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MASTER'S THESIS

THE ROLE OF SMÍCHOV EMBANKMENT IN THE SYSTEM OF RECREATIONAL AREAS IN PRAGUE 5

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DIPLOMA THESIS ASSIGNMENT

Bc. Alice Králiková

Landscape Planning

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The Role of Smíchov Embankment in the System of Recreational Areas in Prague 5

Objectives of thesis

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Literature review

Preparation of site improvements

The proposed extent of the thesis

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Flink, Charles A. and Searns, Robert M. 1993. Greenways: A Guide to Planning, Design, and Development. Washington, DC: Island Press.

Hellmund, Paul C. and Smith, Daniel S. 2006. Designing Greenways: Sustainable Landscapes for Nature and People. Washington, DC: Island Press.

Marsh, William M. 1998. Landscape Planning: Environmental Applications, Third Edition. New York: John Wiley & Sons.

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ABSTRACT

Diploma thesis is a master project of Smíchov Embankment in the System of Recreational Areas in Prague 5. It is a part of a plan how to renovate river walk at Smíchov district. Main goal of this work is to find a suitable and gentle solution to make this embankment more attractive for people living in the neighborhood. Integral part of the project are various analysis and field survey. The final design implement the previous analysis and typology intervention of river walk, Císařská Louka Island connection and overall design of bike lane.

KEYWORDS

river embankment, revitalization, recreation, typology intervention, planning project

ABSTRAKT

Diplomová práce je návrh Smíchovského nábřeží v systému rekreačních ploch Prahy 5. Je to součást plánu, jak modernizovat náplavku na Smíchově. Hlavním cílem této práce je najít vhodné a šetrné řešení, aby tento břeh Vltavy byl přitažlivější pro lidi žijící v blízkém okolí. Nedílnou součástí projektu jsou mnohé analýzy a průzkum terénu. Konečný návrh implementuje znalosti z předchozích analýz a navrhuje efektivní využití celého břehu řeky, včetně náplavky, propojení ostrova Císařská louka a návrhu cyklostezky vedoucí celým územím.

KLÍČOVÁ SLOVA

nábřeží, náplavka, revitalizace, projektování, rekreace

ACKNOWLEDGEMENT

Hereby, I declare that this diploma thesis is a presentation of my original research work and that no other sources were used other than what is cited.

Prague ....

(author's signature)

PREFACE

I would first like to thank my thesis advisor doc. Peter A. Kumble MLA, Ph.D. of the Department of Land Use and Improvement at Czech University of Life Sciences Prague. The door to doc. Kumble office was always open whenever I ran into a trouble spot or had a question about my research or writing. He consistently allowed this paper to be my own work, but steered me in the right direction whenever he thought I needed it.

I must express my very profound gratitude to my parents for providing me with unfailing support and continuous encouragement throughout my years of study and through the process of researching and writing this thesis. This accomplishment would not have been possible without them. Thank you.

Contents

Introduction

I was not born in Prague, but I have been living here for eight years already, so I consider it as my home. Every free minute I have, I spend on my bike riding along the river at Rašínovo Nábřeží. That is when I am having these thoughts: "Why is the opposite side of the river abandoned?". Then I look around and see the difference- bars, cycling path, markets, etc.

It made me think, what is the reason why the opposite bank is not used the same way. Both river banks have the same elementary features. They both border the river, they have the same nice views, spaces to open bars, cafés and public toilets. So what is the problem?

There is a lack of functional public space in every town and city all over the world. The problem is not enough of free space, but the inaction of people. And the Smíchov embankment is one of those places. This issue is very relevant and interesting, so I chose it as my diploma thesis project.

The thesis consist of several chapters. It starts with literature review, which covers the main topics of this issue. Then it introduces the Smíchov area, its historical development and natural conditions. The dominant parts of this thesis are analysis and design. The results from analytical part were used for creating an appropriate design of Smíchov embankment.

Aims

- Identifying problems of Smíchov embankment.
- Understanding the problematics of public spaces in large cities.
- Creating a nice place for people to visit.
- To reveal recreation potential of the space.
- To create opportunities for non-motorized commuting and recreation.
- Enlarging the current bike network.
- Typology intervention of Smíchov embankment.

1 Literature Review

1.1 Landscape

1.1.1 Definition

How one interprets landscape can differ according to the experts who define it in their field of expertise (Sklenička, 2003). For this thesis I will explore the physical, social and environmental implications of different definitions.

According to Paragraph 3 of Act no. 114/1992 Coll., on Nature and Landscape Protection, as amended, is the landscape defined as a part of earth surface with a characteristic relief, consisting of a set of functionally interconnected ecosystems and civilization elements.

The European Landscape Convention (2000) says: "Landscape means an area, as perceived by people, whose character is the result of the action and interaction of natural and / or human factors" (ELC, 2000).

The landscape is idiosyncratic part of the earth surface which is integral qualitatively different from the rest of the landscape sphere. It has a natural boundary, distinctive appearance, individual internal structure, certain behaviour (functioning) and specific development (Demek, 1974).

The landscape is a heterogeneous part of earth's surface, consisting of a set of interacting ecosystems, which in this part of the surface is repeated in similar forms (Forman and Godron, 1993).

The landscape indicates the territory percepted by the residents, whose character is the result of natural or human factors and their interrelations (Novotná, 2001).

Landscape is about relationship between people and place. It provides the setting for our day-to-day lives. The term does not mean just special or designated landscapes and it does not only apply to the countryside. Landscape can mean a small patch of urban wasteland as much as a mountain range, and an urban park as much as an expanse of lowland plain. It results from the way that different components of our environment - both natural (the influences of geology, soils, climate, flora and fauna) and cultural (the historical and current impact of land use,

settlement, enclosure and other human interventions) - interact together and are perceived by us (Fig. 1.1). People's perceptions of land are a reflections of their own concept of landscape. This is not just about visual perception, or how we see the land, but also how we hear, smell and feel our surroundings, and the feelings, memories or associations that they evoke. Landscape character, which is the pattern that arises from particular combinations of the different components, can provide a sense of place to our surroundings (Swandwick, 2002).

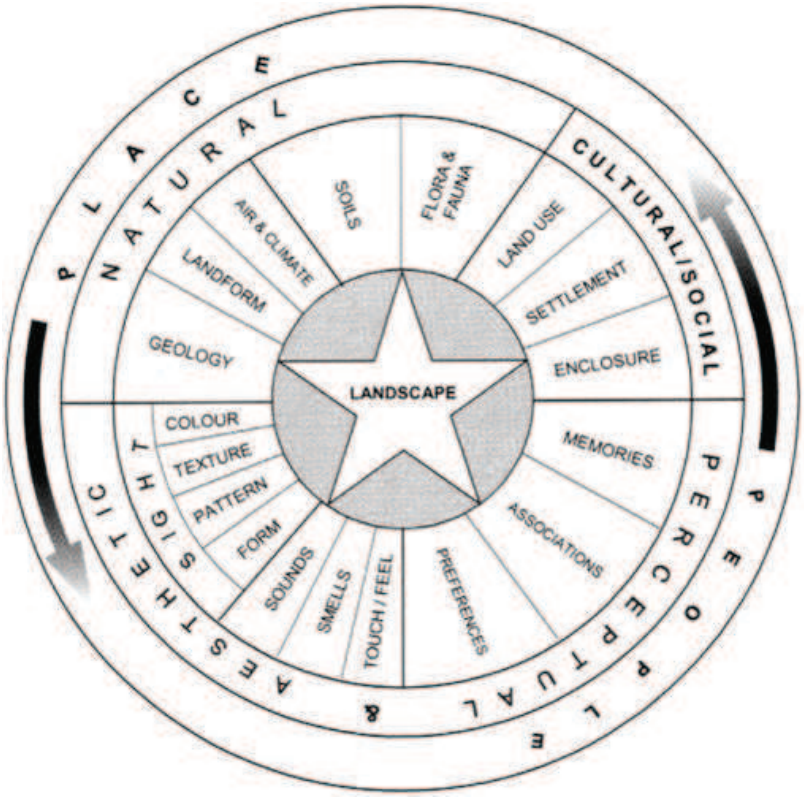


Figure 1.1: Swandwick landscape diagram, Source: Swandwick, 2002

There is no united definition for landscape observed Rohon (1995). He adds that landscape is specific term used so far for designation of nature areas. Rohon also calls landscape an artificial classification unit (Rohon, 1995).

1.1.2 Types of Landscape

NATURAL LANDSCAPE

If we take it literally, there is no ecosystem that would not be influenced by man, at least through the altered air quality. By natural landscape we understand

a formations that are created by natural cause (abiotic and biotic) and landscape processes without the influence of anthropogenic factors or only with minimal effect (Sklenička, 2003).

CULTURAL LANDSCAPE

The first signs of a cultural landscape appeared in the Neolithic period by the formation of human society. Its character is determined in addition to natural factors and socio-economic elements (Lipský, 2000). The landscape, as it is experienced today, is mostly a combination of nature and culture. The most significant factors that caused the conversion of natural landscapes into cultural landscape is agriculture and forestry (Sklenička, 2003).

A cultural landscape is generally a mosaic of ecosystems affected in different ways by human activity. It has a different structure and species composition and needs a certain source of energy form outside for proper functioning (Sklenička, 2003).

Landscape could be affected both in a good and/or bad way by human activity. According to the size of the anthropogenic influence the cultural landscape can be further divided into three subcategories. First is regular cultural landscape. It is a balance between the influence of anthropogenic and other factors. The fully self-regulating ability is present at different levels of ecosystems (Sklenička, 2003).

The second subcategory is called disturbed cultural landscape. The anthropogenic influences disrupt in the greater extent the stability of natural components. Yet self-regulation skills of the ecosystems and their ability to regenerate are preserved. Last subcategory is classified as devastated landscape. Autoregulation capacity of the ecosystems are severely damaged (disrupted) (Sklenička, 2003).

Another division of landscape is according to the land use. The landscape is divided into three basic types - productive land, residential and recreational. Productive landscape includes agricultural land, forests and industrial land. To the residential part of landscape are included cities, settlements, built-up areas, traffic constructions, and recreational facilities. Recreational land is the part of area

(environment), which has geographically, bioclimatic and aesthetically suitable conditions and optimal prerequisites for recreation. And is not (and will not be in near future) intensively used for other (economic or investment) activity or construction (Sum, 1981).

1.1.3 Greenery

A very often used name is the terminology of public greenery. It is a collection of wild growing green plants accessible by public. Those are primarily plants intentionally planted and cultivated. Public greenery is an essential landscape architectural feature and also has important ecological functions (Böhm 1981). The opposite part to public greenery in cities is private greenery.

Public greenery can be divided into a rural area or an urban area greenspace. By rural area greenery we understand all the greenery beyond human settlements in the open countryside. It covers the forests, meadows, groves, gardens, wetlands, fields. Healthy vegetation in rural areas is a main pillar of ecological stability of the entire country. In addition to the ecological functions it has also functions as recreation, water management, soil protection, landscaping, health, aesthetic and decorative.

The urban area greenery is enclosed by man in human settlements (cities, villages, etc.) which forms and participates on the overall character of the urban area. In the history people in residential communities tried to push the nature beyond the city walls. Now, in an unhealthy environment and overcrowded settlements, they try to bring it back. Urban area therefore now consists primarily of greenery intentionally planted and grown, such as lawns, flower beds, shrubs, hedges, gardens, parks and forest parks. Exceptions are the brownfields, where the plants returned by themselves according to the law of successional habitat development.

Vegetation regulates extreme temperatures in the city, assists to positive air flow and humidity, reduces the dust pollution, provides shade, produces oxygen, and consumes CO_2. It represents living nature in the city, creates habitat for other species, it is a mediator in the change of seasons and aesthetic perceptions. It helps

to compensate the negative impacts of transport and overheating of the urban environment. Represented by a particular plant species is an inseparable part of the city identity as well as the wider landscape, shaped by the local climate (Melková and Raimanová, 2014).

Also Barbosa and Tralos identified, that the good condition of vegetation is the basis for the functioning of the urban ecosystem. Public parks and private gardens play an important role in supporting biodiversity. They provide a very important ecosystem services in urban areas (Barbosa and Tralos, 2007).

Urban greenery can alter in individual areas, for example by closing, extending, opening, framing. It can hide aesthetically ineffective or unsightly views. Greenery is involved in the creation of space and sometimes can be even dominant. (Balabánová, 2000)

Frederick Law Olmsted believed that greenery has a positive effect on our health and he tried to move the green areas from the countryside to the urban area (FLO, 2011). He also said in the 19th century, that the observation of nature reduces the stress of everyday city life. Parks and gardens have been long known for its restorative effects on mental and physical health (Jackson, 2003).

1.1.4 Landscape Character

According to Act no. 114/1992 Coll., on Nature and Landscape Protection, as amended, is the landscape character, particularly natural, cultural and historical characteristics of a certain place or area, protected against activities decreasing its aesthetic and natural value. Interventions in the landscape character, especially the placement and permitting of construction can be carried out only with regard to the preservation of important landscape features. Specially protected areas, cultural landmarks and harmonious relations in the country have significant value for natural and cultural environment and is therefore protected against depreciation. Landscape character is therefore determined by the specific features and characteristics of landscapes that create the difference and uniqueness. Landscape reflects not only the presence of positive events and characters, but also the cultural and spiritual dimension of the landscape. The landscape character is expressed by morphology

of the terrain, the character of water courses and water bodies, vegetation coverage and also by settlement. Consequently the landscape character is also an expression of natural relations, cultural, historical and socio-economic conditions in the current location.

