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ARCHIMEDES

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Ústí nad Labem

R60.1 – Improving Cycle Transport in Ústí nad Labem

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1. Introduction

1.1 Background CIVITAS

CIVITAS - cleaner and better transport in cities - stands for City-VITALity-Sustainability. With the CIVITAS Initiative, the EC aims to generate a decisive breakthrough by supporting and evaluating the implementation of ambitious integrated sustainable urban transport strategies that should make a real difference for the welfare of the European citizen.

CIVITAS I started in early 2002 (within the 5th Framework Research Programme);
CIVITAS II started in early 2005 (within the 6th Framework Research Programme) and
CIVITAS PLUS started in late 2008 (within the 7th Framework Research Programme).

The objective of CIVITAS-Plus is to test and increase the understanding of the frameworks, processes and packaging required to successfully introduce bold, integrated and innovative strategies for clean and sustainable urban transport that address concerns related to energy-efficiency, transport policy and road safety, alternative fuels and the environment.

Within CIVITAS I (2002-2006) there were 19 cities clustered in 4 demonstration projects, within CIVITAS II (2005-2009) 17 cities in 4 demonstration projects, whilst within CIVITAS PLUS (2008-2012) 25 cities in 5 demonstration projects are taking part. These demonstration cities all over Europe are funded by the European Commission.

Objectives:

- to promote and implement sustainable, clean and (energy) efficient urban transport measures
- to implement integrated packages of technology and policy measures in the field of energy and transport in 8 categories of measures
- to build up critical mass and markets for innovation

Horizontal projects support the CIVITAS demonstration projects & cities by:

- Cross-site evaluation and Europe wide dissemination in co-operation with the demonstration projects
- The organisation of the annual meeting of CIVITAS Forum members
- Providing the Secretariat for the Political Advisory Committee (PAC)
- Development of policy recommendations for a long-term multiplier effect of CIVITAS

Key elements of CIVITAS:

- CIVITAS is coordinated by cities: it is a programme “of cities for cities”
- Cities are in the heart of local public private partnerships
- Political commitment is a basic requirement
- Cities are living ‘Laboratories’ for learning and evaluating

1.2. Background ARCHIMEDES

ARCHIMEDES is an integrating project, bringing together 6 European cities to address problems and opportunities for creating environmentally sustainable, safe and energy efficient transport systems in medium sized urban areas.

The objective of ARCHIMEDES is to introduce innovative, integrated and ambitious strategies for clean, energy-efficient, sustainable urban transport to achieve significant impacts in the policy fields of energy, transport, and environmental sustainability. An ambitious blend of policy tools and measures will increase energy-efficiency in transport, provide safer and more convenient travel for all, using a higher share of clean engine technology and fuels, resulting in an enhanced urban environment (including reduced noise and air pollution). Visible and measurable impacts will result from significantly sized measures in specific innovation areas. Demonstrations of innovative transport technologies, policy measures and partnership working, combined with targeted research, will verify the best frameworks, processes and packaging required to successfully transfer the strategies to other cities.

1.3. Participant Cities

The ARCHIMEDES project focuses on activities in specific innovation areas of each city, known as the ARCHIMEDES corridor or zone (depending on shape and geography). These innovation areas extend to the peri-urban fringe and the administrative boundaries of regional authorities and neighbouring administrations.

The two Learning cities, to which experience and best-practice will be transferred, are Monza (Italy) and Ústí nad Labem (Czech Republic). The strategy for the project is to ensure that the tools and measures developed have the widest application throughout Europe, tested via the Learning Cities' activities and interaction with the Lead City partners.

1.3.1. Leading City Innovation Areas

The four Leading cities in the ARCHIMEDES project are:

- Aalborg (Denmark);
- Brighton & Hove (UK);
- Donostia-San Sebastián (Spain); and
- Iasi (Romania).

Together the Lead Cities in ARCHIMEDES cover different geographic parts of Europe. They have the full support of the relevant political representatives for the project, and are well able to implement the innovative range of demonstration activities.

The Lead Cities are joined in their local projects by a small number of key partners that show a high level of commitment to the project objectives of energy-efficient urban transportation. In all cases the public transport company features as a partner in the proposed project.

2. Ústí nad Labem

Ústí nad Labem is situated in the north of the Czech Republic, about 20 km from the German border. Thanks to its location in the beautiful valley of the largest Czech river Labe (Elbe) and the surrounding Central Bohemian Massive, it is sometimes called 'the Gateway to Bohemia'. Ústí is an industrial, business and cultural centre of the Ústí region.

Ústí nad Labem is an important industrial centre of north-west Bohemia. The city's population is 93 859 living in an area of 93.95 km². The city is also home to the Jan Evangelista Purkyně University with eight faculties and large student population. The city used to be a base for a large range of heavy industry, causing damage to the natural environment. This is now a major focus for improvement and care.

The Transport Master Plan, initiated in 2007, will be the basic transport document for the development of a new urban plan in 2011. This document will characterise the development of transport in the city for the next 15 years. Therefore, the opportunity to integrate Sustainable Urban Transport Planning best practices into the Master Plan of Ústí nad Labem within the project represents an ideal match between city policy framework and the ARCHIMEDES project.

The project's main objective is to propose transport organisation of the city, depending on the urban form, transport intensity, development of public transport, and access needs.

3. Background to the Deliverable

Ústí nad Labem has a target to improve conditions for cyclists in the city and the surrounding areas and to create suitable facilities for them. This comes in two parts:

- Improving information about cycle transport for the local population, the main output of which will be implementation of the web portal for cyclists in Ústí nad Labem.
- Linking the existing cycling infrastructure into the more complex cycle network is an important step towards increasing the number of cyclists in the area.

The feasibility of connecting the two existing major cycle routes of cross-regional importance in the vicinity of Ústí nad Labem has been assessed and the implementation plan proposed within the task.

3.1. Summary Description of the Task

The work described in this deliverable is the output of ARCHIMEDES Task 11.6.3, which consists of preparatory actions to improve conditions for cyclists in Ústí nad Labem. The main part of the work has been to produce a design and implementation plan for cycle transport improvements on a regional scale in Ústí which has focused on a study to determine feasibility of linking the two existing cycle routes – the Ore Mountains route and the Elbe River route.

However, an outline design and implementation plan has also been produced to set out the steps that will be taken in ARCHIMEDES Task 10.6 to support the development and implementation of a web portal for cyclists to provide them with route information and advice.

The feasibility study proposed two different scenarios for the Ústí cycle link – a route leading on the existing cycling infrastructure and a route leading on a newly constructed cycling infrastructure. The proposals were compared and assessed in terms of costs and benefits.

4. Plan for Improving Cycle Transport Information

One of the aims of the current task is to inform the subsequent cycle transport improvements, the main output of which within the ARCHIMEDES project timescale is implementation of the web portal for cyclists in Ústí nad Labem as a major source of cycling information.

A cycle web portal is currently available as a trial version at: <http://cyklomapa.usti-nl.cds.w.cz/>. Citizens have been asked to send their comments and feedback on the web page to determine where improvements can be made. It provides information about cycling opportunities, cycle services and areas of interest for tourists in the Ústí region. This is further described in ARCHIMEDES deliverable T60.1.

The cycle website includes interactive maps of cycle routes in the area, which provide the following information:

- Detailed characteristics of individual cycle routes.
- Safety issues in terms of traffic on the route, description of its surface, warning about narrow sections, steep hills and other safety risks - shown by warning marks on the map, critical points are presented with comments and pictures.
- Quality of the cycling network according to suitability for in-line skating, road bikes, track bikes, mountain bikes or leading the bike on foot (over obstructions etc.) - shown in various colours on the map.
- Videos from each section of the cycle route, which are recorded by a camera attached to a bike and allow users to view the route - shown in a separate window, while the mark moves on the map according to the current position on the corresponding cycle route. It is possible to choose the direction the route takes.
- Technical equipment, such as cycle stands, rest areas and services with a corresponding photo gallery.
- Interesting locations in the area - presented with a description text and pictures from the locality.
- Links to other web sites.

Data for the cycle website is still being gathered and the information provided will be gradually improved and further updated as the cycling conditions in the city gradually changes.

The aim is to promote and support cycling in the area by increasing awareness about cycling opportunities. At the same time, it is necessary to improve local cycling network and its links to the existing infrastructure, such as the proposed Ústí cycle link is designed to interlink the

two major cycle routes in the Ústí region. Also, improvement of cycling equipment (bicycle stands, resting areas, etc.) in the city is required.

Other sources of information about cycle transport improvements realised by Civitas Archimedes in Ústí nad Labem will be via city web page, local newspaper and radio, leaflets and brochures with a map and a social network (Facebook).

Finally, results of the tasks for cycle transport improvements will be implemented in the SUTP for Ústí nad Labem.

5. Improving Cycle Transport – Linking the Existing Cycle Routes

5.1. Characteristics of the Project

The Ústí cycle link would connect the two major cycle routes in the region - the Elbe route and the Ore mountains route (please see Figure 2).

The Elbe route (cycle routes 2 and 24) passes directly by the city following the course of the River Elbe along its whole length and allowing connection with the Prague and Vltava river routes. It crosses the state border to Germany, carrying the name “Elberadweg”. The cycle route is gradually transferred from 2nd class and 3rd class roads to cycle paths. The Elbe route between the border with Germany and Mělník is part of the EuroVelo cycling network no.7 leading across Norway, Finland, Sweden, Germany, Czech Republic (Děčín, Prague, Tábor, České Budějovice), Austria, Italy and Malta.

The Ore mountains route (the cycle routes 23 and 36) begins in Děčín on the Elbe route. It leads mainly on 2nd and 3rd class roads through the mountain foothills to Měděnec and Cheb. Both cycle routes are of major importance.

