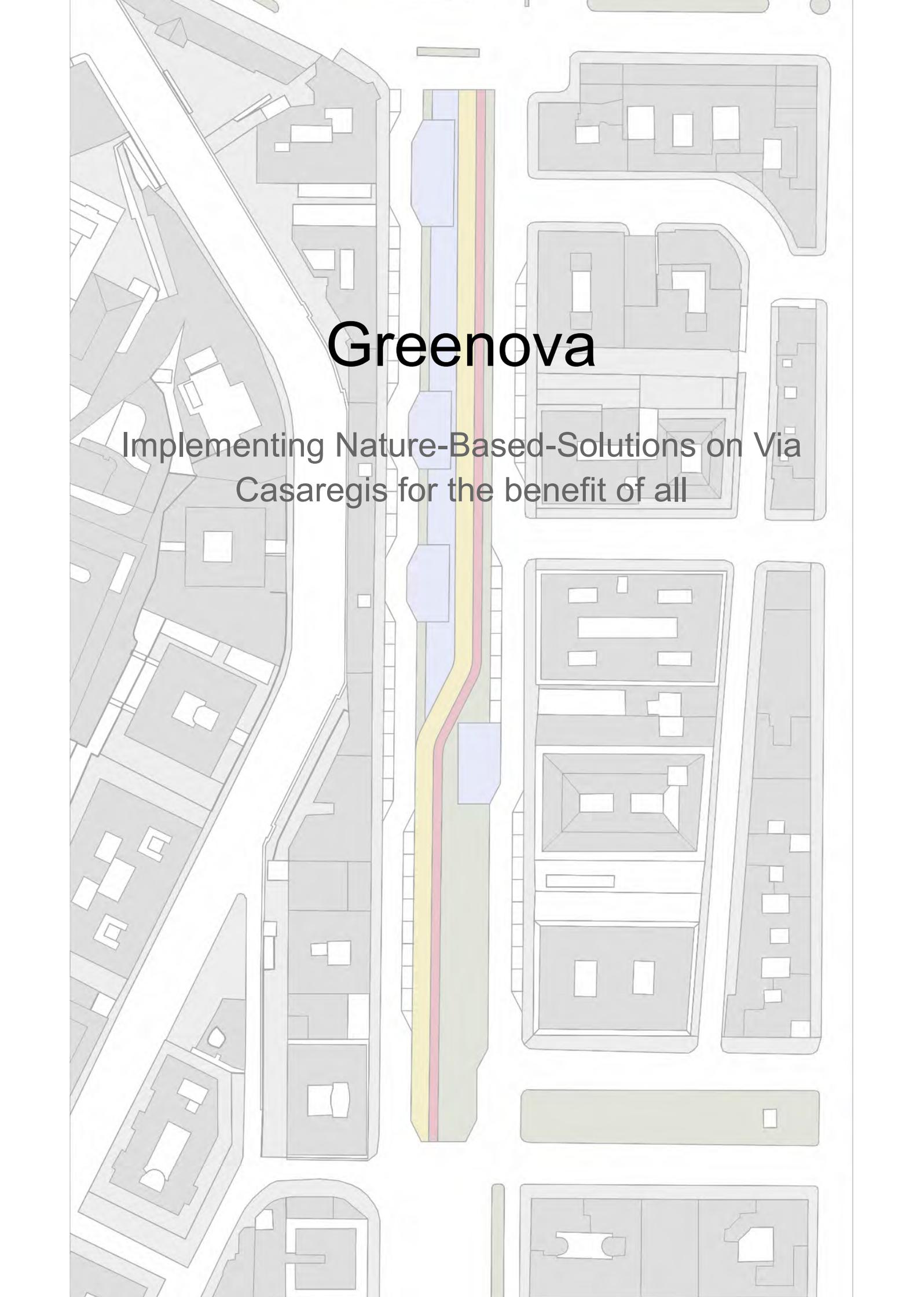


GREEN SKILLS FOR CITIES

Greenova was developed by **Andrea Gnaccarini, Davide Casalino, Karim Abillama, Manuel Harm, Maria Magkavali, and Moritz Dahlmanns** with the support of the Vienna University of Economics and Business, the Institute for Advanced Architecture of Catalonia, the University of Genoa and Alda European Association for Local Democracy.

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Greenova was developed during the Green Skills for Cities project, co-funded by the Erasmus+ Programme of the European Union under the KA220-HED - Cooperation partnerships in higher education call.



Greenova

Implementing Nature-Based-Solutions on Via
Casaregis for the benefit of all

Introduction

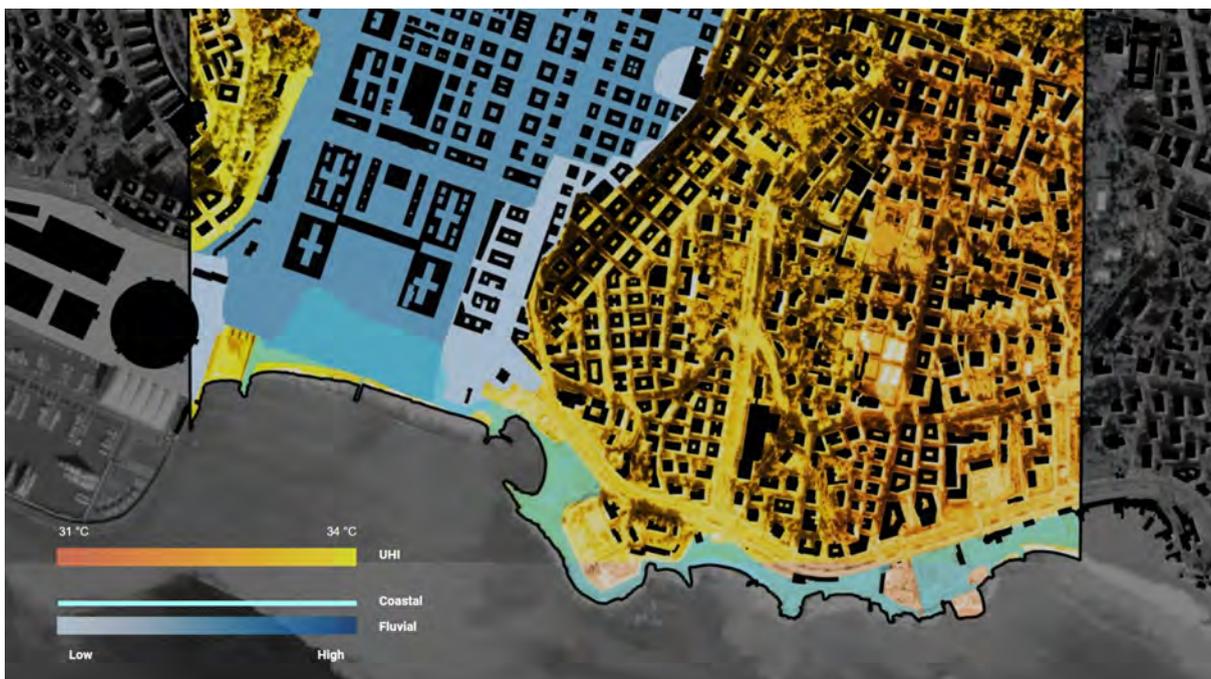
This project report provides a comprehensive analysis of the implementation of nature-based solutions along Via Casaregis in Genova. The report showcases the meticulous integration of sustainable and environmentally friendly practices, which have led to the remarkable transformation of the road into an enhanced and verdant environment. Through the utilization of strategic planning and active community engagement, this project has effectively achieved a harmonious equilibrium between infrastructure development and the preservation of natural elements. The outcomes exemplify our commitment to fostering a greener and more vibrant space while promoting long-term sustainability and enriching the overall well-being of residents and visitors alike.

