probably due to the fact that the application form is more updated than the CBA report which opposite to the application form still assumes the operation period would start in 2013 rather than in 2014 (new full first operating year). Actually the application form itself is also showing an internal inconsistency regarding the starting year of operations, between what stated at page 16 and Section D.1.

Under the methodological stand point, the demand was estimated for both *do something* and *do nothing scenarios* based on data already used in a previous study (*Μελέτη Οικονομοτεχνικής Σκοπιμότητας – Μετατροπή σε Αυτοκινητόδρομο της Ε.Ο. 1, ΥΠΕΧΩΔΕ/ΓΓΔΕ/ΕΥΔΕ-ΠΑΟΕ, 2005*). The study assumes as base year for the demand estimation 2008. The assumptions adopted for the identification of the base year demand are as follows:

- Allocation of private vehicles and heavy vehicles:
 - Glaykos River arteries: private vehicles 60% - 40% heavy vehicles (buses and trucks);
 - Diakoniaris artery: private vehicles 63% - 37% heavy vehicles (buses and trucks).
- Generated traffic due to connections against the *do nothing scenario* 10%.

Table 8 shows the AADT for the *do something* and *do nothing scenarios*, for the base year 2008 and the distribution in private vehicles and heavy vehicles.

Table 8 AADT (2008) and Distribution

Year	AADT		PRIVATE VEHICLES		HEAVY VEHICLES	
<i>do something scenario</i>						
	Diakoniaris	Glaykos	Diakoniaris	Glaykos	Diakoniaris	Glaykos
2008	15,935	10,102	10,039	6,061	5,896	4,041
<i>do nothing scenario</i>						
2008	Diakoniaris	Glaykos	Diakoniaris	Glaykos	Diakoniaris	Glaykos
	14,341.5	9,091.8	9,035	8,605	5,306	487

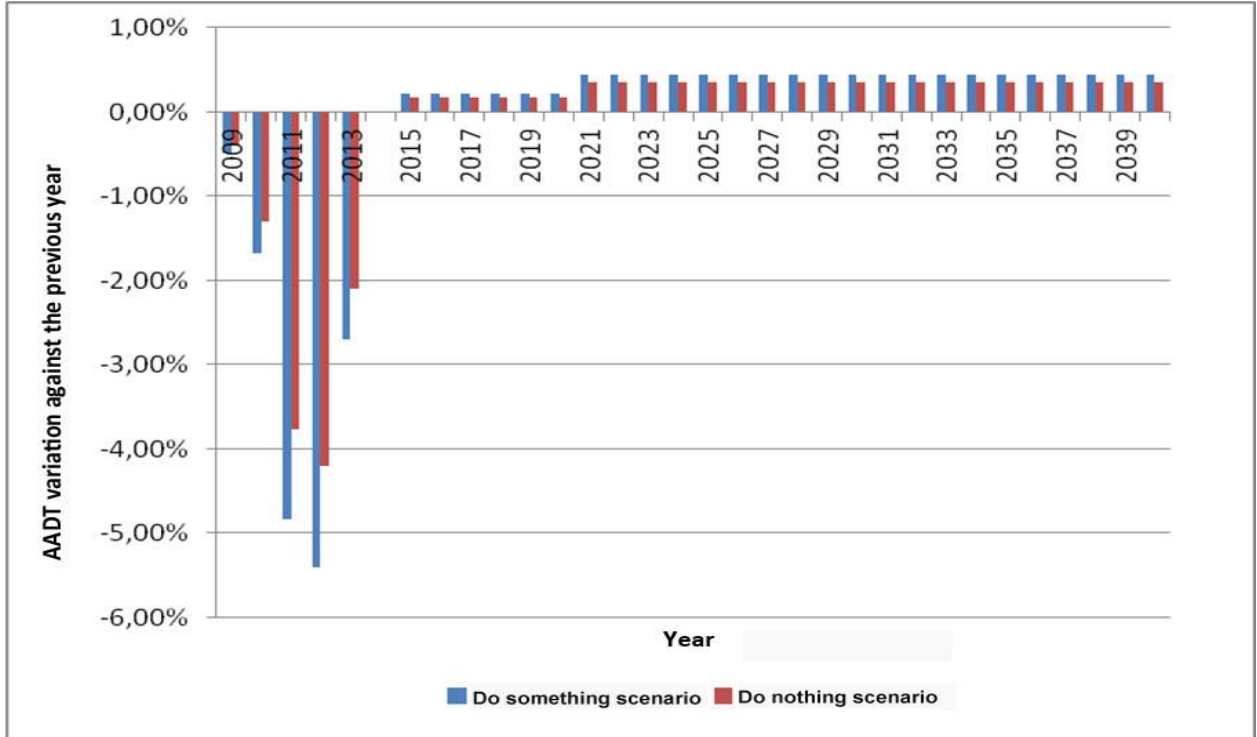
Source: CBA Study, page 14

To estimate future demand (beyond the year 2008) the following assumptions were made:

- Short and mid-term conservative assumption of traffic development, taking into account the current economic crisis, the conditions of the period 2008-2011 and estimates for future socio-economic developments in the domestic environment;
- The development of the demand is related to the change in the country's GDP: GDP has been declining over the period 2008-2013 and a slight increase is expected in the subsequent mid-term period, until the year 2025, when economic recovery and consequently growth of transport demand is expected;
- A demand elasticity to GDP equal to 0.9 is assumed in the *do something scenario* and 0.7 in the *do nothing scenario*. This means that a 10% GDP increase leads to 9% increase in traffic, etc. These values are based on international experience and literature and involve short-term impact on GDP changes in demand;
- These changes apply proportionally (no other available data) both on private vehicles and on heavy vehicles (keeping constant the ratio of private vehicles and heavy vehicles throughout the analysis period).

