LANDSCAPE RELATED FACTORS AFFECTING URBAN SPRAWL IN EUROPEAN CITIES

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ABSTRACT

This thesis aims to discuss some issues related to the actual situation of suburban sprawl in Europe and focuses on the nature and landscapes. Urbanization is a main topic in EU, since cities are still growing, economy is stabilized, although it faced some challenges during the last decade and the larger part of Europe experiences a long period of time with no war or health epidemic. People have the resources to invest in new housing and in many cases they want to fulfill their dream of a house with garden. But this vision requires a lot of space usage so cities are sometimes spontaneously expanding beyond their borders and sometimes it does not even correspond to state urban policies.

Urban sprawl is also a serious issue for European nature that does not have as many space alternatives as for example the USA. There are issues with coastal habitats, landscape fragmentation and loss of natural habitats.

Thus, this thesis aims to find the main drivers behind urban sprawl and issues related to them. It analyzes its political, economic or social background and deducts solutions for urban sprawl repair with the help of successful projects or experience of states/cities, that suffered from urban sprawl but managed to find a way how to keep the urban development in balance. In this thesis it is a case of Norway. In practical part of this thesis, two case studies were chosen to represent characteristic problems of urban sprawl. They are from Portugal (regional level) and Czech Republic (community level). Those two cases are analyzed independently on each other and variations of solutions are found for them.

Keywords: urban sprawl, suburbanization, landscape, protected nature, coastal region

RESUMO

Esta tese tem como objetivo rever a situação real de expansão suburbana na Europa e centra-se na natureza e paisagens A urbanização é um tópico principal da UE, uma vez que cidades ainda estão crescendo, a economia está estabilizada, embora enfrentou alguns desafios durante a última década e a maior parte da Europa experimenta um longo período de tempo com nenhuma epidemia guerra ou de saúde. As pessoas têm os recursos para investir em novas habitações e em muitos casos eles querem cumprir seu sonho de uma casa com jardim. Mas esta visão requer uma grande quantidade de uso do espaço tão cit-s são por vezes espontaneamente expandir além de suas fronteiras e às vezes nem sequer correspondem a afirmar políticas urbanas.

A expansão urbana também é um problema sério para a natureza europeia que não tem como muitas alternativas espaciais como por exemplo os EUA. Existem problemas com habitats costeiros, corredores quebrados ou, por exemplo isolado populações.

Esta tese tem como objetivo encontrar os principais impulsionadores da expansão urbana e as questões relacionadas com eles. Ele analisa seu fundo político, económico ou social e deduz soluções para reparação de expansão urbana com a ajuda de projectos de sucesso ou experiência de estados / cidades, que sofria de expansão urbana, mas conseguiu encontrar uma maneira como manter o desenvolvimento urbano em equilíbrio. Nesta tese é um caso da Noruega. Na parte prática desta tese, dois estudos de caso foram escolhidos para representar problemas característicos da expansão urbana. Eles são de Portugal (nível regional) e República Checa (nível comunitário). Esses dois casos são analisados de forma independente uns dos outros e as variações de soluções são encontradas por eles.

Palavras-chave: expansão, suburbanização, paisagem, natureza protegida, região costeira

RESUMO ALARGADO

Esta tese foi desenvolvida para analisar, quais os efeitos e mudanças que a suburbanization-subdivisão da expansão urbana na paisagem, nos elementos naturais e nas suas relações. Foca-se assim principalmente nos seus efeitos negativos. Os efeitos negativos incluem, elementos de vegetação compósitos, a funcionalidade do sistema (corredores ou habitats) e degradação estético causado pela construção desordenada, geralmente habitação. Esta tese está dividida em três capítulos principais. Os dois primeiros capítulos, teóricos, analisam o plano de fundo de suburbanização e expansão urbana. O terceiro capítulo estuda dois casos práticos, que põem em prática o conhecimento teórico.

O Primeiro capítulo lança um olhar sobre as origens da suburbanização, que remontam ao século XIX. Neste período eram cidades compactas e pedestres **com serviço de transporte adequado.** As únicas habitações existentes no exterior das muralhas da cidade estavam situadas nas fronteiras da cidade e eram habitações de classes sociais altas, que queriam deixar as baixas condições de higiene, que resultavam das fábricas localizadas perto de centros urbanos e do uso do carvão. O maior crescimento da suburbanização começa com a visão de **Garden City**, introduzido por Ebenezer Howard. Este tipo de cidade consistia num núcleo central, rodeado de anéis de habitação e espaços verdes públicos, combinados com círculos e linhas como vias rodoviárias. Isto lançou uma nova onda de construção de moradias, que poderiam ser vistas do espaço nos EUA na década de 50 do século XX, sob condições específicas que é descrita nesta tese, e dura até hoje. O modelo ideal é representada por uma moradia familiar, com garagem, interior amplo e com muita luz, jardim e uma piscina. O crescimento urbano desorganizado, um conjunto habitacional homogéneo, não compacto e muitas vezes descontrolado na periferia das cidades ou no meio rural, foi acompanhado por uma utilização em massa do transporte automóvel, de uma forma desmedida. Hoje em dia a suburbanização é afectada por factores socioeconómicos e políticos, como o aumento da qualidade de vida, a globalização, o individualismo ou da ausência de políticas governamentais. Esta situação perdura desde o final do século XX, tendo o seu pico entre o ano 2000 e o ano 2008. No final da primeira parte teórica, faz-se a avaliação dos prós e contras de expansão urbana, das soluções possíveis para o desenvolvimento no futuro e por último mas não menos importante, dos efeitos da natureza sobre a saúde da população e da importância do ser humano estar rodeado pela natureza. Além da importância de ter uma paisagem funcional e saudável, que é parte indispensável e essencial do património europeu, a paisagem é de suma importância para a população em si. Não podendo ser substituída por elementos artificiais como cercas, casas ou rede viária densa, sendo também possível observar no processo de suburbanização: O movimento da população para fora

cidade, onde existe falta de vegetação, para viver na natureza. Paradoxalmente, convertem a natureza em novas cidades. É por isso, necessário melhorar, em primeiro lugar a cidade onde vivemos e proteger a vida selvagem.

O segundo capítulo teórico, mostra três exemplos representativos de expansão urbana europeia: A Noruega como exemplo de países do norte e oeste, a República Checa como exemplo de um pais pós-comunista e Portugal, que representa os estados costeiros como a Grécia ou a Itália. Este capítulo analisa a fundo a Evolução urbanística específica de cada estado e seus actuais problemas suburbanos. Este capítulo também se concentra em mostrar as diferenças de cada país da EU, levando a uma abordagem individual, para solucionar e gerir os seus problemas. É dada especial atenção à natureza e à paisagem, que estão a ser afectadas pela expansão urbana. Os melhores resultados são observados na Noruega, razão pela qual é um caso de estudo representativo e não foi por isso incluído na parte prática. A Noruega reconheceu o problema da expansão desordenada, quando esta se dirigiu para "Marka", um grande anel de florestas ao redor da capital Oslo. A Noruega promove a construção de prédios em vez de edifícios unifamiliares e **biophilic e abordagem ecológica em geral**. A República Checa inicia a resolução da expansão urbana. Processo este, semelhante ao de muitos outros países do leste da UE, foi contudo atrasada, com a era do comunismo bem como pela falta de capacidade administrativa para resolver o problema com o desenvolvimento descontrolado da construção habitacional, mostrando os mesmos sinais de má suburbanização, que podiam ser vistos nos EUA como em muitos países da UE ocidentais nos anos anteriores. Ainda assim, a situação começa a estar sob controlo e oferece muitas soluções para a reparação da expansão urbana. Portugal, como um estado do sul e costeiro, tem um carácter específico de suburbanização. A tendência da construção de grandes habitações unifamiliares podem ser vista, contudo não está, ainda, fortemente disseminada. Os maiores focos para novos projectos imobiliários são a costa, com belas vistas e natureza intocada. Essa é a principal razão para a protecção e preservação da natureza. Portugal tem muitos locais, que estão sob a proteção do Estado e da União Europeia, mas a aplicação da lei não está em pleno vigor.

O Terceiro capítulo é dedicado a estudos de casos práticos a nível regional e da comunidade. O estudo destes dois casos mostram possíveis formas de abordagem de como lidar com a suburbanização já existente e centra-se na utilização de elementos naturais e re-organização do espaço para trazer equilíbrio em locais escolhidos e para direccionar o desenvolvimento de uma forma correcta. Um dos melhores exemplos da recuperação dos danos feitos pela expansão urbana em Portugal e a zona costeira de Cascais. Nesta região, os edifícios unifamiliares foram detectadas em maior número. Estão também presentes condomínios fechados e construções ilegais em áreas

protegidas por lei. O seu carácter mostra, que esta tendência está em ascensão. Neste estudo de caso, foram estabelecidos limites firmes, as áreas de desenvolvimento foram reorganizados e foram adicionados alguns novos elementos nos centros de cidade / vila, em vez de ocupar lotes vazios e terreno natural, é sugerido o uso de edifícios já existentes de grandes dimensões ou abandonados, para dar nova finalidade. Um dos exemplos que pode ser dado são as Quintas que têm um alto valor e que são na sua maioria locais históricos, do tempo em que Cascais era uma zona agrícola e pesqueira. Podem ser reconstruídos com o fundo financeiro da UE para servir como ponto turístico ou como centros de desenvolvimento regionais. Isso pode incluir a educação, a agricultura ou a ecologia, actividades de lazer ou habitação rural, tão popular hoje em dia. O estudo de caso de Cascais, onde geralmente se tenta encontrar um equilíbrio para o turismo e natureza, destina-se a encontrar um caminho comum, que pode levar ao desenvolvimento bem sucedido e positivo de ambos.

A nível da comunidade, é representada a aldeia República Checa em Větrušice. É um exemplo típico de suburbanização próximo grande cidade do interior na Europa. Em Větrušice, toda a situação é solucionada através de um processo de paisagismo. Novas ruas, parques e sebes são adicionadas para isolar a paisagem aberta de zona urbana e proteger os valores estéticos do local. Para Větrušice, novos caminhos para pedestres e bicicletas foram planeados como um elemento importante para os moradores locais, uma vez que novos residentes não têm qualquer ligação com os antigos moradores e são totalmente dependentes do transporte carro, que é um dos principais sinais de expansão urbana. Em ambos os casos de estudo práticos, a meta é a mitigação de expansão urbana existente, possível graças à simples re-organização do espaço e reforço do papel da paisagem e da vegetação em locais dedicados.

Esses dois casos de estudo mostra formas possíveis e abordagens como lidar com a suburbanização já existentes e centra-se na utilização de elementos naturais e re-organização do espaço para trazer locais escolhidos para o equilíbrio e para dar-lhes direção certa para um maior desenvolvimento. Regional estudo de caso lida com a questão de forma geral e que procuram em vez maneira urbanístico, como lidar com a expansão urbana existentes ou previstas. estudo de caso local vai mais fundo em olhar para o problema da suburbanização e se concentra em detalhes, como o plantio, trilhas direcções ou atualização comunidade. Juntos, os dois estudos de caso fornecem visão complexa sobre a expansão urbana em geral e dar uma visão mais ampla do ponto de vista da paisagem.

A tese é acompanhado por oito lista Mapas (Cascais, Větrušice e estudos de caso), 3 listas de corte (Větrušice) e 6 visualizações de estudo de caso Větrušice.

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AD	anno Domini (before Christ)
AML	Metropolitan Area of Lisbon
AMSL	above mean sea level
CCTV	Closed Circuit Television
CODIS	Community Research and Development Information Service
EEA	European Economic Area
e.g.	for example
etc.	an so on
EU	European Union
EUR	euros
INE	National institute of statistics
MMR	Ministry of Regional Development
NPSC	Natural park of Sintra-Cascais
IROP	Integrated Regional Operational Programme
OPE	Operational program of EU
PPK	Landscape Care Programme
SAC	Special Areas of Conservation
UK	United Kingdoms
USA	United States of America
WUP	Weighted Urban Proliferation
WW2	World War 2

1 THEORY: THE ISSUE OF SUBURBANIZATION

1.1 INTRODUCTION TO THE DEVELOPMENT OF CITIES

Urbanization is a socio-spatial form of social organization. From a qualitative point of view it is a cultural and social process, from the quantitative point of view it is a concentration of residents to the city. For European countries, slower pace of urbanization and the emergence of medium-sized cities of 20-100 000 inhabitants is characteristic, which is caused by the nature of the European landscape (like scale, fragmentation etc.) (Ouředníček et al., 2013).

Ouředníček et al. (2013) characterizes four basic stages of city and its development. These include urbanization, suburbanization, de-suburbanization and re-urbanization. The referred author mentions that urbanization, the first stage, is generally caused by changes in rural and agricultural areas. A frequent reason is decline of jobs, wages, quality of life and increase of industrialization, which motivates people to leave the countryside and move to cities, where they can find better offers and opportunities. This phase was typical in the 19th century, due to railway and factories development. As an example can serve city of London, to where large masses of population from rural areas started to move in and they mainly concentrated into the core of cities, close to factories. At that time, work and place of living was in walking distance, since the automobile traffic did not exist yet or was not as heavily spread as nowadays (Šilhánková, 2007).

At a later time (between two world wars) it leads to further construction of railways, which significantly contributed to improving accessibility to the city from nearby towns or from its periphery. Factories, causing excessive pollution and overall decreasing living conditions in city, were moving to these periphery locations. There was a process of urban **succession**, a gradual migration of indigenous people to areas with better housing, which was usually found towards the outskirts of city. At the same time, there was a substitution of original inhabitants with new immigrants of lower social status. In most industrialized areas of the city illegal dwelling and housing were increasing. At this stage, the growth of the region dependent on core city is observed (Morelli, 2010).

Another phase of suburbanization started after the industrial era. Generally, the arrival of **suburbanization** is connected with automobile development and bus service improvements while new infrastructure is constructed and improved. This allows a better connection between hinterland and city center and enables internal migration of people. Next is the improvement of living and working conditions and increased desire of the population for better life in a healthier environment. Therefore first drafts of **garden cities** are founded, urban agglomeration arises, that are spreading along main transit routes and joints. By separation of home and work (unlike the trend in industrial

age) commuting and higher dependence on public transport arises. At this point, the differences between the EU countries can be observed. That is mainly caused by economic and political situation in each country (Morelli, 2010).

The so-called suburbanization is followed by **de-urbanization**. Its cause is the beginning of city center depopulation and migration of population to the periphery. The city center, where the majority of job offers are located, is less accessible, increases demand for parking spaces and also traffic itself is denser. Tertiary sector has also great influence. It includes services that help displace the original residential function of the city. Even so, some services of everyday life (mostly grocery supermarkets) move for relocated populations. Originally rural areas near town hinterlands are transforming into urban settlements, negatively degrading the natural environment and agricultural land. On the contrary, mainly smaller centers beyond commuting distance of a dominant center are growing (Hnilička, 2012).

At this stage there are numerous European cities with growing suburbanization, mainly in the Western Europe. However, we see a new trend and that is **re-urbanization**. Thanks to it, living and environmental conditions in the city are improving, housing funds are being restored and it also attracts new investors and employers. In the end it is ultimately changing social and demographic structure of the population itself. Thanks to a targeted policy of the municipality, which listens to needs of its residents, it is possible to stop urban decline (Hnilička, 2012).

Economics is considered as the **main driver** of any changes, where various stages of urban development are determined by economic changes in society. New processes in town development firstly appear in the most economically advanced countries and the diffusion spreads to other parts of the world. According to current trends it seems, that economical influences have resulted in de-surbanization processes, which can be corrected by targeted urban spatial planning and therefore support re-urbanization of cities (Hnilička, 2012).

Urban development is considered to be a process, that takes the form of repeated cycles, but the empirical evidence from European countries demonstrates no more than one (mostly unfinished) development cycle. Ouředníček et al. (2013) consider the development of cities as a natural (by human little affected) process. Currently, they point to a "final" stage in the development of cities - **urban decay** (urban decline). From this stage there is only one way out - to support re-urbanization trends through consistent urban planning. It is therefore a somewhat contrived return to population concentration, when economic influences have apparently de-concentration tendencies.

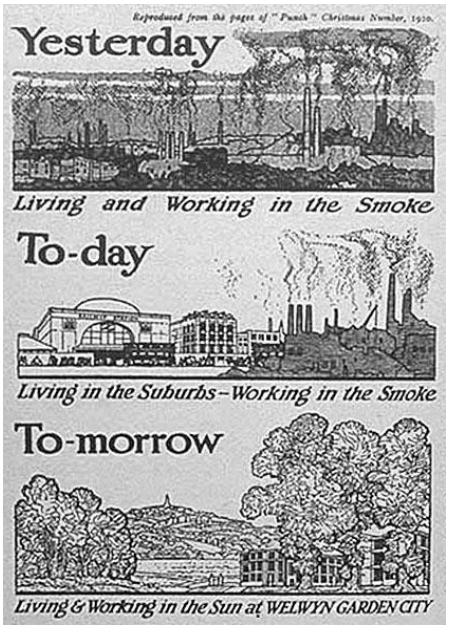
1.2 DEVELOPMENT OF SUBURBANIZATION

This work focuses on suburbanization beginning at the end of the 20th century and also primarily on

trends of the past 10 years. Urbanization itself stands on the foundations of European cities, whose roots go back by hundreds of years. Monitoring suburbanization is relevant from the beginning of industrial revolution, which triggered a massive shift of population to cities. This thesis describes process of suburbanization from spatial, demographic and environmental aspect.

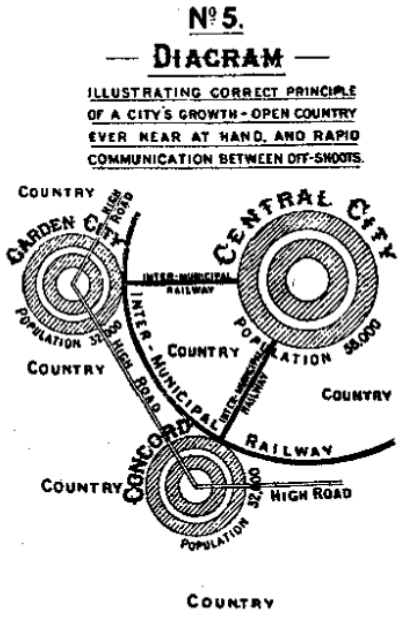
Suburbanization is considered as a natural development of European cities. The process began in the 19th century during the Industrial Revolution. At the time, the largest cities in Europe were London and Paris. Due to over dense center and poor living conditions (pollution, crime and diseases), socially higher class moved to suburban areas. Britain of 19th century also promoted new trend: **the nuclear families** (i.e. a couple with children). This pattern became the basic unit of the family and it was protected in a house that created place of escape and protection from the outside world. Great influence on the development of the suburban trend also had American planners (e.g. Frederick Law Olmsted and his idea of a garden city) and transport infrastructure development. The rapid development of urban sprawl occurred in the second half of the 19th century with the development of the railways. At that time, the concept of an ideal living has varied from state to state (London residents in suburban areas preferred living in the house, while the residents of Paris appreciated flats in an apartment house on a busy street downtown) (Couch, 2007).

In the 19th century many poorer residents migrated to cities to work and increased the growth of cities at that time (Hnilička, 2012).



Picture 1*:* Propagation poster for garden city

Source*:* classes.sdc.wsu.edu



Picture 2*:* Diagram of ideal garden city

Source*:* classes.sdc.wsu.edu

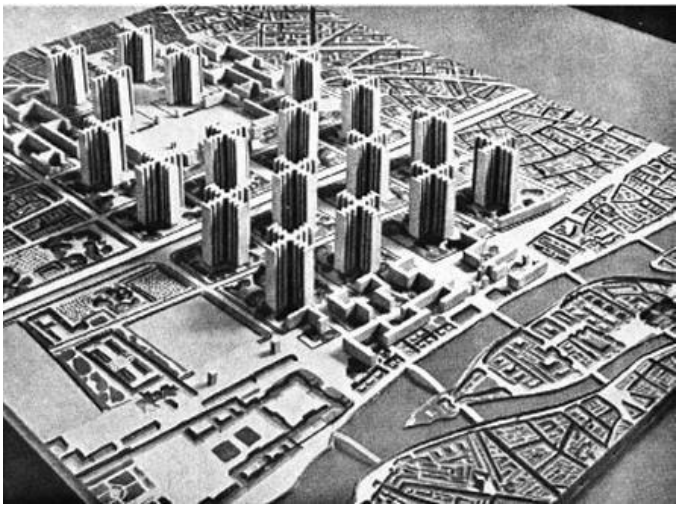
In the **early 20's of 20th century**, at the stage of starting suburbanization, trend of garden cities arising

by authors like Ebenezer Howard and F.L. Olmsted can be observed. Ebenezer Howard created the concept of garden cities, in which he saw the solution for the growing problem of London sprawl. He considered unsustainable city environment of this metropolis, where five million people lived, as the key issue. His ideas on the cities reform were expressed in 1898 in the book called “Tomorrow: A Peaceful Path to Real Reform”, which triggered great interest in the newly proposed concept. Three years later, he published this book with incorporated comments and suggestions under new title: “Garden Cities of Tomorrow” (Picture 1 and 2). Based on his ideas, the urban development of towns Letchworth and Welwyn began. City was described by circular design of central character with a park situated in the middle, surrounded by public amenities. Then housing area followed, that was separated from other living areas by radial designed green belt. Another green zone were closing the residential area toward the outside and behind that, he placed industries and manufacturing. The town was closed by a green ring, which clearly defined the limits of urban development and prevented further sprawl. He proposed to create group of six cities, where the seventh city should play a central role for this group of towns. This way Howard wanted to find a way, how to stop population influx into the cities and to turn this incoming trend towards the countryside. He was looking for a way to entice residents from “unhealthy city" to the "healthy landscape". He thought he found a solution in establishing new cities that should eliminate disadvantages of life in the city and in the countryside. On the contrary he wanted to combine all its advantages, thus linking these two very different locations in a logical and functional unit (Hnilička, 2012).

The new city proposed to build 1,000 acres and settle them with 23,000 inhabitants - the proposed density was roughly 80 inhabitants/ha, which corresponds to standard two-storey terraced houses, but does not represent a city character. His primary effort was not a reduction of population density, but the addition of greenery, respectively, enough of public urban spaces. That was exactly what industrial cities received the least. Still, the quality of public spaces implemented in garden cities (like streets, parks and squares) is incomparably better than in most of today's suburban settlements. The main reason is, that it was carried out on by projects, which were mindful of public spaces and the overall quality of neighborhoods (Hnilička, 2012).

This theory has also found its critics, who noted that vision of garden cities will be transformed into a housing sentiment, which can be seen in the USA and now in Europe, as it meets the wishes of population to live in a healthy environment, in their own house with a garden. The aim to solve the housing issue in the form of satellite colonies at city periphery, regardless of problems of the city, inevitably leads to the emergence of new problems, instead of solving of already existing issues of the city. The commuting distance from apartment to job overloads the traffic and wastes time of those commuting people (Žák, 1947).

Development of a numerous cities was also influenced by opinions of American architect Frank Lloyd Wright, who introduced the concept of so-called "**organic city**" in the 20s of the 20th century. The idea sought a natural and progressive development of cities, respecting historical tradition and existing under specific natural conditions. The architect was even refusing the very existence of the city, as he wanted to preserve values of rural life, but with benefit of motorization use. In the future, he saw no reasons for concentration of activities within the town borders. He assumed scattering of both housing and job functions. He even anticipated emergence of contemporary suburban shopping centers and significance of speedway crossings as growth poles. He basically supported the tendency typical for urban sprawl. While F. L. Wright conceived the city to be planned horizontally**, Le Corbusier** visioned his cities in height (Picture 3). The reason for vertically directed building was clear: he wanted to get as much free space in terrain as possible. His conception of cities with maximum free space, while applying three essential items **- sun, trees, space** - had an ambition to guide the development of urbanism and build cities of the future. He rejected streets in general and defended the projected increase in car traffic, which according to him, was incompatible with the traditional street system. At the same time, he tried to return the green spaces back to cities, instead of trying to convince inhabitants to go out to meet the nature. The main element of his plan for city of 3 million inhabitants was skyscraper, rising from the lush greenery. Around cities, he designed wide free zone with forests and meadows, and behind them belt of garden cities (Hnilička, 2012).



Picture 3: Le Corbusier, The Radiant City

Source: www.archdaily.com

In the **50s of the 20th** century, garden satellite suburb of Helsinki (Tapiola) was build up, situated in forest areas. Le Corbusier proposed linear cities, formed by the lines and influenced by the thesis, that the main communication must be axis of urban organism. However, the problem with the current spatial separation of the various functions of the city arises. Residents of suburbia, where residential function is mainly separated from other functions, are therefore forced to commute for services or jobs to other parts of residential agglomerations (Krier, 2001).

Development phases of suburbanization:

1. **primary suburbanization** – emergence of suburbs, gradually enlarging the territory and buildings

2. **modern suburbanization** – part of urbanization, relocation of population in the city's hinterland, qualitative changes in transportation (public transport), separation of residence place and workplace

3. **postmodern suburbanization** – growth of new cities, that are independent on core city in metropolitan area. Example: exurbia, technourb or technocity in the USA, eastern Asia, Russia, Western Europe (Ouředníček, 2002).

1.3 DRIVERS BEHIND URBAN SPRAWL IN EUROPE

Firstly, it is important to state, that the process of suburbanization and urban sprawl is characteristic to each region and cannot be applied to Europe as a whole. A study carried out by Hay and Hall (1980) shows significant differences between northern, central or southern European states (Table 1).

Table 1: Character of urban sprawl in different countries (Source: Morelli, 2010)

Part of Europe	Trends
North (Sweden, Finland, Norway, Denmark)	decentralization, inter-regional shifts, social housing, growing cities with minimum urban sprawl
Central (Germany, Austria, Belgium)	housing and employment decentralization with the exception of Germany, private rented housing, growing cities with minimum urban sprawl
West (UK, France, Netherlands)	decentralization, social housing, owner housing, growing cities with minimum urban sprawl
South (Portugal, Italy, Greece)	strong centralization, owner housing, mixture of growing cities with minimum urban sprawl (Lisbon, Athens) and declining cities with urban sprawl (Rome, Taranto)
East (Czech republic, Slovenia, Hungary)	Before 1989: social housing, after 1989: in transition, declining cities with urban sprawl

After the agricultural and industrial revolution, the greatest milestones in the history of mankind, we are currently going through communications and digital revolution, which began to take shape after World War 2, in the 50s of the 20th century. These processes and activities are focused on abstract work linked to information and data. This allows flexibility in attendance to work, shortening working times or flexible working hours. De-industrialization leads to a massive development of tertiary sector and has strong spatial impacts. First important signs of urban sprawl started to be shaped in the late 1980s (Morelli, 2010).

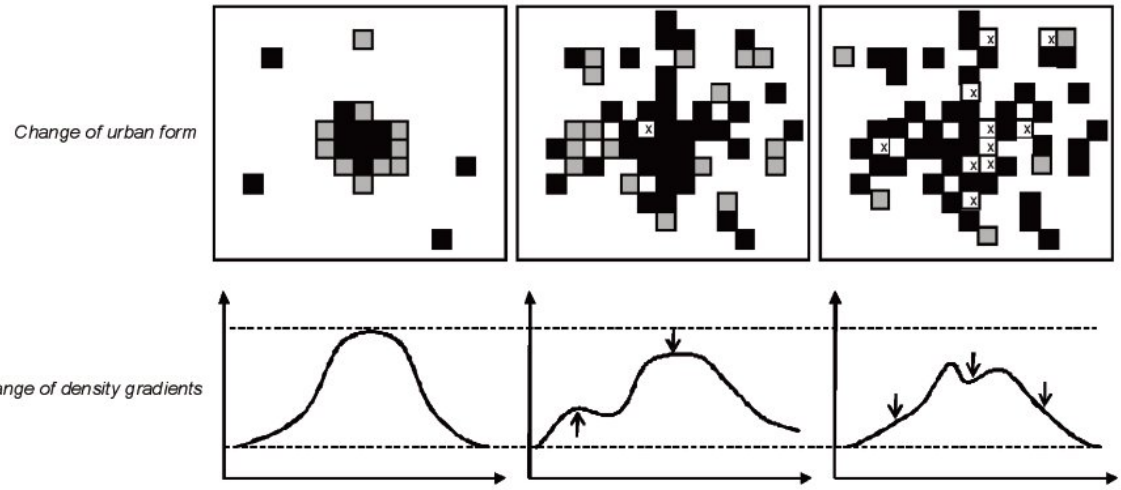
Urban sprawl is divided into three sub-groups: **industrial, residential and manufacturing**. This thesis deals with residential urban sprawl as one of the main causes for inner city decline (city core), the risk of brownfields emergence and similar.