Figure 1 - Two major cycle routes in the Ústí region

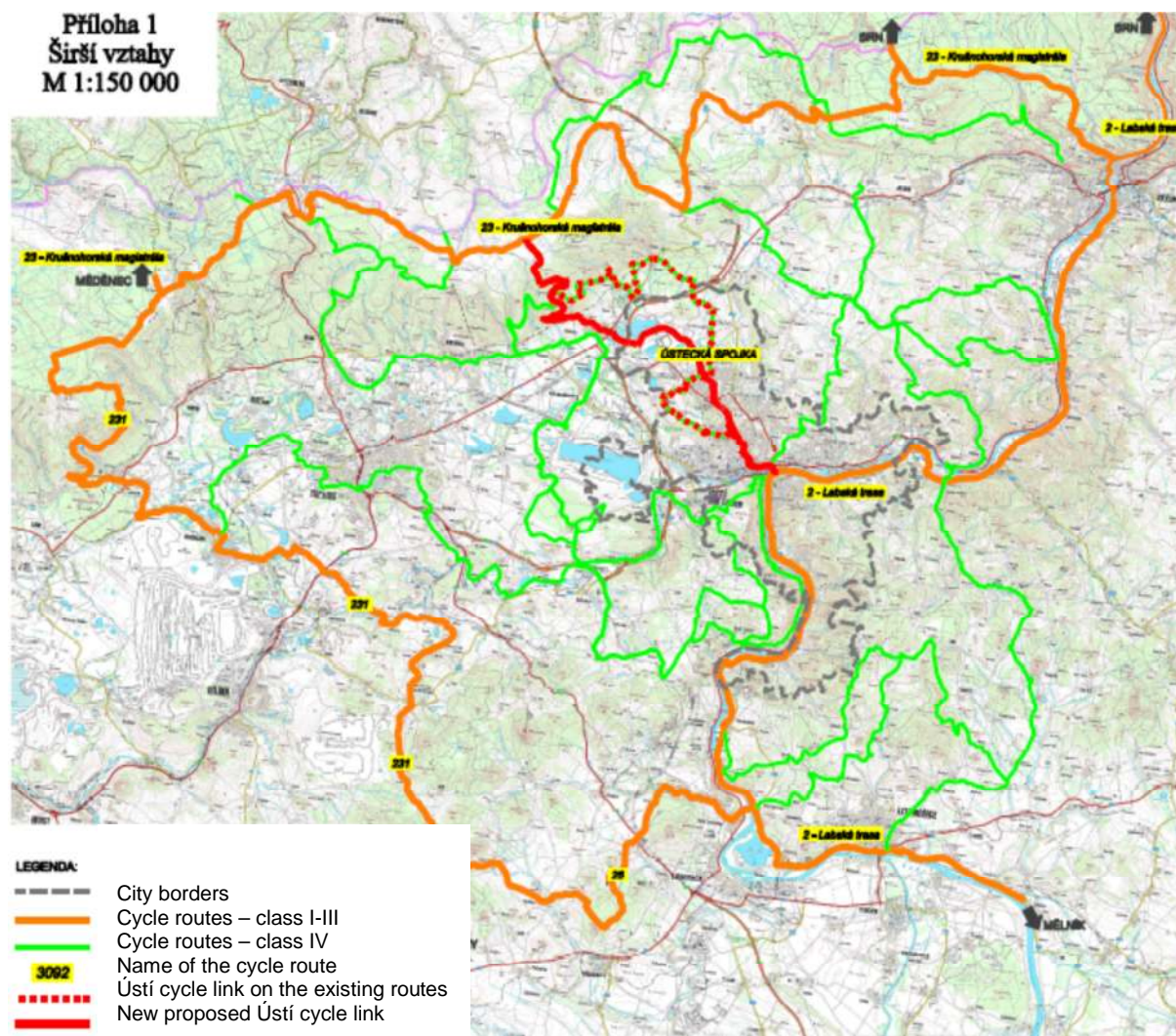


Ore Mountains route (Adolfov)



Elbe route (Ústí nad Labem)

Figure 2 - Overview of major cycle routes in the Ústí region



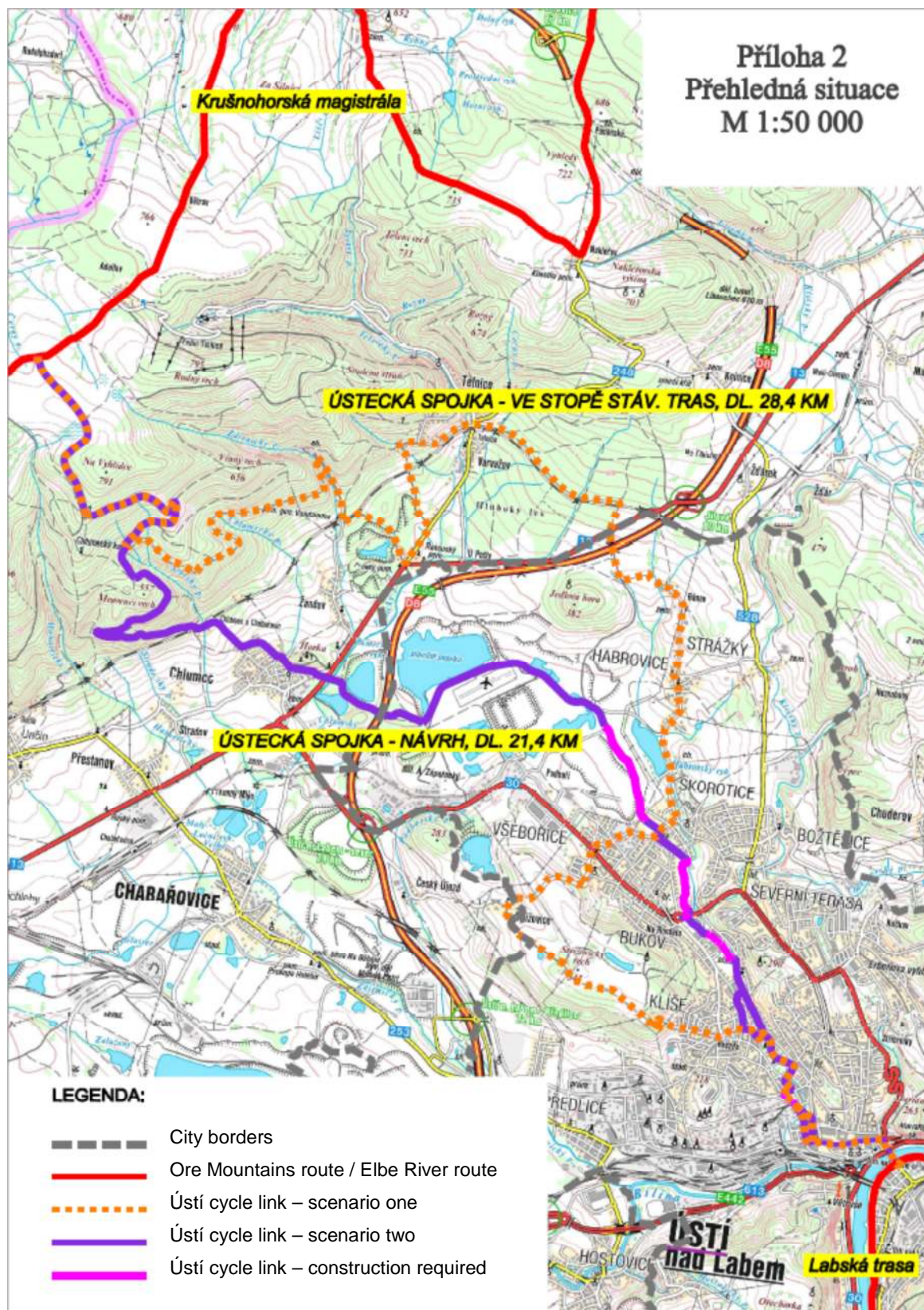
Linking the two routes is expected to increase cycling tourism in the city, thus supporting development of the cycling services and cycling infrastructure, having a great impact on local cyclists as well.

The proposal of the Ústí cycle link is based on:

- Marketing Study of Cycling in Ústí Region (Varia Ltd., 2007),
- Update on the Network of the Cycle Routes in the Ústí Region (Budínský, 2009)
- and the route research study, Cycle Routes in the City of Ústí nad Labem (Budínský, 2001),
- field survey

The research study of the Ústí cycle link had not been elaborated before. Based on the data gathered from the resources listed above, the new proposal for the optimal alignment of cycle routes is designed in 2 scenarios, which are compared in terms of vertical profiles, route length, possibility of separation from motor traffic, etc. The final cycle route is further analysed in this study.

Figure 3 – Two scenarios for the Ústí cycle link



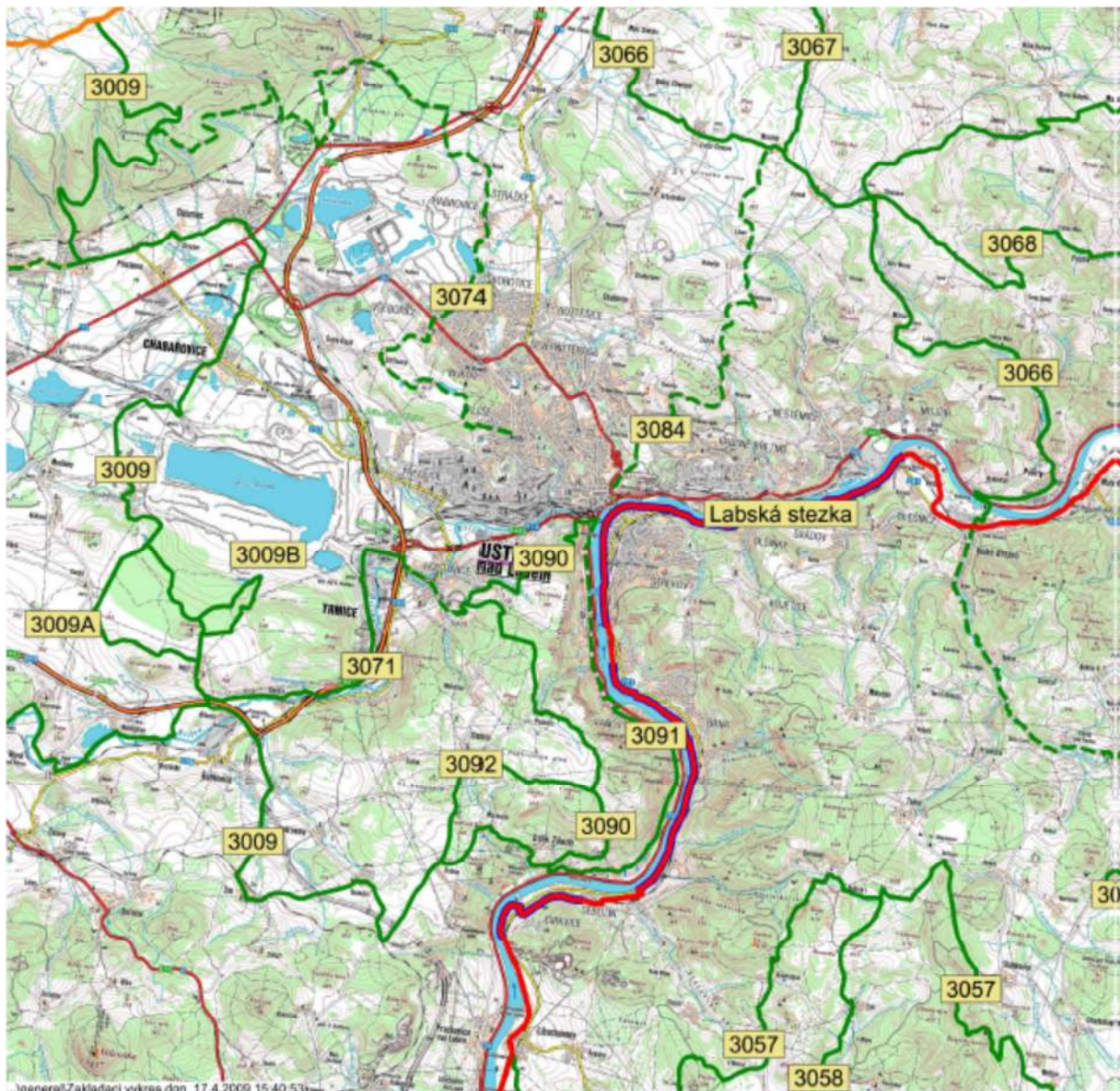
5.2. Location of the Project and its Capacity