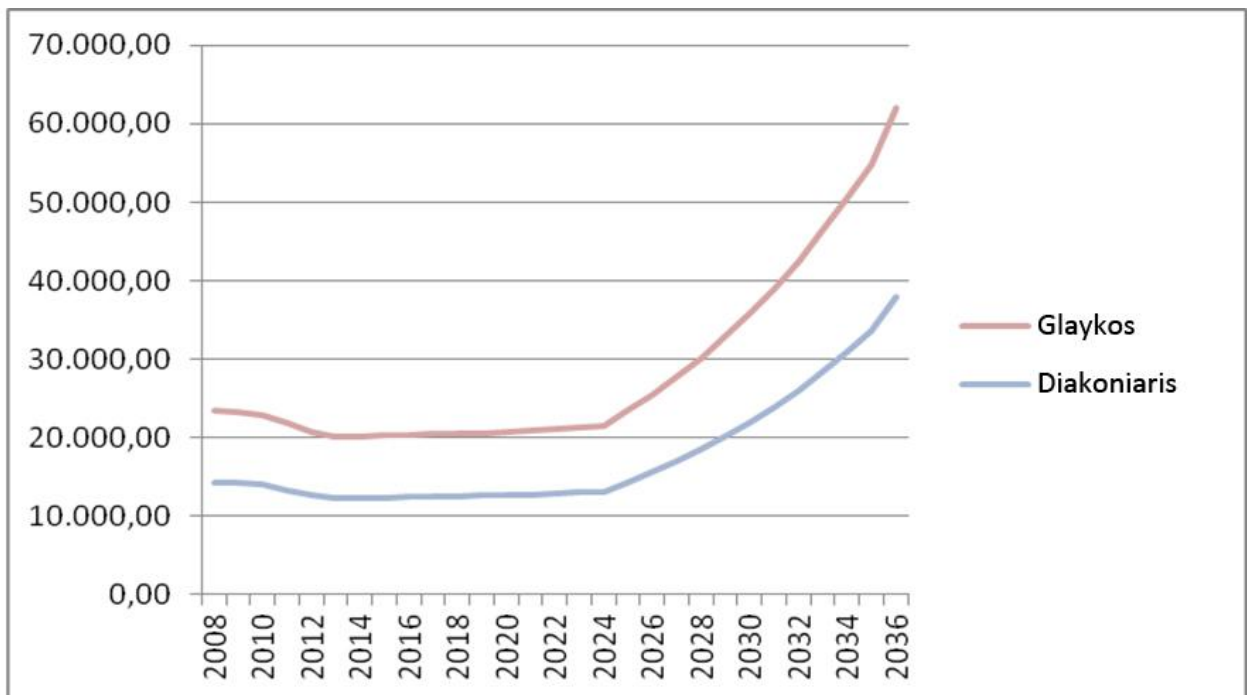
On this basis, the percentage change in demand was derived as shown at Figure 6 (*do something* and *do nothing* scenarios); the evolution of the demand for each artery is illustrated at Figures 7 and 8 overleaf.

Figure 6 Change in Demand (Percentage)



Source: CBA Study, page 15

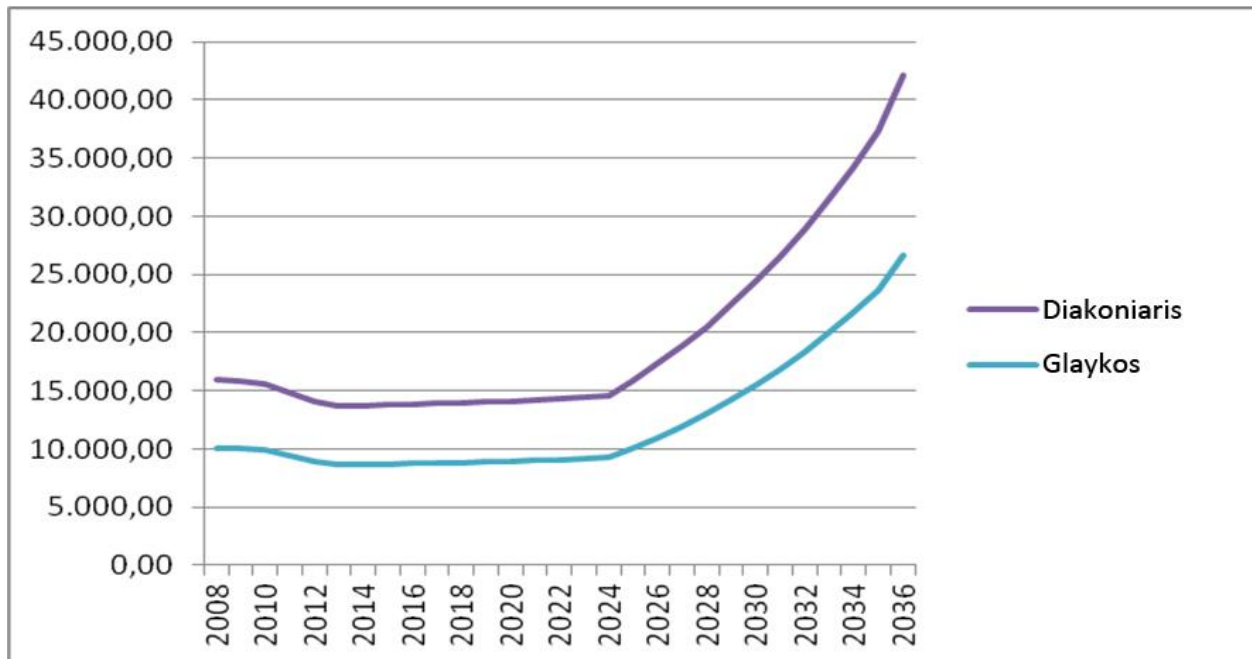
Figure 7 AADT Change (2008-2036) *do something* scenario



Source: CBA Study, page 16

Specifically regarding the identification of the *do-something scenario* and the *do-nothing scenario*, the estimates are based on the fact that the traffic characteristics of the proposed project are improved compared to the current situation, as well as reducing the length and the time for the connection of the port and the By-pass and local travel time in the city of Patras. This definition of the *do-nothing* and *do-something* scenarios is reasonable.