1.1.5 Fragmentation

Fragmentation of landscape has a negative influence upon some species. For example a highway creates a barrier for some big animals, which could led to loss of their habitat or extinction. The same works also for urban landscape fragmentation, where for example noise barrier is in the conflict with possibility of free energy flow. It concludes that fragmentation of urban area could lead up to extinction of the city (Kubeš et al., 2014).

1.2 Water Streams

Water and the greenery are the basic elements of nature, on which we fundamentally depend. In public spaces, water represents a cooling, moisturising, soothing and aesthetic function (Čáblová, 2002).

Watercourses in urbanized areas are constantly exposed to great pressure of various interests and uses. In the Czech Republic streams nearby buildings are used as a recipient of treated waste water. But on the other hand, they also serve as a place for recreation, relaxation and sport. These conflicting possibilities of water streams and their location in an urban area raising the issues such as: aesthetic condition of the watercourse; effect of use on water quality; adaptation of the environment for specific purposes (parks, sports, etc.); lack of space or distance from buildings and roads and those consequences- real estate protection against flooding, ensure effective and safe hydraulic flow in the riverbed (Hlavínek and Říha, 2004).

The Backbone of Prague city is the Vltava River with the river Berounka as its main tributary. In addition Vltava collects other rivers, which create a relief of the city through their valleys. The total length of the network of waterways, including streams which belong to the Elbe River, merge in Prague with a total length of 290 km (Mach, 2006).

The headwaters of the Vltava River are in the Šumava Mountains. The Vltava is 430 km long, which makes it the longest river in the Czech Republic. It flows through cities such as Český Krumlov, České Budějovice and Prague on its way to the Elbe, into which empties at Mělník. Vltava River has tributaries such as Malše River, Lužnice River, Sázava River and Berounka River. This system, along with the Elbe and its tributaries drain nearly all of Bohemia (PVL, 2013).

The administrator of the Vltava River is a state enterprise called Povodí Vltavy. On the territory of total area 28 708 km^2 manages more than 23 000 km of watercourses in the hydrological basin of the river Vltava and other defined hydrological basins. Povodí Vltavy systematically takes care of waterways and their maintenance.

The enterprise is ensuring the operation of water works and water management facilities on the network of watercourses, protect and manage the quantity and quality of surface and groundwater (PVL, 2013).

1.2.1 Floods and Flooded Areas

Flood areas are defined according to Paragraph 66 of Act no. 254/2001 Coll., On Waters (Water Act), as amended, as administratively identified areas that could be inundated in case of the occurrence of natural flood. The range of flood areas is required to be established on a proposal by the watercourse administrator.

According to Paragraph 67 of Act no. 254/2001 Coll., On Waters (Water Act), as amended, is forbidden to store materials, substances and objects which could be washed away in the active zone of the flooded area; to set up fences, hedges and similar obstacles; to establish camps and other temporary accommodation.

Floods are defined according to Paragraph 64 of Act no. 254/2001 Coll., On Waters (Water Act), as amended, as the temporary significant increase in the level of rivers, streams and other surface water, where the water has already flooded areas outside the watercourse and may cause damage. Flooding is a condition where water may cause damage by a certain territory temporarily unable to naturally drain or drainage is inadequate. Or there is flooding by a concentrated run-off of rainwater. A flood can be caused by natural phenomena, in particular by melting, rainfall or ice movement. Those are natural floods. Special floods are caused by other factors, in particular the failure of the water works that may lead to the accident (rupture) or emergency solution to the critical situation on the water work.

1.3 Infrastructure

Infrastructure is a service, not a defining element of the composition (Bradová et al., 2014).

Infrastructure connects the partial structure in one unit and maintains the structure of the system interconnection. The flows of energy, materials and information are the traditional perception of the infrastructure network. Systems of this type are not only technical = artificial (eg. sewage network), but also a natural (hydrological network), possibly combined (transport network) (Kubeš et al., 2014).

According to Paragraph 2 of Act no. 183/2006 Coll., On Spatial Planning and Building Code (Building Act), as amended, is meant by a public infrastructure-land, buildings, equipment which is:

1. transportation infrastructure, such as construction of roads, railways, waterways, airports and related facilities;

2. technical infrastructure, which are conduits, buildings and operationally related facilities of technical equipment, such as water mains, reservoirs, sewers, waste water treatment plants, constructions to reduce the danger areas by natural or other disasters, buildings and equipment for waste management, transformer station, power lines, communication lines of public communication networks and electronic communication equipment of public communications networks and pipelines;

3. civic amenities, which are buildings, facilities and land used for example for education and training, social services and care for families, health services, culture, public administration, protection of the population;

4. Public spaces, established or used in the public interest.

Kubeš (2014) has for systems consisting of roads, pipes and wires cumulative term "gray infrastructure". The absence or breakdown of infrastructure networks is in the anthropocentric view of the world the destruction of "quality of life" for humans (Kubeš et al., 2014).

1.3.1 Green Infrastructure

The term green infrastructure has various meanings. It could be trees providing ecological benefits in urban areas. Or it could mean engineered structures, such a water treatment facilities or storm water management, that are environment friendly degigned.

Kubeš et al. (2014) mean by green infrastructure a natural resources, which provides free assets through ecosystem services. Primary attributes of territories are created by natural forces, secondary attributes are created by natural forces with human help. They generates conditions for transportation of mass, energy and information (Kubeš et al., 2014).

Benedict et. McMahon (2006) defined the green infrastructure as an interconnected network of natural areas and other open spaces that conserves natural ecosystem values and functions, sustain clean air and water, and provides a wide array of benefits to people. They call it our natural life-support system, ecological framework for environmental, social, and economic health (Benedict et. McMahon, 2006).

1.3.2 Landscape Infrastructure

Main interconnections in landscape are provided by ongoing flows. The ideal balance in landscape is stage where the nature is maintain spontaneously. To gain enough of natural resources, we have to maintain and provide the right conditions for nature to restore by itself (Kubeš et al., 2014).

1.3.3 Pedestrian Traffic

Walking is not just one of the transportation possibilities. It is the most natural kind of movement, which makes us human. Pedestrian traffic contributes significantly to the sustainability of the transport system, energy savings, improved health, and economic development. However, pedestrians are often forced to use poor quality infrastructure that is not safe, attractive or comfortable. In today's society we can meet with the underestimation of walking and transportation for short distances, which is a consequence of dominant transport policy (Pokorný, 2011).

Type of pedestrian	**Sub groups**
On foot	Able pedestrian
	Runner/jogger
	Adult pedestrian
	Young pedestrian
	Impaired pedestrian
	Aged pedestrian
	Pedestrian with a guide dog
	Sensory impaired pedestrian
	Pedestrian with a cane
On small wheels	In-line skates
	Roller skates
	Skateboards
	Kick scooters
	Pedestrian with a pram
Mobility impaired	Mobility scooter
	Manual wheelchairs
	Electric wheelchairs
	Pedestrian with a walking frame

Table 1.1: Types and categories of pedestrians, Source: NZ Transport Agency, 2009

Pedestrian traffic has not yet been considered a legitimate part of the entire transport system in the Czech Republic. Neglecting the system of walking paths led to such development of other types of transport, which create constantly new pedestrian barriers. Permeability of city for pedestrians and pedestrian access to suburban recreation is an important indicator of quality of life and economic use of urban space (Staňková, 2008).

When planning for pedestrian traffic is also necessary to distinguish different types and subcategories of pedestrians (Tab.1.1). Each subcategory has its own specifics, which is necessary to take into account. Pedestrians are in fact diverse

group of road users, with features that reflect the diversity of the population (Pokorný, 2011).

Here are some examples of reasons, created by NZ Transport Agency (2009) „Why people don't walk":

· missing footpaths or sections of footpath

· poor-quality (cracked, uneven or slippery) walking surfaces

· obstacles on the footpath, including poorly placed street furniture

· lack of footpath maintenance, including litter, dog fouling and overhanging vegetation

· increased distances imposed by road layouts, barriers, etc.

· lack of continuous pedestrian routes

· missing or unsuitable crossing treatments creating severance

· poor-quality lighting

· lack of rest areas and seating, shade, shelter from inclement weather

· lack of interesting features on the route.

· traffic fumes and noise

Social and perceptual deterrents are also important. Potential deterrents include:

· a perceived lack of time to make journeys, other modes perceived as more convenient

· confusion about which route to take and how far the destination is

· a perception that pedestrians generally have a low social status, especially in relation to car drivers

· fear of being attacked or isolated in potentially risky areas

· a perception that motorists do not properly understand the rights of pedestrians.

The quality of public space is very closely connected with movement of pedestrians in the city. Pedestrians avoid unattractive and dangerous areas. The influence of the quality of public space in social life of city dwellers should be definitely taken into account.

1.3.4 Bicycle Transportation

Špilar (2014) explain a bicycle paths as a linear corridors for continual infrastructure correctly adjusted for movement of cyclist. The net of cycling infrastructure origins from planning of suitable infrastructure to reach the sufficient penetration of territory and availability to reach the location for non-motorized transport users. To have a sufficient system, it is necessary to categorize the cycling paths. The master plan deals mainly with citywide important cycling routes and divide them into three categories: backbone cycling paths, main cycling paths and local cycling paths.

The backbone cycling path creates the fundamental structure for bicycle transportation in Prague. It is used for long distance relations within the city and also for connection to surrounding region. It has both transportation and recreation function. The basal paths leads around Vltava River and are connected to radials mainly led through the valleys around the streams.

Main cycling paths create additional net to backbone paths. They have primary transportation function. They include the main axis of the area serviceability and mutual connection of city districts. Pursue urban axis, major lines of public transportation and other areas with potential demand for cycling connections.

Local cycling paths serve to area serviceability and create connection to citywide network. They also include purely recreational trails with low traffic relevance (Špilar, 2014).

1.4 Public Space

1.4.1 Definition

According to Paragraph 34 of the Act no. 128/2000 Coll., on Municipalities, as amended; public spaces are all squares, streets, marketplaces, sidewalks, public greenery, parks and other facilities accessible to everyone without restrictions, i.e. for general use, regardless of ownership of the space.

According to Building Act mentioned above a public space is included in public infrastructure.

Public space can also be characterized as entire urban space that is not built up and serves all users. The main feature is especially liveability, which is related to the usability of the space for various activities (Šilhánková, 2003).

Public areas are perceived by urban planners and architects as any space that is not private. Public space is a place for interaction and communication in all aspects of human activity. It is seen as a spatial metaphor showing something open and laid out for everything that concerns the public (Štrog, 2001).

Part of understanding public space is terminology. Every person has different opinion on what is included in term public space. For example english urbanist Goodal is using the name "open space". This term refers to all the space that is not occupied by buildings, parks, playgrounds, or cemeteries (Goodal, 1987).

On the other hand, Šilhánková and Koutný (2001) have quite complex definition for public space. They say public spaces are all undeveloped spaces in the city that are open and accessible free of charge to all residents and visitors of the city, either permanently or with time limitation (parks closed by night). The basic characteristic of public space is its liveability associated with the usability for residents. They must serve to residents of the city to operate a variety of physical activities (walking, cycling) and stay activities (seating, board games) (Šilhánková and Koutný 2001).

1.4.2 Types of Public Space

Šilhánková (2003) divided public spaces by fundamental character into four basic types: streets, squares, green areas and other areas.

Streets are urban avenues, residential, representational, corridors and promenades. A street is perceived as an open urban space defined by corridor buildings of elongated shape and mostly without green. A square is defined by greenery, water surface, orientation, shape, size, transverse profile, accesses, surface and equipment. Greenery is area where vegetation prevail. It is used mainly for recreation, relaxation or representation. It is mainly non-motorized area. Other areas are parking lots and housing estates greenery. These areas have no specific spatial function (Šilhánková 2003).

Šilhánková (2003) also identified, that we can divide the public space by other aspects. For example, according to types, functions, meaning, traffic load, position in relation to the ground or according to the roof character (Šilhánková, 2003).

According to Gehl (2000), public space is classified by the meaning of its activities and functions. The function depends on human activity. Outdoor activities indicate the use and attendance of each area. Gehl divides activities to:

· Necessary activities

· Optional activities

· Social activities

Necessary activities are activities of daily life. For example, walking to work, school, waiting for a bus or tram, shopping. These activities take place in any weather.

Optional activities are dependent on the participants, meaning that they do them if they want and if the place and time allows. It is a walking and recreation. It depends on the attractiveness of public space and the weather.

Social activities have a passive form, in terms of listening and observing other people. These activities allow contact with other people. Social activities occur spontaneously as a consequence of the fact that people move and stay in the same places. They depend on the presence of other people in public places (Gehl, 2000) .

1.4.3 Usability of Public Space

Danish architect Jan Gehl deals with the quality of public spaces and improving life in the city. His lifelong research brought many important findings in the field of the use of public spaces. According to his observation on the streets and city squares of low quality takes place only minimal activities. People are hurrying home. A good environment makes completely different and wide range of human activities (Gehl, 2000).

It is necessary to know by what is the space for people interesting or attractive when designing and evaluation the public space. It includes a good place to sit in the shade with beautiful views of the countryside or on the water surface. Effectively designed walkways and synoptic streets also contribute to the good usability of space (Madden, 2003).

If public spaces supposed to serve the people and be habitable, it is necessary to ponder the question of usability. When planning public spaces it is always necessary to identify priorities, such as to consider the pedestrian citizen as the main actor of the urban scene, and therefore to plan a city around his needs (Stefan, 2006).

1.5 Recreation

Recreation is one of the most important urban functions. It can be found in all structures of the city. It is a form of relaxation of citizens. It forms a permanent part of environmental management. It is unconditional, because residents drawn both physical and mental strength from recreation and it helps maintain their health (Sum, 1981; Balabánová, 2000).

