

2.3

RERA

Identification of existing land management issues_HR

2.3.9

Kaštel Kambelovac pilot location

Final Version of 15/01/2022

Project Acronym	PMO-GATE
Project ID Number	10046122
Project Title	Preventing, Managing and Overcoming natural-hazards risk to mitiGATE economic and social impact
Priority Axis	2: Safety and Resilience
Specific objective	2.2: Increase the safety of the Programme area from natural and man-made disaster
Work Package Number	2
Work Package Title	Communication Activities
Activity Number	2.3
Activity Title	Awareness campaign
Partner in Charge	RERA
Partners involved	
Status	Final
Distribution	Public

Table of contents

1. Introduction	2
2. Spatial coverage of the pilot location	4
3. Analysis of the situation in the field of land management at the Kaštel Kambelovac pilot location	8
3.1 Coast and coastal infrastructure	8
3.2 Transport infrastructure.....	9
3.3 Water and municipal infrastructure.....	15
3.4 Energy infrastructure	18
3.5 Fishing and mariculture infrastructure	20
3.6 Waste management infrastructure.....	20
3.7 Telecommunications infrastructure.....	21
3.8 Buildings for public and social purposes	23
3.9 Buildings for residential and commercial purposes	26
3.10 Cultural heritage	26
3.11 Green areas and protected natural areas	28
3.12 Agricultural areas	30
4. Analysis of the exposure of the pilot location to flood hazards caused by rising sea levels and extremely high ocean waves.....	33
4.1 Coast and coastal infrastructure	33
4.2 Transport infrastructure.....	35
4.3 Water and municipal infrastructure.....	35
4.4 Fishing and mariculture infrastructure	36
4.5 Energy and telecommunications infrastructure.....	36
4.6 Buildings	37
4.7 Cultural heritage.....	37
4.8 Terrestrial and marine ecosystems and biodiversity	37
4.9 Agricultural areas	38
5. Key identified issues.....	39

1. Introduction

The cross-border INTERREG VA Italy-Croatia 2014 – 2020 cooperation program supports the European cohesion policy and contributes to the development of the European Union by strengthening economic, social and territorial cohesion while encouraging economic growth. In addition to the exchange of know-how, testing the feasibility of new policies, products and services, and supporting investments, the program contributes to unleashing the “blue growth potential” in both countries by investing in research and in blue economy sectors, and it also improves joint climate change monitoring and natural risk prevention. Under Priority Axis 2 – Safety and Resilience, the project *“Preventing, Managing and Overcoming Natural-Hazards Risks to mitiGATE economic and social impact”* – **PMO-GATE** has been approved.

The goals of the project are the joint development of an innovative methodology for prevention, management and overcoming of multiple natural hazards in the involved regions of Italy and Croatia, and raising the level of protection and resilience to natural hazards specific to the regions involved, such as river and sea floods, floods caused by extremely high ocean waves, and earthquakes. The cross-border approach is based on the integration of risk assessment, prevention, preparedness and response to the said natural hazards while using the existing information and results available in previous research as much as possible, thus avoiding the repeated conduct of past and existing research. The expected results of the project are developed risk management plans aimed at overcoming emergencies with the least possible impact on society and the economy, as well as the development of early warning systems in order to increase safety and resilience to natural hazards.

Part of the project activities includes raising awareness of Italian and Croatian communities involved in flood risks, coastal floods from rising sea levels, and floods caused by extreme ocean waves. In Croatia, the pilot location for the implementation of said activities is Kaštel Kambelovac, which represents a kind of a “test bed” for the entire area of the Town of Kaštela. This document serves to identify land management issues at the pilot location. The first part of the document defines the spatial coverage of

the pilot location and the analysis of the situation with regards to current land management, while the second encompasses the analysis of the exposure of the pilot location to flood hazards caused by rising sea levels and extremely high ocean waves, and the identification of key issues arising from said analyses.

2. Spatial coverage of the pilot location

The Town of Kaštela is located in the area between the Town of Trogir, the Town of Solin and the City of Split, and lies on the shores of the Kaštela Bay. The mainland part of the Town extends over 58 km², of which the length of the coast is 23 km. The town administratively encompasses seven settlements: Kaštel Sućurac, Kaštel Gomilica, Kaštel Kambelovac, Kaštel Lukšić, Kaštel Stari, Kaštel Novi, and Kaštel Štafilić.



Source: Development strategy of the Town of Kaštela 2016 – 2020

Figure 1 Spatial coverage of the Town of Kaštela and the settlements it encompasses

The Town of Kaštela has a total of over 40,000 inhabitants, and it is part of the Split urban agglomeration area. The table below provides an overview of the distribution of the area of Kaštela, i.e. the affiliated settlements, according to the characteristics of the land and the purpose and use of space, according to Corine Land Cover Croatia 2018.

Table 1 Distribution of areas by settlements of the Town of Kaštela

CORINE LEVEL 1	Artificial areas (in ha)			Agricultural areas (in ha)	Forests and semi-natural areas (in ha)		
CORINE LEVEL 2	Urban areas	Industrial, commercial and traffic areas	Exploitation of raw materials, landfills and construction sites	Mixed agricultural areas	Forests	Shrub and herbaceous vegetation	Open spaces without or with little vegetation
K. Sućurac	262.50	148.02	87.89	255.56	45.10	255.56	71.70
K. Gomilica	129.52	5.78	0.00	55.51	0.00	39.32	23.13
K. Kambelovac	134.14	0.00	0.00	205.84	49.73	18.50	24.28
K. Lukšić	142.24	27.75	0.00	181.55	711.18	101.76	0.00
K. Stari	180.40	0.00	0.00	281.00	92.51	30.07	61.29
K. Novi	219.72	11.56	0.00	319.17	294.88	235.90	69.38
K. Štafilić	48.57	94.82	60.13	470.65	19.66	182.71	109.86
Total	1,117.08	287.94	148.02	1,769.29	1,213.06	863.83	359.64

Source: Development strategy of the Town of Kaštela 2016 – 2020, processed by the creator

Kaštel Kambelovac was selected as a pilot location for the development of a Land management plan based on exposure to flood hazards caused by rising sea levels and extremely high ocean waves. It is located between Kaštel Lukšić and Kaštel Gomilica at the foot of the Kozjak hill. The area of Kaštel Kambelovac is diverse enough to be a “test bed” for the entire area of the Town of Kaštela. The spatial coverage of the pilot location is shown in the figures below.



Source: www.geoportal.dgu.hr, processed by the creator

Figure 2 Orthophoto map of the spatial coverage of the Kaštel Kambelovac pilot location

In accordance with the *Kaštel Kambelovac Center Urban Development Plan* (UPU 12) and *Center 2* (UPU 13), which were developed in accordance with the *Program of measures in order to improve the situation in the Town of Kaštela* and the *General Urban Plan of Kaštela*, spatial indicators related to land use were defined. UPU 12 covers an area of 55.15 ha, i.e. the area of the western part of the Kaštel Kambelovac settlement, while UPU 13 covers an area of 19.2 ha, i.e. the area of the eastern part of the Kaštel Kambelovac settlement, and the western part of the Kaštel Gomilica settlement. Quantitative spatial indicators related to the purpose of the areas are demonstrated below.

Table 2 Purpose of areas according to UPU 12

Ordinal No.	Purpose		Plan designation	Surface area	
				ha	%
1	Mixed purpose	Mostly residential	M1	44.62	80.91
2	Public and social purpose	General social purpose	D	1.49	2.70
3	Protection green surfaces		Z	1.40	2.54
4	Areas of transport infrastructure			7.05	12.78
5	Water surfaces			0.59	1.07
Total area covered by the Plan				55.15	100

Source: UPU 12, processed by the creator

Table 3 Purpose of areas according to UPU 13

Ordinal No.	Purpose		Plan designation	Surface area	
				ha	%
1	Mixed purpose	Mostly residential	M1	7.25	37.76
		Catering-tourist and residential	M5	6.66	34.67
		In the function of bathing sites	M8	0.50	2.60
2	Public and social purpose	General social purpose	D	0.26	1.33
		Health purpose	D3	0.09	0.49
3	Economic purpose – catering-tourist	Hotel	T1	1.38	7.19
4	Sports and recreational purpose	Landscaped beach	R3	0.52	2.69
5	Areas of transport infrastructure			2.49	13.02
6	Water surfaces			0.05	0.25
Total area covered by the Plan				19.2	100

Source: UPU 13, processed by the creator

Settlements and parts of settlements are mixed use areas (M) in which residential construction is predominant, as well as all of the accompanying facilities. Accompanying facilities of residential construction include educational, health, sports and recreational, business, trade, catering and service facilities, as well as traffic and green areas, and municipal facilities and apparatus. Areas of public and social purpose (D) are buildings intended for the social activities field (education, science, culture, sports, health and social welfare) and those intended for the work of state administration bodies and state organizations, other state bodies, bodies of local and regional self-government units, public institutions, international institutions, associations, agencies, offices, funds, religious communities and the like. Protection green areas (Z) are mostly undeveloped green areas of lower development standard planned for the protection of watercourses, unstable terrains etc., and as a buffer between residential areas of the settlements and areas with increased environmental impact. Areas of transport infrastructure include areas on which line and surface structures of transport systems can be built and arranged (road and railway transport), and water areas include creek and torrent beds. Hotels with accompanying facilities for trade, congress, cultural and public and social purposes belong to the zone of economic, i.e. catering-tourist purpose (T1), and landscaped beaches to the zones of sports and recreational purpose (R3). Construction, organization and equipping of traffic network, electronic communications network and municipal network with accompanying buildings and areas are allowed on R3 areas, as well as the installation of simple structures and the realization of a promenade – lungomare – that will eventually connect the entire coastal area of Kaštela.

3. Analysis of the situation in the field of land management at the Kaštel Kambelovac pilot location

3.1 Coast and coastal infrastructure

The length of the coastal area is 23.4 km. The coastal area is of lowland type, up to an altitude of 100 m and an average width of 2 km, and is mostly urbanized. During the previous centuries, the development of the Kaštela settlements was marked by systematic embankments and construction of the coast, which also represents one of the main issues today. Moreover, the coastal zone bears the consequences of many years of negative effects in the form of unsystematic sectoral management marked by inadequate construction of industrial plants, non-systematic construction and maintenance of coastal infrastructure in an unsystematic and inadequate manner (non-compliance with the Maritime Domain and Seaports Act (OG 158/03) and the Spatial Planning Act (OG 153/13) responsible for coastal planning and coastal infrastructure), and in recent years the uncontrolled growth of tourist capacities. Simultaneously, the marine environment is particularly endangered.