Clear definition of term "urban sprawl" is still missing. Therefore "**urban sprawl**" is often understood as classic suburbanization:

Carruthers and Ulfarsson (2002) define urban sprawl as "*unplanned, uncontrolled and uncoordinated single- use development that does not provide for a functional mix of uses and/or is not functionally related to surrounding land uses, and which variously appears as low-density, ribbon or strip, scattered, leapfrog or isolated development*."

Galster et. al (2001) define urban sprawl as "*a pattern in an urbanized area that exhibits low levels of some combination of eight distinct dimensions: density, continuity, concentration, clustering, centrality, nuclearity, mixed uses and proximity"*

Urban sprawl is a process that differs from state to state due to historical, cultural, natural, socio-economic and political conditions. The main characteristics and tendencies are, however, common to all. From the structure point of view, it is divided to **compact form**: best option, **linear form**: route of train, where dwellings are located at its individual stops, **scattered** and **leapfrogging**: dependent on car traffic, distances without mutual connectedness (Picture 4).



Key issues	"Compact City"	„Growth Sprawl"	„Shrinkage Sprawl"
Development stage	until 1960	1960 – 2000	from 2000
Population growth	high	high/moderate	negative
Urban form	compact	dispersed	highly dispersed
Urban density	high	moderate/low	low
Centrality	mono-centric	poly-centric/dispersed	none
Infrastructure efficiency	high	moderate/low	very low

Picture 4: Development of urban sprawl

Source: http://www.cairn.info/revue-flux-2010-1-page-90.htm

Urban expansion is predicted to be between 0,4-0,7 % per year (EEA, 2006).

Couch and Leontidou (2007) note, that globalization, reduced transport costs and increased revenues are macro reasons behind urban sprawl. Authors also agree that development of urban sprawl is primarily a failure of political influence on land use and urban planning, often because of pressure from developers and investors. Combination of land use is not very enforced and overall towns are very small and fragmented.

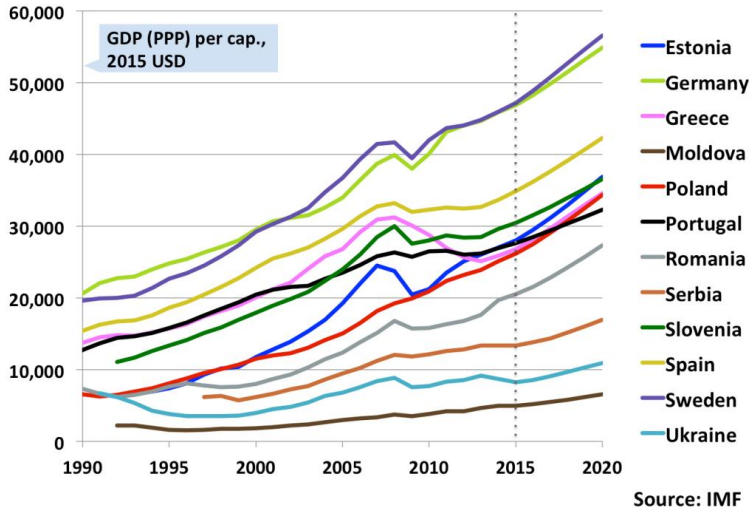
Morelli (2010) identifies some of the main factors for urban sprawl expansion. It is the effect of globalization, when production is moving to other countries, decentralization of employment and new types of employment, the shrinkage of traditional industries or rising demand for single-family nucleus.

1.3.1 ECONOMICAL REASONS

One of the main general reasons is **globalization**. One of the strong reasons for people to move to city is an employment in specialized companies, who have their headquarters usually in city centers or around. Those companies are widely looking for highly educated people in specific fields like IT, science, etc. Not left aside that those fields are principally supported by EU. Therefore those people primarily seek better job opportunities and conditions in urban environment. Rural areas are not as highly supported as urban spaces, therefore their residents move to cities and the quality of rural

spaces is declining. Another reason is **modernization** of high-speed railways and highways that are essential for trade.

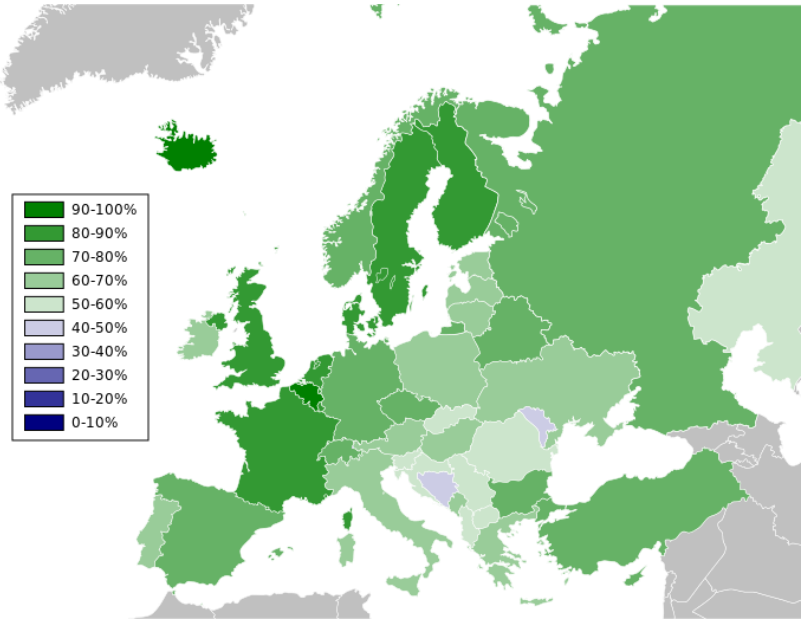
Most discussed argument for suburbanization and urban sprawl is **increasing standard of living** of population, rising incomes and a growing economy, which triggers in people's behavior greater consumerism, buying cars and houses (EEA, 2006) (Graph1).



Graph 1: GDP (PPP) per cap. growth in selected EU countries from 1990 to 2020

Source: **www.reddit.com**

An effect when rich countries have less dense settlements than developing countries, that have smaller economies, can be deduced from this opinion. The most common trend is private housing in form of large plots with big houses and ownership of 2 and more cars. This requires higher or at least higher-middle class income and economy level of the family. Urban sprawl is more intense in countries with higher salary income and with lower transportation costs. Graph 1 supports this theory. From selected countries, Sweden, Germany or Spain have significantly stronger economics than i.e. Serbia, Ukraine or Moldova, where the level of urban sprawl (and suburbanization in general) is lower (EEA, 2006) (Picture 5).



Picture 5: Urbanization in Europe in 2010

Picture shows percentage of total population or area in cities or towns

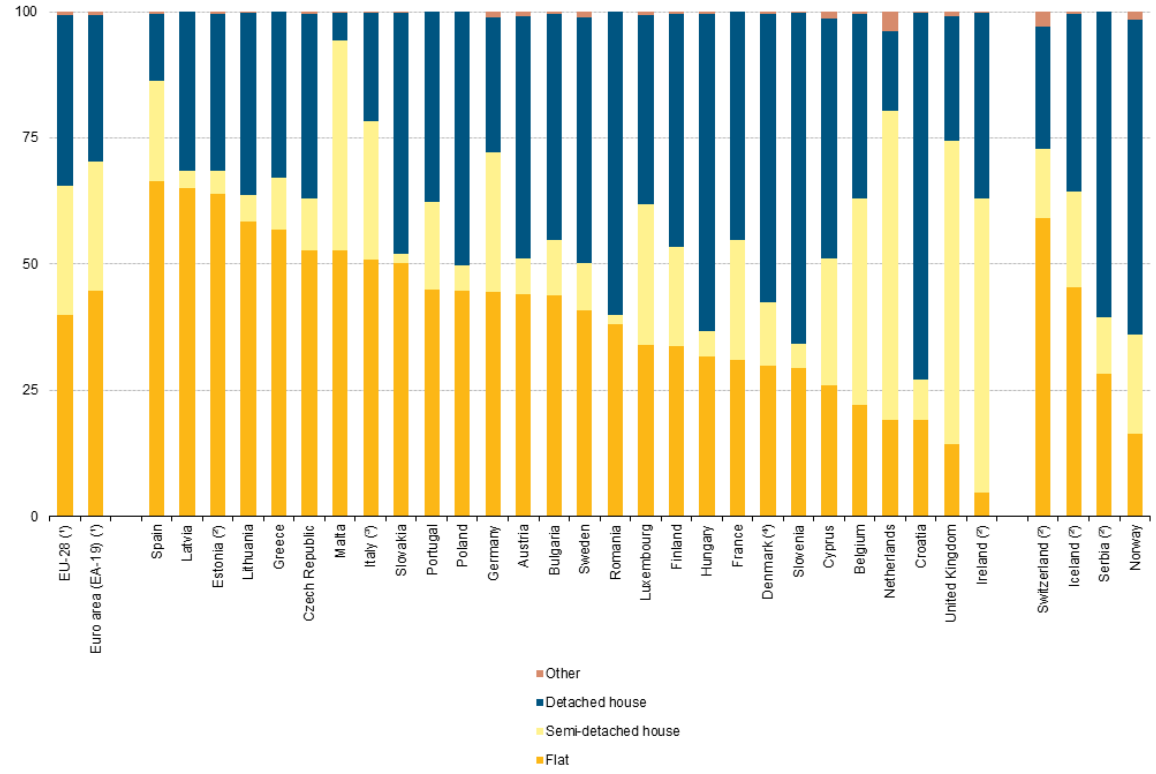
Source: **commons.wikimedia.org**

Third reason for de-urbanization is high level of **prices of properties** in city centers. Those prices are raising and developers are seeking cheaper plots on peripheries. It can be shown on example of Dublin (Ireland), where economical growth and high level of employment led to lack of accommodation capacity, so it started off the building boom. Also green-fields, non built-up properties in peri-urban areas, are cheaper to invest in than revitalization of brownfields in cities. That causes a big problem with occupation of agriculture land and its transformation into construction land (EEA, 2006).

1.3.2 SOCIAL FACTORS

Population growth and the consequently increasing demand for housing are undoubtedly social factors influencing urban sprawl. This increase also affects pollution, crime, noise and traffic in city cores, which makes people to move out of this area. In cities we can see outflow of population aged 30-40 years, who have children or are preparing to establish family. Children friendly environment, a safe neighborhood with little crime, playgrounds, parks, green areas, lower-priced housing etc. are highly demanded. When concerning the housing itself, larger houses with gardens are preferred (EEA, 2006).

In 2014, 4 out of every 10 persons in the EU-28 lived in flats, just over one quarter (25.6 %) in semi-detached houses and just over one third (33.7 %) in detached houses (Eurostat, 2015) (Graph 2).



Graph 2: Housing type distribution in EU, 2015

(Population in percentage)

Source: **www.ec.europa.eu/eurostat**

- **Czech republic:** over 50% of residents are living in flat, 40% in detached house
- **Norway:** 65% of residents are living in detached house, only 20% in flat
- **Portugal:** 47% of residents are living in flat, 40% in detached house

Young people (up to 30 years) prefer to live in city because of proximity of work, services or entertainment. Elderly people continue living in a city, because in many cases they cannot move out due to problems with mobility and need of assistance, proximity of doctors, shops etc. This often leads to segregation of the population and also to the allocation of population to periphery areas because of lack (or low amount) of housing estate in the city due to high rents or property prices (EEA, 2006).

In Norway, a survey (Sørlie 2008) was made to find out a reason for relocation to or out of the city. In 1972 the main cause was work; nowadays the main reason is family and housing. The most frequent reasons were listed in this order: family, housing, location and environment, work. It is explained by more flexible work condition because of modern technologies, better infrastructure and higher lifestyles when one can afford to buy cars and commute to work.

Phenomena of **second house** can be observed across different countries like Austria, Spain, Czech Republic, Norway or Greece. Cottages are often re-built into permanent residency, which gain advantage from better road connection or work flexibility (work from home). For elderly people it is often an affordable compromise for living out of the city with lower cost. In Norway, people combine advantages of city and rural areas, in Spain and many Mediterranean countries, second houses are used as a tourist residency during high (summer) season. It happens because of new income from rent or simply because of the possibility to invest in another house in attractive location (EEA, 2006).

Lately, the reason for resident's relocation is not that much due to population growth, but mostly due to economical and cultural reason together with individual housing preferences. A typical economic model focuses on the housing market from demand side and ignores supply side, considerations of planners and developers and location character (EEA, 2006).

1.3.3 TRANSPORTATION

Commonly known driver for urban sprawl is higher amount of car transportation. Before the mass spread of cars, people were depended on walking, carriages, later on use of public transport like trams and mainly trains. Therefore, nodes were built up by railways or main roads and close to the city center. Newman and Kenworthy (2006) proved in their world-wide study the relationship between vehicle transportation and urban density, that the more dense city, the less it is depended to transportation. This theory is confirmed for example in Oslo city (Newman, Kenworthy, 2006).

1.3.4 POLITICAL DRIVERS

Political drivers have a strong effect on urban sprawl and suburbanization in general, either positive or negative impact. In case of urban sprawl it is difficult to compare each country, because every country has its own state, regional and local laws and politics. These must refer to EU laws, but local adjustments are always present. The general agreement is that the whole system needs to be centralized. Western EU countries (Netherlands, United Kingdom) are already successfully implementing this system, but most issues come from new EU members (EEA, 2006). The following table 2 demonstrates the level of spatial planning study from year 2010 in selected countries.

Table 2: Classification of countries potential to control land-use development (extracted from Nilsson et al., 2010)

Numbers of population in towns

Control mechanisms from supra-local levels of the planning system	Most important supra-local level (from land-use change perspective)	Local level	Countries
C) strong, controlled spatial policies	Large (>1M)	any	
	Medium-sized (0.5-1M)	any	Portugal
	Small (<0.5M)	any	Cyprus, Greece, Lithuania
B) medium level of control	Large (>1M)	large (>30)	Denmark, The Netherlands, United Kingdom
		medium-sized (10-30)	Belgium, France,[5] Germany
		small (<10)	Italy, Spain
	Medium-sized (0.5-1M)	large (>30)	Ireland
		medium-sized (10-30)	
		small (<10)	Austria
	Small (<0.5M)	large (>30)	Sweden
		medium-sized (10-30)	Finland
		small (<10)	Estonia, Latvia, Luxemburg, Malta[6]
A) weak level of control	any	large (>30)	Bulgaria
		medium-sized (10-30)	Poland, Slovenia
		small (<10)	Czech Republic, Hungary, Romania, Slovakia

Portugal has a strongly controlled politics on control mechanism from supra-local levels (federal and state levels) and Czech Republic has a weak level of control on the contrary. Norway is not listed in the table, because it is not part of European Union, but it can be linked to Sweden conditions and its medium level of control.

Countries with the biggest potential of urban sprawl control: Denmark, Netherlands, Portugal, UK

Countries with the lowest potential of urban sprawl control: Czech Republic, Hungary, Slovakia, Romania

One of the reason, mentioned as a reason for low control in new member countries (usually eastern countries), is lack of administrative capacity. Generally, there is a haggling and miscommunication among many municipalities which worsens setting of conditions for suburban regeneration.

1.4 MEASUREMENT OF URBAN SPRAWL

For quantitative measurement of urban sprawl the Weighted Urban Proliferation (WUP) factor can be used. "*The more area built over in a given landscape (amount of built-up area) and the more dispersed this built-up area in the landscape (spatial configuration), and the higher the uptake of built-up area per inhabitant or job (lower utilization intensity in the built-up area), the higher the degree of urban sprawl.*"(Jeager, 2014)

This factor counts with density of constructed sites, present population and degree of urban penetration (Table 3).

Table 3: WUP factor for chosen countries

urban permeation (UPU)/m^2

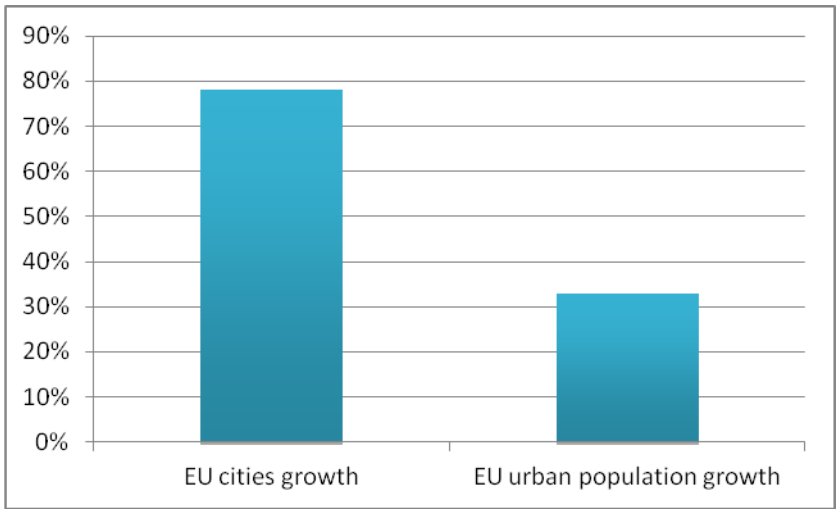
City/country	WUP
Oslo	0.19
Prague	2.11
Lisbon	2.33
Netherlands	6.61
Belgium	6.59

Torrens and Alberti (2000) created an overview of different aspects of urban sprawl and way how to measure it. The authors discuss the ecology of sprawl and ways of measuring its effect on the composition and spatial distribution of habitat patches. The measured elements are: **growth rate, density, spatial geometry, accessibility and aesthetic.**

When concerning the landscape, Torrens and Alberti (2000) describe the measurement and effect of suburbanization on environment. From geometry point of view there are five varieties: fragmentation, leapfrogging, discontinuous development, dispersal, and piecemeal development. The advantage of leapfrogging geometry is observed in unutilized space between a municipality and suburban settlement, which can be used for some type of ecosystems. It is an underrated area. It can also serve as a buffer zone between urban and intensive agricultural areas (for example in Czech Republic) and ease the impact on natural ecosystems. Low density sprawling suburbs provide basic habitats for endemic species and also provide good condition for their survival. Alternative can be a greenbelt localized around suburbia. Studies, determinating the width, length, location and the effect of slowdown process need to be carried out (Czamanski et al., 2008).

1.4.1 STATISTICS

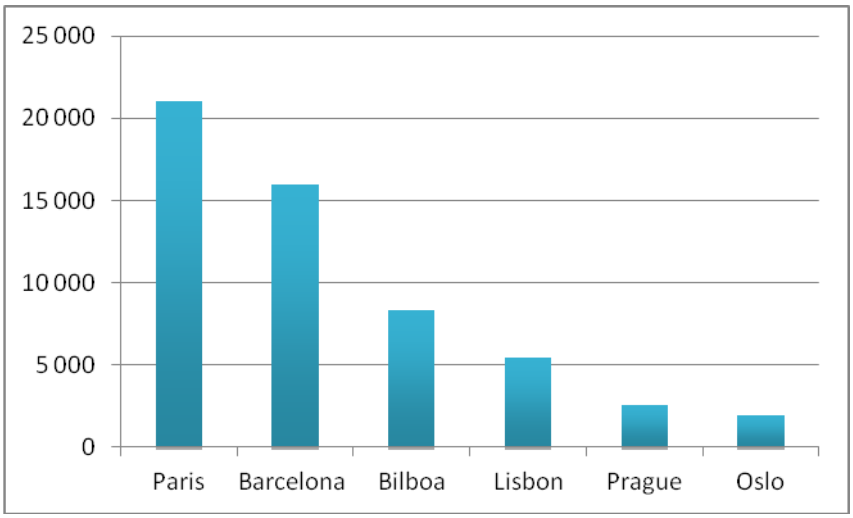
Currently, there is 72% population living in city. EEA report from 2006 predicts, that in 2020 there will be 80% of population living in cities, in some countries even 90% of population. From the 50^{th} of 20^{th} century, the size of European cities grew for 78%, but the increase of residents was only 33%. This information confirms fact that between year 1990 and 2000 there was 8000 km^2 of new built up areas, which corresponds to area of Luxemburg state. It is 5.4% increase (Graph 3).



Graph 3: Comparison of EU city and population growth in percentage

Source: EEA, 2006.

The biggest development is seen by coast lines, main transportation roads, next to rural villages close to main cities and in river valleys.



Graph 4: Comparison of three biggest cities and theory case studies, person/km^2

Source: ec.europa.eu

Graph 4 shows three most dense cities in Europe in cooperation to theory case study cities (2014), person/km^2.

1.5 PROBLEMS OF URBAN SPRAWL

According to EEA 2006 research, the most relevant problems with urban sprawl is the lack of services like schools, medical centers or doctors, low capacity of shops in those newly urbanized areas, environmental degradation, intense construction or connectedness.

1.5.1 NEGATIVE IMPACTS

In Portugal and Spain a phenomena of **urbanization of protected coasts** can be widely observed,

often as a result of expansion of coast cities like Portugal, Porto or Barcelona. According to EEA statistics from 2006, 45% of coasts were transformed into artificial surface. Portugal is claimed to have the most intense urbanization of coast where 50% of this urbanization is located only 13 km away from coastline. One the main drivers are tourism and higher demand of residents from northern Europe, like pensioners. In 20 years, EU expects an increase of population in this area by 35 million of people (EEA, 2006) (Pictures 6-9).

Pictures 6, 7: Alicante: left 2010, right 1965

Author: Pedro Armestre

Pictures 8, 9: Murcia: left 2010, right 1975

Author: Pedro Armestre

Bad environmental impact do not attract investors or service providers to invest in city areas with decreasing population, which causes people to migrate elsewhere. Home prices are dropping in the nucleus and it attracts socially underprivileged population, immigrants or generally groups of population with low income. This results in problem increase like crime, degradation of movable property and similar (EEA, 2006).

Conversely commuting to suburban areas increases emissions, noise and construction at originally green locations. This action is in conflict with the Kyoto Protocol on reducing emissions. There are many environmental problems with urban sprawl in Europe; some of them are natural resources

consumption, primarily **agriculture soil** or increased demand for concrete (+120% between years 1996 and 2006), gravel from rivers, sands and other **construction materials**. But farmer seek profit in this trend by selling cheaply gained land as a building plot for a high price to developers. Between years 2004-2006, the price of agriculture land in Poland raised by 40 %. It is important to state, that the loss of agriculture land is irreversible (EEA, 2006).

Due to construction, soils are losing the ability to retain **water**, nutrients and keep its structure. Water is not absorbed and flows down to rivers and brings dangerous substances (oils, chemicals from gardens). Soil dries out and is not able to keep its retention ability, causing a desertification development. Lack of underground water can also endanger wetlands in hinterland of larger cities. They are supplied from groundwater sources or atmospheric precipitations and the loss of this water resource leads to its disappearing and to a change in wetland related biotops. Less people in one household consumes more water, electricity and gas for general consumption, gardens, heating or use of air conditioning. For example, two-person household uses 300 liters of water every day, when two single households use 210 liters each one of them. A two person household uses 20 % less energy than two single person households. Higher consumption of water is also caused by pool supply and garden irrigation (Morelli, 2010).

The competition between consumption of water for urban areas and agriculture is critical particularly in Mediterranean areas where there is strong lack water. Example can be cities located at foothills, where they are disturbing natural water cycle or golf courses in Spain, where groundwater is collected for irrigation and salty groundwater replaces it (Morelli, 2010).

Additionally, suburban areas have problems and higher demands for **fuel consumption** for commuting, waste disposers due to longer distances to central warehouses closer to large cities. Along with that comes forest fragmentation, ecosystem and migration routes disruption. This is in contrary to goals of Natura 2000 to preserve protected areas (EEA, 2006).

As a result of having to use **cars** to commute to the suburbs traffic congestion is created, air quality is deteriorating and noise pollution occurs. Quality of life in each of these areas, where people move in particular for peace and a clean environment, paradoxically decreases. Areas with low population density, moreover, cannot be effectively served by public transport and most of the inhabitants thus have no choice but to use a car (Sýkora, 2002).

Among **economic** negative effects of suburbanization belong residents, who are not registered for permanent residence in the municipality. This way the municipality is losing tax money that should be used for construction of infrastructure, increase of technical networks capacity (or such) or improvement of wastewater treatment plant. In case municipality does not have the money for

infrastructure construction, a situation arises, when i.e. driveways must be financed by residents themselves. Therefore, property owners often choose a form of housing called “gated communities” (Ouředníček, 2008).

Gated communities, common in the Mexico, Brazil or USA**,** start to be main trend of last few years in Europe and are the highest level of suburbanization. The gated community phenomenon spread from resorts and country clubs to middle-class suburban developments (Low 2001).

According to research made by CORDIS, EU 2014, those sites are mostly developed in areas with low level of crime, although it is initially supposed to protect against crime. This fundamentally influences segregation of population and landscape, in the same time it supports undesirable homogeneity. This phenomenon is sometime called “the landscape of walls”.

1.5.2 LANDSCAPE

Suburbanization influences **biotic and abiotic components** of nature and fragmentation of landscape, which has a direct impact on the dynamics of ecosystems (Czamanski et al., 2008).

Within **the biotic components** the composition of species in a given area may change due to numerous constructions that increase the ambient temperature that is preferred by thermophilic species. These new conditions contribute to change of species diversity composition, often toward invasive species, as shown in examples in table 4 (Ouředníček et al., 2016).

Table 4: Invasive species in theory case study cities (Source: Ouředníček et al., 2016)

Country	Invasive species
Norway	*Cotoneaster bullatus, Impatiens glandulifera, Lupinus polyphyllus, Salix ×fragilis, Centaurea montana*
Czech republic	*Ailanthus altissima, Robinia pseudoacacia, Reynoutria, Ambrosia, Solidago canadensis*
Portugal	*Ailanthus altissima, Robinia pseudoacacia Agave americana, Carpobrotus edulis,* Conyza *canadensis, Acacia karroo*

The problem is not so much the existence of many species of existence as such (as it is known that urban areas often have greater species diversity than their surroundings (Czamanski et al., 2008)), but the domination of those species, that is leading to homogeneity. Private gardens are often not considered as part of the local ecosystem because they usually contain alien species that cannot provide shelter or food source for the local fauna. This fact is supported by research of Britain

vegetation richness by Roy et al. (1999). The author compared urbanized and rural areas and came to conclusion, that urbanization does not lower the number of species but changes the species diversity, especially in managed garden and parks with non-native plants. The proportion non-native species increased significantly with the increase in urban densities, resulting in a loss of the native species.

Due to the massive infrastructure or residential complexes construction, the violation of biota, migration routes and habitat fragmentation occurs. Extensive disturbance causes destruction of habitat of indigenous species (Ouředníček et al., 2008). After the external disturbance, changes in species structures or communities can last for weeks or month before they settle, but the adaptation of whole ecosystem lasts years or decades (Czamanski at al., 2008).

Construction of residential complexes built outside the territory of the municipalities and the construction of new highways and roads contribute to **habitat fragmentation**. This causes a significant problem, negatively affecting the landscape and animal populations. Fragmentation is a major issue for the European Union, since it has a direct impact on the state of organisms. Ouředníček et al. (2016) explain this problem on example of a highway that divides the land and makes it impossible for animals to breed outside their own group on one side of the road that they cannot overcome. This leads to genetic erosion of each specie (Sýkora, 2002).

Another issue is sharp boundaries of settlements, which are not naturally passing into the countryside anymore, but are terminated by dead-end street, fenced-family house or unfinished communications. This causes a fundamental change to the **landscape character**. A typical feature is not accepting town borders given by spatial plan or construction of inadequate feature that is not characteristic for the area (e.g. height). Therefore aesthetics suffers the most (disparity of construction or vice versa catalog unification) and compositions, that leads to loss of primary character of a place called "*genius loci*". Natural development of municipalities terminates and within their peripheries arise dominants like shopping centers, which represent new dominants in landscape. The availability and throughput of a landscape, isolated from residential buildings by private land, is not taken into account. In ideal case, there should be a bounded city with peri-urban area of 10-20 km width and rural areas, where these three groups intermingle (Sýkora, 2002).

Within **the abiotic components** the most influencing elements are material relocation, soil compaction, tubing of streams, increased noise, dust and air pollution overall or light pollution. This includes a public lighting, billboards, shopping centers, etc. Suburbs are not the only source of pollution, but they heavily contribute to it and have a negative impact on all organisms, including humans (Sýkora, 2002).