Recreation is a form of resting or leisure activities, which is necessary for existence and development of physical and mental energy. It provides a change of environment, monotonous work and way of life. It is not necessary only for the restoration of inner power, but supplemented by appropriate interests and hobbies provides human inner satisfaction, enriches their intellect and contributes to the growth of their personality. The greatest recreation value is preventative health function. It balances the negative consequences of the work process, unsuitable environment and numerous pressing situations caused by an inappropriate way of life (Navrátilová and Rozmanová, 2015).

To achieve quality recreation is necessary to provide green space (parks and suburban recreation area), recreational facilities (playgrounds, swimming pools, etc.) and last but not least civil, technical and transport facilities (Balabánová, 2000).

The recreational use of landscape is related to the retroactive impact on landscape, recreation and activities associated with it. Positive impact on recreation is developing of tourism. It enables the development of poor regions. To support recreational and tourist use is to built new infrastructure and improve environment in the area of interest. Some of the elements that contribute to the improvement of recreational effect (water or vegetation features) bring a positive effect on improving the ecological stability and landscape. By creating the tourist and recreational infrastructure, especially nature trails and information centres, is achieved spreading of education to broader layers of population. The purpose of nature trails is to attract visitor's interest to the issue, to deepen their knowledge and contribute to a more sensitive perception of landscape values (Schneider et al., 2008).

1.5.1 Types of Recreation

All recreational activities are socially bounded by two factors; time and space. The time factor gives the boundaries of recreational activities by range from - to. It gives us an overview of the frequency and quantity of activities implemented in time. On the contrary the space factor classifies recreational activities in certain locations in which they can develop. Spatial factor enable categorization of recreational processes in terms of accessibility (Sum, 1981).

Schneider et al. (2008) divided the space factor in four categories- suburban recreation, resort oriented recreation, recreation in the open countryside and individual residence (cabins, cottages). They also classify the recreation according to type of activity into rest recreation, movement recreation, recreational sports, hunting and fishing and harvesting of natural products.

In terms of time, there are three main typological different kinds of recreation - daily, short term and long term recreation. Everyday recreation means mainly leisure time after work on working days. Short-term recreation is done during non-working days only, one day at least and four days maximal. Long-term recreation is longer than four days with necessity of renting place to stay (Navrátilová and Rozmanová, 2015).

Part of everyday life is a daily recreation. Due to the limited leisure time is necessary to take place in the immediate vicinity of the home or job. It should be available when arranging daily duties such as shopping, way to work. The content of everyday recreation activities are stay in the park, sitting on a bench, reading, walking through the city and playing children on the street (Balabánová, 2000).

Short-term recreation according to Balabánová (2000) requires bigger demand of free time (1-3 days) than daily recreation. The most common area is the site of an attractive environment such as large forest complexes or areas near water bodies. Often people choose the alternative way of "second home"- cottages or cabins which they own, mainly due to the bad situation at home town.

Long-term recreation takes place more than three days. It is the recreation of a holiday character. Its advantage is the independence on transportation distance and time availability. Even long-term recreation may affect cities. It means travelling

and exploring foreign cities. Lately it is a very significant phenomenon. It manifests itself in the economic benefits of the country or the city. People will not go to unattractive countries, therefore it is the prerequisite for a quality environment. And it will provide the requested experience to visitors (tourists) (Balabánová, 2000).

1.5.2 Purpose of Recreation

Recreation has an irreplaceable role on the social scale. It is important both for the individual same as for the whole society. It has sociological, psychological and economic relevance, which can be divided into primary and secondary. The primary relevance of recreation is regenerating mental and physical strength of the individual as a member of society. Secondary relevance is the result of the process of recreation in the relevant territory (tourism or recreational activities implementation). The consequence of recreation is the development of services and regional development. But there is also an impact on the landscape- its habitability and the environment in general (Schneider et al., 2008).

The environmental relevance of recreation means primarily modification of landscape structure, quality of ecological stability and its components. The recreation is closely linked to the development of infrastructure. It may have positive or negative impact on the landscape (Schneider et al., 2008).

Recreation is closely related to protection and creation of the environment. Three interconnected functions consists of work, housing and recreation. Therefore, even for the development of recreation, we need to manage interconnection of those functions. It is mainly about everyday recreation, where urban residents cannot commute somewhere for recreation. It must be close to their dwellings. Features of everyday relaxation are closely related to changes in living conditions, such as the rhythm of life, population concentration, degree of noise and air quality. The elements for the realization of cultural activities, manual activities, recreational activities, simple sport activities, educational activities and social life should be included in basic dwellings amenities (Sum, 1981).

Water areas should also be part of the recreational landscape. Water surfaces are important for the changing landscape features and vegetation formations. Water

also absorbs micro-particles of dust from the air and thereby cleans the air in the surroundings (Sum, 1981).

1.5.3 Limits of recreation

Recreational demands for territory are reflected in requirements for using natural environment, to materially technical equipment and transportation. Development of recreation brings problems that often lead to conflicts with other social interests, and have negative impacts on natural environment as well as on their own recreation. Recreation problems cannot be understood as isolated issue, but as one of the equal development issues of settlements and environment. For the optimal resulting solution it is necessary to know the motivations and demands of the population, taking into account limits of the territory and to respect all other social and public interests (Navrátilová and Rozmanová, 2015).

Limits of recreation can be viewed from many angles. They are primarily determined by the scale of landscape segment. Limits of recreational use of landscape are given not only by restricted accessibility or technical development of recreational infrastructure. It can be also aesthetic disruption of landscape character or recreational potential. Important restrictions for recreational usability of landscape arise from their impact on landscape and the sensitivity and the vulnerability of landscape. Limits can be divided into primary and secondary, natural and socio-economic.

Primary one has an influence on recreational usage and accessibility of landscape. They are subdivided into inner (everything what is not connected to recreation, but influence the recreational usage) and outer limits (PAMATKOVA ZONApreservation area, historical buildings). Secondary limits are mainly outer ones and have influence to recreation potential of landscape (Schneider et al., 2008).

The basis of the natural limits is the existence and presence of any natural phenomenon, such as a water body, river, mountain range, etc. The presence of the phenomenon creates the most of the restrictions for recreational use by itself (waterlogged habitat, avalanche fields). It is also important significance to society

and subsequent care of the phenomenon. Natural limits are often based on the extreme characteristics of a given phenomenon (Schneider et al., 2008).

Socio-economic limits are based on human requirements and special purpose elements in the landscape created by it. This includes the buildings, pipelines (oil, gas, water, steam lines, electricity, etc.) and also demands of local residents for other than recreational use of the area (agriculture, mining) (Schneider et al., 2008).

1.6 Teritorrial System of Ecological Stability - TSES

The bigger city the bigger threat of destabilization or disintegration of ecological stability. Vltava River is one of the biggest pieces of ecological stability system. It consist of biocenters and biocorridors, which unfortunatelly are mainly nonfunctionl.

According to Paragraph 3 of Act no. 114/1992 Coll., on Nature and Landscape Protection, as amended, territorial system of ecological stability (TSES) is the interconnection of natural and altered ecosystems that maintain natural balance. The primary task of TSES is to strengthen ecological stability by maintaining or restoring stable ecosystems and their mutual relations. The Territorial System of Ecological Stability is a mutually interconnected complex of both natural and near-natural, altered ecosystems that maintain natural balance. Its main purpose is to reinforce ecological stability of the landscape by conservation or restoration of ecosystems and their mutual interconnection.

Other goals of TSES according to NCA CR (2016) are:

· Creating a network of relatively ecologically stable areas impacting positively ambient and less ecologically stable landscape

· Maintaining or restoring natural gene pool of landscape

· Conserving or promoting the diversity of native species and their communities (biodiversity)

Creating a territorial system of ecological stability is according to Paragraph 4 of Act no. 114/1992 Coll., on Nature and Landscape Protection, as amended, public interest, shared by landowners, municipalities and the state. TSES can be classified according to importance into three hierarchical levels - local, regional and supra-regional TSES. This hierarchical classification of territorial system of ecological stability is a part of the ecological network of higher significance- EECONET (European Ecological Network), which forms the backbone of selected compositional parts of supra-regional TSES for the Czech Republic. The most important level in terms of direct impact on landscape is a local TSES, which is represented by a relatively dense network of the composing elements (Sklenička, 2003).

The fundamental structural elements of TSES according to Sklenička (2003):

· Biocentre is defined as a biotope or centre of biotopes in a landscape, which due to its condition and scope facilitates the existence of a natural or near-natural, altered ecosystem.

· Biocorridor is a territory that does not facilitate permanent or long-term existence of a significant number of organisms, but does provide their migration between different biocentres, creating a network from isolated biocentres. Another function of biocorridors is their positive effect on the environmentally relatively labile parts of the landscape, increasing the permeability of the landscape and ultimately increasing its aesthetic value. Rivers and their floodplains are natural corridors regardless of their definition within TSES.

· Interactive element is defined as a landscape segment, which on a local level mediates the favourable effect of basic TSES elements (biocentres and biocorridors) on surrounding less stable landscape. The hallmark of interactive elements is their ecotone character.

1.7 Czech Office for Surveying, Mapping and Cadastre - ČÚZK

Czech Office for Surveying, Mapping and Cadastre is source of information and data for all kinds of use, such as surveying, planning, analysing etc.

Administration of Cadastre of Real Estate is performed by 14 cadastral offices in regions and 97 subordinated offices, that is 80% of all activities in the sector of Czech Office for Surveying, Mapping and Cadastre - ČÚZK. Since 1993 cadastral offices have the power to make decisions about entries of proprietary and other rights in relation to real estate into the cadastre (CUZK, 2016).

The main roles of ČÚZK (2016) are:

· Complete administration of the Cadastre (including legal relations to real estate property),

· Maintenance and modernisation of horizontal, vertical and gravity control in the Czech Republic,

· Large-scale mapping (cadastral maps, derived 1 : 5 000 State map),

· Medium-scale mapping (Base map of the Czech Republic 1 : 10 000, 1 : 25 000, 1 : 50 000, 1 : 100 000, 1 : 200 000),

· Small-scale mapping of the Czech Republic (1 : 500 000, 1 : 1 000 000),

· Creation of the Fundamental Base of Geographic Data (ZABAGED),

· Geodetic surveys and documentation of state boundaries,

· Development and maintenance of the Information System of Surveying, Mapping and Cadastre in the Czech Republic,

· Standardisation of geographical names,

· Coordination of research and international cooperation in geodesy, cartography and cadastre.

Cadastre of Real Estate (KN) is one of the largest information systems of the state administration as for the data amount. In 1998 the digitization of its File of descriptive information was completed. At this moment the work on the digitization of the File of geodetic information is going on. Information System of the Cadastre of Real Estate (ISKN) is an integrated information system designated for support of

the state administration performance in the area of the KN and for its user services provision. ISKN contains the means for administration of the files of descriptive and geodetic information, for support of administrative activities of the KN as well as for the administration of documentation resources. ISKN is a centralized system with the only database, which is connected to all cadastral workplaces via internal network (ČÚZK, 2016).

The KN provides the information about each real estate. The details of real estate such as parcel number, cadaster area, acreage, type of plot, land type, land use.

2 Area of Interest

Prague 5 District is home to more than eighty thousand people. It consists of several formerly independent municipalities: Smíchov, Košíře, Motol, Hlubočepy, Radlice, Jinonice-Butovice and southern tip of the Lesser Town (Malá Strana) (INFOPRAHA5, 2010). Smíchov cadastral territory (Fig. 2.1) covers an area of 705.1 hectares. Population is 33 558 by? 31. 12. 2014 (ČSÚ, 2016).

Figure 2.1: Area of Interest

Smíchov is located on the left bank of Vltava River in close connection to Lesser Town, on the opposite bank in the northern part to New Town, then south to Vyšehrad and Podolí. Industrial plants and transportation corridors are adjoined from the south at Hlubočepy. From the south-west Smíchov is flanked by green and also built-up Radlice's slopes. Thereby it is forming a border between the historical center on one side and new settlements units on? the outskirts of Prague on the other. This makes it suitable to become a center of Prague 5 District and a major extension of the Prague city center.

2.1 Historical development of Smíchov

Smíchov district has always held a specific function in the city. The territory has been inhabited since the Bronze Age. When creating a denser settlements the population first settled around the main roads leading from the area of the Lesser Town (Malá Strana) to the countryside towards Zbraslav and Pilsen (Plzeň). At the junction of those roads is today's center of Smíchov – Anděl. In 1386 the Carthusians parceled their land and began to develop a medieval village here. Extensive vineyards with many vineyard estates were spread around it, some of which survived until today. During the reign of Rudolf II., many noble summer palaces (Klamovka, Bertramka, Santoška etc.) and several large farm estates (Malvazinka, Šalamounka) were built. At the beginning of the 19th century Smíchov was just a set of gardens with groups of rural homes along main roads. In the mid-19th century there were already 70 homesteads, farmsteads and mansions. That was the largest amount in Prague.

The image of Smíchov began to change significantly in the first half of 19th century. The Age of steam brought enormous blossoming of industrial production. New factories began to develop in Smíchov area. Weaving mills, porcelain factory, sugar mills, paper mills, and in 1843 the Ringhoffer engineering plant (later called ČKD) was established. The convenient location near the inner Prague, field configuration and position by the river significantly helped the development of Smíchov. However, Vltava River considerably damaged the area in 1845 and 1890 during major floods.

