

Birštonas

Introduction

Birštonas, a charming town in southern Lithuania, is celebrated for its abundance of mineral waters, which have long been treasured for their reputed health benefits. Located within the Peršėkė-Verknė plain downstream from the Great Nemunas Loops, **Birštonas boasts an ideal setting for the extraction of these mineral-rich waters.** The region's geological composition, characterized by complex fractured layers, influences the flow of the Nemunas River and creates pathways for groundwater movement.

The mineral springs of Birštonas are renowned for their high mineral content, which is believed to have therapeutic properties. Visitors flock to the town to experience the curative effects of these mineral waters, which are known to contain various beneficial elements such as sodium, chloride, magnesium, calcium, iron, bromine, and iodine. **These natural resources have made Birštonas a hub for health tourism and wellness retreats, attracting visitors seeking relaxation, rejuvenation, and holistic healing experiences.**

Furthermore, the geological heritage of the Great Nemunas Loops adds to the allure of Birštonas, with extensive tectonic fractures shaping the region's landscape over millions of years. As a result, Birštonas stands as a testament to the harmonious interplay between nature's geological processes and human well-being, making it **a destination of choice for those seeking both physical and spiritual renewal.**

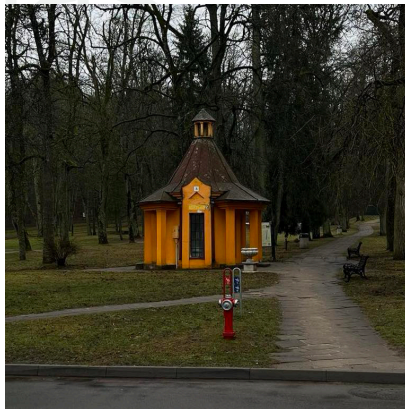


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Birštonas

1 Analysis and manifesto

Birštonas is situated in southern Lithuania, nestled amidst picturesque landscapes along the banks of the Nemunas River. This quaint town lies within the Kaunas County, approximately 30 kilometers southeast of the city of Kaunas, Lithuania's second-largest city. Surrounded by lush forests and rolling hills,

Birštonas occupies a tranquil setting renowned for its therapeutic mineral springs and serene natural beauty. The town's strategic location along the Nemunas River provides easy access to outdoor recreational activities and opportunities for exploring the region's rich cultural heritage.

Situation of Birštonas



Location of Birštonas from the Lithuania perspective



Bird's eye view on Birštonas

Natural framework is spatial system of ecological stabilization.

What is nature frame?

The natural frame constitutes an **interconnected network of territories dedicated to ecological compensation**, facilitating the ecological equilibrium of landscapes, the natural interconnections among protected areas, as well as other critical habitats and zones vital for environmental preservation. It **fosters the migration of flora and fauna** across these areas.

The Nature frame, although integral to the protected areas system, does not hold legal protection itself. It encompasses **both protected zones and other ecologically significant areas** essential for landscape balance. These are integrated into a **cohesive system through the nature frame**, which

ensures equilibrium in land management practices.

The **factors of localization** of natural framework are:

- eco-compensational importance of territory,
- existing protected areas,
- biodiversity,
- and intensity of recreational use.



Natural framework is spatial system of ecological stabilization.

Components of nature frame



I Geoecological divides

strips of land encompassing locations distinguished by their **unique ecological significance and sensitivity**: including upper river reaches, watersheds, highland lake systems, hill systems, marshes, coastal zones, areas with intensive groundwater recharge and karst regions.



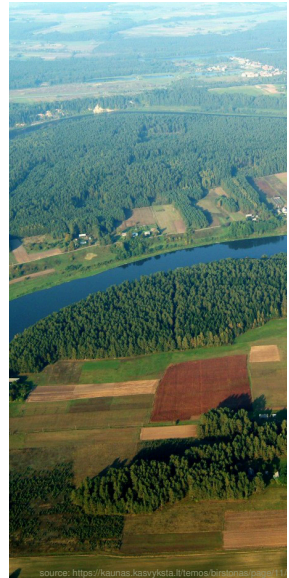
II Geoecosystem stabilization centers and gridlines of geosystems

areas capable of influencing lateral flows or other natural migration patterns and crucial for biodiversity conservation: encompassing large expanses and clusters of greenery, marshes, and other ecotopes within significant ecosystems.



III Migration corridors

river valleys, dry valleys and ravines, along with other **areas facilitating intense material, energy and natural information exchange**, as well as serving as pathways for animal and plant species migration.



source: <https://kaunas.kasvyksta.lt/temos/birstonas/page/11>

Natural framework is spatial system of ecological stabilization.

Dividing and managing

Division of nature frame

Based on their **size, importance, and ecological compensatory functions** within geosystems, the structural components of the nature frame are categorized into:

- European,
- national,
- regional
- and local significance.

Territorial planning documents differentiate the natural framework of geoeologically potent areas based on their **level of naturalness and capacity to fulfill ecological compensation**

functions. There are three levels:

- reliable,
- limited
- and weak.

Managing and protecting nature frame on different levels

An ecological network within the natural framework serves to connect habitats of significant bio-ecological importance, along with their associated environments and migration corridors, contributing to the **preservation of biodiversity**. This network includes the European ecological network *Natura 2000*,

designated by authorized governmental institutions, which plays a key role in protecting essential habitats and bird species. Regulations within *Natura 2000* areas are enforced to prevent harm to protected habitats and species, ensuring their conservation status.

During the establishment of natural framework structures, an extensive evaluation of spatial and territorial landscape characteristics is undertaken. This assessment **at district and local levels** encompasses various factors such as higher-level natural framework structures, engineering geological conditions, relief features, soil types, surface water bodies, erosion patterns, karst phenomena, vegetation cover, protected species habitats, migratory species requirements, human impact and sources of pollution.

At the national and regional scales, considerations extend to geomorphology, hydrography, groundwater, forest coverage,

distribution of ecosystems, soil types, erosion, land use patterns, and human influence.

Activities within the natural framework are geared towards **the protection and maintenance of the landscape's spatial structure**, natural character, ecological stability, and aesthetic value. These efforts entail promoting ecological balance, enhancing ecosystem stability and **facilitating renaturalization and restoration endeavors across all natural framework areas.**

To enhance the compensatory functions of these territories, proactive measures are crucial. This involves **prioritizing the development of natural framework structures with limited and weak geoeological potential**. Emphasis is placed on initiatives such as afforestation, sustainable management of forest parks and green spaces for recreation and ecological purposes, as well as the promotion of ecological agriculture.

Managing natural framework



creating cohesive network
of compensation zones



preserving
biodiversity



protecting natural
landscapes



expanding national
forests area



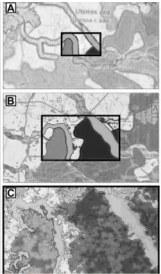
optimizing urban and
agricultural development

Natural framework is spatial system of ecological stabilization.