The feasibility study searched for an appropriate route linking the Elbe and the Ore mountains cycle routes. Such a route was not pre-determined and there were several possible solutions. The feasibility study deals only with routes leading across the city Ústí nad Labem.

5.2.1. Scenario One: Using Existing Cycle Routes

One scenario of the Ústí cycle link runs for its entire length on existing cycle routes in the region (cycle routes 3009 and 3074), which are presented in the Figure 4.

Figure 4 - Existing cycle routes around the city of Ústí



This route initiates at the present cycle route 3009, leaving the Ore Mountains cycle route by the source of the Černý creek. It follows along the hills Na Vyhlídce and Mravenčí Vrch to the crossroad with the cycle path 3074, after which the Ústí cycle link continues into the valley of Ždirnický creek on the banks towards the railway line, then joining the yellow tourist trail leading to the road II/248. It runs parallel with the road after 0.5 km, then turns back to the hills near Liboňov and Telnice. From Telnice, the Ústí cycle link continues along the railway line to the bridge over the road I/13.

Figure 5 – Initial section of the Ústí cycle link



Cycle route in Ore Mountains



Cycle route from Telnice

After entering the city borders, it leads on the asphalt surface; over-crosses the D8 motorway and continues on dirt of asphalt roads. At the entrance to Bánov, the surface changes to local roads in Habrovice and Skorotice.

Figure 6 - Entering the city borders



Cycle route by Jedlová hill



Road between Bánov and Skorotice

In Skorotice, the Ústí cycle link continues on the street K Chatám (6.3m wide, pavement on the left side), the street 5. Května (wider road, pavement on the left side), by the playground to the street Plynárenské (one-way road, 4 - 6m wide), then changing into the grass surface along the Habrovický pond.

Figure 7 - Passing Skorotice town



Route to the Habrovský pond



Skorotice

The cycle route crosses the street Masarykova, joins the street Plynárenská (5 - 10m wide, pavement on both sides). An overpass is constructed over the street Všebořická with a ramp on both sides. It leads into Lipová Street and to the Spartakiádní street (5.5 - 7m wide).

Figure 8 - On the outskirts



Overpass crossing the Všebořická street



Road to Střížovice

The cycle route leaves the street and continues to Střížovice. The cracks on the forest road are fixed. In Střížovice, it turns on the asphalt road to the Střížovický hill, where the surface changes to a grass path and further leads by the Střížovická street (4.8 - 5.3m wide, pavements and alleys on both sides) to the circular crossroad in Klíše Hvězda, where the cycle route ends.

Figure 9 - End of the cycle route



Road from Střížovice to Střížovický hill



From Střížovický hill to Klíše



End of the cycle route in Klíše

There are many possibilities to pass the city centre and cross the River Elbe. The most suitable route seems to be through residential areas in the streets Slavíčková, Brožíkova, Balbínova and Šaldova and across the city parks, as it is described in the next chapter.

Figure 10 - Through the city centre



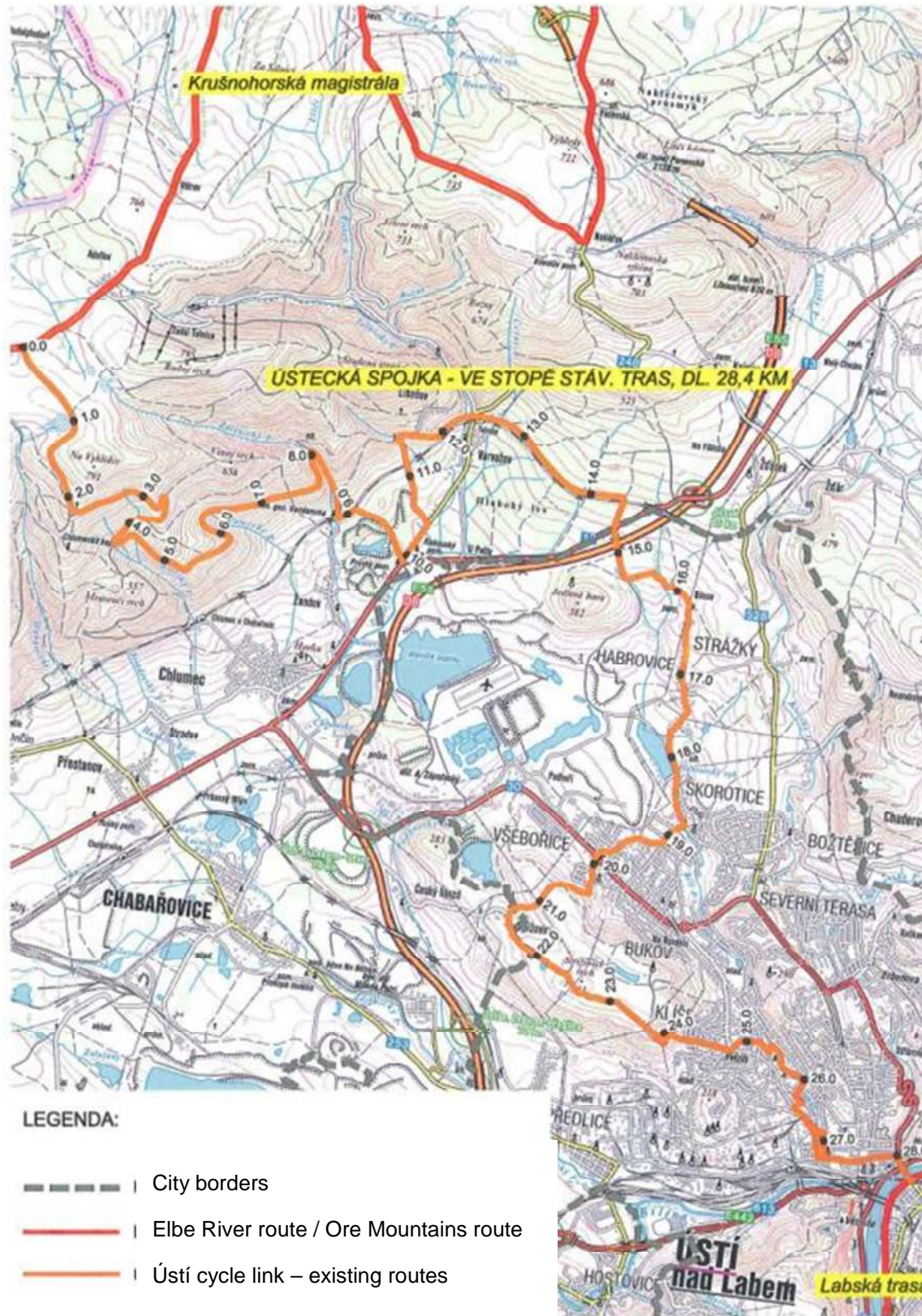
Brožíkova street



Balbínova street

The whole cycle route is presented in the Figure 10.

Figure 11 - Ústí cycle link leading through the existing routes



5.2.2. Scenario Two: Establishing the New Cycle Route

As in the first scenario, the second scenario suggests that the Ústí cycle link starts by the source of Černý creek on the cycle route 3009 towards the Mravenčí hill to Unčín and then on roads of II and III class to Chlumec. It continues on the cycle route 3009 along the Nový pond and the Zámecký pond and crosses the motorway D8 by the bridge called “Kočičí Oči”.

Figure 12 – Mining area



Former mining area



Road in the vicinity of the mining area

After entering the city, the cycle route passes through a former mining area. In this area, the city plans to construct the Podhorský Park involving local roads, which will link with the Ústí cycle link. From the golf course, the cycle route will disconnect from the road to Habrovice, and will run by a new cycle path to the streets K.H. Borovský, 5, Května and Slovanská to the Bílý creek.

Figure 13 - Entering the city



Slovanská street



Bílý creek

It continues alongside a large fenced premises for horses on a grass surface. It continually widens and is stiffened by gravel. A new section of the cycle path is designed from the Slovanská Street to the shopping centre Bukov parking area.

Figure 14 – Route through horse premises



From Slovanská street to horses



Premises for horses

The route follows to the Božtěšická street (4-line road I/30), where cyclists cross the street by the circle crossroad Na Rondelu and continue to the residential area Pod Holoměří on pavements (2m wide), which will be connected and widened specifically for cyclists.

Figure 15 – On pavements



Božtěšická street. (I/30)



Pavement suitable for widening

The route continues across the street Za Vozovnou and on the path along the Bílý creek to the playground (the path will be widened to 3m, with a bituminous surface and barrier-free connection to the Vinařská Street).

Figure 16 - Za Vozovnou



Stairs will be modified for barrier-free movement



Along the Bílý creek

The cycle route continues by an overpass to the Vinařská Street (there is pavement on both sides, but this is interrupted by several steps).