The coastal area stands out as a high-risk area and special attention should be paid to cumulative impacts in order to identify all of the present pressures and propose measures that would alleviate pressures on the narrow coastline, preserve natural shores and spatial characteristics, preserve the cultural landscape, prevent further pollution of the marine environment, and preserve the coastal resources for sustainable tourism development. Due to these negative impacts, there is a need for a systematic, sustainable and thoughtful model of coastal management of the Town of Kaštela that will minimize the negative effects by implementing innovative methods, taking into account the environmental impact of activities related to coastal engineering. To this effect, the *Coastal Zone Management Plan of the Town of Kaštela* was adopted, which defines concrete measures and activities for the management of the coastal area of the Town of Kaštela.

3.2 Transport infrastructure

The area of the Town of Kaštela is an integral part of the functional traffic region of northern and central Dalmatia through which the international Adriatic-Ionian Road corridor passes. Between Trieste and Kalamata, the corridor connects seven countries. Along the Adriatic coast, it connects the main seaports (Trieste, Koper, Rijeka, Zadar, Šibenik, Split, Ploče, Dubrovnik, Bar, Durrës, Igoumenitsa, Patras, Kalamata) and numerous pan-European corridors (V, Vb, Vc, and VIII). In accordance with the *Development strategy of the Town of Kaštela 2016 – 2020*, the transport infrastructure of the Town of Kaštela is divided into road, rail, air, maritime, and public transport.

3.2.1 Road traffic

The main road that passes through the Town of Kaštela is the state road D8, better known as the “Adriatic Highway”, and is the main transport corridor for the entire coastal part of the Republic of Croatia, especially in the Split agglomeration area. The Adriatic Highway connects all important coastal city centers from Rijeka, Zadar, Šibenik, Split, Makarska to Ploče and Dubrovnik. In the area from Trogir to Omiš, it forms the Split bypass, which is one of the busiest road sections in Croatia. Furthermore, on the road between Kaštel Stari and Solin, the average annual daily traffic amounts to 16,000 vehicles. During the summer season, the average daily traffic amounts to 24,000 vehicles. The second transversal transport route that passes through the Town of Kaštela and forms the secondary transport axis is the so-called Old Kaštela Road (Cesta dr. Franje Tuđmana) which stretches along the D8, but is closer to the coast and passes through the centers of the Kaštela settlements, resulting in a significant reduction of the share of transit traffic on said road. The only significant road that does not follow the east-west coast direction, but rather the north-south is the Kaštel Stari – Kladnice road over the Malačka pass, but which in terms of traffic intensity lags considerably behind the two above-mentioned roads. In addition to the considerable traffic load, there are also issues concerning the road network that have arisen as a result of the uncontrolled expansion of settlements due to the absence of integrated spatial planning. Insufficient space left for the road means that two vehicles cannot pass one another, or that access for public service vehicles has been obstructed, which results in human lives being endangered. The legal status of public

roads and unclassified roads, and the manner of their use and planning of construction and maintenance, as well as concessions, financing and supervision are regulated by the Roads Act (OG 110/19).

Table 4 Length of roads in the area of the Town of Kaštela

Length of highways (km)	Length of state roads (km)	Length of county roads (km)	Length of local roads (km)	Total length of classified public roads (km)
2.55	17.61	21.17	9.23	50.56

Source: Development strategy of the Town of Kaštela 2016 – 2020, processed by the creator

Spatial Plan of the Town of Kaštela provides corridors for future construction and organization of the road network (corridor of the A1 highway passing through the northern edge of the Town, state road D8, and the main city streets and larger collector streets which serve to link the settlements) and corridors for the construction and reconstruction of the existing road network, and the construction of communal infrastructure (state roads – highways, state roads, main city streets and collector streets).

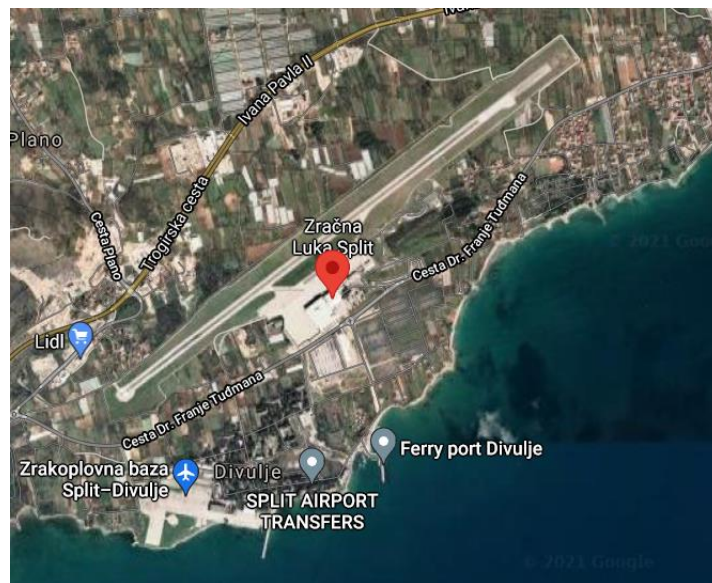
3.2.2 Railway traffic

The railway M604 goes through the Town of Kaštela from Split towards Knin or Zagreb (the so-called Lika railway). The railway is single-track, non-electrified, low-capacity, with a maximum permitted speed of 60 to 100 km/h with a limit of 35 to 60 km/h over switches in railway stations, and up to 60 to 70 km/h in arches. The management of railway infrastructure is regulated by the Railway Act (OG 20/21), and is the responsibility of the Ministry of Maritime Affairs, Transport and Infrastructure. Moreover, the railway is not an integral part of international and pan-European corridors. According to the *Transport Development Strategy of the Republic of Croatia 2014 – 2030*, in the functional region of central Dalmatia, railway transport is less significant since its accessibility levels are not competitive in relation to the road system, therefore the main priority is to improve the links between railway stations in cities with public transport systems. In terms of improving accessibility to freight transport, the priority is to improve accessibility to ports in order to limit and possibly reduce the number of freight trucks in central and tourist areas. Therefore, the priority of the development of railway traffic in the Town of Kaštela is greater integration of the railway into the public transport system and its use in freight transport in order to reduce road traffic congestions, improve cost efficiency and reduce pollution.

Spatial Plan of the Town of Kaštela envisages the modernization (electrification) and reconstruction of the existing Knin-Split railway, the planned main railway, and the construction of the city railway system using the existing capacities and the research of the possibility of using the corridor of Cesta dr. Franjo Tuđman and the connection between the airport and the existing railway route in Kaštel Kambelovac.

3.2.3 Air traffic

The Split Airport (Resnik) is located in the area of the Town of Kaštela and Trogir, and it covers an area of 95 ha, of which 75 ha is in the area of Kaštela, and 20 ha in the area of Trogir. In 2019, a new terminal was opened, and it covers an area of 3.6 ha. The Split Airport is the second largest and busiest airport in the Republic of Croatia; over three million passengers passed through it in 2019, which is an increase of 5.7% compared to 2018 and an increase of 88.4% compared to 2014. The largest number of passengers is recorded during the summer months, especially in July and August.

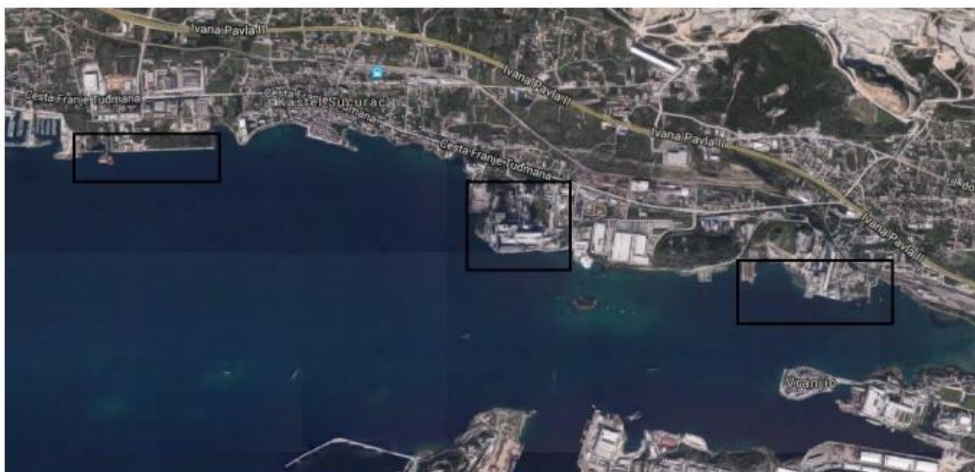


Source: www.googlemaps.com, processed by the creator

Figure 3 Satellite view of the Split Airport

3.2.4 Maritime traffic

In the area of the Town of Kaštela, there are five ports open to public traffic, which are classified as Category III ports when it comes to their local importance. The ports are located in Kaštel Gomilica, Kaštel Kambelovac, Kaštel Lukšić, Kaštel Stari, and Kaštel Štafilić and are under the jurisdiction of the Port Authority of the Split-Dalmatia County, whose management is primarily regulated by the Maritime Domain and Seaports Act (OG 98/19). When it comes to freight traffic, the Kaštela Bay is divided into three port areas that are also under the integration of the Split Port Authority: Basin A (complex ex Adriavinil), Basin B (coast of the St. George I and II Cement Plant) and Basin C (coast of the St. Kajo Cement Plant, Brižine coast, INA tanker terminal, Mala obala Solin). The spatial plan of the Split-Dalmatia County and of Kaštela envisages the construction of a fishing port in the area of Brižine in Kaštel Sućurac, and two nautical tourism ports in the area of Giričić in Kaštel Gomilica and Adriavinil (ex-Jugovinil) in Kaštel Sućurac, as well as a public transport port. Transfer of passengers from the airport in Resnik is part of the Basin D, which belongs to the Port of Split. It is important to emphasize the significance of nautical tourism in the Kaštela Bay where Marina Kaštela is located in Kaštel Gomilica, which has 420 berths and 200 mainland places. It is the largest nautical tourism port in the Split-Dalmatia County, which significantly contributes to traffic density in the area of the Kaštela Bay during the summer months.



