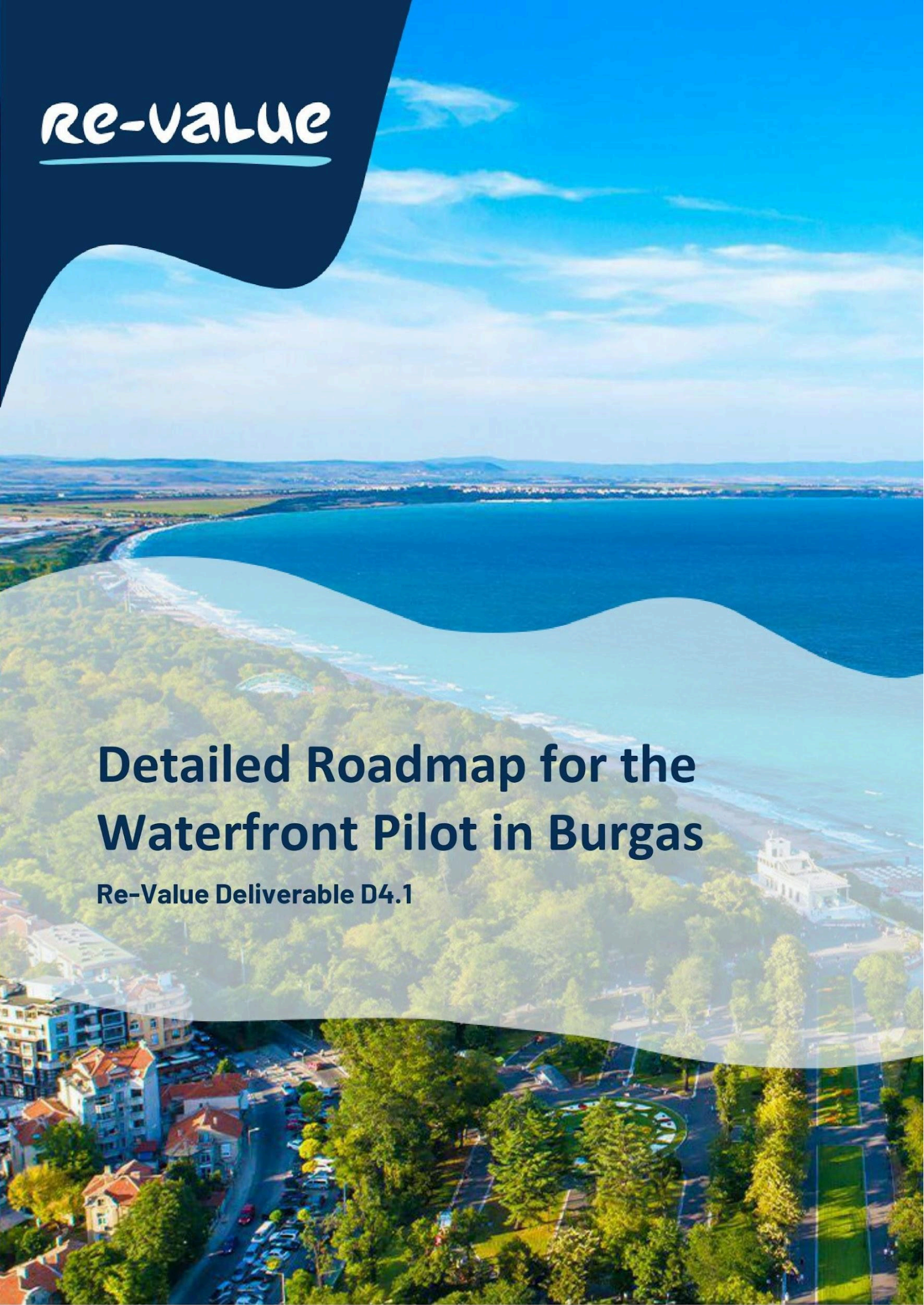


**re-value**

# Detailed Roadmap for the Waterfront Pilot in Burgas

Re-Value Deliverable D4.1



## Report information

**Deliverable:** D4.1: Detailed Roadmap for the Waterfront Pilot in Burgas

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## Executive Summary

The vision for the development of Burgas Municipality for the period 2021-2027 is centered around making Burgas an attractive place for both living and business, effectively harnessing its potential for balanced and sustainable integrated development. The vision emphasizes preserving the local identity while ensuring access to modern, resource-efficient, climate-adaptive, and competitive economic opportunities. By prioritizing the formation of viable and dynamically developing territorial communities and places, Burgas aims to become a hub of innovation and prosperity. This strategic approach involves investing in the enhancement of urban spaces, connectivity between places and territories, and the preservation of a quality natural environment and green infrastructure. Through these concerted efforts, Burgas seeks to foster an intelligent economic growth trajectory, coupled with spatial connectivity and improved access to essential services. Ultimately, the vision for Burgas is to create a thriving and resilient municipality, offering its residents and businesses a high quality of life and conducive environment for sustainable growth and development.

The Sarafovo quarter, situated along the picturesque Black Sea coast in the eastern part of Burgas, presents a promising area for urban development. With its proximity to major transportation routes like Republican Road I-9 and Burgas Airport, as well as its approximate population of 3,500 people, Sarafovo serves as a vital hub with significant growth potential.

However, several key challenges have been identified within the area, including a high proportion of seasonal residences lying dormant during colder months, a lack of green spaces for public use along the coastal strip, and insufficient tree vegetation. Moreover, the quarter faces issues related to noise and potential dust pollution from its proximity to the airport and major road, as well as marshy soils hindering construction efforts without proper soil consolidation measures. Its existing railway infrastructure currently remains inactive. Active coastal erosion, landslide events, and sedimentation in the coastal aquatic zone (with incipient eutrophication) are circumstances that make an up-to-date analysis of geographical conditions a fundamental necessity in re-evaluating spatial planning and development plans.

Despite these challenges, Sarafovo quarter boasts several advantages that can be leveraged to enhance its urban space. Notably, its unique geographical position facilitates a land connection between the Black Sea and Lake Atanasovsko, along with Sarafovo Port and surrounding residential areas. The terrain's elevation differences offer diverse landscapes, scenic viewpoints, and opportunities for wildlife observation. Furthermore, the presence of nearby salt extraction facilities, complete with a museum and educational center, adds to the area's cultural and commercial appeal.

Moving forward, strategies focusing on mixed-use buildings, combining residential and public service functions, could help ensure continuous liveliness within the quarter. By addressing the identified challenges while capitalizing on its inherent advantages, Sarafovo quarter has the potential to emerge as a vibrant and sustainable urban space, enriching the lives of its residents and visitors alike.

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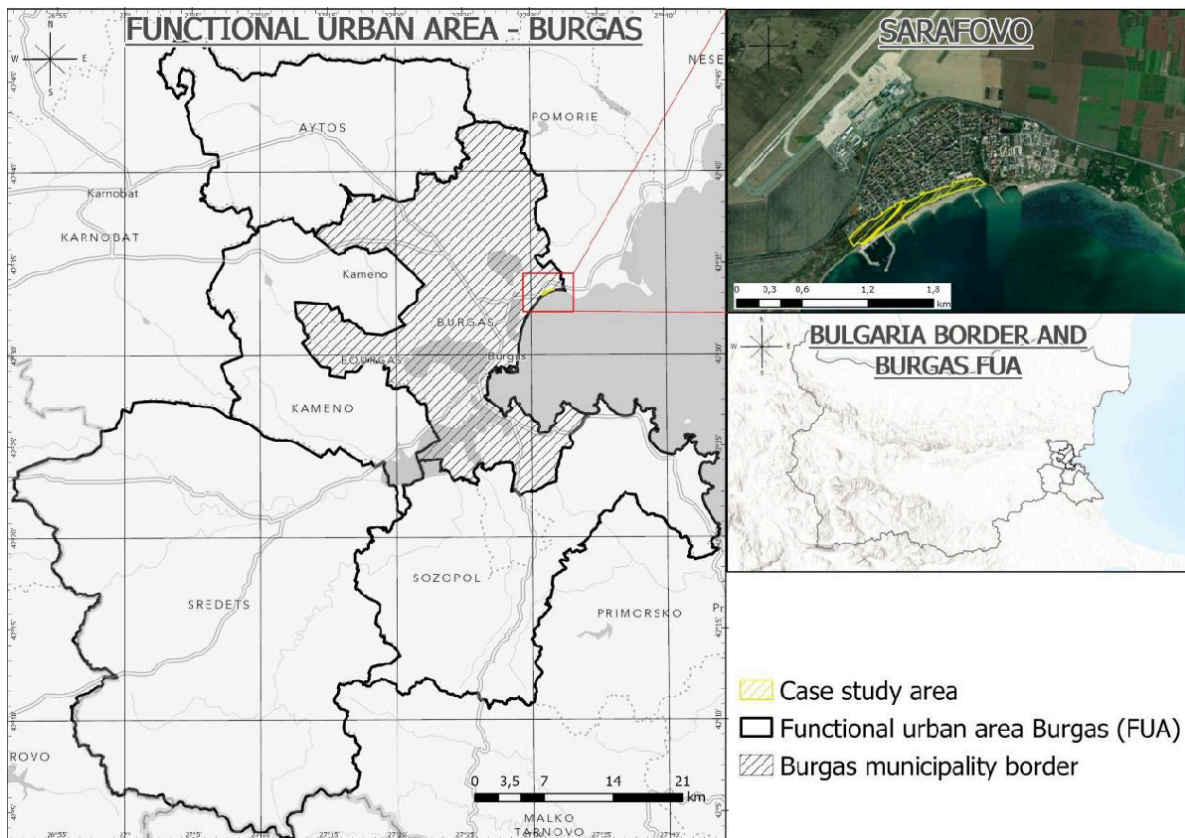
## Phase 1: Context and Analyses

The "Re-Value Waterfront Pilot" aims to support the processes of re-evaluating coastal areas by considering their characteristics, needs, and objectives, while selecting long-term, harmonious, sustainable, and nature-based solutions. The achievement of collaboration among administrations, businesses, educational institutions, non-governmental organizations, and communities at local, national, and international levels are encouraged.

The first phase of the project encompasses the context of the region and the city, as well as analyses of the selected pilot area, leading to conclusions and guidelines for subsequent planning and design processes. The main challenges, opportunities for overcoming them, and the foundation for future interventions aimed at supporting the preservation of the natural environment and harmonious spatial and functional development have been identified.

### 1.1. Re-Value Waterfront Pilot Overview

The project focuses on the coastline of Burgas city, specifically the Sarafovo quarter. Essentially, the city serves as a regional center for the Southern Black Sea, a provincial center, and the core of the functional urban area. It is characterized by high social and economic significance and an exceptionally rich variety of geographical structures with the potential and current need for transformation.



**Fig. 1. Functional Urban Area – Burgas**

# RE-VALUE



**Fig. 2. Burgas, 2024, Source: Municipality of Burgas**

As a leading hub, Burgas has the opportunity to address important topics of contemporary strategic and spatial urban planning, optimize resource use, and enhance the relationship with the natural environment and its components, thereby helping to raise awareness and inspire other cities to adapt solutions.

In the following sections, the regional and geographical characteristics of Burgas will be examined, as well as the main features of the pilot area in the Sarafovo quarter that are valuable for the project.



**Fig. 3. Sarafovo Waterfront Area, 2024, Source: Municipality of Burgas**



## 1.2. Regional Context

Burgas is the fourth largest city in Bulgaria (253.6 km<sup>2</sup>). It is located on the Southern Black Sea coast of the country. The city is the center of the Functional Urban Area of Burgas (FUA, BG004L2) with a total area of 2947 km<sup>2</sup> or 2.7% of the territory of Bulgaria. The city is the administrative center of Burgas Province (part of the Southeast Planning Region, NUTS 2) and of Burgas Municipality. The territorial scope of Burgas Municipality covers 488.6 km<sup>2</sup> including 12 settlements.

In spatial terms, despite the predominant flat nature of the relief, the territory of the municipality is extremely complex, with a high degree of fragmentation of its parts, mainly due to the density of extensive water bodies - the Atanasovsko, Vaya, and Mandrensko lakes, as well as the Black Sea waters. This complex geography has determined the development and configuration of the settlement network and the model of its socio-economic development.

The structure of Burgas city includes 7 residential complexes and 2 new ones under development, as well as 11 quarters, among which the Sarafovo quarter, whose coastal area is of special interest in the context of the current project. On the other hand, the geographical location of the municipality within the national space, the direct contact with the

Black Sea waters through Burgas Bay, and its position in relation to the main communication transport corridors and urban centers are primarily a comparative advantage, with determining significance for its spatial and functional-economic development.

The main economic and demographic potential of the municipality and the region is concentrated in Burgas city, and its influence is dominant in the entire Southeastern region (NUTS 2). The population of Burgas city is 188,242 people (National Statistical Institute, as of December 31, 2022), which constitutes 96.5% of all residents in the municipality and 73% of the population of the Burgas functional urban area. The average population density in the city is 742 people/km<sup>2</sup>.

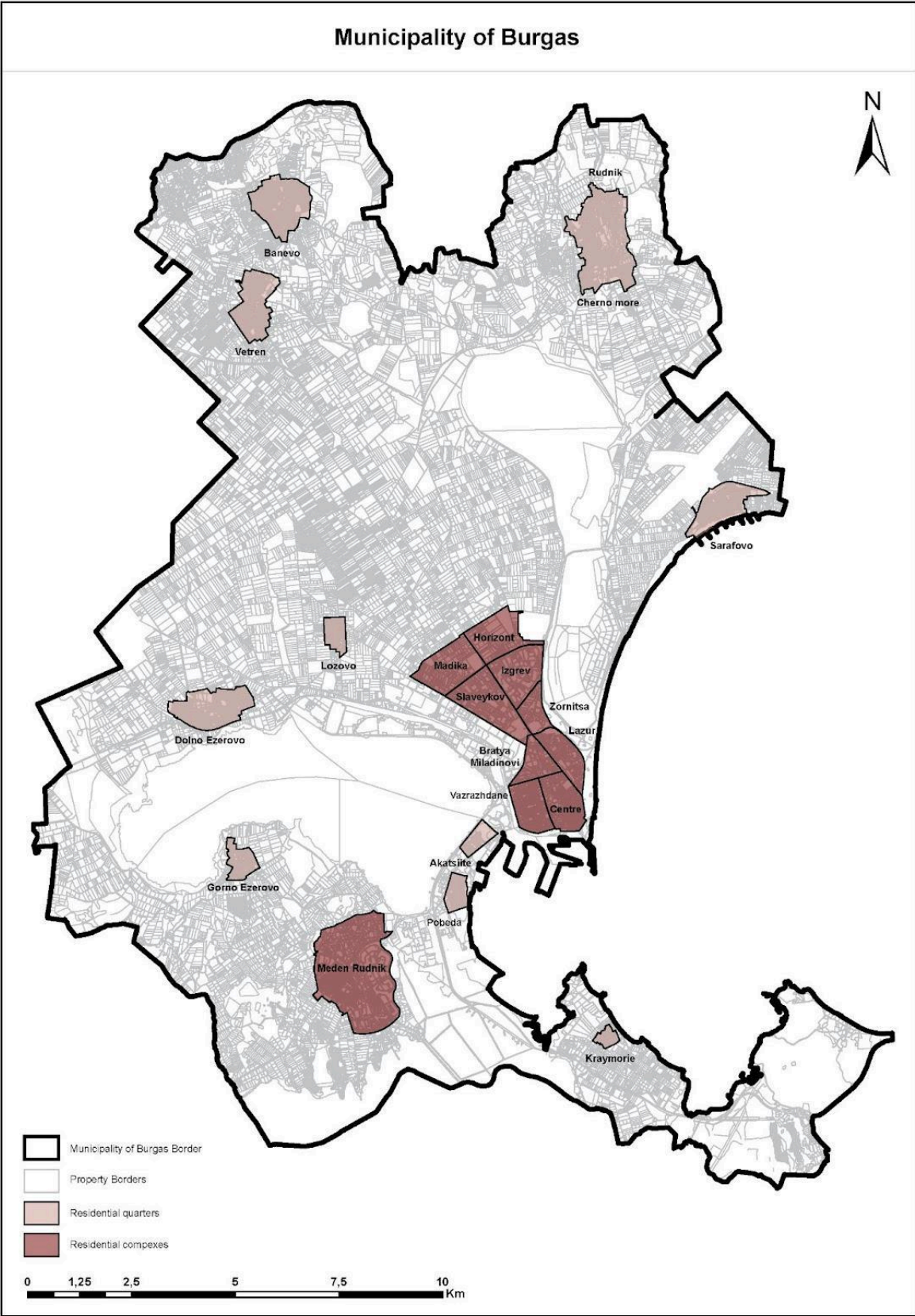


Fig. 4. Structure of Burgas City, 2024

## 1.3. Nature-Geographical Characteristics

The territory of Burgas falls within the Black Sea climatic region of the country, characterized by mild and humid winters and hot, but relatively dry and sunny summers. The average annual temperature is 12.7°C. The lowest average monthly temperature is recorded in January (1.8°C), while the highest average monthly temperatures are recorded in July and August (23.1°C and 23.0°C respectively). The average annual temperature amplitude is 21.3°C. The average annual precipitation in Burgas is 553.7 mm, with the maximum in November and the minimum in August.



*Fig. 5. City of Burgas, 2024, Source: Municipality of Burgas*

## 1.4. Main Characteristics of the Pilot Zone

The pilot zone of Sarafovo quarter is located in the eastern part of Burgas, along the Black Sea coast. The distance from the quarter to the city center is approximately 10 km. To the north of it runs the Republican Road I-9, representing a major transportation route. Burgas Airport for passenger transport is located in close proximity. Both objects serve as spatial constraints on future development. The approximate population of the quarter is 3,500 people. The pilot territory encompasses part of the Black Sea coast (land plots with identifiers 07079.820.1253 and 07079.820.1251) in Burgas Bay near Sarafovo quarter. **The choice of territory is based on the intervention possibilities regarding the main purpose of the land plots, protected areas and zones, type of ownership, mode of permanent use, type of green areas, accessibility to green areas, identified needs, and potentials.**



# Case - Study Area



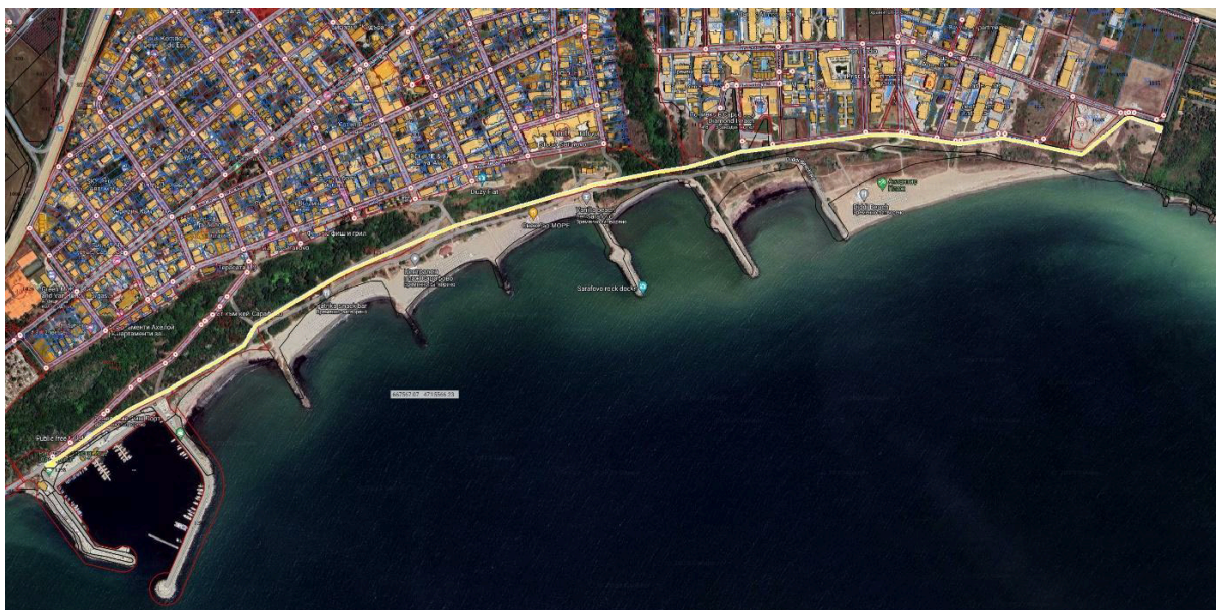


**The main issues identified here include:**

1. High proportion of seasonal residences remaining unused during the cold half of the year.
2. Lack of green areas with broad public use along the coastal strip of Sarafovo quarter.
3. Insufficient tree vegetation.
4. Proximity to Burgas Airport and Republican Road I-9 leading to high levels of noise pollution and potential dust pollution.
5. The terrain is characterised by marshy soils, which prevent construction without measures for soil consolidation and stabilisation.
6. Absence of places for prolonged stays – conditions are created only for transit passage.
7. Presence of railway infrastructure, but it is currently not operational.

At the same time, there are **numerous advantages** to the territory that can be utilised for the enhancement of urban space:

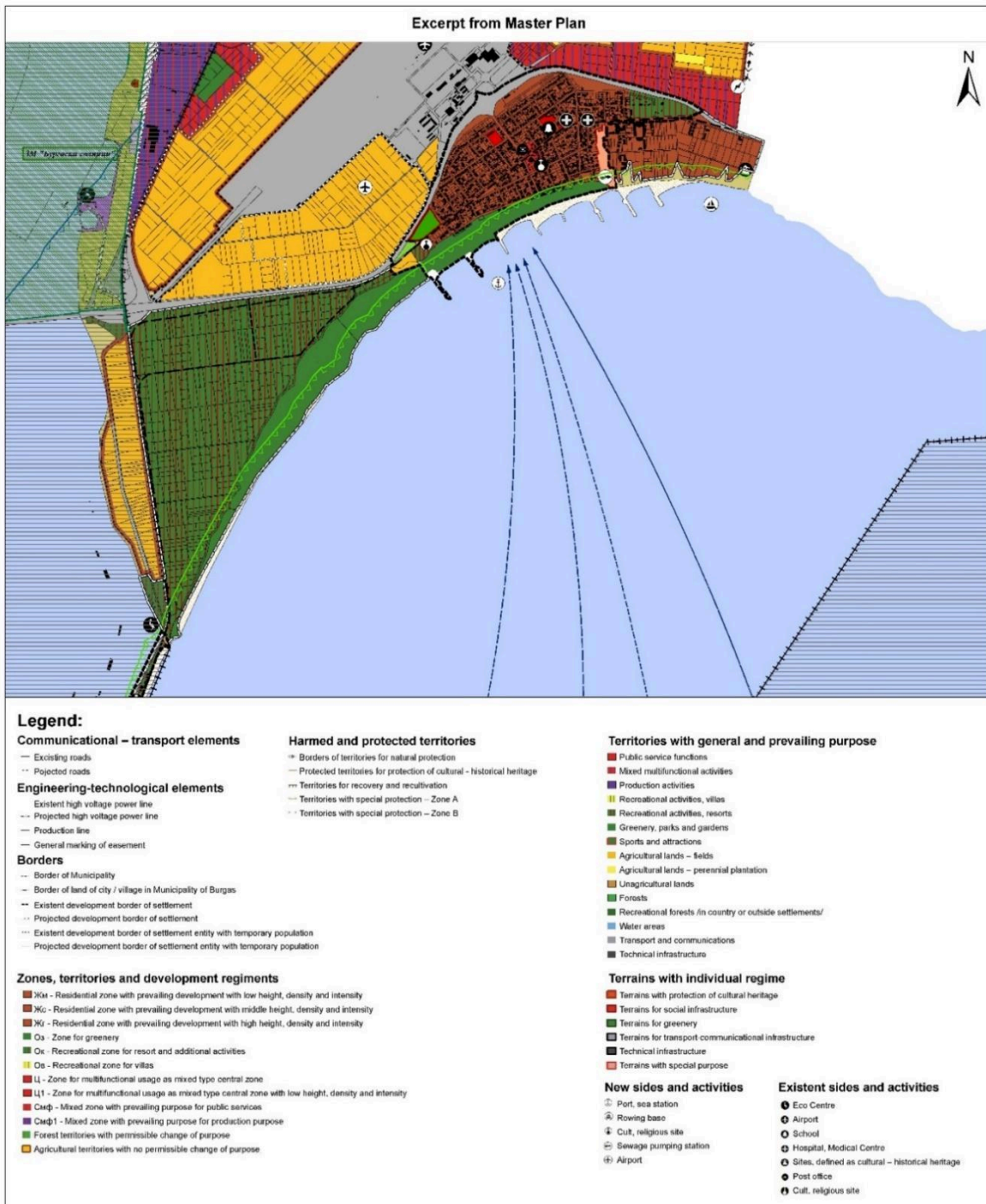
1. Existence of a land connection between two large water bodies – the Black Sea and Lake Atanasovsko, Sarafovo Port, and residential areas.
2. The terrain features elevation differences, offering a variety of landscapes, opportunities for views, and wildlife observation.
3. Salt extraction takes place nearby – there is an object with a museum, educational, and commercial orientation.
4. Possibility of ensuring continuous liveliness through functionally mixed buildings (residential occupancy and public service on the ground floors).



**Fig. 6. Aquatory of Sarafovo, Source: GIS of Municipality of Burgas, Administrative Module**

## 1.5. The primary purpose of the properties

The territorial organisation of Sarafovo quarter is regulated through the Master Plan (Fig.7.). It presents the main purpose of the land plots and the prospects for spatial and socio-economic development. According to the plan, the coastal land plots are designated for landscaping. The opportunities for connecting coastal landscaping with landscaping within and outside urbanised areas are limited. This increases the significance of coastal landscaping for shaping the landscape and overall connection with the natural environment.