Figure 17 - Vinařská street



Vinařská street



Stairs on the pavement, overpass in the background

The route is then divided into two one-way roads according to the direction of cyclists. The direction from the Ore mountains continues to the left to the streets U Stadionu, Alšova, Brožíkova, Balbínova, Šaldova to the Městské orchards (uphill gradient). The direction from the Elbe River continues straight to the streets Pod Holoměří and Erbenova to the Městské orchards.

Figure 18 – Different routes for each direction



Alešova street



Herbenova street

The cycle route continues from the Městské orchards to the streets Sadová, Moskevská, Londýnská to the Mánesovy orchards.(several sections are equipped by asphalt surface usable for in-line skating, gravel surface of other sections will be modified to bituminous surface, stairs in the Londýnská street will be removed).

Figure 19 - Orchards



City orchards



Mánesovy orchards

The route follows to the Špitálské square, where the route divides for each direction. From the Ore mountains direction, it continues to the narrow one-way road Vaníčková; from the Elbe river direction, it continues to the 4-lane road Panská (pavements are separated from the road by 3m wide strip of vegetation and both sides are linked by underpasses).

Figure 20 – Different streets for each direction



Vaníčková street



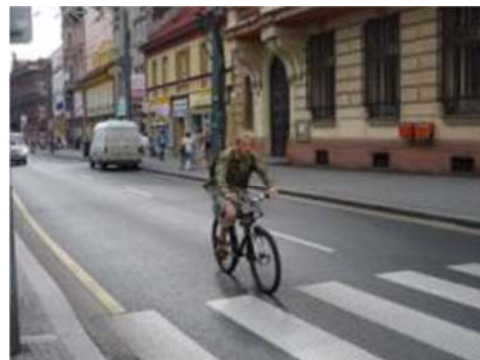
Crossroad with the Panská street

The route leads to the streets Revoluční (access is prohibited for motorised vehicles) and Hrnčířská, Předmostí and the bridge E. Beneše (3 lanes, one is dedicated to PT, 3m wide pavement).

Figure 21 - Through the city centre



Revoluční street



Hrnčířská street

Currently, the link to the Elbe cycle route is possible only from the northeast side of the bridge. The road is asphalted and equipped with poles preventing entrance of motorised vehicles.

Figure 22 - End of the proposed Ústí cycle link



Bridge of E. Beneš



Connection to Elbe River route

The whole cycle route is presented in Figure 23.

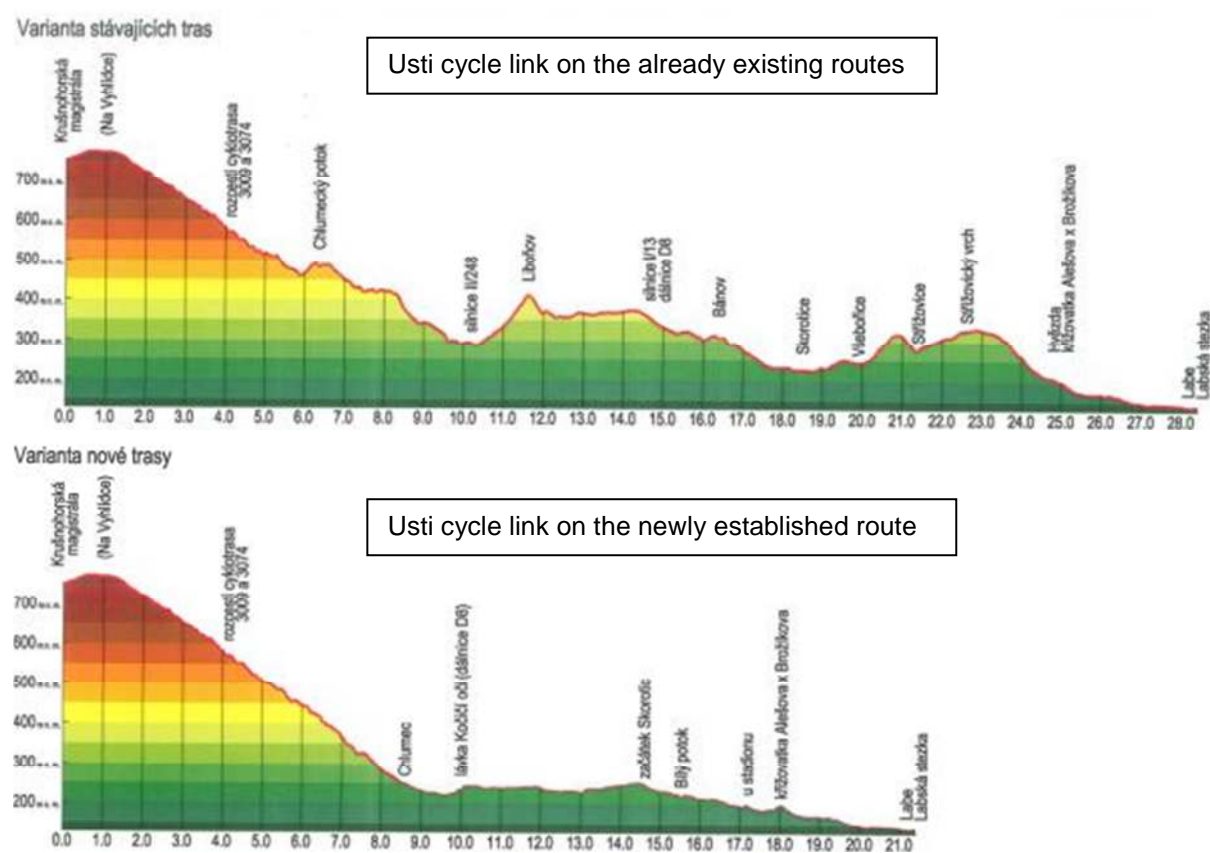
Figure 23 - Proposal for the new Ústí cycle link



5.2.3. Comparison of the Scenarios

Realisation of the Ústí cycle link on existing cycle routes (scenario 1) is convenient in terms of practicality. All the sections of the route are easily accessible except the part by the Střížovický hill (length 1200 m), which is better to tracking or mountain bikes. The surface of this section can be further improved, as well as the grass part from Všebořice to Střížovice. The disadvantage is the altitude associated with the route (down from the Ore mountains, up to Liboňov, down to the city, up over the Střížovický hill).

Figure 24 - Comparing elevation of the two scenarios for the Ústí cycle link



The Ústí cycle link (scenario 2) can be implemented only after finishing the construction of the Podhorský Park and the cycle path along the horse outlet in Bukov. To reach the required quality of the cycle route, it is necessary to carry out other proposed adjustments, such as linking the separated sections, repairing the existing sections, extending pavements etc. The former mining area can be temporarily utilised as substitute for planned cycle paths in the Podhorský Park. The advantage of this solution is that most of the route is situated in the valley of a creek serving as a natural corridor for cycling. The route is also shorter than the previous option.

It is recommended to mark the Ústí cycle link on the existing cycle routes leading more or less through the city and gradually, as the construction of the new cycle routes progresses, to redirect cyclists to the new Ústí cycle link. Such a solution proposes the implementation of a cycle route with a total length of 21.4 km, of which 2.55 km would be on newly constructed roads; other sections are on existing infrastructure (see Figure 23).

5.3. Implementation Planning

5.3.1. The Pre-investment Phase

Within the pre-investment phase, a research study and a feasibility study for the Ústí cycle link were conducted. Processing of documentation required for project implementation (documents for administrative procedures, building licence, etc.) and for grants to finance the construction of the cycle link (financed by EU funds, the State Fund for Transport Infrastructure, etc.) will be carried out by external professional subcontracted on the bases of a tender.

5.3.2. The Investment Phase

Realisation of the project with the following changes, involving the marking and construction of the Ústí cycle link can be divided into the following 7 progressive phases (for details of phases 2-6 see Annex D):

1. marking the existing cycling routes by traffic signs (length 28.4 km)
2. construction of the cycle path in Podhorský Park (length 1.2 km)
3. construction of the cycle path along the Bílý creek in Bukov (length 0.6 km)
4. modifications to the existing pavements in Rondel (total length 0.1 km)
5. modification of the cycle path along the Bílý creek parallel with Vinařská Street (length of 0.5 km)
6. modifications of the cycle path in the Mánesovy orchards (length 0.1 km)
7. marking the new cycle route (length of 21.4 km)

The cost of the project will be met from the budget of Ústí nad Labem and implemented by a specialised construction company selected on the basis of competitive tendering. The work will be carried out according to the approved project documentation by professional staff and associated technology. Construction supervision will be carried out by a qualified employee of the Ústí nad Labem Municipality or by an external contractor.

5.3.3. The Operating Phase

Once the route has been opened the administration and maintenance of the cycle route will be carried out in accordance with the procedures used for the existing cycle routes. The costs of these works will be covered from the city budget. This will largely involve collection of waste from garbage bins, repairs and maintenance of route equipment, winter maintenance, route repairs, route cleaning, lightning and promotional costs, etc. The costs are fully presented in Annex B.

5.3.4. Phasing the Implementation

By adopting the 7 stages described in section 5.3.2, the construction works can be undertaken independently of each other, although the existing pavements in Rondel need to be fixed before the opening of the cycle path along the horse riding area can be realised. The cycle path that runs parallel with the Vinařská streets may be temporarily marked in the current state. Financing required for the implementation is presented in the following table.