Source: Development strategy of the Town of Kaštela 2016 – 2020

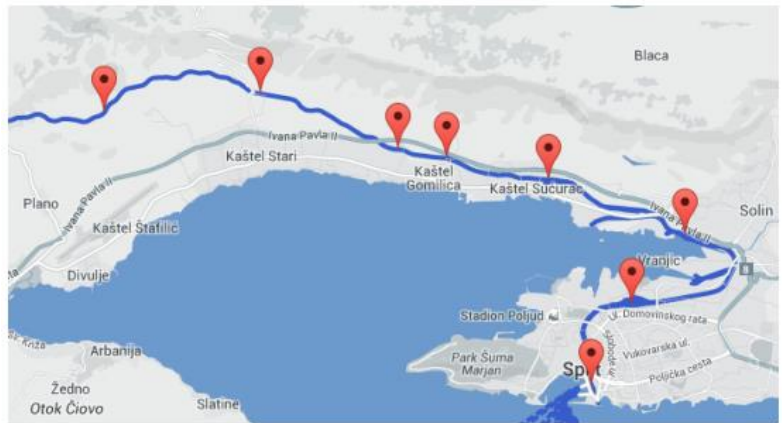
Figure 4 Area of Basin A, B and C (from right to left)

According to the Spatial Plan, the construction and landscaping of the coast and buildings for maritime traffic is envisaged, particularly sports-related ports with up to 200 berths in Kaštel Sućurac, Kaštel Gomilica, Kaštel Kambelovac, Kaštel Lukšić, Kaštel Stari, and Kaštel Novi, as well as the existing operational shore in the Kaštel Sućurac work zone.

3.2.5 Public transport

The Town of Kaštela belongs to the area of public suburban transport of the City of Split, which has the most developed local public transport in the region with 44 local (city) lines and 25 suburban bus lines. The largest portion of public transport is carried out by buses of Promet d.o.o. Split which provides services in the area of five cities and 11 municipalities. The total daily transport to and from Split amounts to over 34 thousand passengers transported by Promet d.o.o. Split, and another 1,500 passengers a day who use other carriers in both directions. This includes passengers from the area of Kaštel Kambelovac. In the Split agglomeration, the most intensive suburban traffic is on the Split-Solin route, followed by Split-Trogir, where almost 7,000 passengers are transported daily to the most remote Kaštela settlement, and around 8,000 passengers are on the Solin-Kaštel Sućurac route. The conditions and manner of performing the activity of public transport of passengers and freight transport in the internal road traffic, and the activity of providing station services at bus and freight stations are determined by the Road Transport Act (OG 89/21).

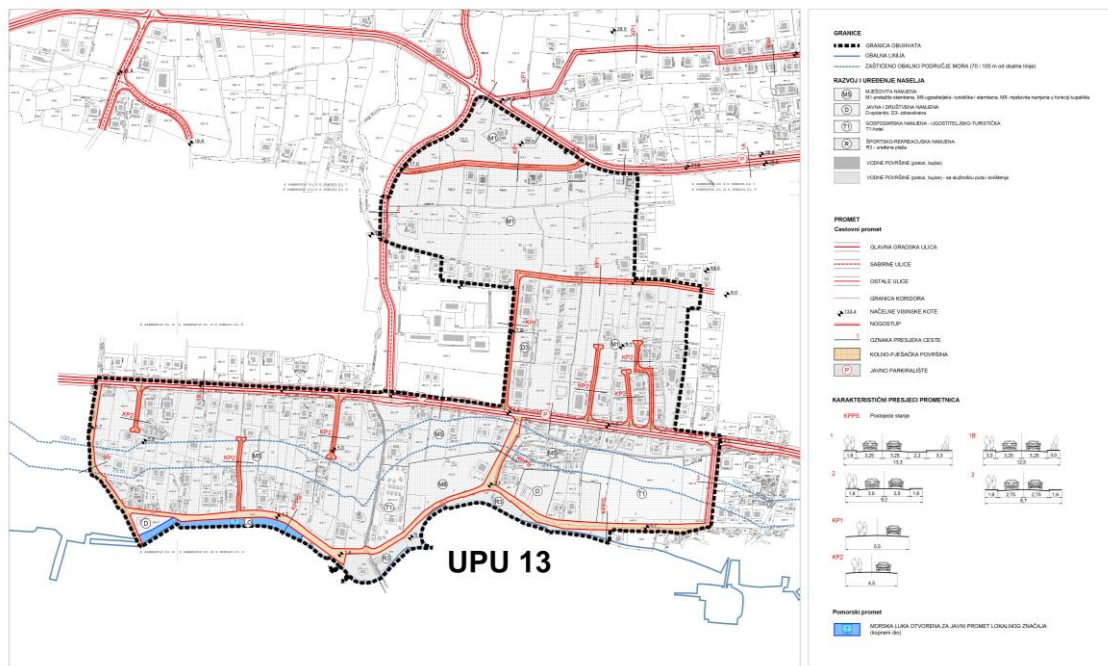
In the function of public city transport or suburban transport, railway transport is used to a certain extent. On the route between the center of Split to Kaštel Stari, the suburban train travels 24 minutes, and there are five stops between these two destinations (Split-Predgrađe, Solin, Kaštel Sućurac, Kaštel Gomilica, Kaštel Kambelovac).



Source: Development strategy of the Town of Kaštela 2016 – 2020

Figure 5 Suburban railway route

The figure below shows the existing transport infrastructure of the Kaštel Kambelovac pilot location, which is defined by UPU 13.



Source: www.kastela.hr

Figure 6 Transport infrastructure of Kaštel Kambelovac

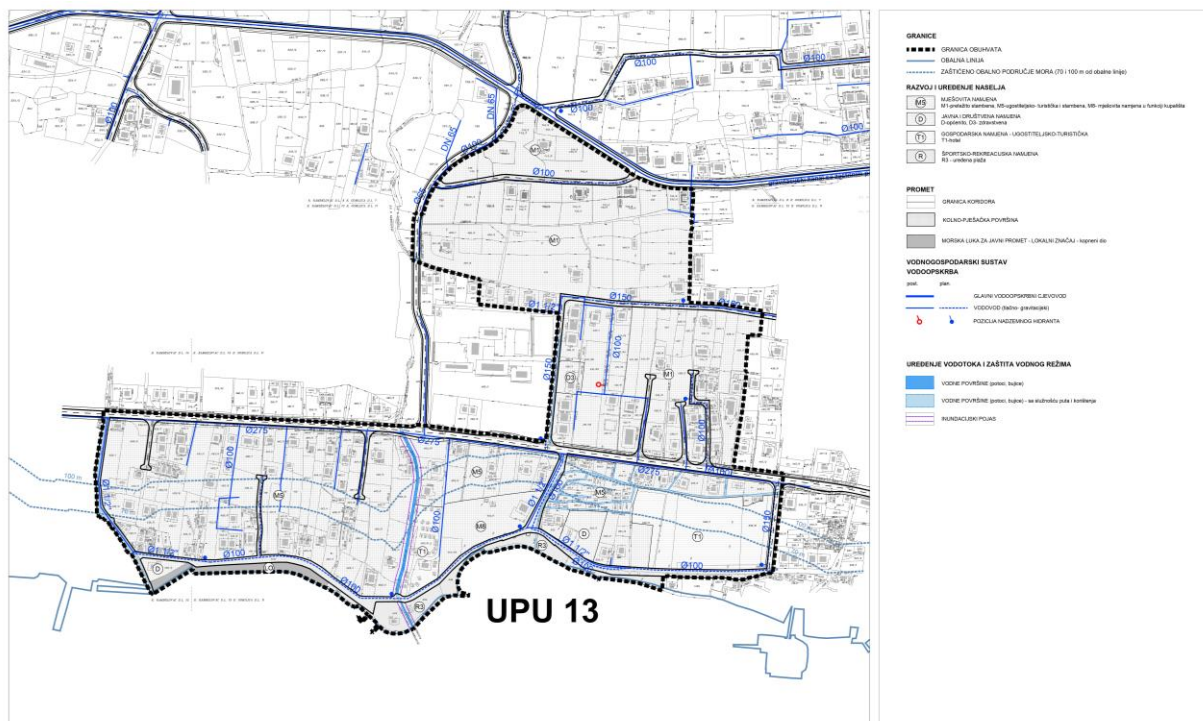
3.3 Water and municipal infrastructure

Legal acts regulating the state of water management are the Water Act (OG 66/19), the Water Services Act (OG 66/19), the Water Management Financing Act (OG 153/09, 90/11), and other legal acts and bylaws in the field of water and communal infrastructure.

3.3.1 Public water supply

The area of the Town of Kaštela is supplied with water from the Split-Solin-Kaštela-Trogir water supply system from the source of the Jadro river. The connection of residents to the public water supply system is higher than 87%, and is under the jurisdiction of the company Vodovod i kanalizacija d.o.o. The key issues faced by the water supply system concern water turbidity and water reduction during the summer months. Due to the high turbidity that occurs up to several times a year, when the turbidity exceeds the permitted level of 4 NTU, the water is disinfected with chlorine gas before distribution, and the population is warned to boil the water prior to its use. Preparations are underway for the construction of a drinking water treatment plant from the source of the Jadro river so that turbidity will no longer be the cause of the interruption of the regular supply. On the other hand, during the summer tourist season, there is a considerable load on the water supply system with existing losses in the system itself that exceed 40%. The improvement of the system is planned by the implementation of the *Improvement of water and municipal infrastructure of the Kaštela – Trogir agglomeration* project (more details on the project below) and regulation of watercourses in accordance with the Water Act and the Spatial Plan of Kaštela, as well as the expert services of the Croatian Waters.

The current water supply system in the area of the Kaštel Kambelovac pilot location is shown below.