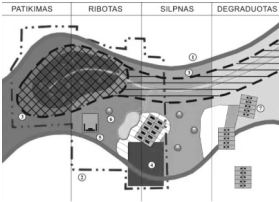
Showcasing nature frame



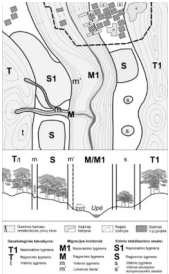
Concepts of the general plan of the Republic of Lithuania (LRBP 2050) The principle diagram of the localization and management of the natural framework system in the territory



Concepts of the general plan of the Republic of Lithuania (LRBP 2050) A diagram of the detailing of the natural framework structure at different planning levels.



The structure of different geological potential (viability) of the natural framework 1) natural framework 2) protected areas 3) eco-network 4) separate green areas 5) individual homesteads 6) natural heritage 7) urbanized areas



The basic structure of the natural framework localized in the territory of the Republic of Lithuania

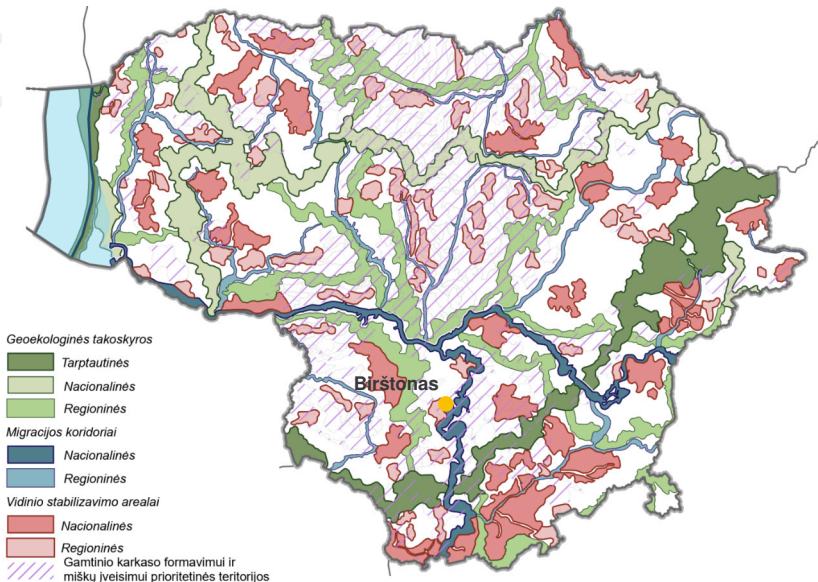
Birštonas

Birštonas nature frame

Birštonas is situated adjacent to **the regional-level internal stabilization area** and falls within the priority zone for establishing the natural framework and cultivating forests.

Moreover, the **national-level migration corridor**, aligned with the Nemunas and Neris rivers, traverses through the Birštonas region.

The nearest **geoeological divide** lies to the west of Birštonas and it is of national level.



Concept of the general plan of the Republic of Lithuania (LIETUVA 2030) Location of Birštonas from the national natural frame perspective

Birštonas nature frame

Migration corridor:

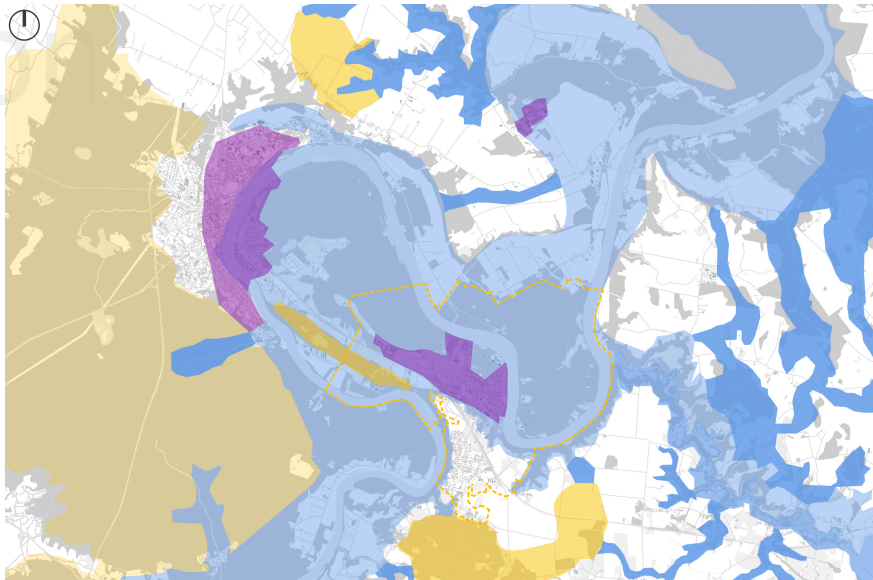
- national level
- regional level
- local level

Areas of inner stabilization:

- regional level
- local level

damaged nature frame areas

town boundaries



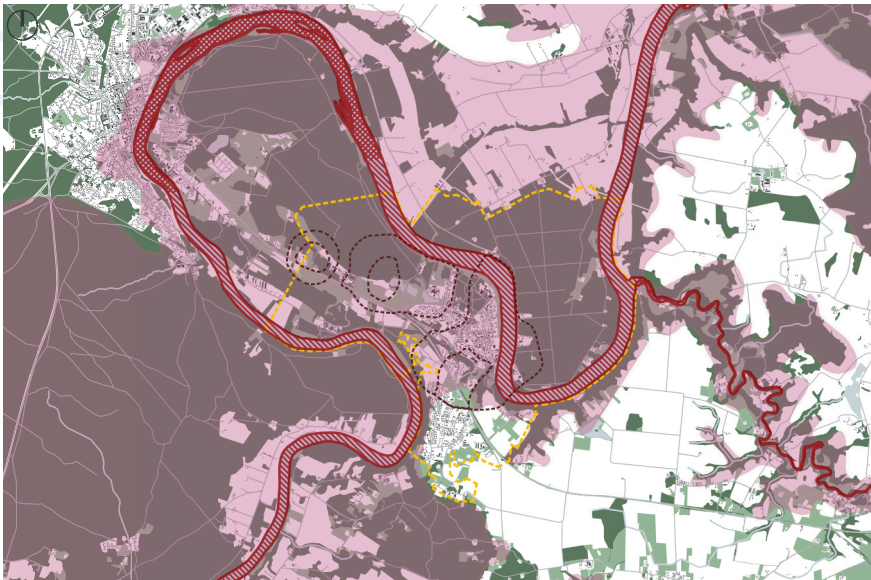
Protected areas

Birštonas nature frame

Almost 82% of Birštonas towns area is located in the Nemuno klipu regional park. Whole part of Nemunas river that frames Birštonas is under Natura 2000 protection and a little part of Verkne river too.

Another thing are areas around wells that are safeguarded from different kinds of pollution.

- water bodies
- canals
- town boundaries
- buildings
- roads
- Nemuno klipu regional park
- Natura 2000- Habitats Directive Sites
- Natura 2000- Habitats and Birds Directive Sites
- mineral waters protection areas



Protected areas in Birštonas and outside town

Birstonas mineral waters

from a geological perspective

Water structure

Mineral water extraction in Lithuania primarily relies on **groundwater deposits that are safeguarded against pollution**. This term "mineral water" is relative since it denotes water with dissolved salts, a characteristic shared by all water sources on Earth to varying degrees.