The railway had a significant part in the development of the neighborhood. Since 1860s 4 tracks were gradually conducted to this point. The development of production was linked to the massive inflow of population (in 1850 there were 2 608 residents and in 1890 it was already 32 646 inhabitants), so in the second half of 19th century Smíchov became the second biggest town in Bohemia right after the inner Prague. The huge influx of people caused rapid construction of apartment buildings. Initially poorly built single storey houses, but their quality was improving with time in some parts of the district. In early 1880s there were still 30 major industrial plants. But later on the factories began to abandon their places in favour

of residential development. The residential area were developed the most in the middle of 19th and 20th century, when the entire Smíchov platform was built up by blocks of tenement houses with expunged spaces for the squares.

In 1838 Smíchov has become the second Prague suburb right after Karlín. The advancement from suburb to city was already in 1850, but formally was not recognized until 1903.

In the period between the wars, the structure of Smíchov was completed by some new buildings and features. The most important intervention was the outcome of Jirásek Bridge in 1933 to the area of former Botanical garden. Today called Dienzenhofer orchads (Dienzehoferovy sady).

The construction of the metro line B in the mid-1980s (opened 2nd November 1985) was a huge impulse for neighborhood. The exits of the station became a natural center of Smíchov area.

In the 1990s began a radical transformation of Smíchov into a modern neighborhood with all the positive and negative influence which the present time brings. Several urban studies brought new solutions to the entire area. Including the solution for the transportation system by creating a tunnel system protecting Smíchov area from traffic passing through.

After the relocation of large industrial plants (except the Smíchov brewery founded in 1869) to the edge of the city, a mixed mode complexes including retail, commercial, cultural, entertainment and administrative premises complemented by a huge parking lots has begun to grow on those plots.

Another development or transformation areas are situated in no longer used northern part of Smíchov Station and in the strip between the station and Vltava River. The building activity will be concentrate there in the coming years.

2.2 Natural Characteristic

In terms of natural conditions Smíchov has a unique position. On one side is bordered by the river, which is an important natural element in the structure of the city and offers yet not enough used embankment promenade. On the other side, high green massifs, covered by villa type settlements, begin from a relatively flat plateau near the river. These hillock are disrupted by valleys completely filled with dense block development. Císařská louka island offers unique natural and recreational facilities.

2.2.1 Geology

Two main types of bedrock (rock) occure in the area of interest. First one (no.1) is type of unconsolidated sediment. Second (no.6) is clay, sand, gravel - unconsolidated sediment as well, but alluvial type. Detailed bedrock description can be found in Tab. 2.1. Both types are visible on Fig. 2.2, type no.1 has light violet color and area of type no. 6 rock is light blue.

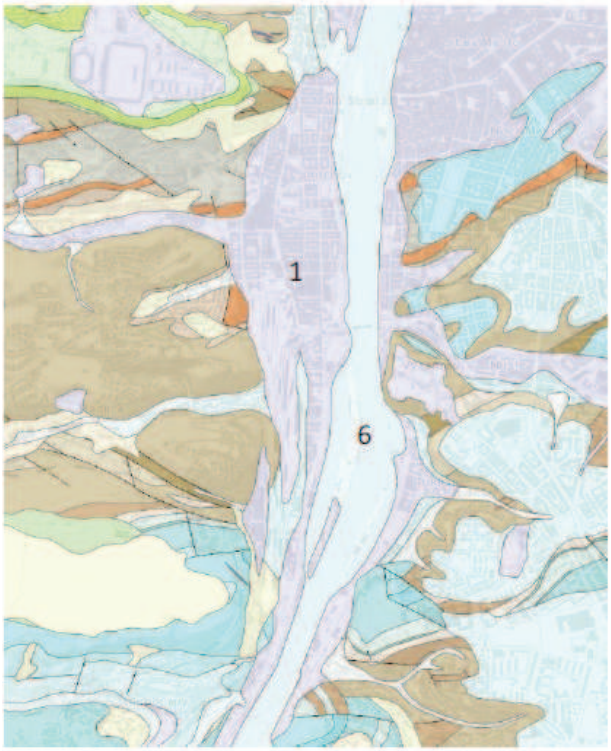


Figure 2.2: Map of bedrock, Source: Česká Geologická Služba, 2016

	Rock Type no. 1	Rock Type no. 6
General Definition		
Type	unconsolidated sediment	unconsolidated sediment - clay, sand, gravel
Description	sampleweight, heap, discharge hopper	alluvialsediments
Mineral compositin	variable	clay, sand,gravel
Color	variable	
Genesis	anthropogenic	fluvial sediments
Chronostratigraphy		
Era	Cenozoic	Cenozoic
Formation	Quaternary	Quaternary
Division	Holocene	Holocene
Regional Classification		
System	Czech massif	Czech massif
Region	Quaternary	Quaternary

Table 2.1: Bedrock Identification, Source: Česká Geologická Služba, 2016

2.2.2 Hydrology

Vltava is the longest Czech river. The spring is in the Šumava Mountains and flows into Labe River near Mělník. The total length of Vltava River is 430 km. Watershed has an area of 28 708 km^2. Vltava penetrates Prague from the south through the Zbraslav area and exits Prague in the north through the territory of Suchdol. Length of the river stream within the city is 31 km. Vltava has ten left tributaries (including Berounka River) and fourteen right tributaries in the Prague territory. Both banks are connected by bridges and walkways in 18 places. Vltava has several islands such as Štvanice, Kampa, or Císařská Louka Island. Vltava River is used mainly for passenger transport with some help of weirs and lock chambers. Vltava creates on its watercourse through Prague unique natural sceneries and picturesque embankments, is popular for recreational purposes and is also used by fishermen.

Motol brook (Fig. 2.3) is the only Vltava tributary in Smíchov area. It springs in the Prague – Stodůlky area and flows into the Vltava River at Palacký Bridge on 54.42 river kilometer. The spring of the creek is located near the Zličín metro

station in a very built up, commercial and shopping area. The total length of the stream is 9 939m. The bottom, entirely covered section has 4 251 m and an upper, partially obscured part is long 5 688 m.

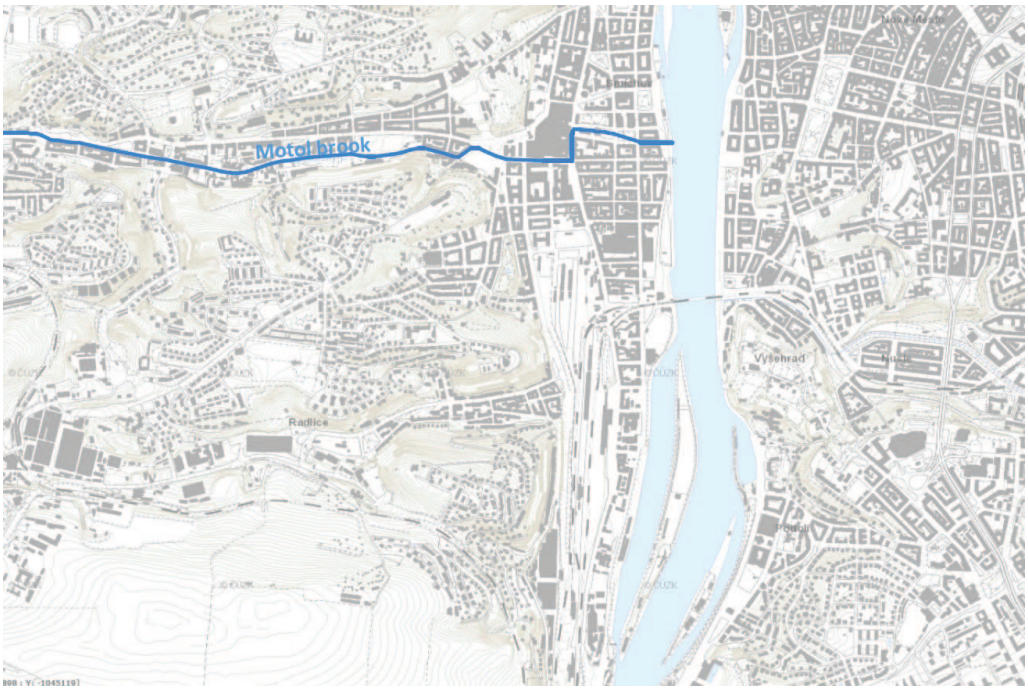


Figure 2.3: Motol Brook, Source: ČÚZK

From the natural perspective, Motol brook springs at the foot of very well permeable Cenomanian sandstones, which accumulate rainwater very easy. The major tributaries are Větvený stream and Cibulka stream (Pražská Příroda, 2013).

2.2.3 Climate

Czech Republic is situated in the temperate zone of the northern hemisphere in the center of Europe. One of the major factor which influences the climate is Gulf Stream. For our area is a characteristic generally favourable climate with rather mild wet oceanic character and the changing of four seasons.

Prague has a completely different climate from the rest of the Czech Republic. Climatic conditions of a particular area are given by characteristic weather regime that determines the energy balance, atmospheric circulation, the nature of the active surface, and nowadays the influence of anthropogenic activities.

Prague's climate is also affected by the so-called urban heat island- the average temperature of the air in the city center is about 1°C higher than in the open countryside at the same altitude. It is caused by a large concentration of heat sources, but mainly by a smaller losses in evaporation due to urbanization of active surface, where hard surfaces significantly prevail over a natural surfaces with vegetation and where the bulk of the rainfall immediately flows into drains.

The map of credit rating of climate (Fig. 2.4) differentiates the capital city area in terms of climatic suitability of individual Prague districts as residential areas.

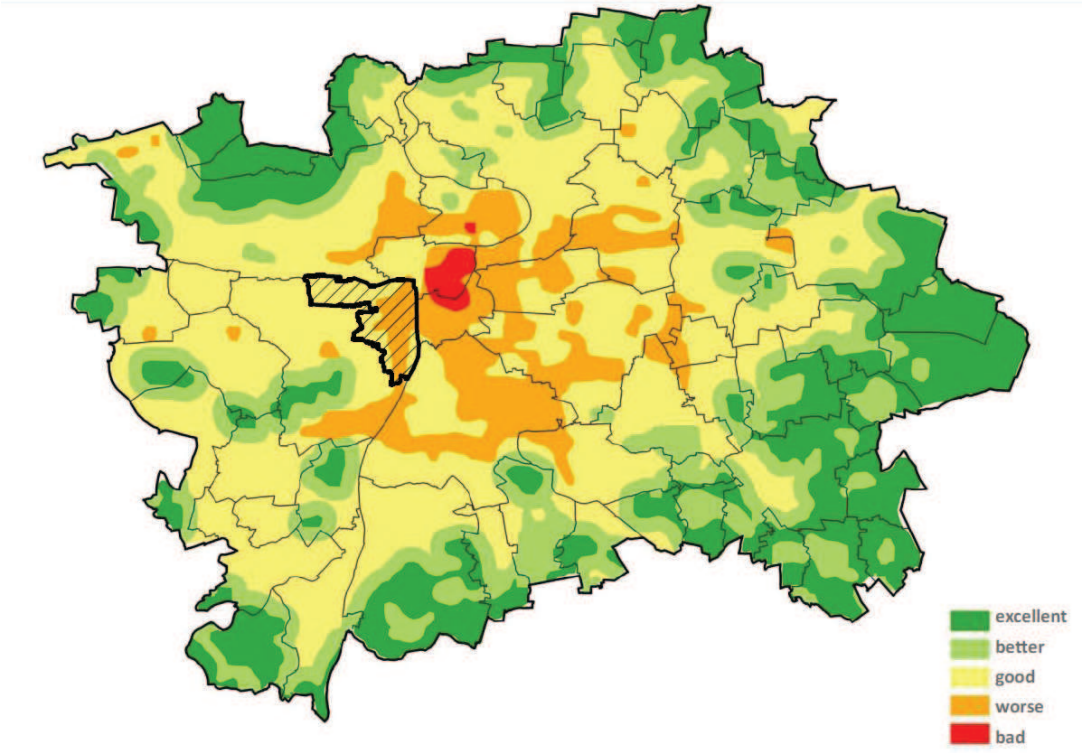


Figure 2.4: Climate Credit Rating, Adapted from: MIG ESP, 2016

The most important climatic characteristics, which for these purposes should be taken into consideration when selecting the territory are solar radiation, air temperature, wind, precipitation, humidity and air pollution. The air pollution is not a climatological characteristics but in urban areas the air quality significantly affects the characteristics of individual sites and some components of air quality are the best indicators of complete meteorological effects and consequently the climatological variables.

By the overall processing of the six phenomena mentioned above is created the map of credit rating of climate that evaluates comprehensively the territory in five relative quality categories reflecting local differences in the capital city.

3 Methodology

First part of this thesis is a literature review and description of the area of interest . The theoretical part of the thesis consist of analysis and design.

The analytical part is based on a field survey, which helped identify the area of study and served as a key for several analysis. Wider relations in terms of accessibility are used to obtain information about access to the area by various means of transportation.

Owner Relationship Analysis is composed of three parts. First part is the distribution map of land to private and public. Second part is a map with detailed analysis according to the plot owner. And third part is a list of all 171 parcels. Owner Relationship Analysis is necessary in order to fully comprehend the current situation of Smíchov embankment.

11 time periods are used for the Historical Map Analysis, which aid to understand the development of the area. SWOT Analysis, accompanied by photos of existing conditions from field survey, describe both positive and negative sides of the area. Analysis of Land Use Limits serve as a guiding tool for design.

Three different views are presented within the analysis of the studied area: map analysis, data analysis and site analysis. It covers different types of approaches to the study area. All three approached are needed for a well-rounded understanding.