Žák (1942) published his findings in the text "Garden, park, landscape as a living space" (1942), and later in a large book “Living Landscape” (1947). Žák refers to the habitability of land not only as suitable for human residency, settlement or work, but also for livability in nature that has primarily recreational value to humans. From this he concludes the fundamental importance of the natural environment for man. He critised overpopulation, improper settlements, production, transportation, pollution, therefore it can be seen, that this is an issue older than half a century (Žák, 1942).

A new way of Žák´s thinking culminates in his verdict that “the biggest architectural act is often not to build in certain regions at all“ (Žák, 1942).

According to Lampugnani, Noell (2007), the revitalization of the suburban landscape should stand on strategies of emphasizing borders, creating identification spots and linking various parts of the country. Table 5 gives examples of specific issues, that can be found in urban sprawl housings.

Table 5: Specific problems in residential suburbanization (Source: Ouředníček et al., 2016)

House	Public space	Landscape
sharp borders of plots	low interest in public space	lack of landscape character
catalogue house	unfinished roads	allotment
gated communities	uncared public spaces	fragmentation
low species composition in gardens	great amount of fences	
	transportation	

1.5.3 RELATIONSHIP BETWEEN HUMANS AND LANDSCAPE

One of the most common problems of civilization is a high level of stress in everyday life. Too much stress can lead to various illnesses, including anxiety-related disorders and cancers. One theory is that visual quality is important for recovery stress and that stress reduction is faster in nature in comparison to the urban environment. Visual presence of plants can be one such stress reduction factor, since the response to visual stimulus, considered by man aesthetic, can release tension. Beauty was defined as visual input, which gives pleasure to the mind, thus offering positive aesthetic experience. Among the important elements belonging to the aesthetic visual cues include the complexity of the forms, the choice of color, perspective and balance (Bjørn, Grete, 2009). According to Ulrich (1983), aesthetic landscape values are being looked at similarly by different groups of people of different age and even cultures and they are stable over moderate period of time. Among the most desired natural features belongs complexity of elements, focal point, clearly defined depth, relatively smooth ground surface favorable to movement, presence of water feature and deflected or curving sightline. People generally prefer high-complexity landscapes, that increase interest and curiosity. The

complexity should also be structured, made by homogeneous textures, group of the same elements with focal point in the scene. Focal point, or vista, is very important, since it attracts one´s attention. It can be made by textures, contours or grouping of elements to direct observers sight. Smooth surface is also important, as it evokes positive feedback in humans. People tend to consider such surfaces as easy to explore and to movement. Also, it gives better oportunitity to identify a threat or danger (f.e. poisoned snakes at sand ground opposite to rocky ground). Mixture of high-liking elements mentioned above is often seen in park-like landscapes.

People generally prefer large trees, low understory shrubs and grassy or herbaceous ground covers over medium or small size tress with lots of shrubs or dead wood. Also landscapes with man-made features like power lines, poles, build elements or even just with urban sounds like traffic are less likely to be in favor of people (Ulrich, 1983).

Absence of plants may be the man considered "unnatural" and therefore potentially hazardous to health, since it is a subliminal depending on the evolution of man. The action of the beneficial effects of nature can have an impact in a short period of exposure. Among health-enriching elements belong essence, low noise, dusting, improved microclimate, including moist environments more oxygen or the like. One example is the placement of hospital windows towards the park, groups of trees and shrubs, which has a positive effect on wound healing, as reflected in the level of pain medication and speed recovery after surgery (Ulrich, 1984). Ulrich (1983) supports this view by confirming, that exposure to natural landscape has also positive influence on individual´s emotional state. This includes reduction of fear and sadness, increase of affection and possibility to block stress, or at least lower its level. And not only emotional status: exposure to trees has significally reduced patient´s need for weak pain-killers (f.e. Aspirin). This fact could also have positive effect on medical economy by lowering the expenses for post-surgery medication or even the length of stay in hospital. All those reactions could be explained by human involvement in natural environments over long periods of time, that made us biologically adapted to natural content and to seek it.

The positive effect of greenery can be observed also at office buildings, where people spend more and more time in recent decades. People often buy flowers or plants for their offices to have at least a little natural space around them and in most cases offices with views out to park, countryside or green atrium are preferable (Bjørn, Grete, 2009).

The actions of these perceptions has proven a positive impact on improving attention, reducing stress, fatigue and results in bringing many physical health benefits, also secondarily. Bjørn and Grete (2009) point to four potential benefits: 1) time spent in nature supports physical activity, leading to compaction health 2) activities in nature often support social life, such as walks in the park, sitting

with friends by the river, time spent together with parents and children at a playground or common walking of dogs. Building social networks is, again, positively influencing health psyche. 3) The nature offers a temporary escape from the daily routine and requirements.

Dolesh et al. (2014) describe a series of benefits for urban residents. These include awareness of basic values such as the importance of nature in their surroundings, not only from the environmental, but also from the psychological aspect. Parks provide space for physical activity that improves health and reduces the risk of obesity, create pleasant meeting places and allow engaging in leisure activities that can contribute to stress reduction. These contribute not only to adults but also for teenagers and children.

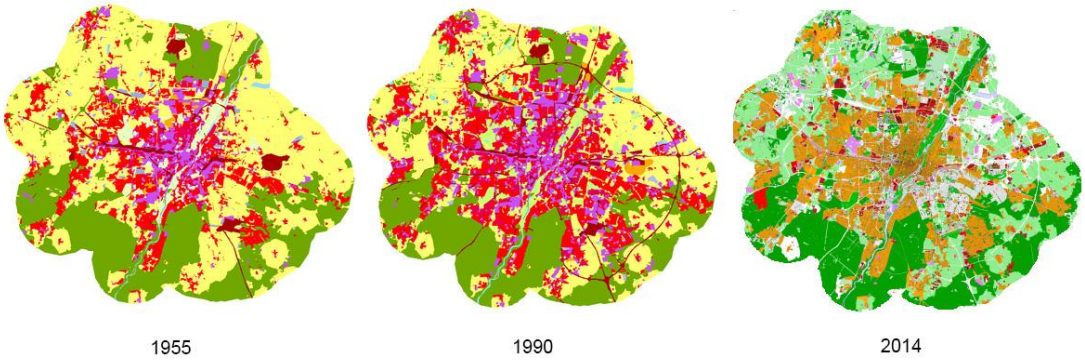
In general, green public spaces have economic benefits for the close-up area, because they increase the value of the land, and small businesses benefit from tourism as such shops and cafes. These spaces have also considerable importance to local communities and their activities (Dolesh, 2014).

Finally, the green areas contribute to the preservation of greenery in an industrialized country and they filter water or can serve as protection against floods. Larger units are often part of nature reserves, which are connected by a territorial system of ecological stability. On that basis, they can become part of public education programs and general education about the environment (Dolesh, 2014).

Shultis (2001) suggests that there is a need to strike a balance between pulling visitors into specific areas and preservation of protected plants and wildlife in its current state. At the same time, however, he notes that a one´s emotional attachment to a location can result in a critical relationship to the land in future, which may have an effect on long-term protection of a specific location.

Strejčková (2000) expands this theme with an idea that man increasingly alienates from the natural environment, is isolated in artificial spaces, where he/she strengthens the relationships with them (e.g. in gyms or fitness centers instead of open spaces). This, according to the author, starts already in childhood, when children are so-called "passive guests" in nature and they do not have opportunities to explore the local area or take care of it. This leads to estrangement from nature in later life, they lack the will to act or are unsolvable to perform some act. Strejčková (2000) however emphasizes that the contact must be in quality natural environment and not in a contaminated or life-threatening environment. The author presents data from the Nature journal, according to which 80 % of civilization diseases come from an unhealthy lifestyle and in the research of William Nelson of the USEPA she found out that urban people spend only 2 % of their time in the nature.

1.5.4 SOLUTIONS FOR URBAN SPRAWL



Picture 10: Land use changes in Munich urban area, 1955-2014

Source: EEA, 2014

Good examples of mastered urban sprawl can be seen in Munich, Germany (Picture 10). This city stays compact, historic center is surrounded by a belt of roads and parks, city is using brownfield sites, improving public transport and cycling paths, precedes urban expansion, uses regional cooperation and applies integrated city development plan.

Solution, applicable by municipalities, should generally be:

- regional cooperation
- involvement of stakeholders in city planning
- rehabilitation of vacant brownfields
- renovation of public spaces
- continuously improving public transport with as few new roads as possible
- keep the city compact and urban, keep green sites
- guarantee the necessary resources for implementing strategies of all relevant policy areas (transport or housing)
- identify key partners (including the private sector and communities)
- creating consistent long-term plans and policy supporting sustainable development and limiting urban sprawl (EEA, 2006).

Living in purely mono-functional areas reserved only for this single function leads to living at housing estate accompanied by all its disadvantages. For this reason, mono-functional colony houses are sometimes referred to as "horizontal high-rise housing landscape". Krier (2001) also draws attention to the appropriate use of blocks and open spaces configuration, as well as traditional building types

like streets, squares and similar type of architecture, which is in harmony with the existing environment. It is necessary to eliminate shopping malls, adjust the division of plots on the effective rate to the capacities and needs space, to introduce a complete range of services and a missing feature of urban lift. The transformation of suburbs will only occur, when deleting their strict functional zoning, radically revising land use plans and revising urban development programs. Zoning reduces urban communities, landscapes and forests, nature, and human resources on mere statistical concepts, expressed by interchangeable numbers and various measures of concentration (Krier, 2001).

Also vegetation and natural elements can have a positive effect on existing urban sprawl. Ulrich (1983) says, that residents of high-density housing liked their neighborhood better, when it contained trees and greenery in general over parking plots of empty grass-covered expanses. Author also points to the fact, that people rather remember streets and building by the vegetation it has, but there is a breaking point in the amount of trees in neighborhood, after which the people´s liking starts to decline.

1.5.5 POSITIVE EFFECTS OF URBAN SPRAWL

Since every coin has two sides, in the urban sprawl we can see some positive impacts on the environment and urbanization in general. These can include, for example:

- pressure on the authority for the construction of new sidewalks, improvement and expansion of infrastructure
- few services (e.g. shops or kindergarten), benefits for local residents
- more time spent on the open air
- walkable communities rather than in city
- increase of employment
- influx of educated population from higher income groups (especially to detached houses)
- lower crime (Ouředníček et al., 2016)

1.5.6 EU RESPONSE

In 1990, the European Commission issued so-called **"Green Paper on the Urban Environment**", which sets main priorities of mixed land use, denser development, revitalization of brownfield sites, preservation of recreational and open spaces, revitalization of existing city areas, and enhancing the use of public transportation as well as increase of walking and cycling (EEA, 2016).

EU has already some projects developed, like Cohesion Policy (2007–2013)- development strategy for rural and urban areas, that take in consideration the coordination of land use policies. One of questionable solution would be fond investment in city cores rather than in suburban area.

Some projects include decontamination of old industrial zones (currently 3.5 million former industrial sites are vacant), often on the outskirts of cities, in order to convert them into residential zones. An example might be in Mont-Saint-Guibert- reconstruction of former paper mill's 300 new apartments or southeast of Brussels or Ginkgo Lyon's project. Those projects are funded by **European Fund for Strategic Investments** that targets investment in innovative projects, as part of the Investment Plan for Europe. The aim is to trigger EUR 315 billion of new investment by 2018 (Rees, 2016).

2 REPRESENTATIVE EXAMPLES IN EU

The next chapters will use a set of three theoretical case studies that try to illustrate background for urban sprawl development and conditions generally common for specific EU region (North and West Europe, Post-communistic countries and Southern coastal countries).

2.1 NORWAY, OSLO CITY

2.1.1 INTRODUCTION

Oslo is the capital city of Norway since 1814. The area of actual city was originally inhabited by Germanic tribes and later by Vikings. In their period, the settlement became one of the biggest markets of northern Europe. The city itself was founded in 1048 by king Harald III. Sigurdsson and it experienced the biggest glory until the first half of 14th century. Then several epidemics, fires and loss of sovereignty ended the flourishing city. The city was under several foreign domination until 19th century, when it started successfully developing until these days. Oslo lies in the northern part of Oslo fjord, surrounded by forests and sea cliffs. The city located in the southeast part of large Norwegian country. It consists of 15 boroughs, that are self administrated to a large degree. The population is 640 313 (by 2014) and the official language is Norwegian. International airport is located approximately 50 km from city center and the closest capital cities are Stockholm (530 km) and Copenhagen (606 km). In scale and in comparison to other European cities, it is smaller city of 454 km² area.

2.1.2 DEVELOPMENT

The beginning of suburbanization goes hand in hand with the construction of a tram line to the west of the city. In 1905 the line was introduced and it should bring people out of the city into the forest areas on the outskirts of northern border, which laid the foundation for future real estate development for wealthier segments of society. New residents did not want to live in proximity of hospitals, factories, housing for the working class and other facilities that would cause noise, smoke and pollution (Kjell, 2005). It is therefore mainly polluted industrial zones, limited access of people to green forests or parks, waste and bad management high densification, that has a strong effect on city sprawl (Luccarelli, 2012).

A very common type of housing was an apartment building. Based on the ideas of Garden City, Ulleval Garden City was built. Located in borough of Nordre Aker and it was constructed between 1918 and 1926 and the goal was to create ideal housing for working class, public spaces with trees and airy environment (Luccarelli, 2012).

2.1.3 MAIN SUBURBAN CONSTRUCTION

Since the **50th**, the city started its main expansion due to high development potential after World War 2 (Næss, 2011). Build up area raised from 157 km^2 between 1950 and 1975 to 183 km^2 in 1992. The population density lowered by 0.1 % each year (Toi, 2016).

First Norwegian suburb built **after WW2** was Lambertseter, located south from Oslo city center. It was regulated and constructed for BOS according to Frode Rinnan plan. The construction was finished in 1953. After 1960 there were first satellite town located northeast from the city center. Those did not appear only in Oslo but also in other cities like Skien with Gulset (the biggest one) and Klyve satellite town or Saupstad or Kolstad, Trondheim suburbs, build up in late 1960's or early 1970's (Toi, 2016).

In **1960's** main development of new housing estate started to appear. In most cases they were connected to public transport routes and nodes like tram or train lines. Specifically they are new boroughs of Ammerud, Romsas or Drabantbyen that was focusing on social housing (Luccarelli, 2012).

In **1990´s** city returned to densification again, which had a positive effect on public transport, housing development and green space protection. 89 % of residents currently live within 300 m of public transport, and 94% in walking distance of public open areas (Luccarelli, 2012). Another reason is the terrain itself, which is rocky in Oslo and the construction is expensive as compared to the construction of the building on green field sites. The third reason for stopping sprawl is the deployment of strict rules on converting farmland to building land in the years 1975-1993 (Næss, 2011). Norway has a strong tradition of ranching, but has declined in the last decade. Farms are closing and people leaving the cities. Rural areas experienced depopulation, since 4 out of 5 jobs were located in the city (Kjel, 2015).

Since 1991, most of the new dwellings in the Oslo region have been constructed outside the municipality itself. On average for the period 1991 – 2008, 39 % of new houses have been constructed within the municipality and 61 % in the rest of the metropolitan area. Anyway, since the 90´s, there has been a high degree of professional and political interest for urban densification. There has also been a substantial market demand for more intensive land use within the existing urban areas, mainly in the central parts of the region. A strong focus on coordinated land use and transport planning in order to reduce energy use and transport emissions leads to significant urban sprawl reduction. In addition, social and cultural conditions, necessary for implementing such a strategy, have been present and necessary. Yet in the 90´s detached single-family houses represented more than 25 % of all new residential buildings. Today it is only 8 % (Toi, 2016).

Asker (Norway) is a typical suburb lying in commuting distance from Oslo. It resists to lot of pressure, because there is great interest for accommodation and related services, infrastructure and spatial

planning. Municipality is trying to attract well-educated residents (43.7 % with higher education, 2012) and investors to enrich the economic side of town. Asker is focusing primarily on transportation improvement. It seeks to promote construction of dense cores and to avoid fragmentation of public nature of space. It supports construction of homes for the elderly with necessary secured services, construction of bicycle paths and walking trails leading to green areas to support the physical activity of people in nature (Næss, 2011).

In Oslo we can see the positive impact of sustainable travel and economization as the key elements in sustainable urban development. The city de-industrialized itself and now it focuses on trade and services. Since 2008 the number of job offers also increased: major part of jobs is located outside the inner Oslo and can be found also in other regions. According to the Norwegian planning legislation, it is forbidden to establish buildings and technical infrastructure (except for agricultural purposes) in areas that are meant for development in the municipal master land use plan (i.e. the land use category of natural and outdoor recreation areas or agricultural plots). The Municipality uses the planning legislation actively to prevent urban sprawl and to prevent "frog-leaping". “Frog-leaping” represents a type of new urban construction, which is totally dislocated from utilities, infrastructure and generally other construction plots and it stands on its own and it is surrounded by undeveloped land (Næss, 2011).

2.1.4 STATISTICS

In 2013 20% of Norwegian population lived in the capital city. Between the years 2000 and 2012, the number of Oslo habitats increased about 21 %, also thanks to immigration from foreign countries. The density of Oslo habitats increased in period 2000-2009 from 966 000 to 105 000 people, while the built-up area has risen from 416 to 452 km^2. In Greater Oslo the difference was more significant. In year 2000 there were 773,000 living in Greater Oslo, while in 2009 it was already 876,000. The build-up area did not spread that dramatically: from 269 km^2 for 285 km^2 (Toi, 2016).

Almost 90 % of the population in municipalities with more than 20000 inhabitants has private parking at their home. 88 % belonged to a household with at least one car. This is an increase from 2009, when 85 % was in the same situation. 45 % has one car, 35 % has two cars, while 8 % has three or more cars. Energy consumption for commuting is for people on the fringes 4 times higher than for people living close to the city (Næss, 2011)

High proportion of residential development has taken place within four and a half kilometer from the city center. Information from 2015 show, that only 8 % of housing fund includes detached houses. 73 % of dwellings belong to the multi-storey apartment buildings. The largest share of these townhouses is in neighborhoods of Vestre Aker and Nordstrand. Sixth (16 %) of all houses in Oslo is represented by

semi-detached houses, which is the trend of last few years, sometimes called as tower blocks laid horizontally. The largest percentage can be found in the same neighborhoods as detached houses or in districts of Ostensjo, Nordre Aker and Sondre Nordstrand (Byplanoslo, 2016).

Statistics show, that over the past five years, within the Oslo city there were about 3,500 buildings a year built, while the population is still expected to grow continuously (Byplanoslo, 2016).

2.1.5 PROBLEMS CONNECTED WITH NORWAY SUBURBANIZATION

Since Oslo has a very good reputation regarding new construction, suburbanization and other development, there are always some issues that last. Among the main ones we can list confusing system between the public and private sectors and a lack of coordination between them, rare coordination with neighboring municipalities or strong demands for universal design, which makes the small projects very pricy. Norway generally has a plan, that investors need to follow and municipalities approve projects according to the national plan. Therefore there must be also interdisciplinary cooperation and long term visions (Næss, 2011).

Densification has, on the other hand, its negative environmental impacts too. As an example can be the intra-urban green areas that were reduced as a result of the compact city strategy, although the objective is to urbanize on already existing site like old industrial buildings. Market agents sometimes also push for greenfield development at locations, that have insufficient public transport net in the outer parts of the Oslo municipality. There are only exceptional cases, as most of developers accept the general plan for urbanization, because there are high social and cultural conditions which are also necessary for implementing such a strategy (Kjel, 2005).

Nonetheless, document from 2005 presents trend low-density housing on example of Municipality of Iveland that tries to meet the need and wishes of potential residents. It offered large building plots, located in a distance from other plots about the size of 5 hectares. Those plots were offered also for acceptable price (about 35 000 Euros). Their advantage was the connection to utilities, close proximity to nature and also commuting distance to major cities. Anyway, this development is in contrary to planning policy, which aims to target for densification of towns (Kjel, 2005).

2.1.6 ACTUAL TRENDS

Oslo has a strong focus on coordinated land use and transport planning to reduce energy use and emissions from transport. It also focuses on old houses repair, development of old industrial areas and other brownfields and massively supports public transportation (Toi, 2016).

Oslo also focuses on the so-called. Green urbanism, namely thanks to independence from fossil fuels, reducing emissions of greenhouse gases, creation of public green spaces and generally improving the

quality of life in the city. It is also called a **biophilic city**.

Biophilia is *"the innately emotional affiliation of human beings to other living organisms. Innate means hereditary and hence part of ultimate human nature"* (Beatley, 2008).

Some of the features of biophilic city are a lifestyle of its population (e.g. walks in the countryside, parks, forests), public interest of greenery, ability to identify basic types of fauna and flora, etc. Another important feature is the existence of natural museums, educational programs in schools or leisure clubs. This will not only invest in the construction of green infrastructure, but accompanies it by raising general awareness, identify needs of the population and enables the personal involvement of its population (Beatley, 2008).

This city therefore provides many opportunities to meet with nature. In Oslo, over 81 % of inhabitants visited the city's surrounding forests in the last year. Also 94 % of the city's residents live only 300 meters of the nearest park**.** Oslo has a Green plan to create 69 parks within the densified city core as an act of urbanistic correction. The aim is to keep as much natural environment as possible; so far 2/3 from Greater Oslo is either forest or lake (Luccarelli, 2012).

Oslo appreciates its waterfronts and prevent from their privatization and construction, so it can remain accessible to the public (Beatley, 2008).

It is a strictly banned to build in the greenbelt of the city (called "marka"). **Marka** is protected and untouched natural border of the city and give opportunity for recreating for more than 35 years. Close to *marka,* an interest in residential housing rises together with higher demand for recreation and its facilities. This area is therefore protected in urban plan and city development strategies. Municipal Master Plan clearly states, that new development should occur within the city border, the fjord area, near public transport stations and main roads and it has to be a mix of functions and services (Næss, 2011).

Biophilic cities are those that provide their citizens transport options other than car. The city therefore tries, like Copenhagen, to promote bicycle transportation and broaden bicycle path within the Greater Oslo as well along green corridors to support commuting from work to home and conversely. So far there is 122 km of paths, but Copenhagen has already approx. 360 km of them (Beatley, 2008).

The main concern of Oslo is a **compact city** and **gentrification.**

Gentrification, "*the buying and renovation of houses and stores in deteriorated urban neighborhoods by upper- or middle-income families or individuals, thus improving property values but often displacing low-income families and small businesses.*"

City aims to construct on former industrial sites, when lately the industrial sector moved to Asia lately. The majority of multi-floor apartment houses, mainly by waterfront and in the city core, on the periphery it is 2-5 floor apartment houses with sufficient public spaces, ideal for families with children (Næss, 2011).

The ideal house should be stable and secure, beautiful to look at; it should have lots of light and air, practical layout and large outdoor spaces. The municipality prefers forward-looking architecture and urban development with eco-friendly solutions. It also promotes a wide range of housing (social, community, semidetached, modern downtown living) (Byplanoslo, 2016).

2.2 CZECH REPUBLIC, PRAGUE

2.2.1 INTRODUCTION

The fist records of Prague are from year 880, when new governing buildings were established on left border of Vltava river. This settlement was soon surrounded by numerous churches, monasteries and courtyards and it became famous trading and religious location of Central Europe. The biggest city development was in 14th century under the reign of King Charles IV., who also became the roman emperor in 1355. He built the university, numerous castles, expanded Prague city and commissioned the construction of the St. Vitus cathedral. During centuries, Prague suffered from different wars, epidemics and later from the Soviet occupation and communistic era, that lasted until 1989, when the Czech Republic gained freedom and democracy. Prague is located almost in the middle of Czech republic, above Vltava river valley and its area is 496 km^2. The official language is Czech and the population is 1 267 449 (2016). Other important European cities are located close to Prague: Berlin is 352 km away, Vienna is 331 km away and Warsaw lies 638 km away.

2.2.2 DEVELOPMENT

Foundations of Czech suburbanization were founded already in the **19th century**, when the upper class were building summer houses and villas outside the city walls to avoid overcrowded and unhealthy urban center, but at the same time they tried to stay within the reach of economic and cultural features of the city (Ouředníček, 2003).

During **socialism period** the state rather invested in construction of large housing complexes at city periphery (e.g. South City) rather than in restoration of old tenement houses in the inner parts of Prague. Therefore it led to decentralization of compact core, where minimal construction occurred. Socialist Prague were developing according to form of planned urbanization (for example complex residential construction), concentrated in a ring growing around stagnant city center and surrounded by decaying suburban zone. Typical was living in a high-rise housing estate and in brick family houses. On the other hand, state directed investments in infrastructure and thereby expanding of city's

hinterland and private construction layout, which was very limited and hindered development of a classical model of suburbanization, which came to Czech Republic after 1989. However Prague's hinterland provided quality environment for residential suburbanization and also potential for expansion of jobs, especially in manufacturing field. The interest in living at locations outside the city can be seen in the tendency of Prague's residents, who preferred to spend their weekends and free day in cottages in countryside or in mountains that provided healthier environment than city. This was a temporary substitute of suburbanization (Ouředníček, 2003).

Suburbanization in the Czech Republic can be observed the best after **the fall of communism in 1989**, when capital and mortgage markets released. Restitution of land occurred and a new strategy of housing support were developing. Those changes allowed people to own houses or start a construction, which was suddenly not accompanied by numerous limitations, permits, strict regulation banning construction, etc. (Galčanová, 2008).

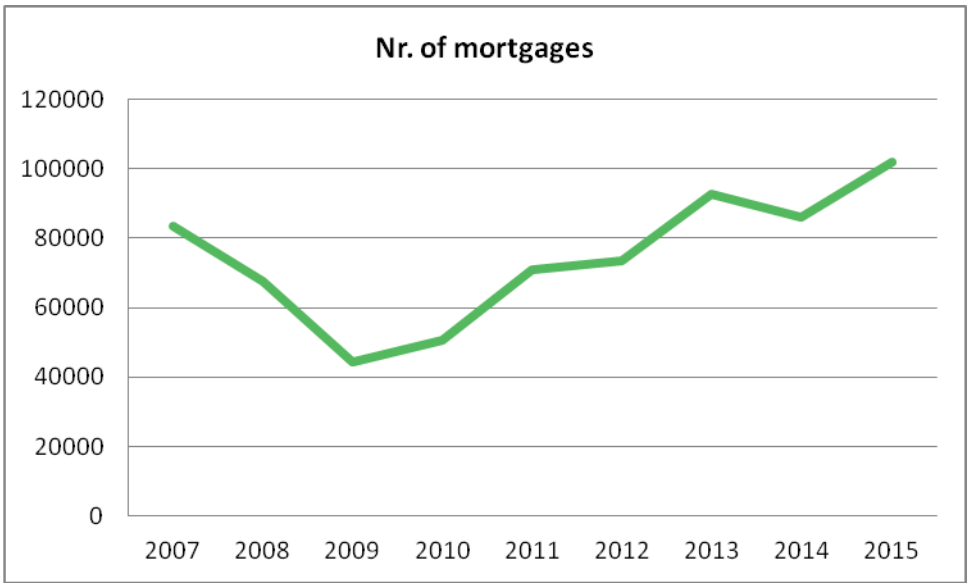
Development was based on the same principles as such. in American culture, but in post-communist countries it is gaining its own direction It is due to previous influence of the Soviet Union, architectural tradition or culture industrialization (Sýkora, Ouředníček, 2006).

After the revolution, there was a massive migration of people from rural to urban areas, because their jobs or placement within the country was already not influenced by communist policies and offices. At the same time, a wave of migrants moving to the hinterland of Prague raised, due to beginning of growth of property prices in central areas of the city (Galčanová, 2008).

2.2.3 THE BIGGEST BOOM

The biggest development of suburbanization is observed since 1995-2000, when the biggest peak happened around years 2007-2008. The trend, even with altered characteristics, slightly continues after the economical crisis (Galčanová, 2008).

This trend is visible in the number of mortgages granted. The largest increase was recorded in 2007, with the number of 83,344 mortgages (Graph 5). Then few years of declining demand follows, due to the crisis and it returns to the original values again in 2013 with the number of 92,608 units, 85 878 units in 2014 and a record number of mortgages in 2015 with 101 973 units (MMR, 2016).