Problem definition

The city center of Genova is grappling with a critical issue that involves the detrimental effects of the heat island phenomenon and an escalating flood risk. With temperatures soaring to alarming levels, reaching up to **34 degrees Celsius**, the dense city center has become an epicenter for heat accumulation, intensifying the urban heat island effect. This problem arises from the prevalence of heat-absorbing surfaces like concrete and asphalt, along with limited green spaces and vegetation. Consequently, residents and visitors in the city center face extreme heat conditions, endangering their health, compromising livability, and amplifying energy demands for cooling systems.

Simultaneously, Genova faces an escalating flood risk, particularly within its city center. The convergence of intense rainfall events, inadequate drainage infrastructure, and the proliferation of impermeable surfaces has augmented surface runoff and flooding occurrences. The combination of elevated heat and flood risks poses a grave threat to the resilience, safety, and well-being of the city center.

FLOOD RISK + URBAN HEAT ISLAND (UHI)



Site Analysis

Car occupation: The issue of car occupation in Via Casaregis, excluding pedestrians, presents a significant challenge to the functionality and safety of the area. With a parking area spanning **2,176 square meters** and a road measuring **10,790 square meters**, the limited parking space often leads to cars occupying the road, diminishing the flow of traffic. Unfortunately, this encroachment affects the designated pedestrian area, which covers only **1,632 square meters**. The dominance of cars hinders pedestrian accessibility and compromises their safety.

Accessibility: Via Casaregis is accessible from the major arterial road, Corso Italia is also connected to two residential roads, namely Costantino Mori and Salita Francesco Vignola. Related to the public transportation, the presence of nearby bus stops Rimass/ Morin (Bus 20), Nizza2/ Scalinata Guerrieri (Bus 36) and Battisti/ Scuole (Bus 36) provide further accessibility for commuters and residents to the space

ACCESSIBILITY



Land Use and Greener: Via Casaregis Road predominantly features **residential buildings**, serving as the primary land use within the area. The presence of housing structures signifies the neighborhood's role in accommodating the local population. One significant concern observed in the analysis is the notable **scarcity of green spaces**. The absence of trees, plants, and open green areas contributes to the exacerbation of the heat island effect in the neighborhood. With a **dominance of concrete surfaces**, the absence of natural elements results in increased surface temperatures and reduced natural cooling effects.

LAND USE

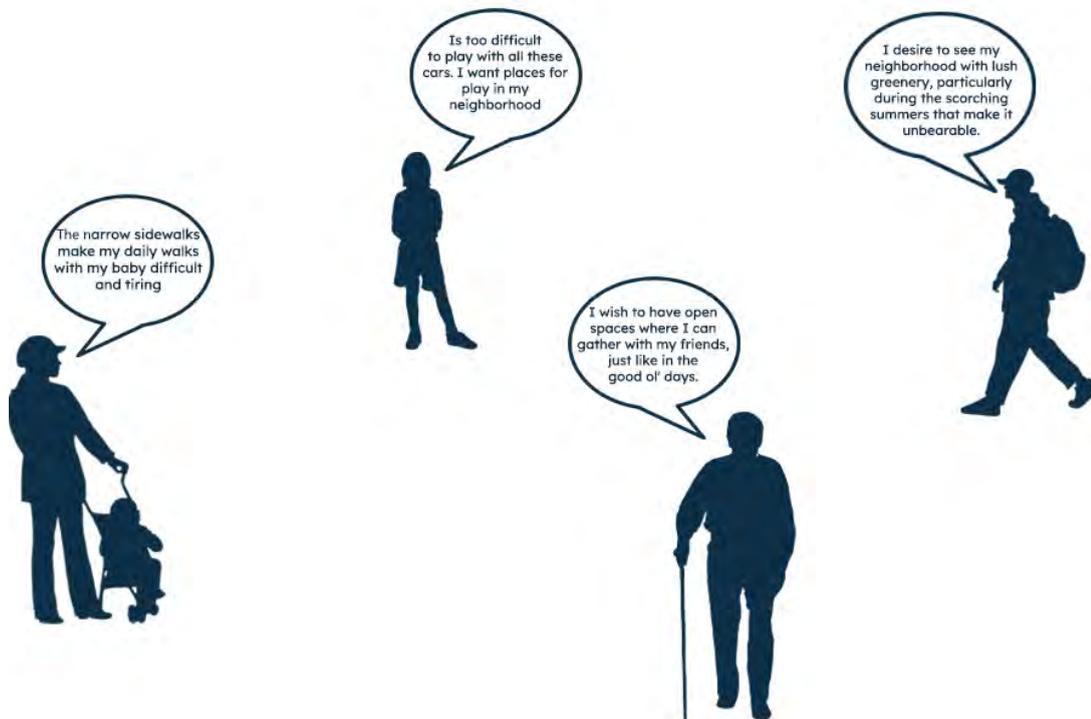


GREENERY



What the residents say:

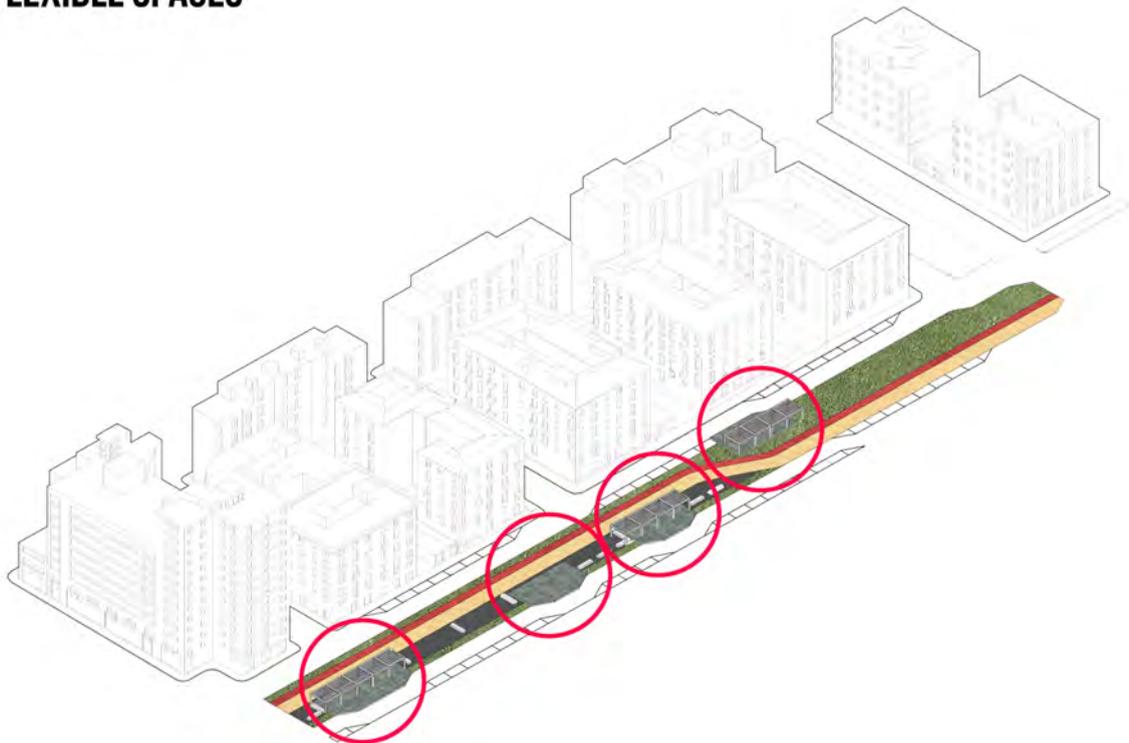
During our interviews with the residents of Via Casaregis Road, a strong consensus emerged regarding their desires for the neighborhood's development. The residents expressed a collective sentiment that a shift in priorities is needed, with less emphasis on car parking spaces and a greater focus on introducing more greenery and creating spaces for gathering outdoors. The residents emphasized the need to reclaim space currently allocated to cars and transform it into inviting green areas that promote a sense of community and well-being. They highlighted the importance of having accessible parks, plazas, and seating areas where they could gather, socialize, and enjoy the natural environment.



The Proposal



FLEXIBLE SPACES



Flexibles spaces

The project is conceived around the idea of flexible spaces. A series of squares are deployed along the park. These spaces, placed in front of bars and restaurants, could be used both by citizens to organize public events and by local and food facilities owners which during the summertime could desire an external place to settle their tables.

The inspiration comes from the Giardini Luzzati in Genoa, where this flexible space is able to offer spaces to stakeholders and citizens into a mix of flexible activities.

Parking lots

Despite the municipality's interest to remove the parkings in the area it has been decided to keep some of them, the shops that overlook on the street will always need goods delivery and it is also nice for the citizens living in the area to have some parking spots nearby; however the parking's distribution has been modified to alter the cars' flow and slow down the traffic creating a safer area and allowing to people to across the street safely, also bars and restaurant waitress in this way could easily reach their exterior spaces.

Mobility

Inside the park are provided a bike lane and a pedestrian path. Considering the future project Waterfront di Levante by the Renzo Piano Building Workshop, it is available inside the park roads to bypass the traffic area and allow pedestrians and bikers to have a safe connection from Renzo Piano's proposal to the city.

Vegetation

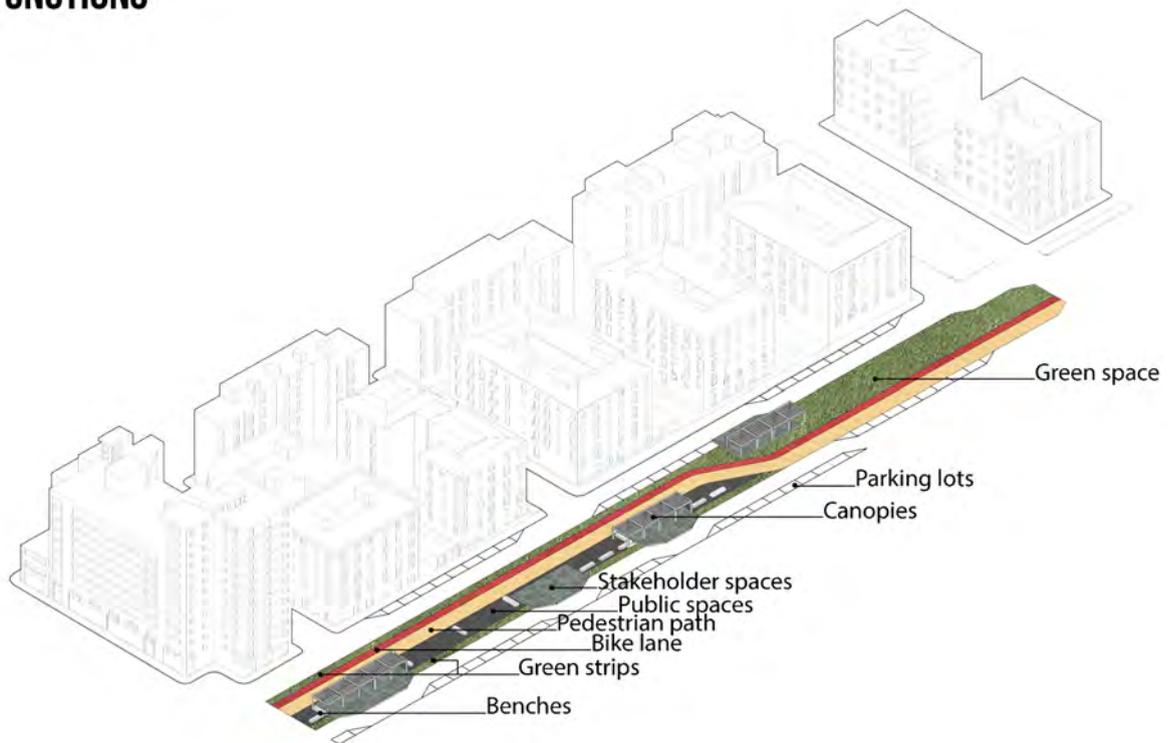
The plants inside the project are deployed along the streets. This deployment provides a double function because it allows a direct absorption of CO₂ and it isolates the area from noise and cars creating a safety island in the middle of the street.