**Fig. 7. Master plan of Municipality of Burgas**

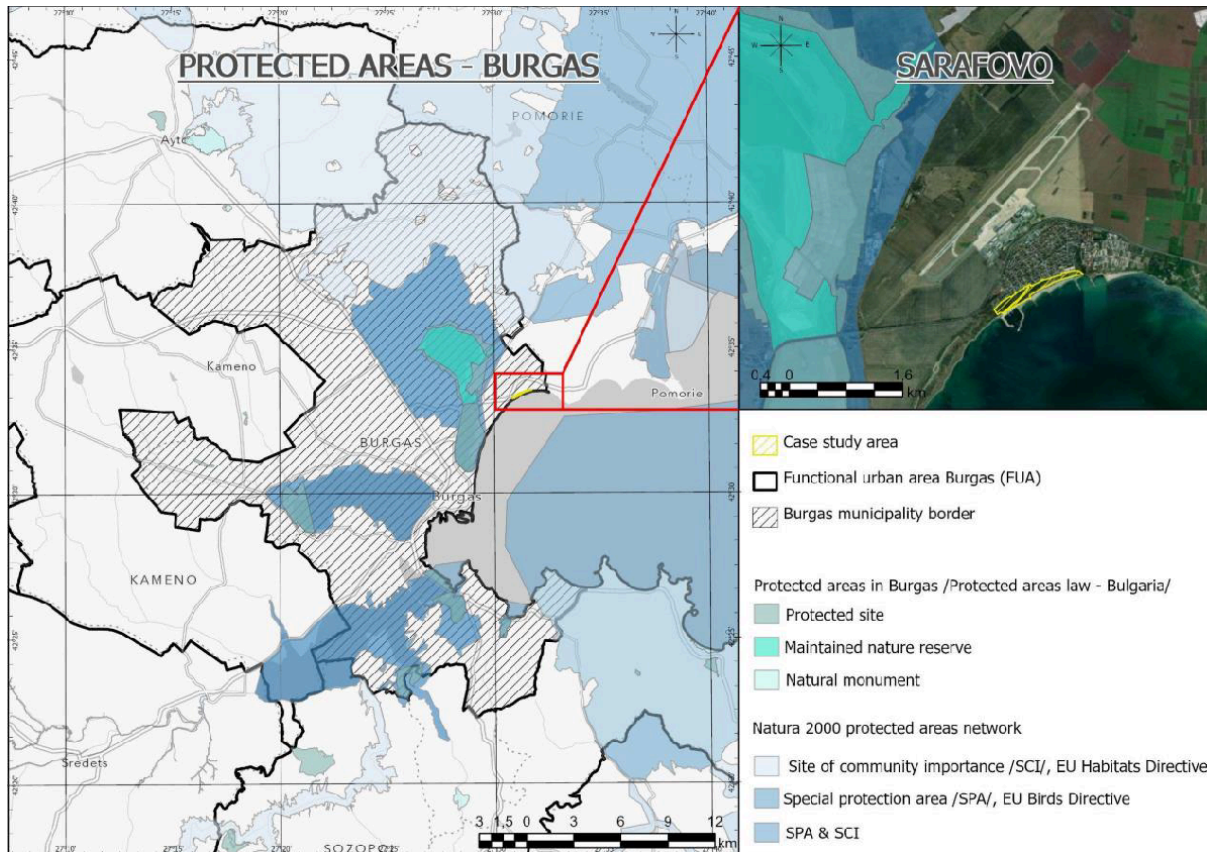
## 1.6. Protected Areas and Zones

The geographical location and natural features of Burgas Municipality, the mild climate, and the presence of extensive water bodies and open spaces around them favor the presence of rich biological diversity. Habitats are diverse, including meadows, marshes, freshwater lakes, sand dunes, drylands, forests, and other habitats. At present, rare, endangered, and endemic species are found here, many of which have national, European, and global significance. The importance of habitats, plant, and animal species is recognized through their inclusion in protected areas (9 objects) and protected zones of the "Natura 2000" network (8 objects). They cover a substantial part of the municipality's territory and Burgas city. It should be noted that **Wetlands and Coastal areas are among the most vulnerable to natural changes and anthropogenic interventions. The selected pilot territory does not fall within the boundaries of protected areas and zones, but numerous protected objects are located nearby. Their conservation regimes do not hinder the development of the project. It may have a positive impact by preserving natural habitats and biological diversity in an authentic manner.**









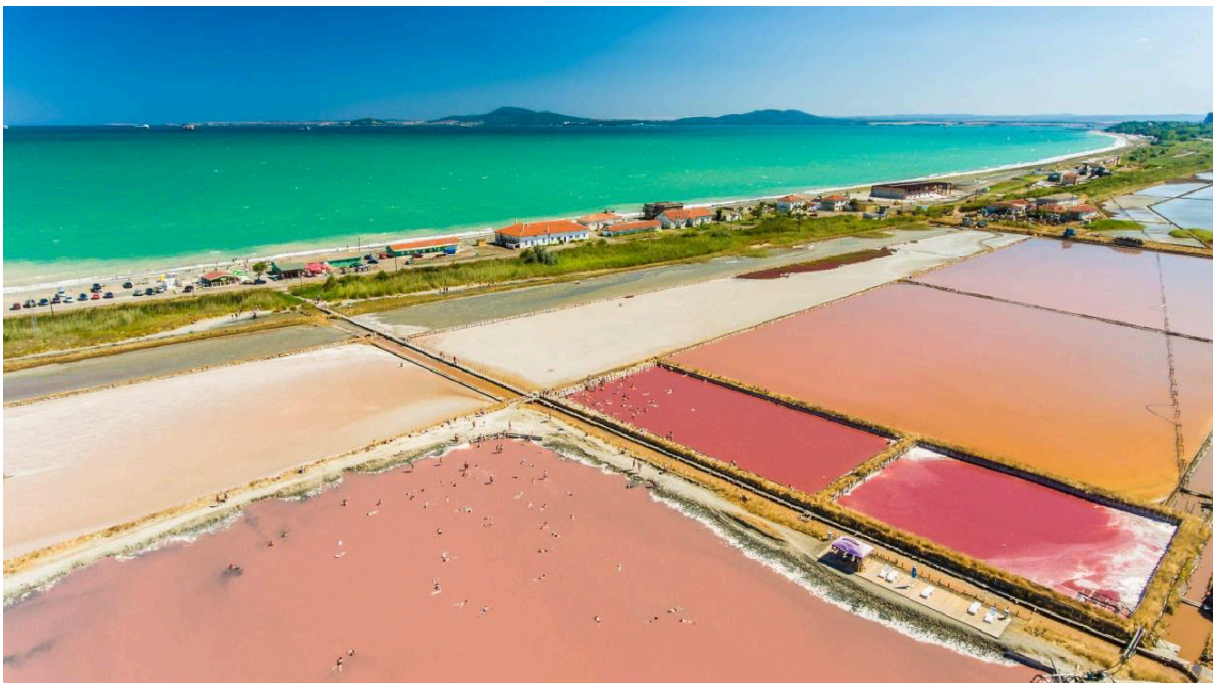
**Fig. 8. Protected areas - Burgas**

The spatial proximity to the **Atanasovsko Lake Protected Area** is of significant importance to the project territory. The northern part of the lake is a protected area with the status of a maintained reserve (IV, IUCN), while the southern part is designated as a protected locality "**Burgas Saltworks**" (VI, IUCN). **The lake serves as a crucial migratory route for birds in Europe, known as Via Pontica, making it an essential habitat for avian species.** The lake's waters are designated as a Natura 2000 site under both bird and habitat directives, as well as an internationally significant wetland area (Ramsar site) and an Important Bird Area (BirdLife International).

Atanasovsko Lake is characterized by hypersalinity, which creates the conditions for the formation of the rarest type of ecosystem in Bulgaria and one of the rarest wetland zones in the Black Sea biogeographic region. The water surface is divided into basins of varying sizes with the help of dikes and embankments, and its depth is only about 30 cm. The southern part has been transformed into salt pans since 1906, with salt extraction carried out using traditional methods that are environmentally friendly and considerate of the reserve's inhabitants.



**Fig. 9. Salt Lakes of Burgas, South**



**Fig. 10. Salt Lakes of Burgas, North**

The diverse habitats attract numerous bird species, making the coastal lagoon the richest bird site in Bulgaria. In the area, over 315 bird species out of nearly 450 found in our country

have been observed. During the autumn migration, approximately 240,000 white storks, over 30,000 pelicans, and about 60,000 birds of prey can be observed. In the whole of Europe, this area boasts the largest concentration of migrating pelicans, herons, night herons, and the second-largest after the Bosphorus for passing small eagles.

**The conceptual solution, in all its stages of implementation of the pilot project, can serve a supporting function for the Protected Area/Maintained Reserve/ Atanasovsko Lake by preserving and showcasing natural habitats, improving accessibility, and raising awareness among the population about the natural riches.**

## 1.7. Ownership Type

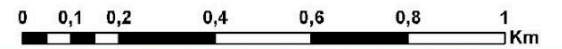
The land plots along the coastline have several types of ownership. According to legislation, the beach strips represent exclusive state property and are under protected status - with no possibility of changing their purpose. The properties selected for the pilot territory are municipally owned. In close proximity, there are other properties designated for landscaping, but intervention possibilities are limited as they are either state public or state private properties.



# Types of property



-  Property Borders
-  Municipal Public Property
-  Municipal Private Property
-  Exclusive State Property
-  State Public Property
-  State Private Property

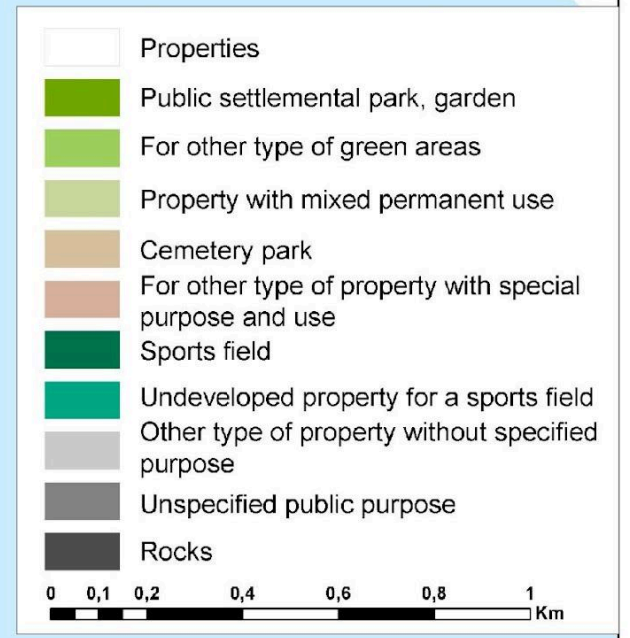




## 1.8. The way the land plots are permanently used

This term indicates the actual utilization of the property at the present moment. **The properties selected for the pilot territory are designated as "Public Settlemental Park, Garden"**. Nearby properties to the east are designated as "Other type of property with special purpose and use" due to the presence of forests, "Without defined economic purpose" and "Rocks." This means that the possibilities for interventions in them are limited, and further research is needed regarding approaches to landscaping. To the southwest, there are properties designated as "Cemetery Park" /existing/ and "With mixed mode of permanent use." For the latter, there are opportunities for future interventions after the transfer of ownership, and currently, activities for coastal protection and development of bicycle access are underway.

# Permanent use of properties



## 1.9. Types of green spaces

Green spaces are defined according to the current national legislation - the Territorial Planning Act - for wide public use (parks, gardens, and street greening), for limited public use (at public service facilities), and with specific purposes. In Sarafovo quarter, there are 2 urban gardens with playgrounds and 1 green wedge. **The main opportunity to meet the population's needs is the coastline, which is also a space of significant interest.** For limited public use, there is a built and functioning sports field in the western part with designated space for future expansion. Another area with a specific purpose is the cemetery park. In the structure of the quarter, several land plots are observed, which are currently underutilized. Making decisions about them could allow for a more comprehensive and evenly distributed development of the green system, and concerning the properties to the north, this could occur simultaneously with measures to protect against pollution and noise from Republican Road I- 9 and Sarafovo Airport.

# Types of Green Areas



	Properties
	Limited public access
	Unlimited public access
	Unspecified purpose
	Special purpose

0 0,1 0,2 0,4 0,6 0,8 1 Km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS



## 1.10. Accessibility to green areas and connectivity

The specific study of the area is based on the recommendation of the World Health Organization for the presence of green spaces for wide public service (such as parks, gardens) with an area of at least 5000 square meters within a linear distance of 300 meters from home.

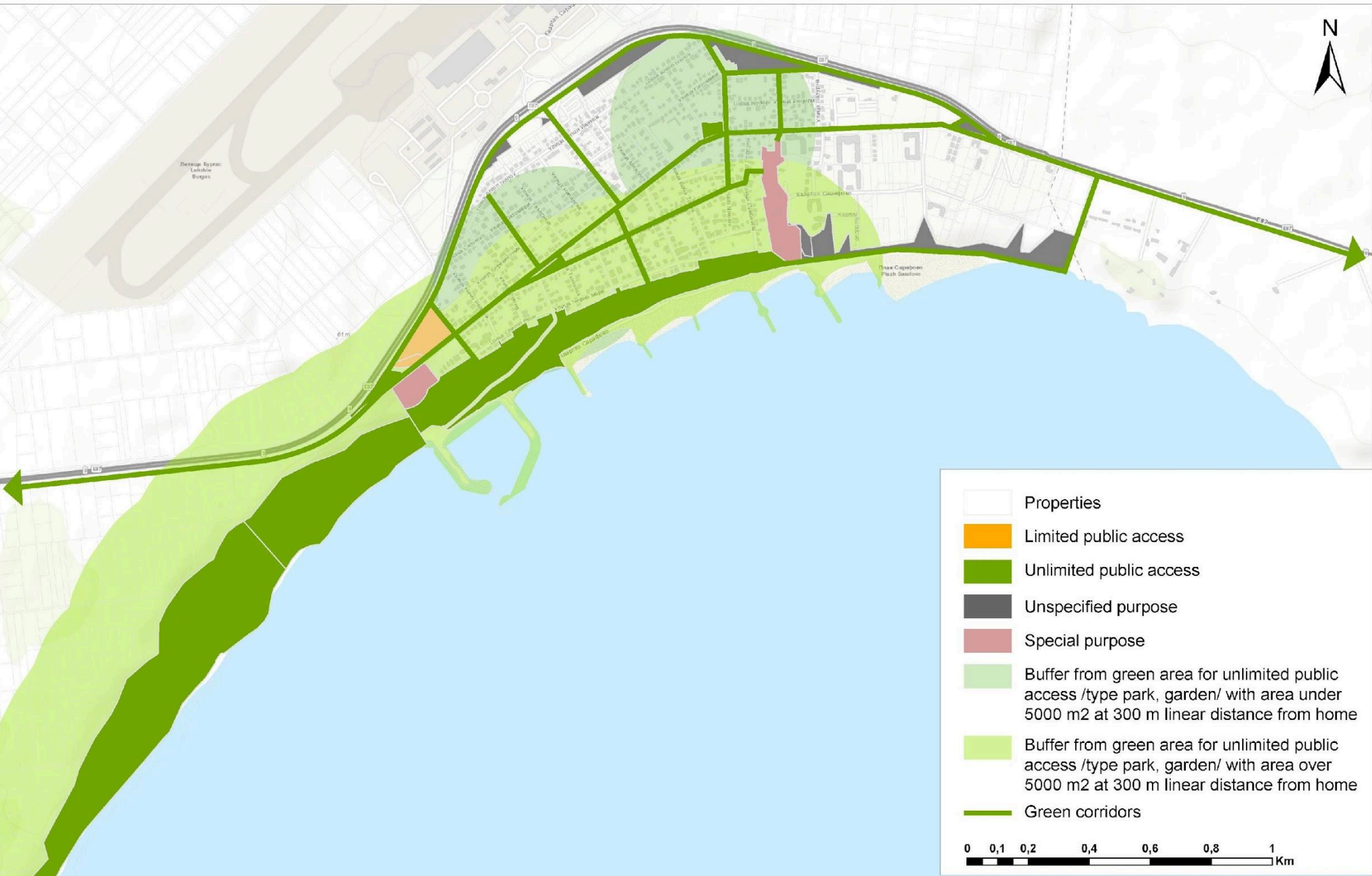
**In Sarafovo quarter, there is an overall uneven distribution of green areas and evident insufficiency concerning the population.** The two urban gardens have smaller areas than recommended. Given the density of development and the structural development of the settlement as a village (before its incorporation as a district of Burgas), **the possibilities for allocating green spaces for wide public access in urbanized areas are severely limited, including for linear street greening.** Some of the wider streets have greening, which can function as green corridors connecting coastal greening with inland areas. This function can also be attributed to the land plot with a special purpose (forest). Its structure does not imply significant interventions due to its proximity to yards, but an attractive bridge can be built. The municipality maintains a geographic information system that provides more information about the green system in Burgas<sup>1</sup>.









**Development and implementation of a Coastal Park concept will contribute to improving access to green areas for the residents and visitors of Sarafovo quarter.** However, in spatial terms, they do not provide a comprehensive solution, and in the future, other solutions should be sought for the establishment of small urban gardens in connection with green corridors to support their functionality and effectiveness.

---

<sup>1</sup> Green System of Burgas: <https://greensystem.smartburgas.eu/>

# Accessibility of Green Areas. Connectivity



-  Properties
-  Limited public access
-  Unlimited public access
-  Unspecified purpose
-  Special purpose
-  Buffer from green area for unlimited public access /type park, garden/ with area under 5000 m2 at 300 m linear distance from home
-  Buffer from green area for unlimited public access /type park, garden/ with area over 5000 m2 at 300 m linear distance from home
-  Green corridors

0 0,1 0,2 0,4 0,6 0,8 1 Km

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS

## 1.11. Geological risk

### 1.11.1. Geological Structure

The geological development of Bulgaria's Black Sea coast is closely related to the young morphotectonic evolution of the Black Sea basin. Since the end of the Paleogene and throughout the Neogene and Quaternary periods, the subsidence of the Black Sea depression has occurred along a system of diverse faults. This process also affects the neighboring continental morphostructures, resulting in the formation of local subsidence or the creation of faults parallel to the contours of the Black Sea basin.

The composition of the earth's masses is diverse, including Senonian limestones, marls, and volcanics, as well as Eocene, Oligocene, Sarmatian, and Pliocene sediments, overlain by Quaternary and modern deposits. The selected project area is characterized by Quaternary deposits and Neogene sediments. The lowest part of the section consists of gravels. In the upper layers, there is an irregular alternation of sands, clays, and limestones. Frequent transitions between different lithological varieties in both horizontal and vertical directions are typical. Geomorphological forms, formed as a result of geodynamic processes, are observed in the lower part of the coast. **Given the age of the bedrock, these formations are unstable, unconsolidated, and there are conditions for a wide range of geological risk.**

### 1.11.2. Analysis, Assessment, and Mapping of Geological Risk Project

The project developed by the Ministry of Regional Development and Public Works of the Republic of Bulgaria, provides information on the presence of **abrasion, landslides, and swelling of construction soils in the selected project area in the Sarafovo quarter**. There is also **liquefaction of weak soils in the western and eastern directions**. According to the project, an assessment of geological risk has been developed based on the presence of the main influencing factors. The assessment is categorized from Class I to Class V.

### 1.11.3. Abrasion

Abrasion is a process of mechanical destruction of the bedrock along the coast and the underwater slope due to the action of sea waves and breaking surf. It encompasses the shoreline and coastal areas.

The intensity and activity of these processes depend on the geological structure and physicomaterial properties, the exposure of the coast, fluctuations in sea level, the quantity of sediment, the slope of the underwater coastal incline, the height of the cliff, and wave factors such as the strength and direction of sea waves and currents; non-wave factors include erosion from surface waters, slope deformations, and groundwater saturation.

In the Sarafovo quarter, the processes are predominantly abrasion-denudational, while in the southwest and northeast directions, they are accumulative. Complicated conditions and



accelerated process rates are observed where mechanical abrasion interacts with landslides at the contact zone between the sea and land. The susceptibility of the coast in the Sarafovo quarter to abrasion and landslide effects is further increased due to the geological structure composed of weakly consolidated Neogene sediments.

The abrasion class in the project area is III around the Fisherman's Port "Sarafovo," II along the eastern beach strip, and I at the breakwaters.

To mitigate the impact of abrasion processes along the coast, protective structures—groynes—have been built to reduce wave strength. In addition, they contribute to sand accumulation and increase the width of the beach.

#### **1.11.4. Landslides**

Landslides are associated with the movement of earth masses along various depths of sliding surfaces. The main factors contributing to their occurrence include an unstable geological structure, slow tectonic vertical movements, earthquakes, abrasion, erosion, precipitation, improper surface drainage, fluctuations in groundwater levels, and anthropogenic activities.

Within the project area, two landslides have been registered—one potential and one stabilized. In the western direction, near the Kiosheto area, there are two additional stabilized landslides, while in the eastern direction, near the Lahana area (within the Pomorie municipality), there are 11 potential landslides. The average depth of these processes exceeds 15 meters below the ground level. Large landslide complexes are prone to multiple activations. Once experiencing landslide deformation, the rocks and soils exhibit reduced shear resistance.

The landslide class in the project area is III, while in the western direction near Kiosheto, it is IV, and in the eastern direction near Lahana, it is classified as III and IV.

Measures to manage landslide processes along the coast include limiting anthropogenic activities in their upper parts (such as deep construction excavations, road construction, building, dynamic impacts, and others), draining atmospheric precipitation, and addressing issues with the associated drainage systems, as well as constructing protective structures and other interventions.

Currently, activities have been carried out in the project area to collect and divert rainwater from higher elevations. This helps prevent water runoff and the activation of landslide processes. Numerous violations are observed, such as narrowing of drainage channels, allowing vegetation growth, filling with debris, permanent coverage of drainage systems, and encroachment through construction. In the western area near Kiosheto, activities for permanent stabilization have been conducted.

#### **1.11.5. Swelling**

These processes are characterized by the expansion and contraction of soil volume depending on the amount of water present. In natural conditions, these two interrelated processes typically occur sequentially and cyclically.

Swelling soils are primarily black and marshy clays. They surface and, during their cyclical wetting and drying, change their volume, causing shallowly founded buildings and structures to crack and deform.

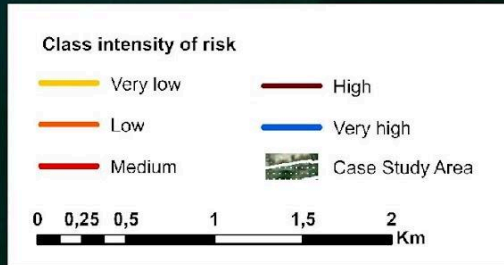
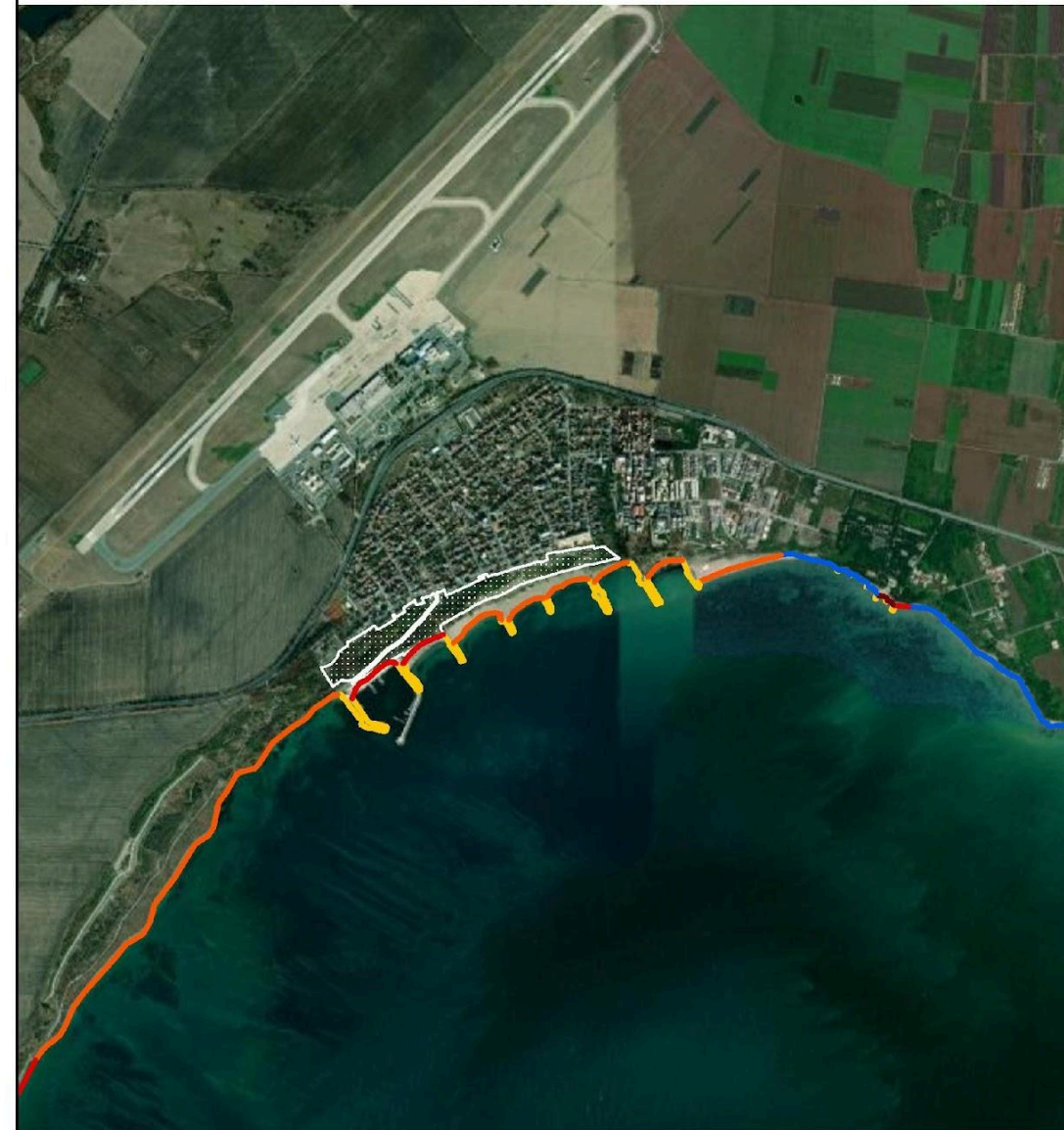
In the coastal zone of the Sarafovo quarter, these processes have been identified as potential due to the soil characteristics. The swelling class of construction soils is II. No buildings or structures have been constructed in the area yet, but future developments will be affected. Therefore, it is necessary to implement measures to limit surface and groundwater.