The design part is combination of knowledge gained from analysis and my intervention of this place. It consist of hand drawn visualization and plan view created in ArchiCAD software.

4 Current State

4.1 Study Area

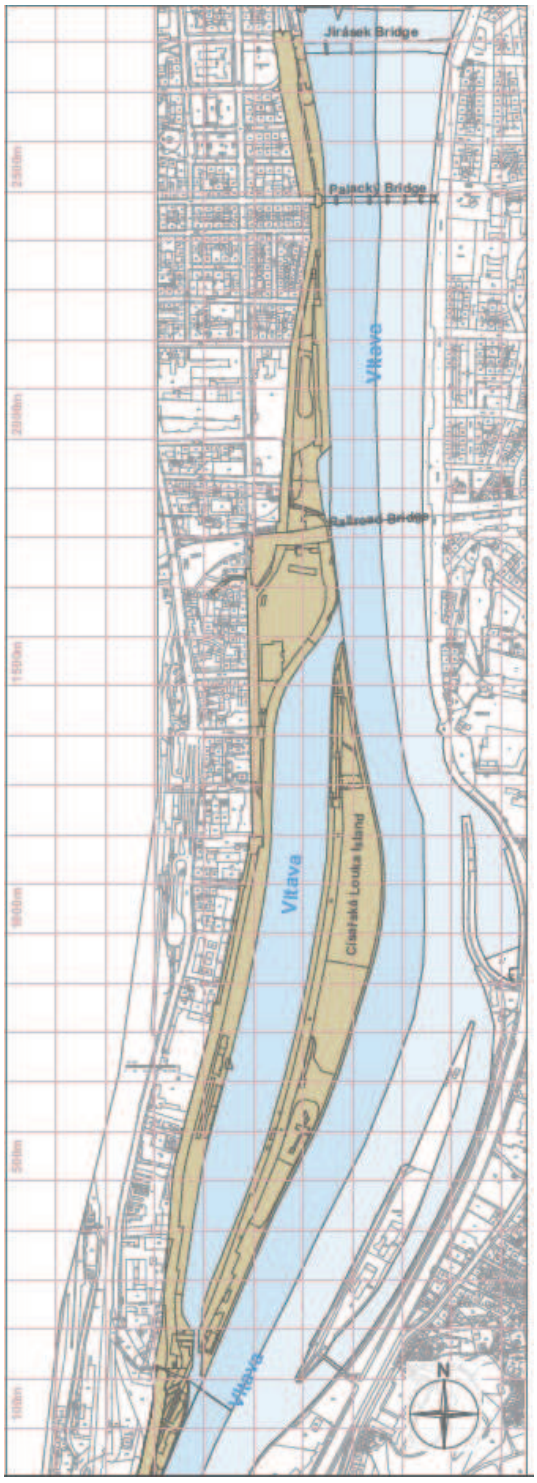


Figure 4.1: Map of Study Area

The study area (Fig. 4.1) was defined after detailed field survey. Various relationships, such as connection to the landscape and continuity of surrounding land, were identified in the studied area. Another assessment tool to identify the area was the map of Cadastre of Real Estate, provided by ČÚZK.

The territory begins at the Jirásek Bridge and continues along the embankment of the Vltava River, upstream to the south by the bottom of Císařská Louka Island, where the boundaries of the cadastral area of Smichov ends. The study area is approximately 2 700 meters long. The narrowest part is less than 150 meters and the widest is around 400 meters. The Vltava River is included, but only the part which belongs to the Smíchov cadastral area.

Fig. 4.1 can be found as Apendix A.1 in full resolution.

4.1.1 Wider Relations

Location

Prague can be considered from a geographical point of view as the center of Europe; it is conveniently located in central Bohemia. It lies on both banks of the Vltava River and adjoining slopes, hillsides and terraces. It covers an area of 496 km^2 and it has 1 262 000 inhabitants (Praha EU, 2016) which dominates the population structure in the Czech Republic.

Accessibility

Smíchov is very well connected to the rest of Prague, not only due to a dense road network, but mainly thanks to an extensive network of public transportation. There is a railway network node, metro, tram and bus services. Smíchov is not just a concentration point of city public transportation, but also serves as one of the starting points of the national public transportation network and makes the area more accessible.

Some means of transportation, despite its positive characteristics to provide more public access, has rather negative effect. The main problem are the surface roads, which have more than one lane in one direction. Most of the time they do not contain bike paths and do not provide sufficient comfort and safety for pedestrians (both walking and crossing over).

To summarize it, the transportation accessibility to the site is satisfactory also thanks to the relatively dense public transport network. But if we focus directly on pedestrians, this area should be improved and especially made more enjoyable. By creating a pleasant environment, not only the qualitative level of this district will rise, but it will also attract more people, and hopefully it will lead to more people spending their leisure time outdoors.

However, it is clearly shown on the map (Fig. 4.2) that some parts of the territory are insufficiently covered by the urban transport network. The map shows approximate walking distances from existing bus, metro, tram or train stations to the nearest point by the river embankment. The most fitting type of transportation

is ferryboat, which provides straight access to the embankment. Unfortunately, there are not enough of ferryboat connections to cover the whole riverside.

Two types of routes are graphically represented on the map. These indicate the differences between the length of the route for all pedestrians and routes with no handicap accessibility. Travel time and distances for routes with handicap accessibility can be almost four times longer due to the obstacles, for example stairs. The map shows routes mostly for all types of pedestrians (routes with handicap accessibility).

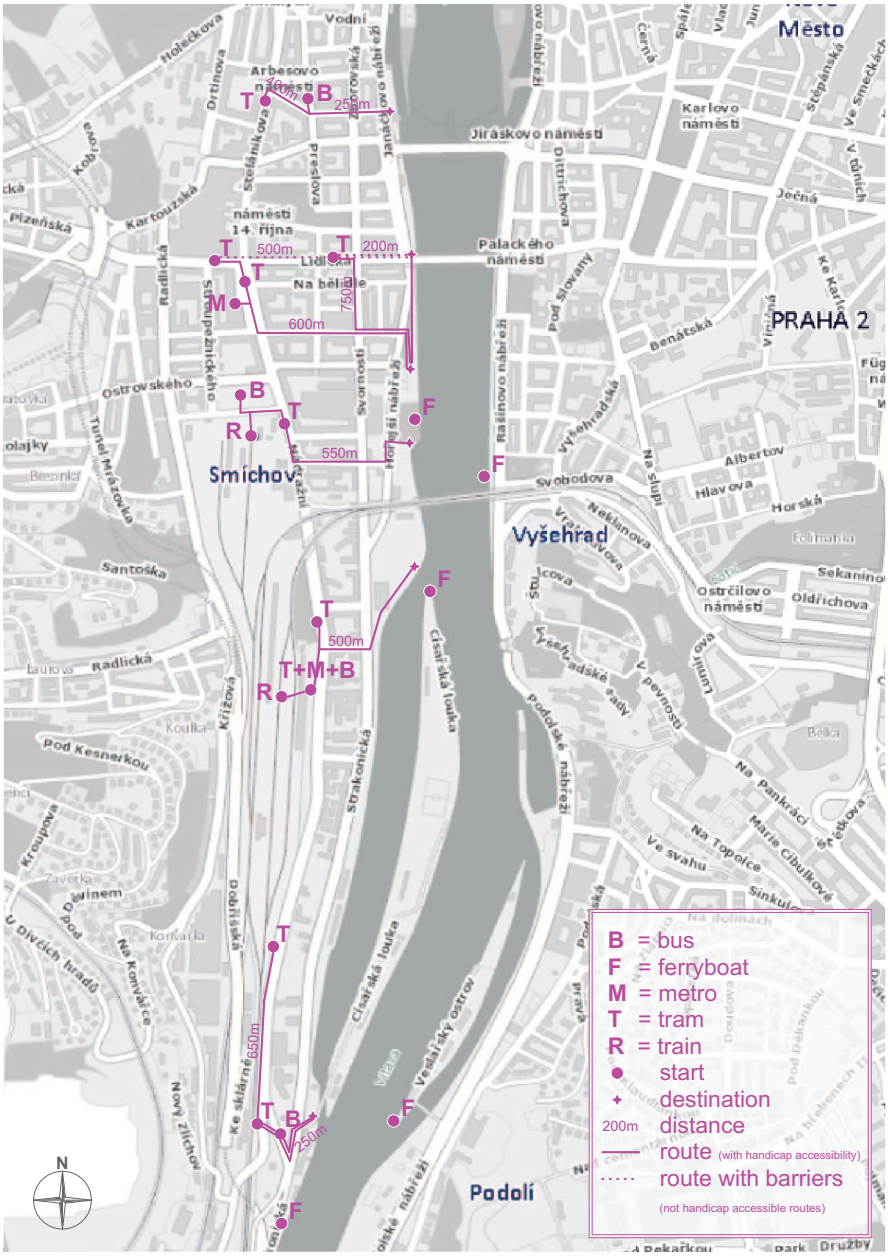


Figure 4.2: Map of Accessibility

4.2 Analysis

Analysis of study area are made from three different angles - map analysis, data analysis from ČÚZK and site analysis. It covers different types of approaches to the study area. It would not be complete with one of the approach missing.

4.2.1 Owner Relationship Analysis

Analysis of Owner Relationship was based on information from portal ČÚZK, section Consultation of the Cadastre of Real Estate and also on site analysis. ČÚZK provides information such as the parcel number, who is the owner of the plot, if there are any ownership limitations, any types of protection of real estate and lot of other information. Owner Relationship Analysis is composed of three parts (Appendix A.2.1, A.2.2, A.2.3). First part is the distribution map of land to private and public (Fig. 4.3). Second part is a map with detailed analysis according to the plot owner. And third part is a list of all 171 parcels and their owners, ownership limitations, type of protection and land use.

Privately owned land means a land owned by private person or by some corporation. By public land are meant all plots which are owned by state or by State Corporation. As we can see on the map (Fig. 4.3), almost the whole northern part is public. Only exception is the plot by Jirásek Bridge, where the Sports Club Slavia Praha is located.

Next place, which is not public and can cause troubles is place called "Smíchov beach". It is possible to see it on the map right above the Railroad Bridge. Not only it occupies the land, but if we compare it to map of study area (Fig. 4.1), it is possible to see, that the private site also covers part of the river. It creates barrier and restrict the permeability of the area.

The southern part, compared to the northern part is almost all private. The south embankment and most of the island is property of České přístavy. There is no chance to get to the left embankment since it is all fenced. Only access to Císařská Louka Island is from south, where is a bridge connecting the island to the

embankment. It is possible to go through the Císařská Louka Island, but somewhere in the middle is a sign "Private Property".

Fig. 4.3 can be found as Appendix A.2.1 in full resolution.

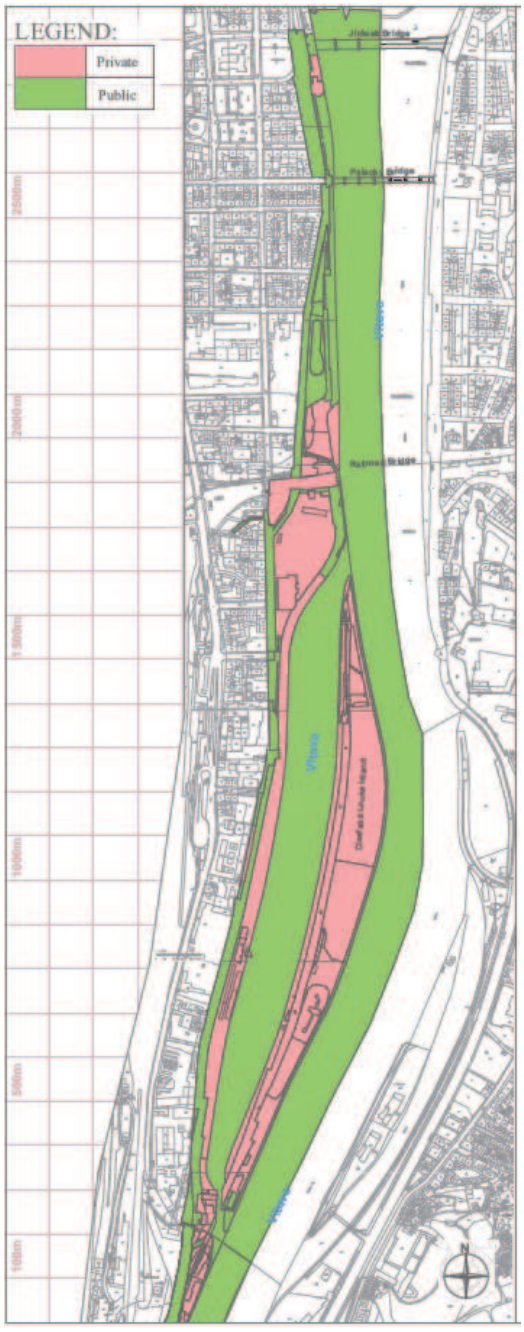


Figure 4.3: Owner Relationship Analysis

4.2.2 Land Use Analysis

Land Use Analysis was also based on information from portal ČÚZK and field survey. Information from List of Plots (Appendix A.2.3) from Owner Relationship Analysis were used to create the Land Use Analysis map (Fig. 4.4). All the information were compared to Spatial Plan (Spatial Plan, 2016). The orthophoto maps were used for clarification of inaccessible places.