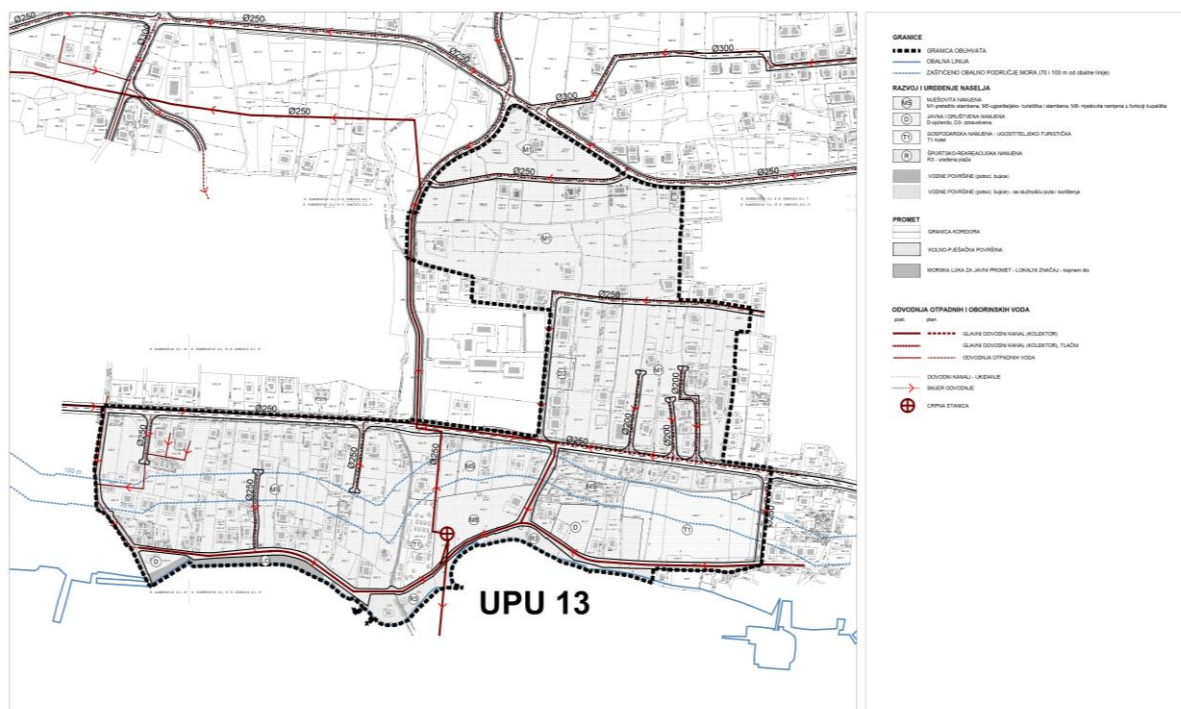


Source: www.kastela.hr

Figure 7 Water supply system of Kaštel Kambelovac according to UPU 13

3.3.2 Public sewerage

The Town of Kaštela is not sufficiently covered by the sewerage network and the settlements below the old Dr. Franjo Tuđman road have a mixed drainage system, and due to insufficient capacity, the secondary network was not expanded. Another issue is the large number of illegal connections of roof and yard rainwater to the wastewater drainage system, which endangers its functioning and overloads the operation of the system. Furthermore, the area above the Adriatic Highway is not currently covered by the main or secondary sewerage network, but the drainage of wastewater in that area is carried out by collection pits. The connection to the sewerage system is only 40%, and according to the *Development strategy of the Town of Kaštela 2016 – 2020*, it should be higher than 80%. The public sewerage system in the pilot location area is shown in the figure below.



Source: www.kastela.hr

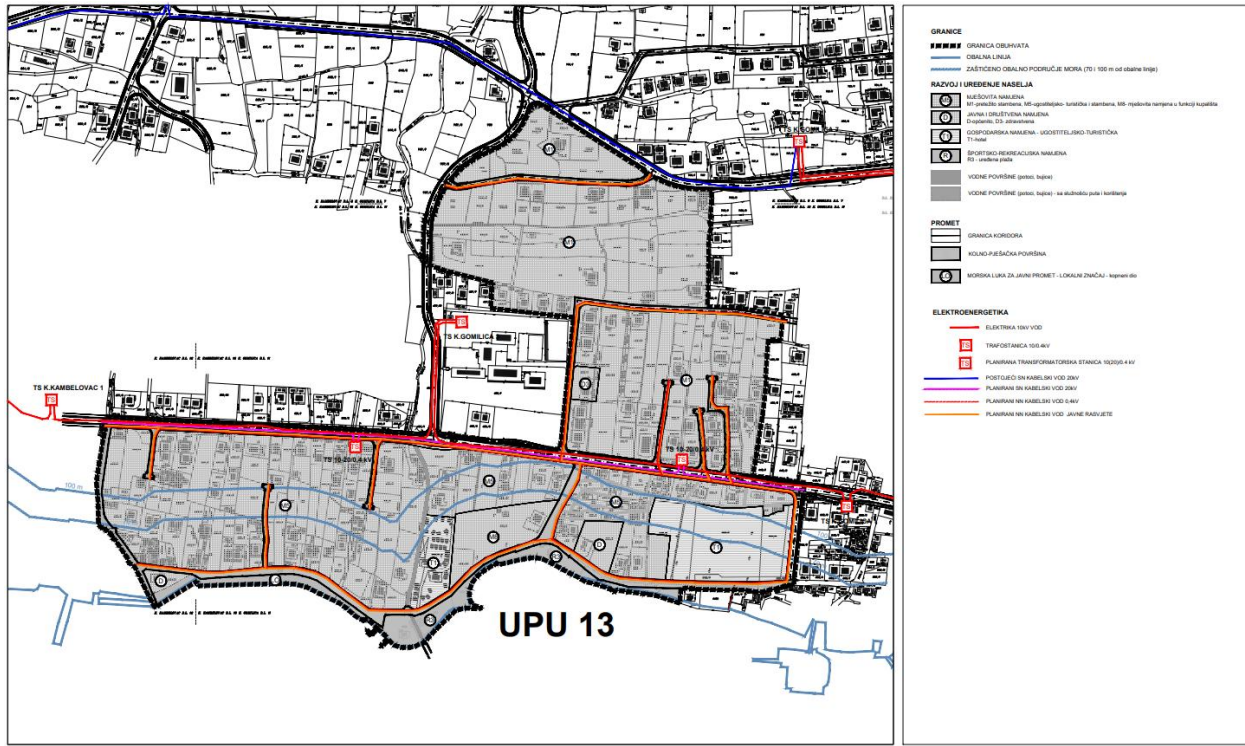
Figure 8 Sewerage system of Kaštel Kambelovac according to UPU 13

In order to improve the state of public water supply and drainage, the *Improvement of water and municipal infrastructure of the Kaštela – Trogir agglomeration* project is underway, which is being implemented in the area of the Town of Kaštela, i.e. the Kaštel Kambelovac pilot location. The investment in the public water supply system within the project includes the construction of 59.87 km of the new public water supply system, reconstruction of 65.41 km of the existing public water supply system, construction of four pumping stations and two water tanks (2 x 500 m³), and 1,640 arrangements for household connections. On the other hand, investment in the public drainage and wastewater treatment system includes the construction of 215 km of new sewer collectors, reconstruction of 4.04 km of sewer collectors, construction of 6.03 km of pressure pipelines, 640 incident systems, 13 pumping stations and 8,613 arrangements for household connections. The investment also includes the upgrade of the existing Divulje central device for wastewater treatment from the first to the second level of treatment with an

increase in capacity from 40,000 ES to 100,000 ES, and the construction of the Čiovo second-level treatment device for wastewater treatment with a capacity of 25,000 ES. Also, the Spatial Plan of the Town of Kaštela envisages the construction of a wastewater drainage system in such a way that rainwater and sanitary wastewater are drained by separate canal systems. Moreover, the recovery of sanitary wastewater is planned in several phases within the Integral Protection Project of the Kaštela Bay by dividing the sanitary water drainage system into zones that can be connected to the water treatment plant by gravity and zones connected using the pumping station system, and enabling the use of the coastal waters as a recipient exclusively for rainwater provided that the coastal waters meet the Category II sea conditions in a width of at least 300 m.

3.4 Energy infrastructure

The energy infrastructure of the Town of Kaštela encompasses power lines 2 * 110 kV TS Kaštela 1 – TS Trogir, 220 kV HPP Zakučac – TS Bilice, 2 * 110 kV TS Kaštela 1 – TS Konjsko, 110(35) kV TS Kaštela 1 – KK Željezara, cable 110 kV TS Dobri – TS Kaštela 1, and transformer station TS 110/35 kV Kaštela 1. There are also two solar photovoltaic power plants in the same area. One is the Kozjak solar photovoltaic power plant with an installed capacity of over 300 kW, which was commissioned in 2014 and for which photovoltaic cells were placed on the roof of CEMEX's St. George mine in Kaštel Sućurac, while the second solar photovoltaic power plant is located on the roof of the Ostrog Elementary School. The Town of Kaštela has implemented four energy efficiency projects co-financed by the Environmental Protection Fund, two of which are directly related to the preparation of documentation, and the other two are related to the installation of energy-efficient solutions in public lighting and renovation of the city administration building envelope. The highest energy consumption by settlements was recorded in Kaštel Sućurac, where there is a concentration of industry, while in Kaštel Stari, which is the largest settlement in terms of population, the consumption is 50% lower. At the Kaštel Kameblovac pilot location, energy consumption in 2014 amounted to over 10 million kWh, which is a share of 9.34% of total energy consumption in the Town of Kaštela in that same year.



Source: www.kastela.hr

Figure 9 Energy infrastructure of the Kaštel Kambelovac pilot location according to UPU 13

The area of energy efficiency, adoption of plans at the local, regional and national level for improving energy efficiency and their implementation, transport and distribution of energy and consumer rights with regards to the application of energy efficiency measures etc. is regulated by the Energy Efficiency Act (OG 41/21). In addition to the above, in the protective corridor of power lines and cables, when other facilities are increasingly closer to the power line or cable or in the construction of roads, it is mandatory to comply with the provisions of the Ordinance on Technical Standards for the Construction of Overhead Electric Lines of rated voltage from 1 kV to 400 kV, the Occupational Safety and Health Act (59/96), the Fire Protection Act (OG 58/93), the Ordinance on Occupational Safety and Health in the Use of Electric Energy (OG 9/97), the Ordinance on Basic Fire Protection Requirements for Electric Power Plants and Apparatus (OG 145/05), the Rules and Safety Measures for Work on Power Transmission Plants (HEP’s Bulletin No. 180), and other ordinances and regulations in the field of construction and occupational

safety and health, and internal regulations of the company HEP. For buildings that are to be built in the protection corridor, it is necessary to obtain conditions, opinions, or consent from the user of the building, i.e. HEP – Operator prijenosnog sustava d.o.o., Split Transmission Area.

3.5 Fishing and mariculture infrastructure

In the area of the Town of Kaštela, no areas for fish and shellfish farming are planned, but the preservation and possible expansion of fishing ports is planned. In Chapter 3.2 Transport infrastructure, it was found that the Friška Riba Split Fishing Cooperative has the concession in the part of Basin C (cargo maritime transport). According to the Spatial Plan of the Town of Kaštela, the construction and landscaping of the Brižina fishing port is planned.