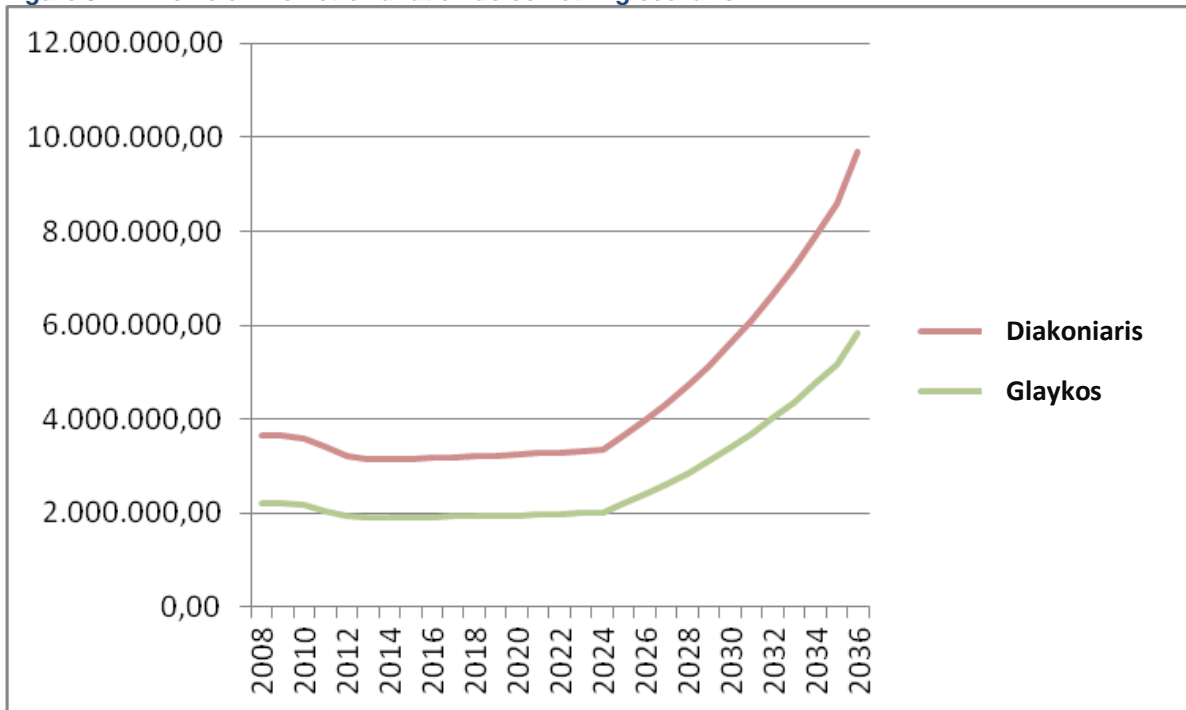
Figure 8 AADT Change (2008-2036) do nothing scenario



Source: CBA Study, page 16

For the development of the economic evaluation (See Chapter 4 below), the assessment of private vehicle- kilometre and vehicle-hour variation was estimated based on the results of the demand analysis for both the *do something* and *do nothing scenarios*.

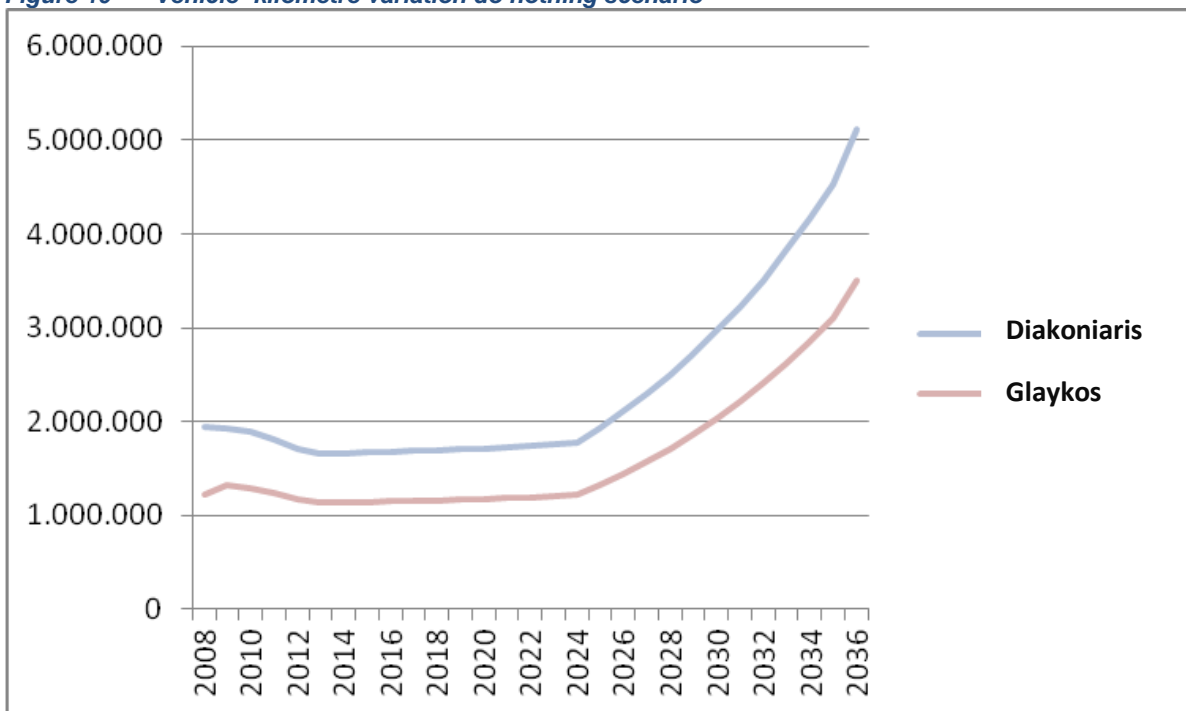
Figure 9 Vehicle- kilometre variation do something scenario



Source: CBA Study, page 36

As illustrated at Figure 9 and Figure 10, the CBA Study (page 36) assumes a linear increase in vehicle- kilometre, varying 2% over the first 10 years (2012-2025). From 2025 the increase is equal to 8.90% until 2036.

Figure 10 Vehicle- kilometre variation do nothing scenario



Source: CBA Study, page 37

From the application dossier we understand that the demand study developed for the whole investment also including the works subject of the major project under appraisal is out-dated and was recently revised to consider the effects of the economic crisis started in 2008 and still on-going. The demand analysis and the assumptions adopted to adjust the results in the short-medium term are acceptable, also considering the decrease in the population in the area – as already commented at Section 2.3 above – and the negative traffic trends at the port of Patras. The traffic trends at the port, since 2007 and until today, show indeed a significant decrease in all types of traffic (passengers, trucks and private vehicles) with the exception of the heavy vehicles traffic in 2008 and passengers traffic in 2005 (See Table 9 below).