In the south part it is present a large green area which was conceived to host a huge biodiversity and different kinds of nature based solutions.

Generally the plant distribution is thought to have a diversification of plants along the park which goes more coastal upon approaching the coastal area.

Project Phases

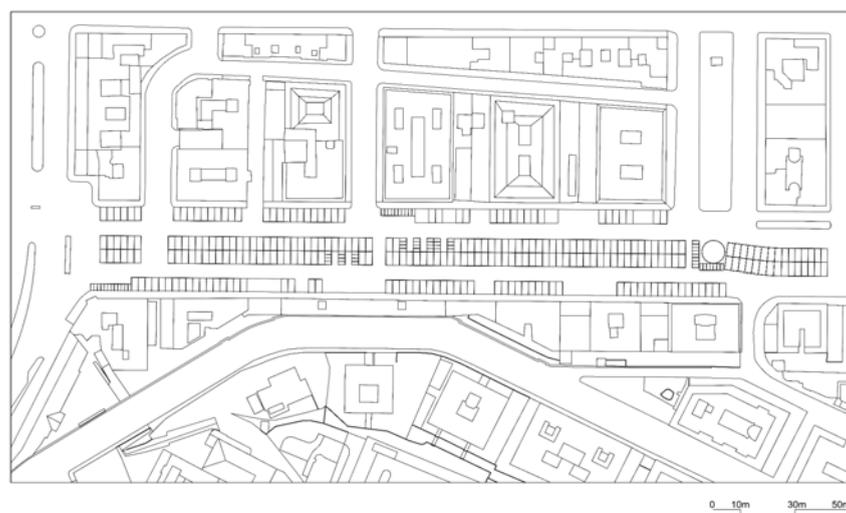
FUNCTIONS



In order to create a smooth change inside the neighborhood the project has been divided in three phases.

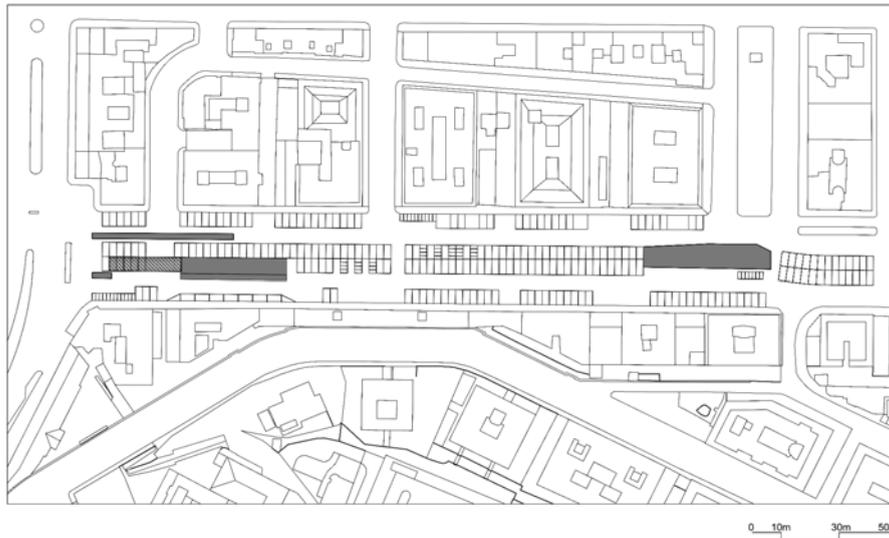
These phases are chosen considering the kind of interventions developing in the area.

2023



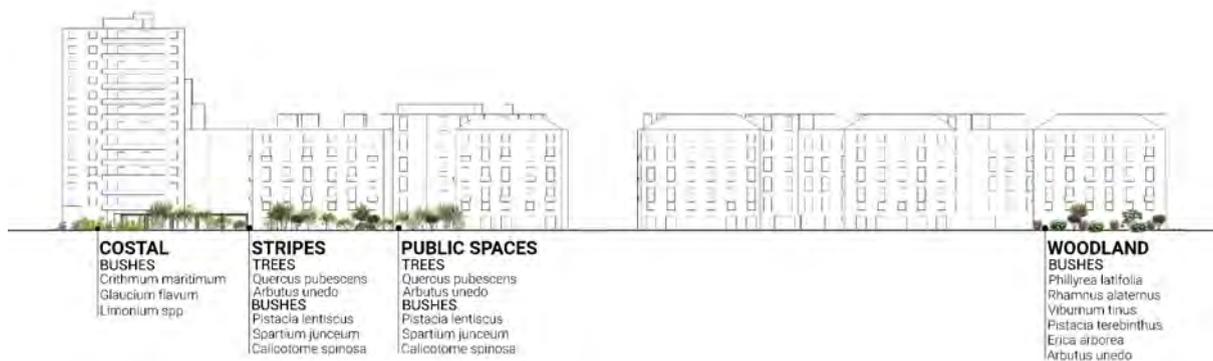
Nowadays the area is mostly characterized by parkings. For this reason there will be a slow reduction in the years in order to not create disease to the population.