3.6 Waste management infrastructure

The waste management system in the area of Kaštela is related to the activities of the public utility company Čistoća d.o.o. Split, which performs the collection of mixed municipal waste. Municipal waste is taken to the Karepovac landfill. The Town of Kaštela is characterized by a great diversity of facilities and activities ranging from industrial, maritime, tourist to agricultural, therefore, in addition to municipal waste, the types of produced waste range from construction, problematic, hazardous and industrial. The company Mali Luka installs paper storage boxes in town and public institutions, private companies and households, the company Unija papir collects paper in containers placed in public areas and within green islands, and the company Jolly-JBS d.o.o. collects plastic packaging. Recently, there have been significant increases in the collection and production of municipal waste as a result of the increase in tourism activities. Waste generated from the tourism activities is similar in its properties and structure to household waste. Sources of waste are hotel complexes, campsites, apartment complexes, marinas and private tourist accommodations, and it is generated by guests and seasonal catering staff. In the area of Kaštel Kambelovac, 59 containers for municipal waste collection and three containers for waste textile treatment have been installed.

According to the *Waste Management Plan of the Town of Kaštela for the period from 2018 to 2023*, prepared on the basis of the *Waste Management Plan of the Republic of Croatia for the period of 2017 –*

2022, there is a plan to procure 13,000 containers for each type of waste and install 17 green islands. There will also be a possibility to build a civic amenity site within the scope of the exploitation field of the cement plant in the part where the exploitation of mineral resources has been completed (landscape greenery zone). This will enable the use of valuable ingredients of inert construction and demolition waste and their disposal, as well as land from construction excavations for the remediation activities. For the area of the ecological black spot, the zone of the ex-Jugovinil factory, the obligation to carry out the remediation of the area where the waste slag was deposited has been determined. The main issue that arises concerns the direct radiation of radioactive material that is not adequately insulated, i.e. there is no building with adequate protection, and it consequently impacts human health and the environment. Furthermore, it is necessary to change the spatial planning documentation, legal status, and make a decision on the future purpose of the area.

The planned construction of the Lećevica County Waste Management Center will enable the collection and processing of waste in the entire Split-Dalmatia County, which includes the Town of Kaštela as well. The construction of the center, which will include a plant for biological waste treatment, construction waste and a plant for mechanical waste treatment, will enable better waste management, remediation and closure of all existing non-compliant landfills in the entire county, including Kaštela.

3.7 Telecommunications infrastructure

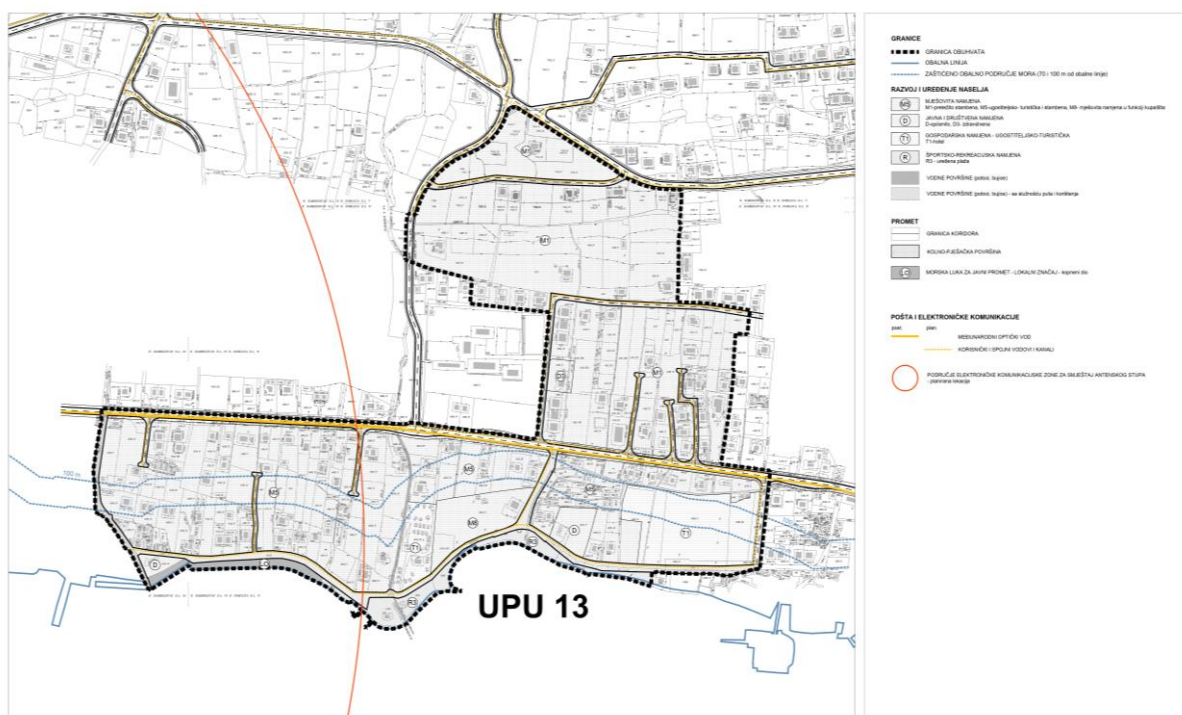
The area of the Town of Kaštela, especially the narrow town area, is mostly covered by broadband infrastructure, meaning that the population has or can have Internet access (network coverage includes 12,530 households (99.89%), i.e. 38,411 inhabitants (99.34%)). In the areas highlighted in the map below, operators have the ability to provide broadband Internet access with access speeds of 2 to 30 Mbit/s, 30 to 100 Mbit/s and greater than 100 Mbit/s through their own infrastructure, i.e. they can, in a short period of time and without significant investments, connect users to their own broadband infrastructure. Access speeds greater than 30 Mbit/s are only available in randomly scattered areas throughout the town, while access speeds of up to 30 Mbit/s (area colored in red) prevail and cover almost the entire town area.



Source: Development strategy of the Town of Kaštela 2016 – 2020

Figure 10 Broadband Internet coverage area (red – 2 – 30 Mbit/s, green – over 100 Mbit/s)

In the figure below, in the area of Kaštel Kambelovac, user lines, interconnectors, channels, and an international fiber optic guide are marked in accordance with UPU 13.



Source: www.kastela.hr

Figure 11 Post and telecommunications infrastructure of Kaštel Kambelovac according to UPU 13

Spatial Plan of the Town of Kaštela envisages the construction and reconstruction of:

- automatic telephone exchanges in Kaštel Sućurac, Kaštel Kambelovac, Kaštel Lukšić, Kaštel Stari, and Kaštel Štafilić,
- cable TC ducts in the entire area of the Town of Kaštela,
- installation of external cable outlets in street concrete poles,
- laying of TC connecting fiber optic cables in the cable TC duct,
- construction of new alternating telephone booths and reconstruction and expansion of existing and construction of new post offices.

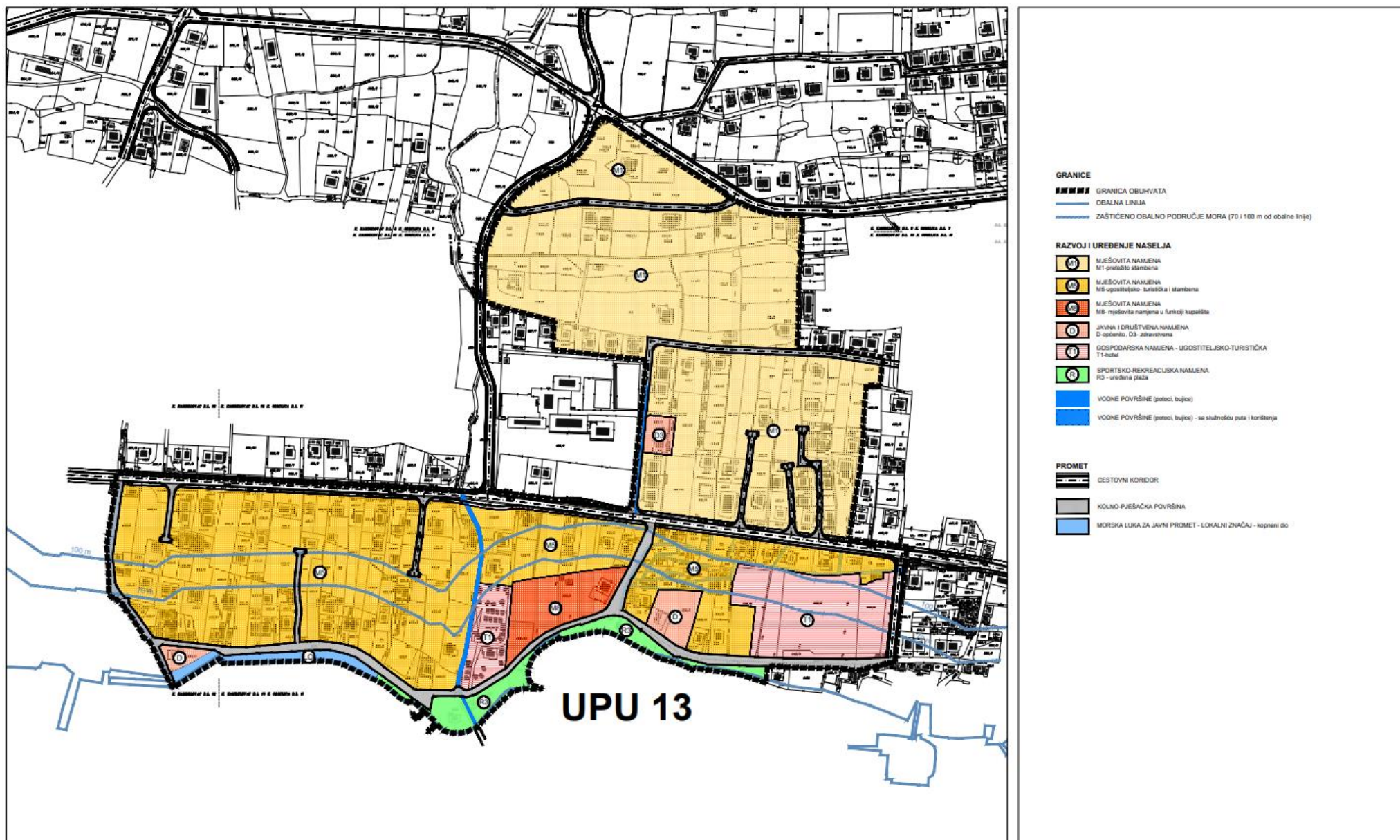
3.8 Buildings for public and social purposes

In the area of the Town, there are 11 branches of the Kaštela Kindergarten established on the basis of the *Decision of the Municipality of Kaštela*, five elementary schools and one high school whose founder is the Split-Dalmatia County. The only Kaštela settlement without an elementary school is Kaštel Kambelovac, but the Prince Trpimir Elementary School in Kaštel Gomilica, which is the largest elementary school in the Town with 35 classes and over 950 students, includes the enrollment area of Kaštel Kambelovac and Kaštel Gomilica. Other buildings for public and social purposes are the Museum of the Town of Kaštela located in the Vitturi Castle in Kaštel Lukšić, divided into two locations (Vitturi Castle and the Archbishop's Palace in Kaštel Sućurac) and the Library of the Town of Kaštela. However, there is no theater building or concert hall in the Town area.