Table 9 Port of Patras Total Traffic

Year	PASSENGERS		HEAVY VEHICLES		VEHICLES	
	Units	Difference / yr	Units	Difference / yr	Units	Difference / yr
2001	1,881,412		302,576		349,569	
2002	1,943,412	3.30%	318,524	5.27%	355,921	1.82%
2003	1,831,709	-5.75%	325,297	2.13%	349,252	-1.87%
2004	1,594,933	-12.93%	314,502	-3.32%	302,581	-13.36%
2005	1,746,056	9.48%	301,286	-4.20%	308,159	1.84%
2006	1,755,764	0.56%	313,669	4.11%	293,715	-4.69%
2007	1,607,115	-8.47%	313,602	-0.02%	290,306	-1.16%
2008	1,575,137	-1.99%	330,100	5.26%	275,870	-4.97%
2009	1,432,275	-9.07%	266,515	-19.26%	244,715	-11.29%
2010	1,304,817	-8.90%	239,951	-9.97%	220,450	-9.92%
2011	1,161,501	-10.98%	210,341	-12.34%	199,956	-9.30%

Source: http://www.patrasport.gr/?section=1610&language=en_US

The application dossier presents observed traffic data only for 2008 and does not include the traffic data on PATHE Motorway for the years 2009, 2010, 2011 and 2012, which would have however confirmed the appropriateness of adopting conservative assumptions for the short and mid-term forecasts.

Despite the appropriateness of the analysis and assumptions for the short and mid-term, the adoption of a recovery assumption for the long term is questionable, which also makes the traffic forecasts after 2025 unrealistic and the results of the CBA unreliable. The fact that the AADT will increase from 20,000 vehicles to over 60,000 on the Glaykos artery and that it will pass from about 11,000 to nearly 40,000 on the Diakoniaris artery in a decade is not plausible and would even put the investment into question under the technical stand point, as the road capacity would be not sufficient to serve such traffic.

B.3.3. Recommendations and suggestions

The adoption of a recovery assumption for the long term is questionable; this hypothesis makes the traffic forecasts after 2025 unrealistic and the results of the CBA unreliable. A sensitivity test significantly reducing the growth in the long term by 50% was to be undertaken.

4 COST BENEFIT ANALYSIS

The CBA analysis presented in the application dossier has been developed according to the guidelines published by the European Commission Directorate General Policy “*Guide to Cost Benefit Analysis of Investment Project*”, July 2008.

The financial and economic analysis of the project under assessment are both included in the Annex II of the documentation provided – *Επικαιροποίηση μελέτης κόστους οφέλους για το έργο «Ολοκλήρωση συνδέσεων αυτοκινητόδρομου ΠΑΘΕ με την πόλη της Πάτρας»*.

The overall quality of the documentation supporting the financial and socio-economic analysis is appropriate for the understanding of the methodology; albeit some of the inputs and assumptions adopted to develop the CBA are not provided nor explained.

The CBA financial and economic analysis are consistent in terms of benefits generated by the whole investment costs and are not limited to the road infrastructure works under appraisal but consider the whole *Connection of PATHE Motorway with the Port and the City of Patras* construction works which began during the 3rd CFS, as mentioned at Section 2.2 above.

Concerning the time plan assumptions, according to the application form (§ D.1) the project implementation will be completed by 2013 and the operational phase is expected to begin the same year, the full first operating year being 2014. However, the CBA financial and socio-economic analysis show a different project timetable considering 2013 as the full first operating year.

According to the application form (§ E.1.2) and the CBA report – page 33 - the time frame is 30 years including the construction phase. Yet the CBA report states that the construction and operational phases have been carried out over a period of 32 years (2005-2036), starting the construction period in 2005 (page 31). In addition, the socio-economic analysis is also undertaken for a period of 32 years (CBA Study, page 35). Since the whole *Connection of PATHE Motorway with the Port and the City of Patras* project has been considered in the CBA analysis, the financial and socio-economic analysis were correctly carried out for the 2005-2036 period thus including the construction phase during the 3rd CFS programming period. The time horizon indicated in the application form and CBA report were to be updated and consistent among the project dossier.

Regarding the general approach to the CBA, the *do-nothing* scenario implies that the current situation is maintained over time without the *Connection of PATHE Motorway with the Port and the City of Patras* project. The financial and socio-economic analysis are based on an incremental approach accordingly to the EU 2008 Guidelines.

4.1 Financial Analysis

The accountancy unit is the *Department of Public Works “Major Projects of Western Greece”*, which is the Beneficiary of the EU funds and the owner of the infrastructure. This approach is consistent with the recommendations of the *Guide to cost-benefit analysis of investments projects, European Commission Evaluation Unit, DG Regional Policy, 2008*.

The financial analysis is based on the following general assumptions:

- The financial analysis is performed at 2012 constant prices. The evaluation period is, as mentioned above, 32 years after the start of the project construction (2005), and the discount rate is 5%, which is acceptable;
- The residual value was calculated by subtracting from the total project cost: the cost for the extended maintenance (€ 1,868,928), the total costs for planting / cleaning (€ 1,349,280) the total cost of asphalt renewal works (€ 374,800) and cost of safety signs works for the past 4.5 years (€ 759,799.22). The total amount is equal to around € 147.1 million which seems a very high value (97% of the total cost of the investment).

Moreover, the following project cash flows have been considered in the financial analysis:

- Investments costs, as included in the application form;
- Cash out-flows: operating costs, including only ordinary and extraordinary maintenance, as there are no personnel, technology or admin costs related to tolling operations;
- Cash in-flows: no cash in-flows are included, as the road is not tolled.
- The prices in the Financial Analysis include VAT in the calculation of the cash-flows, because VAT is eligible since the beneficiary does not transfer VAT (EC Regulation 1685/2000).

4.1.1 Cash Out-Flows

The CBA report considers the investment costs for the whole *Connection of PATHE Motorway with the Port and the City of Patras* project. These costs are € 151.43 million (VAT included), corresponding to a present value of € 119.466 million, consistently with Table E.1.2 of the application dossier.

As mentioned before, the full first operating year is considered 2013, which is not in line with the *status* of implementation of the project (see project calendar at page 18 of the application form). The construction phase/contract is now expected to be completed in 2013, the full first operating year being 2014; this should be reflected in the CBA.