2024

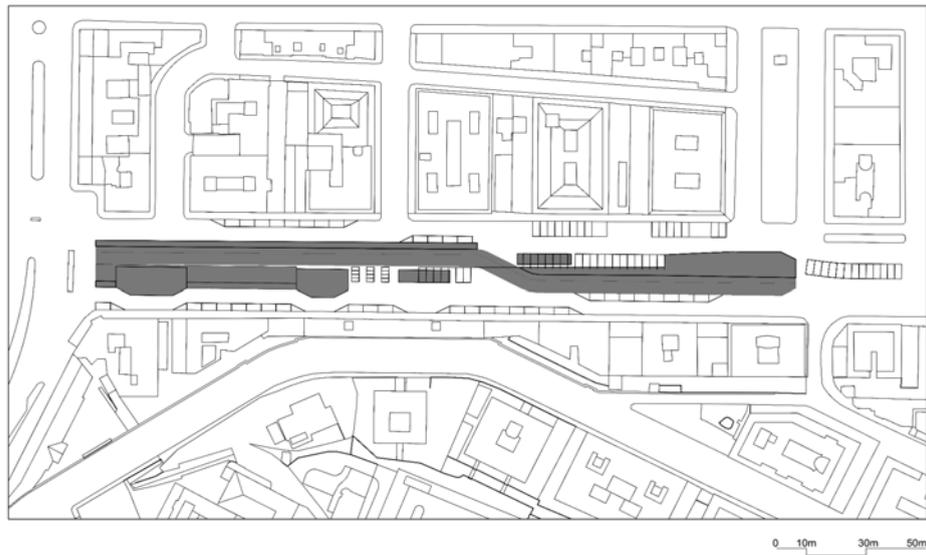


In 2024 there will be the first parking reduction with the introduction of the first public spaces and a canopy. The canopy provides shadows on the street keeping the parking resulting in a flexible space, between parking spot and public area.

2024



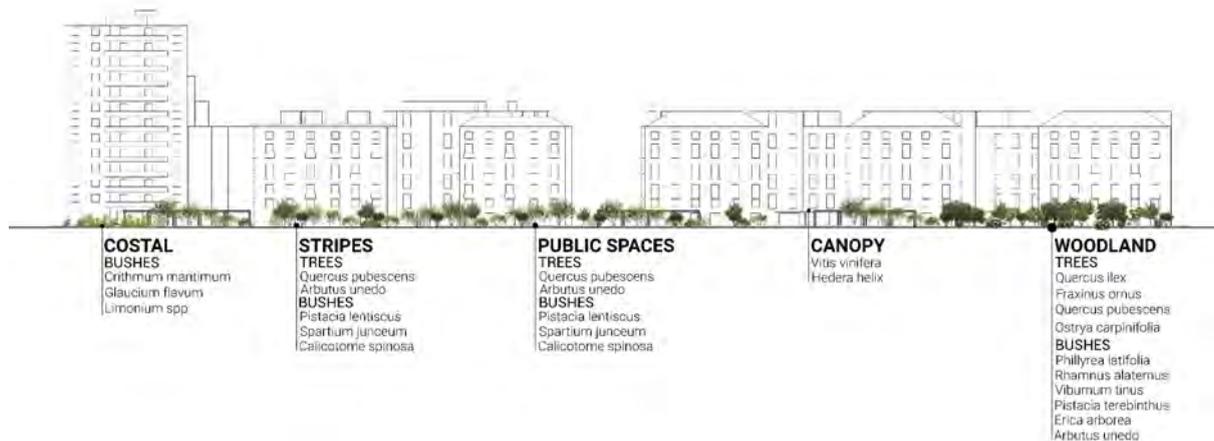
2027



In 2027 there is the introduction of the bike lane, pedestrian path and flexible spaces. Some of the parking spots are kept, some others are modified in order to create a controlled cars flow.

The vegetation reached biodiversity diversification and now is just waiting to grow.

2027



2030

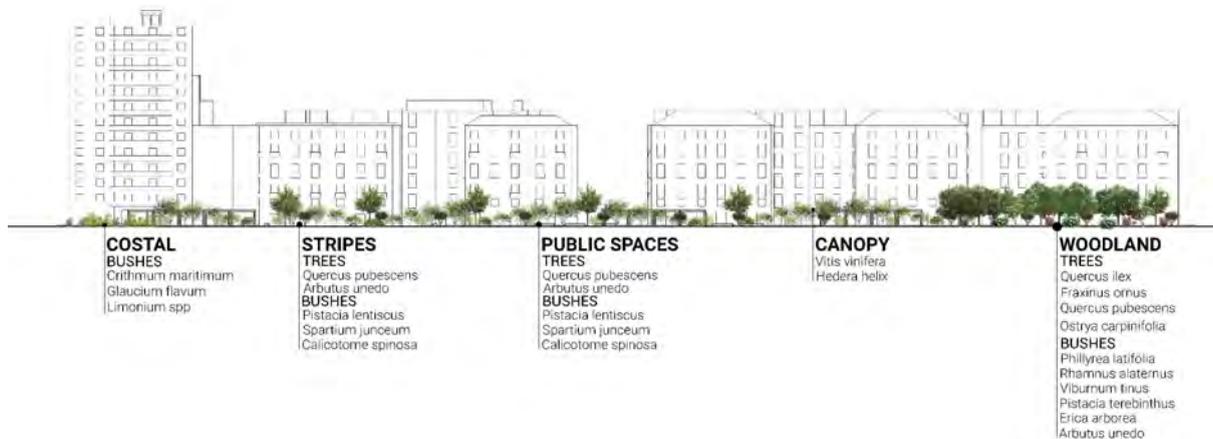


In 2030 the project is complete.

The parking lots are entirely modified, the flexible areas are completed and the public areas are all present.

The vegetation is completely mature and ready to be a green lung inside the city.

2030



Implementing Nature-Based-Solutions

Renature Native Species: All vegetation related measures will be carried out with native species. The Canopy i.e. should be provided by *hebera Helix* or/and *Vitis Vinifera*. By this we want to create an intact habitat for the native faunatic species and contribute to a rise of Biodiversity in this area. Also we dont bring new (alienated) species into the area, which could have an unsuspected impact on the ecosystem or even become invasive. Furthermore, these plant species are already adapted to the environmental conditions and they can be included into the environmental education approach of the project.

Pollinators biodiversity: Since pollinators are essential for a healthy and functioning ecosystem, we want to increase the size of the green space and the diversity of native plants used there. The street should perspectively also function as a corridor from the planned green space at the coastline to already existing green inside the city.