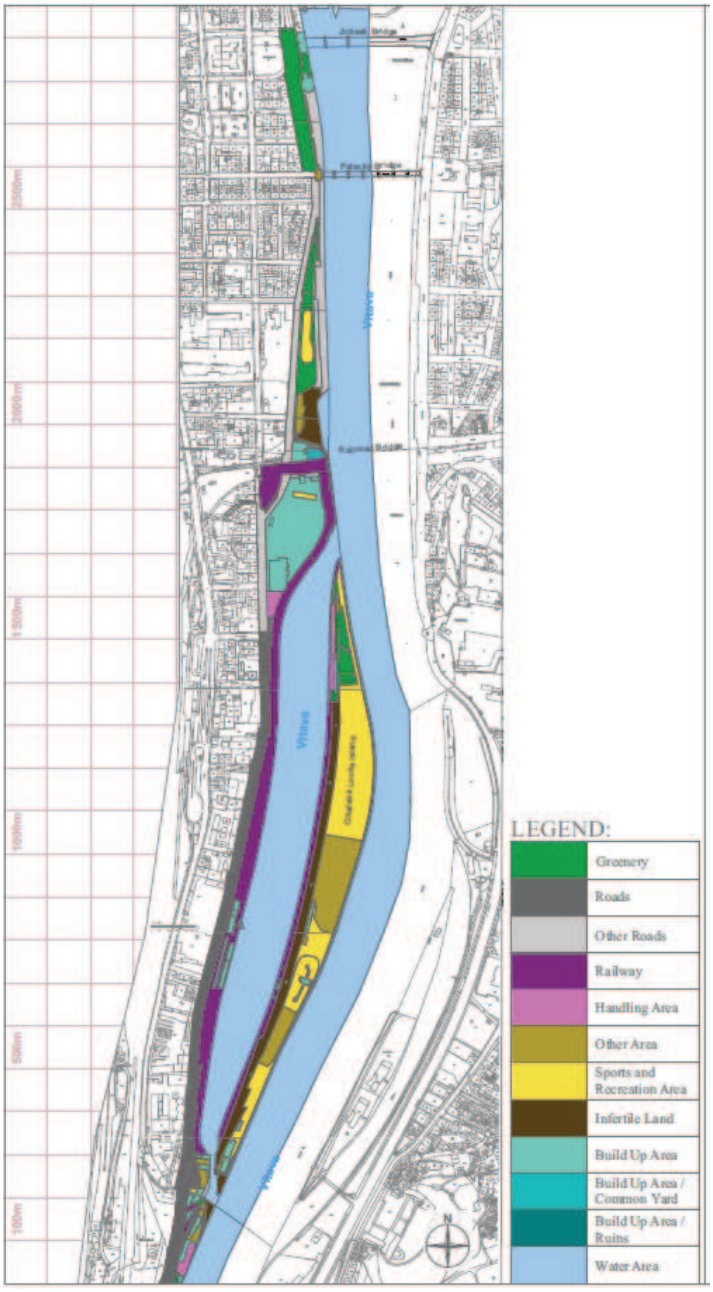


Figure 4.4: Land Use Analysis

Whole river walk is classified as other road. The upper part above the river walk is greenery with some sports and recreational area, which is actually according to field survey a playground. "Smíchov beach" is marked as infertile land and as other area, which corresponds with current state during field survey. The part right next to the Railroad Bridge is labeled as build up area, but according to orthophoto map it is a football field, surrounded by build-up area. In the Spatial Plan the whole area is labeled as sports area.

Interesting part is the embankment from Railroad Bridge to south. In the cadaster it is all supposed to be a railway, but that does not match with the field survey, neither with Detailed Land Owner Relationship Analysis (Appendix 4.1), where the owner is České přístavy and it is used mostly as a port. Also according to Spatial Plan it should be port. The same goes for the left embankment of the Císařská Louka Island. Consequently the information about this plot in Cadastral map are wrong or too old. The rest of Císařská Louka Island is mostly recreation and sports area, combined with greenery on northern tip of the island.

Fig. 4.4 can be found as Appendix A.3 in full resolution.

4.2.3 Historical Map Analysis

Analysis of changes and development of the territory according to the historical maps was carried out based on map data from the Town Historical Atlas portal. This portal draws from sources such as ČÚZK, AMP and Geoportal Praha. A total of 11 time sequences were used. Starting in 1791 and ending with a map of current state. The first four maps (Map from Herget, Stable Cadastre, Altimetric Plan of Prague and an Indicative plan of Prague) were originally processed manually and subsequently digitized. Orthophoto maps were used since 1938 and from 1996 they were in color version. All maps can be found as Appendix A.4 in full resolution.

Císařská Louka Island

The most noticeable change on maps is the man-made island called Cisařská Louka. The first appearance of the island can be seen on a map from 1909-1914 (Fig. 4.5, right). For illustration is a map of Stable Cadastre from 1841 where the island does not occur yet (Fig. 4.5, left). Cisařská Louka Island became an artificial island in years 1899-1903 by excavation of Smichov port, which served as a protective raft harbour. Now, the island is used as a small craft harbour, camping place for caravans, sports areas and Cinda restaurant.

Figure 4.5: 1841, Source: ČUZK; 1909-1914, Source: AMP

The 2008 Spatial Plan recommended the option to connect the northern part of Cisařská Louka Island with Smíchov river walk. Spatial Plan Designs of 2016 (IPR, 2015) are still proposing to connect the northern part of Cisařská Louka Island with Smíchov river walk. The biggest problem is the design and structural solution of a small foot bridge, that would provide pedestrian access. The challenge is, that the foot bridge must not restrict Smíchov port, which is also used as mooring for ships in case of flooding.

Bridges

Next very well noticeable aspect are bridges. The first two bridges over the Vltava River occurred for the first time on the map from 1889 (Fig. 4.6, left). It is the Palacký Bridge and the Railway Bridge (sometimes called Vyšehrad Bridge).

Palacký Bridge, was built in 1876 and put into operation in 1878, stands to this day. The Railway Bridge was built in 1871 and opened 1872. In 1901 it was replaced due to the enlargement of the monorail track to double rail track.

Figure 4.6: 1889, Source: AMP; 1938, Source: Geoportal Praha

Jirasek Bridge is visible for the first time on the orthophoto map from 1938 (Fig. 4.6, right), since its construction began in 1929 and lasted until 1931. The bridge was fully operational in 1933. (Encyklopedie mostů, 2016; Praha virtuální, 2016).

Settlements

On the map of Stable Cadastre from 1841 it is possible to see much of the prevailing greenery, such as gardens, vineyards and fields.

A map from 1889 shows the densely populated northern part of Smíchov, also thanks to the construction of new connections (bridges over the river). Further development of settlements takes place mainly in the South thanks to the rail network and thus better accessibility of the area (it is possible to see on the map from the year 1909-1914).

In subsequent years, the settlements continued to grow. From 1989 (Fig. 4.7, left) until nowadays (Fig. 4.7, right) much new development has stagnate. This does not mean a stop of new buildings however, it is focused now on infilling the vacant lots and reconstruction, both of which are not so apparent on maps.

Figure 4.7: 1989, Current State; Source: Geoportal Praha

Interesting Details

On the map of Stable Cadastre (Fig. 4.8, left) in the northern part of Smíchov embankment is highlighted as a yellow detail drawn to the map. Based on field research and a more detailed analysis of maps from the following years (Fig. 4.8,

right), I believe that it could be the beginning of construction of paving at the embankment in Smíchov called river walk.

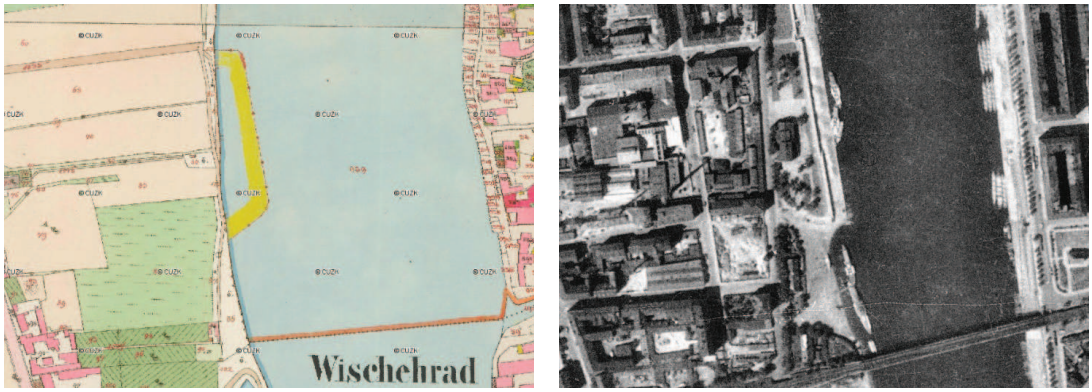


Figure 4.8: 1841, Source: ČUZK; 1938, Source: Geoportal Praha

Another interesting feature is Botel Admiral (anchored on the Vltava River in 1971), which can be seen on maps from 1975 until present day (Appendix A.4).

From the orthophoto maps from 1938 until 1996 (Fig. 4.9), we can see the "Smíchov beach" to be used as a berth for boats. During field research in summer 2015, access to the "Smíchov Beach" was restricted and fenced. Some changes were recorded in the spring 2016. The site is now open to the public, but it is not known for how long, and whether there will be some necessary adjustments for making the place more attractive for people.

Figure 4.9: 1938, 1989, 1996; Source: Geoportal Praha

4.2.4 SWOT Analysis

SWOT analysis (Tab. 4.1) is a tool of long-term strategical planning and is to conduct important site analysis and future policy making. It is used to identify strengths and weaknesses, opportunities and threats associated with a particular site intervention.

STRENGTHS	**WEAKNESSES**
- river	- neglected (poorly culturally / socially used)
- close to city center	- parking spot (instead of place for people to relax)
- view points	- lack of facilities (benches, trash cans, toilets, ...)
- connections (ferryboat, tram, bus etc.)	- private owned land (gaps)
- „Smíchov beach“ historical link (legacy, ...)	- barriers (unnecessary fencing)
- greenery	- no straight connection to the Císařská Louka Island
OPPORTUNITIES	**THREATS**
- unused potential (farmers markets, cultural activities)	- vehicles (passing, parking)
- scenic and historical views (Vyšehrad)	- ongoing degradation of natural habitats (Vltava)
- bike lane (wider connection)	- threat to non-permeability of area with no maintenance
- revival of local neighbourhoods	- water pollution from urban runoff
- improving internal permeability of the area	- floods
- inspiration on the opposite embankment (social life)	- noise from vehicles

Table 4.1: SWOT Analysis

Each category of the SWOT analysis is described in greated detail and accompanied by photos of existing conditions from field survey conducted during the summer 2015.

Strengths

The Vltava River offers many opportunities for recreation, has cooling effect in summer, and also provides psychical relaxation. Connection between city and nature.

View to the Vyšehrad Castle from everywhere at Smíchov embankment.

The left embankment has more vegetation than the right one. There are still places which c be improved or better maintain.

Place right next to the "Smíchov beach" is the only part of the embankment used for social/cultural events.

Ferryboat connects both sides of the River, and is part of the public transport network.

There are only three ferryboat station in study area - Náplavka Smíchov, Císařská Louka and Lihovar.

Weaknesses

No maintenance, no facilities (especially trash cans) just place for parking cars. The Smíchov embankment is neglected and this is a principle reason, why no pedestrians come here.

On the left embankment cars can park everywhere; it is for free. Note the hotel on the boat (Botel Admiral) which also provides parking right next to the boat.

Unnecessary and visually intrusive fence around the playground, located in the north part of Smíchov embankment, can be solved by choosing alternative way to restrict dogs from the playground and keep children inside.

Císařská Louka Island has only one access (from the South) and there is no connection on North part.

The biggest issue is privately owned land.

The Analysis of Owner Relationship illustrates that almost half of the left embankment is privately owned.

Privately owned land creates a gaps between public spaces, sometime there is no way to go through (view at Císařská Louka Island - Smíchov Port).

Those gaps between public and private land consequent to the lack of permeability of current area (Císařská Louka Island - "Private Property" sigh).

Opportunities

The opposite right embankment is fully functioning and well used.

Right embankment can provide an inspiration of ideas for what should be instructive and what to do better.

Inspiration on the right site of the river could be populated by bars and cafes accommodated in the wall and design the same/similar idea at this embankment.

Threats

Vehicles parking at the embankment, which restrict movement of pedestrians.

Passing cars can be big threat for people who wish to relax and enjoy the city and connection to the river.

Floods occur here very often, so it is necessary to adjust the design accordingly.

4.2.5 Limits

Analysis of Land Use Limits (Fig. 4.10) is focusing on natural limits, such as memorial trees, natural monuments, flood areas and TSES.

Spatial analytic data of the capital city of Prague 2014 from IPRPraha server and data and maps from Nature and Landscape Protection server were used for the analysis of land use limits . Another source was Spatial Plan of Prague City 2016 (Spatial Plan, 2016).

Figure 4.10: Land Use Limits

The whole area is in flood risk, so it is necessary to adjust the design accordingly. In the whole study area there is only one memorial tree.

Císařská Louka Island is part of the regional biocenter, which is currently non-functional and needs to be restored to become functional again. The restoration of the non-functional biocenter is connected with the supra-regional biocorridor surrounding the biocenter, which is also non-functioning.

Fig. 4.10 can be found as Appendix A.5 in full resolution.

5 Design

Creating a design is the first step. The knowledge from analytical part was used for creating this design. Dimensions are approximate and design is hypothetical. It shows what is possible. Implementation matrix is included at the end of the design.

The Owner Relationship Analysis identified prevailing private plots in south part and that is one of the reasons to mainly focus the design to north part of the Smíchov embankment. Also the Císařská Louka Island is part of the Regional Biocenter and it should not be disrupted more than with a few adjustments such as a creation of a bike path and connecting it to the northern tip of the Smíchov river walk.