The ordinary and extraordinary maintenance costs are included in the cash out-flows. The maintenance costs are adjusted to 2012 prices and were derived from the Feasibility Study of Highway Ioannina - Albanian borders (*Μελέτη Σκοπιμότητας του Οδικού Άξονα Ιωάννινα - Ελληνοαλβανικά Σύνορα*). These costs include 3 main categories of works:

- Asphalt works (a period of 10 years is considered for the renewal of the pavement);
- Other works such as maintaining planting, forfeitures, cleaning etc. and the cost is considered as 1/4 of the asphalt works cost;
- Signalling and Safety works including the maintenance of horizontal and vertical signalling, safety barriers, speed limit signalling and electricity.

Based on these assumptions the cost of ordinary maintenance, per year, is presented at Table 6.2 of the CBA Study (page 30) and is considered acceptable.

The extraordinary maintenance costs are split as follows:

- The unitary cost for pavement renewal is estimated at 20,000 €/ km, every 10 years;
- The remaining unitary maintenance costs per km/year and estimated in thousands € are shown in the following table (See Table 10 below).

Table 10 Cost per km

Cost Category	Cost per km
Planting, Cleaning, etc	6
Signalling and Safety, etc	18

Source: CBA Study, page 31

Based on these assumptions the extraordinary maintenance costs per year are presented at Table 6.4 of the CBA Study (page 32).

The total cost of the extraordinary maintenance is correctly calculated and equal to approximately € 2 million, which seems acceptable taking into consideration the road length. After completion of the project, ordinary and extraordinary maintenance project costs seem also reasonable.

The project maintenance will be undertaken by the Department of Maintenance Works (*DESE*) of the Region of Western Greece. Maintenance costs will be covered by the Region's own resources.

The present value of the total operating costs is correctly calculated at € 3.18 million.

4.1.2 Cash In-Flows

The project is not generating any annual revenue, given that the road is not tolled. The residual value has been correctly included in the analysis also considering that a well-maintained road will still be functional at the end of the period. As mentioned above, we have only some concern on its high amount calculated in the analysis – totalling € 147,082,000 – and corresponding to approximately 97% of the investment costs, which seems overestimated. We are of the opinion that this assumption is not acceptable and the residual value should be recalculated/ revised.

4.1.3 Funding Gap and Financial Indicators

The project is not revenue generating, therefore the funding gap method is not applicable and correctly considered equal to 100% (§ E.1.2 of the application form).

The financial performance indicators are calculated based on the whole project investment cost, without taking into account the EU contribution, according to the EU guidelines. The relevant calculations are presented at Table 6.5 of the CBA – page 34 –, at constant 2012 prices. The values of all the project cash flows include taxes, in contrast with the socio-economic calculations which should exclude taxes (in line with the suggestions of the 2008 DG Regio Guidelines).

Finally, the FNPV (financial net present value) results in a negative value of 91,484,044.

4.1.4 Financial Sustainability

The financial sustainability presented in the CBA is not properly detailed; the total cash flows and cumulative cash flows were not calculated and the FRR(E) was not included, which hamper the full understanding of the methodology and hence the evaluation of the reliability of the results. According to the CBA report (page 33), since the project is not generating any revenue, the financial analysis of the return on capital which includes the EU Contribution was not necessary and thus the IRR(K) was not calculated due to the negative cash flows.

4.1.5 Public Contribution Viability

As described in the application form, the whole project (*Connection of PATHE Motorway with the Port and the City of Patras*) was previously financed by 3rd CFS funds (€ 66,141,053.18). The specific investment under appraisal (*Completion of PATHE Motorway connections with the Port and the City of Patras*) has already received a partial funding by ERDF amounting to €20,220,960.946 (Section H.2.3, page 39 of the application form).

Concerning the determination of the EU contribution (€47,108,245.58), Table H.1 seems correct – eligible costs include VAT since it is non-reimbursable. Total project costs included at Table H.1 are not consistent with those presented at Table E.1.2 of the application form and in the financial analysis of the CBA document. This is due to the fact that Table E.1.2 and CBA present the investment costs for the whole project (*Connection of PATHE Motorway with the Port and the City of Patras*) whilst Table H.1 refer to the costs for the works under appraisal (*Completion of PATHE Motorway connections with the Port and the City of Patras*); this assumption is appropriate.

EU financial assistance will accelerate the implementation of the project and be essential since the project could not be implemented without EU contribution due to the critical shortage of national public funding and the difficulties for Greece to access the financial markets.

Also Table H.2.1 of the application form seems reliable and the co-financing rate adopted (85%) is consistent with ERDF 2007-2013.

B.4.1. Recommendations and suggestions

Despite some inconsistencies between the application form and the CBA report relating to the start year of operation and time horizon adopted for the analysis, the results of the financial analysis are generally acceptable.

More in detail our analysis shows the following incongruences and inconsistencies which were to be corrected, although the way they are presented do not impact on the calculation of the Funding Gap (and therefore on the calculation of the EU co-financing rate):

- The application dossier is not consistent with respect to the project calendar included in the application form; the full first operating (2014) indicated in the application form, do not correspond to the year assumed in the CBA report (2013);
- The residual value equals to € 147,082,000 corresponding to approximately 97% of the total investment cost, which seems overestimated. We are of the opinion that this assumption is not acceptable and the residual value should be recalculated/ revised;
- The time horizon of 30 years presented the application form (§ E.1.2) and the CBA Study – page 33 – is not in line with the CBA analysis which has been correctly carried out over a period of 32 years (2005-2036), starting the construction period in 2005 (page 31 of the CBA);

4.2 Socio-Economic Analysis

The socio-economic analysis is based on the following main assumptions:

- The social discount rate is 5.5% which is acceptable according to the 2008 EU CBA Guidelines which suggest using this rate for the evaluation of projects in the Convergence Regions;
- In addition to the project costs from the financial analysis, the CBA also includes the users' benefits, whose values have been calculated based on the Louis Berger Study Methodology and the Feasibility Study - Conversion of Highway Road 1 – PATHE (*Μελέτη Οικονομοτεχνικής Σκοπιμότητας – Μετατροπή σε Αυτοκινητόδρομο της Ε.Ο. 1, ΥΠΕΧΩΔΕ/ΓΓΔΕ/ΕΥΔΕ-ΠΑΟΕ, 2005*) implemented by the Ministry of Public Works;
- An incremental approach for the calculation of the benefits has been properly adopted. It was based on the comparison of two alternatives – the project (*do something*) and the business as usual (*do-nothing*) scenarios;
- The CBA economic analysis is consistent in terms of benefits generated by the whole *Connection of PATHE Motorway with the Port and the City of Patras* investment project;
- The socio-economic analysis is carried out for a period of 32 years starting in 2005 and ending in 2036. The partial operation of Glaykos and Diakoniaris arteries starts from the middle of 2010 whereas the Interchange operation and the new port connection start in 2013. Yet, as already stated in § 4.1, the CBA study assumes that 2013 will be the first operating year whilst the application form (Table D.1 / pages 17-18) states that the operation phase starts on 01/04/2013, the full first operating year being 2014. Therefore a clarification is needed on the starting operating year.
- All values in the socio-economic analysis are expressed at 2012 constant prices.