Table 1 - Costs of individual phases in thousands of CZK/EUR

Phases in thousands	demolition		construction		other work		total	
	CZK	/ EUR	CZK	/ EUR	CZK	/ EUR	CZK	/ EUR
1. marking the existing cycle route	0	/ 0	0	/ 0	630	/ 24,833	630	/ 24,833
2. cycle path in the Podhorský park	0	/ 0	9 820	/ 387,087	210	/ 8,278	10 030	/ 395,364
3. cycle path in Bukov	0	/ 0	4 440	/ 175,017	120	/ 4,73	4 560	/ 179,747
4. modifications in Rondel	40	/ 1,577	640	/ 25,228	30	/ 1,183	710	/ 27,987
5. modifications along the Bílý creek	160	/ 6,307	1 420	/ 55,974	80	/ 3,153	1 660	/ 65,434
6. modifications in the Mánesovy orchards	110	/ 4,336	840	/ 33,111	30	/ 1,183	980	/ 38,63
7. marking the new cycle route	0	/ 0	0	/ 0	480	/ 18,921	480	/ 18,921
TOTAL	310	/ 12,22	17 160	/ 676,417	1 580	/ 62,281	19 050	/ 750,916

The eventual proposed cycle route is in total 21.4 km long, from which 11.4 km is located in the city. It includes five construction modifications totalling 2.6 km, widening and connecting the existing pavements. Vertical alignment is based on the height of the existing terrain - the minimum longitudinal gradient is 0.3%, the maximum longitudinal gradient with respect to immobile persons (such as wheelchair users and people with walking impairments) is recommended to be 8.3%. The width of the roads is between 3 - 4 m, which is sufficient for the cycle route. The transverse gradient is 2% to one side, allowing drainage of rain water. Before connecting the existing cycle paths, the transverse gradient will be adapted to allow for a continuous smooth transition.

Slopes of embankments and excavations are designed to 1:2.5. In Slovanská Street, it will be necessary to implement a retaining wall or to lead the cycle route on the other side of the river and to construct two small bridges, which must be specified in subsequent more detailed documentations.

The surface of the cycle paths will be bitumen, while in Rondel it will be paved by interlocking tiles, as well as the existing pavements. In existing sections there are panels. With the new path bituminous layers will be placed above on top of the existing panels to increase comfort of cyclists. Removal of the panels would be expensive and also inconvenient due to the fact, that cyclists would not break these panels if kept underneath.

Modifications for the existing roads are not planned.

Not all the planned construction works are situated on the land owned by the city of Ústí nad Labem. In some areas, the land is owned by the state or by physical and legal persons. After the completion of plans for building works and after geodetic measurements, the actual space required for the construction will be necessary to buy, lease or loan, depending on the will of its owner, as a standard property procedures resulting from civil and commercial law.

For land acquisition, the concerned width is considered to be 3 - 5 m; 3 m for panel routes, for other routes it is the width of the road + 2x 0.5 m for terrain construction works. Other technical details will be addressed in subsequent documentations.

5.3.5. Project Schedule

Preparation and implementation of the Ústí cycle link is proposed for the period 2011-2014. Individual phases are planned as follows:

Marking the current route 2011

Modifying the cycle route parallel with the Vinařská Street and the cycle route in Mánesovy orchards:

Project documentations 2012
Project realisation 2012 - 2013

Implementation of the cycle routes in Podhorský Park, in Bukov and in Rondel:

Project documentations 2012 - 2013
Project realisation 2013 - 2014

Marking the planned cycle route 2012 - 2014

Gradual financing of the project is planned in the analysis of the economic effectiveness according to this time schedule.

In the first phase of the Ústí cycle link implementation, the route can be marked on the already existing infrastructure (cycle routes 3009 and 3074 through the city centre to Klíše, then via the current street network). With the proceeding construction of the new cycle route, it will gradually shift to the new sections until the cycle route is fully implemented according to the proposed scenario.

Implementation of the new cycle route requires relevant documentation for planning inquiry and a building permit. It would be possible to partially finance costs of the project from an appropriate programme, such as EU funds or SFDI. For the selection procedure, construction documentation is also necessary, including measurements and budget.

Table 2 - Actions required for implementation of the Ústí cycle link

Action	Responsibility	Timing	Financing
Mark the cycle route	Department of Transport	2011 after individual sections are constructed	Budget of the department
Provide project documentation	Department of Transport	2011 - 2013	Budget of the relevant department processing each document
	Department of Spatial Planning		
	Department of Investments		Received subsidies
	Cycle coordinator		
Ensure agreement with land owners	Department of Investments	2011 - 2012	Budget of the department
Seek possibility of funding from grants	Department of Investments	2012 - 2013	Budget of the relevant department performing actions
	Cycle coordinator		
	Department of Transport		
Tender for construction provider	Department of Investments	2012 - 2013	Budget of the department
Active promotion	Department of Transport	Continuously	Budget assigned from individual departments
Management and maintenance	Department of Transport	Continuously	Newly allocated from the budget of the department
Surveys	Department of Transport	Regularly	Budget of the department
Infrastructure and related services	Department of Transport	Continuously	Budget of the relevant department performing actions
	Cycle coordinator		
	Department of administration and property registration		Private investors

It is necessary to determine responsibilities for management and maintenance of the Ústí cycle link and to identify requirements for care of the infrastructure and the equipment. A monitoring system, defect reporting and elimination procedure needs to be established to follow the actual state of the cycle route. The Ústí cycle link must be kept clean, obstacle-free and lighted. During winter, snow removing is required. Waste bins needs regular cleaning.

It is recommended to conduct regular counting of cyclists and field surveys on the cycle route directly on major profiles and by utilising city web site. With an increase of cyclists in the city and along the Elbe river, demand for interconnecting infrastructure and for related services (such as bike rentals, facilities welcoming cyclists, repair services, bike storage rooms, cycle stands, shops, sport premises, cultural facilities) will grow. Adequate supply of services needs to be offered.

Citizens will be informed about the newly designated cycle route as part of the improved cycling information delivered through ARCHIMEDES Task 6.10, using the city website, the local newspaper, radio and leaflets. The new cycle map will be distributed to the public. To support an active promotion, workshops and other cycling events will be held regularly. Financing of promotion activities will be ensured from budgets of individual participating departments.

5.4. Broader Feasibility

The Ústí cycle link described in the previous section completes the interconnection of two important and widely used cycling routes. This will allow wider use of the current cycling infrastructure, support tourism in the region and increase the use of services located in Ústí nad Labem. Furthermore, the link will improve accessibility to the city centre for daily cycling trips. The measure is supported by equipping the city with a network of cycle stands implemented within the CIVITAS ARCHIMEDES project or using the city's own funds.

However, identifying and elaborating the technical solution is only one part of the development phase. Other factors such as the level of use, environmental impact and financial considerations also need to be taken into account. The first two of these factors are considered in this section.

5.4.1. Market Analysis

The city area has considerable potential for sightseeing, landmarks and touristic attractions with high potential for touristic demand. Although both tourist supply and demand exist in the city, demand for cycling is poor due to inadequate cycling conditions with lack of cycling infrastructure and services offered.

Implementation of the Ústí cycle link will increase attractiveness of the city as a tourist destination and will fulfil goals of the Strategy for Development of Ústí nad Labem in 2015 and the Strategy for Touristic Development in the Ústí Region 2010-2015. These goals are mainly to:

- Increase the city's potential as a touristic destination by improving quality of accommodation facilities and extending range of offered products and services;
- Improve the transport infrastructure by improving level of transport safety, introducing modern transport systems, etc.

The potential impact on the tourism sector has been conducted using the travel cost method (see http://www.enviwiki.cz/wiki/Metoda_cestovn%C3%ADch_n%C3%A1klad%C5%AF for information on the method) resulting from the length of stay in the area of the economic impact of an investment and on willingness to pay for offered services.

Unfortunately, development of a market analysis cannot be based on complex data on supply and demand in the area, as no official surveys have been conducted here. The analysis is therefore based on local field surveys, available statistical data, information about cycle routes of similar character and on expert estimates, as detailed in Annex A.

5.4.2. Impact on the Environment

There are several specific locations where the route of the cycle path will need to be considered carefully and sympathetic design will be used:

- In Podhorský Park - part of the route leads along the local bio-centre LBC 113a.
- The cycle path in Bukov - part of the route passes across the local bio-corridor LBK 579a. It crosses the Bílý creek twice. Under the condition migration of animals is

preserved and the water basin is not violated, the impact on the environment will be small.

- Modifications in Rondel - extension of the current pavement will not influence the environment.
- The cycle path along the Bílý creek parallel with the Vinařská Street – the route passes through the local bio-centre LBC 133a by the currently existing bridge.
- Modifications in the Mánesovy orchards - part of the route leads along the local bio-corridor LME 631.

These areas actually comprise a small proportion of the total length; in fact, the planned cycle route will run predominantly through built-up areas. In most places the surface is already adjusted, therefore the interventions to the environment will not be completely new but rather the existing state will be modified. The negative impact on the environment will be very low or with have effect at all.

The planned route leads in two sections along the bio-centre and it passes through the local bio-corridor. This area is currently utilised by pedestrians, the surface will only be modified. There is no proposal for new interventions into the System of Local Ecologic Stability (ÚSES).

In localities, where the Ústí cycle route will lead along the bio-corridors, it will not interfere with migration of animals. In the section, where the cycle route crosses the Bílý creek, it is important that the bridge will not influence the water corridor to preserve free water migration. Currently, a trail along the Bílý creek already exists, only its surface needs to be adjusted for the cycle route and therefore, the interference into the environment will be minimal and no new migration barriers will be created.

By improving conditions of the cycle transport in the area, such as by constructing cycle routes and their interconnections, higher take-up of cycling as a sustainable mode of transport is supported. Any increase of cyclists and decrease of car users would have a positive effect on the city and on its citizens.

5.5. Financial Assessment

The financial assessment is based upon a cost-benefit calculation, as presented in the following sub-sections. Derivation of detailed input values are presented, where available in the report annexes.

5.5.1. Project Costs

The analysis includes investment costs of the project of €960156 (24.4 million CZK) and annual operating costs of €9899 (224720 CZK). See Annex B for more information. Investment costs are split across four years according to the planned implementation schedule.

Table 3 – The schedule for implementation of the Ústí cycle link

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Capital cost (€)	var 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	var A	24 833	49 963	480 535	404 825	0	0	0	0	0	0	0	0	0	0	0
Operating and Maintenance cost (€)	var 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	var A	0			4 949	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899
Salvage value (€)	var 0															
	var A															
Total (€)	var 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	var A	24 833	49 963	480 535	409 774	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899
Changes	Change A - 0	24 833	49 963	480 535	409 774	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899

5.5.2. Project Benefits

The project benefits are calculated as indirect social benefits of increased consumption in the field of tourism and consequently, of increased number of job opportunities in the area. The benefits of the project are estimated according to the analysis of the current tourism and to the statistical data of resulting benefits, such as indirect social-economic benefits of increased tourism in the Ústí region, extension of the length of stay in the area of economic impact of the investment, calculated by the methodology of travel costs. The prediction of development was based on comparison of:

- statistical data on the development of tourism in the Czech Republic;
- multiplying effects of touristic development.