Of the public health institutions in the Town area, there are four Health Center offices of the Split-Dalmatia County, the branch office of the Institute of Emergency Medicine of the Split-Dalmatia County in Kaštel Stari, and the branch office of the Public Health Institute of the Split-Dalmatia County in Kaštel Sućurac. Within the Pharmacy of the Split-Dalmatia County in the area of Kaštela, there are three pharmacies located in Kaštel Gomilica, Kaštel Sućurac, and Kaštel Stari. In the field of social welfare, there is the Social Welfare Center Split – Kaštela Branch, Children's Home "Maestral" – Branch "Miljenko i Dobrila", the Homeless Shelter in Kaštel Gomilica, and the soup kitchen. The Red Cross, in cooperation with the Kaštela Town Society, also carries out numerous voluntary blood donations, first aid education and the like. There is not a single state-owned nursing home in the Town area, but there are private

nursing homes: two in Kaštel Gomilica, Kaštel Sućurac, and Kaštel Novi. In Kaštel Kambelovac there is a family nursing home with a capacity of up to 20 people.

The picture below shows the position of buildings for public and social purposes in the area of Kaštel Kambelovac marked with the letter D (light pink), as well as residential and commercial buildings, marked with the letters M and T.



Source: www.kastela.hr

Figure 12 Arrangement of the Kaštel Kambelovac settlement according to UPU 13

3.9 Buildings for residential and commercial purposes

In accordance with the *Development strategy of the Town of Kaštela 2016 – 2020*, based on the 2011 census, the Town of Kaštela has over 12 thousand housing units and households. Of the total number of apartments intended for permanent residence, 6,442 are temporarily unoccupied, and 193 are abandoned. Also, according to the same census, the total number of household members living in occupied apartments is 38,403, while in the collective apartments, of which there are 13 in the area of Kaštela, there is a total of 256 people, including the homeless registered in the shelter.

The main issue regarding housing and housing stock in the entire Split agglomeration, and even in the wider coastal zone of the Republic of Croatia is the uncontrolled housing construction, the so-called illegal construction. The most common characteristic of illegally constructed buildings is that they are built in groups on the outskirts of the city, without obeying the spatial plans and without proper design and technical documentation, while houses are randomly scattered regardless of plans for the construction of necessary municipal and other crucial infrastructure.

Areas for residential and commercial purposes in the area of Kaštel Kambelovac, Center 2, according to UPU 13, are shown in the previous figure.

3.10 Cultural heritage

The area of the Town of Kaštela was inhabited by many: the Illyrian tribe Delmats, Greek colonists, Romans, and Croats arrived in the 7th century. Traces of high civilization of the area are shown by the remains of tools from the Stone Age, sites of ancient rustic villas, stone finds of early Christian and pre-Romanesque sacral buildings and others in the hinterland (Kaštela Field, the slopes of Kozjak), while the area of today's Town started to develop in the 15th century. In the period from the 15th to the 17th century, 17 fortifications and 12 fortified settlements were built, and to this day, 12 fortifications and 10 fortified settlements within seven settlements have been preserved: Kaštel Sućurac, Kaštel Gomilica, Kaštel Kambelovac, Kaštel Lukšić, Kaštel Stari, Kaštel Novi, and Kaštel Štafilić.

Historic buildings are divided into two groups: civil buildings (castles-fortifications, residential buildings, villas, public buildings, schools etc.) and sacral buildings (churches, cemeteries etc.). The cultural heritage of Kaštel Sućurac includes the old historic center – Kaštilac, the Old Parish Church, the hydroarchaeological site Tišić, the archaeological site Barbarinac, the hydroarchaeological site Blato-Trstenik and Đardin-Blato, and the archaeological site Sustjepan. In Kaštel Gomilica it is the old historic center – Kaštilac and the Old Parish Church of St. Jerome. The historic center of Kaštel Lukšić consists of the Vitturi Castle and the Tartagila and Rosani castles, and in the same area, there is the archeological site Roskovsko. In Kaštel Stari, there is the settlement of the Cippico Castle, the Old Parish Church of St. John the Baptist, Celio Cega Tower, and the Andreis Castle. The first Kaštela hotel Palace and Villa Nika are particularly important, and at the mouth of the Gostinj-Štalija stream there is an archaeological and hydroarchaeological site. The historic centers of Kaštel Novi and Kaštel Štafilić consist of the fortified settlements of Pavao Cippico, Stafileo Castle, and Nehaj Castle. Also, in Kaštel Novi there is the Parish Church of St. Peter, and in Štafilić there is the Parish Church of the Immaculate Conception. In the area of Štafilić there are also three archeological sites Kaštel Kvarko, Kaštel Dragač, Resnik-Siculi, and a hydroarchaeological site Resnik.

The cultural heritage of the Kaštel Kambelovac pilot location includes the historic center, a fortified settlement next to the round Cambi Tower, Mala and Velika Piškera, a fortified settlement of the Lippeo Castle, and the “Ballet School” Villa. The historic center consists of several connected fortifications. The oldest are the Kumbat Towers, which were abandoned after the construction of fortified settlements within which the inhabitants of the medieval villages of Lažani and Kruševik settled. The fortified settlement next to the round Cambi Tower was built in the 15th century and had three gates: the southern “sea” gates, the western ones towards the Brce Square, and the northern ones which have been preserved to this day. Furthermore, the next fortified settlements include Mala and Velika Piškera and the settlement of the Lippeo Castle. Mala and Velika Piškera were built in the 15th century by the inhabitants of the village of Kruševik, while the Lippeo Castle was built in the 16th century on sea cliffs. The fortified settlement of the castle is irregularly shaped and was mostly created on land, and partially on the embankment in the sea, and it had only one gate which was preserved to this day along with one part of the eastern wall. Ballet School Villa was founded in the 20th century in the Art Nouveau style for the needs

of the resort. Today it is used as a Music School from which the park extends to the west, and the beach to the east.

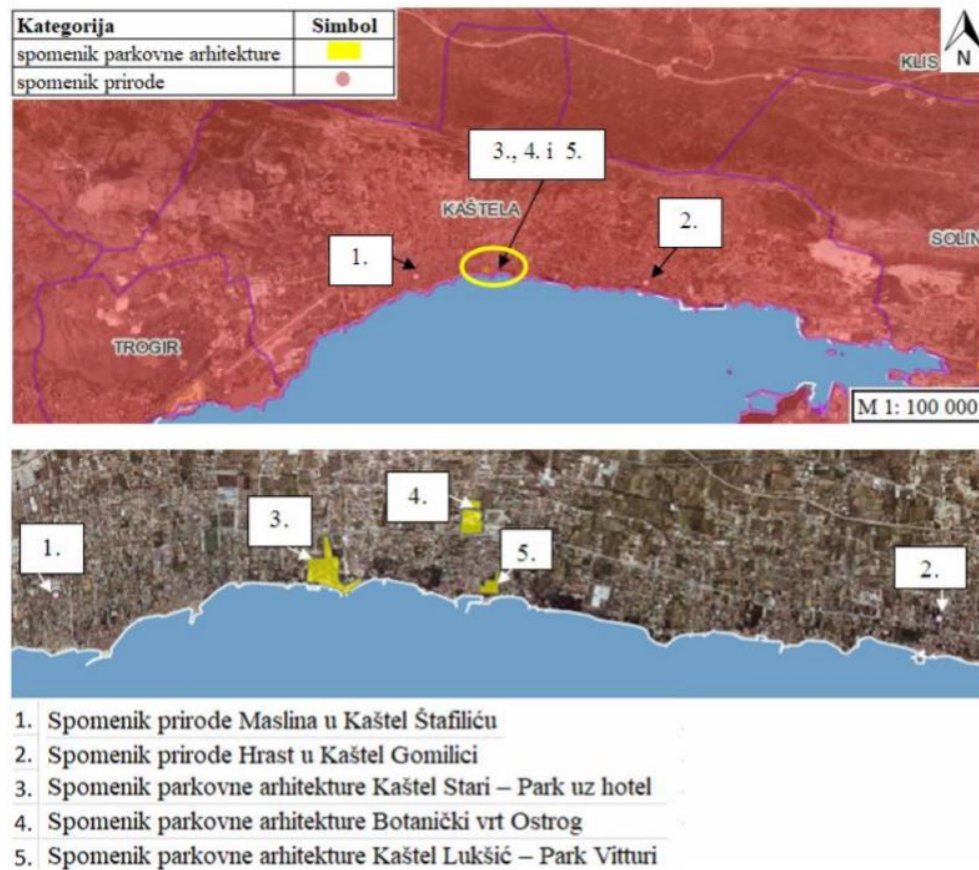
Cultural heritage, as a living environment, exposed to permanent impact and pressures (pollution, urbanization, natural hazards etc.), due to its physical structure, is particularly sensitive and prone to decay. In the specific case of the Town of Kaštela, the cultural heritage is integrated into the landscape as a whole and is affected by all of the pressures that are present in the town itself, while the current level of protection is not at a satisfactory level. Therefore, historical settlements and their parts, buildings and their environment, natural and cultivated landscapes, archeological sites and others must be included in a professionally acceptable manner in the future development of the municipality and the county. This primarily implies taking all protection measures according to the Act on the Protection and Preservation of Cultural Goods of the Republic of Croatia (OG 69/99) and others in accordance with the Urban Development Plan of the Town of Kaštela.

3.11 Green areas and protected natural areas

As previously mentioned, the area of the Town of Kaštela, especially along the coast, is highly urbanized. Out of a total of 5,785.86 ha belonging to the administrative area of the town, only 35% are covered by forests and shrub and herbaceous vegetation.