Birštonas, situated within the Peršėkė-Verknė plain downstream from the Great Nemunas Loops, is one of Lithuania's most notable mineral water sites. These loops, formed by the Nemunas River, have long intrigued researchers, initially attributed to glacial activity before deeper geological exploration revealed their true origins.

The geological composition of the Birštonas region features complex fractured layers, with movements of up to 40-60 meters, significantly

influencing the river's course. This intricate geological setting stands in contrast to neighboring regions, where such river bends are absent. **Tectonic fractures in this area create pathways for groundwater movement, allowing mineral-rich water to ascend through impermeable layers and form springs.**

Presently, Birštonas hosts 13 exploited boreholes, each yielding sodium chloride-rich

water with significant mineral diversity, including magnesium, calcium, iron, bromine, iodine ions.

The geological heritage of the Great Nemunas Loops is characterized by extensive tectonic fractures, which have vertically displaced sedimentary layers over millions of years. This dynamic geological setting not only shapes the landscape but also contributes to the unique properties of Birštonas' mineral water sources.



source: <http://www.visitbirštonas.lt/en/publications/>

Exploited aquifers in the Birštonas area mineral water deposit



source: <https://www.visitbirštonas.lt/en/publications/>

Bored wells and geological- hydrogeological section lines near Birštonas



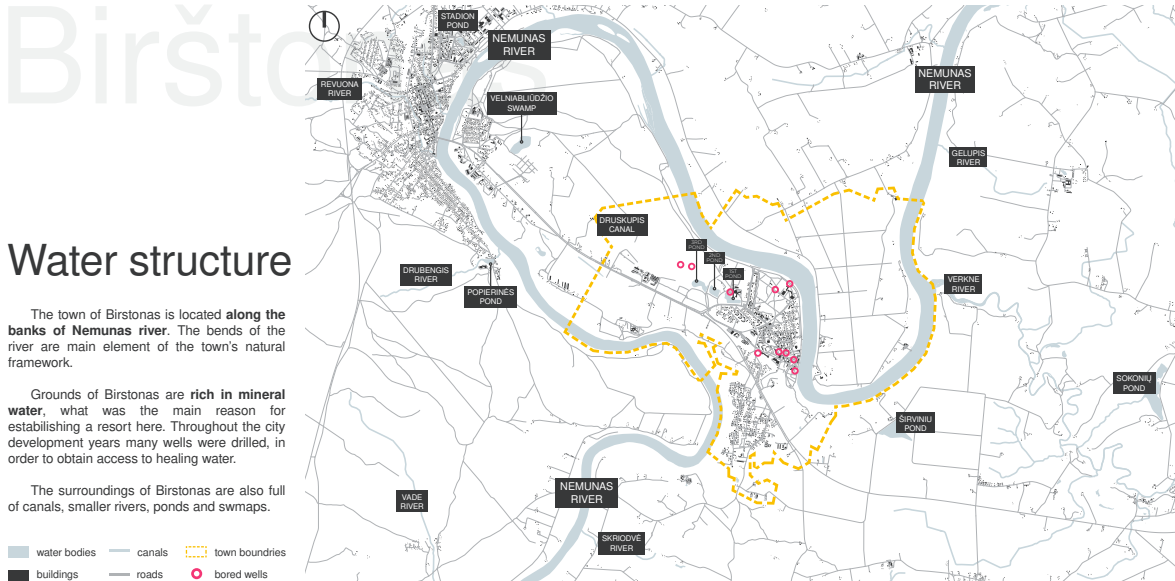
Bored wells of the Birštonas mineral water deposit

Water structure

The town of Birštonas is located **along the banks of Nemunas river**. The bends of the river are main element of the town's natural framework.

Grounds of Birštonas are **rich in mineral water**, what was the main reason for establishing a resort here. Throughout the city development years many wells were drilled, in order to obtain access to healing water.

The surroundings of Birštonas are also full of canals, smaller rivers, ponds and swamps.



Water structure in Birštonas and outside town

Green spaces in Birštonas

The Nemunas Loop Regional Park covers nearly 82% of Birštonas, resulting in extensive greenery dominating the town's land use.

Within the urbanized area, there are two parks, namely the Central Park and the Vytautas Park, which are connected by the green boulevard along the river.



Green spaces in the region Birštonas

Green spaces in Birštonas

The Nemunas Loop Regional Park covers nearly 82% of Birštonas, resulting in extensive greenery dominating the town's land use.

Within the urbanized area, there are two parks, namely the Central Park and the Vytautas Park, which are connected by the half green boulevard along the river.



Green spaces in the town of Birštonas

Condition of green spaces

Green spaces in Birštonas

Although Birštonas seems like a very green town it **lacks biodiversity** in both public and private spaces in the urbanised area.



The greenery in public spaces is very tidy and well maintained, but according to current landscape design trends it looks really unhealthy- huge areas of short green lawn have absolutely nothing in common with biodiversity.



The contrast between Kneip's garden lush vegetation and short lawns in other parts of Birštonas center has a character of baroque park. As the national level migration corridors are going through Birštonas, the greenery here should be facilitating that flow.



Birštonas semi public areas between multifamily housing are full of different kind of thujas and conifers. As thuja is not native european species it is not adapted to local weather conditions. In result these trees tend to die very unexpectedly and quickly, infecting other trees at the same time, which is not very sustainable



Another thing about thujas is that it is very popular among single family houses owners. It creates a problem of lack of biodiversity and a very monotonous landscape. Probably, if the town would give a good example of native north european plants in public spaces, it could change homeowners thinking.



Conclusions on blue and green infrastructure

Strengths

- Satisfying natural framework condition overall
- Access to the river
- Forests and park surrounding
- Lots of green spaces in urbanized area

Weaknesses

- Damaged natural framework areas
- Migration corridors broken by the A16 road
- Lack of bioviresity in urbanized area

Opportunities

- Opportunity to introduce more biodiversity into public greenery
- Possibility to create more small green spaces that could create a network
- Opportunity to create more green public spaces in the neighbourhood on the other side of A16 road

Threats

- Situation of most of Birstonas area in the regional park might make some investments more difficult
- Urban sprawl could degrade migration corridors even more

Manifesto

- **Create local community**
- **Affordable housing for locals**
- **Cultivate biodiversity**
- **Focus on pedestrians (and accessibility)**
- **Dense city centre**
- **Maintaining protection of regional park**



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Birštonas

2 Strategy

Hypothesis

Green spaces

Green infrastructure is important for creating a healthy city because it provides environmental benefits such as mitigating the urban heat island effect and improving air and water quality, supports biodiversity conservation, promotes physical and mental well-being through access to green spaces, fosters social cohesion, offers economic advantages, and enhances climate resilience.

Migration corridor

Habitats that are typically long relative to their width, and they connect fragmented patches of habitat. They can vary greatly in size, shape, and composition. The main goal of corridors is to facilitate movement of individuals, through both dispersal and migration, so that gene flow and diversity are maintained between local populations. By linking populations throughout the landscape, there is a lower chance [of] extinction and greater support for species richness. (Conservation Corridor, 2018).

Health

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organization, 1948).

Establishing high-quality network of green spaces in Birstonas will contribute to the restoration of the migration corridor as well as positively impact residents health.

Green and blue infrastructure

What is blue-green infrastructure?