Benefits resulting from the cycle route utilisation for daily trips were omitted due to difficulties in calculating such benefits and lack of background data. The residual value of the project was calculated as a one-time benefit into the cash flow of the economic analysis of the last year. See Annex B for more information.

1) Benefits of increased consumption in tourism:

Cyclists utilising the Ústí cycle link coming from the Elbe river route or the Ore Mountains route: The capacity of the project was calculated for use of 200 cyclists per day, while the average increase of time spent in the economic impact area is increased by 0.12 days. Average travel costs were considered to be €51.24 (1300 CZK). The length of the cycling season was set to 200 days.

The annual benefit in 2015 = $200 * 0.12 * 51.24 * 200 = €245969.5$ (6.24 million CZK)

Cyclists utilising the Ústí cycle link coming from Ústí nad Labem: Effects of the project construction were calculated for the use of 75 cyclists per day, while the average increase of time spent in the economic impact area is increased by 0.2 days. Average travel costs were considered to be 51.24 € (1300 CZK). The length of the cycling season was set to 200 days.

The annual benefit (2015) = $75 * 0.2 * 51.24 * 200 = €153731$ (3.9 million CZK)

Combined total annual benefit due to increased consumption in tourism =

$€245969.5 + €153731 = €399700.5$

2) Benefits of increased number of job opportunities

The increased number of jobs was calculated from the increased consumption in the field of tourism calculated previously and the relationship that on average 1 work position is created for every €38886 (986500 CZK) spent.

Total annual benefits (2015) = €399700 (38886 CZK) = 10.27 work positions

The total benefits were then calculated as the difference between the actual proposed wage and the shadow wage for required jobs in the peak tourism period each year (i.e. approximately of 7 months each year).

Total annual benefits (2015) = (761.95 – 690.76) * 10.27 * 7 = €5122.16 (129944 CZK)

Table 4 – Annual benefits of the investment

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
		2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Revenue	var 0 (€)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	var A (€)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Changes (€)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
External cost/benefit	Increase Expenditures Tourism	var 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
		var A	0	0	199 850	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700
		Changes A - 0	0	0	0	199 850	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700	399 700
	Employment Benefits	var 0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		var A	0	0	0	2 561	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122
		Changes A - 0	0	0	0	2 561	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122	5 122
Changes in total benefit (€)		A - 0	0	0	0	202 411	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	

5.5.3. Results of the Financial Analysis

The calculation was performed with a recommended discount rate of 5.5% for the project life, which is 30 years after commissioning. See Annex B for more information about the methodology.

Table 5 – Results of the economic analysis for the Ústí cycle link

Year	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	
Undiscounted cash flow																
Changes in total cost (€)	24 833	49 963	480 535	409 774	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899	9 899
Changes in total benefit (€)	0	0	0	202 411	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823	404 823
Net cash flow (€)	-24 833	-49 963	-480 535	-207 363	394 924	394 924	394 924	394 924	394 924	394 924	394 924	394 924	394 924	394 924	394 924	394 924
Discount Factors																
Discount Rate	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%	5.5%
Base Year	2011															
Discounted cash flow																
Changes in total cost (€)	24 833	47 358	431 738	348 969	7 990	7 574	7 179	6 805	6 450	6 114	5 795	5 493	5 207	4 935	4 678	
Changes in total benefit (€)	0	0	0	172 376	326 780	309 744	293 596	278 290	263 782	250 030	236 996	224 640	212 929	201 829	191 307	
Net cash flow (€)	-24 833	-47 358	-431 738	-176 593	318 789	302 170	286 417	271 485	257 332	243 917	231 201	219 147	207 723	196 894	186 629	
Cumulative cash flow (€)	-24 833	-72 191	-503 929	-680 522	-361 733	-59 563	226 853	498 339	755 671	999 587	1 230 788	1 449 935	1 657 658	1 854 551	2 041 180	
Changes in NPV (€)	4 273 129															
Internal Rate of Return IRR	38.2%															
Benefit Cost Ratio BCR	6.010															

Results of the economic analysis of the project:

Net present value (NPV)	€4273129
Internal rate of return (IRR)	38.2%
Benefit cost ratio (BCR)	6.01

The net present value of the project and the internal rate of return have positive values; taken with the outcome that the benefit cost ratio is significantly greater than 1, the project appears economically effective.

5.5.4. Financial Risk Analysis

Risk analysis was conducted by considering the effect of changes in the input parameters to the financial analysis. Among the risks identified and considered were variations in the investment costs of the project and fulfilment of the prognosis for utilisation of the cycle route (i.e. the benefits of the project). Both parameters were tested within the range of $\pm 30\%$. The results are presented in the following table. Even with increased investment costs of 30% and decreased expected benefits of 30%, the outcome is still favourable and thus the project is economically efficient.

Table 6 – Change of costs and benefits of the project in percentage to determine the efficiency

		% změna	Change of Benefits			
			-30	-20	-10	0
Change of Costs	0	IRR	27.06%	30.84%	34.57%	38.24%
		NPV	2 718 253.21	3 236 545.24	3 754 837.28	4 273 129.32
		BCR	4.19	4.79	5.40	6.01
	10	IRR	24.62%	28.10%	31.52%	34.90%
		NPV	2 627 274.10	3 145 566.14	3 663 858.17	4 182 150.21
		BCR	3.80	4.35	4.91	5.46
	20	IRR	22.56%	25.78%	28.96%	32.09%
		NPV	2 536 295.00	3 054 587.03	3 572 879.07	4 091 171.11
		BCR	3.48	3.98	4.49	5.00
	30	IRR	20.81%	23.81%	26.76%	29.68%
		NPV	2 445 315.89	2 963 607.93	3 481 899.96	4 000 192.00
		BCR	3.21	3.67	4.14	4.61

The limit of the financial efficiency was determined by repeated calculations. The project is not effective if the investment costs increase by 569% or benefits decrease by 82,45% (i.e. the benefits amount to only 17,55% of the value forecast).

5.6. Final Project Assessment

The Ústí cycle link completes the interconnection of two important and widely used cycling routes in the area. This will allow greater use of the existing infrastructure, support tourism, promote local points of interest and enable better utilisation of local services. Another benefit is improvement of the city centre accessibility, mainly in terms of accessing services, offices, shops and businesses in the city for daily use of citizens.

Implementation of the project will increase attractiveness of the city as a tourist destination and will contribute to intensification and promotion of cycling in the area, primarily as a leisure activity and alternatively for commuting purposes.

As such the project meets the objectives outlined in the Strategy for the Development of Ústí nad Labem for 2015 and the Strategy for Development of Tourism in the Ústí Region for 2010-2015.

The total investment costs of the project are €960156 (24.358 million CZK). The cost of the project is feasible within the budget of Ústí nad Labem, if the objectives were sufficiently supported in terms of strategy and planning of the city. The costs can be partially financed by an appropriate subsidy program. The management and maintenance will be provided from Ústí nad Labem's own budget, within a scale similar to the existing cycle paths. It is anticipated that increased funding for maintenance and repair works of the new cycle infrastructure will not constitute significant burden in terms of resources that have already been allocated.

The project presents high economic efficiency of investments. As a project which supports and develops cycling, it generates no direct benefits but significant indirect socio-economic benefits resulting from increased length of stay of users in the economic impact area which further contributes to its significant financial efficiency.

Based on the CBA analysis outlined in section 5.5.3, the economic efficiency of the project is as follows:

Net Present Value (NPV)	€4279435
Internal Rate of Return (IRR)	38.3%
Benefit Cost Ratio (BCR)	6.02

Annex A: Detailed Market Analysis

Visitors to the Ústí Region

According to processed analysis, the most common types of visitors of the Ústí region were identified. The results are summarised in the following table.

Table A1: Visitors to the Ústí region

Type of activity	Place of residence	Community groups	Length of stay
Visitors of cultural activities, attractions and events	Ústí region Czech Republic	Young people, families, middle aged visitors, seniors	Half-day 1 – 4 days
Participants of business meetings, conferences	Ústí region Czech Republic Abroad	Middle aged visitors	2 - 4 days
Pedestrians	Ústí region	Young people, families	Half-day, 1 day - 1 week
Cyclists	Ústí region Czech Republic	Families, middle aged visitors	Half-day, 1 day - 1 week
Skiers	Ústí region Abroad	Young people, families, middle aged visitors	Half-day, 1 day - 1 week
Climbers	Ústí region Czech Republic	Middle aged visitors	2-4 days

Source: Marketing study for support of the local tourism in the Ústí region, Kolpron CZ Ltd., February 2006

According to the observed data, cyclists spend 0.5 - 7 days in the city. After the construction of the Ústí cycle link connecting the two major cycle routes in the area to the services in the city centre, the average length of stay in the area is expected to increase by about 1.5 hours. The users are expected to utilise the food supply, cultural and natural attractions, shops and links to other modes of transport (especially train, ship or funicular).

Tourist Traffic Load on Cycle Routes

The census conducted in 2004 counted on the Elbe route 297 cyclists per day on average. The last census on this cycle route carried out between 13th and 29th July 2009 by the public benefit company Partnerství counted an average of 400 cyclists per day. The counting was undertaken by an automatic Eco-counter device.

Table A2: Number of cyclists in Ústí nad Labem, compared to other cities of similar size in the Czech Republic

City	Period	Maximum number of cyclists	Minimum number of cyclists	Average number of cyclists on working days	Average number of cyclists on weekends
Děčín	25.6.09-12.7.09	1001	179	350	700
Ústí nad Labem	13.7.09-29.7.09	830	91	400	270
Litoměřice	31.7.09-12.8.09	717	253	500	450
Nymburk	14.8.09-27.8.09	1739	720	1160	1360

In the same period, between 13th – 29th July 2009, a total of 6 300 cycle trips was recorded in Ústí nad Labem in the section between the Mariánský bridge and the end of the cycle route on the Děčín street. A maximum of 830 cyclists was recorded on Monday 13th July. The average daily number recorded was over 400 cyclists on working days and only 270 cyclists on weekends, which was caused apparently by significantly bad weather conditions during the weekend survey. The hourly load profiles show that the cycle route is predominantly used for recreational purposes.

According to past censuses, the average number of cyclists in 2004 was 270, while in 2009 it was 400 cyclists. This shows a growth in cycling and use of the cycle route. This trend will be supported in the future by enhancing the quality of the cycling network, expanding the routes and improving related services.