The users' benefits considered are as follows:

1. Travel time savings;
2. Vehicle operating cost savings;

3. Reduction of externalities, including reduction of accidents;

The value of travel time savings is by far the largest benefit supporting the case for this investment (66.27% of the total benefits). Then the vehicle operating costs savings correspond to the 5.91% of the total economic benefits; safety and reduction of externalities totalling only a percentage of 1.65%.

The residual value has been correctly included in the analysis but, as stressed above, we have some concern on its high amount, totalling € 147,082,000, which seems overestimated. We therefore suggest reducing it by 50% in order to make the CBA analysis more reliable.

The socio-economic costs taken into account are:

- The construction cost of the project;
- The maintenance costs; and
- The operational costs.

The residual value is also considered in the economic analysis as an in-flow at the last year. The costs and benefits calculation is based on the following assumptions:

- The traffic volumes registered in the current and future road network and the estimates of the generated traffic as described at Section 3.3 above. As already mentioned, the demand analysis seems overestimated in the long-term and its results implausible;
- The composition of traffic (light and heavy vehicles) on the existing and future road network;
- The functional and geometric characteristics of the road network which reflect the average speed limit for vehicles traffic and the service level of the roads;

The overall quality of the information describing the methodology is satisfactory and adequate.

4.2.1 Conversion of market to accounting prices

According to the 2008 EU CBA guidelines, socio economic prices of inputs and outputs to be considered for the CBA should be net of VAT and of other indirect taxes. Also, financial cash flows should be converted from market to accounting prices, in order to reflect the social opportunity cost of inputs and outputs.

However, the socioeconomic analysis does not present any conversion factors.

Moreover, although in the CBA report, at page 35, it is explained that all prices in the socioeconomic analysis are free from taxes in order to appraise the social value of the investment only (Ολες οι τιμές της κοινωνικοοικονομικής αξιολόγησης εκφράζονται σε σταθερές τιμές 2012 και είναι απαλλαγμένες από φόρους, ούτως ώστε η οικονομική αξιολόγηση να ανταποκρίνεται στην κοινωνική της διάσταση), at Table 6.20 (page 53 of the CBA report) the analysis shows the same cash out-flows and residual value derived from the financial analysis, thus including VAT. This should be corrected. According to the 2008 EU Guide: *all prices of inputs and outputs to be considered for CBA should be net of VAT and of other indirect taxes: taxes are paid by consumers to the project, from the project to the Tax Administration, and are then redistributed to the consumers as public expenditures.*

Travel Time Savings

A significant benefit from the road project is the travel time savings as a result of the reduction of distance and increase of the average vehicle speed. The reduction of this time is calculated based on the trip purpose and by multiplying the number of the road users per the incremental travel time.

The traffic composition per trip purpose for 2002 (Υ.ΠΕ.ΧΩ.Δ.Ε./ΓΓΔΕ/ΕΥΔΕ ΟΑΠ, 2003, *Επεξεργασία στοιχείων και ανάπτυξη κυκλοφοριακών μοντέλων*) is provided at Table 11:

Table 11 Trip Purpose

Work	45.7%
Leisure	32.3 %
Other	22.0%

Source: CBA Study, page 48

The value of time adopted in the analysis is assumed to be 7 €/ hour for business travels and 3.5 €/ hour for other trip purposes. This values are significantly conservative if compared to the ones suggested by the *Greek Ministry of Environment/Public Works* (See Table 12), and the HEATCO Guidelines (See Table 13).

Table 12 Value of Time

Work	9.88 €/h
Leisure	11.28 €/h
Other	11.56 €/h

Source: CBA Study, page 48 (Ministry of Environment/ Public Works, 2003, *Data processing and developing traffic models*)

Table 13 Values of Time in the HEATCO guidelines

€/h. (2002)	Work (Business)	Non Work Passenger Trips / Commute-Short Distance	Non Work Passenger Trips / Other Short Distance	45.7% Work - 32.3 % Non Work - Business – 22% Other
Greece	19.42	6.93	5.82	12.39

Source: HEATCO

The assumption regarding the average occupancy per type of vehicle is shown at Table 14.

Table 14 Occupancy

Private Vehicles	2.1
Heavy Vehicles	1.2
Buses	25

Source: CBA Study, page 48

In addition, the CBA also includes the time savings for the delivery of goods, resulting from the reduction of the total travel time. Based on the assumption that the capital rate is 5%, the analysis combines the time savings by the faster delivery of goods, their value and the 5% capital rate. The average value of delivered goods is estimated at € 1,000 / tonne and the average load factor per vehicle is estimated at 12 tons. To calculate the hourly capital rate, the analysis assumes 250 working days per year and 8 working hours per day. Hence, the hourly capital rate is 0.0035% and therefore the value of time is € 0.42 per vehicle/ hour.

The adopted values and assumptions are generally acceptable. The application form (page 26) presents the total value of the Travel Time Savings equalling to € 103,039,734.

Worth adding that the traffic demand is over-estimated, according to our opinion and the available studies (See Section 3.3 above and Section 4.2.5 below), which makes the travel time savings benefit estimation unreliable.

Vehicle Operating Cost Savings

The CBA document calculates the vehicles operating cost for the *do-nothing* and *do-something* scenarios in order to estimate the benefit generated from the operational costs reduction. The vehicles are grouped into two categories:

- Light vehicles, including 80% private passenger vehicles, 2% TAXI and 18% semi-trailers;
- Heavy Vehicles, including 38% 2-axle vehicles, 11% 3-axle vehicles and 51% multi-axle vehicles.