The concept of green infrastructure (GI) falls under the umbrella of **nature-based solutions** (NbS) and can play a key role in addressing the climate and nature crisis while bringing other benefits to people, with the fundamental principle of all Nature based solutions being the *building on healthy ecosystems and nature to deliver a variety of ecosystem services and wider benefits to society and biodiversity*. (biodiveristy.europa.eu, 2023)

Green infrastructure (GI) comprises protected and enhanced natural areas that provide ecosystem services, benefit biodiversity, and society at large, with the

European Commission emphasizing its strategic planning aspect, uniting these areas into **a connected network across rural and urban regions**, incorporating both terrestrial and aquatic features (blue and green), which can range from pure nature elements to hybrid solutions combining grey and green infrastructure for resilience, with examples including fish migration channels, farmland, parks, forests, floodplains, water retention areas, as well as hybrid options like green bridges, roofs, and façades, deployable at various scales from site-level to city-wide and landscape-scale interventions.

Benefits of Nature-based Solutions

European Environment Agency, in the report *Nature based Solutions in Europe...* from 01/2021, outlines Core societal challenges where NbS can provide direct and multiple benefits. Most important, from many mentioned in the paper, from this reasearch point of view are:

Challenges

Preserving habitat, reducing biodiversity loss and increasing green and blue spaces

Social justice, cohesion and equity, and reducing risk for groups of society highly vulnerable to climate change

Public health and well- being (related not only to climate change)

Make cities and human settlements inclusive, safe, resilient and sustainable

Benefits of NbS

Reduces or prevents loss of natural capital/ biodiversity and the ecosystem services it provides (clean air, water and soil); enhances coastal resilience and marince protection; increases natural insurance value, thus improving ecological resilience

Improves liveability, health and well-being for an ageing population and deprived communities to counteract growing inequalities and enhance social cohesion

Reduces mortality and morbidity directly or indirectly due to adverse heat and flood events; reduces stress and anxiety; improve mental well- being (thinking, attentiveness, concentration and sociability, stress, depression); develop and maintain immune defences (against asthma, allergies, diabetes, intestinal desease, cancer); enhance physical health (exercise and sport)

Regenerates urban and rural areas; promotes sustainable land use and liveable urban development, including urban green and blue spaces and urban agriculture

Green and blue infrastructure

Benefits of BGI

Gathering information on the costs, benefits, long-term efficacy, and efficiency of green infrastructure is vital when deciding whether to implement green, hybrid, or grey solutions, or to advocate for green infrastructure's cost-effectiveness in policies and to the public.

Green infrastructure provides diverse benefits across sectors, benefiting society, biodiversity, and the economy over time. These

benefits include economic advantages like food outputs, job creation, and cost savings, as well as environmental benefits such as biodiversity support, air and water quality regulation, and climate mitigation. Societal benefits include improved health, social cohesion, and climate adaptation. Societal benefits range from increased recreational opportunities, physical and mental health improvements, enhanced social cohesion, to climate adaptation support.



Environmental benefits

- Reduction of urban heat island effect
- Noise reduction and sound buffering
- Soil erosion prevention
- Protection of water resources (e.g., groundwater recharge)
- Enhanced pollinator habitat, supporting agriculture
- Reduced flood risk
- Improved biodiversity



Societal benefits

- Creation of green jobs in landscaping, conservation, and eco-tourism
- Promotion of environmental education and awareness
- Crime reduction in green spaces, contributing to safety
- Support for local culture and heritage preservation
- Improved workplace productivity



Economic benefits

- Tourism revenue from green attractions and natural beauty
- Increased business opportunities in eco-friendly industries
- Cost savings from reduced energy consumption (e.g., cooling costs)
- Boost to local economies through green infrastructure projects
- Attraction of businesses and investment to green-certified areas

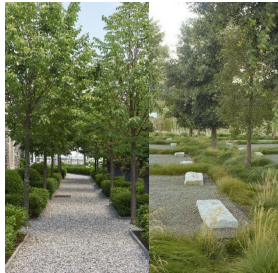


Health and well-being benefits

- Stress reduction and mental health benefits from exposure to nature
- Enhanced productivity and creativity in green work environments
- Improved air quality leading to reduced respiratory illnesses
- Opportunities for physical activity, promoting overall fitness
- Better access to fresh produce in urban areas with green spaces

Green and blue infrastructure

Urban green infrastructure differs from its rural counterparts due to unique features and elements. Although the list below isn't exhaustive, it offers a snapshot of common urban and peri-urban elements with illustrative examples.



Typology of Urban Green Infrastructure

Greenery on buildings

Green roofs and facades provide habitats and food to insects and small animals (including pollinators), improve building energy efficiency and indoor/outdoor climates, and are particularly useful in dense urban areas with limited open space.

Examples Balcony green, ground based green wall, facade-bound green wall, extensive green roof, intensive green roof, atrium, green pavements and green parking pavements, green fences and noise barriers

Urban green areas connected to grey infrastructure

Beyond serving as habitats and ecological stepping stones, street trees provide shade and green space for relaxation for urban residents, as well as improve air quality and climate, thereby also reducing energy needs for heating and cooling. dense urban areas with limited open space.

Examples Tree alley and street tree/hedge, street green and green verge, house garden, railroad bank, green playground/school ground, green parking lots, riverbank greens

Parks and (semi)natural urban green areas, including urban forests

Pocket parks are a new trend in urban areas across the globe. They consist of very small greened spaces, often in reclaimed parking or street spaces, and frequently also include resting or play areas. They utilize small spaces efficiently to bring biodiversity into urban areas and provide high-quality recreation space for residents, improving quality of life.

Examples Large urban park, historical park/garden, pocket park/parklet, botanical garden/arboreta, zoological garden, neighbourhood green space, institutional green space, cemetery and churchyard, green sport facility, forest, shrubland, abandoned and derelict area with patches of wilderness

Green and blue infrastructure

Urban green infrastructure differs from its rural counterparts due to unique features and elements. Although the list below isn't exhaustive, it offers a snapshot of common urban and peri-urban elements with illustrative examples.



Allotments and community gardens

Community gardens create spaces not only for biodiversity, but also for urban food provision. They encourage residents to get involved in garden management, contributing to social inclusion and cohesion.

Examples Allotment, community garden, horticulture



Agricultural land

Agricultural land in urban and peri-urban areas are important for providing habitat to agricultural species in and near cities, and also for provision of urban residents with fresh and healthy food when adequate food market structures are in place

Examples Arable land, grassland, tree meadow/orchard, biofuel production/ agroforestry, horticulture



Green areas for water management, blue areas

Systemic approaches to protect urban areas from flood damage and help adapt to changing rainfall patterns by eg combining green, blue and grey components; can include e.g. green roofs, permeable surfaces, infiltration trenches, swales, detention basins.

Examples Rain gardens or sustainable urban drainage systems (SUDS), rain gardens, swales / filter strips; Lake/pond, river/stream, dry riverbed, canal, estuary, delta, sea coast, wetland/bog/fen/marsh

Typology of Urban Green Infrastructure

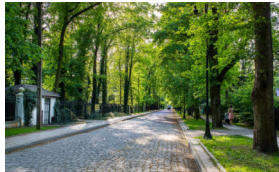
Green and blue infrastructure



Bird's eye view on Podkowa Leśna



Bird's eye view on Podkowa Leśna



Green alley in Podkowa Leśna



Plan of green infrastructure in Podkowa Leśna, Garden city

Podkowa Leśna, located near Warsaw, stands out as a wonderful example of a garden city where the harmony between nature and architecture shines through. Its streets, flanked by trees and vibrant gardens, create a serene atmosphere, offering a welcome retreat from the hustle and bustle of urban life.