### **1.11.6. Liquefaction**

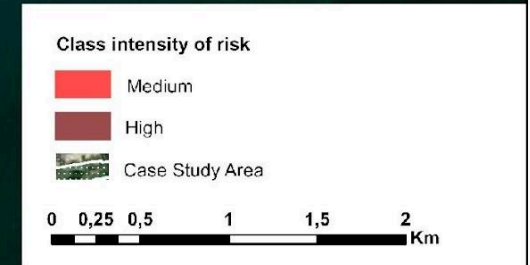
This process involves the transition of unconsolidated soils from a solid state to a liquid state due to increased pressure and reduced effective stresses. The process is influenced by factors such as grain size distribution, relative density, dynamic action parameters, drainage conditions, layer dimensions, geological age of the deposits, loading history, and the air dissolved in water. Causes of activation may include static loading, dynamic impacts, sea waves, and the nature and type of deformations that occur. These processes are continuous and can lead to sudden (risky) phenomena.

In the territory of Burgas, liquefaction is characteristic of sandy spits and coastal lagoons. The selected project area is not located in a zone defined as at risk for liquefaction of weak soils, but it is in close proximity to such areas. The liquefaction class of weak soils is III. It is essential to **anticipate** measures for stabilizing the earth masses in the event of potential risk events.

## Abrasion



## Landslides





# Swelling re-value

# Liquefaction





## 1.12. Terrain

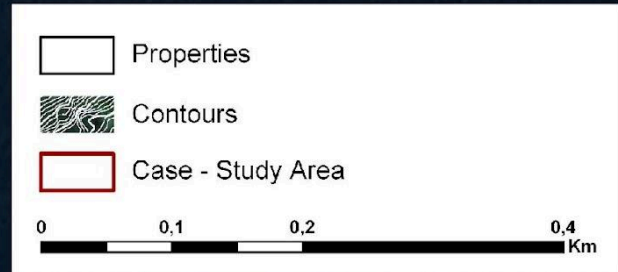
The coastline is characterized by an increase in elevation from the beach strip towards the inland surface. The beach strip varies in width from 40 to 80 meters in different parts. The selected green areas for the pilot territory cover widths of approximately 150 meters in the western part with elevations up to 35-40 meters, and in the eastern part, widths of 50 meters with elevations ranging from 25-30 meters. In the eastern direction, the structure of the terrain changes, thinning the soil layer and revealing rocky shores with sharp increases in relief to precipitous slopes (cliffs).

Important aspects considering the relief and its features are water runoff and soil drainage. **Heavy rains, with water runoff from the high built-up parts of Sarafovo quarter towards the low coastal areas, can be extremely risky for activating unfavorable soil processes.**

**When developing the conceptual solution for the territory, approaches for environmental intervention should be sought, considering horizontal aspects, conducting activities for shore protection, water diversion, and soil drainage, as well as the application of lightweight (in some sections aerial) constructions. Vegetation should be selected without the need for irrigation.**



# Relief





### **1.13. Social-economic characteristics (including existing businesses)**

The wide access to the Black Sea and the passage of one of the main corridors, part of the TEN-T network, "Orient/Eastern Mediterranean", are some of the key factors that have a sustainable impact on the local economy and the municipality's potential for its future socio-economic development. The presence of a significant port complex, combined with the development of other infrastructural and transportation facilities and multimodal connections, implies a key role of the municipality and its administrative center in organizing the territory of the entire Southern Black Sea region, as well as in the immediate contact zones and municipalities that are part of the Burgas region and Southeastern Bulgaria. Moreover, the central role of the municipality in the region provides exceptional potential in terms of access to significant market resources, which are formed as a result of the development of the tourism industry along the coast, which in turn has a structurally defining value for its economic profile.

The city of Burgas is an important industrial, commercial, transportation, and tourist center, serving as a supporting economic center in the municipality and the region. Industrial enterprises, which have played a long-standing role in shaping the economic profile of the region, are of regional or national significance and are associated with the production of dark and light petroleum products, chemical fibers, plastics and other chemical products, ship repair activities, ventilation and purification facilities, freight wagon manufacturing, and fish processing. At the same time, the maritime outlet creates many opportunities for the development of tourism, transportation, and goods logistics. In recent years, active work has been done to build a new economic image of the Burgas municipality - an innovative municipality offering a good business environment <https://www.businessmap.burgas.bg/bg>, and modern infrastructure, seeking investors in innovative and high-tech sectors <https://www.industrialpark-burgas.bg/en>. For this purpose, part of the industrial zones has been renewed, new multifunctional complexes have been created, internet platforms, a technological cluster <https://ictc-burgas.org/bg>, forums are organized, and modern approaches are applied to popularize the conditions and opportunities.

The socio-economic characteristics of the Sarafovo quarter are defined by the proximity to the Black Sea, the proximity to Sarafovo Airport, and the convenient transportation connection, Republican Road I-9. The local population is engaged in services related to tourism, hospitality, servicing the airport complex, and trade. These activities are characterized by strong seasonal fluctuations, which is why a significant portion of the population commutes daily to the compact city of Burgas for a wide range of economic activities. The conceptual solution will provide a higher quality environment for relaxation for the local residents and visitors of the Sarafovo quarter, which could be a prerequisite for increasing interest and visitation.

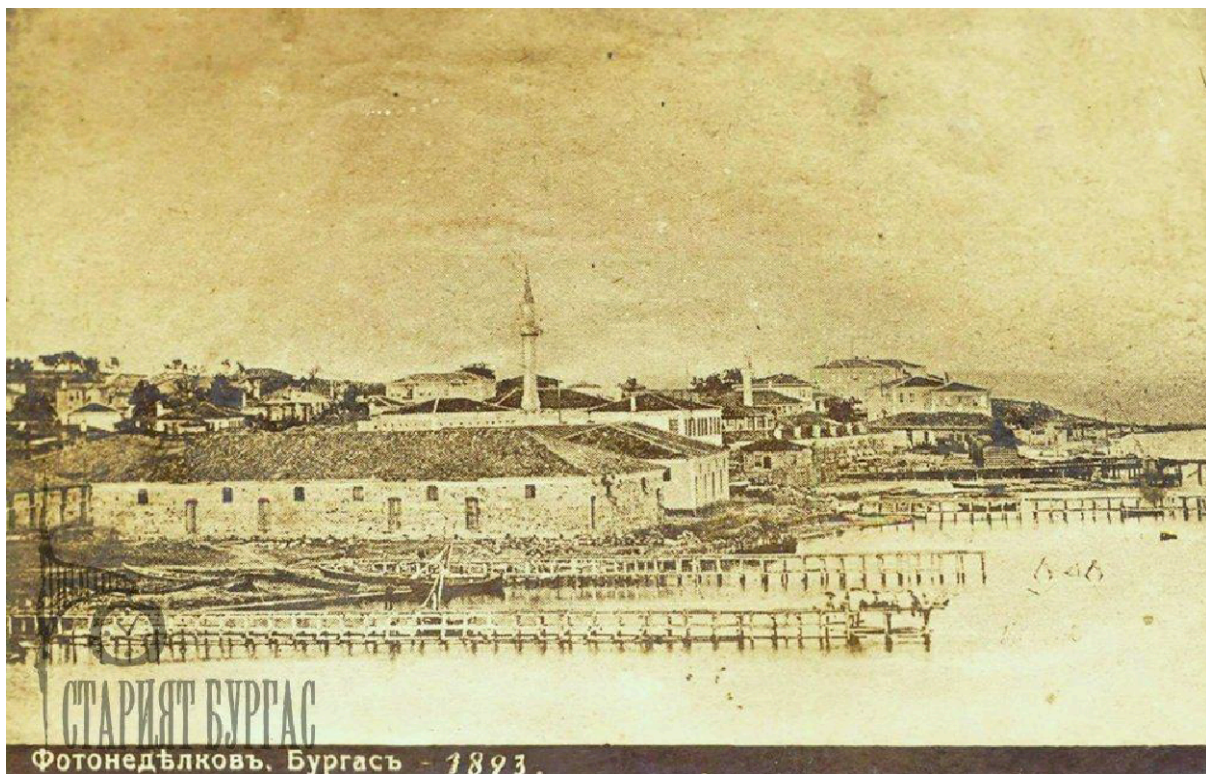


## 1.14. History and development of construction

The favorable living conditions in the Burgas Basin and the connection to the Black Sea are the reasons why people settled here since ancient times. Today, at least six settlements from the Neolithic and Chalcolithic periods (6th-5th millennium BC) are known, located at various places in the urban territory of Burgas - near the Fish Harbor, in the Izgrev complex, Vetren quarter, and the "Burgas" mound. There is reliable evidence of the existence of a Thracian sanctuary on Mount Shiloto, near the Meden Rudnik complex, from the 4th to the 3rd century BC. During the Roman era, the Aquae Calidae baths were built, as well as Roman villas in the New Foros quarter, and a villa from the 3rd-4th centuries north of the Sarafovo quarter.

Today it is accepted that Burgas is mentioned for the first time in historical sources in the 13<sup>th</sup> century. Then the Byzantine poet Manuel Phile wrote about Pirgos, which according to medievalists is precisely today's Burgas. Pirgos is a Greek word meaning "tower". The earliest dated map showing Pirgos from 1697 by the Dutchman Nicolaas Vitsen. In the 18th century, Burgas was already a well-known and lively port, impressing travelers and cartographers. The bay was visited by almost all types of vessels typical of that time, the city had over 1000 houses and was connected to a lively trade. Since 1854, Pirgos has been the center of a district with 68 adjacent villages, and from a "iskele" (pier), a port, it becomes a "kasaba", i.e., a small town.

In 1891, a regulatory plan was drawn up and adopted, marking the outlines of the streets and neighborhoods. The opening of a railway line in the direction of Yambol - Burgas (1890) and the construction of the Burgas Port (1903) were of exceptional importance.



**Fig. 11. Port of Burgas, 1895, Source: <https://oldburgas.com/bg>**

Since the middle of the 20th century, industrialization at the local level began. The significance of the city of Burgas as a key regional center increased, with numerous successful enterprises, an airport, a port, and recreational areas. The first development plan for Burgas from 1891 marked the beginning of coastal landscaping with the creation of the Sea Garden (designed by architect Georgi Duhnev) - today it covers an area of 600 hectares and has a length of almost 5 km. Thus, the vacant space between the city and the sea has been transformed into one of the most beautiful parks in Bulgaria and a center for the cultural life of the city and the daily relaxation of its residents. In 1910, the construction of the Primorski Park began. Today, these two facilities are of fundamental importance in the city's green system and are an important prerequisite for the development of plans for greening coastal areas (including the pilot area under the current project).

A significant expansion of the city is observed as a result of the industrialization process and the associated attraction of population and the emergence of the need for an adequate housing stock. In the 1970s, a process of annexing settlements as quarters of the city of Burgas began, simultaneously with the development of new residential complexes and the utilization of intermediate complexes. In this way, the current structure of the city of Burgas is formed - quarters such as Pobeda, Akatsii, Gorno Ezerovo, Lozovo, Dolno Ezerovo, Sarafovo, Kraymorie, Banevo, Vetren, Rudnik, Chernomore are annexed. Complexes such as Lazur (part), Meden Rudnik, Zornitsa, Slaveykov, Izgrev are built. At the moment, the expansion continues.



**Fig. 12. Sea Garden, 1920, Source: <https://oldburgas.com/bg>**



At present, the expansion to the north continues through the new residential complexes of Madika and Horizon. The annexed territories bear distinct spatial characteristics of villages, and the processes of their renewal continue to this day.

## 1.15. Current State. Land Use and Urban Structure, Building Typology, and Age Range

**According to the territorial organization, the predominant part of the Sarafovo quarter is designated for residential development and landscaping, with a small portion allocated for public services. In historical context, land development began around the third and fourth decades of the 20th century in the western and central parts.** Low-rise (up to 3 meters) detached single-family residential buildings were constructed. Towards the end of the 20th century and the beginning of the 21st, the number of buildings increased, with heights rising to medium-rise buildings (15 meters). The character of development shifted to include the construction of multifamily residential buildings. Density increased, with some previous buildings demolished and replaced with new ones. In recent years, there has been intensive development in the eastern direction and utilization of vacant green areas. Building heights reached high-rise (above 15 meters), and the character shifted noticeably to complex, with multifamily residential buildings predominantly intended for temporary or permanent occupancy as investment properties. Regarding architectural design, no requirements or color palettes have been introduced, leading to a wide variety and the incorporation of details not typical for the region. There is no congestion in the selected project area. The beachfront property, leased long-term, hosts four movable food service establishments. The conceptual solution should provide an alley network to the beachfront for pedestrian and bicycle access, with special arrangements for vehicles and charging within specific time ranges, without entering the property or affecting the location of movable objects.

Currently, parts of the Sarafovo quarter located south of Republican Road I-9 and Sarafovo Airport, according to the Master Plan, are designated for landscaping, but there are intentions to amend them for public purposes and residential construction. The planned development in the Kiosheto area, located southwest of Sarafovo, has not been realized, and there are no conditions for starting it in the near future.



## 1.16. Transport accessibility

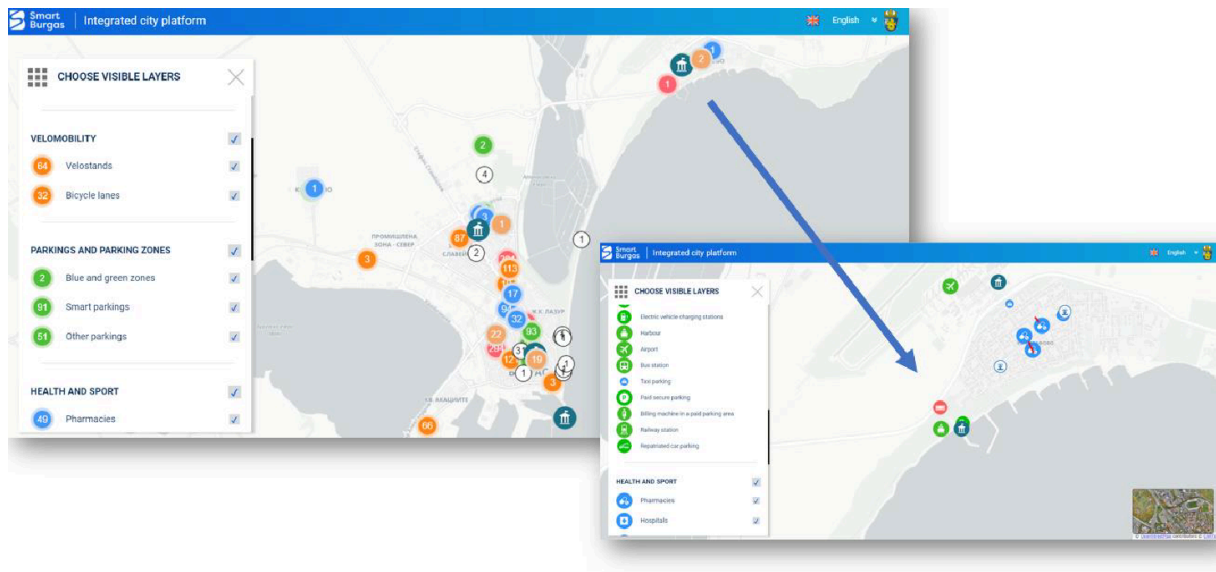


Fig. 13. Smart Burgas, Source: <https://map.smartburgas.eu/>

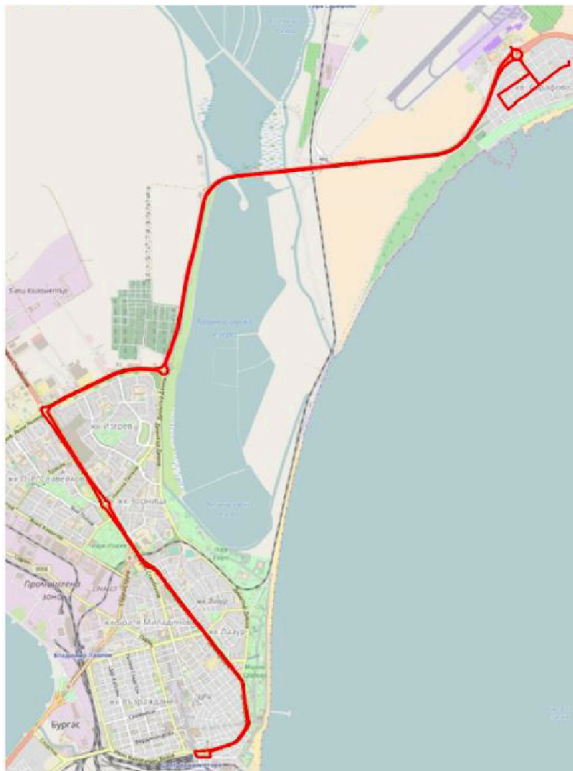


Fig. 14. Public transport line from Urban core to residential area of Sarafovo, Source: SUMP Burgas 2023-2031, [https://www.burgas.bg/uploads/posts/2024/8-prilozheniya\\_pugm.pdf](https://www.burgas.bg/uploads/posts/2024/8-prilozheniya_pugm.pdf)



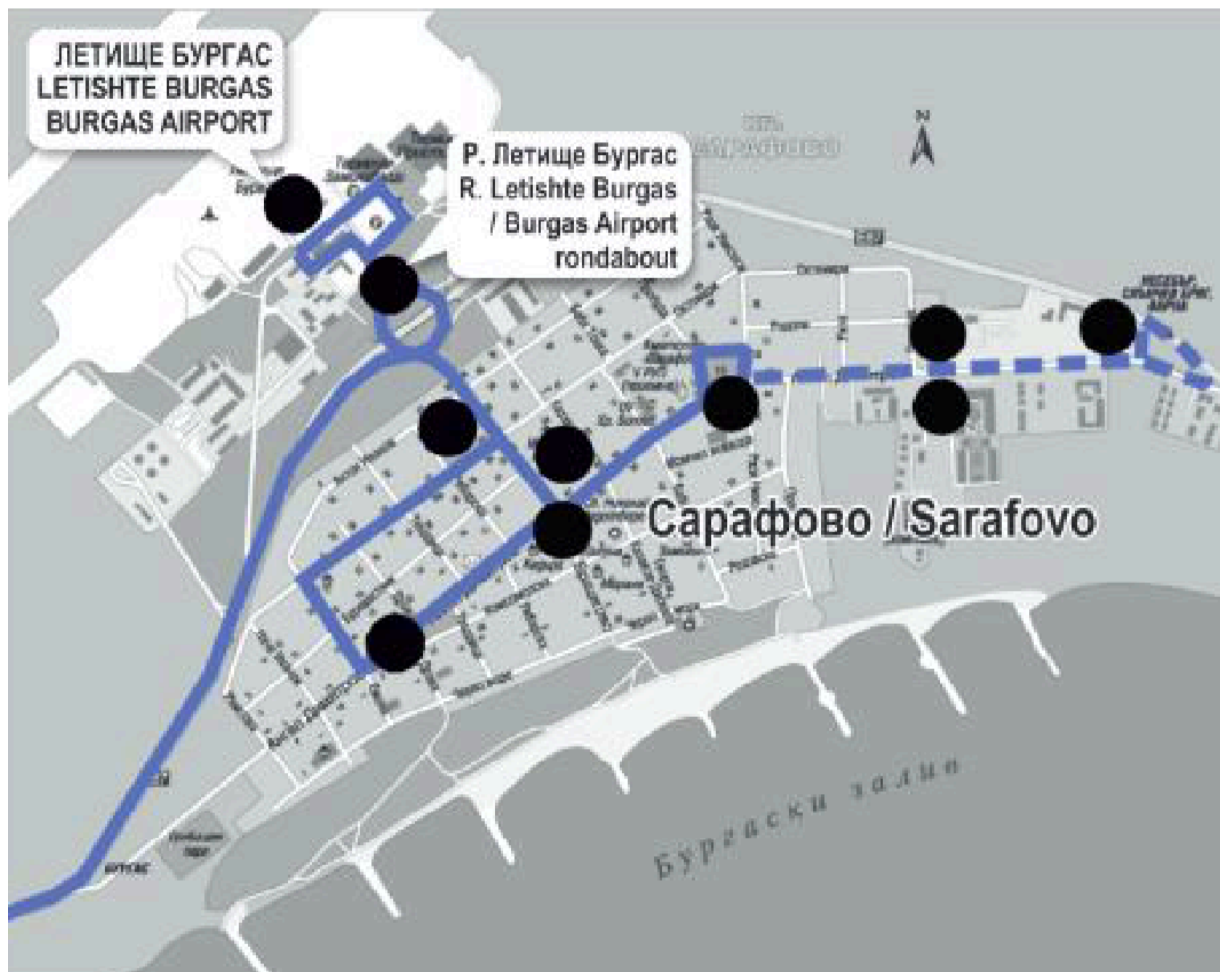
Fig. 15. Existing, planned and under construction bicycle lanes network, Source: SUMP Burgas 2023-2031 [https://www.burgas.bg/uploads/posts/2024/8-prilozheniya\\_pugm.pdf](https://www.burgas.bg/uploads/posts/2024/8-prilozheniya_pugm.pdf)

## RE-VALUE

Transport connections at national, regional, and local levels are well developed, with a continuous process of upgrading and improving connectivity. **At the local level, in Burgas Municipality and more specifically in Burgas City, there are land (road and rail transport), water, and air transport connections.** Key elements of the technical infrastructure include Republican Roads I-6 (main east-west connection linking the western and eastern parts of the country) and I-9 (sub-meridian connection serving the Black Sea coast), the Northern Bypass Road connecting the two, Burgas Port, and Burgas Airport. Necessary technical facilities have been built to ensure their normal operation and meet the needs of industry and the population.

**Accessibility to the coastal areas** is ensured, with different types of mobility adapted to the specific characteristics, functions, and needs of the zones. The historical development of the area led to railway transport being dominant, subsequently displaced by automobiles. As a result, the need for some railway lines has ceased, exemplified by the direction: North Industrial Zone - Lake Park - Burgas Saltpans - eastern part of Atanasovsko Lake - northern part of Sarafovo quarter (north of Burgas Airport) - Pomorie Municipality. In the future, reconstruction and restoration of railway lines with a recreational focus are desired in the section: Sea Garden - Burgas Saltpans. At present, a similar function is performed by a tourist train connecting several landmarks.

**The considered area (Coastal Park near Sarafovo quarter) has transportation access via Cherno more Street**, located north and parallel to the coastline and the park, as well as **the extension of Drava Street** in the northeast-southwest direction, diagonally reaching Sarafovo Port. Both transportation routes provide car and pedestrian access, with the extension of Drava Street also offering bicycle access. **Recently, a bicycle lane has been built from the northern border of Sarafovo Fishing Port to the east.** It reaches the border of a land plot designated as a coastal beach strip, representing exclusive state property under protection. Through the development of the future conceptual solution, it should be connected to the alley network and integrated compositionally. A valuable spatial, functional, and transport link for the area is in the direction: Sarafovo - Kiosheto area - Burgas Saltpans - Lake Park and Sea Garden. At present, activities for coastal fortification and development of bicycle accessibility are ongoing. Mass urban public transport passes through Bratsigovo, October, Emona, and Angel Dimitrov streets with numerous stops (Fig. 16). **The considered area falls within the 15-minute isochrones of pedestrian movement, equivalent to a linear distance of 300 meters.** Given this, it can be concluded that the area is served, and in the future, if necessary, the provided services can be improved by changing the routes.



**Fig. 16. Public Transport Link Burgas City - Sarafovo quarter and Burgas Airport,** Source: <https://transport.burgasbus.info>

Parking spaces are provided at the entrance of Sarafovo Port and in several zones along Chernomorska Street. **The entrance to the park area has led to the removal of tall tree vegetation and leveling of the terrain, which are prerequisites for activating natural risks.** At the intersection of Chernomorska Street with the extension of Drava Street, an observation terrace has been built for landscape viewing. It is divided into two parts - eastern and western, due to the passage of the transportation route. Spaces are designated for prolonged stays and social interaction with urban furniture, with the eastern part featuring a playground and the western part featuring tables for board games. Through this, a smooth transition from urbanized areas with residential buildings to the coastline and its greening has been achieved. **The interior alleys of the considered area are not developed.** As a result of the overall development of Sarafovo quarter for residential purposes, both permanent and temporary, **unregulated interventions have been made.** Hotel complexes on the first line have created accesses to the coastline. The majority of the alleys are paved, with only one constructed as a wooden staircase. **The future spatial development of the park and the conceptual solution should not align with these interventions but rather seek optimal**



solutions in response to the needs of the entire population and achieve a unified composition that reflects and preserves natural characteristics.