Pursuant to the Nature Protection Act (OG 80/13), there are five protected areas in the area of the Town of Kaštela, of which three are monuments of park architecture and two are natural monuments, Figure 13. The monuments of park architecture are: the school botanical garden of the “Vjeko Butir” Elementary School, the Vitturi Park in Kaštel Lukšić, and the Park in Kaštel Stari. Natural monuments are: an old olive tree in the yard of the “Braće Perišić” Kindergarten in Kaštel Štafilić and an oak tree in Kaštel Gomilica. The above-mentioned protected areas are urban in nature and can certainly contribute to the quality of life in the town, as well as the tourist offer. As these are artificially created parks located in the town center, the active involvement of managers is required in order to maintain and organize them. Individual protected trees are more sensitive to pressures than they would be if they were in their natural forest habitat. Therefore, it is important to monitor their condition for their preservation, and in case of diseases,

pests and similar phenomena, it is crucial to implement active protection measures in a timely manner. “Sea and Karst” Public Institution is in charge of managing protected parts of nature in the Split-Dalmatia County in accordance with the Nature Protection Act.

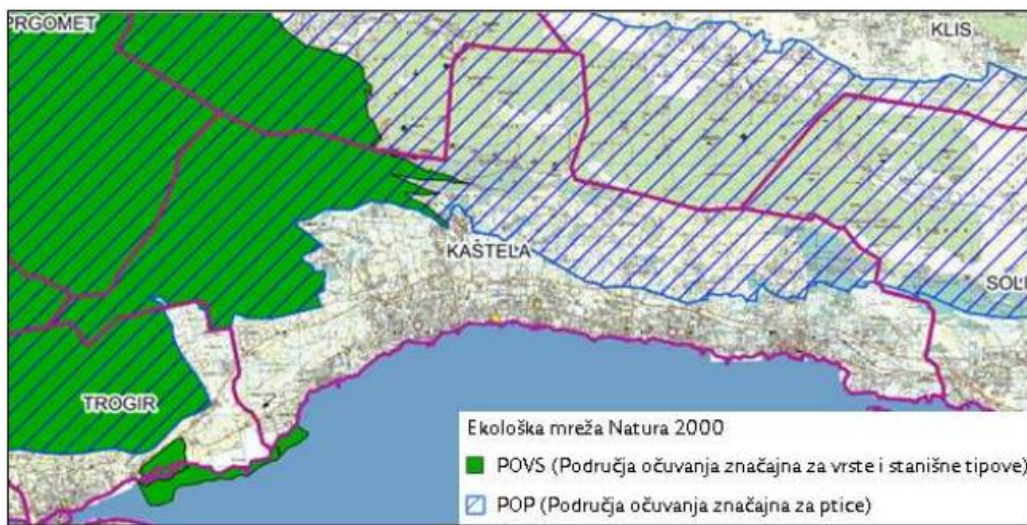


Source: Waste Management Plan of the Town of Kaštela for the period from 2018 to 2023

Figure 13. Map of protected areas

The *Ecological Network of the Republic of Croatia* represents the areas that Croatia, in accordance with the EU Birds Directive and the Habitats Directive, has singled out as areas of particular significance for the target species and habitats listed in the same directives. At the EU level, these areas are called Natura 2000 sites. The Natura 2000 network supports the principle of sustainable development and its goal is not to stop overall development activities, but to set the standards according to which they will be able to

take place, while preserving biodiversity. As such, Natura 2000 can provide new opportunities through eco-tourism, recreation or natural agriculture and forestry. Within and in the immediate vicinity of the administrative boundaries of the Town of Kaštela, there are several areas of the ecological network. These are conservation areas important for birds (Mosor, Kozjak and the Trogir hinterland), and conservation areas important for species and habitats (the Trogir hinterland, Pantan-Divulje and Pantan) shown in the picture below.



Source: Development strategy of the Town of Kaštela 2016 – 2020

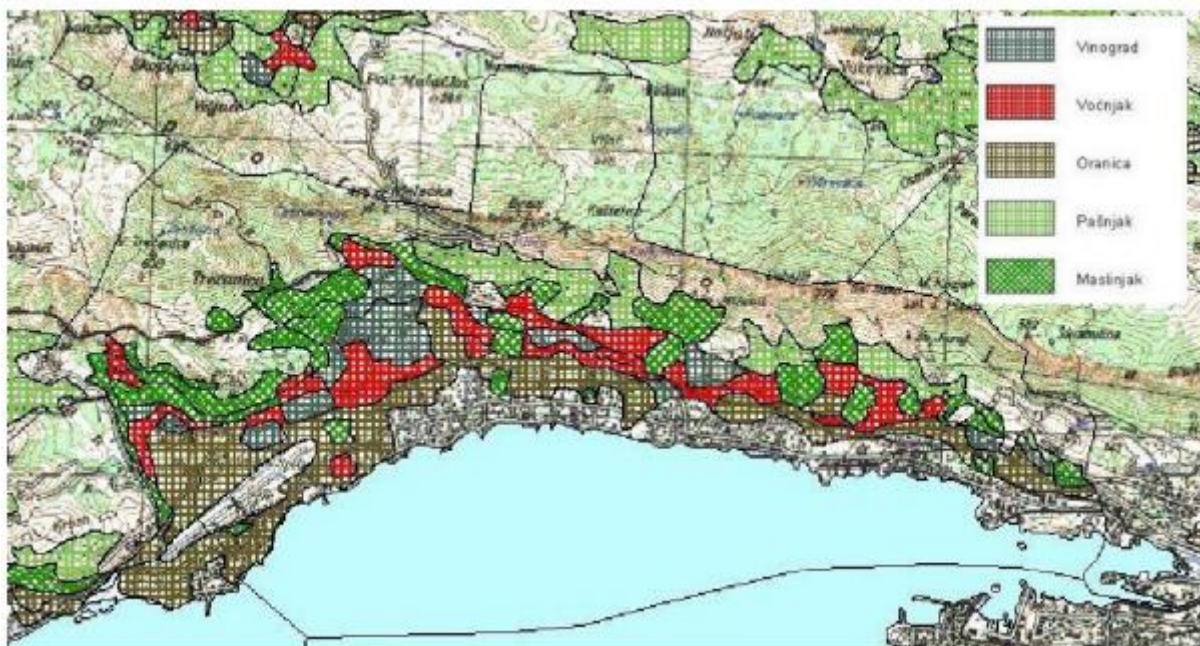
Figure 14. Areas of the Natura 2000 Ecological Network

3.12 Agricultural areas

The agricultural land of the Town of Kaštela, the Kaštela Field, is located behind the coastal strip with the settlement zone, and rises in relief towards the Kozjak Mountain. Traditionally, in the area of Split-Dalmatia County, olive-growing and viticulture prevail, along with the continuous development of wine and oil production with the possibility of growing various citrus fruits. For instance, cherry-growing is a tradition in the entire area from Kaštela to Omiš.

According to the Corine Land Cover Croatia 2018, the total agricultural area in the area of the Town of Kaštela is 1769.29 ha, of which 205.84 ha, or 11.6%, is located in the area of Kaštel Kambelovac.

Maintenance and protection of agricultural land, its use, change of purpose, compensation and disposal of agricultural land is regulated by the Agricultural Land Act (OG 20/18). Olive groves in the area of Kaštela are located on hilly plateaus in the outskirts of the town, and on terrains with a deeper terrain profile and a greater ability to retain soil moisture, there is a tradition of table olive production. From the cultivation of fruit trees, the most common are the above-mentioned cherries and figs, almonds and peaches.



Source: Development strategy of the Town of Kaštela 2016 – 2020

Figure 15 Use of agricultural land in the area of the Town of Kaštela

According to the data from the Registry of Agriculture from 2015 in the area of the Town of Kaštela, a total of 906 members of agricultural holdings have been registered, while in the overall structure, family farms prevail. There are 134 family farms and two companies located in the area of Kaštel Kambelovac, out of a total of 710 registered agricultural holdings on a total of 502 ha of land. Also, out of the total number of registered entities, as many as 704 have an area of less than 3 ha. Such fragmented land structure prevents profitable agricultural production, except for the possibility of systems of cooperatives or producer organizations, i.e. joint market entry.

Deagrarization is a socio-economic process visible at the overall county level. In the area of the Town of Kaštela, but also in other settlements of the Split agglomeration, it was a result of the process of urbanization and employment of the population in other sectors. In practice, this process is visible by the change of the cultural landscape where arable land is increasingly uncultivated, and the land is overgrown with weeds. Through planned action, this process can be suppressed, which ultimately contributes to a greater possibility of self-employment of the local population in agriculture, a more attractive environment and quality of life. The Spatial Plan of the Town of Kaštela defines the purpose of agricultural land, construction in these areas and future protection.

4. Analysis of the exposure of the pilot location to flood hazards caused by rising sea levels and extremely high ocean waves

In the last hundred years, human activity and the development of the world economy based on fossil fuels has significantly influenced the increase in heat in the atmosphere and the sea, especially due to the increase in the amount of greenhouse gases. Consequently, an increase in air temperature, sea surface and sea level, precipitation and winds, changes in currents, extinction of plant and animal species and other negative consequences have been recorded. Sea level rise and high ocean waves are closely related to climate and climate change in recent years, and the analysis of the exposure of the pilot location to flood hazards caused by rising sea levels and extremely high ocean waves is observed in terms of the impact of climate change on various pilot location features.

4.1 Coast and coastal infrastructure

In the area of the Kaštela Bay, the sea level varies dramatically on an annual basis. The highest sea level values are recorded during late autumn and early winter. The reason for this is the expansion of the water column due to heat transfer from higher to deeper layers of the sea during autumn. Also, in the same period of the year, the highest probability of occurrence of extreme floods in the coastal area is recorded, which, with extreme southeast winds and waves, can significantly endanger the coastal infrastructure and facilities in the coastal area of the Town of Kaštela. Even now, the lower parts of the coast and coastal promenades, especially in parts that have not been renovated in recent years, are being flooded by waves which can be up to several meters high. According to the *Coastal Zone Management Plan of the Town of Kaštela*, three zones of threats from coastal flooding have been identified:

- Zone 1 – includes areas up to 1 m above sea level (red on Figure 16)
- Zone 2 – includes areas from 1 to 2 m above sea level (orange on Figure 16)
- Zone 3 – includes areas from 2 to 3 m above sea level (yellow on Figure 16)



Source: Coastal Zone Management Plan of the Town of Kaštela

Figure 16. Coastal flood zones 1, 2, and 3

Zone 1 includes 28 ha of areas already exposed to coastal floods. The distribution and areas of zones 1, 2, and 3 in the area of Kaštel Kambelovac are shown in the table below.