One of the town's defining features is its interconnected network of green spaces. Trails and pathways follow water canals and wind their

way through the town, linking parks, gardens, and recreational areas. This green infrastructure not only enhances the town's aesthetic appeal but also promotes a healthy lifestyle and encourages sustainable modes of transportation, like walking and cycling.

Green and blue infrastructure



Bird's eye view on Hammarby Sjöstad



Waterfront infrastructure



Blue infrastructure

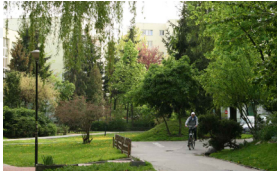


Plan of green infrastructure in Hammarby Sjöstad

Hammarby Sjöstad, nestled in Stockholm, exemplifies a visionary approach to urban development where nature intertwines seamlessly with contemporary architecture. Its streets are adorned with verdant foliage and flourishing gardens, providing a verdant respite from urban commotion. Sustainability is at the heart of this district, evidenced by its innovative eco-friendly buildings and infrastructure, including energy-efficient systems and waste management solutions.

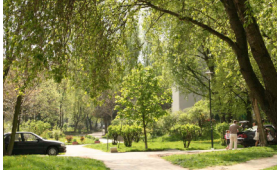
A hallmark of Hammarby Sjöstad is its extensive network of green spaces and blue-green infrastructure. The district boasts interconnected parks, waterfront promenades, and green corridors, fostering biodiversity and enhancing the quality of life for residents. These green pathways not only beautify the urban landscape but also serve functional purposes, such as mitigating stormwater runoff and promoting active transportation options like walking and cycling.

Green and blue infrastructure



Bird's eye view on Hammarby Sjöstad

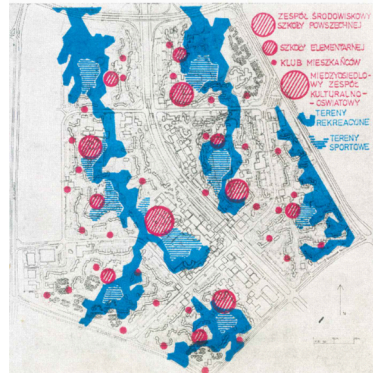
Case study *Ursynów, Warsaw, Poland*



Waterfront infrastructure



Blue infrastructure



Plan of green infrastructure in Ursynów

Ursynów, a modernist-designed district within Warsaw, seamlessly merges contemporary urban living with natural allure, through its organic green infrastructure network. This network offers residents serene pathways away from the bustling main roads, fostering a sense of tranquility amidst the urban environment. As residents traverse these green corridors, they not only experience the aesthetic charm but also benefit from improved air quality and enhanced biodiversity, contributing to

overall well-being. The walkability of Ursynów not only promotes physical health but also nurtures a sense of community, connecting residents with their surroundings and fostering a sustainable urban lifestyle.

Migration corridors

What are migration corridors?

Connectivity can be achieved by means other than corridors, but corridors remain the most effective way. For example, stepping stones are small patches of habitat that allow species to move through the landscape without a continuous corridor, but they require individuals to traverse through lower quality habitat in between. Assisted migration, where humans physically move individuals to a new, better location that they might not otherwise reach, can help populations, but remains controversial as a management tool. Corridors, which provide continuous habitat for species to move on their own, are a reasonable and effective means for ensuring connectivity in the landscape.

Structural vs functional connectivity

Structural connectivity refers to the way a corridor is built. A corridor or connected path has a physical presence in the land- or seascape, and the way the elements of the corridor and the land- or seascape interact is structural connectivity. **Functional connectivity** refers to the way a corridor serves species' needs. A corridor or connected path is considered to have high functional connectivity if it supports dispersal and movement, and protects ecological processes.

Structural connectivity	Functional connectivity
Connectivity from land- or seascape perspective	Connectivity from species perspective
Can have structural connectivity with limited functional connectivity	Can have functional connectivity with limited structural connectivity
Measured through landscape metrics from GIS	Measured through tracking movement of species
Physical measures of habitat patches and surrounding disturbances	Tracking measures of species moving through habitat patches and corridors
Only considers habitat amount and spatial configuration	Accounts for species dispersal and establishment as a response to habitat amount and spatial configuration
More spatially representative	More ecologically meaningful

Corridor concerns

In the same way that linkages support species of conservation concern, they may also increase the movement of unwanted species. For the most part, researchers have not encountered major negative effects of corridors in conservation. However, work is still needed to understand when and where corridors have unintended negative effects.

Invasive species

might increase the spread of invasive species

Disease

might increase transmission of disease or parasites by providing a better pathway for their spread

Population synchrony

might affect predation rates by forcing prey to move through a small area that makes them easier targets for predators

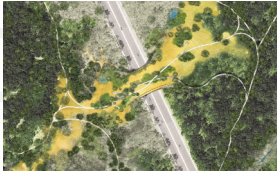
Predation

increase the amount of border between good and deraded habitat, and species tend to behave differently at this edge

Edge effects

have the potential to make to connected populations grow or shrink at the same time, putting them at risk for simultaneous problems

Migration corridors



Land Bridge plan



Land bridge



Case study *Hardberger Park,* *USA*

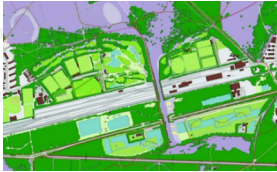
Hardberger Park Land Bridge

This is the largest land bridge ever planned and built in the United States. Hardberger Park, once a dairy farm, was transformed into a park through an international competition for San Antonio. It preserves 75% of the native landscape and dedicates 25% to recreation, blending cultural heritage with local ecologies.

The Hardberger Park Land Bridge reconnects

pedestrians and wildlife split by a highway. At 150' wide, it accommodates both people and animals, with vegetation providing wildlife cover and pedestrian trails. Wildlife blinds at each end offer resting spots for observers, featuring artistic designs inspired by local flora and fauna.

Migration corridors



Zanderij Crailoo Nature Bridge plan

Case study *Zanderij Crailoo Nature Bridge, Netherlands*



Birds eye view on golf course



Zanderij Crailoo Nature Bridge

The Zanderij Crailoo Nature Bridge, a major project that lasted from 2002 to 2006. The largest ecoduct in the world, 800 meters long, 50 wide, in the Goois Nature Reserve and also managed by that organization. The bridge connects the Spanderswoud and the Bussumerheide and bridges a provincial road, a railway, a sports park and the Railpro site. There

is also a cycle and equestrian path across it.

The goal is for animals to be able to walk back and forth across the entire Utrechtse Heuvelrug again, if they want, from Rhenen to Naarden. It has been shown that many animal species use the bridge, such as deer, foxes and rabbits. But also rarer animal species and the cricket mole and the sand earworm, which had previously only been spotted in the Veluwe.