## 1.17. Energy Mix, Distribution System(s)

The existing 110 kV transmission and distribution network in Burgas City is in good condition and connected to the national transmission network. In the region, there is one thermal power plant - Lukoil TPP, which is industrial and intended to supply the respective industrial enterprise to which it belongs. **There are no hydroelectric power plants in the region because there are no suitable conditions for it - the rivers flowing through the Burgas region are short and have a small flow rate.** Despite the initial stage of development of the gas transmission network, a significant number of domestic, public, and industrial consumers have access to natural gas. In the municipality, there are capacities for electricity generation from renewable sources (wind, solar, bioenergy, or cogeneration installations). In the Burgas municipality, there are 7 photovoltaic power plants with a total capacity of 4.33 MW.

**At present, the pilot area is not supplied with electricity, water supply, and sewage systems.** Elements of the electricity distribution, water supply, and sewerage networks pass nearby, providing connectivity to the residential areas of Sarafovo quarter and Sarafovo Fishing Port, as well as wastewater treatment at the Pumping-Drainage Facility in the eastern part of the considered area and discharge into the Black Sea. **When developing a detailed project for the Coastal Park, the routes of the engineering-technical elements affected by the alley network and designated spaces should be determined.**

## 1.18. Access to Water, Connection, Community Relations

**Access to Sarafovo quarter is provided through the extension of Drava Street -pedestrian, bicycle, and car movement.** An alley network has not been built within the green area. A few years ago, the beginning of a bicycle lane was built, starting from the northern border of Sarafovo Fishing Port and extending in an eastern direction.

**The future development of the alley network is related to coastal fortification activities.** After clarifying their location, a unified composition for the area should be developed, creating favorable opportunities for movement in the maximally preserved and manifested natural coastal environment.

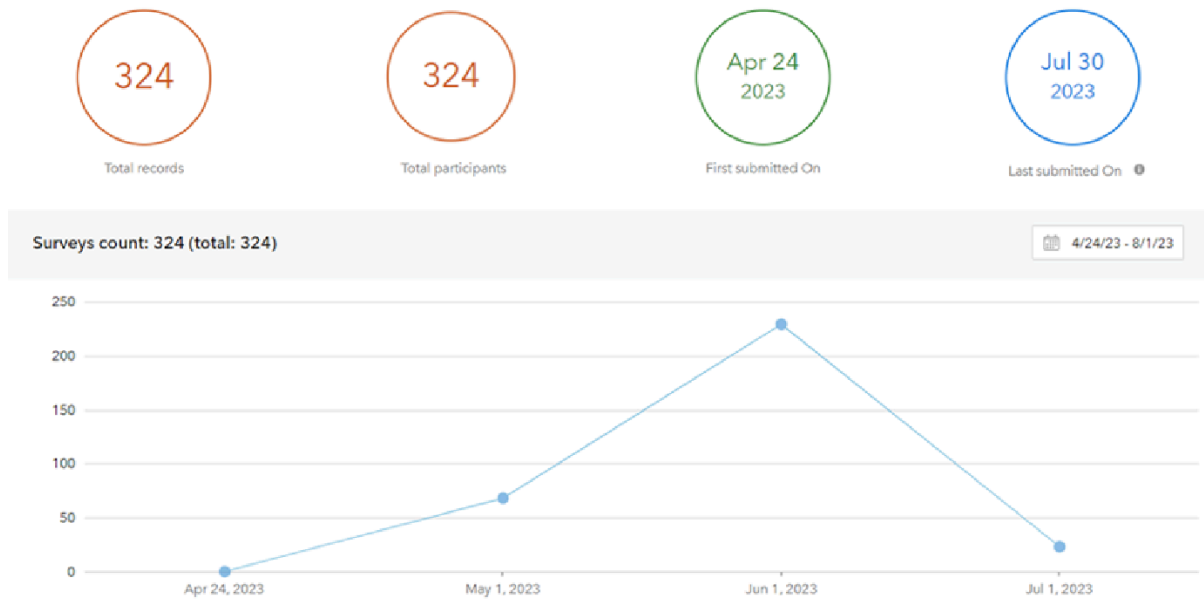
**Another perspective for spatial and functional development of coastal accessibility is the connection between the Black Sea and Atanasovsko Lake, Sarafovo Fishing Port, residential areas in Sarafovo quarter, and the planned ones in the Kiosheto area.** At present, there is a road (for car and partly bicycle transport) in close proximity to the southern part of Atanasovsko Lake, connecting to Republican Road I-9 and continuing northward. Paths to

Atanasovsko Lake exist, but they have limited public access due to salt extraction and processing processes. Any future development of pedestrian and bicycle networks should take into account the protected areas under NATURA 2000 and Protected Areas regulations. The policy of Burgas Municipality is focused on preserving cultural heritage and creating a unified urban cultural and architectural image, integrating elements of cultural landscape by creating a natural harmonious connection between the old urban core and the new urban structures. Emphasis is placed on maintaining community connection with urban cultural heritage. One of the five identified urban areas for cultural heritage preservation is aimed at emphasizing and skillfully presenting cultural landscapes in the "man-sea" relationship - the salt pans of Burgas.

## 1.19. Cultural and Spatial Quality, Public Facilities

Given the current state of the pilot area, it can be defined as **undeveloped**. It lacks an alley network, designated spaces for prolonged stays with diverse functions, and the placement of urban furniture (lighting, benches, gazebos). These should be included in the future conceptual solution. As a natural consequence of the location of the area, **local culture is historically associated with the activities of fishing communities and the development of passenger aviation**. These are two essential aspects that need to be preserved and manifested as characteristic accents in the space.

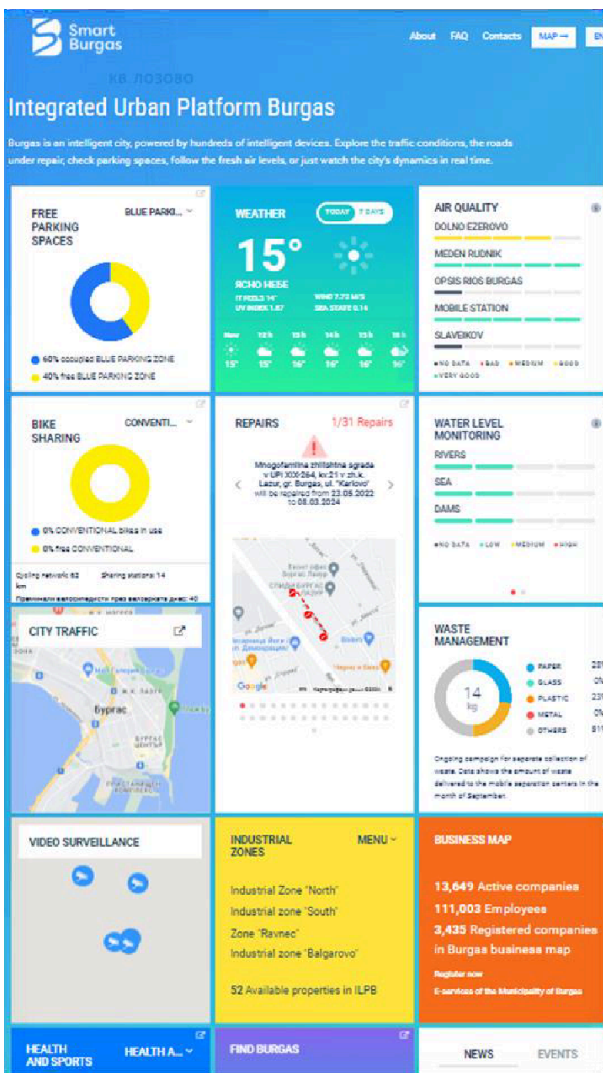
**Community Issues and Attitudes (In or Towards the Pilot, Regarding Actions) – Describe Efforts to Engage the Community So Far**



**Fig. 17. Survey, 2023**

A survey was conducted among the population of Burgas city in the period April - July 2023 with 324 respondents, from which the following proposals were given for the specific territory in summarized form: Construction of a circular cycling alley from natural materials, creation of green areas connected to the Sea Garden - Burgas and the coastal alley (park) of Sarafovo;

Preservation of the "wild" character of the area; Development of ecological, educational activities, a permanent information center / museum dedicated to Lake Atanasovsko and biodiversity; Improvement of the coastal alley between the Salt Pans canal and Sarafovo and creation of a large bio/eco-park with good infrastructure - alleys, benches, picnic areas; Providing urban transport, expansion of the coastal cycling alley; Planting green vegetation available in all seasons, emphasis on permaculture, and installation of erosion control facilities.



## 1.20. Digital infrastructure

Several innovative digital projects have been implemented as a tool for modernizing existing infrastructure solutions in urban environments. The city has an integrated urban platform with interfaces for both employees and public use, offering real-time integrated information on various aspects of the city - [Integrated Urban Platform Burgas - Smart Burgas](#). SmartBurgas is not merely an informational portal; it serves as a tool for monitoring and even managing the city. Through the municipality's website, more than 40 electronic services are offered; through the GoToBurgas tourist portal, payments can be made for purchasing tickets for events and attractions; the use of paid parking and bike rental is facilitated by various digital tools. Smart Burgas provides information on mobile applications that can be effectively used for the Burgas area.



## 1.21. Planning Process History

Several urban plans have been developed for the territory of Burgas city - around 1800, 1890, 1920, 1944, 1964, 1980, and 2012, with the last one upgraded to the territorial scope of Burgas Municipality a few years later. The first plan reflecting the structure of Sarafovo quarter is the general urban plan of Burgas from 2012. Through it, changes to existing land boundaries, existing building boundaries of settlements and their structural units, and settlement formations, existing and projected routes of communication-transport and engineering- technical elements, boundaries and regimes of zones and territories, the location of existing and projected objects and events have been defined. With the General Urban Plan, the territory of Sarafovo quarter is planned to be expanded eastward to the intermediate border between Burgas and Pomorie municipalities. Recreational zones intended for resort and complementary activities are allocated in the northeast and southeast directions. Northeast of Republican road I-9, mixed multifunctional zones are planned, and westward - for the expansion of Sarafovo Airport. At present, only the expansion of Sarafovo quarter to the east has been implemented. To meet modern needs, a process of updating the plan is envisaged, which is expected to be developed in the coming years. It is not expected to affect the pilot area with its zones and regimes.

## 1.22. Policy Analysis and Regulatory Framework

### 1.22.1 Specific laws, regulations, or adopted policies influencing the pilot area

**According to the General Urban Plan, the pilot area is designated as an "Greening Zone" with planning parameters: Density up to 10% (ratio of built-up area to land area), Height 1 floor - 4 m., Intensity coefficient up to 2.5 (ratio of built-up area on all floors to land area), Minimum greening percentage of 20%. The conceptual solution should comply with these regimes and parameters.** The existing Bulgarian legislation should be applied to the area, namely: Spatial Planning Act, Regulation No. 7 of 22.12.2003 on rules and standards for the development of individual types of territories and development zones, Protected Areas Act, Biodiversity Act, Environmental Protection Act, Black Sea Coast Planning Act, State Property Act, Regulation for the application of the State Property Act.

### 1.22.2. Approaches to urban planning and design. Existing policies, programs, and initiatives

By implementing sustainable urban planning and design initiatives, Burgas is committed to fostering climate resilience, equity, and environmental stewardship. This approach extends to the waterfront pilot area of Sarafovo, presenting both a challenge and an opportunity that encompasses various facets of urban development. Aligned with existing city policies, programs, and initiatives, this comprehensive strategy integrates Transit-oriented development (TOD) as a cornerstone, emphasizing connectivity, accessibility, and mixed-use

zoning regulations. The goal is to promote compact, walkable quarters with easy access to public transit, reducing dependency on private vehicles, mitigating traffic congestion, and enhancing community cohesion.

In the realm of environmental stewardship and sustainable development, Burgas champions ecological urbanism principles, leveraging natural assets for blue-green planning and resilient ecosystem creation. This involves mitigating urban heat island effects, enhancing biodiversity, and promoting environmental preservation and sustainable resource management. Additionally, the city pioneers energy communities and renewable energy districts to transition towards a low-carbon future, while implementing adaptive reuse strategies and the 15-minute city paradigm to revitalize urban quarters, promote social inclusion, and combat urban sprawl.

Furthermore, Burgas embraces innovative solutions and community engagement to enhance urban livability and sustainability. This includes the implementation of Complete Streets and Vision Zero principles for improved urban mobility and road safety, alongside circular economy principles to minimize waste generation and maximize resource efficiency. Leveraging Smart City initiatives and Intelligent Cities technologies optimizes urban services, and improves quality of life, while education programs and campaigns promote sustainability awareness and foster collaboration. Through these concerted efforts, Burgas aims to create a more resilient, inclusive, and livable city for its residents.

### 1.23. Urban Planning and Design Tools

The city of Burgas is committed to advancing sustainable urban development through a multifaceted approach, utilizing a range of planning instruments to achieve sustainable growth, enhance livability, and promote climate resilience. Burgas employs a multifaceted approach to urban planning, leveraging various instruments to foster sustainable development, with a spotlight on the Sarafovo quarter as a testbed for innovative interventions. Central to this strategy are zoning regulations and district overlays, which guide land use patterns while preserving natural resources. Emphasis is placed on mixed-use development, transit-oriented design, and the integration of green spaces, aiming to cultivate vibrant, walkable quarters while ensuring ecological integrity.

In tandem with zoning regulations, stringent net-zero and green building codes are enforced alongside **Sustainable Energy and Climate Adaptation Plan of Burgas 2021-2030**<sup>2</sup> and **Sustainable Urban Mobility Plan of Burgas 2023-2031**<sup>3</sup> strategic documents guidelines, setting high standards for energy efficiency, environmental performance, and climate adaptation. Architectural aesthetics is ensured by the enforcement of the new Municipal

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<sup>2</sup> *Sustainable Energy and Climate Adaptation Plan of Burgas 2021-2030: [Стратегия за устойчива енергия и климат 2021-2030 | Община Бургас \(burgas.bg\)](#)*

<sup>3</sup> *Sustainable Urban Mobility Plan of Burgas 2023-2031: [План за устойчива градска мобилност на Община Бургас 2023-2031 | Община Бургас \(burgas.bg\)](#)*

Ordinance on Urban Spaces<sup>4</sup> which defines the specific requirements for the appearance of urban spaces, buildings and architectural ensembles. These measures mandate sustainable building practices and innovative design strategies, contributing to reduced carbon emissions and enhanced overall built environment quality.

Moreover, Burgas's comprehensive urban planning framework is incorporated in the main Strategic document **Plan for Integrated Development of Burgas Municipality 2021-2027**, providing a roadmap for long-term goals and policy alignment across sectors. This strategic approach is complemented by public-private partnerships and incentive programs, facilitating collaboration and investment in sustainable initiatives, thereby driving innovation and fostering growth. Through this holistic approach, Burgas aims to create a resilient, equitable, and prosperous city for both current and future generations, underscored by community engagement initiatives like the "My Quarter, My Street" program, which empower residents to actively participate in quarter enhancement and collective stewardship.

### 1.23.1. Development of Concept before Reassessment or Previous Plans

Vision for the Development of the Coastal Zone of Burgas Municipality

The **Plan for Integrated Development of Burgas Municipality 2021-2027**<sup>5</sup> for the period 2021- 2027 defines several coastal locations as significant for the development of the territory, establishing an integrated connection between the urban area, the coastline, and the coastal lakes. Based on this, the Plan designates the following compact zone for integrated intervention, referred to as the "Coastal Zone" (Parts of residential complexes Izgrev, Zornitsa, Lazur, Center, and the quarter of Kraymorie). The intervention aims to harness the potential of the coastal areas and address current challenges in city management, resulting from the disrupted connection between "Man - Sea" (loss of visual, spatial, and functional contact between the living environment, recreation areas, and water bodies) and the gradual loss or alteration of the city's authentic cultural heritage. There is also evidence of private investment interest in development, setting up temporary facilities, and limiting public access to territories, which should be publicly accessible.

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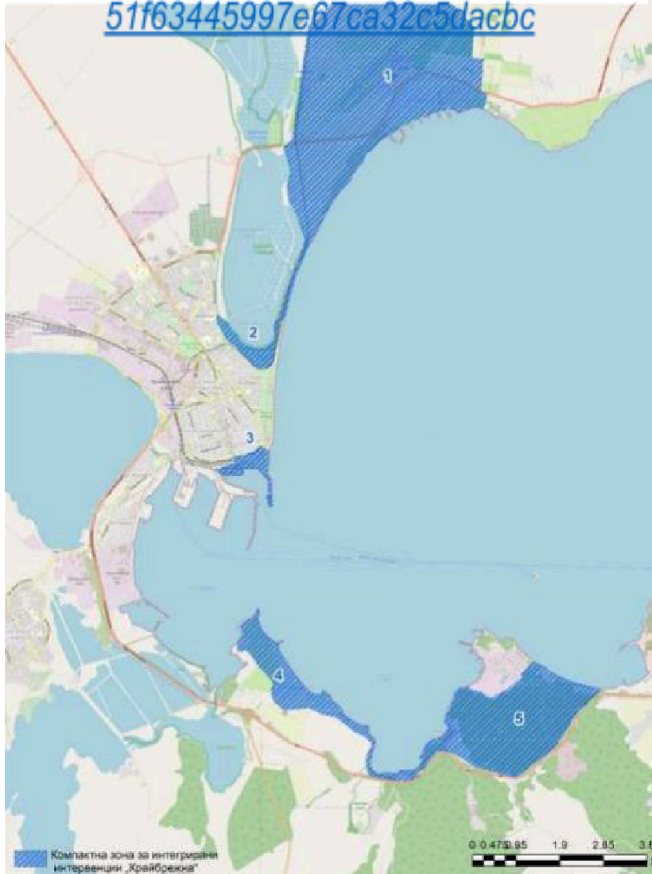
<sup>4</sup> *Municipal Ordinance on Urban Spaces:* [НАРЕДБА ЗА СПЕЦИФИЧНИ ИЗИСКВАНИЯ КЪМ ОБЛИКА НА ГРАДСКИТЕ ПРОСТРАНСТВА, СГРАДИТЕ И АРХИТЕКТУРНИТЕ АНСАМБЛИ НА ТЕРИТОРИЯТА НА ГРАД БУРГАС | Общински съвет-Бургас \(burgascouncil.org\)](#)

<sup>5</sup> *Plan for Integrated Development of Burgas Municipality 2021-2027:* [ПЛАН ЗА ИНТЕГРИРАНО РАЗВИТИЕ НА ОБЩИНА БУРГАС\(2021-2027\) \(arcgis.com\)](#)



**Fig. 18. Compact Zone for Integrated Intervention "Coastal Zone" - excerpt from the current Plan for Integrated Development of Burgas Municipality 2021-2027, Source:**

<https://storymaps.arcgis.com/stories/291634d51f63445997e67ca32c5dadabc>



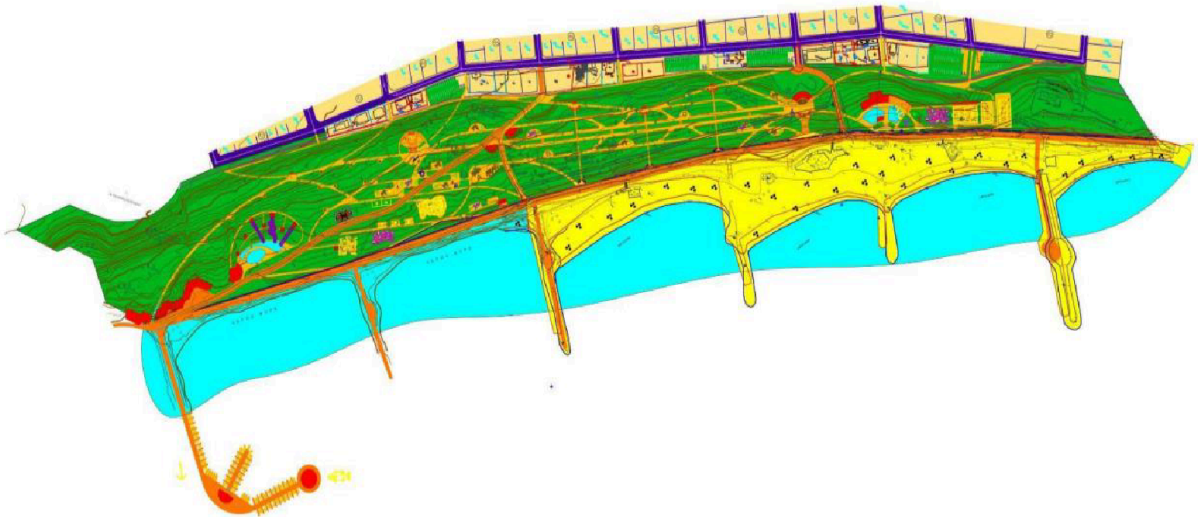
The pilot area falls within Subzone 1 (Coastal Alley compact city of Burgas – Burgas Airport - quarter of Sarafovo) of the planned Compact Zone for Integrated Intervention "Coastal Zone." The Plan envisages: the possibility of delineating and building a green area for wide public use (park type) along the coastal edge of the Sarafovo quarter, achieving spatial and functional connection with an existing park; construction of a noise barrier between the Sarafovo quarter and Burgas Airport; development and enhancement of mass urban public transport through a fast bus line between the compact city of Burgas and Sarafovo Airport; improving the quality of the environment and interest in permanent residential habitation; development of the airport complex and enhancement of opportunities for cargo flights and related loading and unloading activities, storage, and transfer of goods.

### 1.23.2. Coastal Park Project

A project for the Coastal Park area near the Sarafovo quarter was developed in 2009

(Fig.20). It included the construction of a comprehensive network of alleys with durable

pavements and shore fortification, monochromatic gardens for picnics, a water park, a mini-golf course, outdoor fitness facilities, a skateboard and bicycle wave-like surface area, an amphitheater, a children's celebration area, a pony walk area, a main pedestrian alley "Seven Arts," a sports and educational center with a children's pool with water slides, a bar, outdoor rope structures, cafes, and more.



**Fig. 20. Conceptual Design for the Coastal Park near Sarafovo quarter, 2009.**

At present, the project has not been realized. In 2015, the Sarafovo Fishing Port was built and put into operation, along with adjacent transport infrastructure. It significantly affects the adjacent territories, attracts interest, and becomes an attractive point for visits by fishing communities, local residents of the Sarafovo quarter, people from the compact part of Burgas, going for pedestrian and bicycle walks, as well as tourists. Substantial natural and anthropogenic changes have occurred in the territory from 2009 to the present. Therefore, there is a need to develop a new project, aligned with the current situation, needs, and modern goals.

## Phase 2: Concept and next steps

The phase involves synthesizing the analysis with the derived conclusions and recommendations and developing a conceptual spatial and functional solution as part of the process of creating a stable foundation for subsequent planning and design processes.

Efforts are directed towards prioritizing the natural coastal environment with its valuable characteristics, ensuring comprehensive functionality, and creating "places for people" that provide favorable conditions for spending more time outdoors in recreation with educational, scientific, and developmental aspects, physical activity, and social interactions. It is essential to improve the state of nature alongside the quality of the urban environment and the lives of local residents, enhancing the connectivity of the elements of green and blue infrastructure while achieving a smooth transition to urbanized areas. Given the local climatic characteristics and economic structure, creating an environment suitable for year-round visitation is a necessary condition.

### 2.1. Introduction

The project area is located in the eastern part of the city of Burgas, in the Sarafovo quarter, on the coast of the Black Sea. It is a coastal landscaped area making the transition between the beach and the urbanized areas. This is an extremely valuable area in terms of location near an airport, a fishing port, protected areas and protected areas of NATURA 2000, transport communications and residential areas for permanent and temporary residence. The total area is 138,653 sq.m. Its selection is based on the characteristics of the properties and the possibilities of intervention in a near time horizon.

Transport accessibility is provided on foot, by bicycle, by public transport and cars, but only up to the boundaries of the property. In the interior, the territory is completely unimproved.

The region is distinguished by the presence of valuable habitats and rich biological diversity. The project area does not fall within the boundaries of protected areas and protected areas under NATURA 2000, but is spatially close to them. It can perform a supporting function, but with careful assessment of impacts due to extreme vulnerability to natural and anthropogenic interventions.

Two main limitations for future development can be indicated - the type of ownership and the method of permanent use of the landed properties. According to the first, the project territory is municipal private property, but the adjacent areas are state property - exclusive, public and private. In the long term, there is no legal possibility to change the form of ownership of exclusive state property. According to the second, the project area is designated as "Public Settlemental Park, Garden", but the nearby ones are "Special purpose and use" due to the presence of a ravine, as well as "Rocks" to the east.