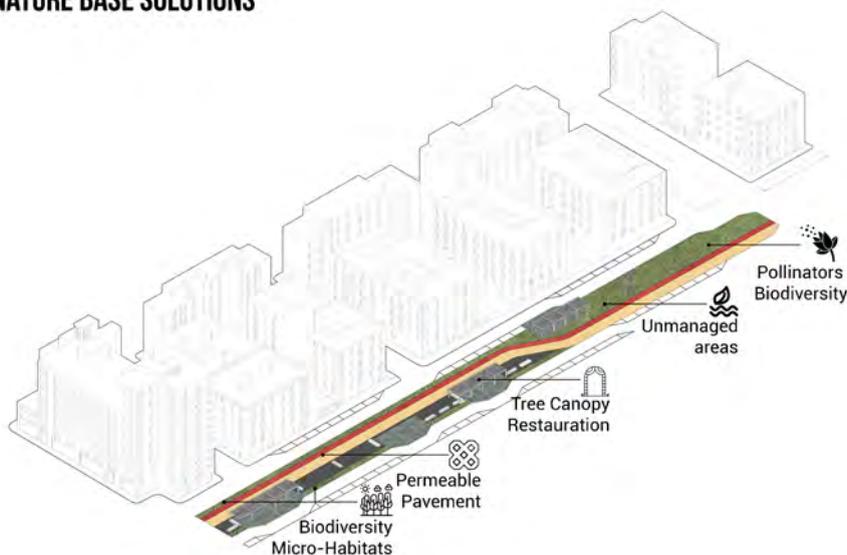
Permeable Pavement: Bike and pedestrian lane will be built on permeable pavement, so that it can infiltrate water at light precipitation and get into the soil. Also by that groundwater can be replenished and canalisation systems are relieved. It also contributes to decrease the risk of flood events.

Tree Canopy Restauration: We want to implement trees to bring shadow and fresher air for the people and to increase the quality of stay. This will be the part of the project, which will need the most time, so there will also be trellis covered by plants to provide shadow for the gastronomically used spaces.

Biodiversity Mirco-habitats: To attract local faunatic species we want to build micro-habitats for them. For example insect hotels, bat and bird-houses and space for reptiles.

Unmanaged Areas: Some green spaces, which do not have plant species that grow a lot (i.e. with annual plants) should be left unmanaged for the processes of nature. These areas attract pollinators and also other local species as they are not frequented and used by humans. Also the inhabitants can watch real natural processes over the year as part of environmental education.

NATURE BASE SOLUTIONS



Native Plant Species (& Biodiversity as Habitats and Animals)

Re-evaluating native plant species, we decide to start the first phase planting mostly bushes that can grow until different meters from 2 to 4 or 5. This will be important because it will provide the shade that little trees will need to grow until adult form from second phase. After this, trees will provide each other the shade and light they'll need for their fitness in the third phase.

Will be important in the unmanaged areas to don't remove branches and leaves on the ground: thanks to the natural degradation of the matter, will be provide the stock of Carbonium in the soil and the resources to micro and macro organisms that can create symbiosis with the plants, as bacteria, mycorrhizal fungi, collembola and others arthropods. In the natural spots can be placed rocks that can be used as lair for reptiles, arthropods houses that will host different species with different ecosystem services or functions and bat box.

Bushes and trees can be used as place to build the nest by birds.

This will set up a little "close" ecosystem fragmented by the ecosystems in the hills close to the city, but that will provide itself all the resources that will need to live without management, developing the fitness of the native species in their niches.

Coastal/dunal spots will be important for the conservation of important species (animal and plant ones) that are threatened by human's activity in beaches and coastal environments and that can find there a place where to survive.

Others fragmented spots in stripes and public spaces will host native plant species useful for the conservation of reptiles and arthropods thanks to their flowering or fructification, of bats using boxes, of birds for the spaces for the nest.

Species Catalogue

2024:

(I, II, III, IV, V) **Woodland** -Native habitat/forest- :

Bushes: *Phillyrea latifolia*, *Rhamnus alaternus*, *Viburnum tinus*, *Pistacia terebinthus*, *Erica arborea*, *Arbutus unedo*

(I, II, III, VI) **Stripes**:

Arbutus unedo, *Quercus pubescens*

Pistacia lentiscus, *Spartium junceum*, *Calicotome spinosa* as high bushes (till 5 meters high)

(I, II, VI, VII) **Coastal/Dunes spots** (end of stripes):

Crithmum maritimum, *Glaucium flavum*, *Limonium* spp.

(I, II, III, VI) **Public spaces:**

Arbutus unedo, *Quercus pubescens* as trees.

Pistacia lentiscus, *Spartium junceum*, *Calicotome spinosa* as high bushes (till 5 meters high).

2027:

(I, II, III, IV, V) **Woodland** -Native habitat/forest- :

Quercus ilex main tree. *Fraxinus ornus*, *Ostrya carpinifolia*, *Quercus pubescens*.

Bushes: *Phillyrea latifolia*, *Rhamnus alaternus*, *Viburnum tinus*, *Pistacia terebinthus*, *Erica arborea*, *Arbutus unedo*.

(I, II, III, VI) **Stripes:**

Arbutus unedo, *Quercus pubescens* as trees.

Pistacia lentiscus, *Spartium junceum*, *Calicotome spinosa* as high bushes (till 5 meters high).

(I, II, VI, VII) **Coastal/Dunes spots** (end of stripes):

Crithmum maritimum, *Glaucium flavum*, *Limonium* spp.

(I, II, III, VI) **Public spaces:**

Arbutus unedo, *Quercus pubescens* as trees.

Pistacia lentiscus, *Spartium junceum*, *Calicotome spinosa* as high bushes (till 5 meters high).

(I, II, III, V, VI) **Canopy:**

Vitis vinifera loses leaves, *Hedera helix* have leaves for the whole year, attracts more pollinators and is a microhabitat for some reptiles. Needs to be managed making it grow as we need for the shade or avoiding the annoy for the parking or the shops.