5.1 Design Sections

The design is divided into three sections. Each section has its own problematic and specific design, but it is also connected together by several features, such as bike lane. The first part is the design of the Smíchov river walk (Fig. 5.1, left), which leads to the second part - "Smíchov beach" (Fig. 5.1, middle) and continues with the plan of connection of the Smíchov embankment with the Císařská Louka Island (Fig. 5.1, right).

Figure 5.1: Smíchov River Walk (left), "Smíchov beach" (middle), Connection of Císařská Louka Island and Smíchov embankment (right)

5.1.1 Smíchov River Walk

The River Walk is a long narrow strip. The design has been divided into three subsections for better clarity and in order to preserve the scale within all designs.

Smíchov River Walk Part 1

The Smíchov river walk begins close to Jirásek Bridge. It is the paved lower area right next to Vltava River. This part was mostly used as a parking place, which the new design (Fig. 5.2) does not support.

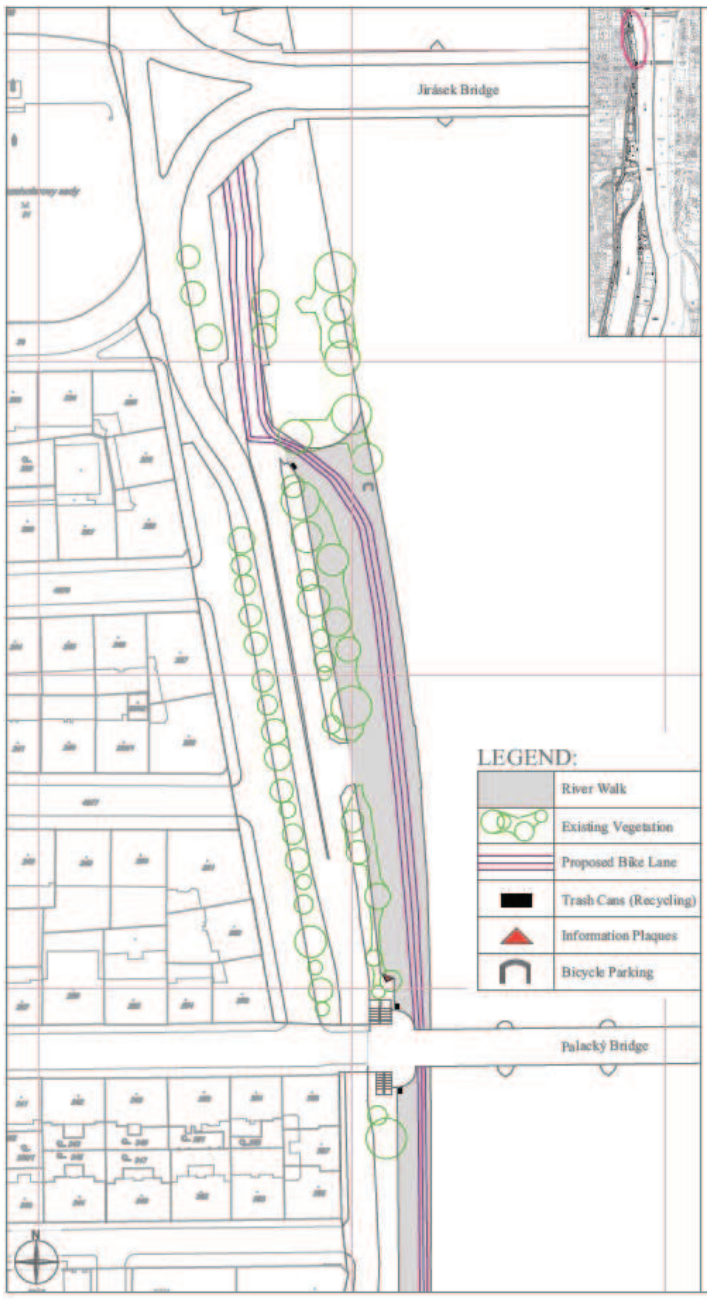


Figure 5.2: Smíchov River Walk Part 1

The proposed bike lane passing through the whole area will be connected here to the communication that is unidirectional. In order to maintain the bidirectional cycling path, it will be necessary to place contra rotating bike lane here. It will cross the road and join together with the opposite direction bike lane at river walk area.

Main features in this part are newly established trash cans for recycling and bicycle parking spots. Also information plaques about history of the place, directions and wider relations.

Fig. 5.2 can be found as Appendix B.1.1.

Smíchov River Walk Part 2

The second part (Fig. 5.3) covers the area from Palacký Bridge up to the place where the Botel Admirál anchors. The space around the Botel Admirál is also frequently used as a parking spot, mainly for the guests of botel. There could be a few parking spots left for emergency, such as handicapped guest, supply, etc. But main parking has to be designated elsewhere. The parking close to "Smíchov beach" can be partially used for that purpose.

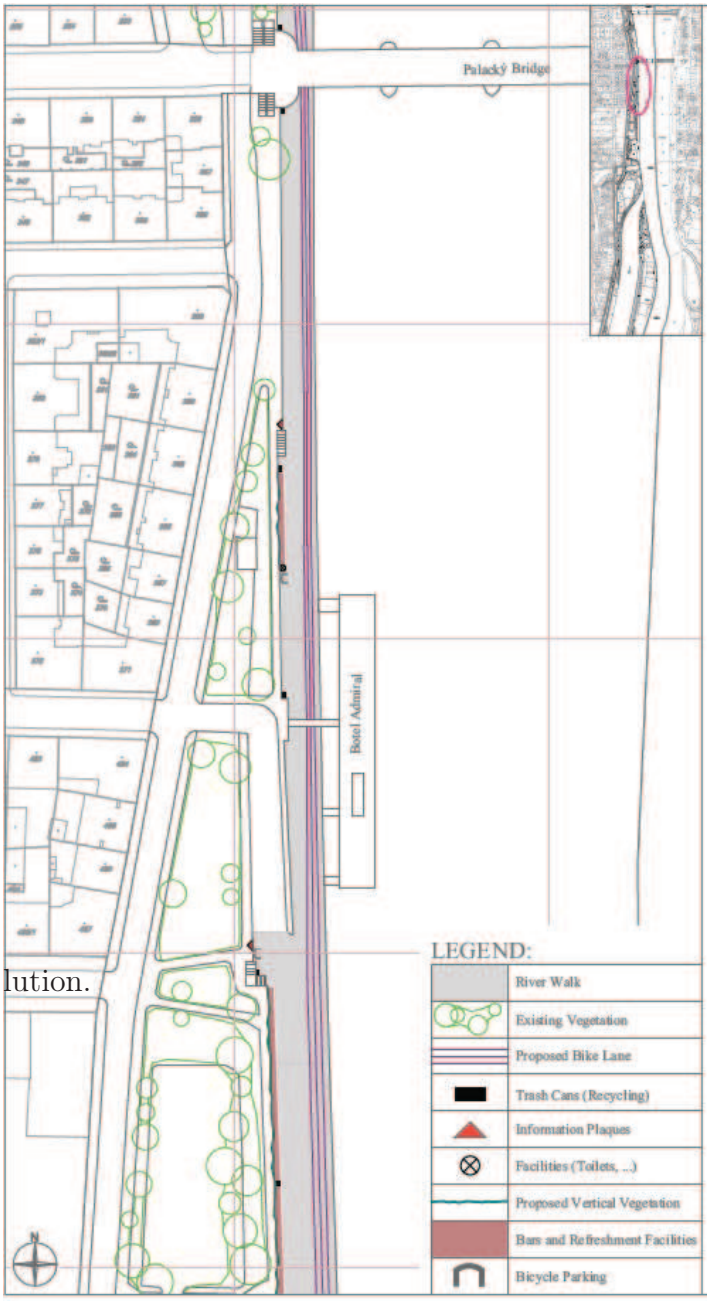


Figure 5.3: Smíchov River Walk Part 2

By reducing motorized vehicles at the river walk rises the opportunity to situate bars and refreshment facilities in this area. Firstly are designed bars in close proximity to botel, because that is the place, where the premises serve the facilities the most, occurs.

It is also essential to provide a supply of potable water during the main season. The toilet facilities placed at river walk area will also be providing potable water.

Fig. 5.3 can be found as Appendix B.1.1 in full resolution.

Since the river walk is a predominantly sunny place, it is necessary to cool it down, ideally by vegetation. The design uses vertical vegetation, which will be attached to the wall, so in case of smaller floods it will be protected. It will cool the place, but also absorb the noise and dust in the main season of the year.

Figure 5.4: Visualization of River Walk

Figure 5.5: Current state photo

The visualization (Fig. 5.4) of design compared with current state photo (Fig. 5.5) was taken during field survey in summer 2015. It portrays the vision of this space being used by a variety of people. It also indicates the use of vertical vegetation.

Smíchov River Walk Part 3

The biggest concentration of bars and cafés will be at the last part of the river walk (Fig. 5.6). It is in direct connection to "Smíchov beach" and it can be useful in case of shortage of refreshment facilities there. The refreshment facilities will be located in premises inside the wall. Each bar or cafe will have their own seating area, which will not be fenced or limited. The seating will be placed seasonally and stored in the cubicals.

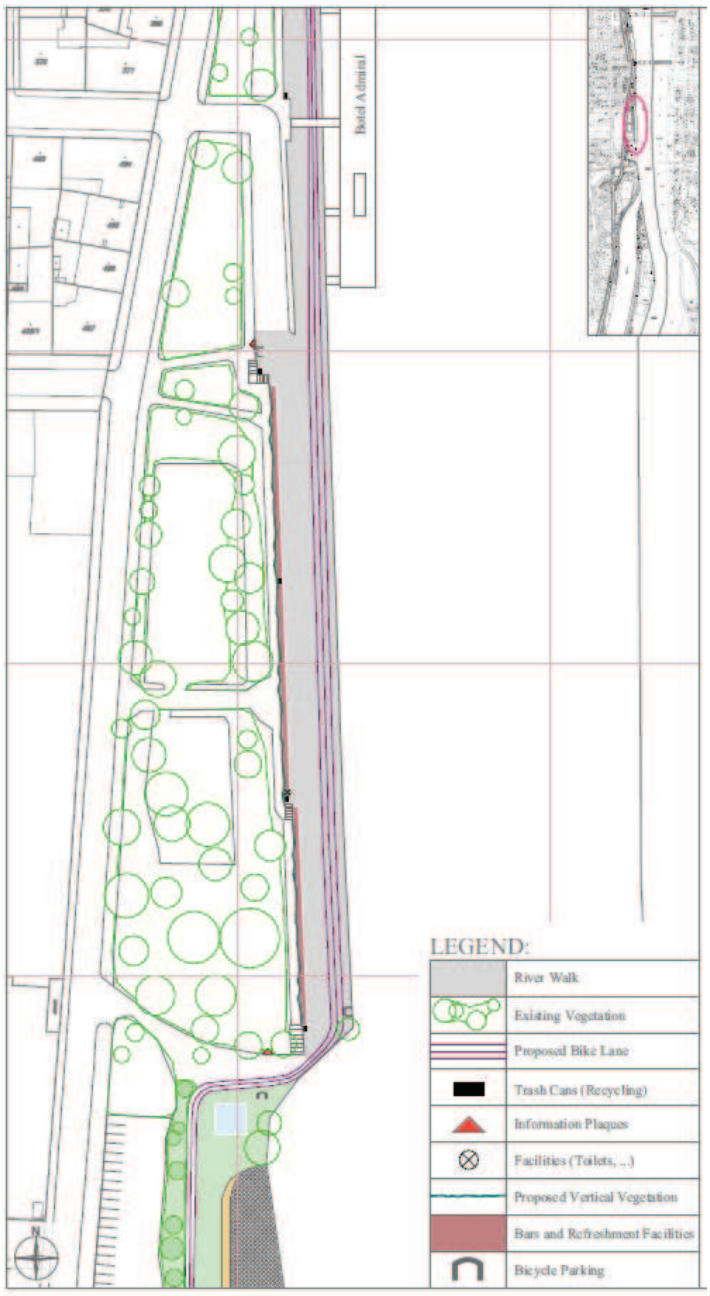


Figure 5.6: Smíchov River Walk Part 3

Trash cans for recycling, places for parking bikes and toilets are also planned in this area.

The same pattern is also used for vertical vegetation, placed on walls by the bars and cafés. There will be a combination of two types of vertical vegetation - the first one growing from top down and second one attached to the wall growing up. It will enable the use of various types of greenery.

Fig. 5.6 can be found as Appendix B.1.1 in full resolution.

Figure 5.7: Visualization of River Walk

Figure 5.8: Current state photo

The visualization (Fig. 5.7) of design compared with current state photo (Fig. 5.8) was taken during field survey in summer 2015. It shows the premises used as bars and cafés, bike lane passing through the whole area and all kinds of people sitting, walking, relaxing and enjoying the view to Vyšehrad Castle. It also indicates the use of vertical vegetation.

5.1.2 "Smíchov beach"

The plan for "Smíchov beach" (Fig. 5.9) is designed as "in case of ideal conditions". According to Land Ownership Analysis (Fig. 4.3 or Appendix A.2.1) this area is privately owned. As mentioned before, the situation regarding "Smíchov beach" has changed and the original fencing around the place (recorded during field survey in summer 2015) has been removed. The design considers a situation where all citizens have access to this area, altretatively repurchase of the plot from current owner.

Figure 5.9: "Smíchov beach"

During the summer, this area benefits from vast amount of sun exposure. The design is proposing to plant as much vegetation as possible in addition to cool the place and offer the shade for visitors. It will also be used as a buffer zone from proposed parking place.