Health is a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity (World Health Organization, 1948).

Health

What is health?

Health is a state of overall well-being encompassing physical, mental, emotional, and social aspects. It goes beyond the absence of illness or disease and includes factors like fitness, nutrition, mental resilience, social connections, and quality of life. Health is influenced by genetics, lifestyle choices, environmental factors, access to healthcare, and societal determinants, and it is a dynamic state that can vary throughout a person's life. Maintaining good health involves a balanced approach to physical activity, healthy eating, emotional wellness, social engagement, and regular healthcare check-ups.

Social health

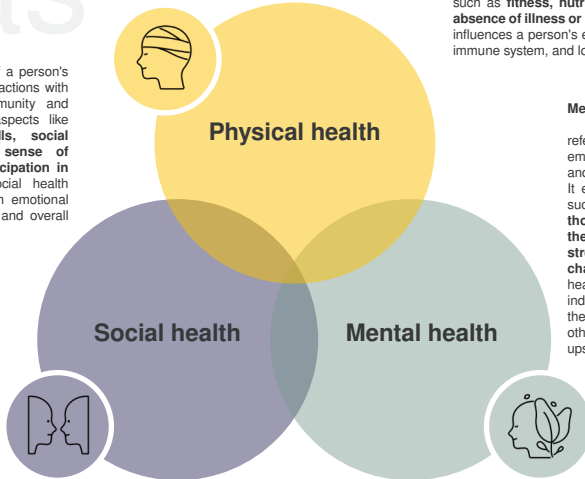
refers to the quality of a person's relationships and interactions with others in their community and society. It involves aspects like **communication skills, social support networks, sense of belonging, and participation in social activities**. Social health plays a crucial role in emotional well-being, resilience, and overall life satisfaction.

Physical health

relates to the overall condition and functioning of the body. It involves factors such as **fitness, nutrition, sleep, and the absence of illness or injury**. Physical health influences a person's energy levels, mobility, immune system, and longevity.

Mental health

refers to a person's emotional, psychological, and cognitive well-being. It encompasses aspects such as **mood, thoughts, feelings, and the ability to cope with stress and daily life challenges**. Mental health can impact how individuals perceive themselves, interact with others, and handle life's ups and downs.



Health Birštonas Solutions supporting health

Urban solutions supporting residents' health

Good urban planning can enhance residents' health by creating walkable neighborhoods with green spaces, cycling lanes, and public transit, encouraging physical activity and reducing the risk of chronic diseases. Mixed land use and access to amenities foster social connections and mental well-being, while sustainable practices promote clean air and water quality, contributing to overall health and environmental sustainability.



Green spaces and urban parks

Increasing access to green spaces and urban parks provides opportunities for physical activity, reduces stress, and improves mental health.



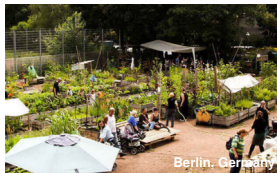
Air quality improvement

Implementing measures to reduce air pollution, such as promoting clean energy sources, enhancing public transportation, and implementing vehicle emission standards, improves respiratory health and reduces the burden of respiratory diseases.



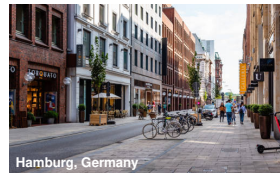
Active transportation

Promoting walking, cycling, and public transit usage encourages physical activity and reduces air pollution and traffic congestion.



Healthy food access

Implementing policies to increase access to healthy and affordable food options, such as farmers' markets, community gardens, and urban agriculture initiatives, can improve nutrition and combat food deserts.



Noise reduction

Addressing noise pollution through urban planning measures and noise regulations can mitigate its adverse effects on mental health and sleep quality.



Community engagement

Engaging communities in decision-making processes and health promotion activities fosters social cohesion, empowers residents, and enhances the effectiveness of public health interventions.

Birštonas

Biophilic city

Biophilic urbanism acknowledges the **intrinsic bond between humans and nature**, advocating for its integration into daily urban life, despite the conventional perception of natural systems as distinct from built environments.

A Biophilic City is characterized by **abundant nature, embodying a commitment to nurturing, preserving, and expanding natural elements within urban environments**. These cities prioritize fostering strong connections and frequent interactions with the natural world.

A Biophilic City is marked by its wealth of nature, reflecting a dedication to nurturing, safeguarding, and enhancing natural features

within urban settings. These cities place a premium on cultivating deep ties and regular engagements with the natural environment. Biophilic urbanism recognizes the inherent connection between humans and nature, promoting its seamless integration into daily urban living, challenging the conventional notion of natural systems being separate from the built environment.

A Biophilic City embraces:

- Nature connections
- Urban nature conservation
- Coexistence and care for nature

Indicators of biophilic cities

Biophilic conditions and infrastructure



Percentage of population within 100 meters of park or greenspace



Existence of connected, integrated ecological network; green urbanism from rooftop to region



Percentage of city land area in wild or semi-wild nature



Miles per capita of walking trails



Number of community garden plots; access to community garden area



Extent and number of green urban features

Biophilic activities



Percentage of population that is active in nature or outdoor clubs or organizations



Percentage of population engaged in nature restoration and volunteer efforts



Percentage of time residents spend outside



Percentage of residents who actively garden



Extent of recess and outdoor playtime in schools

Biophilic attitudes and knowledge



Percentage of population that can recognize common species of native flora and fauna



Extent to which residents are curious about natural world around them

Case study Copenhagen, Denmark

Copenhagen seamlessly blends nature with urban life, making it a leading example of a biophilic city. Renowned for its commitment to sustainability and innovative urban planning, Copenhagen offers a harmonious environment where green spaces, waterfront living, and vibrant city life coexist in perfect balance.

The city's green areas, comprising parks, gardens, nature areas, sports facilities,



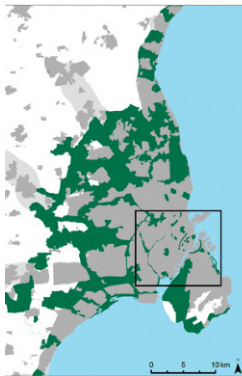
Cloudburst system, Copenhagen



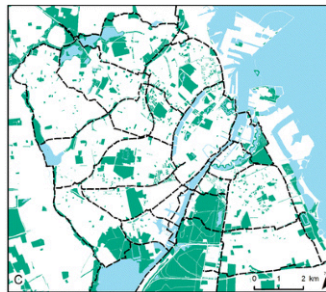
Opera Park, Copenhagen

allotments, and cemeteries, are easily accessible to its residents. With over 2,260 hectares of public green areas, including lakes and aquatic spaces, and 92 km of coastline, Copenhagen ensures that 80% of its citizens live within 300 meters of a green space.

Copenhagen's dedication to sustainability is evident in its ambitious goal to become carbon neutral by 2025. Innovative urban planning and



Fingerplan, Copenhagen



Legend:
 ■ Fingerplan 2013: Protected regional green structure (wedges and rin)
 ■ Fingerplan 2013: Urban area and airports
 ■ Fingerplan 2013: City fingers
 ■ Blue spaces (marine and lakes)
 --- Green Cycle Routes
 ■ Green in city center (green spaces, green roofs and green courtyards)

design prioritize sustainability, resulting in pedestrian-friendly streets, bike lanes, and green roofs. Former industrial areas have been transformed into vibrant, sustainable neighborhoods, such as Ørestad and Nordhavn.