The unit operational costs are calculated based on data of the Ministry of Public Works for each vehicle category, according to the methodology of the mentioned Louis Berger study. The cost per vehicle category and the vehicle-kilometre value are calculated from the Feasibility Study - Conversion of Highway Road 1 PATHE (Μελέτη Οικονομοτεχνικής Σκοπιμότητας – Μετατροπή σε Αυτοκινητόδρομο της Ε.Ο. 1, ΥΠΕΧΩΔΕ/ΓΓΔΕ/ΕΥΔΕ-ΠΑΟΕ, 2005) parameters and then evaluated at 2012 constant prices, based on variations in the general price index, for the transport sector, in the period 2000 – 2012, which is +15%. The operational costs of vehicles are calculated either in financial terms (private cost) including fuel, salaries, with all their respective taxes and duties, or at a socioeconomic level (economic costs), not including taxes and depreciation.

The operational costs savings are adequately presented in the CBA Study at Tables 6.9, 6.10, 6.11 and 6.12 (pages 42 to 46) taking into consideration the expected traffic volumes.

The calculation methodology is overall acceptable and the values included in the CBA Study are reasonable. The Vehicle Operating Cost Savings is estimated in economic cost and it represents the 5.91 % of the total benefits which seems sensible.

Reduction of externalities and Reduction of accidents

The benefit from the reduction of externalities and accidents regards the internalisation of the external costs and includes effects due to accidents, environmental pollution (with vehicle-generated pollutants PM_{2.5}, NO_x, SO₂, O₃), water and soil pollution, noise and greenhouse reduction (expressed tonne CO₂ equivalent).

The CBA Report analyses and calculates – Chapter 6.4.4.4., page 51 – this benefit based on the results of the relevant research Institute of Transport Economics, University of Cologne⁵ and the inputs of the study are estimated as a function of vehicle- kilometre value.

Overall, for both traffic in the peak and off-season periods, the average cost in the EU is estimated € 0.081/ vehicle-kilometre in 2010. The results are shown in Table 6.19 of the CBA Study (page 51). The calculation methodology is clearly provided and the values included in the CBA Study seem reasonable. The reduction of externalities and accidents is estimated in economic cost and it represents only the 1.65 % of the total benefits, totalling a value of € 2,568,568 which seems sensible.

4.2.2 Effects on employment and other non-monetized effects

The application form (table E.2.4) presents the estimation of the number of jobs created with this project. It is expected that the project will generate 141 jobs during the construction phase and no jobs in the operation phase. No quantification of indirect impact on employment is included in the application dossier.

⁵ Baum, H., Geißler, T., Schneider, J., Bühne, J-A (2008). External Costs in the Transport Sector – A Critical Review of the EC Internalization Policy. Report. Institute for Transport Economics at the University of Cologne, Germany

The non-monetized effects included in the application dossier are:

- The positive externalities from the project operation which mainly concern road safety improvement along the arteries;
- The contribution of the project to the local GDP;
- The benefits of reducing unemployment during the works' implementation either directly, or indirectly, or from proliferative employment.

These non- monetized effects actually lead to greater Economic Net Present Value (NPV) given that the majority of these effects relate to economic benefits. These additional benefits were not considered in the CBA.

4.2.3 Economic performance indicators

The results of the economic analysis are included in Section E.2.3 (page 26) of the application form and are positive – B/C ratio is equal to 1.30, ERR is equal to 6%, and the economic net present value (ENPV) shows a positive amount of € 5.109 million – thus suggesting that the project is producing added value for the society. We have some concerns on these indicators because the users' benefits are calculated based on an overestimated demand analysis (See § 3.3 and § 4.2.2).

In addition to this, the ENPV is not entirely reliable because of the high residual value and the fact that the prices should be net of VAT. Yet due to the fact that the prices in the socio-economic analysis do not include VAT the consideration of a reduction in the demand or in the total amount of the benefits as considered appropriate according to our comments, may in our opinion not result in a negative ENPV value. This also calculating the ENPV reducing the residual value (i.e. by 50%).

4.2.4 Risk assessment and sensitivity analysis

A sensitivity analysis is included in the application form, in line with the 2008 EU CBA guidelines. The sensitivity analysis allows the determination of the 'critical' variables or parameters of the socio-economic assessment. The critical variables are those variables or parameters for which a relative variation of 1% around the central estimate produce a corresponding variation of not less than 1% (one percentage point) in the ERR and not less than 5% in the ENPV.

In the case of the investment under appraisal, the sensitivity analysis examined the following parameters:

- Fluctuation of construction costs;
- Fluctuation of operation costs;
- Reduction of benefits.

According to the sensitivity analysis the ENPV variation is critical only in the cases of:

- Increased Construction Cost by 20%;
- Reduction of Benefits by 15%.

The increase of the construction cost by 20% is considered unlikely given the fact that the project is almost completed, which is acceptable.

Rather optimistic is instead the comment relating to the reduction of benefits by 15% which is considered unlikely by the Applicant and Beneficiary according to the application form. It is indeed stated that the demand have already been reduced/adjusted to incorporate the effects of the current economic crisis. As already commented at Section 3.3 above, we agree on the fact that the conservative assumptions relating to the demand analysis are appropriate in the short and mid-term, although too optimistic in the long term, when a complete recovery is expected. At the same time we would consider more appropriate undertaking the sensitivity analysis on the demand.

In conclusion, whilst a sensitivity analysis should have been undertaken for the demand rather than the reduction of benefits, the CBA should have in any case included a risk analysis for the reduction of benefits by 15%.

B.4.2. Recommendations and suggestions

The presentation of the assumptions behind the calculation of the economic benefits of the project is sufficient and appropriate to a full comprehension of the results. The following aspects should however have been considered, in order to improve the quality of the application:

- The application dossier is not consistent with respect to the first operational year of the project in the application form; the full first operating (2014) indicated in the application form, do not correspond to the year assumed in the CBA report (2013);
- The benefits are estimated based on an overestimated demand;
- As mentioned above, prices should be net of VAT in accordance with the 2008 EU Guide.
- A sensitivity analysis should have been undertaken for the demand rather than the reduction of benefits. The CBA should have in any case included a risk analysis for the reduction of benefits by 15%, as these are based on implausible demand forecasts;
- The residual value has been correctly included in the analysis but seems overestimated as it corresponds to the 97% of the total project costs. Its reduction by 50% would make the CBA analysis more reliable.