The original stones will be preserved and supplemented with sand, which can also serve children as a means of entertainment. As the whole embankment is in a flooded area, the design proposes the area for mobile refreshment facilities. It will be used seasonally.

Fig. 5.9 can be found as Appendix B.1.2 in full resolution.

The bike lane is right next to the buffer vegetation and portrays this zone as a place for activities and relaxation. There will be also trash cans for recycling and parking place for bicycles designed in this area.

Figure 5.10: Visualization of "Smíchov beach"

Figure 5.11: Current state photo of "Smíchov beach"

The visualization (Fig. 5.10) of "Smíchov beach" design compared with current state photo (Fig. 5.11) was taken during a field survey in spring 2016. It shows the nice view and the difference that proposed vegetation makes.

5.1.3 Connection of Císařská Louka Island and Smíchov embankment

By creating a non-motorized movement bridge connecting the northern tip of Císařská Louka Island to Smíchov embankment a new access to the island will be enstated. It will be also used as a bike connection, which which was previously missing. It will allow cyclist to continue from the south up to the city center without any conflict with motorized vehicles. The proposed connection is a floating bridge, which will be detachable in case the port would be used.

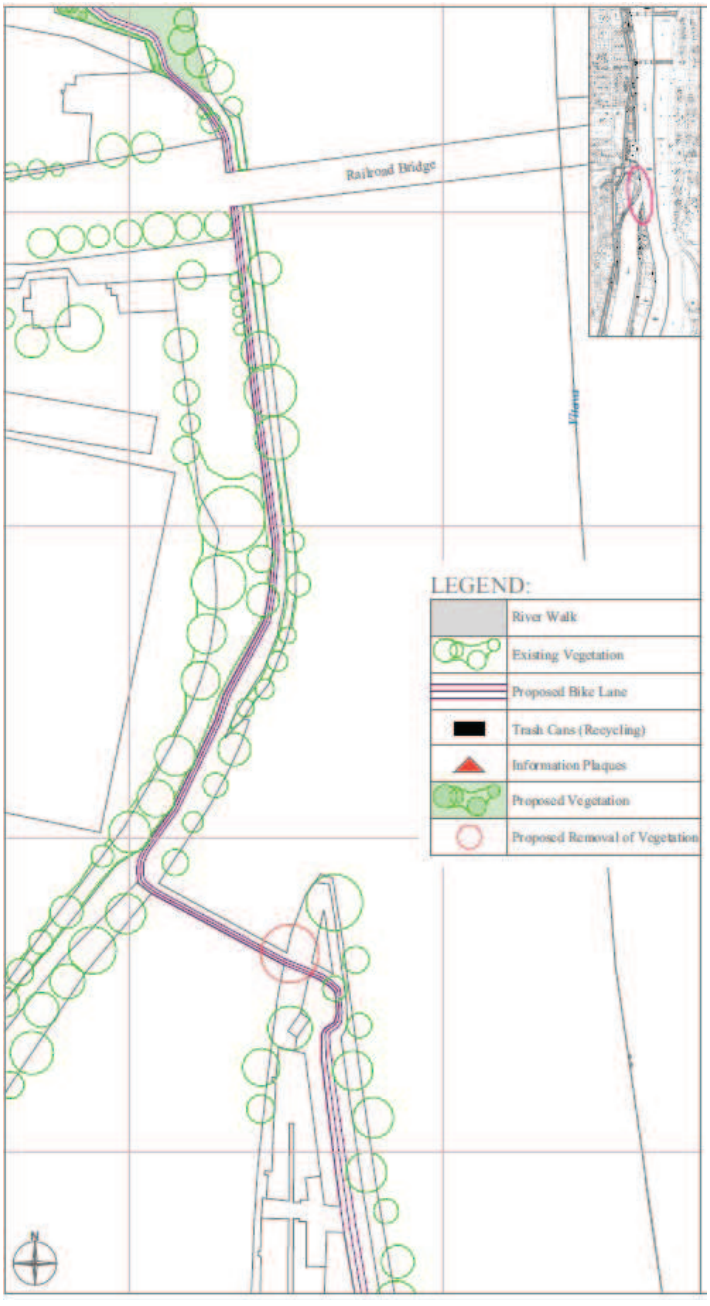


Figure 5.12: Connection of Císařská Louka Island and Smíchov embankment

As it will float on water, the speed of cyclist passing through will be limited and the bridge will also serve as slowing belt.

The purpose of this design is not a solution to a specific bridging design, it is rather the connection itself. There are other alternatives besides a floating bridge.

Considering the cost, affecting the nature and visual impact, the floating bridge seems the best alternative for this place.

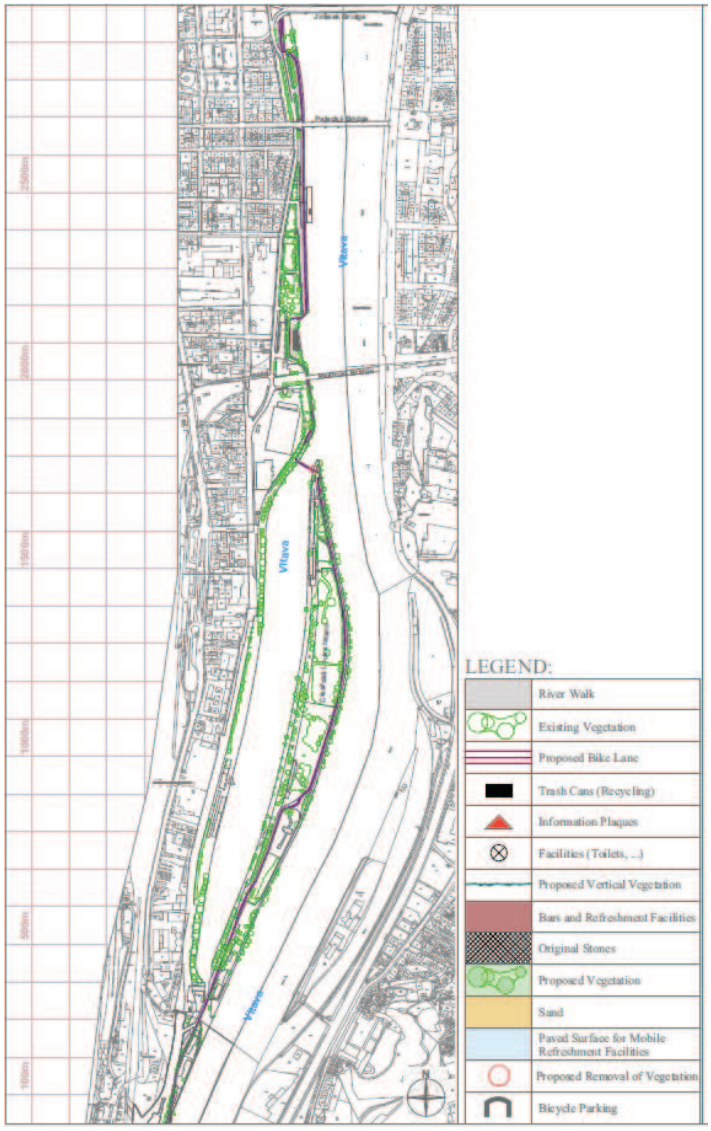
Fig. 5.12 can be found as Appendix B.1.3 in full resolution.

5.2 Complete Design

The design is simplistic, but the terminology can be applied to future designs. It is focused on identification where the impact is needed the most.

5.2.1 Overall Design

The bike lane is the most visible and also the most important part of overall design. It will be creating the connection to A1 bike lane on South and continuing to city center on North.



In the northern part of the design (Fig. 5.13) there will be a bike lane connected to the communication that is unidirectional. In order to maintain bidirectional cycling path, it will be necessary to place a contra rotating bike lane from the center. In the opposite direction cyclists will join the existing roads, which will be labelled as recommended (multi-purpose) cycling lane.

Fig. 5.13 can be found as Appendix B.2.1 in full resolution.

Figure 5.13: Overall Design, Bike Lane

The recommended (multi-purpose) cycling lane (Fig. 5.14, left) is usually used for supplementing the cycling infrastructure in a already existing street. Recommended cycling lanes are characterized by a dashed line. Unlike the regular bike lane (Fig. 5.14, right) the multi-purpose cycling lane can also be used by other forms of transportation. The main benefit of a multi-purpose bike lane is highlighting the possible presence of cyclists.

Figure 5.14: Multi-purpose cycling lane (left), Bike lane (right)

The regular cycling path will be used in most places of the river walk area. In the narrower areas there will be space for a collective strip designed for cyclists and pedestrians. Bike path for two-way traffic is supposed to be at the least 2.5 meters wide, ideally 4 meters (Cyklodoprava, 2015). The design reflects the limits for designing a two-way traffic bike lane. In places where the space allows for it, the bike line would be 4 meters wide. In case of lack of space the lane has the minimum width 2.5 metes.

The illumination will be built in to the bike path. It will serve mainly as a leading sign. The surface of the bike lane will be unified and changing as little as possible. There will be signs indicating a biking path printed on ground and also as road signs. Additionally it should be accompanied by signposts with information about the bike lane, such as length, direction, etc.

In places where the concentration of parked bicycles is high or where the concentration will be expected in the future, it is necessary to establish a well-organized, convenient and secure bicycle parking. The parking opportunity itself is capable of increase the demand for cycling. A solution would be to deploy a small amount of parking spaces, such as inverted "U" bike racks, allowing cyclists to attach the bicycle for short-term parking near their destination.

5.2.2 Matrix

The Work Program Matrix (Fig. 5.15) is an instrument for better and more efficient management of work. It implements what steps to do first, which parts are the most important and critical and what can be postponed for later.

It is a approximate schedule for working process.

PROJECT	IMPORTANCE	TIMERFAME	DEMANDS Time	DEMANDS Financial
Overall Design				
Bike lane construction	1	1	1	1
Illumination	2	2	2	2
Parking for bikes	3	3	3	3
Design Sections - River Walk				
Trash cans for recycling	2	1	3	3
Information plaques	3	3	3	3
Parking for bikes	3	3	3	3
Facilities (toilets, ...)	1	1	2	2
Bars and refreshment facilities	1	1	2	2
Vertical vegetation	2	2	2	3
"Smíchov beach"				
Proposed vegetation	1	1	1	3
Surface treatment	2	2	2	2
Trash cans for recycling	2	1	3	3
Parking for bikes	3	3	3	3
Císařská Louka Island Connection				
Bridge construction	1	1	1	1
Removal of vegetation	1	1	3	3
Trash cans for recycling	2	1	3	3

IMPORTANCE		TIMERFAME		DEMANDS Time	DEMANDS Financial	
1	Catalytic/Very important	1	Now	1	1	High demands
2	Very important	2	1 year	2	2	Medium demands
3	Important	3	As available	3	3	Low demands

Figure 5.15: Work Program Matrix

Conclusion

People like to spend their free time in places, where they feel comfortable and safe. This place is, for most people, at home. To create a successfully usable and nature related environment in a large city as Prague is not an easy task. Even considering the best designs, it is ultimately within the citizens themselves whether they utilize the space.

That is the reason, why I decided not to over design this place. My aims were to give people the opportunity to choose how they want the embankment to look like. My inspiration came mostly from the opposite sides of the river.

People are social based creatures and they need contact with other creatures (people, animals) on a daily basis. They need an appropriate place for creating those contacts, a place where they will feel safe and welcomed, place which will cover their needs.

For a good functioning place it is necessary to provide enough opportunities for a wide range of people, considering different age groups, handicapped, etc. To succeed this task it is better to proceed in several steps, rather than implementing all adjustments in one time. Within some time range there is a possibility to adapt the original design accordingly to the current situation, while implementing feedback from the public.

The complex part of the design is the bike lane, which will allow cyclist to safely enjoy ride with no conflict with motorized vehicles. It will also create easier access and bring more people to the river walk.

The river walk itself is already a nice place, but it needs more maintenance. It will become more attractive for people by adding new bars and refreshment facilities.

From the river walk, there is an easy connection to "Smíchov beach", which in a ideal world will be publicly accessible. It will be used for connecting bike lanes from the river walk to the bike lane leading from Císařská Louka Island. There will also be a place designated for parking cars. The newly designed vegetation will serve as a buffer between the public space and parking place- both visual and sonic. It is also meant for cooling the place.

Last but not least is the connection of the Smíchov embankment and Císařská Louka Island. It will be used not only by cyclist, but by pedestrians as well. The floating bridge is one of the possibilities of how to connect the two river banks. The main idea is the connection itself.

I believe people would enjoy revitalized the Smíchov embankment.

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List of Acronyms

AMP – Archív hlavního města Prahy (Prague City Archives)

ČKD – Českomoravská Kolben-Daněk

ČSÚ – Český Statistický Úřad (Czech Statistical Office)

ČÚZK – Český Úřad Zeměměřičcký a Katastrální (Czech Office for Surveying, Mapping and Cadastral)

EECONET – European Ecological Network

ELC – European Landscape Convention

FLO – Frederic Law Olmsted

IPR – Institut plánování a rozvoje hlavního města Prahy (Prague Institute of Planning and Development)

ISKN – Informační systém katastru nemovitostí (Information System of the Cadastre of Real Estates)

KN – Katastr nemovitostí (Cadastre of Real Estates)

NCA (AOPK) – Nature Conservation Agency (Agentura Ochrany Přírody a Krajiny České Republiky)

PVL – Povodí Vltavy

TSES – Teritorrial System of Ecological Stability

ZABAGED – Základní báze geografických dat (Primary Geographic Data)

List of Figures

List of Tables

Appendices