Counting of cyclists on the Ore mountains route was not carried out and it can only be derived from cycle routes of similar nature, such as the Jizera mountains route in the north of the Czech Republic. A census was conducted on this route in 2004 by manual counting undertaken by the public benefit company Nisa. The results are presented in the tables below.

Table A3: Census conducted on Friday 10th September 2004

Locality	Pedestrians	Cyclists	Total
Josefův Důl dam	72	140	212
Kristiánov	19	158	177
Knajpa	28	270	298
Hřebínek	13	120	133
U Nové Louky crossing	96	70	166
Bedřichov u Hájenky	100	136	236
Jizera mountains TOTAL	328	894	1222
percentage	26.8%	73.2%	100.0%

Source: public benefit company Nisa

Table A4: Census conducted on Saturday 11th September 2004

Locality	Pedestrians	Cyclists	Total
Josefův Důl dam	291	477	768
Kristiánov	196	604	800
Knajpa	282	891	1173
Hřebínek	9	508	517
U Nové Louky crossing	302	487	789
Bedřichov u Hájenky	250	523	773
Jizera mountains TOTAL	1330	3490	4820
percentage	27.6%	72.4%	100.0%

Source: public benefit company Nisa

Table A5: Census conducted on Sunday 12th September 2004

Locality	Pedestrians	Cyclists	Total
Josefův Důl dam	357	619	976
Kristiánov	97	508	605
Knajpa	95	598	693
Hřebínek	28	338	366
U Nové Louky crossing	256	387	643
Bedřichov u Hájenky	232	381	613
Jizera mountains TOTAL	1065	2831	3896
percentage	27.3%	72.7%	100.0%

Source: public benefit company Nisa

The cycle traffic on individual routes ranged from 70 to 891 cyclists per day. The average load on the Ore mountain cycle route is similar to a load of the Knajpa profile in the Jizera mountains, which is considered to be about 300 cyclists per day.

Prediction of take up of the newly constructed Ústí cycle link is estimated based on the use of cycle routes in Jizera mountains as presented in tables A3 - A5 because it has a similar profile.

Connecting the two major cycle routes in the area (the Ore mountains route and the Elbe river route) is expected to lead to increased visitor numbers and an economic return on the investment. For this it has been assumed that about one third of the cyclists on the major routes would use the new Ústí cycle link. This estimation is based on the average time for the utilisation of touristic destinations in the area each year, taking into account the local climatic conditions. (The length of the cycling season is considered to be 200 days split across the year.)

The cycle link will also enable cyclists living near Ústí nad Labem to arrive in the city by means of transport other than the car (although pool or rented bikes are not available in the area). These cyclists will begin their trip in Ústí nad Labem and will use one of the cycle routes in the area. Their number is estimated on average to be about 75 cyclists per day

(higher on weekends and holidays, lower on working days). This group of cyclists will make trips to the surroundings, which will have economic impact on the Ústí region. The average extended length of stay in the area will be approximately 2.5 hours (as compared to the extended length of stay by 1.5 hour for cyclists, whose destination or stop on their trip is the city of Ústí nad Labem).

Travel Costs

For an assessment of the socio-economic benefits for tourism, the travel cost methodology was used. It is a standard methodology applied in the Czech Republic for evaluation of efficiency of projects, which do not generate financial incomes (for example when local businesses benefit from newly constructed infrastructure). The input data were the average expenditure of tourists in the region for short trips representing a typical group of cyclists (the most common trips realised by cyclists are short trips, as presented in Table A6. The travel costs include expenditures for services, accommodation, refreshments, paid admission to cultural destinations, etc.

Table A6 Visitors to the Usti Region

Type of activity	Place of residence	Community groups	Length of stay
Visitors of cultural activities, attractions and events	Ústí region Czech Republic	Young people, families, middle aged visitors, seniors	Half-day 1 – 4 days
Participants of business meetings, conferences	Ústí region Czech Republic Abroad	Middle aged visitors	2 - 4 days
Pedestrians	Ústí region	Young people, families	Half-day, 1 day - 1 week
Cyclists	Ústí region Czech Republic	Families, middle aged visitors	Half-day, 1 day - 1 week
Skiers	Ústí region Abroad	Young people, families, middle aged visitors	Half-day, 1 day - 1 week
Climbers	Ústí region Czech Republic	Middle aged visitors	2-4 days

According to data from the Statistical Yearbook of the Ústí region in 2009, the average cost of domestic trips of Czech residents in the Ústí region in 2008 was on average 1300 CZK (=€50.6).

Tourism and Employment

Apart from in the construction phase, the project will not directly generate new job opportunities; however, it is expected that a secondary, long term impact on employment will result in the related fields of tourism. The demand for new work opportunities was derived from the expected increase of earnings in the field of tourism and from statistical data on employment in the field of tourism in the Czech Republic and its total revenues.

When increasing number of visits in certain area by bringing more cyclists and improving services, the need for new work opportunities will emerge indirectly in the tourism sector (catering, accommodation, etc.).

Table A7: Number of people employed in different fields of tourism in the Czech Republic in 2008 – individual fields are given by the methodology of data gathering of the Czech Statistic Office.

Indicator		Number of full-time jobs in the field of tourism		
		Self-employed	Employees	Total
Fields of tourism				
1.	Hotels	8 559	35 801	44 360
2.	Restaurants	15 716	47 051	62 767
3.	Individual train transport	0	14 776	14 776
4.	Individual car transport	1 575	11 573	13 148
5.	Individual water transport	6	49	55
6.	Individual air transport	10	6 350	6 360
7.	Additional individual transport services	112	2 448	2 560
8.	Rental of equipment for individual transport	35	90	125
9.	Travel agencies	5 346	9 329	14 675
10.	Cultural services	2 389	9 873	12 262
11.	Sport and recreation services	920	2 027	2 947
Characteristic fields in the Czech Republic		34 668	139 367	174 035
Complementary fields in the Czech Republic		15 714	43 135	58 849
Non-specific fields in the Czech Republic		634	2 857	3 491
Tourism in total		51 015	185 360	236 375

Source: ČSÚ (the Czech Statistics Office)

Table A8: Internal consumption of tourism spend in the Czech Republic between 2003 - 2008

Indicator	2003	2004	2005	2006	2007	2008
Costs spend in tourism in the CR in the field of:	193 729	213 655	217 187	223 284	234 087	239 616
Services of travel agencies	5 585	5 766	5 244	7 031	8 015	8 551
Accommodation	31 439	35 925	36 874	37 723	39 499	39 778
Refreshment	39 989	44 497	44 393	46 283	46 450	46 849
Transport	26 819	29 392	29 442	30 434	32 918	36 680
Goods	66 700	73 323	76 425	76 925	81 227	82 502
Other	23 198	24 752	24 809	24 887	25 978	25 256

Source: ČSÚ (the Czech Statistics Office)

General relationship for the creation of new job opportunities in relation to consumption was derived from the statistical data of the Czech Republic. To indicate need of indirect jobs resulting from the construction of the Ústí cycle link, socio-economic benefits were calculated as follows:

According to the tables A7 and A8, one job is required for about 986500 CZK / €38886 thousands of economic activity in tourism. To calculate the benefits of employment, the methodology of shadow wages was utilised. The employment Figures are listed in table A9.

Table A9: The input data for calculations of the employment benefits in the Ústí region

Location	Registered unemployment (%)	Total population (thousands of persons in 2008)	Employed people (thousands of persons in 2008)	Unemployed people (thousands of persons in 2008)	Average wage (CZK / EUR)
Ústí region	10.26%	834.3	404.2	45.65	19330 / 762

Source: ČSÚ (the Czech Statistics Office), *Statistic Yearbook of the Ústí region 2009*

The shadow wage is a theoretical amount of wage by which full employment was achieved. In regions with low unemployment, the value approximates the statistical average wage, while in regions with high unemployment it is significantly lower than the actual wage.

Where:

SW = shadow wage [CZK / employee]

AW = average real wage [CZK / employee]

n_{em} = number of employed persons

n_{unemp} = number of registered unemployed persons

The resulting socio-economic benefit is the difference between the actual proposed wage and the shadow wage. Statistics on the average gross income and unemployment in the Ústí region were used for the calculations. The shadow wage in the Ústí region was calculated to be 17,524 CZK / €691.

Annex B: Detailed Financial Assessment

Set-up Costs

The long-term investments will be following:

Project documentation	575000 CZK or €22665
Processing of applications for grants	50000 CZK or €1971
Purchase of land for cycle paths from organisations and physical / legal persons in the total area of 5854 m ² (estimated price 800 CZK/m ² = 31.53 €/m ²)	4683200 CZK or €184603
Sub-total	= 5308200 CZK or €209239

Implementation Costs

Costs (without VAT) for project realisation were estimated to be:

Demolition	310000 CZK / €12219
Construction	17160000 CZK / €676416
Other work	1580000 CZK / €62281
Total	19.05 million CZK / €750916

Therefore the total initial costs for the project are **24358200 CZK / €960156 €**.

Asset Analysis

Any project on infrastructure in the Czech Republic includes calculations of the residual value of the project. During the lifetime of the investment, degradation of the construction occurs despite the maintenance and repair works, which is calculated as a residual of the investment. At the end of the period of the economic analysis, the residual value is credited as a one-time benefit.

According to the methodology of the transport economic model HDM-4, the residual value of the project is calculated by the following formula:

where:

- S_v = residual value of construction
- W_L = lifetime in years
- Y = last year of the analysis
- y^* = starting year / operation of buildings
- $UNDISCST$ = undiscounted economic costs

Average life-time of buildings is considered to be 50 years. The residual value of the project at the end of the analysis was calculated at 9.743 million CZK, which is €384062.

Realisation of the project is a one-time investment and no current assets will be generated.

Operating Costs

Operating costs will be financed from the budget of the city Ústí nad Labem. Costs for repair works and maintenance will mainly include rehabilitation of horizontal and vertical traffic marks and equipment. Costs for such activities were established to be around 20000 CZK/year, which is 788.4 €/year. The rates for maintenance and repair works were derived from data on a similar project of a different cycle route in the Czech Republic with similar conditions.