Graph 5: Number of mortgages approved to Czech residents between 2007-2015

Source: Ministry for Regional Development, 2016

Future stage of this process may be creation of the so-called "exurbia" or "edge cities" (the term of journalist Joel Garreau). This term is explain of existence of current residential suburbanization, that attracts commercial and leisure services, that are relocating closes to those settlements (“malling”). It also creates new industrial activities and creates new jobs that are followed by cheaper residential district ("suburbs of suburbs") in the next stage (Galčanová, 2008).

In the last decade of the 20th century an onset of suburbanization can be observed that continues to support decentralization, which already started at the time of socialism. Current development is identical with Vienna and it is common with trends in comparable European cities, where the growth of housing facilities exceeds the decline in the city core. Intense growth in hinterland is therefore largely determined by its under-dimensioning, due to centralized urbanization under socialism regime (Sýkora, 2002).

Residential suburbanization mainly takes place in hinterlands of large cities. Concerning Prague, suburbanization began in the southern outskirts of Prague (until 2000) and by 2006 it had spread to the northwest and northeast part of mainly arable farmlands and permanent grasslands. An increased surface area is registered and new construction on separate isolated units happened in the 2000’s (Ouředníček, 2008).

The development of suburban areas is often not coordinated by governed, municipality or county, but by private developers and construction companies, thus they are causing changes in typical character of settlement, built-up space and transforming the regional landscape (Galčanová, 2008).

Main drivers behind Czech (and other within Eastern Europe) suburbanization are:

- increase of spatial standard -consequence of economic growth and democracy,
- increase of traffic and transport options,
- cheaper land and flat units behind the city borders, rather than in the city itself (Galčanová, 2008).

2.2.4 MOTIVATION

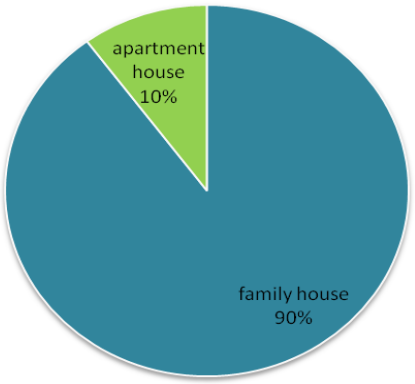
The main motivation of the population to move to Prague's hinterlands, in addition to rise of property prices in city center, is also reduction of environmental quality (crime, pollution, higher traffic), easier conditions for obtaining mortgages, cheap and affordable plots on the outskirts, little or no regulation of construction until year 2000, clean environment, proximity and the relative availability of the capital city or municipalities efforts to obtain new taxpayers (Galčanová, 2008).

Pull factor is the fulfillment of people's wishes for ideal housing, regardless of the character of the specific area or territory limits. According to a survey among residents in 2001 (peak of suburbanization), the idea is ownership of an apartment or a house (71 %), which has a garden, garage, swimming pool, a spacious kitchen and with 3 bedrooms and more. Fulfilling this idea about an ideal house is possible also thanks to growth of population's wealth, but also thanks to the offer of restituted land that is available for housing construction according to new local spatial plans (Galčanová, 2008).

Typical resident of suburban zone is a 25-35 years old person, who works in services and lives with a partner with children (or is planning to have children soon). He/she has a university degree and belongs to higher income group (Ouředníček, 2003).

2.2.5 STATISTICS

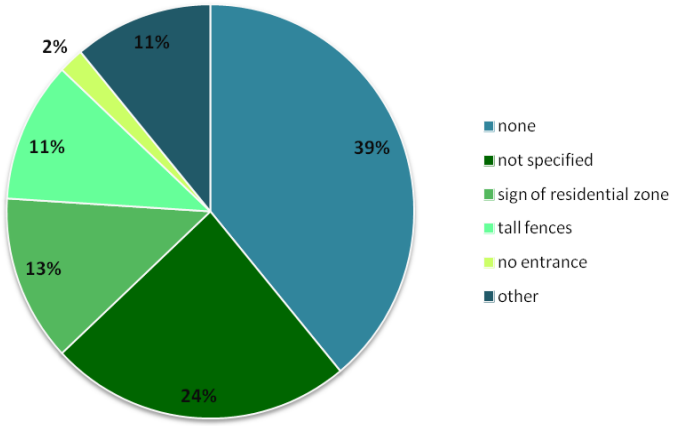
Totally there is 2 158 119 of houses. Majority of people live in family houses (1 901 126) and 35.8 % of them are the owners (Ministerstvo pro místní rozvoj ČR, 2016) (Graph 6).



Graph 6: Population in house types
Source: mmr.cz

Ouředníček (2009) made a field survey in 137 suburbs in the hinterlands of Prague, from which he gained the following results (2004) (Graph 7-10):

Borders new development:

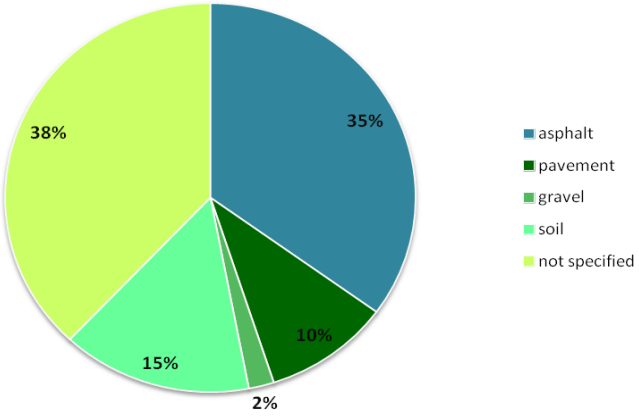


Graph 7: Residential borders

Source: Ouředníček (2009)

The quality of public space:

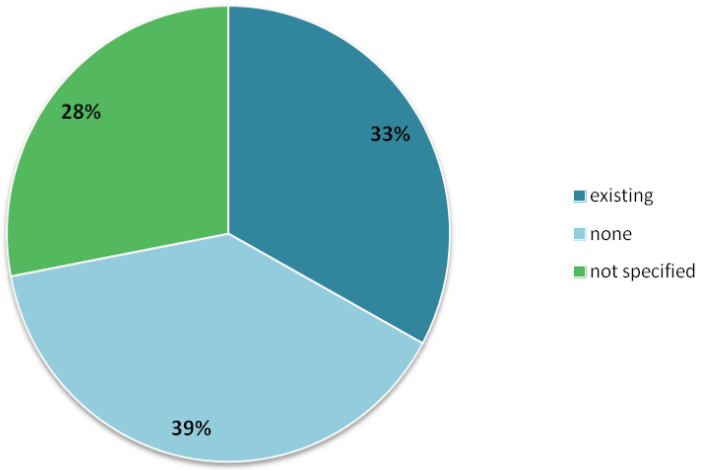
Roads:



Graph 8: Quality of public space

Source: Ouředníček (2009)

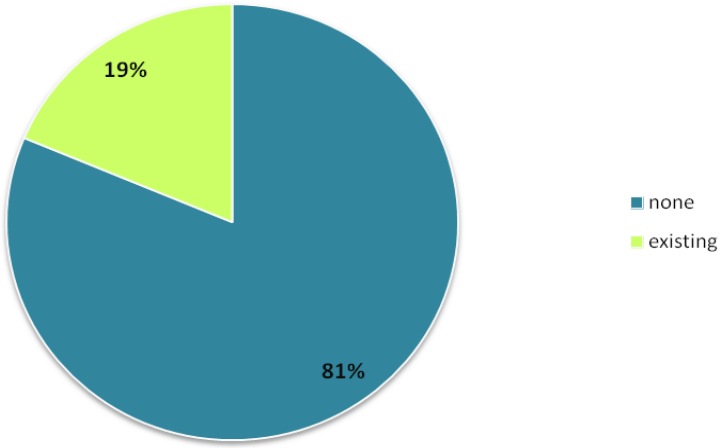
Sidewalks:



Graph 9: Sidewalk presence

Source: Ouředníček (2009)

Playgrounds:



Graph 10: Playground presence

Source: Ouředníček (2009)

Currently, the situation is improving, especially in the area of footpaths, roads and kid playgrounds.

2.2.6 PROBLEMS RELATED TO SUBURBANIZATION IN THE CZECH REPUBLIC AND EASTERN EUROPEAN COUNTRIES

Spatial fragmentation of suburban construction, non-compact city development and large proportion of individual projects are the characteristic features of Czech suburbanization. Uncoordinated development of suburban areas next to large cities often leads to subsequent problems in transportation connectivity of suburbia and brings foreign and inappropriate elements of

architectural character of settlement. One of them is transformation of individual recreation for permanent housing. Close to municipalities, which are located in recreationally attractive locations along the Vltava, Sazava, Berounka rivers and many other places, long-term use for weekend and holiday recreation of Prague citizens dominates. This trend is supported by well-developed infrastructure and favorable environment (Ouředníček, 2003).

Concerning zoning plans, planned built-up areas should be compact, new construction should continuously build on the old ones, it should not suppress the original landmarks and it should also include aesthetic components that are often forgotten. An integral part of the new plans should be the availability and throughput of landscape, which is one of the main reasons, why city residents move to hinterlands. New buildings should therefore be facing the town and should not be extending toward the open countryside and loosen up (Zuntychova, 2014).

Another case, from the urban point of view, is the problem of new nuclei (cores) in existing settlements (former villages), that accepts an urban character, because of their new incoming residents. From an architectural point of view it is e.g. a flat roof and large windows, use of glass materials, while the surrounding area remains rural (wood, gabled roof, ground floor layout). From a functional point of view, cafes, kindergartens, schools, parking lots, shops and other services, which are clearly of urban character, infiltrate rural areas. Suburbanization often leads to social segregation. In the US, there are areas, where white middle class prevails. In the Czech Republic minimum participation of Romani (Gypsy) residents can be observed in this kind of housing (Galčanová, 2008).

2.2.7 MAIN ISSUES

1. Place of permanent residence (low number of permanent residents) – mainly a tax liability. Most of newcomers are not registered residents in the municipality. Therefore the municipality has a low proportion in tax revenues and thus it reduces the possibility of investments, like construction or maintenance of technical infrastructure and other public projects.
2. Municipality spatial planning – occupation of vacant space with all the environmental impacts
3. Transportation – the intensity of car traffic - traffic connection is in most cases only possible by car (commuting to work, amenities, leisure), on the other hand there is an insufficient or unused urban and suburban public transport.
4. Integration of new residents – they often do not participate on municipality activities or events, there is also lack of meeting places (public spaces).
5. Change of landscape –character of settlement, construction on open space in landscape and irreversible changes in the image of the traditional Czech countryside, loss of genius loci.

Hnilička (2012) refers to the fact, that problems occurring within urban sprawl are similar in character

to high rise housing estate: people do not know each other, they do not care about public space and people with higher income or higher social status are leaving to other locations. The question is, whether we can expect similar trends in suburbia in the future?

Another negative trend is the construction itself and deflection from classic trends, such as placement of house in the middle of plot, not respecting construction line, which generally leads to very close proximity of houses.

As for the gardens themselves, the vast majority of these are small areas bordered by a hedge, which function is isolating its owner from the surroundings. Owners usually do not have a deeper relationship to their garden and consider it only as an addition to their house, representative space, where they, however, do not plan to spend a lot of time. The opposite owners are enthusiasts, who make up their garden by actual offers of hobby centers. As a result, the gardens are lacking a concept, aesthetic quality both for the owners and for the environment and do not respect characteristic features of local habitats (Zuntychová, 2014).

Public space was recently totally neglected due to the fact, that it brought no profit to developers and investors. Because of increased public interest in the environment and an overall increase in environmental education, developers are beginning to support construction of at least small public green spaces such as playgrounds or avenues. Their quality is, however, unstable (Zuntychová, 2014). For the integration of new residents it is necessary for them to meet with the original residents. Due to insufficient amount of public space and the location of suburbs on the outskirts of the village, it is often a problem and new residents have the opportunity to meet them only for example at bus stops or at a local store. Given the relatively large number of children mutual meetings of young families could be possible in parks, on playgrounds or at cultural events held by municipality (Easter, concerts) (Ouředníček, 2008).

2.2.8 QUALITY OF LIFE IN SUBURBANIA

Residential satisfaction is most often applied when assessing the overall quality of housing, neighborhoods and individuals sharing a common geographical space. It is, for example, quality of housing, social and physical environment in the area etc. People try to reach their vision, and if it is not possible, it may lead to a change in their socioeconomic status and subsequently to change of their residential destination. This implies that residential satisfaction has an impact on population migration (Kopečná et al., 2012).

Life cycle of an individual has also affect on population migration. Lively urban center is more suitable for a young man, while families with children would prefer safe place for their children's development. Older citizens need available services, need to be in the company of other people and

prefer to live in a smaller apartment in city (Kopečná et al., 2012).

Kopečná et al. (2012) conducted a survey among residents of suburban areas, so-called satellites, and came to conclusion, that people plan to move away within 5-7 years, if they live in rented apartment, but home owners plan to stay permanently. For residents, the most important thing is surrounding environment (forests, parks, etc.) and distracting elements are construction, lack of sidewalks, poor infrastructure and services.

2.2.9 ACTUAL TRENDS

It seems that in the Czech Republic the conventional satellites are less and less popular. The trend is moving toward better service accessibility, shorter commuting and more ecologic approach, that can be explained by emergence of new generation of 30+ age (born close to revolution year 1989). Modeled houses are also on the wane. Residents wish to make their own choices about the appearance of their house. Leinberger (2008) notes that the media also working on making cities more attractive and try to attract residents back to depopulated cities.

Prognosis of Project OMEGA (Ouředníček et al., 2011) assumes further development of Prague's hinterland, especially in southern and southwestern areas (Beroun and Benesov city) due to the large number ready-to-build plots or because of good connection to the city center (up to 30 min.). It assumes population growth in suburban zones: until year 2030 it is up to 70 000 inhabitants in comparison to year 2016. The most represented age structure in 2030 will be between 15-20 and 45-55 years, with slightly bigger prevalence of women. To compare it with history development, over the past 10 year, the population in hinterland has increased by 130,000 people.

2.3 PORTUGAL, LISBON

2.3.1 INTRODUCTION

Lisbon´s beginning are recorded as important Phoenician trading place, that later came under ruling of Roman Empire and gained many privileges as a city. As a capitol city Lisbon was established later, in 1225. In 14th and 15th century Lisbon became colonial empire, which made Lisbon one of the richest cities in then world. The city suffered from destructive earthquakes, mainly in 1755, that destroyed mjor part of the city and killed almost 100 000 of people or Napoleon's armies in 19th century. Lisbon consists of 24 boroughs and the official language is Portuguese. The population is 545,245 (2011) and the area of city itself is 100 km^2. The main area is located on the right bank of the river Tagus, where the rivers mouth meets the Atlantic Ocean. In larger scale, the city is located in the middle of the country on western coast. The closest other capital cities are Madrid (620 km away) and Rabat in Morocco (914 km).

2.3.2 DEVELOPMENT

Development of urbanization in Lisbon can be evaluated after the Second World War, because the urbanization growth had stayed constant in Portugal and agriculture prevailed in most of the country. **After 1940** the number of inhabitants began to rapidly increase in the area of AML (*Lisbon* Metropolitan Area) mainly due to an influx of people from rural areas, who were looking for a better job. Innovations in the agricultural sector in the mid 20s lead to modernization and promotion of this sector, but due to new machines introduction and an overall increase of mechanization it has resulted in loss of worker strength and it supported movement of population to cities seeking for a job. After 1970, there was another influx due to immigration from former colonies (Ferreira, 2010).

At that time, according to Ferreira (2010), there was a lack of housing for middle class population existed, when the city center stopped flexibly responding to this trend. According to the author, the changes started to occur primarily **after 1968** at the time of António de Oliveira abandonment from power. Another millstone is the year of Portugal's entry to European Union in 1986 and influx of new investors to the realty and services market. At that time, there was an increased of housing construction on the outskirts of city and its reduced quality. Urbanistic plans did not count with traditional elements such as avenue, a block of houses or parks and public gardens. Architects have mainly focused on if technical conditions are met (e.g. utilities or infrastructures) to get permission from the developers for their projects. In 1964, therefore, first Lisbon Urban Plan is released, which set out to reorganize the whole region, including infrastructure (e.g. highway CRIL, CREL A5) and led to the design of new towns on the periphery of the original Lisbon. First construction can be seen on the northern outskirts of Lisbon.

In the 80s there was the main development of suburbanization, and it occurred mainly along existing railway lines, but also because of the use of new types of transport (mainly automobile) as well as the development of industrialization. Therefore, coastal areas began to lose its inhabitants, who were looking for new types of housing, generally in shorter distance to work, that was usually located in Lisbon city. (Simões, 2012). Low-density housing areas with family detached houses were created and they were in close connection with employment, while abandoned slums and industrial areas remained in the city center. Most of those new dwellings were being built around 1991 (Eraydin, 2012).

In the seventies there was a well known construction of Portela de Sacavém, a high rise housing complex in eastern part of the Outer Lisbon, which in the future become a model for further construction. Establishment of Portela de Sacavém developed according to Le Corbusier vision, who indented to create green cities and buildings full of light, sun and greenery. Accommodation was designed mainly for the middle class, for whom the location near Lisbon and next to the highway was

very attractive and at the same time they were looking for a suitable alternative for low-quality housing in the city center. For this project it was important to ensure healthy housing with adequate space, fresh air and sun, organize workplaces and last, but not least, to provide necessary facilities for the proper use of free time. A similar construction took place mainly in the northern area of Lisbon (Ferreira, 2010).

After **1990,** a change from the fordist functional distribution (mass cumulation and centralization) to polycentric system, based on government documents and strategies, came (e.g. CCDR-204 LTV), but also the introduction of Municipal Master Plans, which channels the use of individual land use (Ferreira, 2010).

2.3.3 MAIN BOOM

At the time of main suburbanization development **(1986-2000),** some of the traditional functions of the city began to change, like the conversion of unused ports and industrial sites because of global change in production and economical market. These areas began to deteriorate or convert to e.g. residential buildings with services or administration, as seen on an exceptional example of the former Expo area (Ferreira, 2010).

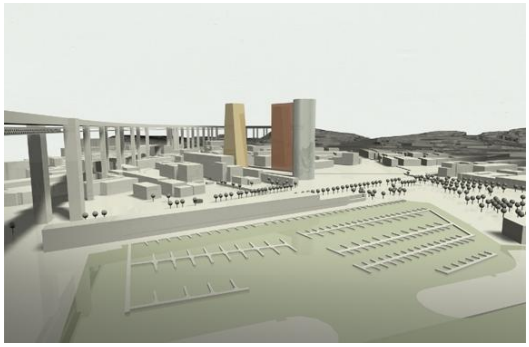
Even the change of infrastructure had a major role in the transformation of a city. Earlier radial form of the city turned into a single axis formed by highways or railways. Therefore specific land use (e.g. shops) started to shape, formerly typical for the center, and they moved to the periphery, causing the increased mobility of people to move more into this area. This all leads to further displacement of the city's

ALCANTARA- HISTORIC EXAMPLE OF SUBURBAN AND RECENT CHANGES

- originally located at city borders (today between historic center and Belém district) on a hill surrounded by canal and lagoon, which was filled up to provide more place for housing
- today a high risk of flooding and also earthquakes
- former industrial and port area, today it is an important potential polycentric key node-node
- economic and social dynamics stagnates, majority of elderly population
- improvement is expected by investment in infrastructure

NOVALCÂNTARA PROJECT:

- under development by the SIL Group
- 489.08 m^2 site; two separate areas, offices and luxury homes, one on either side of the new road being developed by Lisbon City Council as part of its Alcântara XXI Town Planning Project
- day and leisure centers will occupy one of the few remaining 19th century buildings of Alcântara, the Bernardo Daupis & Cº Mill and Textile Factory, which will be completely restored and remodeled.
- 5,684 m^2 of green space for public use and a footbridge connecting the new development with the River Tagus docklands (Picture 11)



Picture 11: Illustration of Master plan for Nova Alcântara

Source: www.carloscastanheira.pt

population (Eraydin, 2012).

Peri-urban areas are unsatisfyingly placed between city and its rural districts, while they are used primarily for development of urban sprawl and construction of transport infrastructure, instead of agriculture or recreational zones.

Pressure is developed on peripheral areas also because of progressive housing, that is absorbing former villages and which is converted to high-rise housing. Other cores remain, but they are surrounded by new construction, as it could be seen in Carnaxide, Oeiras and others. In other cases, cities are raised in middle of fields like Paco de Arcos, Sassoeiros Alto da Barra, New Oeiras, Miraflores in Oeiras; Póvoa de Santo Adrião in Odivelas, Bela Vista Towers and Vila Franca de Xira (Ferreira, 2010).

The central city of Lisbon experienced a 30 % population decline from 1965 to 2000. Yet suburban Lisbon's growth was 80 % during the same period (Eraydin, 2012). Increase in population around the capital has been 8-9 % in recent years (INE, 2016).

2.3.4 ISSUES LINKED WITH URBAN SPRAWL IN PORTUGAL

Main issue is continuing construction at coastal zones that should be in many cases considered as protective area. Next is depopulation and decay of a city, development on scarce agricultural land and degradation of old housing (Eraydin, 2012).

Sousa (2010) proposed a typology of **three Portuguese shrinking cities**:

a) metropolitan core and de-industrialized area
b) small coastal village or inland dwellings
c) suburban metropolitan areas of Lisbon and its north or center

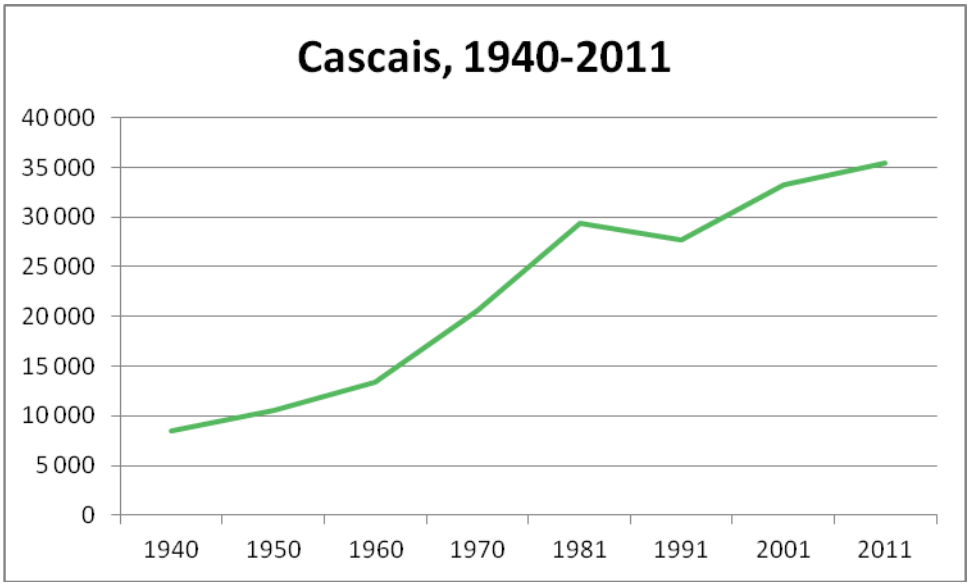
In Lisbon surroundings, districts like Barreiro and Almada are shrinking. Barreiro is example of a degraded residential area with **sharp deterioration of buildings and public spaces**, lower quality of environmental and urban and architectural **distinctiveness**, social degeneration with a decrease in population heterogeneity, growing segregation – poor, inactive, illiterate or uneducated residents, and foreigners (Sousa, 2010). According to Panagopoulos and Barreira (2012) one in five buildings in Lisbon is either abandoned or in poor condition.

There is a general failure of central and local government, which establishes their own policies and do not cooperate with each other. Mainly, each group has its own interests- at the local level that are residents themselves or commercial entities at the central (national) level. That is for example ICNF (Institute for Nature Conservation and Forestry) or Lisbon Port Authority, who has the greatest influence and is responsible for logistic activity (Panagopoulos, Barreira, 2012).

2.3.5 CITY AND COASTAL ZONES

Portugal is due to location of its largest cities, Lisbon and Porto, one of the exceptions in the European Union. These cities are located on the coastal zone or nearby, while 40 % of the national population is living in them. According to EEA, between the years 1990-2000 there was even the biggest increase of build-up sites in Europe (34 %), at a distance of 9-12 km from the coast. At the same time, it is not linked with the increase of population over the same period. The increase was only 5.3 %. It is important to note, that 1,807 square kilometers of Lisbon region lay in the coastal areas, and that is 64 % of all the region size (EEA, 2006).

Cascais is a typical representative suburban city located at coastal zone. It has 35 406 residents (2011) and it lays only 25 km from the Lisbon center, which it is in an affordable commuting distance to work. It is permanently facing a population growth, as it can be seen in graph 11 (INE, 2016).



Graph 11: Population growth in Cascais

Source: INE, 2016

The reason for the expansion is the proximity to metropolitan areas rather than tourism, like can be seen in Alentejo. Tourism is a problem more in Costa da Caparica, which is facing pressure of leisure activities, seasonal housing, but also the influx of population from African colonies, that started to appear after 1981, and whose residents began to build a temporary and often illegal housing in Almada. All this was, at the time, supported by lack of spatial and urban planning and policies (Panagopoulos, Barreira, 2012)

Related to this topic is a construction of so-called **second homes**, which are one of the main causes of the urban sprawl. Among them weekend houses in the proximity of city dominate. In Cascais, the majority of houses are owned by residents of Lisbon (Simões, 2012). For second house it is considered such a dwelling that is vacant and it is not offered for sale or for rent. At the same time, the owner

uses this house or apartment only in a certain season and he/she has a different permanent residency, mainly in the area of AML (Lisbon metropolitan area). Among personal reasons of owners for buying or constructing second house belongs escape from urban life, leisure-based lifestyle, increased use of personal car, closeness to nature, investments, increased social status or similar. They often have a plan to transform second house for their permanent residence after retirement and leave their apartments in Lisbon to their children (Roca, 2016).

They are mostly single houses, mainly terraced houses, located in peri-urban zones in countryside or houses offered as tourist resorts in coastal zones (yet gated communities are still rare). Roca (2016) describes the main reasons for the development of this phenomenon:

- abandonment of farms during the migration of people to cities, where owner relations are often not clarified. At the same time there are no statistics on these dwellings, and therefore the extent of capacity of potential second houses is unknown
- use for recreation and leisure, including employment in tourism
- on the contrary, higher density of development and population supports formation of second homes, as it provided sufficient space for expansion
- local policies try to attract new residents and therefore support construction or reconstruction of dwellings to second houses
- commuting distance to large cities

Second houses are mostly found in highly urbanized and economically strong regions, as well as in areas with high tourism or vice versa in poorer regions, where strong emigration and poverty is registered. In 2001, there were 929,936 of these types of properties, which covered 20 % of total Portuguese housing. For comparison, in the UK it was 10 %, 9 % in France and 27 % in Spain, which indicates the fact that is especially phenomenon of southern Europe (Roca, 2016).

This trend has its positive and negative environmental impacts. Most new owners have higher education and interest in nature and environment. Often they try to maintain local rural characteristics. At the same time, they utilize and renovate abandoned buildings, mostly rural, and thereby preserve the rural heritage. Increased energy consumption (water) and increased waste and pollution may belong among the negative environmental impacts. Furthermore, silting of rivers or lagoons, cliff erosion, creation of so called “ghost town”, where there is a minimum population during work days. The biggest impacts have newly constructed buildings and eventually mainstream housing stock (Roca, 2016).

2.3.6 MOTIVATION

There are several reasons for relocation of residents in the hinterland, but as Simões (2012) notes, the

main reason is the search of bigger and cheaper houses (e.g. in regions Sintra and Loures), moving of elderly residents on retirement to mentioned “second houses” and general moving of people closer to work (specifically tertiary sector), particularly in coastal zones (Simões, 2012).

2.3.7 STATISTICS

Between the years 1996 and 2001 there is a loss of population in large cities, for example Lisbon had a tendency to decline by 1.75 %/year, Porto by 1.37 %/year. One reason is the aging of population, insufficient growth of newborns. Annual increase in western countries is generally only 0.36 %, in developing countries it is, on contrary, 2.37 % a year (Sousa, 2010).

Turnover occurs in the last few years, when the Portuguese population expands. In 2011 there were 10.56 million inhabitants living in Portugal (INE, 2016).

In 2015, Portugal had a population of 10,401,062 people. The population density in cities 447 people/km^2, in rural areas 23.8 people/km^2

Urban population: 61.1 % of total population (2011)

Rate of urbanization: 0.91 % annual rate of change (2010-15 est.) In the capital city itself there were 2.843 million people living in year 2015.