In Copenhagen, each citizen has an average of 42.4 m² of green space at their disposal, representing about 25% of the city's overall area. This commitment to providing

access to nature within the city ensures a high quality of life and a strong connection to the environment.



Novartis physic garden



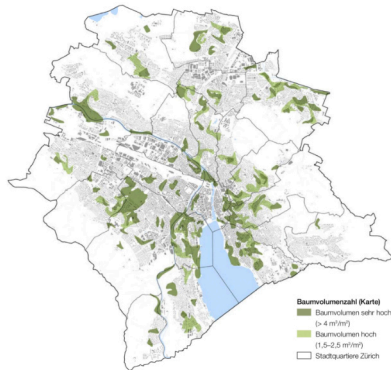
MFO Park, Zurich

Case study Zurich, Switzerland

Zurich, Switzerland's largest city, is a shining example of a biophilic city, seamlessly integrating nature into urban life. Renowned for its commitment to sustainability and innovative urban planning, Zurich offers a harmonious environment where green spaces, waterfront living, and vibrant city life come together in perfect harmony.

The city's green areas, including parks,

gardens, nature reserves, and recreational areas, are easily accessible to residents and visitors alike. With over 8,000 hectares of public green space, Zurich ensures that its citizens have ample opportunities to connect with nature. The city's picturesque lakeshores, including Lake Zurich and the Limmat River, offer stunning waterfront views and recreational activities.



City parks map, Zurich

Zurich's commitment to sustainability is evident in its ambitious environmental goals and initiatives. The city has implemented innovative urban planning and design strategies to reduce carbon emissions, promote renewable energy, and enhance green infrastructure. Former industrial areas have been transformed into vibrant, sustainable neighborhoods, such as the trendy Zurich West district.

In Zurich, each citizen has an average of 27 m² of green space at their disposal, representing about 30% of the city's overall area. This dedication to providing access to nature within the city ensures a high quality of life and fosters a strong connection to the environment.

Birštonas

Conclusions

High-quality green infrastructure in urban areas can significantly influence migration corridors by providing vital pathways for wildlife amidst the built environment. By integrating green spaces such as parks, greenways, and vegetated corridors into cities, we create interconnected networks that mirror natural habitats. These corridors not only facilitate the movement of wildlife but also contribute to maintaining genetic diversity and supporting healthy ecosystems.

Moreover, the presence of green infrastructure enhances residents' health and well-being in several ways. Access to green spaces promotes physical activity, reduces stress, and improves mental health. Cleaner air, cooler temperatures,

and reduced noise pollution in green areas contribute to better respiratory health and overall quality of life for urban dwellers. Additionally, green spaces serve as recreational areas for community gatherings and social interactions, fostering a sense of belonging and community cohesion.

Thus, investing in high-quality green infrastructure not only benefits wildlife and ecosystems but also promotes the health and vitality of urban residents.

Principles to follow



1. Connect green spaces, deserted neighbourhoods, people



2. Preserve and protect existing natural habitat



3. Restore damaged parts of nature frame



4. Create multifunctional spaces



5. Educate and draw attention



6. Promote active lifestyle



7. Enhance biodiversity



8. Create community and engage residents



9. Make it local



10. Take care of accessibility



11. Plan in long term



12. Improve use of natural resources

Creating strategy

Potential
Fantastic nature setting

Challenge
Damaged nature frame in urbanized area

WILDING



Wilding

A green strand that weaves through the site, focusing on wildlife, the environment, the green connection and bringing people closer to nature.

This wild infrastructure will provide a nature recovery network that delivers wildlife enhancements with climate resilient landscape; to create truly biodiverse environment.

Potential
Rich and vivid history of Birštonas

Challenge
Fragile sense of community

EXPERIENCE



Experience

Embracing the context, history and character of an area to positively influence the design and place, giving a greater sense of identity and ownership.

Potential
Great recreational conditions

Challenge
Medium diversity of possible activities

ACTIVATE



Activate

Key interventions in the landscape that facilitate access to recreation, nature and education within distinctive places that are equitable and inclusive.

Creating strategy

Potential
Fine base for walking

Challenge
Unbalanced parking/ traffic system

VITALITY



Vitality

The creation of an uninterrupted dedicated cycling and walking network that encourages sustainable modes of travel, whilst optimising multifunctionality and connectivity, to positively respond to the climate emergency. Creating dedicated parking spots in key areas to encourage visitors to walk more.

Potential
Different character neighbourhoods

Challenge
Weak neighbourhood connections

CONNECT

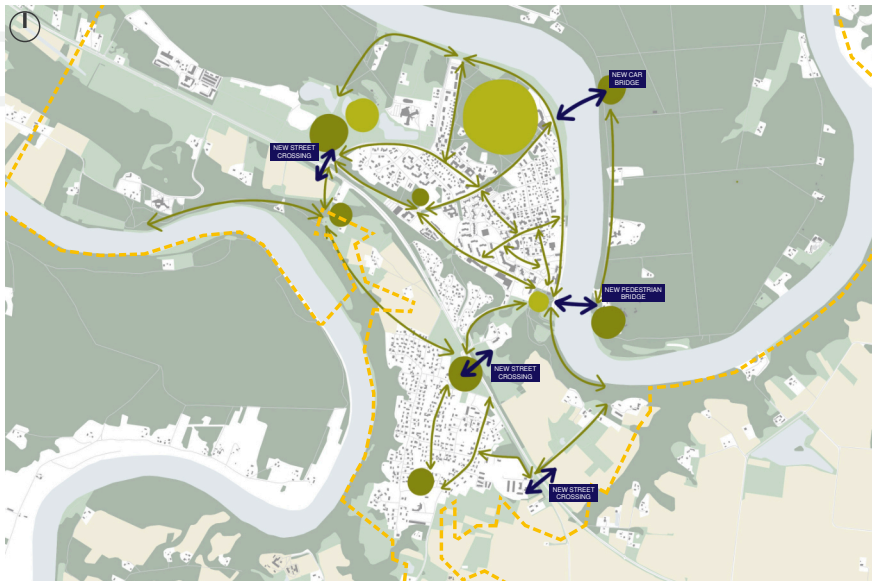
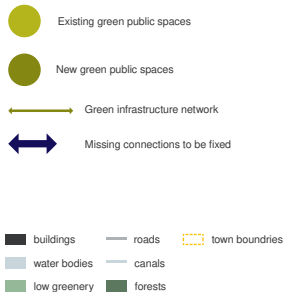


Connect

Providing opportunities for nature- based solutions to facilitate carbon offsetting through the use of carbon credits and storage, to reduce and neutralise the emissions associated with community use and growth.