2030:

(I, II, III, IV, V) **Woodland** -Native habitat/forest- :

Habitat 9340

Quercus ilex main tree. *Fraxinus ornus*, *Ostrya carpinifolia*, *Quercus pubescens*. (Phase II)

Bushes: *Phillyrea latifolia*, *Rhamnus alaternus*, *Viburnum tinus*, *Pistacia terebinthus*, *Erica arborea*, *Arbutus unedo* (Phase I)

Eupatorium cannabinum: plant species that feeds the butterfly *Euplagia quadripunctata* that is in Habitat Directive as important specie. (Phase III)

About the soil restoration: without the management of the soil, without removing branches and leaves falled down, thanks to micro and macro organisms we have a continue decomposition of the matter that can make the soil more rich.

Birds, Reptiles, Arthropods, Mammals.

Amphibians only in wet conditions

- Management

(I, II, III, VI) **Stripes:**

Habitat 6310

Arbutus unedo, *Quercus pubescens* as trees.

Pistacia lentiscus, *Spartium junceum*, *Calicotome spinosa* as high bushes (till 5 meters high). (Phase I)

Removing the brenches (maybe moving into Woodland? Maybe reusing them?) falled down.

(I, II, VI, VII) **Coastal/Dunes spots** (end of stripes):

Habitat 1220/1240

Crithmum maritimum, *Glaucium flavum*, *Limonium* spp.

Spots with limestone and sand, no shade (just the little one made by the rocks).

Low management: caring that these species can grow well and doing intervention in first phases avoiding the growth of invasive alien species.

Birds, Arthropods, Reptiles.

+/- Management

(I, II, III, VI) **Public spaces:**

Habitat 6310

Arbutus unedo, *Quercus pubescens* as trees.

Pistacia lentiscus, *Spartium junceum*, *Calicotome spinosa* as high bushes (till 5 meters high).

Removing the brenches (maybe moving into Woodland? Maybe reusing them?) falled down.

Birds, Arthropods, Reptiles.

+ Management

(I, II, III, V, VI) **Canopy:**

Vitis vinifera loses leaves, *Hedera helix* have leaves for the whole year, attracts more pollinators and is a microhabitat for some reptiles. Needs to be managed making it grow as we need for the shade or avoiding the annoy for the parking or the shops.

Arthropods, Reptiles.

+/- Management

Involving Stakeholders

When it comes to urban planning and city development, it's crucial to consider the various stakeholders involved. By dividing them into five categories, we can better understand their unique interests and concerns.

Let's start with citizens. Within this group, there are a variety of people with different needs and desires. For example, older residents may be looking for local recreation spaces and medical services that are easily accessible. Families with children may be interested in safe and well-maintained parks, and playgrounds. Employees and passers-by might be looking for safe streets and transportation options. Meanwhile, shoppers and recreation seekers might be interested in a vibrant and diverse mix of retail and entertainment options.

Moving to the economic players, which include businesses, research institutes, and homeowners. These stakeholders are concerned with how changes to the urban environment will affect their profit. Whenever a neighborhood undergoes gentrification, it could lead to rising rents and property values, which could be good for homeowners but bad for renters, in particular for low-income residents. Similarly, if new developments lead to a loss of pedestrian circulation, shops may struggle to attract new customers.

Of course, we need to consider the natural stakeholders too, plants and animals. These living beings play a crucial role in the health and well-being of every urban environment. When planning new developments or making changes to existing ones, it's important to take into account how they will impact local ecosystems. This might involve taking measures to protect native plants and animals, such as planting native species or creating green spaces where wildlife can thrive.

Finally, we have the city administration, which includes politicians, planners, and other government officials. This group is responsible for overseeing the planning and development process and making sure that all stakeholders are represented. They have to create plans that are sustainable and transparent and avoid any negative perceptions, delays, or corruption. This also might involve working closely with community groups, conducting thorough environmental impact studies, and soliciting feedback from residents.

In summary, urban planning and development is a complex process that requires the consideration of many different stakeholders.

5 categories of stakeholders:

1. Citizens
2. Economic Players
3. City Administration
4. Animals
5. Plants

Citizens	Interests/Wishes	Concerns/Objections
Residents	Get home and away easily; Nice quarter atmosphere; Good local Climate (Temperature, Air Quality, Noise); Local Shopping Opportunities;	Loss of parking space; Gentrification; Involvement in local decisions, Price increases;
Old Residents	Local Recreation Space; Cafes; Medical Services	Accessibility; Construction Noise;
Family	Playgrounds; Road Safety;	Road Safety
Children	Safe Place to meet friends; Safe way to school;	
Employees	Get to work; Job Opportunities; Lunch Place; Nice local atmosphere	Loss of parking space; Loss/Move of current job;
Passer-Bys	Move quickly and safely through street;	Loss of traffic corridor / capacity
Shoppers	Different Shopping opportunities; Easy access to shops;	Loss of parking space; Price increases of shops;
Recreation Seekers	Cool and calm place; Cafes; Seating Opportunities; Small Attractions	

Economic Players	Interests/Wishes	Concerns/Objections
Shops on the Street	Get more customers; Good connections for employees; Integration into design	Loss of current customers; Loss of accessibility by car; Loss of regular customers through AirBnB-ification; Carriage of heavy goods
Research Institutes	Accompany City development	
Home Owners	Increase of house value; Higher attractiveness of quarter	Gentrification; Loss of identity; Change of resident types

Animals	Interests/Wishes	Concerns/Objections
Birds	Food sources; Nesting spaces; water;	Safety to sleep; Protection from predators, humans;
Bees		
Bugs		
Rodents		
Lizards		

City Administration	Interests/Wishes	Concerns/Objections
City Planners	Improve city landscape; Generate tax revenue;	Development delays
Politicians	Win public favor; Prominent public sponsorship;	Negative Perception; Backlash; Delays
EU / Italy	Development to the benefit of all; Sustainable City Development; Renaturation; Climate Change Mitigation	Divergence of funds; Corruption

Plants	Interests/Wishes	Concerns/Objections
Plants	Water; Nutrients; Conditions close to natural habitat	Invasive foreign species;

Potential engagement strategies for involving stakeholders in Nature-based Solutions (NbS) initiatives in cities:

1. Surveys, interviews or focus groups can be useful to gather input and feedback from stakeholders. Concerns and interests can be addressed more effectively.
2. Workshops might help residents in order to understand the benefits of Nature based Solutions and the need of the change of urban areas in Genua.
3. Local businesses, NGOs and the city administration should align and work together.
4. Communication campaigns should raise awareness. It is important to use various channels such as social media, websites, brochures, and community events to disseminate information and engage citizens.
5. Successful projects in different cities can also be useful.