When concerning commuting from hinterland to the city, in 2001 the amount was 34 % according to the INE statistics. Between the years 2001 and 2009, thanks to the construction of railways to Sintra, the number of local population raised the by 74 %, in Villa Franca Xira it was about 39 % (INE, 2016).

Generally the construction was on its decline since 2002. It can be seen on example of years 2007-2015, when construction dropped from 65,650 units in 2007 to 6,785 units in 2014. The trend starts to reverse. In 2015, there were already 8,153 registered units, which is 20 % increase compared to year 2014 and there are positive prognosis towards year 2016, also thanks to improving GDP and export (INE, 2016).

3 CASE STUDIES

There are two case studies chosen for this work. First it is a strategy of solution for urban sprawl at **regional level** and the dedicated country is **Portugal**. Second, urban sprawl at community level is being solved in **Czech Republic**. In Portugal, the case is concentrating on example of urban sprawl near large city (Lisbon) and coastal zone at the same time and because of its character it is dealt in larger scale, since it is necessary to see the problem in bigger picture than solving single issues. In Czech Republic, the **community level** case study was chosen due to the fact, that common pattern is smaller single-family units being spread in landscape in smaller scales and in point character, rather than generally. Portugal case tries to intervene the issue before it´s full development using prevention and protection tools by state institution, Czech case is applying steps to improve existing situation and show possible solution for inappropriate residential development by private owners, community or local municipality.

3.1 Portugal, Cascais Case Study

3.1.1 ANALYSIS

Location

Cascais County (concelho) can be found at the Estoril coast of Atlantic Ocean and it is located approx. 31 km from the capital city Lisbon. It is part of Greater Lisbon metropolitan area (AML). Cascais County consists of those parishes (freguesias): Alcabideche, Cascais, Estoril, Parede, Carcavelos and S. Domingos de Rana and the total area is 97.40 km^2. Study area works only with the western part of Cascais County, including Cascais and Alcabideche parishes, as pictured below (Picture 12).

Picture 12: Location of study area of Cascais

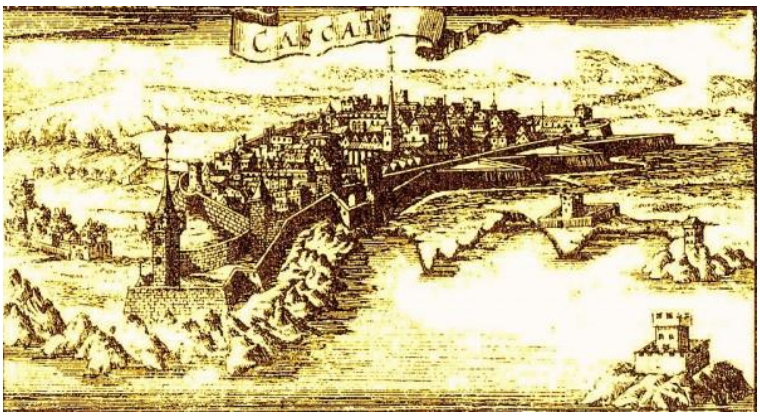
Brief history

The origins of Cascais first inhabitants lay in **paleolithic era**, although the main occupants were Romans, who's relics could be found for example in Charneca village or in São Domingos de Rana from the period of **1 AD**. The beginning of main era began in the 12th century. At the time Cascais was mainly an agriculture and fishing area, gaining wealth from those important commodities.

In **1364** Cascais was granted with title of town by King Pedro and as a maritime town, it became an important protection point, so not only castle of Cascais was built but also several fortress along the mouth of Tagus and its border with Atlantic Ocean. Cascais is also supposed to be one of the first places to have a lighthouse. The main agriculture production at this time was fruits, olives and wine (Pictures 13-14).

At the beginning of **19th century** the town started loosing its strategic importance and later it became a favorite location for the royal family. From 1870 to 1908, the royal family turned to Cascais to enjoy the sea, turning the former village into a cosmopolitan address. Many rich and noble families built luxurious villas that still can be seen in the town centre and surroundings. Before the WW2, Cascais and Estoril established their new role as a leisure and vacation location of Portugal gulf.

Picture 13: Cascais and Estoril, 1572
Source: http://old-cities-world.blogspot.rs



Picture 14: Cascais, 14th century
Source: www.portugaltravelmaps.com

Nature

Natural park of Sintra-Cascais was established in 1994 to protect not even natural but also cultural heritage of this western part of Portugal. NPSC is blending with Natura 2000 areas that include more than 27 protected sites. The total surface is 166 km^2 and marine area covers 54 % of it. The most important sites are reefs, embryonic shifting dunes, thermo-mediterranean and pre-desert scrub, arborescent matorral with *Laurus nobilis*, siliceous rocky slopes with chasmophytic vegetation or southern riparian galleries and thickets.

In study case area, that is partly covered by Sintra-Cascais natural park, some protected animal species (mainly birds) can be observed like *Phalacrocorax aristotelis*, *Falco peregrinus, Larus melanocephalus, Larus cachinna, Hydrobates pelagicus, Falco tinnunculus* or rodent *Eliomys quercinus*, living in elevated areas of Sintra forest. Birds are the largest group, representing protective species (49), followed by plants (12) and mammals (6).

In flora, there are those protected species: *Armeria pseudarmeria, Dianthus cintranus subsp. cintranus, Limonium multiflorum, Omphalodes kuzinskyanae* or *Dianthus cintranus subsp. cintranus.*

Hydrology

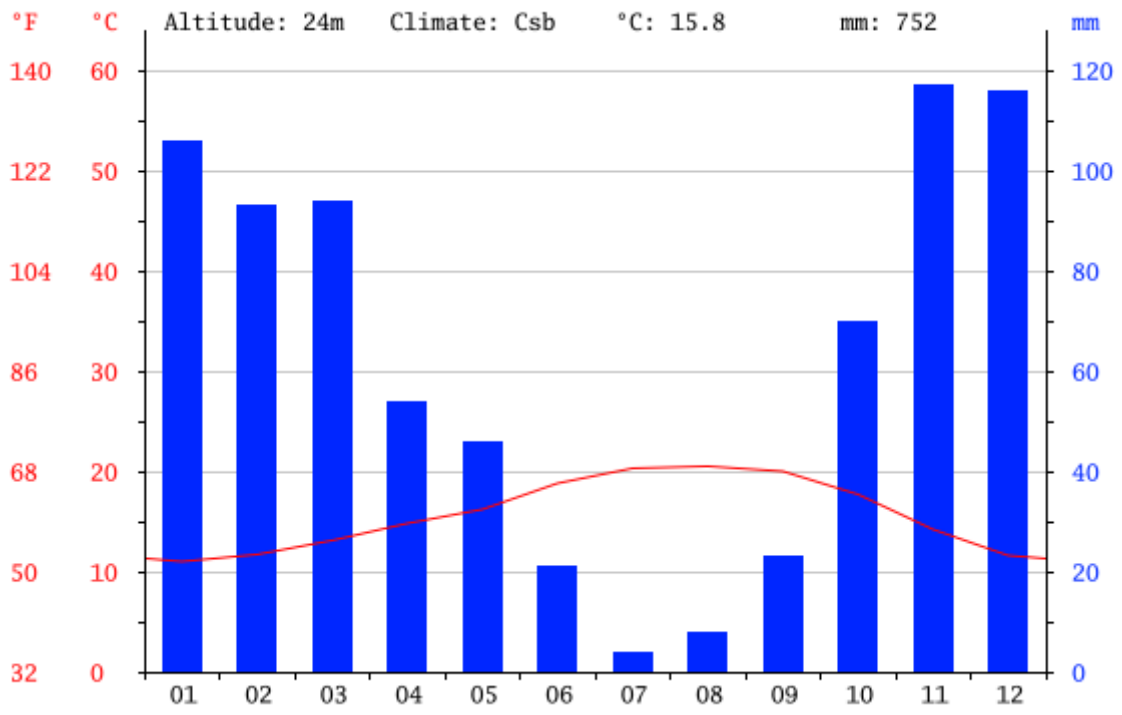
The main river of Cascais is the Tagus River that pours into the Atlantic Ocean. The ocean has a significant influence on local clime and it can also represent risk of flooding or tsunami.

Cascais county does not have any significant source of surface water (creek, river), but there are several sources of groundwater near Sintra forest in the north areas.

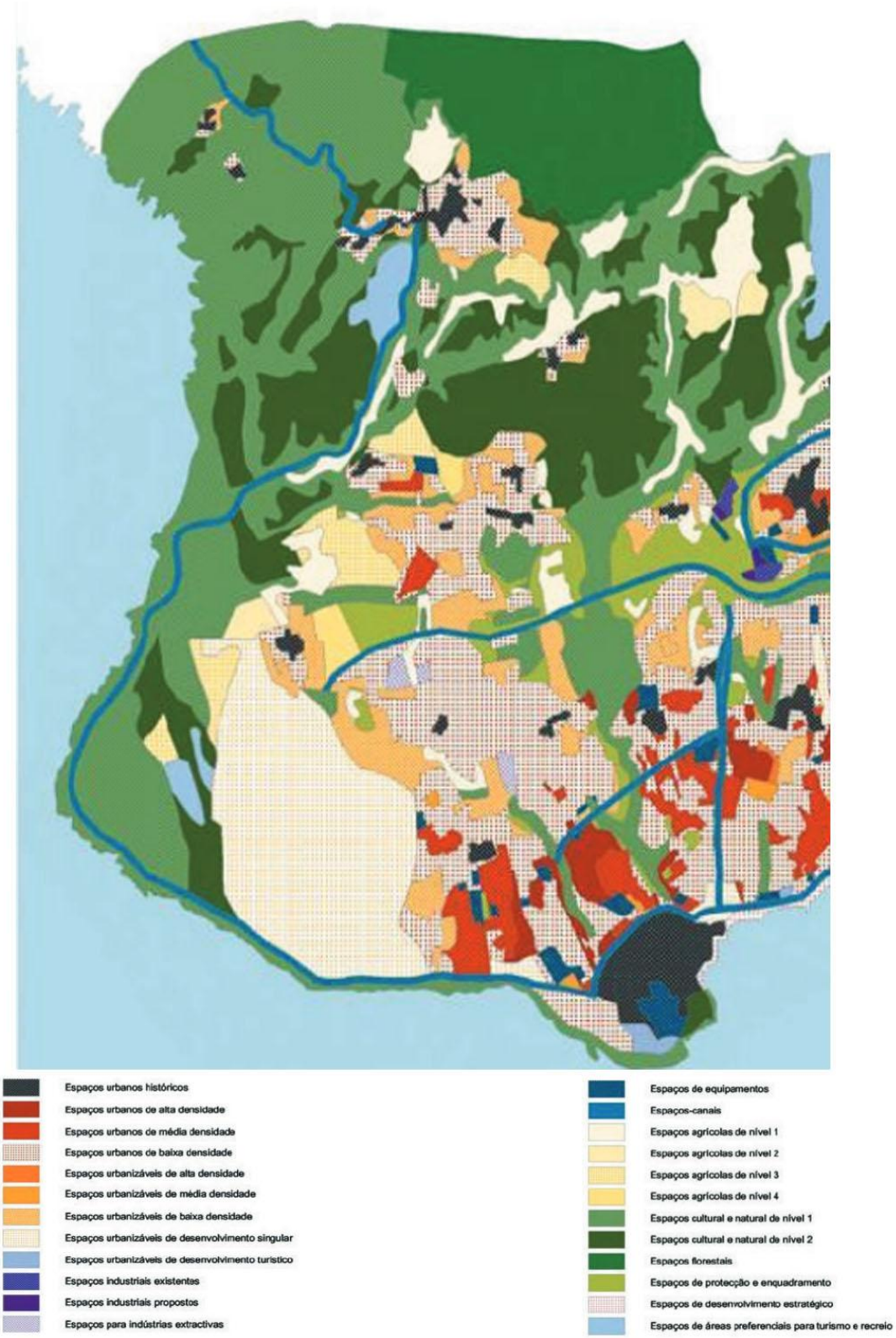
Clima

The climate of Cascais is warm and temperate and its climat classification is Csb according to Köppen and Geiger scale, which refers to Warm-summer Mediterranean climate. It is affected by ocean current and upwelling. In winter there is much more rainfall than in the summer with the most rainy days between November and January, when the medium amount is 114 mm. Summers are warm and dry. The average annual temperature is 15.8 ° C (Table 6).

Table 6: Climate diagram of Cascais region (Source: http://en.climate-data.org)



Land use



Picture 15: Spatial plan of Cascais

Source: http://www.apambiente.pt

The zoning plan in picture 15 shows that the study area is dominated by natural zones of 1 and 2 level, urbanized zones and historical zones. Agriculture areas are on the decline compared to previous years and occur sporadically. Natural areas are in the corridors oppressed by urban zones and in some places (triangle Areia-Sao Gabriel-Bairro Chesol) stop to be connected.

Monuments

Along coastline, many old fortresses can be found. Fort of Guincho, Forte de Galé, Forte de Bateria Alta, Forte de Cresmina or Forte de Sanxete. Even though they hold a strong importance when protecting the entrance of river Tejo and the access to Lisbon, nowadays most of them do not held any special purpose anymore, are closed to public or free open but in bad conditions.

Cascais region is also knows for its numerous quintas (Portugal vineyards and farms), that are spread along the whole county. They were located in areas with recreational character and agricultural function, with fertile soils, wildlife and water resources. Later on with the decline of agriculture the farms were fragmented and now they are mostly reduced to housing areas and their dependencies. The most famoust quintas are Quinta do Barão in Carcavelos (Picture 16), Quinta dos Ingleses, Quinta da Charneca in Cascais town, Quintas de Vale Cavalos or do Marquês de Angeja in Alcabideche, where the most of quintas in region are located. They were usually accompanied by chapels, watermills, cellars; larger ones included also hospital and school.

Picture 16: Quinta do Barão
Source: cascais.pt

Services

The area is well equipped mainly for recreation and tourism. There are many sports centers or playgrounds, hotels and private apartments for rent. Stores are located in every village, their range is

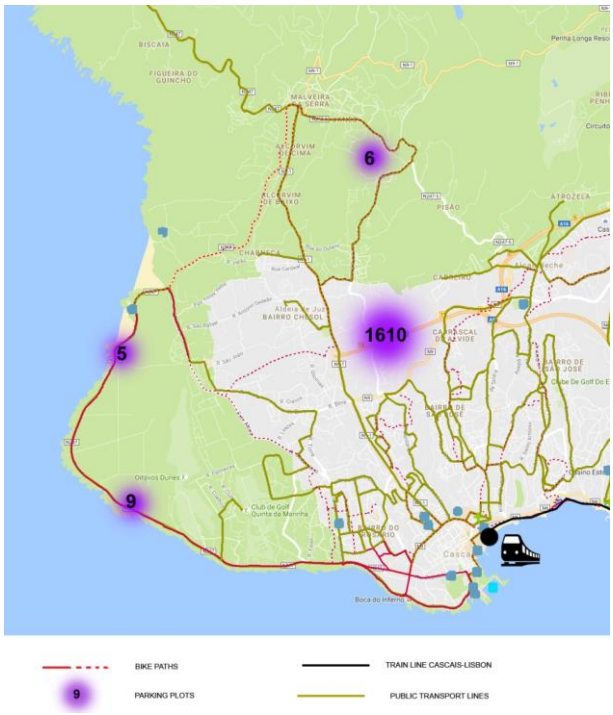
although weaker and they are located mainly in the cities (towns), as well as the central shopping areas of the city of Cascais. Primary schools are located in villages Malveida de Serra, Aldeia, Cascais, Areia and Cascais. The hospital is located in Cascais and Alcabideche. All other locations have pharmacies.

Given the overall network of essential services, which is oriented mainly near the town of Cascais and Alcabideche area, their use is dependent heavily on private transport.

Tourism

Location is most popular for leisure time like beaches, golf, casino, vacations, sea sports or hiking to nearby Sintra forests. The coastline between Belém and Cascais started to be very attractive from the 19th century thanks to visits of Queen Maria II in Pedrouços's beach and later when king Luís I settled his summer residence in the citadel of Cascais in 1870. Later on, casinos, bath houses, hotels and new infrastructure were built to support the demand of new visitors.

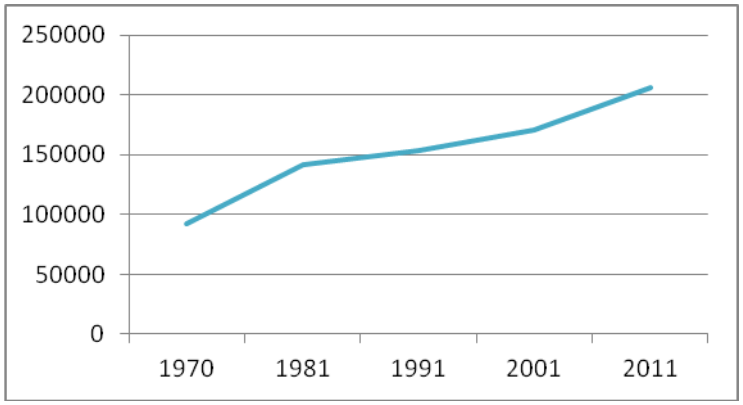
In 2009 there were 39 official accommodations (hotels and pensions) at Cascais with the total capacity of 7 272 persons. It does not include private renting at sites like Airbnb (+300 offers), Booking (240 places) and others, that list private properties being rented by owners for short or even long term stay. Favorite activities include surfing, beaches, historic trails, horse riding, golf, biking, casinos and shopping or boat cruises and yachting as Cascais was the official host of the ISAF World Championship in sailing. The most attractive locations are also supported by public transport lines and parking plots, as shown in picture 17.



Picture 17: Illustration map of transport and parking plots

Source: geocascais.cm-cascais.pt

Population



Graph 12: Evolution of population between 1971-2011
Source: INE, Censos 1991, 2001 e 2011

Major increase of population is visible between years 1970 and 1981 (52 %) in graph 12.

Population growth is directly related to the improvement of public transport (the first train arrived to Cascais in 1889), construction of new roads and highways connecting the city with Lisbon, more parking spaces, etc. In larger municipalities walking or public transport is the primary mean of transport, but the construction of single-unit family houses in countryside has resulted in a high proportion of private transport by car. Another reason is the change of leisure, tourism promotion and conversion of agricultural land to urban and residential zones. Popularity of Cascais as a summer residence started in the 19th and 20th century with royal family. King Luis I. also financed the launch of electric lighting in the town. Cascais, up to these days, has become a lucrative address.

Currently, the county of Cascais has the majority of population in women 30-50 years old, then men aged 30-45 years. In a society elderly population aged 65+ and one- to two-person households (57 %), followed by a three-member households (22 %) dominated increasingly. That could represent that the site is popular for young people with no commitments or elderly residents who live alone.

30.7 % of the population has a primary education, 24.7 % have a university education. Unemployment in the county is 5.5 %, people work in tertiary sector are in 86 % of cases (services) (data from 2011, the source http://www.cm-cascais.pt).

Urbanism

Current plans (inspired by plans from the 40´s of the 20th century) expect to transfer former fishing and agricultural areas to a new Portuguese Riviera as part of the so-called "Costa do Sol". According to authors *„it is important to understand deepen the prospects of sustainability in the Portuguese Riviera as a space of touristic and urban competitiveness in a regional but also international context*“

(Ferreira, 2012). First beach resorts were being planned in 30´s of 20th century to follow the successful tradition of Côte D' Or. The coast from Lisbon to Cascais was supposed to be urbanized, supported by strong infrastructure, while maintaining views on ocean and horizons. "*Plans of the thirties and forties reveal the pervasive influence of Garden Cities, with low density, appointments with topography and organic designs, expanding on lots of villas with deadlocks/ impasses"* (Ferreira, 2012). In plans, very important was also concentration of services and civic center into micro-centrality.

Typical suburban houses in this area include mainly luxurious villas on hills with ocean views like new suburban area at Guincho or Malveira de Serra (Picture 18). Those houses typically have 1 floor, numerous rooms, pools, tennis courts, large garden and plots, they include large lawns with irrigation, spacious driveway and parking places and they are isolated by high fences. The second most common type is a regular one floor family house of 3-6 rooms, built next to each other in a linear scheme, with small gardens and parking places. Typically they are located in a hilly area where nice views are provided.

Picture 18: Photo of one of Quinta da Marinha villa
Source: economico.sapo.pt

3.1.2 DIAGNOSIS

Table 7: SWOT analysis of Cascais county

Strong elements	Weak elements
Scenic surrounding landscape and rich nature	Untapped potential for cooperation between municipalities

Satisfactory infrastructure, mainly transportation Proximity of beaches and ocean in general Proximity to capital city Lisbon Safe location Human scale of current construction (including Cascais town) Attractive area for potential investors Family friendly	Highway A5 dividing northeastern part of Cascais Overcrowded in summer time Services in-land
Opportunities	**Threads**
Tourism Recreation potential and wide sport opportunities Educational sources (mainly ocean and related habitats) Further nature protection	Increasing traffic loads Car dependence Economical interests of municipalities over qualitative interests Landscape fragmentation without adequate maintenance Mono-functional neighborhoods Price growth Displacement of low and middle class society by high society

Case study concentrates mainly **on gated communities** (Marinha Guincho, Quinta da Marinha, Janes), **scattered detached family houses** (Areia-Bairo Chesol) and **neighbourhoods separated** by highway (Cabreiro).

First of all it is important to specify natural areas, establish development plot and connectivity. Next step is to determinate development locations, establish centers and channel touristic flow (Map A). Then to find location suitable for further residential development- either empty plots or abandoned buildings. Additional and reasonable use of vegetation is necessary, along with new pedestrian and cycle paths maintenance and routing.

Protective zones clearly define the areas that are legally protected by the state or that are part of the Natura 2000 network, which protects the rarest and the most endangered species. Already for that reason, the boundaries of this territory should be respected and any construction development in these areas should be absolutely prohibited. The extent of the protected zones is shown on the map B. Those areas will be protected in its entirety. Map B shows boundaries of this territory, which marks the line from which it is possible eastward to authorize new construction, which, however, should be adhered to notes below. Currently, this border is created by the golf course Quinta da

Marinha, municipal road to Areia and national road no. N247 leading to the village of Malveira de Serra. Those areas are moreover listed under code 5330 (Natura 2000). It is a **Thermo-Mediterranean and pre-desert scrub**. This habitat includes extraordinary endemicity index with, for example, the Lusitanian endemism *Coincya cintrana, Iberis procumbens subsp. microcarpa, Jonopsidium acaule, Juncus valvatus, Limonium multiflorum* or local endemism *Armeria pseudarmeria, Dianthus cintranus subsp. cintranus* and *Omphalodes kuzinskyanae*. It is necessary to require no further development to expand settlements in these areas, especially in the village of Charneca to avoid disrupting existing corridors , which are already disturbed by garden Quinta da Charneca, illegal dumps or labors construction in the middle of the protected areas marked on the map B (suburban location nr. 5). Buildings of this type provide a pretext for further construction and they should not be allowed at all in the first place. From Malveira village the boundary continues along N247 westwards.

Given the background the clear center of development would be the village Malveira de Serra with Arneira and the area around Areia. In **Areia**, fairly intensive construction of luxury villas with large plots that are scattered along the road leading to the village of Aldeia de Juzo is happening. This location allows further development of the municipality with no risk to protected areas. For Areia community it is essential to create a buffer zone between the Crismena protected dunes and municipalities. Those dunes are a moving object and are slowly spreading behind the road border, which is a natural feature. One of the options could be a creation of artificial smaller fore dune, which would be accompanied by local vegetation (grasses, creepes, shrubs, and short-lived tress) to give an evident and effective border between natural preserve area and urban zone. In this location, it is not effective to make an effort for stopping the dune movement, since it is a wind corridor, therefore the effect of the barrier would be rather visual and mental.

Malveira da Serra is a recently popular place for construction, located in the hilly terrain and within driving distance to Cascais (18 minutes). At the same time it meets all requirements for convenient proximity to coastal life larger city, ocean views, privacy, the nearest beach is a 5-10 minute drive away, and public transport can be also found here. This village is the gateway to the park itself Sintra-Cascais and the historic village of Capuchos and thus has a major potential for tourism development. There is a slight lack of services, but there are also plenty of places for accommodation. Malveira can expand toward north and north-east hills, strengthen its town center and gain advantages from tourism and vacation residents.

Process of suburban repair comes hand in hand with urbanization and denser re-urbanization, so it is necessary to carefully select sites for new construction or to choose unused and abandoned buildings instead of taking free land.

In areas with existing suburban building with the typical features of urban sprawl (homogeneity, linearity, lack of services, dependence on motorized transport cul-de-sac, etc.), it is necessary to reorganize the empty spaces to create natural neighborhood with centers, parks, services, etc. This is particularly the case between Oitavos Gold and Quinta da Marinha Golf, northern part of Murches and gated community Marinha Guincho at Arneira. Gated communities have no foundation in this area, since the county of Cascais has not a high crime rate, the risk of terrorism and so. Gated communities privatize public space and they physically and mentally separate from its surroundings, which is always a negative factor for the indigenous population. These objects in turn can become a magnet for burglars. In the area there are four gated community of large scale (10 or more homes) registered so far and the assumption is that their number will grow. These communities, already due to its location (on a hill on the outskirts), do not necessarily have to be fenced and guarded by security so they could become at least visually more accessible. They often include private swimming pool, sports courts, riding schools or restaurants, and other facilities that may be chargeable and fused terms accessible to local residents, who thereby reducing maintenance costs.

On the map C routes of roads, bicycle paths, public transportation routes and the number of car parks in their districts can be seen. Public transportation provides good connections to major towns; an additional bond would be needed to supplement the Malveira de Serra da Praia Quincho due to the proposed increase in tourism. The road network is in sufficient. At P.d.Quincho it is also necessary to increase parking capacity, as well as in the village Malveira da Serra, Charneca and in the municipality of Areia. Cycling routes in the area are adequate and clearly marked, especially along the coast to Cascais and Guincho route. It would be better to improve pedestrian tourist signposting to local attractions that are not adequately visualized (especially the lesser known inland as old quintas, where they could be productive and improve their tourism potential). Those quintas can provide accommodation, leisure activities typical for its area (horse riding, winery or orchards), services, local production or small local restaurants, to attract people to inland and take advantage from its close proximity to the ocean and beaches.

For directing tourism it is a suitable to place information tourist centers directly on the inputs on the border of Cascais (existing one near harbor) and the second in Praia da Guincho, possibly one in the village of Malveira da Serra, which can serve as the southern gateway to the park Sintra-Cascais (see map D). These centers would also collect service (café, restaurant, shop) and the parking area should be carefully expanded. This would streamline traffic to the desired centers, while the public could be better informed about the importance of this natural region.

Complementing the vegetation is necessary in marginal urban areas, which should create frequent border between protected areas and settlements, and often enhance the aesthetic quality of

buildings (building rubble, beaten paths, fences, concrete). These plantings should preserve scenic views of the surrounding countryside and ocean, which are disturbed by spontaneous and illegal construction in some places. Complementing alley is also important in major streets in larger communities to improve better climate conditions in major or important classes. Another important part is the application of buffer zones between protected dunes Crismina and municipalities Areia. Currently the border is represented only by road Rua Areia, behind which family houses already exist, in some parts only 50 meters from the protected dunes.

3.1.3 PROPOSAL FOR EACH URBAN SPRAWL LOCATION

1- Location by Biscaia village, consist of single houses with large plots on hill; surrounded by protected area that does not allow space for further development; due to low number of houses and its character there is no need of new creation of common meeting space (Picture 19).

Picture 19: Biscaia

2- Gated community in Janes consists of 28 houses and pool in central area; it is located at the border of municipality; location does not have any more facilities and it is built as a closed circle that does not leave much space for re-organization to become an open community (Picture 20).