Strategy

Green network



Strategy

Migration corridor restoration

- buildings
- roads
- town boundaries
- water bodies
- canals
- low greenery
- forests



Strategy

Supporting health



New residential areas



New spa areas



New PARK+WALK localisation



Local multifunctional centers



Continuous bike path



buildings



roads



town boundaries



water bodies



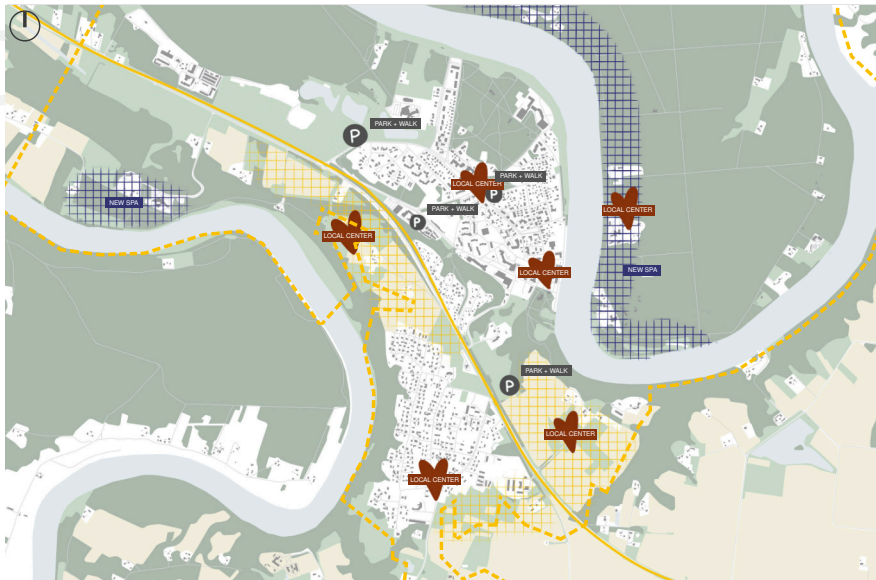
canals



low greenery



forests



Strategy

Final strategy



Birštonas

Community activation



Planting native species

Community activation involving planting native species and uploading results to a dedicated app fosters grassroots involvement in ecological restoration while providing valuable data for monitoring biodiversity and ecosystem health. By engaging citizens in hands-on conservation efforts and utilizing digital platforms for data collection, this approach promotes environmental stewardship and community empowerment in urban areas.



Observing changes

Encouraging citizens to capture images from dedicated spots to observe changes in nature provides an accessible and engaging way to monitor environmental shifts and track ecosystem dynamics over time. By leveraging technology to document these observations, communities can contribute valuable data to scientific research while fostering a deeper connection to their local environment and promoting environmental awareness.

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Birštonas

3 Design

Green network special plan

town boundaries roads buildings

Existing

forests
city parks
semipublic organised greenery
farmlands
water bodies canals

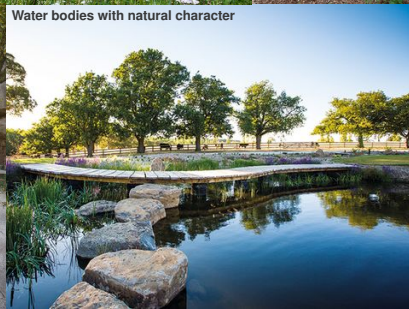
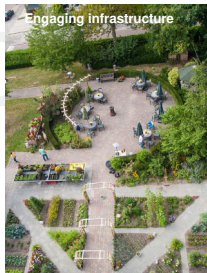
Planned

forests
city parks
possible location of new green bridge
green connections (streets with higher density of greenery)



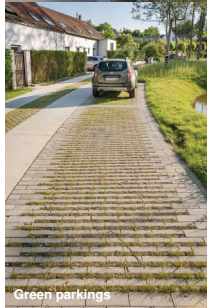
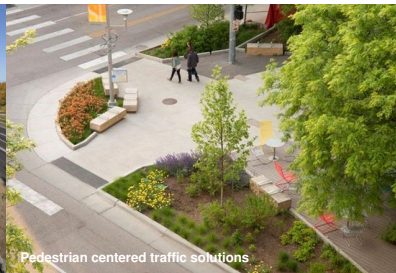
Infrastructure suggestions

City parks suggestions



Infrastructure suggestions

Green streets suggestions



Native plants

Masterplan

town boundaries roads buildings

Existing

forests
city parks
farmlands
water bodies
residential
mixed use
industrial
canals

Planned

forests
city parks
residential
possible location of new green bridge
green connections (streets with higher density of greenery)



Masterplan of Birstonas



Pilot plot analysis

Selected area is located in eastern part of Birstonas, on the opposite site of Prienu street than the city center. It is mostly cover by low green areas (meadows, farmlands) and forests. Unfortunately it is almost disconnected from the other side of the city due to lack of enough number of pedestrian overpasses.

In the southern part of this area the bigger residential neighbourhood starts.

There are few points of interest: Observation tower, hotel and restaurant. All of them located next to each other, in northern part of the area.



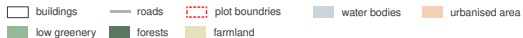
View from the Observation Tower



Viaduct over Prienu street



Gas station



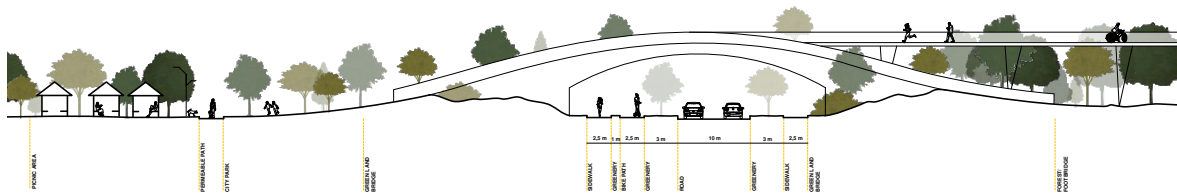
Masterplan

- plot boundaries
- roads
- bike paths
- buildings:
 - existing
 - new residential
 - new service
 - new mixed use
- parking place
- pedestrian paths
- nature:
 - forest park
 - city park
 - private greenery
 - native shore greenery
 - beach
 - water



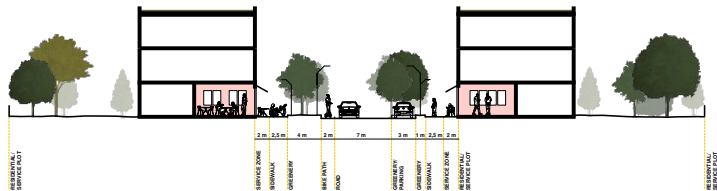
Pilot plot masterplan

Section drawings

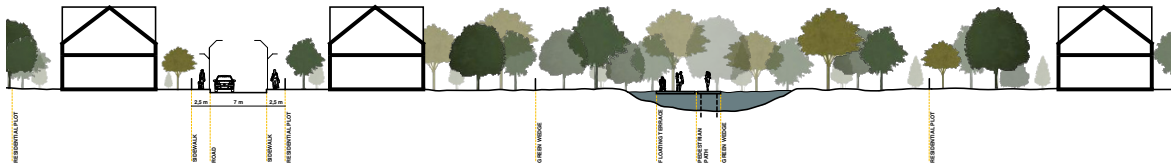


Land bridge section

Section drawings



Service street section



Residential area and green wedge section

Biršto

Axonometry

Green wedge





Biršto

Axonometry

Land bridge