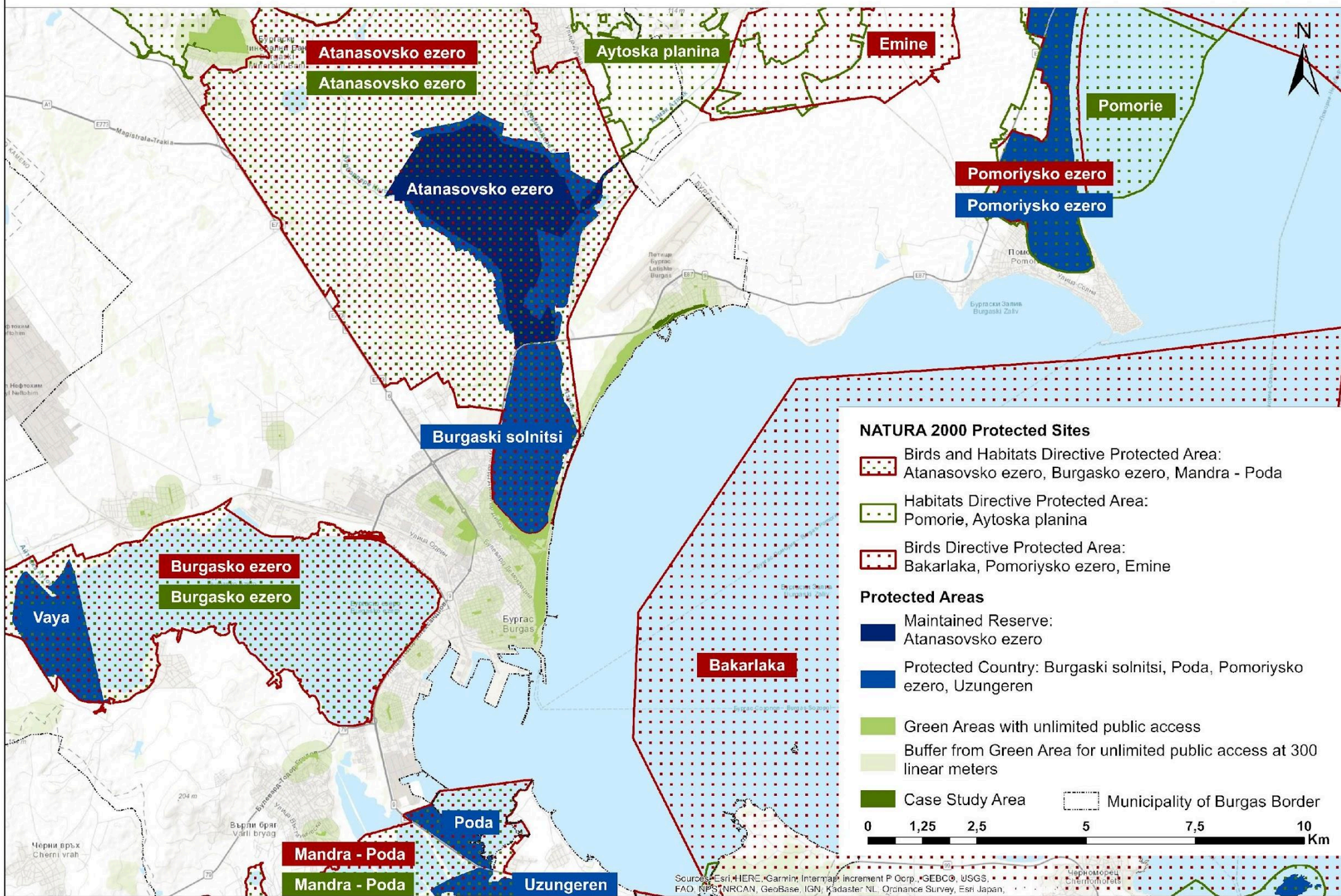
## RE-VALUE

Currently, in the Sarafovo quarter there is an uneven distribution of green areas and a marked shortage of people. The amount of green areas amounts to 2.36 sq. m per person with a minimum norm of 20 sq. m per person, and after the implementation of the project the values will reach 29 sq. m per person. Also, the coastal park of Sarafovo could satisfy about 40% of the residential areas within 300 meters linear distance. The possibilities to connect the coastal greenery are west and partly east direction along the coast, but towards the urbanized areas in the north are limited due to the development.

The coastline is characterized by an increase in altitude from the beach to the inland surface. The relief reaches up to 35 meters high in the west and 25 meters high in the east. There are geological risks in the area - abrasion, landslides, swelling, and in the vicinity liquefaction of weak soils. Basic measures have been taken to control them, and additional ones are planned with the development of the area. Landslide processes and soil swelling are directly related to the need for drainage of surface and underground water.

Deforestation is observed due to natural processes and anthropogenic interventions. The total deforested area is approximately 28.3% of the entire project area. For comparison, in the last 5 years it has increased by more than 10%. In addition, a significant proportion of the beach area has non-surviving or removed vegetation. Part of the areas will be reforested, and others will be included in an alley network and themed areas. There are also many unregulated interventions in the environment, including the laying of paths without or with permanent pavement, artificial leveling of the terrain, backfilling, car parking, pollution and others.

# Protected Areas, NATURA 2000 Protected Sites and Green Areas with unlimited public access







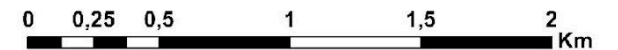
Geological Risk according to the project "Analysis and Mapping of Geological Risk" of the MRDPW

-  Abrasion
-  Landslides
-  Swelling
-  Liquefaction

Geological Risk according to the Registry of "Geoprotection - Varna", MRDPW

-  Active
-  Potential
-  Stabilized
-  Case Study Area

MRDPW - Ministry of Regional Development and Public Works





# Unregulated interventions in the Case Study Area







**Fig. 21. Angled visualization of a 3D point cloud obtained from an aerial photogrammetric survey of the Project Territory, Source: Sofia University “St. Kliment Ohridski”**



**Fig. 22. Angled visualization of a 3D point cloud obtained from an aerial photogrammetric survey of the Project Territory - western part**





**Fig. 23. Angled visualization of a 3D point cloud obtained from an aerial photogrammetric survey of the Project Territory – middle part, Source: Sofia University “Saint Kliment Ohridski”**



**Fig. 24. Angled visualization of a 3D point cloud obtained from an aerial photogrammetric survey of the Project Territory – eastern part, Source: Sofia University “Saint Kliment Ohridski”**



The development of a design solution aims to protect, restore and express the authentic natural environment and biodiversity. Managing geological risks by applying nature-based solutions and adapting to changing geography to create a vibrant 'place for people' is essential.

## 2.2. Purpose of the document

The document aims at the development of a structured and in-depth analysis of the selected coastal territory and its interrelationships with the contact ones, the determination of guidelines creating a comprehensive framework for future planning and design, as well as the selection of practical approaches and innovative solutions. The following aspects can be defined as key: sustainable use of natural resources and their management, climate adaptation, social inclusion, climate neutrality, implementation of environmentally friendly solutions, overall improvement of the quality of the urban environment, economic profitability, public prosperity and others.

## 2.3. Role of Re-Value

The project is based on a partnership between several European cities and serves as a kind of **platform for the exchange of expert knowledge, good practices and experience to rethink valuable coastal areas**. The activities are inspired by the New European Bauhaus and approach to sustainability and in support of the EU's mission for climate-neutral and smart cities.

Efforts are focused on addressing the **systemic challenges** of cities /and selected territories/ through data and information-based decision-making with accountability for long-term results and transparency at all stages.

The **involvement of a wide range of stakeholders** including local authorities, academic institutions, non-governmental organizations, local communities is encouraged. This is essential for the realization of collective action and cooperation at different levels.

**The developed spatial analyses, development guidelines, conceptual model, and selected solutions will serve as a unique foundation in the subsequent stages of planning and designing the chosen territory.** They hold exceptionally high value due to their depth, the exchanged international expertise, experience, and practices, as well as the successful and ongoing involvement of stakeholders.

## 3. Fit for 55 Barometer / Cities Mission - Opportunities and Challenges

The Municipality of Burgas has defined a set of goals in the Burgas Strategy for Sustainable Energy and Climate from 2021 to 2030, aiming at a 40% reduction in greenhouse gas emissions, a 32% increase in the share of renewable energy and a 32% reduction in energy used. These goals are not just numbers, they represent our commitment to a greener and healthier Burgas.

The strategy aims to identify measures to ensure the reduction of greenhouse gas emissions as one of the main elements in the climate change mitigation plan and to provide long-term planning and management of climate change adaptation measures.

Taking into account the need to strengthen local policy and build expertise, training, building a knowledge base, monitoring, adequate management of urban infrastructure and natural capital in relation to changing conditions, the following climate goals of the Municipality of Burgas were defined:

- Building / Increasing the resilience of the municipal territory to climate change;
- Adaptation of the urbanized territory and environment to climate change;
- Building institutional capacity and raising awareness of local communities on climate change adaptation.

The strategic document reviews the climatic changes in the region and presents specific data on the climatic and meteorological phenomena in the last 20 years, registered by the monitoring stations in the Municipality of Burgas. Based on the analysis of climate hazards, assessments of vulnerability by sector and population vulnerability have been made. Adaptation capacity is assessed and indicators are proposed for monitoring impact by sector. The following mitigation and adaptation priorities are proposed, as well as their corresponding measures, indicators and financial mechanisms:

### 3.1. Adapting to climate change

**Priority 1:** Improvement of the normative, strategic and program framework for the development of the Municipality of Burgas in the context of adaptation to climate change;

**Priority 2:** Awareness and databases for climate change monitoring;

**Priority 3:** Improvement and development of green and blue urban infrastructure;

**Priority 4:** Promote and engage the public on the topic of adaptation to climate change;

**Priority 5:** Increase local capacity to implement climate change adaptation measures.



## 3.2. Key areas of impact and opportunities for climate mitigation

The location of the pilot area in the overall configuration of the municipality of Burgas, as well as the geographical location of the Municipality, indicate the need for a targeted impact on the mitigation of climate challenges in this part of Europe and the Black Sea basin. Energy efficiency of buildings: The integration of energy efficiency measures in public and residential buildings is a priority, with the aim of reducing the carbon footprint through renovation and the implementation of renewable energy technologies. On this basis, we identify the following important impact pathways with direct relevance to the implementation of the pilot project:

**Priority 1:** Improvement of the normative, strategic and program framework for the development of the municipality of Burgas in the context of deepening climate changes (and with particular attention to the coastline)

**Priority 2:** Reduction of energy consumption and implementation of RES for individual consumption in the building sector: The implementation of renewable energy sources, such as solar energy and geothermal energy, in the local energy system is a top priority to achieve a higher degree of independence and lower emissions.

**Priority 3:** Promoting green and alternative urban mobility: Promoting green urban mobility, including bike lanes, electric transport and green corridors, is critical to achieving lower emissions in the transport sector.

**Priority 4:** Behaviour change and campaigning with a focus on carbon footprint reduction, circular economy and waste management: Optimization of waste collection, recycling and recovery systems and introduction of circular economy practices will support both emission reduction and sustainable development.

**Priority 5:** Increasing the administrative capacity in the municipality in connection with adaptation and mitigating the negative consequences of climate change.

## 3.3. Opportunities and challenges

The feasibility analysis showed that the advantages and disadvantages of the pilot area stem from its location and the combined influence of coastal characteristics (active erosion, gravity disturbances in landslide processes, coastal sedimentation), the duration and style of its development (density of development, use in housing and tourist infrastructure, infrastructural provision in transport links with other settlements), and the location of the area within the municipality (and its established internal functional relationships).

On this basis, the pilot project's impact toolkit relies on the advantages of green infrastructure as an adaptive (to coastal conditions) and at the same time long-term effective

(to climate adaptation) approach to urban planning. Among the main challenges here will be to combine green with transport infrastructure in terms of functionality and efficiency.

Burgas Municipality adheres to a policy of using green infrastructure design elements following the European Commission's (EC) Technical Guidelines for Climate Resilient Infrastructure Projects (2021-2027). For the construction of a seaside park as a key element of the reassessment of the development of the Sarafovo district, the municipality envisages the use of terrestrial species with proven qualities in terms of carbon sequestration and accompanying ecosystem benefits to the local climate. A combination of broadleaved trees (*Aesculus hippocastanum*, *Acer campestre*, *Celtis australis*, *Fraxinus americana*, *Platanus orientalis*, *Tilia x euchlora*, *Quercus robur* etc.), deciduous shrubs (*Cornus mas*, *Laurocerasus officinalis*, *Lavandula officinalis*, *Melissa officinalis*, *Viburnum lantana*, *Viburnum tinus*) and a limited presence of individual representatives of conifers (*Cedrus deodara 'Aurea'*, *Cupressus arizonica*, *Cupressus sempervirens*, *Pinus pinea*, *Pinus nigra*, *Pinus maritima*) is accepted as the most acceptable in the local geographic conditions. Indirectly, a reduction in sedimentation to the adjacent Black Sea coast and a reduction in atmospheric emissions accompanying eutrophication processes are expected.

Additionally, we would highlight the following circumstances and prerequisites:

**Opportunities:** The project to build sustainable blue and green infrastructure as part of the coastal pilot area enables innovation in urban planning for urban development and the integration of climate adaptation and mitigation measures. This will allow Burgas to test new models of urban environment management aimed at the sustainability of coastal areas, improving energy efficiency and promoting sustainable practices.

**Challenges:** The complex nature of the impacts in the pilot area raises among the key challenges the need to build institutional capacity and guarantees for sustainable financing. Key challenges remain the need to build institutional capacity and sustainable financing for the long-term implementation of climate measures, as well as attracting public attention and participation in climate policies.

In conclusion, the Municipality of Burgas strives for climate neutrality through a strategic framework for climate change mitigation and adaptation. The pilot project for the renewal of the coastal zone of the Sarafovo quarter will help integrate these measures and will focus on the use of sustainable and innovative practices in urban planning.

### 3.4. Climate change

Climate change directly affects the characteristics of the urban climate and is accompanied by a series of challenges to the maintenance of functioning urban infrastructure and a favorable living environment for urban residents. This increases the need for a change in the planning of the territories with the aim of simultaneously applying two approaches -

**mitigation** /limitation to complete cessation of negative impacts, protection and restoration of habitats and biodiversity as a single ecosystem/ **and adaptation** /application of measures against already established consequences/ .

Climate change is essential in modern processes of strategic and urban planning and subsequent design phases. **Aspects such as protection, restoration and management of natural resources, reduction of harmful emissions in the components of the environment, application of modern and innovative approaches and solutions, subsequent monitoring of implementation and achieved results are covered.** Efforts are aimed at preserving nature, achieving long-term sustainability, preserving climatic comfort in the territories, protecting against the occurrence of natural disasters and related damages.

### 3.5. Climatic changes - characteristics in the context of the municipality of Burgas

According to the calculated climate change **vulnerability index** for the regions (NUTS 2) for the entire EU, the municipality of Burgas falls into the fourth group with **high vulnerability (Integrated Territorial Development Strategy for the South East Planning Region, Republic of Bulgaria<sup>6</sup>)**. The most sensitive sectors to climate change are agriculture, tourism, water resources management and forestry. **The influence of climate change is most evident in the climatic indicators of average annual temperatures, average annual precipitation, as well as in terms of the intensity of the manifestation of adverse and risky atmospheric and hydrospheric phenomena** (extremely high air temperatures in summer, flash floods).

According to the developed climate scenarios for Bulgaria<sup>7</sup> (at the National Institute of Meteorology and Hydrology, Republic of Bulgaria through simulations of the regional climate for the future, for two intervals - "near future" (2021-2050) and "far future" (2071-2100) .), an increase in the average annual temperature of about 1.5–2°C is expected in the near future and between 2.5 and 3.5°C in the distant future it is possible for the trend to change and in some parts to reach a negative trend, especially during the summer months.

The analysis of the results of the simulations with the **ALADIN 5.2 regional climate model under the RCP 4.5 and RCP 8.5 scenarios (for the purpose of developing climate change mitigation and adaptation measures and disaster risk reduction as an integral part of the Integrated Development Plan of the Municipality of Burgas for the period 2021-2027<sup>8</sup>)** for

<sup>6</sup>*Integrated Territorial Development Strategy for the South East Planning Region, Republic of Bulgaria: [Интегрирана териториална стратегия за развитие на Югоизточен регион за планиране от ниво 2, приета с РМС № 899 от 16.11.2022 г. | МРРБ \(mrrb.bg\)](#)*

<sup>7</sup>*National Climate Change Adaptation Strategy and Action Plan: [Strategy and Action Plan - Full Report - ENd3b215dfec16a8be016bfa529bcb6936.pdf \(government.bg\)](#)*

<sup>8</sup>*Integrated Development Plan of the Municipality of Burgas for the period 2021-2027: <https://plan.smartburgas.eu/wp-content/uploads/2022/01/plan-za-integrirano-razvitie-na-obshtina-burgas-2021-2027-q1.pdf>*



the future period 2023-2050 shows that in the region of the city of Burgas an **increase in surface temperatures** can be expected in all months and seasons of the year. The values of the expected rise in temperatures are highest in the summer months, with a higher probability of **"heat waves"** occurring - a prerequisite for the manifestation of the **urban heat island effect**. This trend, combined with **decreasing rainfall** during the same months, is expected to produce longer droughts than in past historical periods. There is a high probability of serious **soil moisture deficits** between the months of June and November.

For the future period, a **slight increase in average annual precipitation** (of the order of several percent) can be expected, **but with serious changes in their intra-annual distribution**. The model results for both scenarios show that during the summer months there is a steady trend towards a decrease in the average monthly precipitation amounts. At the same time, an increase in the frequency of intense rainfall during the winter period is expected (rainfall in the area of the Southern Black Sea coast is under the pronounced influence of Mediterranean cyclones), which maintains a high risk of sudden (flash) floods (today they occur with frequency from 5 to 9 cases per year).

The forecasting of climate changes for the next 100 years, obtained by applying the **ALADIN regional model**, show that in the territory of the municipality of Burgas, compared to the base period (1961 - 1990): **an increase in average annual temperatures of 3.60°C, compared to the norm (12.70°C); increase in the average number of days with maximum air temperatures above 32°C; a decrease in the number of frosty days, but an increase in those with extreme cold; reduction of the number of days with snow cover; a general increase in precipitation in the winter months and a decrease in the summer months; a decrease in precipitation by between 10 and 20%, which will lead to a significant decrease in the levels of water reserves; manifestation of short-term but torrential rains, floods and influx of water to urbanised territories and road infrastructure, activation of abrasion and landslide processes**. In the long term, drought, difficult irrigation and provision of water for domestic and economic purposes, difficulty in growing agricultural crops and a reduction in their diversity are expected. As a result, the increase in temperatures and prolonged droughts significantly increases the risk of forest fires.

According to the Flood Risk Management Plan (Basin Directorate of the Black Sea Region), the city of Burgas falls into an "area with a significant potential risk of floods". According to the National Center for Territorial Development at the Ministry of Regional Development and Public Works, between 10 and 20% of the territory of Burgas Municipality is under direct threat of flooding - this refers to the estuarine areas of the Black Sea rivers and is mainly associated with rain floods. According to the same source, the territory of interest is classified as a zone of moderate development of landslide processes. Geoprotection services register 2 active landslides in the coastal zone of the city of Burgas (one - in the area of the Sarafovo quarter, subject of the current pilot project of the Municipality of Burgas), 2 stabilised and more than 10 potential. The main reason for this vulnerability of the territory

is the geological environment, under the combined influence of urbanisation processes and sea abrasion.

The reported characteristics require the introduction of specific and feasible measures in the short- and medium-term perspective. They are aimed at sectoral policies, action plans, rules and regulations of the municipality of Burgas.

Thus, the predictive data and analyses presented make a strong case for the application of green infrastructure extension approaches and tools, and with the support of nature-based solutions, for the implementation of the project in the pilot area. These should ensure both the comfort of the public spaces in the coastal zone for local residents and tourists, as well as the prevention of adverse phenomena and destructive processes accompanying climate change that threaten the sustainability of infrastructure.

### 3.6. Key areas of influence for climate change mitigation and adaptation

Currently, a Plan for Integrated Development of the Municipality of Burgas for the period 2021 - 2027 and a Strategy for Sustainable Energy and Climate for the period 2021 - 2030 have been developed. The measures contained therein that have the most relevance to the objectives of the pilot can be summarised as follows:

- **Green infrastructure** - healthy state of vegetation; increasing the amount and degree of connectivity between all elements in and outside the urbanized territories; development of a system of green corridors and blue infrastructure; reduction of the relative share of sealed soils in existing and future spaces;

- **Decarbonization, increasing energy efficiency and introducing renewable energy sources in urban spaces and buildings.**

- **Fighting energy poverty;**

- Development of a "**green economy**" through the implementation of innovative technological and organisational approaches, incl. low-emission urban mobility - stimulation of alternative ways of moving and a new culture of urban mobility;

- Development of a "**circular economy**" on the territory of the municipality of Burgas, the district and the region with minimal transport costs and Waste management;

- **Raising awareness about climate change and the necessary mitigation and adaptation measures.** Involvement of the public in the processes of strategic and structural planning and design;

The presented measures are tied to the implementation of numerous projects on the territory of the municipality of Burgas. **Implementation and achieved results are monitored.** Reports are regularly developed, presenting a comparison of the expected and achieved results according to pre-compiled indicators.

The implementation of the pilot project for a coastal park in the Sarafovo residential area aligns with priorities and measures set in the main strategic document of the city - Plan for integrated urban development of Burgas 2021-2027 aimed at fostering climate neutrality and reducing emissions. Here's how the specific elements of the project contribute:

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## Priority 5: Burgas mobilises the territory

### Measure 5.1: Development of sustainable mobility

- **Activity: Expanding the network of bicycle lanes**  
By identifying new routes and connecting them with existing bicycle lanes, the project promotes sustainable urban mobility. Encouraging cycling reduces reliance on motorized vehicles, directly lowering greenhouse gas (GHG) emissions from transportation—a major contributor to urban emissions.
    - **Specific Contribution:** The planned expansion of cycling lanes and routes will offer a viable, low-carbon alternative for short commutes and leisure activities, thus reducing emissions and traffic congestion.
  - **Activity: Provision of public electric bicycle mobility rental options.** New electric bicycles can be made available in the pilot coastal area to support the integration of sustainable mobility options into the daily routines of residents and tourists. These publicly available bike-rental services provide infrastructure to facilitate greater adoption of cycling.
    - **Specific Contribution:** A change in the transport scheme may contribute to introducing one way streets and limiting the parking options to the park border area and also making sure parking facilities are available at nearby locations. A robust cycling infrastructure makes it easier for residents to switch to bicycles as a primary mode of transportation, thus decreasing emissions linked to fossil-fuel-powered vehicles.
- 

## Priority 6: Burgas implements green solutions

### Measure 6.4: Adaptation to climate change, prevention and risk management

- **Activity: Increasing the potential of the green system**  
The reconstruction and improvement of seaside park area and garden in Sarafovo enhances the area's green infrastructure. This directly supports urban cooling, carbon sequestration, and increased biodiversity, making the area more resilient to climate change. It also becomes an example of how green and landscape infrastructure can be implemented with nature based measures that employ climate adaptation



approaches and thus can be used as good practices, the template of which can be applied for the regeneration of other urban public or private green areas.

- **Specific Contribution:** Enhanced green systems mitigate urban heat islands, lower energy consumption for cooling, and absorb carbon dioxide, directly reducing the area's carbon footprint. Additionally, better green spaces promote active lifestyles, potentially encouraging more walking and cycling.
  - **Activity: Upgrading the water management information system**  
Installing rainfall sensors and upgrading existing water-level measurement stations improves local climate monitoring and risk management. This proactive approach minimizes risks associated with extreme weather events, such as flooding, which are exacerbated by climate change.
    - **Specific Contribution:** Early warning systems and better water management reduce the need for carbon-intensive emergency responses and ensure sustainable resource use, contributing to climate adaptation efforts.
- 

## Overall Importance of the Coastal Park Pilot Project

The coastal park project serves as a demonstration of integrated climate adapted urban and ecological development. By aligning with the broader urban strategies in Burgas:

1. **Emission Reductions:** The emphasis on sustainable transport (bicycle lanes, stations) and green infrastructure directly reduces emissions from vehicles and enhances natural carbon sinks.
2. **Climate Adaptation:** Improved parks and water management systems increase resilience to climate impacts like heatwaves and flooding.
3. **Community Engagement:** These measures encourage sustainable lifestyle changes among residents, such as opting for cycling or engaging with green spaces, further reinforcing long-term climate goals.

The project's integration into larger municipal priorities ensures its scalability and replicability, positioning Sarafovo seaside park as a climate shelter and a model for climate-neutral urban living.

## 3.7. Practices for mitigation and adaptation of climate changes

The Municipality of Burgas works actively on the topic of climate adaptation. In the following lines, good practices from other projects on which the Municipality collaborates with the National University Center "Geospatial Studies and Technologies" at Sofia University "St. Kliment Ohridski" and other institutions.

**Burgas Solar cities<sup>9</sup>:** Real smart cities and regions are those that apply technological solutions and usable science to adapt more effectively to changing climates and geographies. Through the Solar cities project, the team from Burgas Municipality and the National University Centre for Geospatial Research and Technology Sofia University "St. Kliment Ohridski" mapped and assessed the potential for electricity generation from rooftop structures in the city of Burgas, and the Bulgarian Solar Association (prepared working designs for each roof with the potential for such generation).

At the moment, there are no buildings in the pilot area and no buildings are planned. However, with the development of thematic zones within the pilot territory, the basic solutions could be applied and the capacities identified in the project could be enhanced with light structures such as canopies. In addition, there are public catering and entertainment establishments nearby, as well as residential buildings with an increasing number, which could and should generate electricity through their rooftop structures so energy efficient and renewable energy sources can also be explored and integrated in the planning, design and implementation phases of the pilot area technical investment design concept.

**Burgas Digital GeoTwin:** Digital twins of cities are one of the key tools to manage them more effectively and adapt them to changing climates and geographies. The team of Municipality of Burgas, SmartBurgas<sup>10</sup> and National University Centre for Geospatial Research and Technology at Sofia University "St. Kliment Ohridski" are actively working to make the city one of the first with a fully digitalized urban environment. With laser scanning, digital shadows have been made of the two main streets in the centre of Burgas - Bogoridi and Alexandrovska as well as part of the Sea Garden. The aim is to do this in the whole city.

...

**Selection of sites for urban landscaping in Burgas Municipality to reduce secondary dust spraying:** The research uses geospatial location analysis to examine the area of Burgas. The goal is to pinpoint suitable locations for constructing or improving green infrastructure elements to enhance natural processes for long term control of PM pollution and reduction of secondary dust. The methodology integrates 12 indicators to reveal spatial mismatches between demand needs and GI potential for ecosystem services provision. The final prioritisation of properties was conducted based on population and social infrastructure sites. The procedure entails active collaboration with the municipal government. Publicly available data and information from an integrated city platform were used. A database has been developed to support the ongoing Municipal Programme for the Improvement of Ambient Air Quality in Burgas.