Flood zone (area in ha)	Zone 1 (0 – 1 m above sea level)	Zone 2 (1 – 2 m above sea level)	Zone 3 (2 – 3 m above sea level)	Total (ha)
Kaštel Kambelovac	3.79	4.30	3.99	12.09

Source: Coastal Zone Management Plan of the Town of Kaštela, processed by the creator

Flooding and splashing of the waves also cause coastal erosion, which can cause its damage and collapse after prolonged exposure to the influence of the waves. Naturally, similar effects, depending on the quality of construction, can be expected in other coastal facilities, especially in those in the strict centers of some castles that were built a hundred or more years ago, and which have therefore not been adapted to sea level rise in the past, which is visible due to the type of construction material and construction techniques that were used. Therefore, they must be further reinforced and protected from the coastal erosion, which includes regular monitoring of the state of the coast and timely decision concerning the remediation in case of damages. In addition to the built areas, the beaches in the area of the Town are constantly endangered by the coastal erosion, therefore it is necessary to put in place appropriate protection of the beaches. Also, due to the action of the strong south wind, there is a possibility of a tidal wave. Its consequences, which can cause damage by flooding the basements of buildings along the coast,

also cause damage to boats and pollute the coast. According to the *Action Plan in the field of natural disasters for 2020 of the Town of Kaštela*, there are civil protection measures in the form of informing on the occurrence of hazards and collecting information on the consequences of tidal waves, regulating traffic and insurance during interventions, but also covering the endangered area using the emergency alert apparatus for citizens, evacuation routes, and protective structures. Also, it is recommended that during the construction and reconstruction of local operational shores, the edge of the shore be raised by a fence wall which would be at least 60 cm high.

4.2 Transport infrastructure

Given that the Town of Kaštela is located along the very coast and the foundations of the old town centers and castles/towers are located in the sea, the roads are located very close to the coast, especially within the settlements, and in some places, they pass through the coast. Also, road D8 (Adriatic Highway), the Dr. Franjo Tuđman road (the Old Kaštela Road) and the railway are located within 2 km from the coast, and the Split Airport has access to the sea. Therefore, due to the position of roads which are in the immediate vicinity of the flood zone, unfavorable changes in sea levels can cause short-term traffic jams (short-term floods due to waves) or long-term traffic jams (deterioration of transport infrastructure due to erosion or long-term sea level rise).

4.3 Water and municipal infrastructure

Climate change will significantly affect the increased air temperature during the summer period, which also causes a decrease in the amount of precipitation. Therefore, the reduced amount of rainwater will negatively affect the availability of drinking water in the summer months when the pressure on the public water supply is the most intense, which will increase the frequency of water reductions. Also, given the existing level of construction of the area, unplanned construction, and the capacity and poor condition of existing rainwater drainage systems, there is a risk of frequent torrential floods.

Rising sea levels will negatively affect the existing communal infrastructure, which is currently underdeveloped. Elevated sea levels will prevent the discharge of wastewater and lead to sewage spills on external surfaces in cases where appropriate solutions have not been implemented. At the same time,

this will cause negative consequences not only for the infrastructure, but also for the health of the entire population.

4.4 Fishing and mariculture infrastructure

Rising sea levels and floods caused by climate change, as stated above, can cause damage to the coast and coastal infrastructure, which includes fishing ports as well. Also, floods can cause damage to the boats and lead to pollution of the coast and sea. On the other hand, changes in sea temperature and salinity can have positive and negative effects on mariculture, which, although not developed in the Kaštela Bay area, may develop in the future. For example, rising sea temperatures will benefit tuna and gilt-head sea bream farming, while potential shellfish farming could be jeopardized by the rise in salinity. The rise in temperature will also affect the fishing communities in the central Adriatic, which belong to the hunting area of the Kaštela fishermen. In addition to human influence, the expansion of new species from warmer waters will take place in the central Adriatic, some of which may be commercially exploited.

4.5 Energy and telecommunications infrastructure

According to the analysis of the situation, the energy infrastructure includes power lines and transformer stations in the area of Kaštel Kambelovac, which are located relatively close to the coastline, as can be seen in the figure below. On the other hand, the analysis of the telecommunications infrastructure indicates that the entire area of Kaštela is covered by broadband Internet access, and the international fiber optic guide, user lines, interconnectors, and channels are also located near the coast.

Telecommunications infrastructure is located underground, and it is known that such infrastructure is laid below sea level. Energy infrastructure can also be laid below the sea level, so the islands are supplied with electric energy and telecommunications. However, the current electric energy supply and telecommunications infrastructure of the Town of Kaštela, which is located above the ground, may be endangered by coastal flooding, especially user lines, interconnectors, and channels on facilities located near the coast and at low altitudes. In such cases, floods can cause short circuits, electricity shortage and Internet access interruptions if the infrastructure is not insulated and resistant to water, salinity and corrosion.

4.6 Buildings

The Town of Kaštela is located on the coast, which is highly urbanized. In the narrow coastal zone there are buildings for private (residential) and public purposes (schools, health care institutions, social welfare institutions), as well as business buildings and facilities. Due to the effects of climate change in the future and rising of sea levels, floods and destruction of all types of buildings are possible as a consequence. Even now parts of the facilities right by the sea are damaged by the action of splashes of waves, which, depending on the quality of construction, may collapse. Also, due to the increase in the intensity of torrential waters in the future, as well as due to the possibility of urbanization that will not take into account the proper capacity of drainage of such waters, the vulnerability of buildings in the Town of Kaštela is likely to increase in the future. Therefore, it is important that drainage systems are provided with sufficient capacities in future reconstructions and planning of construction of residential and commercial buildings, as well as with the implementation of solutions for flood protection caused by rising sea levels.

4.7 Cultural heritage

The cultural heritage of the Town of Kaštela is mostly present in the narrow coastal zone and it is thus exposed to the ocean waves. This particularly applies to parts with critical infrastructure: Kaštilac in Kaštel Gomilica, Vitturi Castle and Rušinac Castle in Kaštel Lukšić, Cipicco Castle and Rotondo Castle in Kaštel Štafilić, which are located on the coast itself. Given the location, they are subject to the foundation erosion like all other coastal structures, which may ultimately endanger their stability. As sea levels rise, it is possible to multiply the threat to stability, therefore it is necessary to take appropriate measures in order to protect these facilities.

4.8 Terrestrial and marine ecosystems and biodiversity

In the area of the Town of Kaštela there are five protected areas, of which three are monuments of park architecture and two are natural monuments, and in the immediate vicinity there are several areas of the Natura 2000 Ecological Network (conservation areas important for birds and conservation areas important for species and habitats).

Climate change will lead to changes in the system of plant and animal species. Organisms more resistant to high temperatures and prolonged drought periods will be more resistant than those sensitive to changes in environmental parameters. This will also affect the cultivation of certain plant cultures. Rising sea temperatures and salinity will affect biodiversity, especially in the coastal area. The diversity of plant and animal species in the sea will vary, as well as those on land. The number of thermophilic species will increase in relation to those more sensitive to change, and the total number of species may decrease as a result of changes in production, sea acidity, dissolved oxygen, and nutritive salts. The raise of sea levels can lead to flooding of the part of the ecological network that is located along the coast itself (Figure 14, part of the area important for species and habitats). With regards to the protected areas in the area of Kaštela, the raise of sea levels may cause flooding of these areas, as well as their destruction. Prevention of such events can be achieved by taking the necessary measures in order to protect against such extreme events.

4.9 Agricultural areas

An increase in air temperature, the appearance of heat waves, and a decrease in precipitation in the warmer part of the year caused by climate change will endanger certain crops that need more water in order to grow. This issue can be solved by irrigating the area, which is closely related to the proper capacity of the water supply infrastructure. However, due to the accelerated urbanization in the Kaštela Field, areas suitable for agriculture will not be significant, and the negative impact will be noticeable in smaller urban agricultural units and house yards in which agricultural activities take place. In the area of the Town of Kaštela, where such units are located near the coast, the sea level may rise, which leads to the destruction of land and crops.

5. Key identified issues

The analysis of the situation in the field of land management took into consideration the current situation, legislation and the existing planning and strategic management framework of various features (coastal, transport, energy and telecommunications infrastructure etc.) of the Town of Kaštela or the Kaštel Kambelovac pilot location, where available. The analysis of the exposure of the pilot location observes the impact of possible flood hazards caused by rising sea levels and extremely high ocean waves on various features of the area. Thereby, floods and the rise in sea levels have been identified as the consequences of future climate change, mostly caused by human activity. Both analyses identified key issues in land and other infrastructure management summarized below:

- coastal embankments and systematic construction of the coast during development
- unplanned and illegal construction of housing developments
- pollution and devastation as a consequence of industrialization
- high density of buildings and population in a narrow coastal strip
- coastal erosion, damage to coastal infrastructure and beaches caused by ocean waves
- unsatisfactory construction of water and municipal infrastructure with high system losses and insufficient level of connection of the population to the public sewerage system
- low levels of wastewater treatment
- non-existence of a complete waste separation system (in some places only certain types of waste are collected)
- it is necessary to improve the system of municipal construction and special waste disposal
- unsatisfactory state of railway infrastructure
- underdeveloped maritime transport and inadequate infrastructure
- it is necessary to invest in public transport in the form of other transport models (rail, maritime) in order to relieve the road traffic pressure

- unsatisfactory number of buildings for public purposes (schools, health care institutions and social welfare institutions) in the area of the Town of Kaštela, i.e. high dependence on facilities in the City of Split
- inadequacy/non-existence of basic cultural infrastructure; in the area of the Town of Kaštela there is only a museum and a library, while there are no theaters or concert halls
- deagrarization of the Kaštela field as a consequence of urbanization
- fragmentation of agricultural land on which production takes place, as well as the sparseness of agricultural holdings, which prevents the profitability of production
- negative impacts of urbanization on environmental and natural heritage degradation
- potential biodiversity loss of terrestrial and marine ecosystems and crops caused by climate change.

Analyses of the situation have shown that the area of Kaštel Kambelovac, i.e. the Town of Kaštela as a whole, is an high-risk area sensitive to climate change and natural hazards such as floods caused by rising sea levels. This is due to the development of the town in a narrow coastal area, as well as systematic illegal construction, unplanned expansion of urban areas without adequate infrastructure, and continuous embankment of the coast which endangers natural habitats, cultural heritage and biodiversity. Therefore, there is a need to develop a systematic and sustainable management model for the area of the Town of Kaštela, especially when it comes to exposure to natural hazards caused by rising sea levels and the action of extremely high ocean waves.