Picture 20: Gated community in Janes

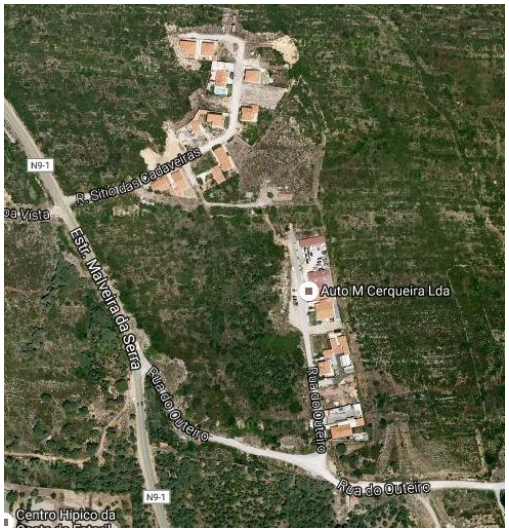
3- Located south of Janes, at municipality border; consists of 5 larger villas with large plots and pools and then 18 single family houses; location is surrounded by protected area but its inner part is available for further construction and provides also empty plot in the center of this location to create a common meeting place (park) to create a neighborhood (Picture 21).

Picture 21: Janas

4- Large gated community Marinha Guincho; project expects 101 built villas, location includes restaurant, pools, tennis courts, spa and kids group; surrounded by protected area does not leave space for further construction outside the community borders; located on top of local hills, next to municipality of Malveira de Serra; due to better contact with locals and better intersegment of gated community residents, this location should be partly open – common facilities should be offered under special conditions and fee (e.g. monthly or year pass); common open spaces (artificial lawns, forests) should be connected by hiking trail with local nature and protected areas, leading to and out of nearby town (Picture 22).

Picture 22: Marinha Guincho

5- Typical example of urban sprawl, constructed in protected area and out of Charneca village borders; consists of 14 family houses and one service facility (auto repair) distributed in two nucleuses; located in hilly area does not disturb views to surroundings; surrounded by protected area; allowed development is between both nucleus to connect this location in one unit and further extend this location to original Charneca borders (Picture 23).



Picture 23: Charneca

6- Two family houses located in protected area with large plots; further construction is not allowed (Picture 24).

Picture 24: Praia da Guincho

7- Scattered family houses partly in protected area, some new ones, several houses are former agriculture properties; possible construction should keep its agriculture character and natural areas (even artificial like gardens) show represent majority of land use; those conditions should ensure division of municipality of Areia and Bairro Chesol, that could otherwise end up as one municipality in the future (Picture 25).

Picture 25: Areia-Bairro Chesol

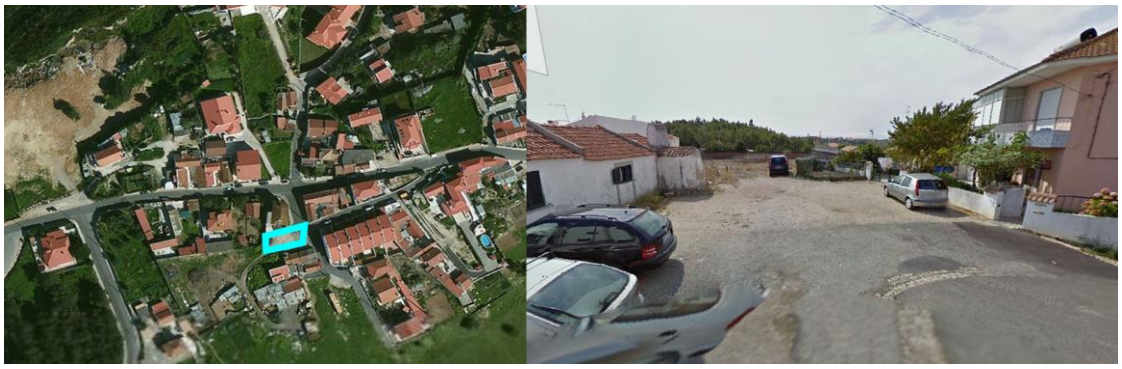
8- Large area of Quinta da Marinha, half consisting of gated community, located in between of two golf courts; at west borders with protected areas (dunes); golf course represents artificial buffer zone between dunes and urban zone; for southern area, that is not part of gated community, a common meeting space (park, square) is suggested (Picture 26); existing empty plot contains grown pine trees that could be kept to provide shape and that would lower expenses for park development; this common space could be accompanied by smaller shops or cafeterias that are missing this area (services in general).

Picture 26: Quinta da Marinha

9- Separated plots at east border of Areias village show area of possible allowed development for residents, to prevent further spreading construction to western parts, that are under protected habitats and Sintra-Cascais natural park; construction should include larger plots and keep semi-agriculture character (orchards, gardens) of this area (Picture 27).

Picture 27: Areia

10- Residential area Cabreiro separated from original municipality centers by highway A5; provides several empty plots for further construction and it is not under protected habitat or part of natural park; case study allows further development and suggest creation of two common meeting centers accompanied by local services (small shop, newsstand etc.) (Pictures 28-29).



Picture 28: Cabreiro 1

Picture 29: Cabreiro 2

3.1.4 ALTERNATIVES

Golf course

In case of the golf course shot down, it is possible to convert the field into the ownership of the municipality Cascais and include the area back to its natural habitat, hence protected and adapt vegetation to naturally occurring.

Abandoned plots

Removal of unused buildings or dilapidated buildings, the transfer of land to public green areas and possible involvement in the corridors or construction of local parks.

Large villas

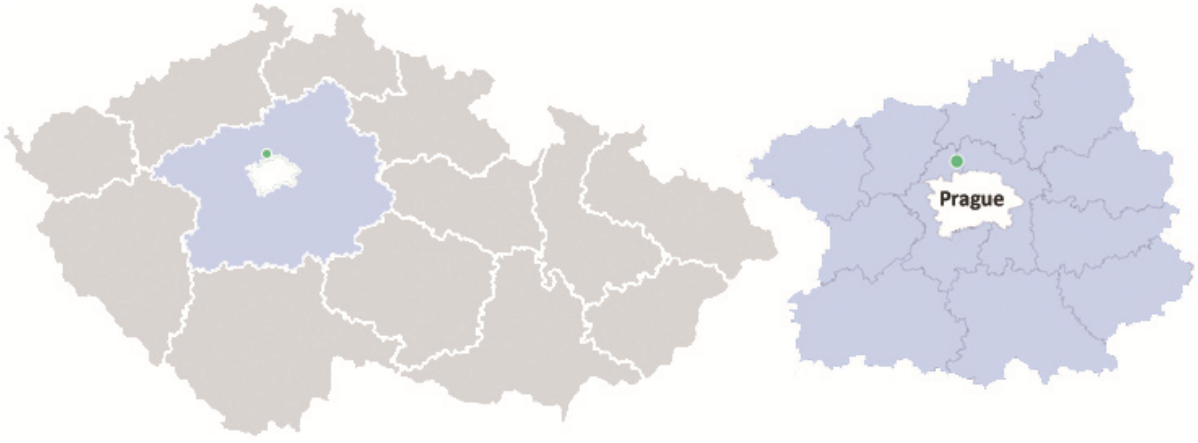
Split plots of villas with extensive grounds to thicken built-up area, where natural neighborhoods instead of scattered buildings could be possible to create. Some of those villas are used only seasonally and they are left unused for the rest of the year.

3.2 Czech Republic, Větrušice case study

3.2.1 ANALYSIS

Location

Village Větrušice (Vetrusice) is located in the north-west corner of Prague - East district, right on the border with Prague-west, which separates it from the Vltava River (Pictures 30-31). The average altitude is 261 meters above sea level.

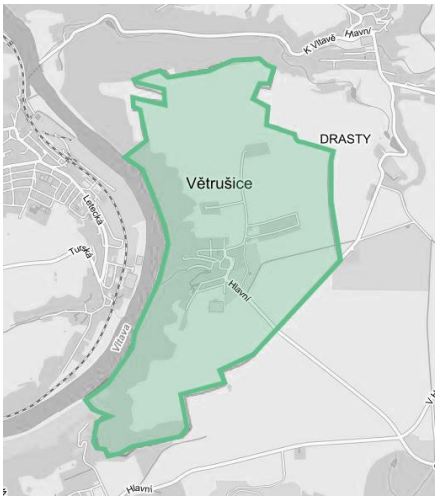


Picture 30: Vetrusice location

Czech Republic – Middle bohemian region with capital city of Prague

It is located 15 minutes from the capital city by car and 25 minutes by public bus which it makes a potentially interesting location for new construction and suburbanization growth.

Brief History



Picture 31: Vetrusice district

Vetrusice origins are attributed to the year **1306**, although the first written mention of the village appeared ten years later. In the subsequent centuries, there were several owners. Originally, the village consisted of **1 agriculture estate, 7 peasant farmhouses and 3 houses**; political, judicial administration and serfdom belonged to the Vysehrad Chapter. In 1853 there had been 22 houses in the village and after the abolition of serfdom it was connected with nearby village called Klecany. In 1888 the village was declared as an independent political community. Also in 1885, a seed production station was founded especially for the production of sugar. While the construction of new buildings came on, an **old underground passages** leading to other nearby villages were found, from which it was concluded that there were a **castle** in the old days. In 1957 excavations of vessels and human skeletons were found. The age was estimated at about **3,000 years** (Picture 32).

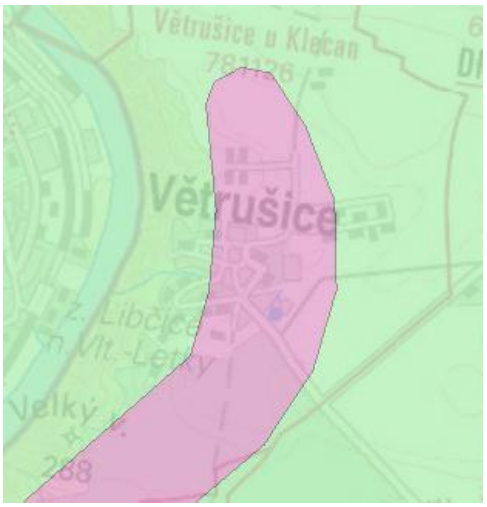
Picture 32: Vetrusice, 30s of the 20th century

Source: starepohledy.cz

During the 20th century the village continued to grow gradually - **while in 1900 there were only 223 residents in 31 houses**, **after the first world war (in 1921) it was already 400 residents in 66 houses**, and this state was maintained practically until second world war.

Nature

Potential natural vegetation is shown in picture 33: **Melampyro nemorosi - Carpinetum** is dominated by *Quercus petraea*, mixed with *Tilia cordata, Quercus robur* and other deciduous trees such as *Acer platanoides*.



Picture 33: Potential natural vegetation
Melampyro nemorosi -- Carpinetum (green area)
Sorbo torminalis-Quercetum (pink area)

Herbal floor consists of mesophilic species like *Hepatica nobilis*, *Melampyrum nemorosum*, rarely *Poa nemoralis*. The unit has a considerable environmental variability and predominates at altitudes from 200 to 450 AMSL, on the southern slopes of up to 550 AMSL. The soil cover consists mainly from cambisols and luvisols, at debris forests they are transformed in rankers. Alternative communities are spruce monocultures (*Picea abies*), pine (*Pinus sylvestris*), followed by meadow communities and pastures.

Sorbo torminalis-Quercetum: The tree floor is dominated by *Quercus petraea, Carpinus betulus* and *Tilia cordata*. In the brighter and drier habitats there is *Pinus sylvestris* and *Sorbus aria*. The dominant feature of many the herb floor is *Poa nemoralis*, but often prevails *Calamagrostis arundinacea*, *Festuca ovina, Luzula luzuloides* or *Vincetoxicum hirundinaria,* in very dry habitats also *Carex humilis*. These oak habitats colonize frequently sunny locations on acidic or secondarily acidified substrates where the soil pH generally ranges from 4.0 to 5.5. Typical habitats are slopes of river valleys, their upper edges and near rock outcrops. Often they are mineral-poor to moderately rich igneous rocks and metamorphic rocks. *Sorbo-Quercetum* is often the most dry-tolerant forest community growing in rugged terrain in warm and moderately warm areas.

The territory was forested in the early 20th century. From this planting remains of inappropriate plantations like acacia and black pine or birch are present. Herbal floor represents a mix of rocky steppes with de-alpine elements from basophilic communities to spilite after poor communities with *Festuca pallens* and *Aurinia saxatilis* with transitions to heath.

There is a rich fauna with numerous small relics, such as green lizard and snail *Pupilla sterr*. The territory has historical and potential nesting place for prey birds, especially hawk and falcon, insects (namely butterflies) *Iphiclides podalirius* or *Papilio machaon*.

At the borders there is a protected area of SAC, Natura 2000 at Vltava River valley called **"Větrušické rokle"**. The goal is protection of different types of rock steppes ecosystems and so-called "river phenomenon" with a number of endangered animal and plant species characteristic for this communities.

Hydrography

In the village itself, there is an artificial water reservoir with a nameless stream, which is navigable to the Vltava River. Its distance is 250 m from village air-line

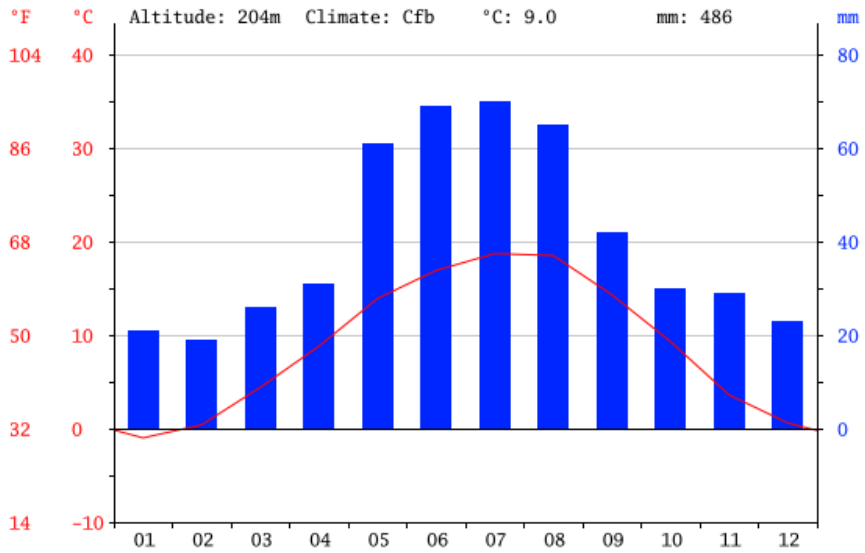
Climate

Due to its location on open plateau, the wind is sometimes quiet strong. Therefore the name of the village comes from **wind** (wind = "vítr" – "*větru*"). Warm climate data are listed in tables 7 and 8 below:

Table 8: Climate characteristics (Source: Czech hydro-meteorological institute)

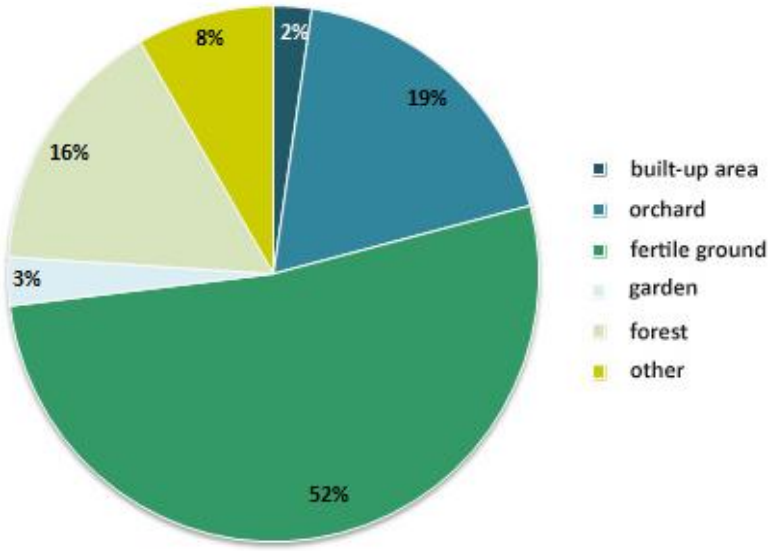
The number of days with an average temperature of 10 ° C and more	**160-170**
The number of days with frost	**100-110**
The average January temperature	**-2 – -3 °C**
The average July temperature	**18–19 °C**
Sum of rainfall during the growing season (mm)	**350–400**

Table 9: Climate diagram of Prague as the closest bigger city to Vetrusice village (Source: http://en.climate-data.org)



Land use

Exceptionally, this is an area where the natural vegetation clearly outweighs the built-up area, as it can be seen in graph 13. In this cadastre of 285.9 ha, there is only one village and it is an impassable area.



Graph 13: Land use in Vetrusice cadastre

Terrain and erosion

The village is situated on a plateau with a slight slope (0.7 % < 1 °), on the west side of the edge of a gorge, which is protected by a deciduous forest zone. Agriculture is mixed type, predominantly of arable fields, orchards and gardens and forest. Given these circumstances, the risk of erosion in this area is low.

Monuments

There are several old agriculture estates (approx. 100-150 years old) and statue of St. Venceslav from the 19th century, located in central area.

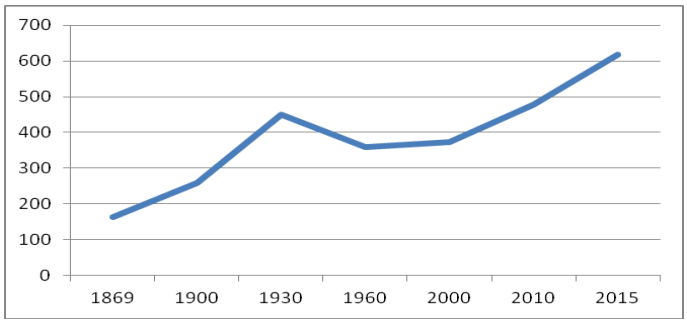
Geology

The bedrock outcroppings in the wall of the Vltava canyon are formed by base spilite, partly offal and proterozoic lydites. Here it is one of the largest contiguous outcrops spilites. The surface consists of shallow basic to acidic soil from rock rankers to brown soil with a high content of skeleton and the islands pararendzin.

Services

There is one public transport line that goes to capital city several times a day. In the village there is one local pub, child club, municipal office and library. In 2015 there was one small local shop but it was closed recently due to bad hygienic conditions.

Population



Graph 14: Development of municipality population from 1869 to 2015

Evolution of the population is fluent until year 1930, when there was decline of population caused by Second World War. In 2005 the trend is observable growing intensively because of construction of new houses. In 2015, there were 31 new residents coming to Vetrusice (Graph 14).

Urbanism

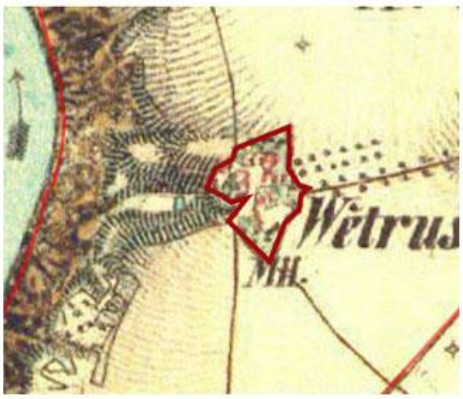
Vetrusice is a historic village with a single core formed by a irregular square. Majority of housing consists of single-family units or multi-storey houses of max. two storeys. Houses have gabled roof and maintain its village character. Farm houses generally have "L" profile and they are located on edge of village (main activity: farming or fruit processing). The development of newly finished apartments can be seen in table 9. The situation is stagnating.

Table 10: Development of newly finished apartments

Year	2011	2012	2013	2014	2015
New apartments	6	7	8	3	5

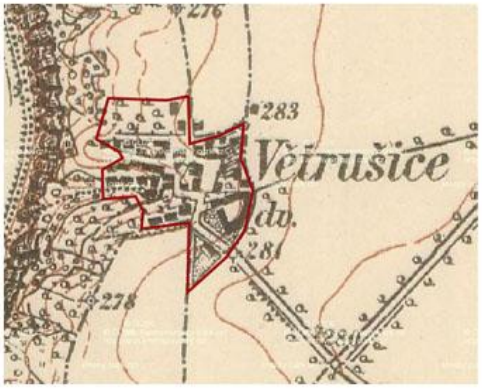
The municipality's main road is the dead end road.

Suburbanization development



Beginning of 19th century

1826-1843



1869 - 1885

2003

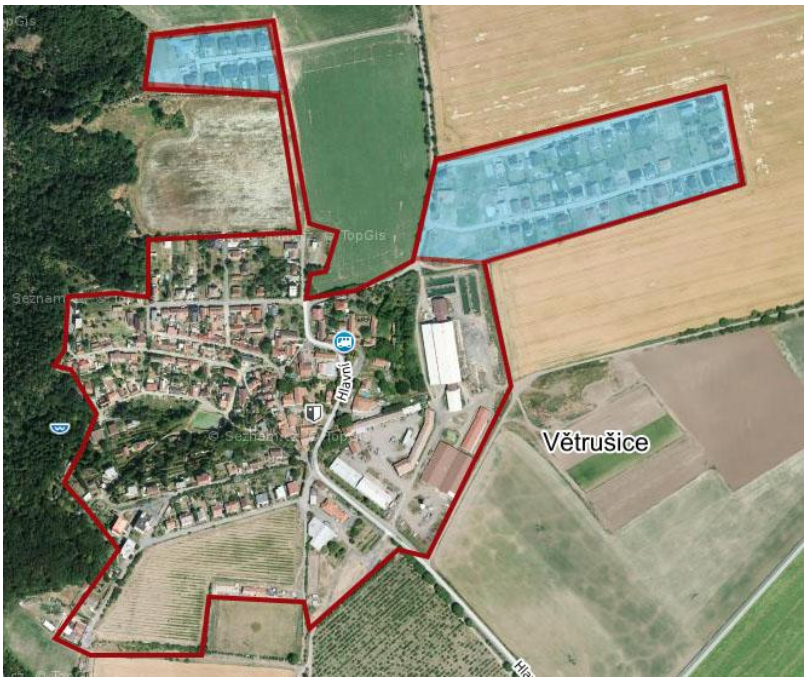
Pictures 34-37 (from top): Urban development of Vetrusice

Picture 38: Development in year 2012

Pictures 34-37 illustrate the gradual development of municipality from the beginning of 19th century up to year 2012. A large boom can be seen in the late 19th century to present. It is caused by a sprawling capital city, agricultural development in 20th century and currently also due to suburbanization development of small settlements near major cities or large ones. In the first phase, the village was approaching towards the gorge of Vltava River, then emergence of new production and agricultural buildings appeared, and in the last phase (Picture 38) random construction of houses at the expense of arable land engagement in outlying areas of the municipality occurred, mainly in northern and northeastern parts. The development of Vetrusice towards the west is limited due to the buffer zone SAC "Větrušické rokle".

Description of current situation

Case study of Czech Republic suburbanization deals with areas marked in blue in picture 39 below.



Picture 39: Selected suburbanized areas

Generally to selected areas

Vetrusice could become a much desired location in the future as a housing background for Prague residents. They generally want to live in nature and countryside and at the same time in commuting distance to the capital city.

In recent years, a development of construction and population growth of productive middle-aged families is noticeable. In the northern part of the village (Area 1), a project of 10 low-energy houses grew up. There are 8 storey semi-detached houses and two bungalows. These houses have the same floor plan and architectural style, they differ only in color of facade, which maintains a single character of this district. The average area of land in the northern part is 450 m^2. At Area 1 there is no greenery planted and the built up area is surrounded by actively cultivated arable land.

In the northeast area (Area 2) there are currently 43 detached houses and 6 vacant plots, ready for construction, located. The average size of plot is 750 m^2. All houses have a private garden. The area is partially protected by several trees of specie *Pyrus communis* that are fragments of the original alley along main road at the western part. Along the border of the land there are several species of *Rosa canina* and *Prunus spinosa*. The connection of Area 2 and village core is better than of the Area 1. In its southeastern part it is connected by 3rd class local road.

Further construction is planned in the Area 3. Currently the land is parceled out and let fallow.

3.2.2 DIAGNOSIS

Table 11: SWOT analysis partly based on the Strategic Plan of Vetrusice

Strong elements	Weak elements
The village located in beautiful countryside and near the capital Prague Impassable village -smaller traffic density Proximity of tourist attractions -protected area "Větrušické rokle" Traditional favorite events for children Improvement of municipality leadership The existence of areas owned by municipality office: possible construction of public facilities and improvements in the social life of the village Demographic composition of the population with a prevalence of young people	Very poor or critical condition of roads - unwillingness of district for the road repair The absence of sidewalks in almost all parts of municipality In winter almost impassable road in the old part of the village The absence of school and preschool facilities The absence of facilities for the elderly Relatively weak transport links No shops or cultural background Few recreational possibilities Zero accommodation capacity More or less indifference of citizens about events in the community Lack of medical care Black landfill on the border of protected area
Opportunities	**Threads**
Reconstruction of local roads Construction of sidewalks Construction of new family houses in northern part of municipality Effective and efficient use of land and property owned by the municipality Bike path construction The introduction of new activities in all areas Getting the youth to participate in events in the community	Increasing traffic loads New construction without adequate networks and infrastructures Dilapidation of abandoned properties Citizens' interest mainly for their own benefit without regard to other age groups or overall structure of inhabitants Inactivity of municipality office Citizens do not register for permanent residence Increasing bureaucracy The antagonism among citizens

NEGATIVES

Neighborhoods are unhappily located outside the existing village and in middle of fields. At the same time they are not isolated by any surrounding greenery. Agricultural processing negatively affects the quality of life in both neighborhoods. In the summer months there is a disproportionate increase in dust and noise from farm machinery and chemicals being transferred by air to garden plots. New construction does not tie up with the existing village core and aesthetically disrupts the horizon,

hence the landscape character. Area 2 is, at least, partially bordered with an agricultural building; Area 1 is linked only to east side of protected area "Větrušické rokle." Despite the high potential of surrounding landscape there are no walking circuits planned and it creates a space only for night accommodation. Isolation contributes to mutual animosity of existing residents and new residents who are not interested in situation in the remote village. There are therefore two different groups of people, who do not have much in common and the scissors continue to open. The situation does not help the fact, that the community totally lacks any services.

GOALS FROM LANDSCAPE ASPECT

The goal of this case study is not to create urban character at this suburban location, but retain the rural character blended with urban elements, because the people who move in these locations, do not primarily desire for country life, but a life in the nature. At the same time it is important not to disturb the core of the village.

1. **incorporation of suburban area into the existing plan of Vetrusice village**
2. **natural transition between the village and the countryside**
3. **attractiveness of the location**
4. **ecology: support of migration routes (birds, small mammals, insect)**
5. **improving the health conditions of the location (dust, noise, water, shade)**
6. **recreation: creation of circuits and trails around the village in relation to the surrounding municipalities**

Other goals:

- integration of services to the extent to satisfy basic needs of local residents and to create a subject for mutual meeting or joint actions of residents. At the same time it should not turn the village to town
- the establishment of a ferry in the bottom of Větrušické rokle, that would connect Libcice nad Vltavou-Letky town, where there is a train station (e.g. in the morning between 7-9 am and afternoon 14-17.hod) or by agreement
- improvement of interconnectivity
- construction of sidewalks and adding public facilities (benches, trash cans...)

3.2.3 PROPOSAL: THE PROJECT ON VETRUSICE

The project is phased into different stages and with the possibly of implementing and financing practices taken into account. Procedures are in individual logical steps.

Phase 1:

Creating isolation rings around each developed areas.

The total length of the perimeter of developed plots in the Area 1 is 490 meters. The total length of the perimeter developed plots in the Area 2 is 1070 meters. Along the perimeter of both areas loosening groups of bushes will be planted, placed towards the field, in combination with solitary trees. Species are domestic, naturally occurring in this area. The goal of the development is aesthetic incorporation into the surrounding countryside. From a hygienic point of view, it prevents excessive dust from the surrounding fields throughout the year, reducing wind gusts in open areas, which also corresponds to the composition of the plant and prevents penetration of chemicals to the family gardens from spraying of the fields, which are in close proximity. Vegetation will also provide shade, that is missed in a large scale especially during the summer months and it will make the time spent on walking circuits more pleasant.

Overall, there will be 280 trees planted and 450 bushes. Composition is shown in table 11. Planting retains the natural character, shrubs will be planted irregularly and maintenance will be minimal during the year to support natural growth of the proposed plants. Once a year there will be maintenance of trees (cut of death branches, general maintenance cut), and three years after there will also be eventually thinning of planted shrubs. Conceptual plantings are indicated in the maps nr. 3 and 5.