Although the CBA analysis would benefit from the consideration of the above suggestions, it is worth noting that even by reducing the benefits by 15%, the residual value by 50% and excluding VAT from the prices, we are of the opinion that the socio-economic analysis may still generate added value for society.

5 KEY FINDINGS AND CONCLUDING REMARKS

5.1 Key questions for project appraisal

(a) Is the application dossier complete?

The project dossier is complete and complies with the EC Regulations. The information provided is consistent with Art. 40 Reg. 1083/2006, Annex XXI and Commission Regulation 1828/2006. It is in any case worth noting that the application dossier presents some inconsistencies regarding the information included in the application form and the related annexes (and even internal to the application form) and relating to project costing, project timetable (i.e. first year of full operation), EIA related information. These incongruences have been commented in this report, depending on their relevance to the scope of the analysis and assuming in any case that these are probably due to the fact that the application form have been updated over the course of the time, since its original preparation and that the information in the application form is the most updated one. In the event another application form/dossier will be requested, we suggest asking the applicant and beneficiary to submit a consistent application dossier.

(b) Does the project meet the expected strategic and functional objectives?

The *Connection of PATHE Motorway with the Port and the City of Patras* project, also including the works subject of the major project under appraisal, is reasonably expected to be a beneficial one for the population living in the city of Patras and the travellers to/from the city and port of Patras. Under the functional standpoint the investment – providing a new express road infrastructure alternative to the existing urban local roads – will alleviate congestion on the main urban road network, providing a direct link between the City and the Port on one side and the PATHE motorway on the TEN-T infrastructure. The whole project will effectively reduce travel times, enhance safety (reduction of accidents) and ensure reduction of environmental pollution. This last element will also be pursued through implementation of flood protection works at the Glaykos & Diakoniaris rivers [See § 2].

(c) Is the project consistent with the EU policies?

The project is overall consistent with EU policies. The project under appraisal is a "bridge project" with the Third Community Support Framework – 3rd CSF. More in detail, the whole project (*Connection of PATHE Motorway with the Port and the City of Patras*) was previously financed by 3rd CFS funds (€ 66,141,053.18) and the specific investment under appraisal (*Completion of PATHE Motorway connections with the Port and the City of Patras*) already received a partial funding by ERDF amounting to €20,220,960.946. We suggest cross-checking the results of previous submitted and already approved applications for funding [See § 2.4].

(d) Is the project technically sound?

The project is technically sound regarding the proposed solutions. It is also technically sound in what respect its functional characteristics either regarding the existing and future demand. The proposed time-table is acceptable in principle and there should be limited risks regarding the completion of the construction works by end of year 2013 [See § 3.1.2, § 3.1.4 and recommendation and suggestions box B.3.1.4].

The application dossier omits to include the EIA certificate for the Interchange of Glaykos River Arteries. The EIA process for this infrastructure was undertaken in 2006 and the application form does not specify whether an extension would be required. The costs for the impact mitigation measures are not detailed. In addition the application form provides an incorrect link to the SEA report. These omissions and inconsistencies should be clarified and the application dossier amended, as appropriate [See § 3.1.3 and recommendation and suggestions box B.3.1.3].

(e) Are the project costs reasonable?

The information provided regarding the project costs is overall acceptable. However we suggest:

- Confirming that the high cost of the road project subject of analysis, including the work part of the major project under appraisal, are due to the technical works needed for the two rivers (Glaykos & Diakoniaris) and the interchange, by providing the details of the costs by type of infrastructure (i.e. road sections, the interchange and covering and/or arranging of the two rivers);
- Confirming with the beneficiary that the investment includes all infrastructure works necessary to complete the whole project including the major project under appraisal and also the costs relating to technical supervision and planning, as the description provided regarding the project budget is not entirely clear; although we assume all these costs are considered [See § 3.1 and § 3.2 and recommendation and suggestions box B.3.2].

(f) Are the results of the demand analysis acceptable?

The adoption of a recovery assumption for the long term is questionable; this hypothesis makes the traffic forecasts after 2025 unrealistic and the results of the CBA unreliable. A sensitivity test significantly reducing the growth in the long term by 50% were to be undertaken. [See § 3.3 and recommendation and suggestions box B.3.3].

(g) Are the results of the Financial Analysis acceptable?

Despite some inconsistencies between the application form and the CBA report relating to the start year of operation and time horizon adopted for the analysis, the results of the financial analysis are generally acceptable [See recommendations and suggestions box B.4.1].

(h) Is the value of EU contribution correctly estimated?

The project is not revenue generating, therefore the funding gap method is not applicable. The amount of the EU contribution is correctly estimated [See § 4.1.4].

(i) Are the foreseen socio-economic benefits likely to be attained?

Due to the adoption of over-optimistic demand assumptions, we are of the opinion that the benefits are over-estimated. [See § 4.2.4 and recommendations and suggestions box B.4.2].

(j) Are the results of the Cost Benefit Analysis acceptable?

The positive result of the socio-economic analysis is over-estimated. Despite this, by reducing the benefits by 15%, the residual value by 50% and excluding VAT from the economic costs, we are of the opinion that the socioeconomic analysis may still generate added value for society, although not a significant one due to the high investment costs [See § 4.2.3 and recommendations and suggestions box B.4.2].

5.2 Concluding remarks

The application is not entirely satisfactory due to inconsistencies and the over-estimation of the demand in the long term and estimated benefits and the residual value. In addition to this prices in the socio-economic analysis include VAT, which is not correct. The appropriate consideration of these elements may in our opinion lead to conclusion that the project is worth co-financing. The Commission should confirm with the Applicant and Beneficiary the following aspects before the approval:

- The high cost of the road project subject of analysis, including the work part of the major project under appraisal, are due to the technical works needed for the two rivers (Glaykos & Diakoniaris) and the interchange, by providing the details of the costs by type of infrastructure (i.e. road sections, the interchange and covering and/or arranging of the two rivers);
- The validity and availability of the EIA related documentation for all infrastructure.

For a more accurate and conservative assessment the Commission may also consider requesting the Applicant and Beneficiary undertaking the risk analysis on the reduction of benefits by 15% and a sensitivity analysis on the over-estimated demand forecasts in the long term followed by a risk analysis as appropriate.

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