**Mapping and assessment of Urban Heat Island Effect in the city of Burgas:** The aim of this study is to present the possibilities of thermal photogrammetry, carried out by an unmanned

<sup>9</sup> Burgas Solar cities: [Solar Cities Map](#)

<sup>10</sup> SmartBurgas: [Integrated Urban Platform Burgas - Smart Burgas](#)

aerial system (in determining the local climate zones (in the city of Burgas, Bulgaria This LCZ based methodological approach has been used as one of the major standards in the research practices of mapping and assessment the effects of the urban heat island phenomenon. A complex methodological approach specifically designed for the purpose of the study was applied, which includes the use of a flying wing type UAS and a specialised integrated sensor with a thermal calibrated camera and a photogrammetric one, as well as a developed scheme for the collection, processing and modelling of the data. As a result, the thermal characteristics of the surface of the individual types of LCZ on the territory of the city of Burgas were determined and specified. The latter was used as an information basis for the modelling and mapping the effect of the UHI and determining its intensity. All in situ studies were carried out after sunset, in the time interval 20:30- 22: 00 in order to eliminate the effect of direct solar radiation on the recorded temperatures of the different land cover types.

The gained expertise and data base on the topic of climate adaptation from the above-mentioned projects implemented in the territory of Burgas municipality, enables the best practices to be applied in the pilot territory. The spatial database of Sarafovo, which is being collected for the creation of the digital twin of the territory, can be expanded with the following activities:

- Thermal photogrammetry, carried out by an unmanned aerial system for mapping and assessing the effects of the urban heat island phenomenon. At the time of the development of the project, the territorial scope is centered on the compact city of Burgas and does not include the residential districts, including Sarafovo and the coastal areas in vicinity. The achieved results of the thermal photogrammetry, the realisations regarding the prerequisites for the formation of the urban heat island effect and the measures taken can also be applied in the considered territory as part of the conceptual solution. In the future upgrade of Mapping and assessment of Urban Heat Island Effect in the city of Burgas project, the territorial scope should be expanded to cover all urbanised spaces of the city, including the quarters.
- To apply geospatial location analysis for the study of the Burgas region. The aim is to identify suitable locations for the improvement and construction of green infrastructure elements. They should help to efficiently use spaces and resources, increase the quality of the environment and create conditions for full recreation, as well as improve processes to achieve climate neutrality and long-term control of pollution with fine dust particles and reduction of secondary dust (on the model of **Selection of sites for urban landscaping in Burgas Municipality to reduce secondary dust spraying** project). It is appropriate to examine the possibilities of creating a coastal park along the entire length from the Sea Garden to the Sarafovo district.



## 3.8. Influencing systemic policies, practices and behaviours

The development of large territories is an opportunity to have a significant impact on the processes of mitigation and adaptation to climate change and systemic challenges at the local level, the application of policies.

**In order to implement the investment intentions, a process of changing the current regulatory plans should be carried out.** At the present time, there are significant discrepancies between the cadastral map and the cadastral registers, the detailed development plans that have entered into force and the established boundaries of the landed properties. In the northern part of the pilot territory there are illegally increased areas of land properties. In the south, there is an increase in the width of the beach due to the accumulation of sand as a result of the construction of breakwaters to break sea waves and limit the abrasion processes. Planning and design are initial steps to ensure the possibility of implementing interventions in the selected scope.

**Spatial planning is focused on the preservation, restoration and expression of valuable natural features.** The development will support **connectivity between the linear and areal elements of the green infrastructure** and in particular coastal landscaping to the west and east, as well as landscaping in the urbanized areas to the north. The processes have a long-term perspective, due to the need to plan and enrich the existing vegetation for the construction of green corridors.

In sync with modern approaches to **climate neutrality, mitigation and adaptation to climate change**, a set of solutions should be implemented. They cover the construction of **systems for renewable energy sources**, providing the necessary energy capacity to satisfy the future consumption of the territory, the **application of nature-based solutions in all parts of the alley network and thematic zones, preventing the sealing of soils to mitigate the urban heat island effect and afforestation by including local communities.**

The management of geological risks is of leading importance for the future development of the territory. They are related to surface water removal and groundwater drainage. In view of this, systems should be built for capturing and draining rainwater at the northern border of the property, flowing from the high parts - the urbanised territories, towards the coast, similar systems at the northern parts of the alley network, as well as drainage systems according to the geological studies. In this way, constant maintenance will be ensured, and in heavy rains and protective mechanisms to prevent material damage.

Part of the planning processes are aimed at **creating conditions for changing the behaviour of the public and businesses.** They include **building an attitude towards the natural environment** with its habitats and biodiversity, **representativeness with an educational effect, local history and continuity between generations, walking and cycling** in and between recreation areas, increasing **physical activity** in everyday life, spending time outdoors, without need for consumption and others. The regulatory processes of **limiting**

**the possibilities for building and building physical and visual barriers between the landscaped areas and the beach through the construction of public facilities and parking spaces are of significant importance.** All these aspects can contribute to building a new image of the city of Burgas and a culture of behaviour to be adopted and improved by local residents and visitors.

### **3.9. Long-Term Vision and Short-Term Goals and Objectives / Next Steps**

Strategic planning in Bulgaria sets medium-term goals. It is set in the development of the Plan for Integrated Development of the Municipality of Burgas. A project was developed for the selected pilot territory in 2009, which is in need of upgrading and development to reach the modern vision.

#### **3.9.1. Plan for integrated development of the municipality of Burgas**

A leading strategic document in the planning processes at the local level is the Plan for Integrated Development of the Municipality of Burgas with a program period of 2021 - 2027. It identifies a large number of impact zones grouped by similar characteristics. The development of the pilot territory falls within the Compact Zone for Integrated Interventions "Coastal", sub-zone Coastal Alley "Compact City of Burgas - Sarafovo quarter".





According to the plan, the following **issues** have been identified that apply to the selected pilot territory:

- **Unexploited potential of coastal territories;**
- **Interrupted connection "Man - Sea"** - loss of visual, spatial and functional contact between the living, leisure and recreation environment and the water areas;
- **Gradual loss or alteration of the authenticity of the environment;**
- **Manifestation of private investment interest** in construction, placement of temporary objects and restriction of public access to territories that should be generally accessible.
- **Weak liveliness during the dark part of the day and the cold half of the year;**
- **Lack of places for prolonged stay** - conditions have been created only for transit;
- **Low levels of real and perceived safety;**
- **Availability of free land** (municipal public property) **without assigned functions** - prospective development should be consistent with the natural character of the territory and support the use of the potential of ecosystem services.

According to the plan, the following **potentials** have been identified that apply to the selected pilot territory:

- **Location** in the context of the compact city of Burgas, the municipality and at the regional level;
- **Good accessibility** on foot, by bicycle, by public transport, by car and by waterways;
- **Availability of sufficient free spaces for intervention;**
- **Possibility** of protecting the coast from construction, deterioration of the quality of the environment as a result of anthropogenic interventions of a private investment nature;
- **A land connection between two large water areas** - the Black Sea and Atanasovsko Lake, Sarafovo Port and residential areas;
- **Unevenness of the relief** - possibility of diversity of the landscape, views, observation of animal species;

Part of the plan is an Implementation Program covering Priorities, Measures and Activities with additional descriptions. The selected pilot territory is in: Priority 5: Burgas mobilises the territory. Integrated development of the territory and reduction of intra-municipal and regional differences, Measure 5.1. Development of sustainable mobility, Activity "Expanding the network of bicycle lanes" - identifying new routes and connecting them with existing ones; Construction of new bicycle stations. The main importance for the development is: Priority 6: Burgas implements green solutions. Sustainable management of urbanised ecosystems, Measure 6.4. Adaptation to climate change, prevention and risk management, Activity "Increasing the potential of the green system in terms of the vulnerability of the territory to climate change"- Reconstruction and improvement of parks and gardens located in the quarters of the city of Burgas. The same priority and measure includes the Activity

"Upgrading the water management information system" - Upgrading existing water level measurement stations with a rainfall sensor at the Fisherman's Harbor in Sarafovo quarter.

In addition to the presented activities, Priority 1: Burgas generates sustainable growth can also be considered. Accelerated development of the local economic ecosystem, Measure 1.4. Development of the sectors of the blue economy, Activity "Development of sea transport - sea taxis" - from Sea station to Fisherman's port "Sarafovo". It does not specifically affect the considered territory, but it is important for the planning of its contact ones.

### **3.9.2. Previous project for Coastal Park near Sarafovo quarter, Burgas city**

Initial attempts to design the territory were substantial in 2009, which were subsequently not realized. From the time of its completion to the present, **significant changes have occurred in terms of the vision for the territory and the needs of the public. New approaches and solutions** developed at local, regional, national and global scales that could be implemented should also be taken into account. Given this, it is necessary to develop a new project, based on the previous one and building on it in all aspects.

### **3.9.3. A modern vision for the development of Coastal Park near Sarafovo quarter**

The vision for the development of the territory is:

**Preservation, restoration and manifestation of valuable natural features, sustainable management of geological risk, improvement of the connectivity of green and blue infrastructures in the conditions of mitigation and adaptation to climate changes and increasing the quality of the urban environment**

Given the chosen vision, **the project can be defined as broad-spectrum, going beyond the standard shaping of parks and gardens.** It covers the application of innovative solutions for creating an alley network in accordance with the horizontal of the terrain, drainage of surface and underground water and application of nature-based solutions. All this points to the **need to involve a wide range of specialists and interested parties.**

As an expected result, efforts are aimed at the overall improvement of the physical environment with its natural, anthropogenic and cultural layers, saturation with multiple spaces providing a variety of sensory sensations, places of prolonged stay and social interaction, while showcasing local nature, history, culture and communities.

## 3.9.4. Next steps

In the short term, we envisage **gathering a team with various specialists** /landscape architects, geologists, urban planners, architects, ecologists, biologists, designers and others/ **to achieve a holistic approach in the planning and development of a conceptual and technical project** for the Coastal Park near Sarafovo quarter, city Burgas. At the same time, the process of **securing financial resources** from structural funds and the municipal budget is being carried out. In addition to this, the trend of active involvement of stakeholders through the organization and holding of events in all parts of planning and design is expected to continue.

The pilot project for the development of the coastal area in the Sarafovo neighbourhood of Burgas aligns well with the best practices outlined in the concept for sustainable and innovative urban planning. Key aspects of compatibility include:

### **Sustainability and Ecological Approach:**

- The project focuses on preserving and enriching natural habitats while minimizing anthropogenic impacts. It includes measures for coastal reinforcement, the creation of green spaces, and the integration of natural resources.

### **Integration and Functionality:**

- The project plans the construction of a pathway network that will connect the coastal area with urban infrastructure, including the existing cycling network, enhancing connectivity and accessibility.

### **Inclusiveness and Community Participation:**

- Public consultations and surveys have been conducted, influencing the project by reflecting the needs of local residents and visitors. This is a key element of inclusive planning.

### **Cultural Identity and Recreation:**

- The project highlights the cultural heritage of the fishing communities and the "human-sea" connection, integrating these aspects into the spatial design. Recreational, sports, and cultural facilities are planned.

### **Nature-Based Solutions:**

- Initiatives include planting resilient plant species to strengthen soil and minimize erosion. Protective measures for the natural resources in the area are also integrated.

### **Digital Integration:**



- The municipality already has a Geographic Information System (GIS) and urban management platforms in place, which can be used for project management and optimization.

## Objectives

1. Develop an integrated coastal area that provides recreation, cultural, and environmental benefits for the community and visitors.
  2. Strengthen natural and infrastructural features to protect against environmental risks.
  3. Enhance accessibility and functional connectivity with the existing urban and transport network.
- 

## Phases and Activities

### Phase 1: Analysis and Preparation (0-6 months)

1. Detailed Area Analysis:
  - Mapping natural risks (erosion, landslides, abrasion).
  - Assessing existing infrastructure (water, electricity, accessibility).
  - Surveying community needs and attitudes through additional questionnaires and public consultations.
2. Regulatory and Project Preparation:
  - Confirming the status and intended use of land parcels.
  - Developing an updated Detailed Development Plan (DDP) including green zones and functional connections.

### Phase 2: Infrastructure Enhancements (6-18 months)

1. Establishing Core Infrastructure:
  - Building coastal protection structures against erosion and abrasion.
  - Installing a drainage system for stormwater management.
2. Improving Accessibility:
  - Constructing a primary network of pedestrian and cycling paths.
  - Ensuring transport links to Republic Road I-9 and the city of Burgas, including public transport integration.
3. Technical Infrastructure Installation:
  - Connecting the area to electricity and water supply networks.
  - Installing street lighting.

### Phase 3: Landscaping and Social Areas (18-36 months)

1. Creating Green Spaces:
-

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- Planting local, resilient plant species.
  - Establishing picnic areas, playgrounds, and outdoor fitness zones.
  - 2. Cultural and Educational Initiatives:
    - Setting up an information center or museum dedicated to Atanasovsko Lake and biodiversity.
    - Organizing green corridors connecting the area with nearby nature reserves.
  - 3. Urban Furniture Installation:
    - Benches, gazebos, and trash bins.
    - Constructing an observation tower for views of the sea and the lake.
- 

## Phase 4: Service Development and Long-term Maintenance (36+ months)

1. Developing Tourist Services:
    - Organizing water-based activities and sports.
    - Incorporating local businesses such as cafes, restaurants, and souvenir shops into the area.
  2. Establishing a Management System:
    - Appointing a team to maintain the area.
    - Introducing platforms for citizen feedback.
  3. Monitoring and Adaptation:
    - Utilizing digital tools to monitor the state of infrastructure and ecosystems.
    - Adapting the area to meet changing community needs and environmental conditions.
- 

### Expected Results

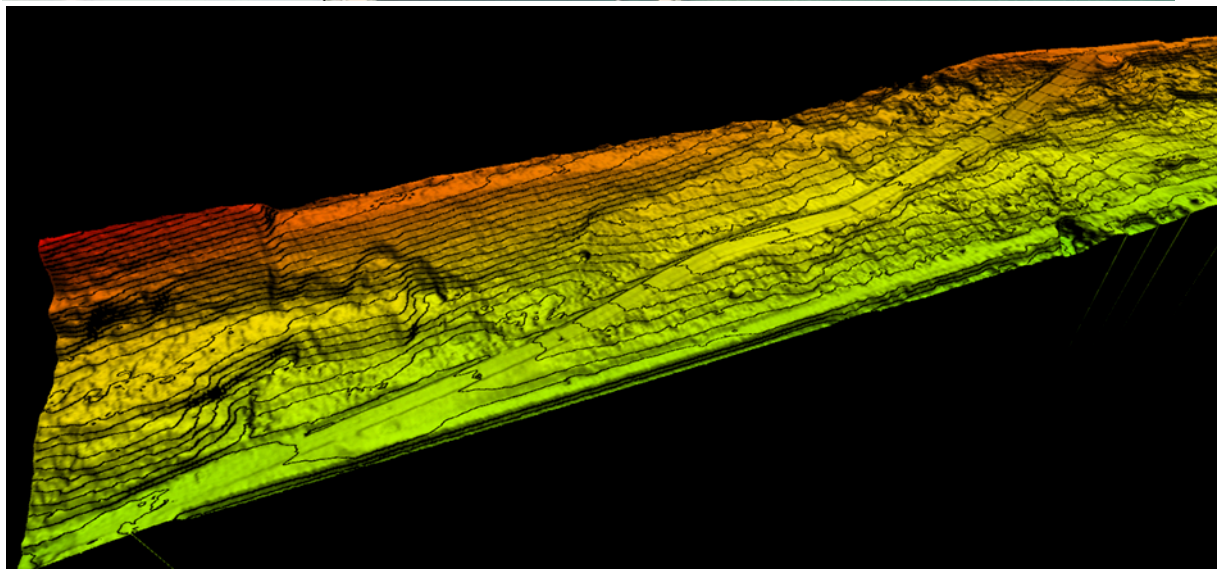
1. A sustainable and accessible coastal zone with increased appeal for visitors.
2. Reduced environmental risks through effective engineering and nature-based solutions.
3. Improved quality of life for the residents of Sarafovo and surrounding areas.

## 3.10. Process of re-evaluating the coastline

Ground and aerial laser scanning with LiDAR technology was performed within the boundaries of the considered territory. The approach differs from the previously performed aerial photogrammetric survey, the main purpose of which is the preparation of a 3D model and an orthophoto map of the current state of the territory. Based on the laser scanning, data was collected both on the vegetation and the current state of the environment, as well

as extremely important data on the terrain, which is impossible with other technology. Thanks to this data, a precise digital model of the terrain has been prepared with high accuracy, which will enable its detailed visualisation and analysis of parameters such as the slope of the slope, its exposure and others.

**Fig. 26. Visualisation of laser scanning with LiDAR technology of the pilot territory, 2024,**  
Source: Sofia University "Saint Kliment Ohridski"



**Fig. 27. Visualization of laser scanning with LiDAR technology of the pilot territory, 2024,**  
Source: Sofia University "Saint Kliment Ohridski"

The images show the current state of the terrain under the overgrown tree and shrub vegetation in the area. For clearer readability in the images, the model is colored relative to



the altitude and horizontals have been added every 1 m, showing the complex nature of the territory.

## 3.11. Objectives within the framework of the Re-Value project

Our specific objectives include **realising the valuable features of the pilot territory** through the analysis, **discovery and adaptation of appropriate effective, innovative and sustainable approaches and solutions**. They are aimed at achieving climate neutrality, mitigating and adapting to climate change, creating socially inclusive spaces. Through integrated planning, we aim to develop **models that balance the interrelated environmental, social and economic aspects**. Part of the project includes the **creation of a Detailed Roadmap for the Waterfront Pilot in Burgas for the future development of the territory /current part of REVALUE project/**, which will be a kind of basis for the long-term sustainability of the coastal areas in the municipality of Burgas.

To achieve our goals, we rely on the partnership with the participants of the Re-Value project, which contributes to the exchange of wide-ranging expertise, good practices and experience. Also, a valuable part of the process is the **acquisition of knowledge and skills for involving stakeholders**, encouraging the sharing of their views and wishes and their reflection in the project.

## 3.12. Stakeholders

### 3.12.1. Stakeholder groups

For the creation of the vision, goals and objectives of the project related to the coastal park in Sarafovo, a variety of stakeholders from different fields are involved. Here is a brief description of the main actors involved in the process:

#### Local authorities and institutions

**The Municipality of Burgas** plays a key role in the management and coordination of the project, including through specialised departments such as the "Economy and Business Activities"

**Directorate: Responsible for supporting the economic development of the municipality**, including by stimulating investments, developing local business and supporting strategic projects, which influence the economy of the region. It supports projects related to the blue economy, tourism and sustainable use of coastal resources.

**Directorate of Tourism:** Main partner in the promotion of sustainable tourism, including ecological and cultural tourism. It is working on improving the tourist infrastructure and

promoting the coastal park project as part of the wider strategy for the development of tourism in Burgas.

**Directorate of Ecology and Environmental Protection:** Responsible for the protection of natural resources and biodiversity in the region. It works on the integration of nature-based solutions to mitigate climate change and adapt urbanized areas to changing climate conditions. It coordinates with other environmental organizations to ensure the sustainable development of the territory.

**Directorate of Territorial Development:** Plays a key role in urban planning and the development of infrastructure projects related to the improvement of the coastal zone. Responsible for the implementation of regulatory and development plans in sync with the vision for the coastal park.

**Directorate of Culture and Education:** Promotes the inclusion of cultural and educational elements in the project, such as places for cultural events and outdoor educational programs aimed at protecting the environment and cultural heritage. Works with local schools and universities to organize educational initiatives within the project.

**Directorate of Strategic Planning:** Responsible for coordinating strategic projects related to the sustainable development of Burgas, including finding funding from European funds. Promotes the application of innovative approaches in urban planning, based on the principles of sustainability and climate neutrality.

**Burgas Municipal Council,** which makes the key decisions and approves the strategic plans.

### **Scientific and academic organizations**

Academic institutions such as the National University Center for Geospatial Research and Technology at Sofia University, which provide scientific support through research and consultancy on sustainable development and climate change. Burgas Free University and other research organizations that play a role in consulting and training activities.

### **Non-governmental organizations**

Organizations such as "Green Strandzha", Bulgarian Biodiversity Foundation and other environmental NGOs that focus on protecting biodiversity and natural resources. Local fishing and conservation groups such as FLAG Burgas-Kameno and "Green Balkans", which are involved in promoting the blue economy and the sustainable use of marine resources.

### **Local communities**

Citizens and local residents who participate in the discussions and give their suggestions and opinions regarding the planning of the territory and functional solutions. Representatives of the tourism sector and local businesses, including tour operators, hoteliers and restaurateurs, who are affected by changes in the coastal area.

## **Business and economic actors**

Investors and representatives of the tourism and fishing sectors who focus on the development of the blue economy, including aquaculture and sustainable tourism. The Burgas Airport and the ports, which are interested in improving the connectivity and transport possibilities of the area.

## **Cultural and sports organizations**

Local cultural institutions and creative industries that can be involved in the development of the space with cultural and social events. Among these are the Center for Contemporary art and Library, Cultural center "Sea casino", Expo center "Flora" and the Youth international center. Sports clubs that offer active leisure initiatives such as sailing and water sports.

The process of creating the vision and objectives involved extensive consultation with all these groups to ensure maximum public participation and engagement.

### **3.12.2. Stakeholder's consultation**

#### **Nature Based Solutions workshop, part of Re-Value Project**

A variety of solutions and recommendations for the Sarafovo quarter Coastal Park were proposed by the four working groups during the Nature Based Solutions workshop and presented on the third day of the working visit to Burgas in 12 – 14 June 2024. Recurring themes between the groups highlighted the desire that the park keep it "natural" and use nature-based solutions to stabilise soils, implement non-invasive, low-impact solutions to improve pedestrian access to the beach, preserve perennial trees and vegetation, remove invasive species, ensuring natural air conditioning of the park by promoting marine air corridors, improving viewpoints and limiting sealed surfaces, and particularly unregulated parking adjacent to the beach.

Participants in the groups also emphasised that planners and designers need to look at the site from a more holistic/systemic perspective, taking into account the connections (mobility, bluegreen infrastructure, etc.) transport connectivity from the site to the city centre, the international Burgas airport / highway, and the Sarafovo quarter itself.

During the workshop on Eco-friendly solution ideas on Day 2, four groups combined their learning and impressions to fill Sarafovo Marine Park with eco-friendly solution ideas on large printed maps. The proposals from each group are summarised below.

In general, the participants united on the following challenges facing the territory:

- Abiotic factors - present erosion processes on the coast
- Soil-climatic conditions - unfavourable wind regime (increases evaporation and dries the soil, periods of drought with months without rain, extreme rains (and storms), illegal dumping of waste → uncompacted soils, unregulated parking → soil compaction



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topography: steep slope conditions; presence of large trees that can contribute to the worsening of landslide processes

- Sealed surfaces at the top of the slope → strong runoff that erodes the soil.
- Increased infiltration required
- Lack of underground water
- Lack of recreational facilities/inaccessibility of the natural environment for people
- Biotic factors - presence of invasive species and management of their spread in (protected) surrounding areas.

The participants proposed the following solutions to the challenges and problems in the territory.

**Table 1. Working groups and Solutions, Nature Based Solutions workshop**

Group	Challenges, Solutions and Ideas
Group 1	<ul style="list-style-type: none"> <li>• Preservation of trees - playgrounds and other uses under the tree canopy. Integrating the facilities into nature there.</li> <li>• Construction of roads without asphalt pavement, use of alternative materials /e.g. porous pavement.</li> <li>• Increasing permeability at the top of the hill so that water infiltrates and there is less runoff.</li> <li>• Creating accessible winding routes.</li> <li>• Terracing of the slope (where possible without cutting down trees or by removing invasive species, if this creates walls, we must make them green, vertical growth of plants above the walls)</li> <li>• Creation of a centralized parking lot under the trees for shaded parking and incl. on electrified transport with a small train to the park</li> <li>• Construction of natural sports facilities that are missing in Sarafovo, e.g. rope park</li> <li>• Space for cultural events</li> <li>• Construction of ditches on the road</li> <li>• Retention basins with multiple functions (sports fields, also parking lots)</li> <li>• Use of drought-resistant plant species</li> <li>• Natural attractions</li> <li>• Tree houses for children, bird and bat houses, insect hotels</li> <li>• Ecological educational paths, educational zones, for outdoor lessons in schools.</li> <li>• Construction of an amphitheater on the site with the steepest slope, covered with trees for shade</li> </ul>

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## Group 2

- The territory as a natural resource is already special and should be preserved as a natural resource and improved through specific changes, but not differentiated. Conservation as a natural resource.
  - It is important to improve connectivity with the city center and the airport, as well as green infrastructure links.
    - Lack of amenities in the quarter (50% villas of outsiders and 50% locals living there permanently.)
    - Need for community needs assessment.
    - Keeping the peace and quiet of the beach
    - Moving the parking out of the center of the site
    - Use it in the "salt house model" (referring to the neighboring Lake Athanasius)
      - Removal of invasive plant species and replacement with sustainable ones that stop landslides and erosion.
      - The territory should be adaptable to the future climate
      - Capturing some of the cooling sea breezes: selective thinning or other concepts.
        - Following the example of other parts of the city, the presence of a transect from the city with traffic and parking there, but then a green park and beach with no parking options on the beach.
          - Creation of the vision for Burgas in the long term

## Group 3

- Connectivity to the city center is essential.
- The park should be as wild and natural as possible and less urbanized than the city park in the center.
  - Exclusion of parking spaces in Sarafovo marine park and use of alternative transport - boats or electric trains to bring people from the center (and bicycles).
    - Improving the quality of the quarter by providing a more natural environment, creating green corridors within the quarter, providing tree-lined streets, limiting two-way traffic on some of the streets.
      - Nature interpretation and education sites (insect hotels, etc.)
      - Creating amenities for social gatherings.
      - Creation of amenities and facilities such as multifunctional wooden structures (as in the central park in Burgas) for shade, etc.
      - Strengthening the seashore from coastal erosion with suitable vegetation
        - A "low intensity site" that is primarily for residents. And tourists who come to this place should expect that this is a place where they are close to nature.