Table 12: Composition of trees and shrubs

Latin name	Parameters	Amount	Location
Acer platanoides	Bare-root, trunk height 200-250 cm, trunk perimeter 10 cm	108	Isolation ring, park
Tilia cordata	Bare-root, trunk height 200-250 cm, trunk perimeter 10 cm	101	Isolation ring, park
Malus sylvestris	Tree height 121-150 cm, volume of rootball 3-5l, neck perimeter 14 cm	23	Alley
Pyrus pyraster	Tree height 121-150 cm, volume of rootball 3-5l, neck perimeter 14 cm	48	Alley, Isolation ring
Sambucus nigra	5 shoots – 50 cm	62	Isolation ring, park
Prunus spinosa	5 shoots – 50 cm	100	Isolation ring
Rosa canina	5 shoots – 50 cm	80	Isolation ring, park
Rosa rugosa	5 shoots – 50 cm	95	Isolation ring, park
Corylus avelana	5 shoots – 50 cm	48	Isolation ring

Sorbus aucuparia	5 shoots – 50 cm	65	Isolation ring, park

Part of isolation greenery is purposed **park** between residential Area 1 and 3. This place is not parceled and by cadastre office it is recorded as fertile ground at this moment. This gives an opportunity to create a green space that will provide a new centre to Vetrusice village and especially those new residential areas.

The total area of purposed park is 5843 m^2 and it has a rectangle shape. It consists of 4 parts: **central meeting place, children playground (Picture 41-43), open green space and wooded area**. Eastern part is open area with several trees and triangular meeting point that is located on crossroad of three pedestrian paths. On two sides there will be trees planted to provide shade, traditional wooden benches with trash cans will be added. There will be no paving, only firmed ground with fine sand color gravel of 4⁄8 fraction. This area will not have any shrub floor to maintain views to surrounding. Playground will be located right across pedestrian path next to central meeting point. This playground will consist of natural play tools, mostly made of wood and stone and it will include sandpit, swings, stone steps, slide, willow tunnels and benches with trashcans. The ground will again be grey gravel of 4⁄8 fraction on firmed base. Playground will be surrounded by 1 meter tall wooden fence with gate to specify the area and protect this place from dogs. Lights will be added only to this area, rest of park will not have night lighting.

Pictures 40,41: Willow tunnel and wooden elements at playground

Picture 42: Characteristic of new village playground

Open green space is important for mutual meeting of residents, cultural events like traditional Witches burning, that occurs at the end of April, Children's Day or so. Also it will be a good place for playing sports, doing exercise or for children games. It will be bounded by shrubs on the northern side to still provide view from nearby houses of Area 1 and it will have tree alley on south side to provide partly shade.

Table 13: Composition of grass for residential lawn for purposed park (Producer: Agrostis.cz)

Grass botanical name	**% in mixture**
Lolium perenne	10
Festuca rubra	40
Festuca brevipila	20
Poa pratensis	20
Agrostis capillaris	5
Cynosurus cristatus	5

Ornamental residential varietal grass mix is very diverse and has great adaptability to exist in a variety of climatic and soil conditions. Due to its composition it is not only visually beautiful, but it is also resistant to stress factors. It is suitable for recreation, park and garden lawns. Increased share of dry-resistible *Festuca brevipila* makes it ideal for use on land with inadequate irrigation and dry conditions (Table 12).

The main goal of this purposed park is to increase attractiveness of this area, provide green views for future residents, create a new place for mutual meeting, playground for children and to create a new

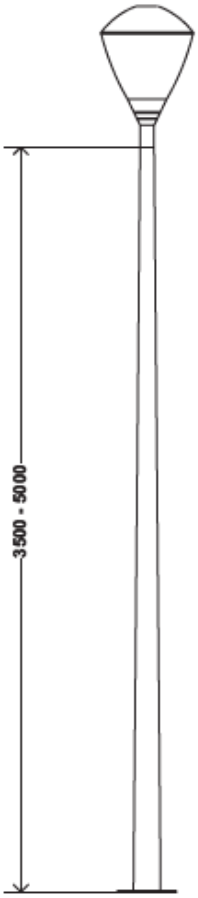
centrum for residential area 1 and 3, that are currently disconnected from original village core.

Western part will play more natural role as it will gradually blend into the local protected forest, starting at path crossroad. There, one path will continue creating a small walking circuit around Area 1 and second path will serve as connection to feet of Vetrusice valley, where a ferry to neighboring town is proposed. At the same time it will be an educational trail, listing information about local flora and fauna, protected area of "Větrušické rokle", origins of the village and history of the location. Composition of planting will respond with tree and shrub species existing in forest.

Phase 2:

Connection to an existing village, alleys along main roads and maintenance of road's surroundings

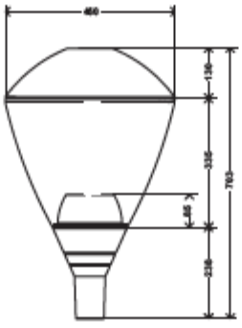
In both areas clear and functional connection on existing village core does not exist, mainly in pedestrian paths and also bicycle paths. For Area 1, additional trees to alley are planned leading from eastern road, which connects to road of 3rd class leading to town Klecany. Alley is planned from both sides and composites of fruit trees (table 11), that are traditional in this locality and also have production use. In this case the main goal is to create an orientation element and a way how to better incorporate roads to local landscape. For pedestrians there will be adapted currently dusty path leading from southern part of village. The path divides field in its half and it is spontaneously created by locals



CHARACTERISTICS - LUMINAIRE

Luminaire tightness level:		IP 66 (*)
Impact resistance	- PC:	IK 09 (**)
	- PMMA:	IK 06 (**)
Aerodynamic resistance (CxS):		0,080 m²
Nominal voltage:		230 V - 50 Hz
Electrical class:		II (*)
Weight (empty):		8,2 kg

(*) according to IEC - EN 60598
(**) according to IEC - EN 62262



Picture 43: Public lightiting, brand: KIO LED + by Grandedesign.

The path will be extended to match 1.5 m standards, material will remain soil with added gravel of 4⁄8 fraction. Lighting will be added each 30 meters (Picture 44).

From landscape point of view there will be groups of one-sided shrubs, that will be completed by

single or groups of deciduous trees. This character was chosen due to continuous field cultivation; therefore the planting will occur on eastern side to stop dustiness and visually separate path from the field. Similar planting will be also on western part, where future construction of Area 3 is planned but views to surrounding landscape will be kept open. The composition of greenery is designed to require minimal care, adapt to local conditions and naturally grow. It consists of the same species like by isolation ring, see table 9.

Construction of new sidewalks will be essential for Area 2, located at northeast border of village. At the present time residents are forced to walk on car road of bad condition and without suitable lighting. Sidewalks will be constructed on the right side of road towards the village and existing but fragmented fruit alley will be completed with new trees to provide shade.

In terms of pedestrian traffic there is also new walking path designed, leading from the southeastern tip towards the core of the village, which will serve as a walking trail.

Phase 3:

Creation of walking circuits around the village

CIRCUIT 1: This is a small circle around residential Area 1. At the eastern and northern parts it leads through dusty road, using existing paths. It will be complemented by shrub groups and solitary trees. In the western part existing greenery of protected Vetrusice forest connects with planned vegetation. In western part, a walking path will be created and it will lead to newly designed park and its path network. The total length circuit 1 is 570 meters and is suitable for pedestrians, cyclists or parents with trolleys. It is a soil path with added gravel of fraction 0/8 mm. The width is 1.5 m, with added trash cans at main nodes and by the entrances to park.

Proposed park separates the residential Area 1 from planned construction of Area 3. In the early years it will reduce the negative impact of new construction, in the next few years it will serve as a meeting point for local residents.

Area 1 will be, given the close location to Větrušické rokle, separated by green belt of 3 meters width, consisting again of the groups of shrubs and individual trees. It will be extended to core of the village at Area 3 borders and it will connect Vetrusice with Vltava River.

Great circuit leads from residential Area 1 from its western part along forest of Větrušické rokle and leads through free space between plots of streets Slunecna, Chaloupky and Vltavska. This way leads to the old core of the village, where water reservoir is located and where local nameless creek flows into.

Then it continues along the already existing walking trail through woods down to the Vltava River. It

will also be the local nature trail, describing prehistoric populated areas, natural conditions and a natural monument, the Vltava River and Větrušické rokle. The nature trail will have 5 stops, will partly be paved in areas of village and left natural in forest area.

CIRCUIT 2: It leads from area 2 and starts at the bus stop. From the northern and eastern parts it uses the same paths as the one at existing service road. It will be complemented by shrub and tree against the negative effects from the agricultural processing, like in other areas. In the southern corner of a residential area it will be adapted to the newly created green belt which walking paths. The circuit is intended for hiking, walking dogs or walks with children. In the southern part it continues along agriculture farm toward local road, which will be supplemented by tree alley. It will be connected to the greenery in village center and the circuit ends in northwest border by the entrance to area 2. The total length of this circuit will be 2 kilometers.

Phase 4: Adding services

Since there is a massive lack of services in Vetrusice, a smaller mixed shop in the village core is essential (see map. nr. 2). This privately owned shop should offer basic grocery, newspapers, basic drug goods and similar. Besides one pub, this shop would offer another place to meet other residents.

Proposed shop together with existing pub and children club will support the role of today's city core and will strengthen occasions for residents to meet and interact.

Pre-school is not necessary yet, since there is not enough small children and they can attend nearby village or be taken to city pre-schools by their parents. The situation might change in next 5-10 years with increase of new residents.

Several benches, lamps and trash cans will be added, located at important nodes, crossroads or connecting paths (see map nr. 3 and 5) (table 13).

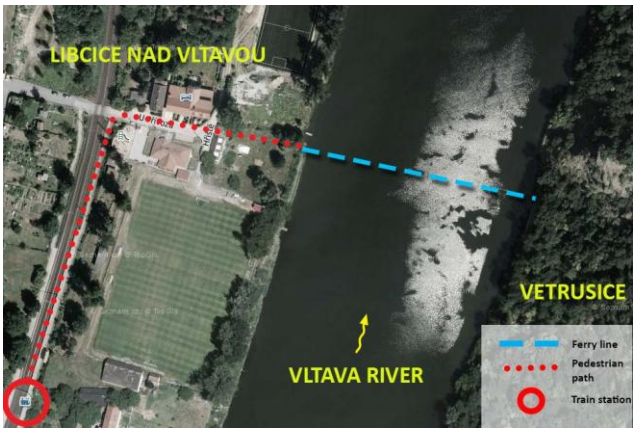
Table 14: Set of benches and trash cans for public spaces

Item	Amount
Wooden bench with iron construction, color: black, spruce wood with oil paint, Producer: Kovokrab CZ 	11
	11

Wooden public trash can; material: wood, steel
Producer: Mevatec CZ

It is necessary to construct sidewalks at areas specified in map nr. 5. Due to highest car traffic and proposed walking circuits there will be more pedestrians in the streets and higher risk of accidents. Sidewalks will be one side, 1.5 meters wide, made of asphalt.

Proposed shop together with existing pub and children club will support the role of today's city core and will strengthen occasions for residents to meet and interact. Final purpose is to plan a new ferry at the feet of Větrušické rokle, that would connect Vetrusice village with town Libcice nad Vltavou, that has a doctor, shops, pre-school and grade school, cultural and shopping places (Picture 45). There is an existing connection from Vetrusice down the hill/ravine by pedestrian path to right border of Vltava River. On the left border there is a nearby train station that leads to Prague, capital city, and Decin (border city between Czech Republic and Germany). River is 105 meters wide at place, where a ferry should operate. On the left border, path would connect with street U Přívozu and lead to train station that is located 185 meters away from river border. Ferry would functional mainly at peak hours (7-10.00 and 15-18.00) or depending on residents' request. Ferry would be operated by Regional Prosecutor's Office of Central Bohemia.



Picture 44: Vetrusice-Libcice nad Vltavou ferry plan

4 CONCLUSION

The aim of this thesis is to analyze current suburban situation through Europe and to focus on typical representative example of already existing urban sprawl and related issues, while finding a suitable solutions for them, instead of focusing mainly on new urbanistic projects.

This work promotes nature-centralized urban sprawl repair without primarily focusing on artificial elements like playgrounds or additional outdoor furniture, as those play secondary role in supporting primary vegetation changes. Natural elements, in complex extent, play main role in place conversion and adaptation.

Suburbanization on regional level is represented by Cascais region nearby Lisbon and within Lisbon metropolitan area. This county has a high leisure potential, which was discovered already in 19th century, when it was frequently visited by members of Royal family and many other people would later follow. At that time, this area started transforming from fishing and agriculture location into mainly leisure oriented county and this transformation last until these days. But it goes hand in hand with complications for another specific purpose of Cascais and that it nature conservation and protection. This region is partly under coverage Natura 2000 and Sintra-Cascais Natural Park and therefore many construction limitations come in a way. Unfortunately, housing demand in this location is so high, that buildings are built even at protected habitats, in near proximity of dunes, beaches or cliffs and mainly scattered and dislocated from original town or village borders. In some cases, protected areas are established after the constructions were done, which makes the situation more difficult. This thesis pointed out several locations, which either characterize urban sprawl or hold typical features of uncontrolled suburbanization. There are gated communities, isolated islands of single-family houses, large luxurious private properties at locations listed in Natura 2000 and so. This thesis tries to have a look at each example and aims to bring a solution that would be suitable for both sides: existing construction and also for the surrounding environment.

For gated communities, it is suggested to open at least partly for public and to provide its facilities like pools, sport clubs or spas to public under specific conditions. Therefore it is not a walk-in service, but still it is available in form of weekly or monthly membership to locals who can also have benefits of facilities, that the municipality itself does not have finances for. Those communities would also open to its neighbors and create better connection and relationships with locals instead of being isolated and without interest of what is going on behind the high walls.

A ban for any construction of scattered family houses in protected areas is suggested, since there

exists a reason, why such a place if protected. The only exemptions could be small educational center or state facilities for the nature protection but definitely not luxurious villas with artificial lawn and irrigation being located just 50 meter away from protected dunes or similar. It is important to recognize those places and have enough administrative power and knowledge to stop the process of approval for construction before it even begins.

Another case is represented by locations with many single-family houses being built in linear shape and of homogenous character. Those locations often miss a common meeting place or square with small local services and functional pedestrian connection to the old settlement, which is a typical sign of urban sprawl. In this thesis there are four of these places identified. All of them have empty plots, that are not being currently used and that are located in central area of this new settlement. Because of this reason, it can serve simply as a plot with few trees and benches as a simple meeting place with shade, it could have a small shop with beverages, newspapers or similar in places, where no other shop is present or it can be a larger combination of both with cafeteria and smaller park in location with more urban character (for example near Quinta da Marinha resort). This procedure helps to keep the suburbanization in a traditional nucleus-shape with construction building up around its core instead of extensive linear construction. It also keeps mutual relationship of residents in better shape and brings an interest in run and shape of the specific municipality.

In this thesis all those step are followed by sites allowed for further construction. Also a new visitor center is purposed at the north entrance of Cascais-Guincho trail. Its purpose is to educate more about important surrounding landscape and also to channel the tourist flow and keep it under control. Last not but least, this thesis suggests a municipality of Malveria da Serra to become an important tourist center and crossroad between Cascais coastal area and Sintra forest area. This municipality has a strong potential to gain from its location, provides desired views on ocean and surrounding landscape, has possibilities for further construction (empty and abandoned plots) and it has near proximity to Cascais and beaches. One of the centers was proposed also at one of the empty plots, near shops, rental agencies etc.

Villa on the reef should not be commonplace and available for everyone. For homes built in sensitive and protected areas must be a special permission, a number of conditions, in particular ex-post controls.

It is very important to find a balance between the desire for lucrative locations for homes, expansion, urbanization and protecting what attaches tourists the most, because Cascais without beautiful coasts, vegetation, horizons and views will not benefit from the influx of candidates and opulent villas they keep on with emptiness. This regional case study shows options for municipalities and points to

importance of mutual cooperation and organization between towns and villages of Cascais region, for example in form of micro region. This way, the area can use advantages and benefits of its location and at the same time protect itself from disturbing interventions .

Suburbanization on community level is represented by village Vetrusice in the Czech Republic. This village is located in proximity of capital city of Prague and in last decade it became a magnet for suburban residential construction that resulted in typical urban sprawl. This new suburbanization holds almost all typical features of the sprawl like disconnection, homogeneity, lack of services, car depended commuting, bad relations with locals etc.

The case study divided each steps in different phases, depending on financial and technical possibilities of the municipality in practice. First it was important to establish and support connectivity. Vetrusice has two areas with urban sprawl, therefore both are suggested and designed with pedestrian and bicycling paths, connection new settlements with village core, nearby protected forest “Větrušické rokle” and Vltava River. By the river, new connection in form of a ferry is suggested, which gives the residents an opportunity to get to town Libcice nad Vltavou, where train station and also many shops, doctors and school with kindergarten are located. Those paths also make circuits and trail so they can be used for leisure activities too.

Next phases count with adding more services to village center like a small local shop that is desperately missing or building playgrounds for children, who represent a large portion of new residents in newly built houses. There are no suitable locations for kids to play so each area gets its own small playground and natural parks that can be used by new and also old residents.

A very important part of this proposal is the implementation of greenery. It not even provides a shade in summer times but it has a strong importance for elevating the aesthetic value of the location. Newly designed trees can soften the transition between urban and agriculture zone, lower the bad effects of agriculture like dust, chemical spray, noise and it can also provided a connection between fragmented vegetation groups and corridors (Větrušické rokle forest and greenery in central village). New alleys are planned along pedestrian and bicycle path, trees are along newly purposed sidewalks, at playgrounds and creates rings around each development area. They are accompanied by shrubs, that consists of local species and the maintenance is kept on necessary minimum (like security cuts), to keep the local countryside and natural character. The same applies to newly planned trees.

The second study case shows, that urban sprawl repair can be done with simple but functional re-organization steps and that adding vegetation can make a big difference in the total appearance of the municipality. It can also solve many issues from natural point of view and it gives a firm border for further expansion. All those steps provide better living conditions for residents and elevate the value

of the location. It can all be done at small costs, with support of existing European funds, state of private financial programs. In the end, residents themselves can voluntarily contribute on planting, which lowers planting costs, strengthen their relation to the location and gives them opportunity to improve relationships between new and old residents.

This thesis gave a goal to evaluate typical examples of nowadays urban sprawl for selected countries and to find the most effective way of repair of already existing sprawl- either from qualitative and economical point of view. It focused mainly on landscape and natural aspects of mitigating the impact of uncontrolled construction and enriching the quality of life of the residents. From this point of view, the goal met the expectations.

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invasoras.pt; Invasive plants in Portugal

EEA; European Economic Area

EUROSTAT; statistical office of the European Union

MMR; Ministry of regional development, CZ

http://geocascais.cm-cascais.pt/; System of geographical information

maps.google.com

LIST OF ANNEXES

DEFINITIONS

Peri-urban

Transition area between urban and rural form, often containing characteristics of both.

City hinterland

City background, previously serving primarily as an agricultural function and supply to the city. It is characteristic of close link to the city core and it is an area with intense suburban development.

De-urbanization

Process, by which the city is gradually losing its residents due to bad living and environmental conditions, lack of jobs or housing or transformation of apartment houses to office centers. Former city residents are therefore moving to city suburbs.

Suburbanization

Mass migration of people from city centers to suburbs, often linked to the increase of business activities and decrease of population in the centers, while maintaining the narrow functional relationships of newly populated area with the residential cores. Suburbanization is also invoked by constantly growing spatial claims, when people desire of larger properties, plots and living space than in past.

Residential urbanization

A type of urbanization, when development in city's hinterland is mostly made of housing, sometimes referred as "dormitory settlements", when there is a lack of general services and shops.

Satellite town

Small town or artificially created residential unit located near large cities or industrial areas. Satellite cities are at least partially economically, socially and physically independent of the metropolis. They lack natural center and basic services and they are not linked with already existing settlement.

Urban sprawl

Non-conceptual extension of suburban residential and commercial areas to the countryside, in many cases created by homogenous type of housing development with lack of public space, services or connectedness.

Gated community

Walled or fenced housing developments to which public access is restricted, often guarded using

CCTV and/or security personnel, and usually characterized by legal agreements (tenancy or leasehold) which tie the residents to a common code of conduct.

Re-urbanization

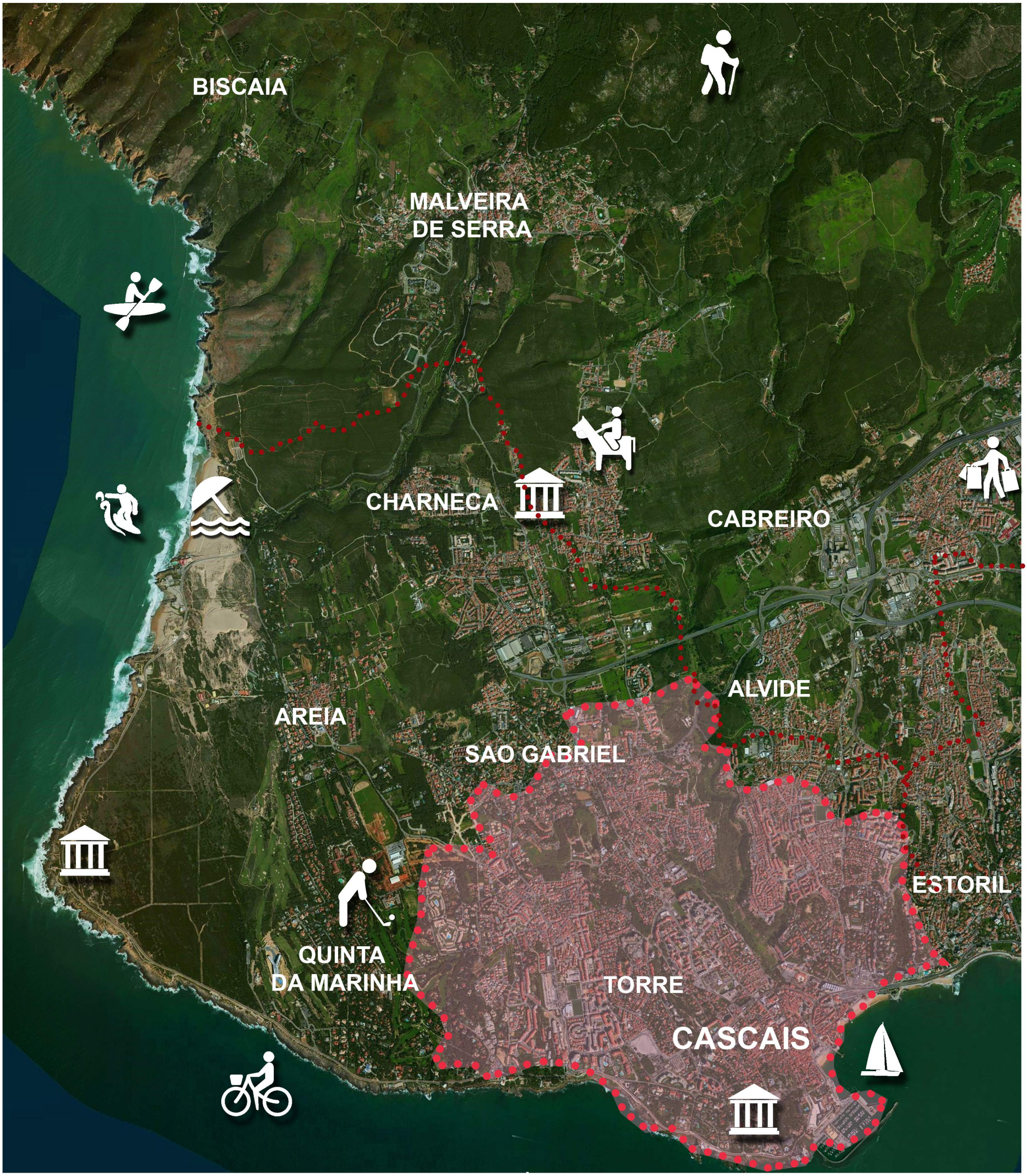
Process, when citizens return back to depopulated cities. It generally helps to stop the city decline or at least slows it down. The primary effort to attract people back to the city comes usually from municipalities themselves.

Community housing

A form of housing of more people, mostly independent, non-family, in single apartment or house, using common spaces accessories. Often referred as co-housing.

WUP factor

WUP factor is quantitative measurement of urban sprawl, defined by Jeager (2014) as follows: „The more area built over in a given landscape (amount of built-up area) and the more dispersed this built-up area in the landscape (spatial configuration), and the higher the uptake of built-up area per inhabitant or job (lower utilization intensity in the built-up area), the higher the degree of urban sprawl. (Jeager, 2014)



CASCAIS PARISH

CASCAIS TOWN LIMITS

POINTS OF INTERESTS

1:25 000

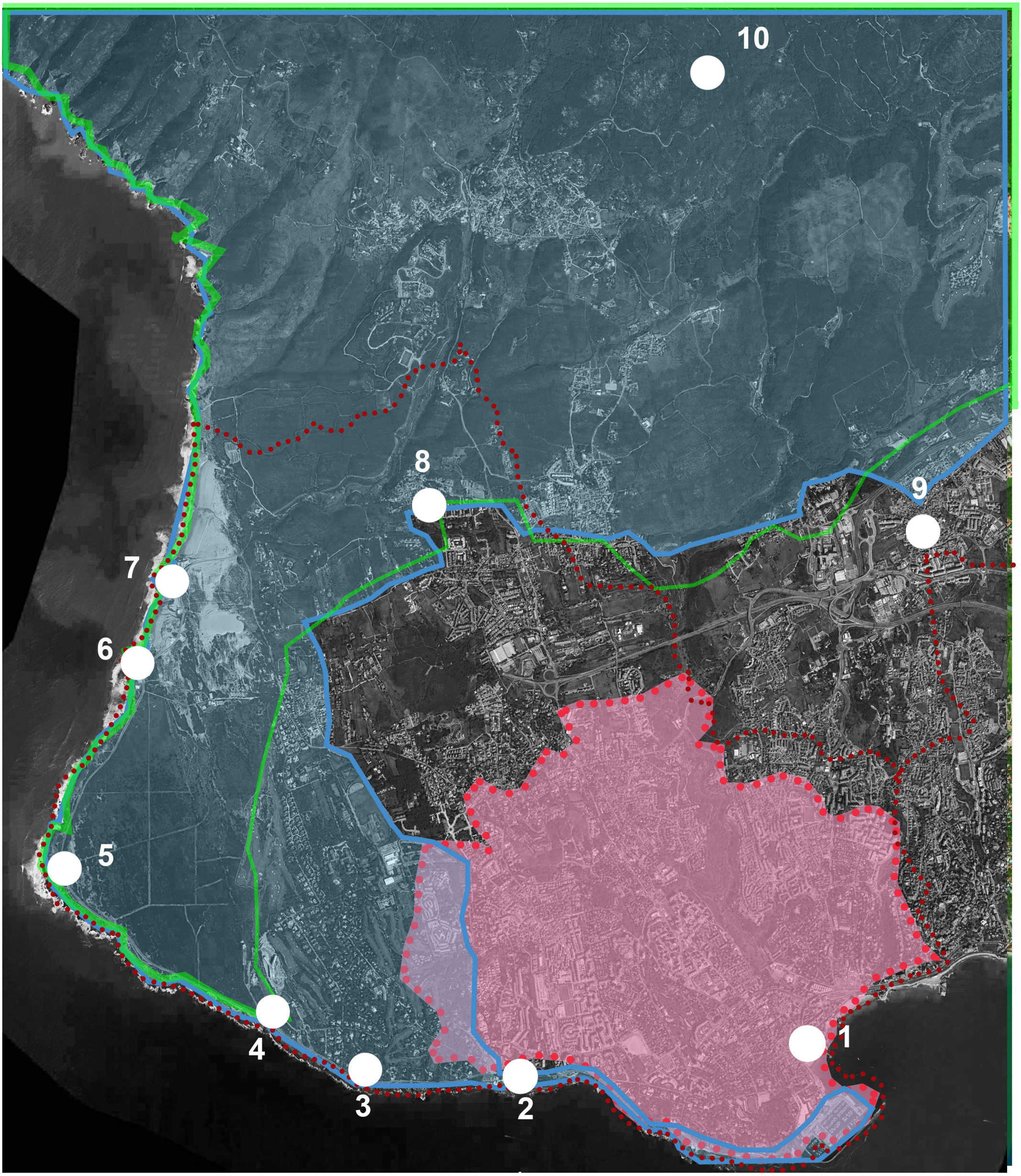
0 200 400 600 800 1000 m

N

CASCAIS COUNTY, AML

GENERAL MAP + POINTS OF INTERESTS, MAP A

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016



CASCAIS PARISH

CASCAIS TOWN LIMITS

HABITAT DIRECTIVE LIMITS, NATURA 2000

PROTECTED LANDSCAPE/SEASCAPE LIMITS
SINTRA-CASCAIS NATURAL PARK

1 CASCAIS CITY CENTER
2 FAROL DA GUIA
3 FORTE DO RAMIL
4 FORTE DE OITAVOS
5 FORTE DE SANXETE
6 FORTE DA BATERIA ALTA
7 FORTE DA GALÉ
8 CHARNECA
9 ALCABIDECHE
10 CAPUCHOS