Table 7 - Maintenance and repair works included in the operating costs of the Ústí cycle link

COSTS	Rate		Annual costs	
	Summer maintenance (including greenery care)	6 000 CZK/km	236.5 €/km	128 400 CZK
Winter maintenance	4 800 CZK/km	189.2 €/km	102 720 CZK	4 049 €
Repair works			20 000 CZK	788 €
Total Annual Costs			251 120 CZK	9 899 €

The total annual operating costs are calculated to be 251120 CZK, which is 9899 €.

Annex C: Financial Analysis Methodology

The economic analysis is based on the estimation of increased tourism in the area and on the resulting increase of consumption in the field of tourism in Ústí nad Labem. The currency used for calculations is the Euro; the conversion rate was the average exchange rate in 2010.

All prices are constant, excluding VAT, for the year 2010. The CZK to € exchange rate used is 25.369

Calculation of the economic efficiency was carried out in MS Excel. The presented costs and benefits are given in differential form - the difference between the zero option (scenario 0) and the active option of project realisation (scenario A). The economic efficiency of the investments is reported in the standard indicators:

Net present value (NPV)

Net present value of investing state (m) in comparison to no investment state, which is the comparative base (n) is the sum of all discounted net revenues. It is calculated as follows:

Where:

- $NB_{y(m-n)}$ is the net economic income of investing state (m) against the state without investing, or the comparative scenario (n) in the year y ;
- r is the discount rate (%);
- y is the assessed year ($y = 1, 2, \dots, Y$);
- Y is the number of assessed years.

The higher the NPV, the greater the economic benefits of the proposed investment projects in comparison to no investment (the comparative scenario).

The internal rate of return (IRR)

The internal rate of return is the discount rate at which the net present value (NPV) equals 0. It is detected by repeated calculations, where the value of r is repeatedly calculated from the following relation:

The internal rate of return (IRR) does not provide information on the magnitude of costs and revenues, but serves as an indicator of productivity of the investment (the higher, the better).

Profitability of costs (BCR)

Profitability (rate of return) of the invested costs is calculated from the following relation:

Where:

- $BCR_{(m-n)}$ is the rate of return of invested purchase costs
- $NPV_{(m-n)}$ is the net present value (please see the first indicator) at a discount rate r
- C_m are the discounted invested purchase costs

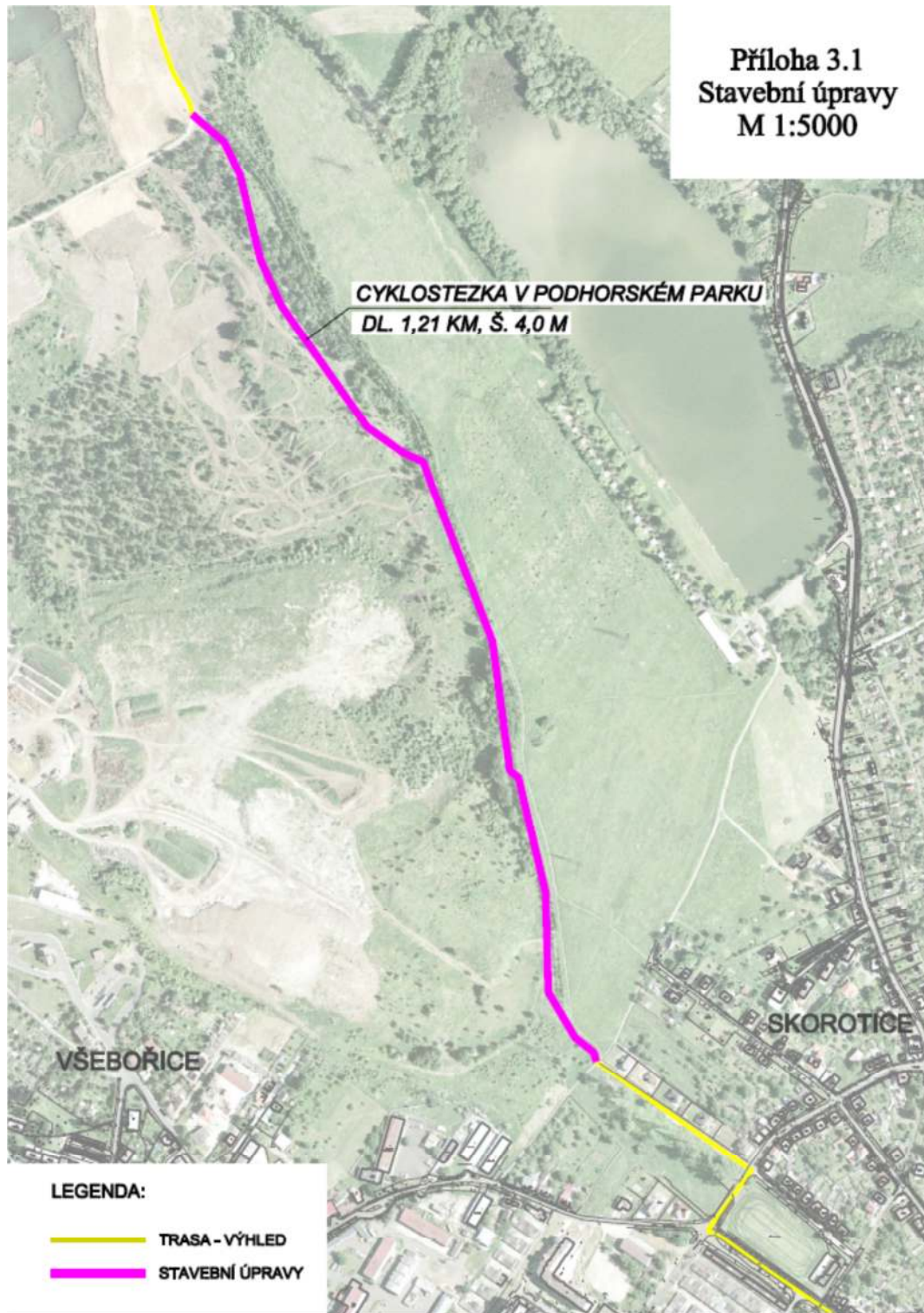
The indicator reflects the profitability of investment costs at a discount rate and the overall assessment period Y .

The individual costs and revenues represent the socio-economic incomes and expenses included in the balance of cash flow and modelled for the period of the economic life of the investment. Economic analysis is based primarily on indirect socio-economic benefits of the project.

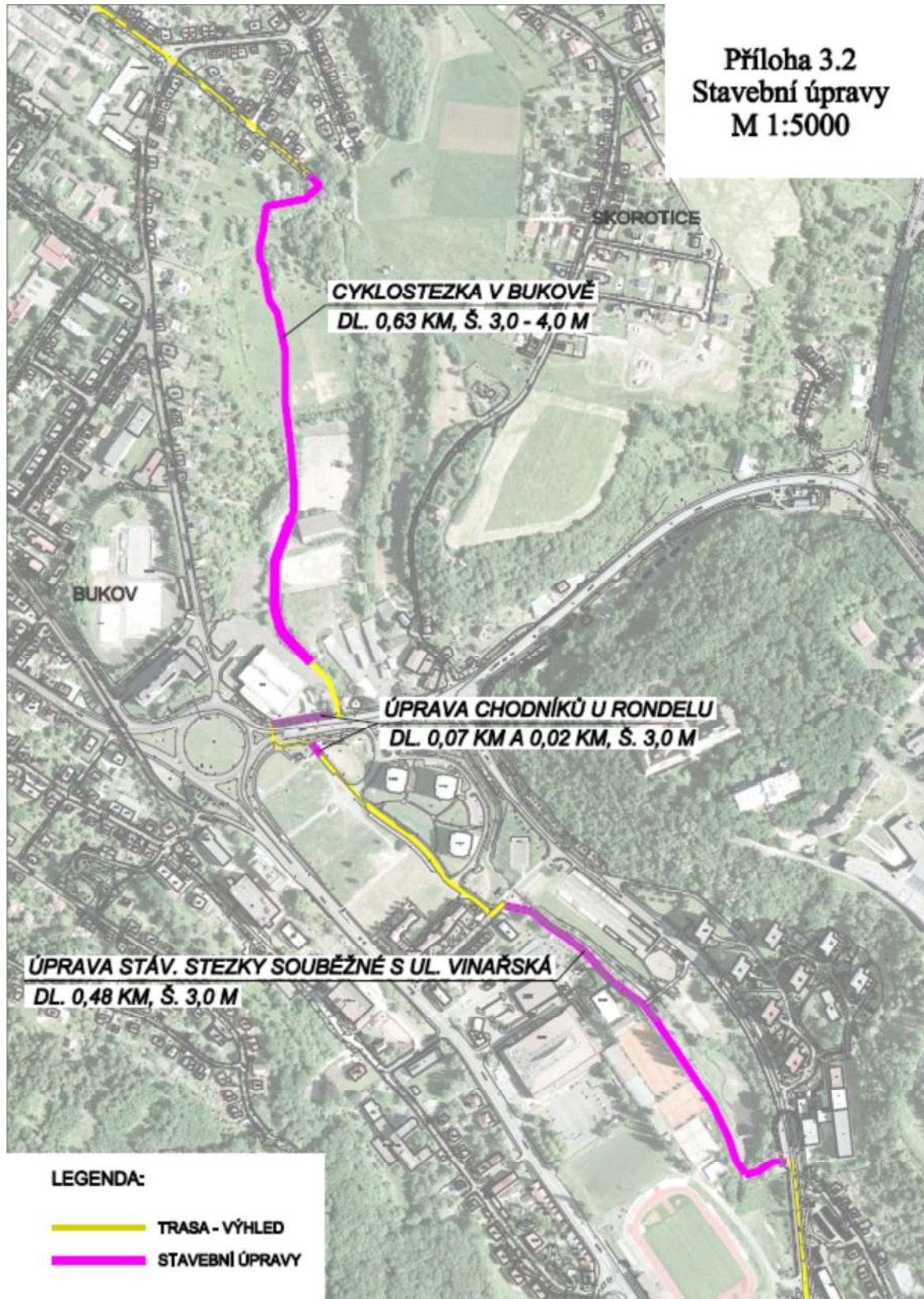
The economic analysis is conducted for a period of 30 years after project completion.

Annex D: Detailed Plans by Phase of Implementation

Podhorský Park



Bukov, Rondel and parallel with the Vinařská Street



Mánesovy Orchards