Participation Process in the planning and building phase:

Involving the people that live and work in Via Casaregis in the planning and design process is key. Being part of developing your own neighborhood, strengthens the connections to the new public space and enhances the responsibility for the new design.

With our proposed 3 stages of development (2023-2024, 2024-2027, 2027-2030). We suggest implementing workshops at the beginning and the end of each phase. At the first workshop of each phase, the population and workers of the site will get the chance to suggest their ideas for the space with the guidance of city planners and experts. In this stage it is really important to include many layers of the population, from men to women, old to young, families etc., so a broad participation can take place.

The results of this event can then be implemented in the official planning and design process, carried out by professionals. The second stage of the workshop will then be held off at the end of the phase, where the results of the phase will be presented to the public, with a Q&A, feedback and how to proceed further in the upcoming stages.

Business Model Canvas

Key Activities: - redesign street layout - plant local flora - integrate NBS - install recreation spaces & furniture - build up network with citizens, school,	Key Resources - city administration - politicians - EU funding - building materials - plants - local construction workers ...	Value proposition - improve Quality of Stay - increase activity - attract local shops & foster business - improve health of citizens - habitat for local plants and animals - increase property value - save maintenance & adaptation costs	Key Partners - EU (funding) - City of Genova (funding, planning) - Politicians (sponsoring) - construction companies - citizens	Key Beneficiaries - local residents - animals - local businesses - all city residents - tourists
Cost Structure - 40% direct Government funding - 60% EU LIFE funding program for Climate Adaptation - collaboration with real estate developers			Cost Reduction - heat reduction for residents & public buildings - lower maintenance cost through traffic load reduction - less heat-related illnesses	Capturing Value - higher attractiveness & revenues for businesses on street - higher economic / real estate value of area - lower health costs, ...
Governance - execution through city administration & city planners - reporting to local democratic structures - EU oversight				

Some aspects will be described here in more detail. The other aspects are described in detail in other places in the report:

Value Proposition: The project delivers value for a large variety of stakeholders of the street. Most profit the local residents living in the apartments close to Via Casaregis. With Greenova, a local recreation area is created where people can go to rest, meet friends, or enjoy the evening. Thanks to the implementation of NbS and traffic calming, they additionally enjoy a reduced heat stress in their apartment, better air quality and higher pedestrian safety. The residents of the whole city also profit from a recreation space close to the city center. This will increase the level of activity within the street strongly. Higher frequentation makes the street more attractive for existing and interested business owners looking to set up shop. Currently, the street is sparsely populated with tyre shops, a pharmacy and more. A NbS-based street layout would allow cafes, clothing shops and other leisure shops to set up and serve the people enjoying their free time there. The higher quality of stay will also help attract tourists to stay longer in the city when visiting. This in total will increase the tax revenue for the city from this quarter and help boost the local economy.

Additionally, the local plants and animals find a space to flourish, giving them a safe habitat to live. Lastly, the city of Genova will be viewed positively as a city that follows the most modern principles of urban planning in Europe. Local universities will find a space to evaluate the principles and conduct leading research to further urban design in Europe.

Key Partners: For a successful project execution, multiple roles must be filled. Monetary funding should come from the EU through its LIFE funding program and the City of Genova. It will also be responsible through its urban planning department in executing the project in time. Help for resources can come from politicians who provide sponsorship to the project. The positive effect of the street redesign will in turn help them gain popularity with the people. Lastly, local construction companies are required to execute the construction phase.

Governance: The project will be executed by the city administration and urban planning department of Genova. To ensure adherence to the principles layed out in this proposal and

to realize the value, governance and oversight should be provided by local politicians who approve and oversee the planning and execution process. Additionally, the EU will monitor and provide assistance to ensure the redesign helps mitigate the effects of climate change through its funding program.

Cost Reduction: Implementing NbS will help save cooling costs for both citizens and the city in nearby buildings. Additionally, the reduced heat stress will reduce the health impacts on citizens such as heat stroke. Lastly, as the amount of traffic and looking for parking is reduced, the load on the asphalt and street is also greatly reduced, leading to lower maintenance costs in the long term. The NbS itself will be designed to be mostly self-sustaining, requiring minimal care.

Capturing Value: Directly, value will be captured through considerably higher economic activity in the long term. Attracting (new) local businesses and helping the existing ones both increases economic value for the citizens as well as boost tax revenue for the city. Real estate developers gain from the raised economic value of nearby properties and should therefore also be approached to support the development of the street by contributing resources.

Indirectly, the city will profit from a lower stress on its health care system thanks to better air quality and reduced heat stress, especially in the summer. Through traffic calming and improving the control over traffic, the number of accidents should also be reduced.

Funding Plan



Estimating the total cost of the project depends on the details of the execution and is up to the city. The baseline for implementing Nature-based solutions, redesigning the street layout to provide pedestrian space, and implementing recreation areas will be roughly 1.5 million Euros. The street design could be further upgraded with special, permeable pavement and other elements that further increase the attractiveness and value of the street which could increase the total cost to (very roughly) 3 million Euros.

In our financial plan, we want to propose a system to fund the execution whilst keeping the burden on the city budget minimal and maximizing the return on investment for the city of Genova.

The EU generously funds urban development projects that both renature existing areas and help cities adapt to climate change. One such program is the [EU LIFE funding program for climate adaptation](#) (ID: LIFE-2023-SAP-CLIMA-CCA). It is part of the EU LIFE program for Climate Action and is open for application until September 2023. It covers 60% of the total cost for urban development projects that (amongst others) provide...

- Adaptation policy development, and adaptation strategies and plans
- State-of-the art tools and solutions for adaptation
- Nature-based solutions in the management of land, forests, coasts and marine areas

This would help reduce the contribution of the Comune di Genova to 40% of the total cost including planning at the city administration.

Additionally, the project should be connected with Genova's existing efforts to attract real estate developers to its city in the [Genova Meravigliosa initiative](#). Developing the public space around the city's buildings is in the common interest of both. Their interest could therefore be leveraged to provide expertise and resources to the development of the street and overall area. Currently, some shops around the street stand empty and do not generate revenue for their owners.

With both levers, the city can minimize the burden on its budget whilst executing the project to an extremely high standard, generating maximum value.