1:25 000

0 200 400 600 800 1000 m

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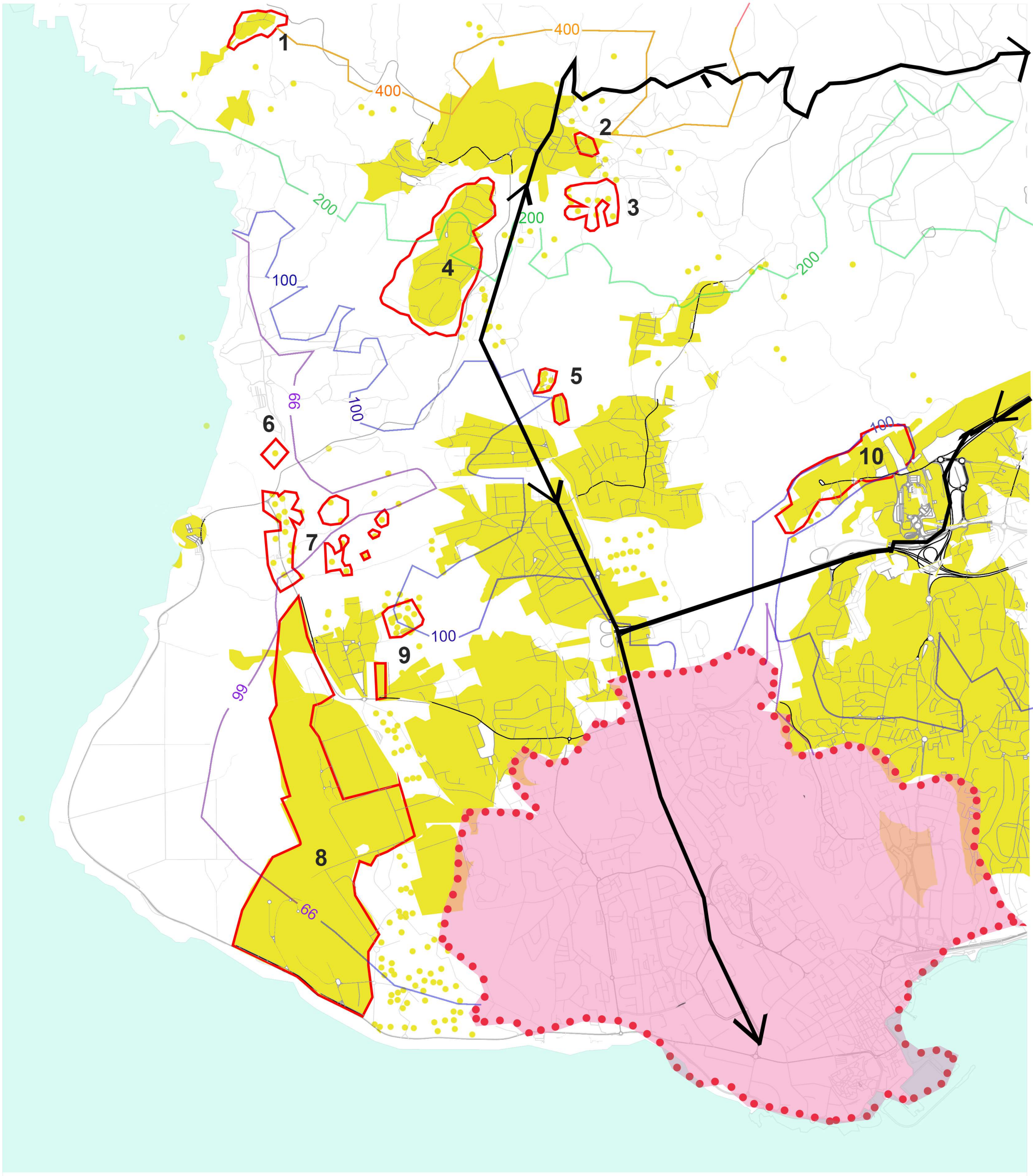
CASCAIS COUNTY, AML

NATURE LIMITS AND HISTORY SITES, MAP B

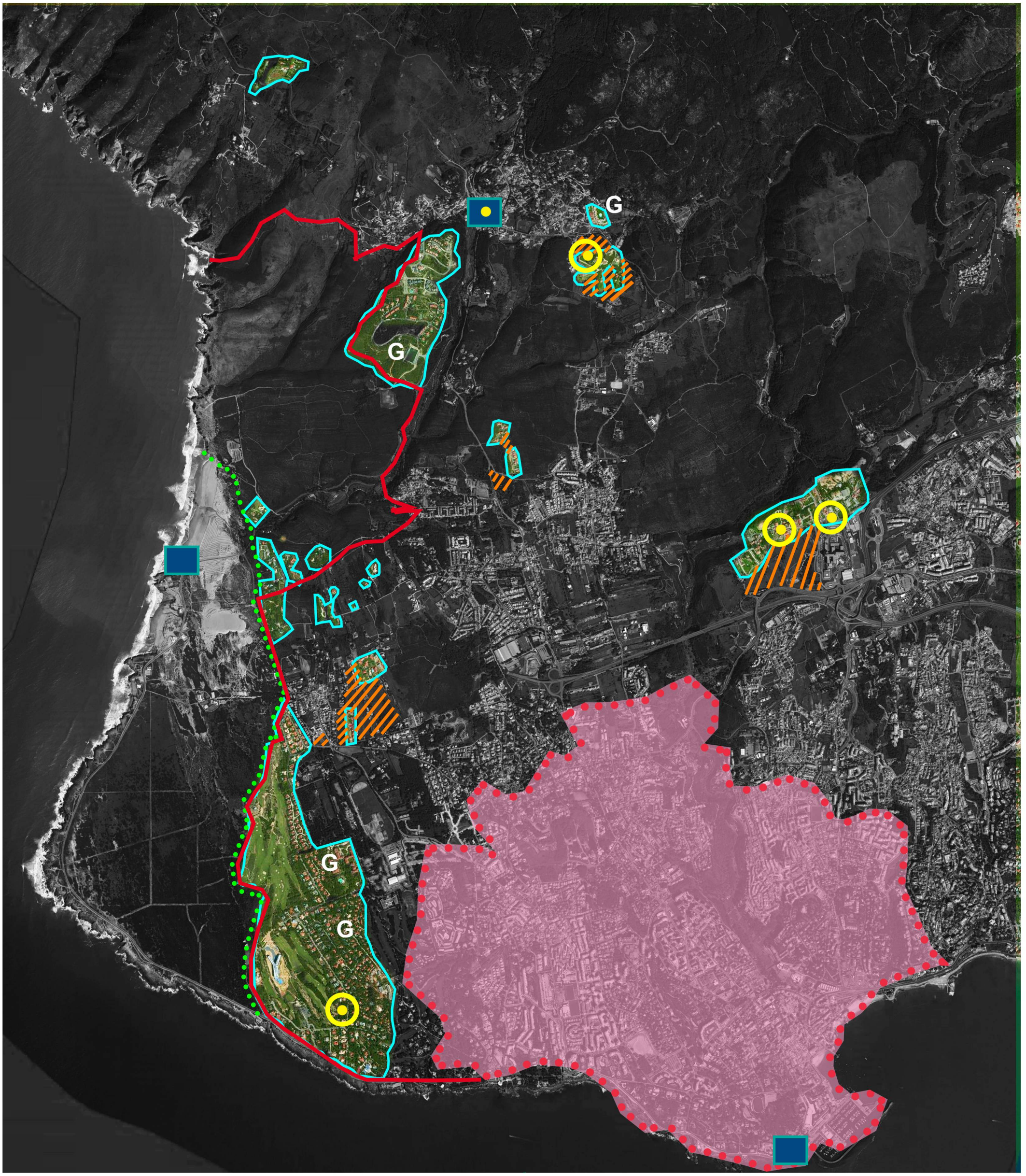
AUTHOR: ANDREA LACINOVA, ISA UTL, 2016



CASCAIS COUNTY, AML

URBANIZATION MAP, MAP C

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016



CASCAIS TOWN LIMITS

CONSTRUCTION LIMIT

ALLOWED CONSTRUCTION AREAS

PROPOSED CENTERS OF SUBURBAN LOCATIONS

PROPOSED BUFFER ZONE FOR DUNES

SUBURBAN LOCATION BORDERS

PROPOSED VISIT CENTER/EDUCATION CENTERS

G GATED COMMUNITIES

1:25 000

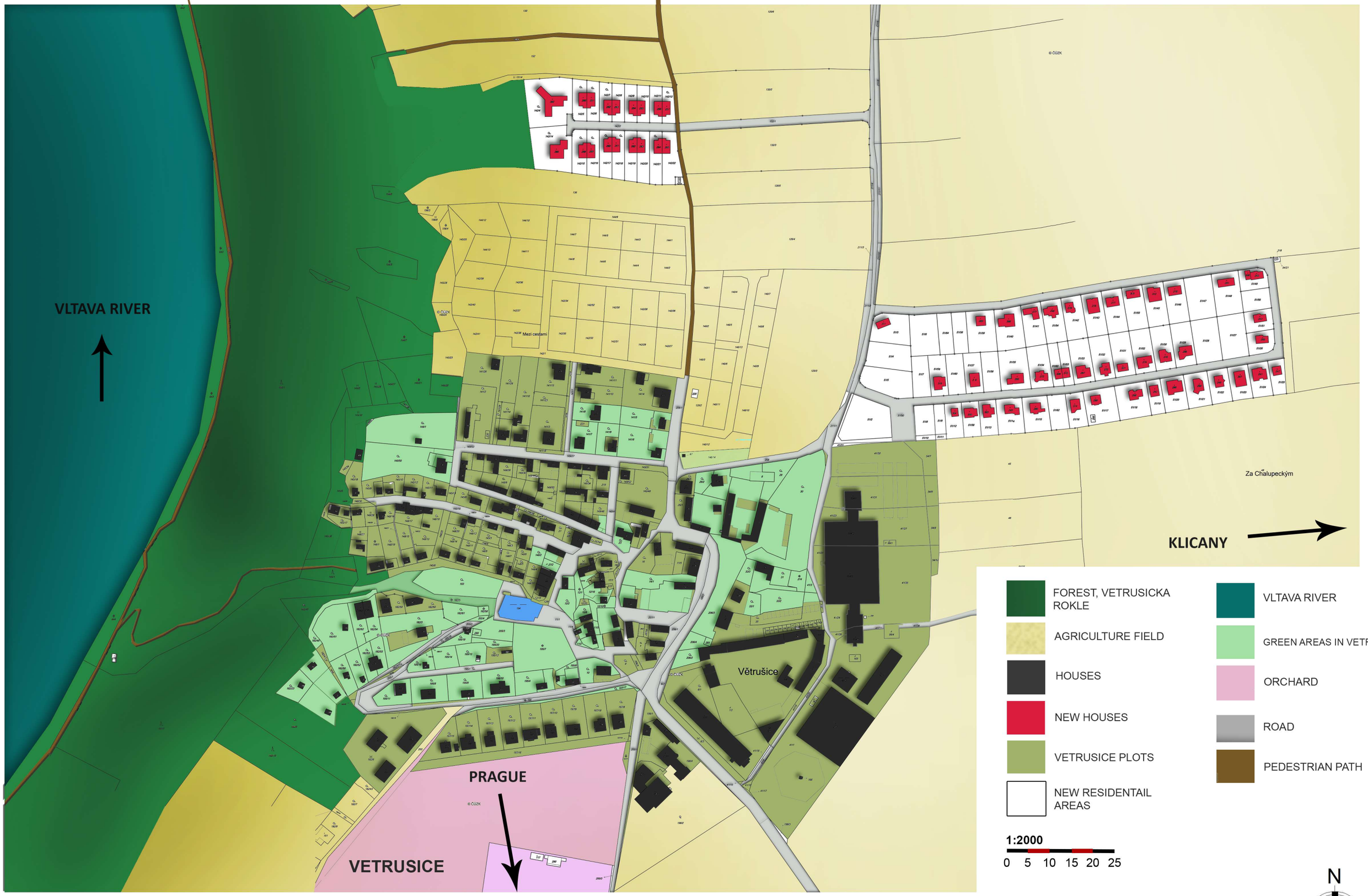
0 200 400 600 800 1000 m

N

CASCAIS COUNTY, AML

SPRAWL REPAIR CONCEPT PLAN, MAP D

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016



FOREST, VETRUSICKA ROKLE

AGRICULTURE FIELD

HOUSES

NEW HOUSES

VETRUSICE PLOTS

NEW RESIDENTAIL AREAS

VLTAVA RIVER

GREEN AREAS IN VETRU.

ORCHARD

ROAD

PEDESTRIAN PATH

1:2000

0 5 10 15 20 25

N

VETRUSICE

ACTUAL PLAN, MAP 1

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

VLTAVA RIVER

Mezi cestami

Za Chalupeckým

KLICANY

Větrušice

PRAGUE

VILLAGE CORE

JUNCTION OF CIRCUITS

CIRCUIT 1

CIRCUIT 2

CIRCUIT 3

FERRY LINE

N

1:2000

0 5 10 15 20 25

VETRUSICE, CIRCUITS AND ACTIVITIES

CONCEPT PLAN, MAP 2

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

FOREST, VETRUSICKA ROKLE

AGRICULTURE FIELD

HOUSES

RESIDENTIAL AREA 1

FUTURE RESIDENTAIL AREA 3

PARK

SHRUB GROUPS

MEETING PLACE AT PARK

PLAYGROUND

ROAD

PEDESTRIAN PATH

NEW TREE

PUBLIC LIGHTING

V VISUALIZATION POINTS

BENCH WITH TRASH CAN

BORDER OF RESIDENTAILAREA 3

1:1000

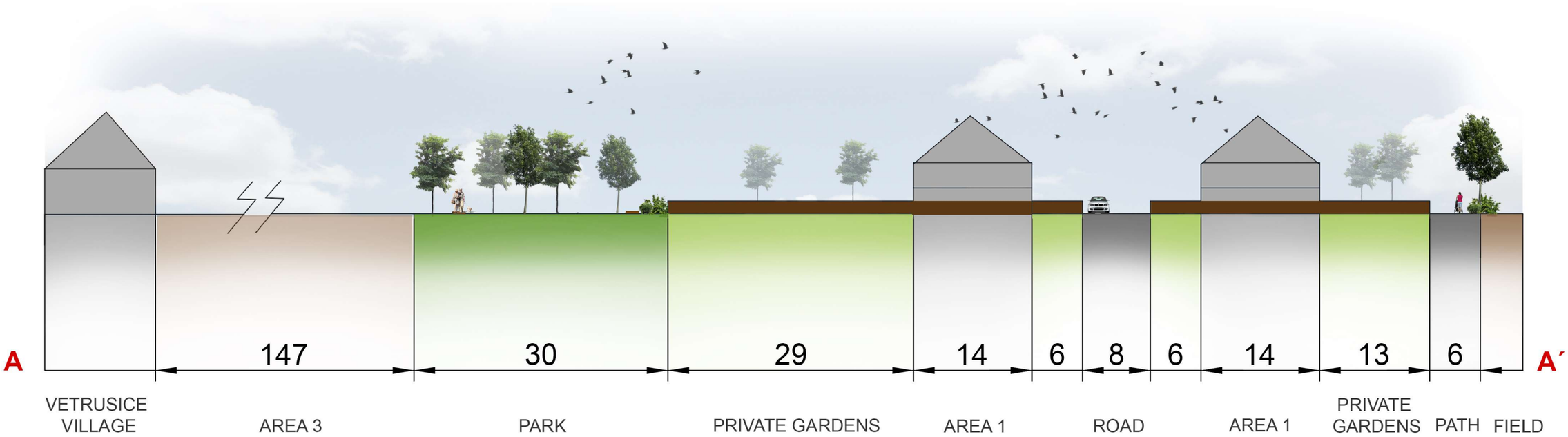
0 5 10 15 20 25

N

VETRUSICE, RESIDENTIAL AREA

MASTER CONCEPT PLAN, MAP 3

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016



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0 5 10 30

VETRUSICE, RESIDENTIAL AREA 1

CUT A-A´, MAP 4

distance in meters

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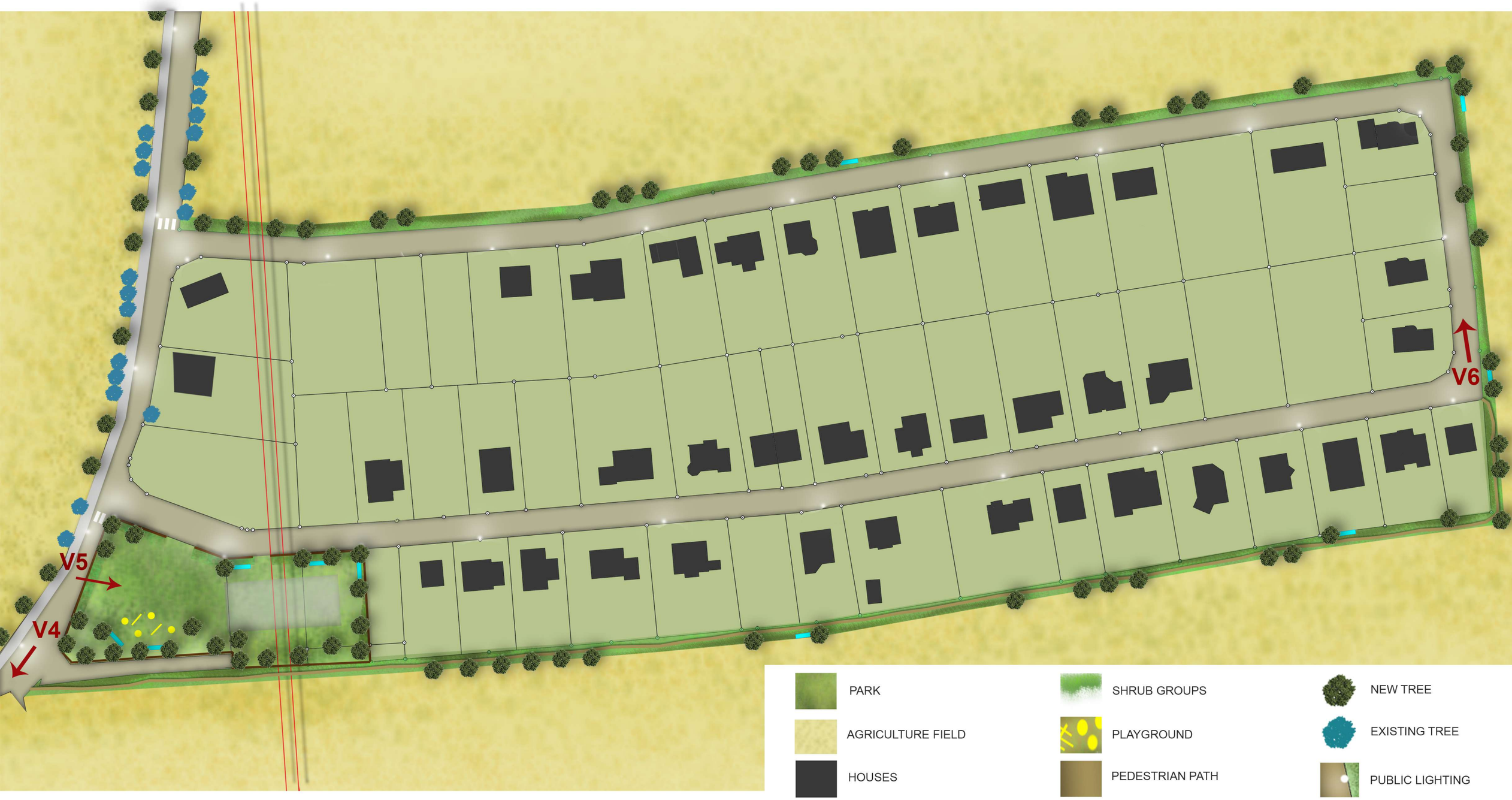


PARK

AGRICULTURE FIELD

HOUSES

RESIDENTIAL AREA 1

V VISUALIZATION POINTS

SHRUB GROUPS

PLAYGROUND

PEDESTRIAN PATH

ROAD

SIDEWALK

NEW TREE

EXISTING TREE

PUBLIC LIGHTING

BENCH WITH TRASH CAN

HIGH VOLTAGE LINES

1:1000

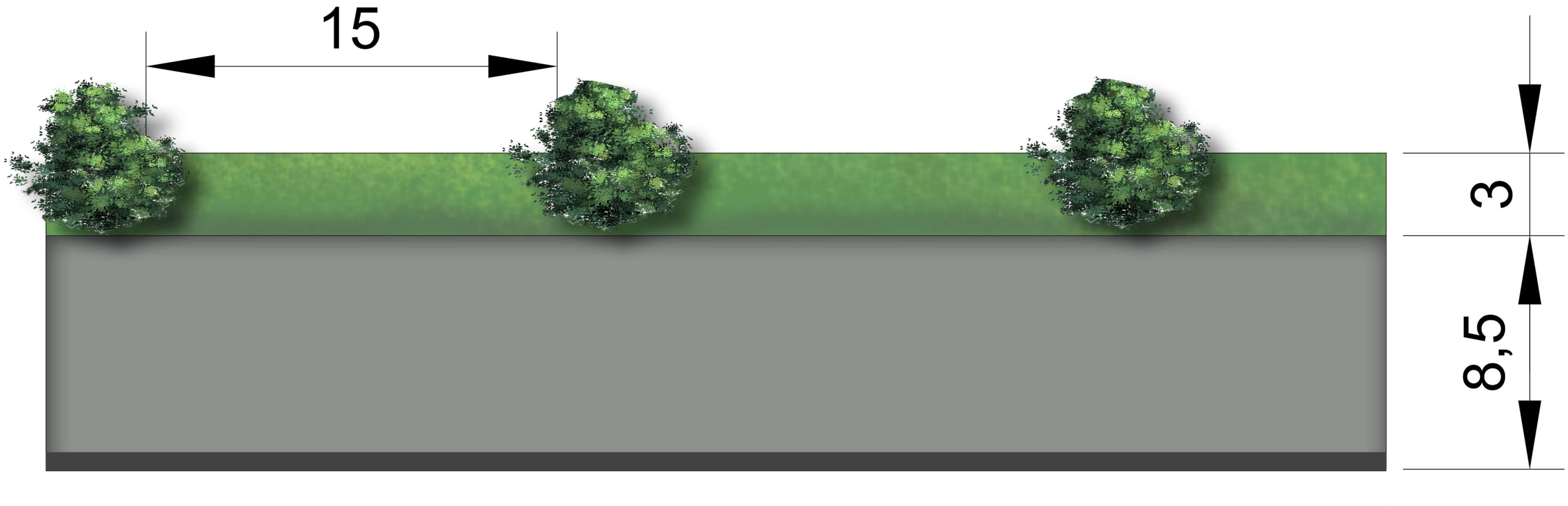
0 5 10 15 20 25

N

VETRUSICE, RESIDENTIAL AREA 2

MASTER CONCEPT PLAN, MAP 5

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016



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VEGETATION CUTS

TREE ALEY, MAP 6

distance in meters

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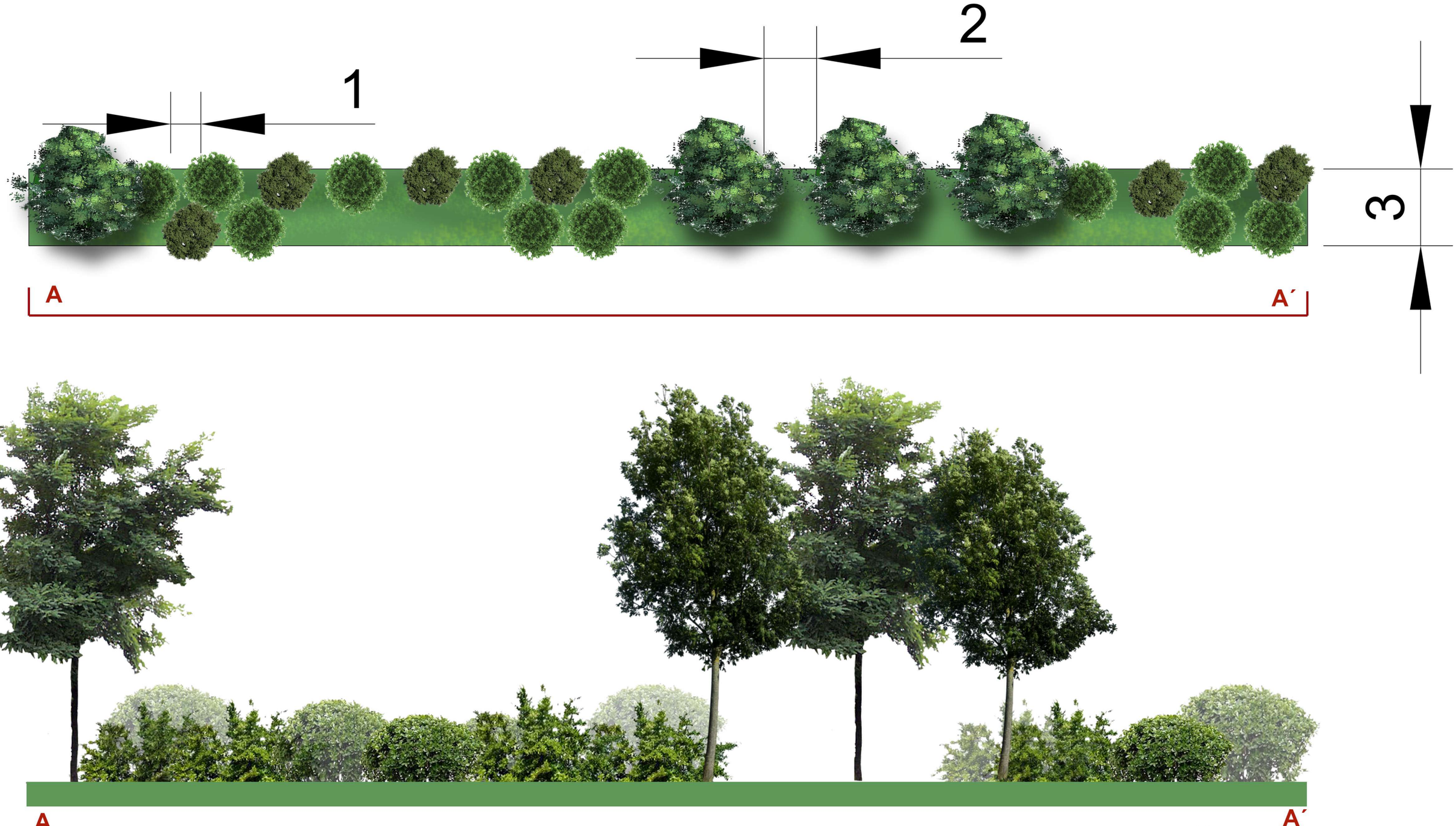

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VEGETATION CUTS

ISOLATION VEGETATION, MAP 7

distance in meters

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

1

2

3

4

5

6

ORIGINAL CONDITIONS OF CHOSEN LOCATIONS

VISUALIZATION 1: CONJUCTION FROM VILLAGE CENTRUM TO AREA 1

AUTHOR: ANDREA LACINOVA,ISA UTL, 2016

VISUALIZATION 2: TREE ALLEY FROM AREA 1
AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

VISUALIZATION 3: PARK BETWEEN AREA 1 AND AREA 3

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

VISUALIZATION 4: SIDEWALK FROM AREA 2 TO VILLAGE CENTRUM

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

VISUALIZATION 5: PLAYGROUND AND PARK BY AREA 2

AUTHOR: ANDREA LACINOVA, ISA UTL, 2016

VISUALIZATION 6: SIDEWALK AT AREA 2

AUTHOR: ANDREA LACINOVA,ISA UTL, 2016