	<ul style="list-style-type: none"> <li>• Inclusion of bio-accounts and other catalog NBS in Sarafovo quarter.</li> <li>• A community-run park</li> <li>• Solutions for viewing animals in the forest, not an intensive tourism environment.             <ul style="list-style-type: none"> <li>• Natural rest areas along the cycle path from Burgas to Sarafovo for shade and recovery, placement of local art along the way.</li> <li>• Added movable trees in the port area.</li> <li>• Venues for concerts and social gatherings</li> <li>• Increasing safety: public lighting, etc.</li> </ul> </li> </ul>
<b>Group 4</b>	<ul style="list-style-type: none"> <li>• The area should be conceptualized as larger to include the beach and parts of the sea and parts of the quarter.</li> <li>• The assessment of the needs of the local community</li> <li>• Creating more zig zag paths instead of steep paths, more inclusive for the elderly etc.             <ul style="list-style-type: none"> <li>• Calm outdoor pool protected from larger waves.</li> <li>• Placing trees in the marina as there is mostly concrete (mobile or fixed trees).</li> <li>• Electrically independent marina, e.g. installation of photovoltaics.</li> <li>• Preservation of the wild appearance of the area</li> <li>• Creating wind corridors to bring the sea breeze into the quarter.</li> <li>• Connection to other parks in the quarter.</li> <li>• Possible construction of a green parking lot for people who come there with children to walk and to the beach), but also more bus connections per day, so the connection to public transport is easier.                 <ul style="list-style-type: none"> <li>• Landslide risk analysis (LIDAR data etc.) to see what can be done where.                     <ul style="list-style-type: none"> <li>• The largest oil refinery in the Balkans is in Burgas. The oil tankers etc. they have to leave after a while. The project can contribute (in small parts) to these larger changes. Many of the conditions in the area will change. Prepare the area for these shifts as well.</li> </ul> </li> </ul> </li> </ul> </li> </ul>

## Impact Model Workshop

Regarding the deeper engagement of local stakeholders, residents and visitors, a workshop was held with stakeholders to better understand their needs and desires, sharing suggestions during the local workshop on impact models. It was organized on 11 June 2024. On this last point, an important step in supporting the Municipality of Burgas to identify (new) ideas and networks for the joint design of the Sarafovo Marine Park was taken in the form of a Workshop on an Impact Reassessment Model. Many local stakeholders were brought



together, sharing their visions, concerns and ideas for the future of the Marine Park. Local residents, the territorial mayor, architects, engineers, concessionaires participated. Participants remained highly segregated in their occupational groups, indicating that they "speak different languages".

- Concessionaires advocated for the construction of parking lots, as they feared that their absence might turn people away.

- The architects proposed to do it slowly, stage by stage. First to start with parking lots away from the beach, to do pilot tests, and in time to introduce electric vehicles.

- Scientists pointed out that the gulf is young and there are terrestrial activities and movement there, the activities must happen step by step. Not to develop everything at once, but to start with a part and make intermediate assessments.

- Locals suggested to have attractions like zip lines in the forest, adventure park type rope attraction place for cultural events like amphitheatre, archaeological dig area etc.

### **Innovation camp for students in cooperation with Junior Achievement Bulgaria**

Young people also got involved in generating concepts for the development of the territory by participating in Innovation camp. It was organised in the period between 8 and 9 June 2024. As a result, participants presented many interesting innovative ideas such as creation of Eco park showing the regional biological diversity, taxi boat, youth park, use of sheep wool for insulation, panoramic birdwatching sites, educational sightseeing boat tours and others.

## **3.13. Stakeholder Engagement Structure**

The success of the Burgas Waterfront Pilot relies on active stakeholder engagement, ensuring the project aligns with the needs of local communities and relevant experts. A comprehensive engagement process was initiated in early 2023 to involve key stakeholders, including local authorities, academic institutions, non-governmental organisations (NGOs), businesses, and citizens.

### **3.13.1. Key Stakeholders**

- **Local Authorities:** Representatives from the Burgas Municipality, including urban planners and environmental departments, provided input on regulatory frameworks and strategic planning.

- **Academic Institutions:** Sofia University and Burgas Free University contributed scientific expertise on environmental impact, sustainability practices, and climate adaptation strategies.

- **Non-Governmental Organizations:** Local environmental NGOs such as "Zelena Strandja" and the Bulgarian Biodiversity Foundation were involved in shaping the project's approach to biodiversity and conservation.

- **Business Community:** Local businesses, particularly those involved in tourism and fisheries, provided insights into the economic impact of the pilot and how it could support local industry.

- **Local Communities:** Community consultations included surveys, focus groups, and public forums to gather feedback on design proposals, ensuring the park reflects the needs and preferences of residents.

### **3.13.2. Engagement Process**

Several workshops, forums, and surveys were conducted between June and July 2024 to collect input on specific project components. These sessions allowed stakeholders to provide feedback on key themes such as climate adaptation, sustainable mobility, and nature-based solutions. The feedback gathered has been instrumental in refining the design and ensuring the project balances environmental and socio-economic objectives.

### **3.13.3. Stakeholder Feedback and Influence**

- **Environmental Conservation:** NGOs emphasized the need to preserve existing habitats, resulting in a stronger focus on protecting local biodiversity and integrating nature-based solutions.

- **Economic Development:** Input from the business community highlighted the importance of promoting eco-tourism, leading to the inclusion of spaces for small-scale cultural and ecological tourism activities. The business community in the face of the concessionaire of the beach emphasized the need for parking spaces near the beach

- **Community Needs:** Residents expressed the desire for more recreational green spaces, influencing the expansion of pedestrian zones and the inclusion of educational and social areas within the park.

### **3.13.4. Future Engagement**

Stakeholder engagement will continue throughout the project's lifecycle, with regular updates and opportunities for input during the design and implementation phases. The project team will host quarterly meetings with stakeholders to ensure ongoing collaboration and adaptation based on evolving community needs.

## 4. Re-Valuing Burgas Waterfront Pilot

In the context of the development of modern cities, coastal areas are of extreme importance. They are characterized by a richness of habitats and biological diversity, they provide the connection between beaches and urbanized areas, but they have a high vulnerability to natural and anthropogenic interventions and a set of geological risks with complex management. In view of all these factors, the development of the pilot territory - Coastal Park near Sarafovo quarter, Burgas city - was purposefully chosen. Planning requires careful consideration of the natural features of the territory to emphasize them and create a unique and recognizable character. Part of this includes achieving harmony between nature and infrastructure. The balance between functionality and aesthetics is a guiding principle in the design of spaces that are not only accessible and comfortable to use, but also create a feeling of connection with nature. Achieving these aspects requires first an awareness of the landscape features that directly influence the formation of the infrastructure and the overall appearance of the park.

### 4.1. Relief and Spatial solution approaches

The horizontals of the relief forms and their heights are of decisive importance for the structuring of the alley network and the shaping of thematic spaces. Possible approaches to make this happen are:

#### Approach 1: Alley network laid along the horizontals

- Free, natural geometry of the alley network;
- Overall unstressed traffic for pedestrians and cyclists;
- Less amount of degenerate agents;
- Light load on the ground base; Possibility of using natural materials for the alley network - stone, wood.

#### Approach 2: Alley network laid independently of the horizontals

- Strict imported geometry of the alley network;
- Partial traffic for pedestrians and cyclists;
- Greater amount of construction funds;
- Heavy load on the ground;
- Requirement to use unnatural materials for the alley network - iron, concrete.

It is appropriate for the majority of the avenue network to be planned and designed using Approach 1. This will allow unencumbered pedestrian and cyclist movement as well as accessibility for disadvantaged people.



## 4.2. Thematic zones

To achieve sustainability, harmony, and ongoing interest and visitation, the park will represent a combination of thematic zones. These encompass the proposals generated from the Impact Model Workshop and field activities with participants from the Re-Value project.

Among the planned thematic zones are:

- **Panoramic terrace** for landscape viewing;
- **Zone for prolonged stays and social interaction** among people of different age groups and interests;
- **Zone for children's playground**—thematic and educational. These will support the transition from conventional information zones for children to gamified areas for ecological and nature-friendly education, fostering interest, easy comprehension, and long-term retention of information;
- **Zone for sports playground;**
- **Zones of natural vegetation** (high, medium, and low), including corridors with landscaped arches;
- **Zone for afforestation;**
- **Botanical gardens and aroma gardens;**
- **Water features and effects;**
- **An outdoor cultural events zone with terraced seating and stage** /small celebrations/;
- **Zones for presenting local life and history**—fishing, crafts, local fishing communities;
- **Zone for local craft products and foods** /temporary/;
- **Zone for observing the natural environment, plants, and animals;**
- **Zone for ecological education and practice of nature - based solutions;**
- **Zone for science of geography, geology. climatology.** Technological systems for monitoring natural components and biodiversity, including demonstration zones;
- **Zone for practice by students** in artistic disciplines /Schools, Art centres and National Academy of Art - Burgas/;
- **Zone for rope construction** for children and adults;
- **Zone for extreme aerial sports**—takeoff and landing;
- **Zone with Monuments;**
- **Zone for picnic;**
- **Zone for meditations** /with small water feature/;
- **Zone with board games** with massive (marble) tables;
- **Zone for off-leash dogs**—comprehensive facilities, benches, a shelter, and a drinking fountain for dogs;
- **A bridge** over the stream in the eastern direction;
- **Zone for temporary exhibitions;**

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- **Zone for bicycle rental;**
- **Zone for parking personal bicycles;**
- **Zones for parking personal cars** parallel to “Black Sea” street in the urbanized areas of Sarafovo;
  - Others in accordance with the terrain's contours and natural characteristics for their expression.





- Zone for prolonged stays and social interaction
- Zone for children's playground
- Zone for sports
- Botanical gardens / Aroma gardens
- Outdoor cultural zone with terraced seating and stage
- Zone for presenting local life and history
- Zone for observing the natural environment, plants, animals
- Zone for ecological education and practice of nature - based solutions
- Zone for science of geography, geology and climatology. Technological systems for monitoring
- Zone for practice by students in artistic disciplines
- Zone for rope construction
- Zone for extreme aerial sports
- Zone for picnic
- Zone for meditations
- Zone for off-leash dogs
- Bridge
- Zone for temporary exhibitions
- Zone for bicycle rental / Zone for parking personal bicycle

Pathways

0 0,05 0,1 0,2 0,3 0,4 Km



# Thematic zones - West part

## Re-value

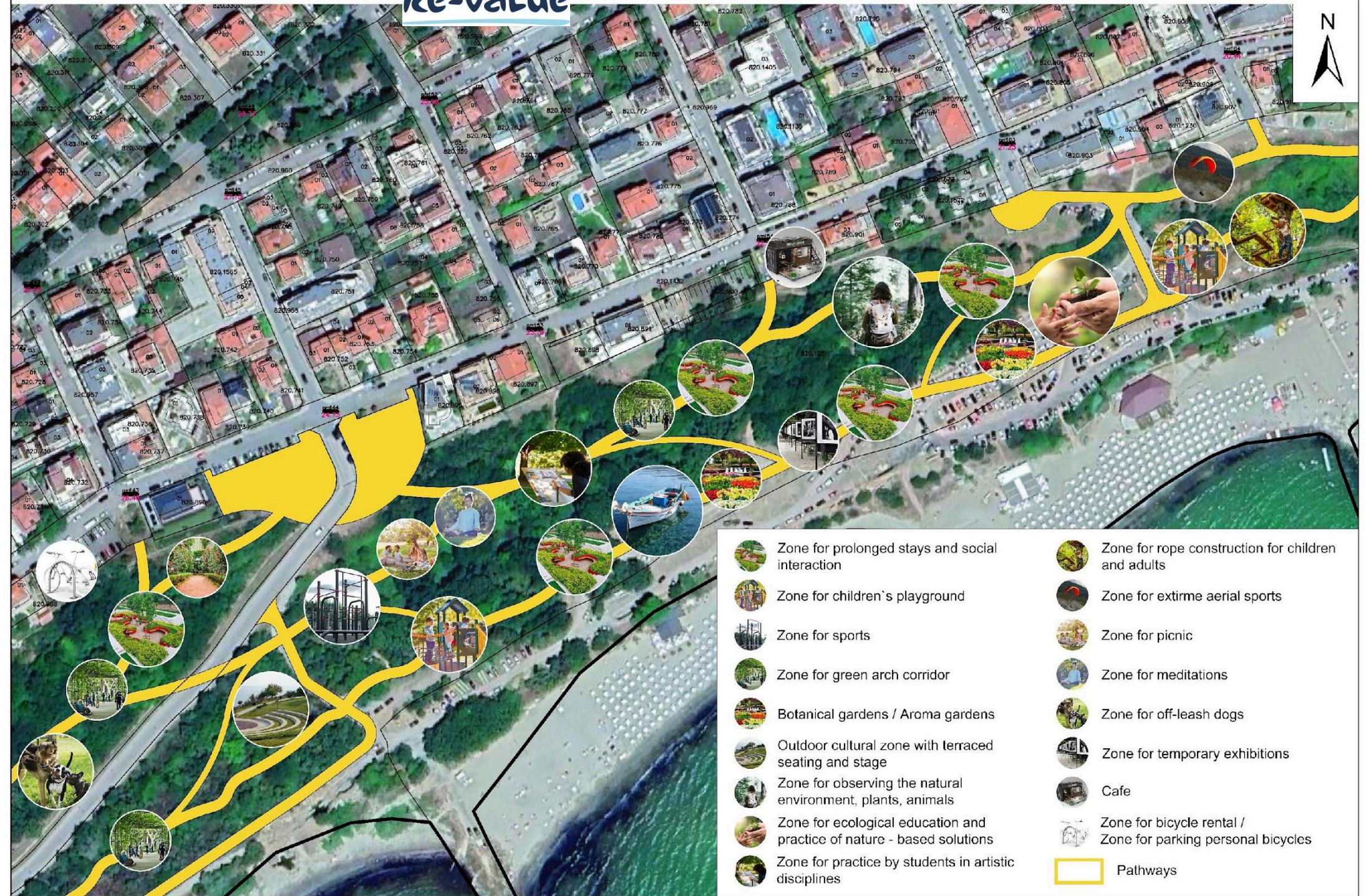




















- Zone for prolonged stays and social interaction
- Zone for children's playground
- Zone for sports
- Zone for green arch corridor
- Zone for green terrace corridor
- Botanical gardens / Aroma gardens
- Outdoor cultural zone with terraced seating and stage
- Zone for observing the natural environment, plants, animals
- Zone for ecological education and practice of nature - based solutions
- Zone for science of geography, geology, climatology. Technological systems
- Zone for picnic
- Zone for meditations
- Zone for off-leash dogs
- Zone for bicycle rental /  
Zone for parking personal bicycles
- Pathways



# Thematic zones - Central part

## Re-value



-  Zone for prolonged stays and social interaction
-  Zone for children's playground
-  Zone for sports
-  Zone for green arch corridor
-  Botanical gardens / Aroma gardens
-  Outdoor cultural zone with terraced seating and stage
-  Zone for observing the natural environment, plants, animals
-  Zone for ecological education and practice of nature - based solutions
-  Zone for practice by students in artistic disciplines
-  Zone for rope construction for children and adults
-  Zone for extreme aerial sports
-  Zone for picnic
-  Zone for meditations
-  Zone for off-leash dogs
-  Zone for temporary exhibitions
-  Cafe
-  Zone for bicycle rental / Zone for parking personal bicycles
-  Pathways



# Thematic zones - East part

## Re-value



- Zone for prolonged stays and social interaction
- Zone for children's playground
- Zone for green terrace corridor
- Botanical gardens / Aroma gardens
- Zone for ecological education and practice of nature - based solutions

- Zone for rope construction for children and adults
- Zone for extreme aerial sports
- Zone for bicycle rental /  
Zone for parking personal bicycles
- Pathways



As concomitant necessities in the development of the park are the achievement of high levels of real and tangible safety and the creation of conditions and interest for year-round functioning. These include the construction of lighting, appropriately shaped and marked paths, convenient for parents with strollers and people with limited physical capabilities, video surveillance. In terms of striving for year-round visitor attraction, the park will offer a variety of year-round and seasonal activities suitable for the diverse local climatic conditions. These include festivals, days of local crafts and artisan products, as well as educational programs related to nature, biodiversity and sustainable development. In this way, the park will become a center of attraction for social, cultural and educational interaction in all seasons.

### 4.3. Structural challenges

For the **Waterfront Pilot** in Burgas, the integration of “Re-Valued” components under the framework of the **2030 climate-neutrality target**, the **New European Bauhaus principles** (inclusion, beauty, sustainability), and **Re-Value's six systemic challenges** offers a comprehensive approach to ensure that the project addresses both spatial and non-spatial elements. Below is a structured response based on these elements.

#### 4.3.1. Systemic Changes in Governance, Regulatory Structures, and Advocacy

There are several structural challenges that affect the implementation of the Waterfront Pilot actions and portfolio in Burgas Municipality. These challenges can delay or complicate the processes of realization and achievement of project objectives.

#### 4.3.2. Main structural challenges

**Cumbersome administrative processes:** One of the main problems is the slow and complicated administrative procedure for issuing permits and approvals for construction activities and implementation of new technologies. The lack of coordination between different management levels (local, regional, national) leads to delays in project implementation. A key change is the effort to establish a collaborative governance model that includes public, private, and civil society stakeholders. This model ensures inclusive decision-making processes and is aligned with climate-neutrality goals.

**Policies and Regulations:** The regulatory framework at national level needs to be updated to include incentives for sustainable urban projects and the promotion of green innovation. The existing regulatory frameworks are being re-evaluated to encourage faster implementation of sustainable solutions, including the removal of barriers related to zoning and permits for renewable energy infrastructure and green spaces.

**Lack of access to finance and markets:** Despite the availability of various European funding programmes, limited resources at local level and the difficulty of accessing funding through public-private partnerships are also a challenge. Many projects rely mainly on European grants, without sustainable long-term funding mechanisms. It is recommended to develop innovative financial instruments and improve the capacity of the municipality to attract private investments.

**Institutional capacity and governance:** The lack of specialised personnel and expertise makes it difficult to plan and implement new technologies. To overcome this problem, it is necessary to invest in training and building expert capacity in the administration, including the adoption of international best practices.

**Political will and advocacy:** The successful implementation of large-scale projects such as the Waterfront Pilot in Sarafovo requires strong political support at all levels. Active advocacy at both local and national levels for the adoption of new regulations that support sustainable urban development is essential. The municipality is working on promoting nature-based solutions and green infrastructure within the national policy framework. A strong advocacy role on the part of the Municipality of Burgas before the national authorities and international institutions is needed in order to speed up the approval processes and ensure political support for the sustainable initiatives.

## 4.4. Cultural and Spatial Quality

The Waterfront Pilot is guided by the **New European Bauhaus principles of inclusion, beauty, and sustainability**, ensuring that the urban transformation enhances the aesthetic and functional quality of public spaces. The design integrates multifunctional spaces that serve diverse community needs, including spaces for recreation, education, and social interaction, enhancing both the visual and cultural landscape.

**Cultural heritage** is respected through the incorporation of elements that celebrate the region's historical and environmental identity. Digital tools are used to create interactive experiences, including augmented reality platforms that highlight the history and biodiversity of the waterfront.

**All spaces should be developed in a single composition, and their constituent elements - in a single design appearance, without intrusiveness in the environment.** Original urban furniture will be designed, created using natural and local materials in unity with the spirit of the coast. **They should be of high quality and resistant over time and exposure to atmospheric influences. The park will have a distinctive character, highlighting the natural environment with its elements of green and blue infrastructure, vegetation and biodiversity.**

In addition to this, efforts will be made to **preserve the local appearance of the territory**. Emphasis will be placed on the **expression of fishing culture and history**, which is an integral part of the area's identity. Thematic spaces will be **created with installations that tell the story** of the local fishing communities, their traditions and crafts, such as weaving nets and making fishing lures, fishing rods and other tools. These elements will not only preserve the cultural heritage of the area, but also attract visitors through interactive demonstrations and exhibitions to engage local residents and visitors to the park and city. All this will help to achieve **continuity between generations**.

## 4.5. Financial and Circular Value Chains

The project actively promotes **circular economy principles**, particularly in the construction and management of urban infrastructure. This includes the use of locally sourced, sustainable materials in the construction of public amenities and the recycling of construction waste.

Financing mechanisms combine **public funds** (municipal and EU programs) with **private investments** through public-private partnerships (PPP), ensuring the financial sustainability of the project. The **EU's Green Deal and Horizon Europe** are key sources of funding, while innovative financing mechanisms, such as green bonds and climate funds, are also being explored.

Additionally, efforts are being made to foster local circular economies by promoting **green entrepreneurship** and integrating sustainable business models into the waterfront's economic ecosystem, including tourism, sustainable fisheries, and aquaculture.

## 4.6. Data-Driven Co-Creation

The Waterfront Pilot leverages **geospatial and environmental** data collected through **drone photogrammetry and laser scanning** (as mentioned in the project documentation), allowing for precise monitoring of environmental conditions such as erosion, water levels, and vegetation cover.

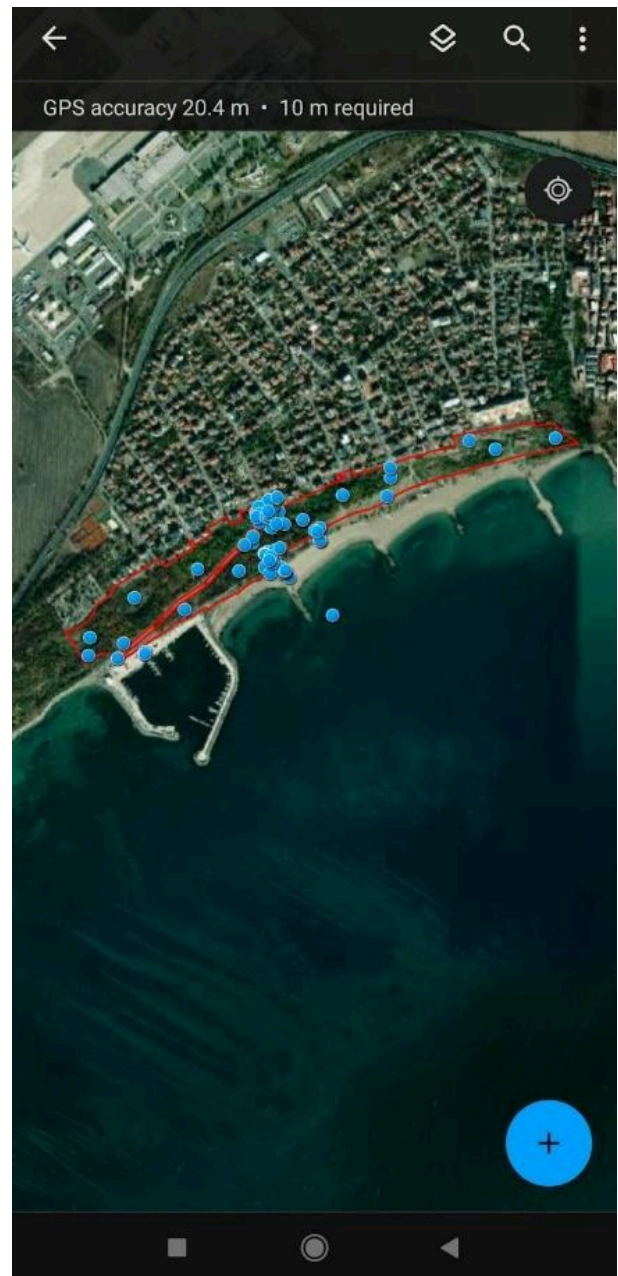
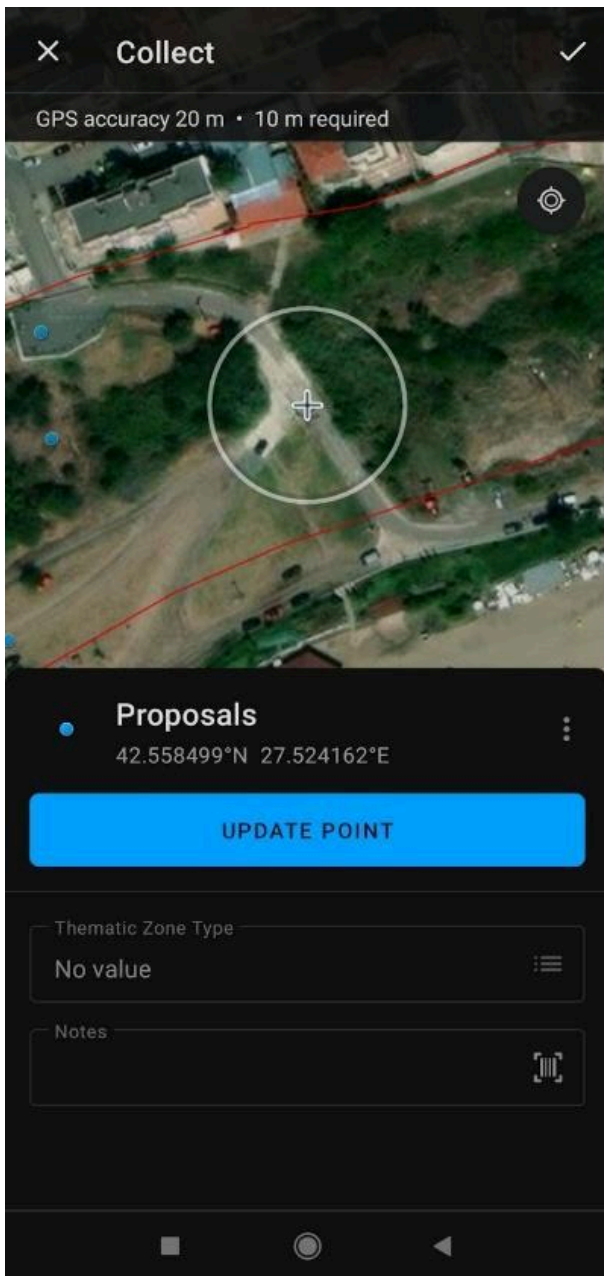
Co-creation is a key principle, with regular **public consultations** involving local residents, businesses, and NGOs to gather input and collaboratively shape the design and functionality of the waterfront. **Data-driven platforms** enable transparent decision-making and allow for **real-time feedback** from the community on environmental conditions and the use of public spaces.

**Digital twin technologies** are being explored and demonstrated during the Innovation cycles to simulate different urban planning scenarios and predict the impact of climate interventions, helping to optimize long-term sustainability goals.



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On 12.06.2024, with the use of a pre-created web GIS application (Fig. 28. and 29.), a field exercise was carried out with the main goal of participants in the REVALUE project (Fig. 30.) having the opportunity to give ideas for design and, accordingly, future development of the project territory. Each proposal is marked on the ground using the GIS mobile application and its ability to record the GPS position of the user. Proposals for the development of the project area are predefined as a drop-down list, and also the exercise participants are provided with the opportunity to give their own suggestions as notes.





**Fig. 30. Short briefing before the field exercise, Source: Sofia University “Saint Kliment Ohridski”**

As a result of the field exercise, a total of 93 proposals were made. The results of the exercise are presented in the form of a table.

**Table 2. Types of proposals, field exercise part of Re-Value project**

Type of proposal	Count
No data	8
Panoramic terrace	10
Zone for prolonged stays and social interaction	2
Zone for children's playground	2
Zone for sports playground	7
Green arc corridor	3
Zone for afforestation	4
Botanical garden and aroma garden	4
An outdoor cultural events area with terraced seating and stage /small celebrations/;	1

Zone for presenting local life and history - fishing, local fishing communities	1
Zone for local craft products and foods	1
Zone for observing the natural environment, plants, and animals;	1
Zone for ecological education and practice of nature - based solutions	1
Zone for science of geography, geology, climatology. Technological systems for monitoring natural components and biodiversity, including demonstration zones	1
Zone for practice by students in artistic disciplines /Schools, Art centres and National Academy of Art - Burgas/	2
Zone for rope construction for children and adults	1
Zone for extreme aerial sports	1
Zone with Monuments	2
Zone for picnic	9
Zone for meditations /with small water feature/	4
Zone for off-leash dogs	1
Zone for temporary exhibitions	1
Zone for bicycle rental	4
Zone for parking personal bicycles	5
Zone for parking personal cars	2
Café	2
Other (Please explain in "notes" field)	13

Proposals made beyond the pre-defined drop-down list included adding more trees to the existing panoramic terrace, banning cars from the project area, and creating a bike lane and bike parking near the waterfront. They will be taken into account in the planning and design of the territory.

## 4.7. Energy and Mobility

### 4.7.1. Energy and sustainable systems

The pilot includes the implementation of **renewable energy systems**, such as **solar panels** and **energy-efficient lighting**, which reduce the carbon footprint of public infrastructure along the waterfront. Integration with the city's broader energy transition strategy is key, with goals aligned with the **2030 targets for climate neutrality**. To meet the needs of the Coastal Park, renewable energy sources - photovoltaic panels - will be applied. They should be located on the sheds at some of the thematic zones and the ground stations for bicycles, as well as the parking lots for bicycles and cars. Possibilities for generating electricity from other types of renewable energy sources are to be explored.



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In addition to the actual provision of electrical energy, demonstration facilities with an educational and practical focus will also be placed. Among them are paths, devices for physical activity for children and adults, smart tables, benches and trees. Currently, the Municipality of Burgas has developed designs that have been implemented in various locations in recent years.



**Fig. 31. Smart trees placed on "Troykata" square, Burgas city, 2017, Source: [www.mediapool.bg](http://www.mediapool.bg)**



*Fig. 32. Smart benches placed on "Troykata" square, Burgas city, 2020, Source: [www.mediapool.bg](http://www.mediapool.bg)*

#### 4.7.2. Mobility and movement organization

The coastal park near Sarafovo quarter is intended for free movement of pedestrians and cyclists. Given the location of public service facilities at the beach, the presence of the Sarafovo Fisherman's Port and the Canal Pumping Station, it is necessary to provide conditions for the passage of service vehicles only at certain time intervals, as well as special regime/police vehicles, emergency medical assistance and fire/.

A focus on **sustainable mobility** is evident through the creation of **bike lanes, pedestrian paths**, and the incorporation of electric vehicle (EV) charging stations. These measures aim to reduce dependency on fossil-fuel-based transportation while promoting healthier, more sustainable alternatives.

The project promotes **green mobility services**, such as electric public transport and bikesharing programs, to increase accessibility and connectivity between the waterfront and the rest of the city.



# Pedestrian and bicycle movement





Alley network should be consistent with the horizontal relief, with maximum permissible values up to 5%. All parts of the alley network should be accessible to parents with strollers, the elderly and people with disabilities.

Parking In order to encourage the movement of cyclists, several places in the park will be allocated parking spaces for stopping personal bicycles, as well as municipal bicycles for rent.

One of the future goals is to achieve social inclusion and equality through the provision of combined bicycles with seats for children, as well as those for adults with limited physical ability and disadvantaged people.



**Fig. 33. Example images of compound bikes – parent with kids**, Source: [www.sixthreezero.com](http://www.sixthreezero.com)



**Fig. 34. Example images of compound bikes – adults with limited physical ability**, Source: [www.sixthreezero.com](http://www.sixthreezero.com)

Currently, there are designated **parking spaces** at the Fisherman's Port "Sarafovo", and the conceptual solution envisages the construction of **capacities parallel to "Cherno More" street in the higher parts of the park**. They will be in landed properties, municipal property, as well as parts separated from the landed properties of the Coastal Park. The possible capacity is approximately 130 places, including places for people with disabilities. **Given the geological structure of the land masses and the geological risks, there is no possibility to allocate parking spaces on the slope and low parts of the park**. In addition to this, the development status of the beach strip, legislatively does not allow any change and any actions that would violate the character of the territory, including the construction of parking spaces. As part of the measures to reduce the urban heat island effect, mitigation and adaptation to climate change, the parking spaces are planned to be built on a grass joint. In this way, the share of sealed soils will be reduced by up to 50%. Pergolas with photovoltaic panels will be built in part of the spaces to provide shading and generate electricity.



**Automobile movement /for cars with special status and for loading/unloading at specific time intervals for public facilities/**





## 4.8. Nature-Based Solutions

Nature-based solutions have been highlighted in international agreements such as the Sendai Framework for Disaster Risk Reduction 2015-2030 as promising strategies to reduce disaster risk, adapt to climate change and strengthen community resilience. The nature-based solutions in the current pilot project have the meaning of a targeted intervention in the planning of the territory with a multifunctional purpose. The focus here is on the use of the Coastal Park as a tool to help strengthen the active landslide body and stabilize the slope surfaces - the role of a protective forest. It is suggested to use appropriate preparation of the terrain and undertake landscaping with a configuration of plant species appropriate for the conditions to contribute to the strengthening of the landslide surface. It is expected to support the soil drainage and stabilize the natural surface and underground runoff, which will limit the influence of rainwater on the activation of landslide processes.

It is also proposed to increase the total grass cover where possible to stimulate a rapid effect on the stabilization of the surface soil layers and create a favorable environment for the gradual increase of green areas. The application of hybrid solutions is also encouraged, where appropriate bioengineering techniques in strengthening in the area of the landslide slope can support the available techno-engineering strengthening facilities.

A series of accompanying regulatory functions are also expected from the Protected Forest Coastal Park such as: Improving the microclimatic situation and increasing the natural cooling effect during the summer heat; Encouraging habitat functions in coastal vegetation to enhance natural coastal biodiversity on land; Regulating coastal erosion and assisting the circulation of waters in the bay.

**Green and blue infrastructure** plays a central role in the waterfront transformation, with new **green spaces and water features** designed to provide climate resilience and enhance biodiversity. These include bioswales, rain gardens, and restored wetlands, which serve both ecological and social purposes by mitigating flood risks and providing spaces for community engagement.

The park's design also includes **sustainable water management** systems, such as **greywater recycling** and **rainwater harvesting**, to reduce the ecological footprint of the site and provide long-term resilience against climate-related risks like drought and flooding.

Additionally, **coastal ecosystem restoration** efforts, including the planting of native species and the rehabilitation of dune systems, aim to protect against erosion and preserve the natural coastline.



## 4.9. Integration of the Re-Value Systemic Challenges

The Waterfront Pilot aligns with the **six systemic challenges** or pillars of Re-Value's Impact Model:

**Governance and Advocacy:** Strong governance models and advocacy efforts to streamline regulations and promote sustainable urban development.

**Cultural and Spatial Quality:** Enhancing cultural and spatial environments by integrating beauty, inclusion, and sustainability principles.

**Financial and Circular Value Chains:** Establishing circular economy practices and innovative financing mechanisms to ensure long-term sustainability.

**Data-Driven Co-Creation:** Utilizing data and digital technologies to engage stakeholders and improve urban planning outcomes. Demonstrating the collection and use of data for data-driven modelling of climate and urban processes during Innovation cycles- Innovation camp 1 and 2.

**Energy and Mobility:** Supporting the transition to renewable energy sources and promoting sustainable, low-carbon transportation options.

**Nature-Based Solutions:** Implementing green infrastructure and ecosystem restoration to address climate challenges and improve urban resilience.

This holistic approach not only supports the climate-neutrality goals of 2030 but also ensures that the Waterfront Pilot serves as a replicable and scalable model for sustainable urban development across Europe.

The pilot project for the development of the coastal area in the Sarafovo neighborhood of Burgas aligns well with the best practices outlined in the concept for sustainable and innovative urban planning. Key aspects of compatibility include:

### **Sustainability and Ecological Approach:**

- The project focuses on preserving and enriching natural habitats while minimizing anthropogenic impacts. It includes measures for coastal reinforcement, the creation of green spaces, and the integration of natural resources.

### **Integration and Functionality:**

- The project plans the construction of a pathway network that will connect the coastal area with urban infrastructure, including the existing cycling network, enhancing connectivity and accessibility.

### **Inclusiveness and Community Participation:**

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- Public consultations and surveys have been conducted, influencing the project by reflecting the needs of local residents and visitors. This is a key element of inclusive planning.

## Cultural Identity and Recreation:

- The project highlights the cultural heritage of the fishing communities and the "human-sea" connection, integrating these aspects into the spatial design. Recreational, sports, and cultural facilities are planned.

## Nature-Based Solutions:

- Initiatives include planting resilient plant species to strengthen soil and minimize erosion. Protective measures for the natural resources in the area are also integrated.

## Digital Integration:

- The municipality already has a Geographic Information System (GIS) and urban management platforms in place, which can be used for project management and optimization.

## Objectives

1. Develop an integrated coastal area that provides recreation, cultural, and environmental benefits for the community and visitors.
2. Strengthen natural and infrastructural features to protect against environmental risks.
3. Enhance accessibility and functional connectivity with the existing urban and transport network.

## 4.10. Waterfront Pilot Transformation Activities

### Pilot transformation activities within the Sarafovo Coastal Park

#### 4.10.1. Rehabilitation and construction

**Action description:** The project involves the construction of a functional and sustainable coastal park that integrates green and blue infrastructure by providing areas for recreation, social interactions and sports. Actions are aimed at adapting to climate change and reducing the ecological footprint by implementing environmentally friendly technologies.

**Affected stakeholders:** Local residents, tourists, businesses in the area, academic and scientific institutions, as well as the Municipality of Burgas.

**Roles and Responsibilities:** Burgas Municipality will coordinate the activities, while contractors, suppliers and architects will be involved in the construction and rehabilitation of the infrastructure.

**Data and expertise needs:** Geospatial imaging is required to assess terrain and climate vulnerabilities (erosion, landslides). There are needs for urban planning experts, engineers, environmental specialists and sustainable materials technologists.

**Implementation schedule:** Start of the project - 2024. Expected completion - 2026. Activities will be phased, with the main focus being on building infrastructure, afforestation and greening as well as providing an accessible environment.

**Funding and partnerships:** Funding can be provided through national structural and cohesion funds, the municipal budget, European programs for sustainable urban development and climate adaptation (e.g. Green Deal and Horizon Europe). Possible partnerships with private investors and international organizations.

**Changes in policies and regulations needed:** Administrative processes for approval and consultation with environmental authorities should be accelerated.

#### 4.10.2. Systems for monitoring and management of natural resources

**Action Description:** Use of advanced geospatial systems and technologies such as aerial photogrammetry and laser scanning to monitor the terrain, coastline and potential vulnerabilities. The data will be used to plan adaptation measures and manage the risk of natural disasters (e.g. landslides and floods).

**Affected stakeholders:** Scientific organizations, municipal authorities, geospatial technology companies and the citizens of Sarafovo.

**Roles and Responsibilities:** Scientific institutes will carry out the research, while Burgas Municipality will coordinate the use of the collected data for planning.

**Data and Expertise Needs:** High quality spatial data as well as expertise in data analysis and climate projections.

**Implementation schedule:** 2024–2025, with regular data updates each year.

**Funding and partnerships:** For the implementation of the pilot measure, funding will be sought from the national structural and cohesion funds, as well as through European programs for climate adaptation, Horizon Europe, as well as partnerships with research institutes and universities.

**Changes in policies and regulations needed:** Need to create a regulatory framework for implementing innovative technologies in urban planning.



### 4.10.3. Development of green and alternative mobility in the coastal zone

**Action Description:** Introduction of cycle lanes, footpaths and electric vehicles to improve access to the coastal area. Promoting sustainable forms of transport as part of a wider strategy to reduce carbon emissions.

**Affected stakeholders:** Residents of Burgas, tourists, companies for shared transport.

**Roles and Responsibilities:** The municipality will be responsible for planning and building the infrastructure, while the private sector will provide transport services.

**Data needs and expertise:** Mobile needs assessment, transport usage studies and emissions data collection.

**Implementation schedule:** 2024–2026.

**Funding and partnerships:** Partial funding through public-private partnerships, national and European urban mobility programmes.

**Policy and regulatory changes needed:** Incentives to promote electric transport and upgrade the urban transport network.

In conclusion, the pilot activities on the transformation of the coast in the Municipality of Burgas cover a wide range of measures related to climate adaptation, sustainable planning and improvement of the ecological and social environment in the coastal zone.

### 4.10.4. Integrated Geospatial Studies for Climate Change Risk Management

To update the primary spatial data for the territory, with maximum attention to potential vulnerabilities caused by natural factors, incl. risks accompanying climate change (landslides, torrential rains, flash floods, drought, coastal erosion, increased sedimentation in the bay, eutrophication of coastal waters), a series of studies of the pilot area have been undertaken using modern geospatial systems and technologies:

**Aerial photogrammetric survey - August 2022.** An aerial photogrammetric survey was carried out with an EbeeX fixed-wing unmanned aerial system and an AreaX photogrammetric camera on the territory of the Sarafovo quarter. The survey covers the entire built-up area of the quarter and has a high spatial resolution. The capture results are spatial data in digital formats, including orthophoto map, 3D point cloud, Digital Surface Model (DSM), Digital Terrain Model (DTM).

**Ground laser scanning - March 2024,** within the boundaries of the project area, a ground laser scan was carried out with a mobile laser system GEO Slam - Zeb Horizon. The result of the scan is in digital format, including a highly accurate and detailed 3D point cloud, including

## re-value

information about the entire area and detailed information about the terrain under the dense tree and shrub vegetation.

**Aerial laser scanning – June 2024**, a complete aerial laser scanning of the territory was carried out. Aerial laser scanning was carried out to complement the data collected by aerial photogrammetry and ground laser scanning. An unmanned multicopter flight system mdLiDAR1000HR equipped with LiDAR technology was used. The received data will be used in the discussion and taking specific measures for the implementation of the project.

## 5. Budget

The estimated financial requirement for the successful completion of the coastal park pilot implementation in Sarafovo is **€6,700,000**. This figure accounts for the development, construction, and management of sustainable mobility infrastructure, green urban solutions, and enhanced water management systems outlined in the project plan.

### Financial Sources

The primary funding will be sought from **National Structural and Cohesion Funds**, aligning with the broader goals of territorial development and climate adaptation under EU financing frameworks. These funds are critical for addressing both the pilot project's financial needs and its alignment with overarching regional and national climate neutrality objectives.

### Partnerships and Supplementary Finance Strategies

To ensure the robustness of funding, additional sources and partnerships are being explored:

- **Public-Private Partnerships (PPPs):** Engaging private entities, especially those specializing in sustainable infrastructure (e.g., cycling networks, green landscaping, or tourism infrastructure), to co-invest in specific project elements.
- **EU Program Synergies:** Leveraging complementary EU mechanisms like Horizon Europe, LIFE, and the Just Transition Fund to secure co-financing for innovative and high-impact activities within the project.
- **Local Contributions:** Mobilizing municipal budgets and community-based funding through initiatives such as green bonds, if feasible, to encourage local stakeholder investment.

### Challenges in Securing and Utilizing the Budget

1. **Complexity of Structural Fund Applications:** Accessing national and EU structural funds can be delayed by administrative requirements, necessitating early-stage planning to meet documentation and compliance needs.
2. **Cost Escalations:** With rising inflation and potential project delays, maintaining cost controls will be critical to ensure the budget remains sufficient.
3. **Securing Co-Financing:** While partnerships present an opportunity, ensuring stakeholder alignment and timely financial contributions can be challenging.

## 5.1. Funding and Partnerships Strategy

### Long-term partnerships for replication and scaling

For the successful long-term development and replication of the Waterfront Pilot project in other areas of Burgas and beyond, it is essential to build stable partnerships with various



stakeholders. These partnerships will facilitate the sharing of knowledge, resources and expertise needed to scale up sustainable practices and projects.

## 5.2. Key partnerships for replication and scaling

### Local and regional authorities

Partnerships with other municipalities and regional administrations can help scale up projects through exchange of experience and common programs for sustainable development.

Municipal and regional authorities will play a leading role in implementing good practices in urban planning and developing infrastructure for sustainable development.

### Scientific and research institutions

Collaboration with academic institutes, such as universities and research centers, will provide the necessary scientific expertise for project monitoring and evaluation, as well as for analysis and optimization of climate adaptation solutions. Research partnerships will also help develop innovations in sustainable urban infrastructures and monitoring technologies.

### Private sector and industry partners

Public-private partnerships will be key to securing funding and resources to scale the project.

This includes companies specializing in construction, renewable energy sources, smart city technologies and sustainable transport. These partners can implement new technologies and services to support the sustainability and effectiveness of the project.

### International organizations and programs

Joining international initiatives such as the European Union's climate neutrality programs (Horizon Europe, Green Deal) and networks of cities such as Mission Cities will provide additional funding and access to good practices. International organizations can also provide technical assistance and support to replicate the project in other cities.

### Non-governmental organizations and local communities

The inclusion of NGOs and local initiatives will encourage the active participation of citizens in the planning and implementation processes of the project. This will ensure long-term support and social sustainability of the project. Local communities and civic organizations can play a role in disseminating good practices and supporting project replication.

### Replication and scaling approaches

Program funding: Continuation of funding through European and national programs for sustainable development, as well as attracting private investments.

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Standardization and regulatory framework: Development of standards for sustainable planning and integration of these standards into national and local regulatory documents, which will facilitate replication of the project.

**Sharing experiences:** Organizing conferences, workshops and knowledge exchange between cities and regions that want to implement similar sustainable projects.

These long-term partnerships and approaches will ensure the successful replication and scaling of the pilot project, while contributing to the region's overall sustainable development and climate adaptation.

## 6. Pilot Monitoring and Evaluation

Monitoring and evaluation of the impact of the construction of the pilot area will be structured around clearly defined key performance indicators (KPIs) developed within the framework of WP7, while integrating existing KPIs implemented in Burgas. These indicators will ensure systematic monitoring of progress and assess the impact of pilot activities on various aspects of sustainable development.

### 6.1. Basic KPIs for monitoring

#### **Energy efficiency**

Reduction of energy consumption in public and private buildings in the coastal park area.

Increasing the share of renewable energy sources used to power the infrastructure in the park and adjacent buildings.

#### **Green and blue infrastructure**

Number of newly built and number of renovated green spaces and their maintenance during the different seasons.

Integration of water features (lakes, fountains) and their management to improve resilience to climate change.

#### **Air quality and biodiversity**

Reduction of air pollution levels as a result of improved transport infrastructure (bike lanes, footpaths).

Increasing biodiversity by creating botanical gardens and other green spaces.

#### **Social impact**

Number of events and activities held within the park with the participation of various social groups.

Assessment of resident and visitor satisfaction through periodic surveys.

#### **Mobility and accessibility**

Measuring the use of sustainable means of transport (bicycles, electric transport) in the new infrastructure of the park.

Improving accessibility for marginalized groups and people with disabilities



## **6.2. Monitoring and evaluation processes**

Monitoring will be carried out at different levels through joint efforts between local authorities, urban planning experts and independent evaluators. Periodic progress reports will be produced, using both quantitative and qualitative indicators to assess impact.

Technological monitoring tools will include air quality sensors and energy efficiency monitoring systems. Public polls and surveys will provide feedback from residents.

Through these mechanisms, the Municipality of Burgas will ensure transparency and responsibility in the implementation of the project, and regularly evaluate the results achieved against the set goals.

## 7. Conclusion

### Conclusion: Towards a Resilient and Sustainable Burgas Waterfront

The **Burgas Waterfront project** represents a transformative step toward creating a sustainable, resilient, and inclusive urban area that balances environmental preservation, economic development, and community well-being. By focusing on innovative infrastructure, expanding green spaces, and promoting eco-tourism, the project envisions a future where the Sarafovo area and its surroundings become a model of climate-conscious urban development.

#### Key Objectives

- **Environmental Conservation:** Strengthening green systems, enhancing biodiversity, and implementing nature-based solutions.
- **Economic Progress:** Supporting local businesses, eco-tourism, and recreational activities to stimulate sustainable economic growth.
- **Quality of Life:** Providing accessible infrastructure, cultural spaces, and recreational zones to meet the needs of residents and visitors.

To achieve these goals, the project is structured into four well-defined phases, ensuring systematic progress while engaging stakeholders and maintaining financial accountability.

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### Action Plan Overview

#### Immediate Next Steps

1. **Forming a Multidisciplinary Team**  
Bringing together experts in ecology, urban planning, and infrastructure will ensure a holistic approach to project design and implementation. This team will address technical challenges while embedding sustainability in every aspect of the project.
  2. **Finalizing Stakeholder Consultations**  
Engaging residents, local businesses, government entities, and NGOs will refine the project's details. Public consultations and participatory design processes will align community needs with technical and ecological considerations.
  3. **Securing Funding**  
Leveraging national and EU programs, including Structural and Cohesion Funds, ensures financial feasibility. Public-private partnerships and innovative financing mechanisms like green bonds may supplement funding.
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## Phases and Activities

### Phase 1: Analysis and Preparation (0–6 months)

This phase focuses on research, consultation, and regulatory groundwork:

- **Detailed Area Analysis:** Mapping natural risks (erosion, landslides), assessing existing infrastructure, and conducting community surveys.
- **Regulatory Preparation:** Finalizing the Detailed Development Plan (DDP) with an emphasis on green zones, stormwater management, and land use.

### Phase 2: Infrastructure Enhancements (6–18 months)

Core infrastructure will be constructed to mitigate risks and improve accessibility:

- **Coastal Protection Structures:** Engineering solutions to prevent erosion and abrasion.
- **Improved Accessibility:** Establishing cycling paths, pedestrian networks, and transport links to the broader region.
- **Technical Infrastructure:** Integrating electricity, water, and lighting systems into the project area.

### Phase 3: Landscaping and Social Areas (18–36 months)

Creating vibrant, green, and functional spaces for recreation and education:

- **Green Space Development:** Planting local vegetation, building picnic areas, and constructing outdoor fitness zones.
- **Cultural and Educational Initiatives:** Establishing an information center focused on biodiversity and setting up green corridors.
- **Urban Furniture:** Adding benches, observation towers, and trash management systems.

### Phase 4: Service Development and Long-Term Maintenance (36+ months)

Sustaining the project's impact through active management and community involvement:

- **Tourist and Recreational Services:** Water-based activities, local businesses, and eco-tourism opportunities.
- **Management Systems:** A dedicated team for upkeep and a platform for citizen feedback.
- **Monitoring and Adaptation:** Using digital tools to monitor infrastructure and adapt to environmental and community changes.

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## Expected Results



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- **Environmental Benefits:**
    - Reduced environmental risks through engineering and nature-based solutions.
    - Enhanced biodiversity and climate resilience in the Sarafovo area.
  - **Economic Impact:**
    - Increased attractiveness to tourists and eco-conscious visitors.
    - Boost to local businesses through eco-tourism and service integration.
  - **Social Advantages:**
    - Improved quality of life for residents with accessible green spaces and cultural initiatives.
    - Strengthened community engagement and ownership of the project.
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## **Concluding Vision**

The Burgas Waterfront project is not just an initiative, it is a roadmap for long-term, sustainable urban development. Its phased approach ensures that immediate community needs are met while creating a legacy of resilience, environmental stewardship, and economic opportunity. With effective partnerships, sound financial planning, and strong community engagement, Burgas will set a benchmark for sustainable urban coastal development in the region and beyond.

The long-term objectives include continuous monitoring, adapting climate change mitigation strategies, and creating a vibrant, nature-friendly urban environment for future generations.

With collective efforts and commitment, we can make the Burgas Waterfront a model for sustainable development and inspire other communities around the world.