

# D.T3.3.4 FUA-LEVEL CWC STRATEGIES ON INTEGRATED CIRCULAR URBAN WATER MANAGEMENT INCLUDING TARGETED ACTION PLANS

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Subtitle

Version 1  
09 2021

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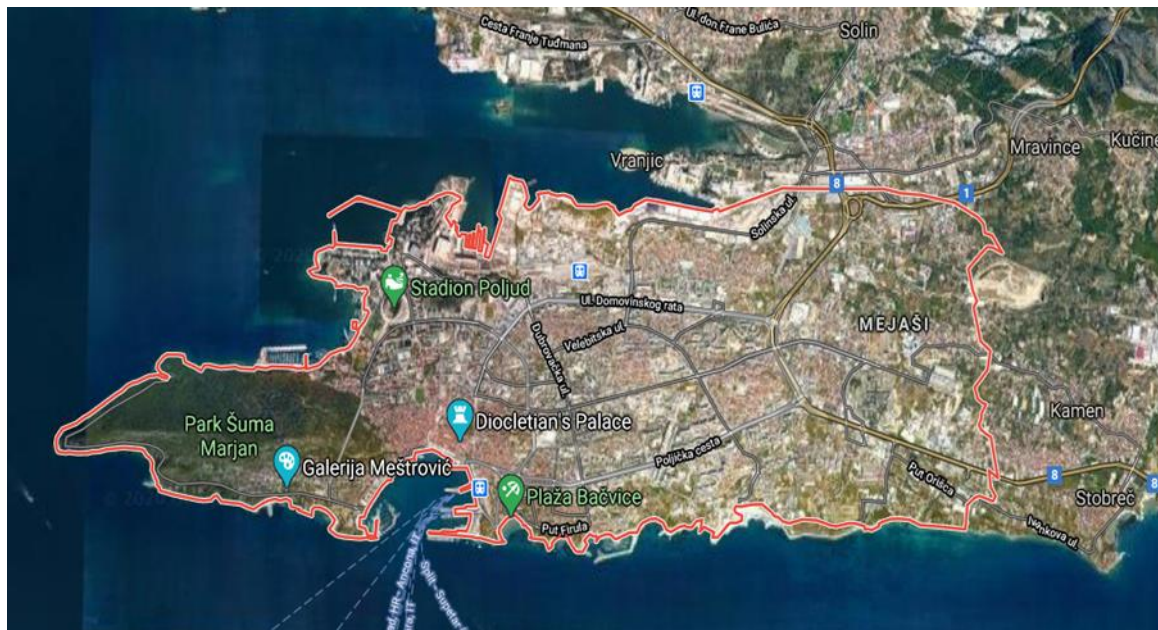
## INTRODUCTION

The document summarizes Functional Urban Area (FUA) Split baseline assessment, its vision, strategic goals, and objectives together with the set-up target indicators. The first chapter of the document determines Split FUA territory, while the second chapter describes the stakeholders' involvement in the process of building the Strategy's vision, goals, and objectives. Furthermore, the third chapter shows a baseline assessment divided into the following subchapters (main CWC areas): population and territorial configuration (climate, environment); natural water resources; water infrastructure; water consumption; potential issues arising due to climate change and local laws and rules regulating the anthropic and natural water cycle and good practices. The baseline assessment represents an overview of the FUA Split current situation and it is based on the synthesis of the following project deliverables: FUA level self-assessment on background conditions related to circular water use (D.T3.1.3), FUA level water efficiency and reuse related public perception assessments - a public survey conducted during January and February 2020 targeting the city of Split residents and daily migrants from the surrounding area (D.T3.1.4), and the Comprehensive FUA level status Quo studies (D.T3.1.5). Finally, the vision that presents the desired future state of the Split FUA in 2030 is shown in the fourth chapter. In order to define the vision, the strategic planning technic - the SOAR analysis (Strengths, Opportunities, Aspirations and Results) along with the strong participatory approach was used. Upon defining the vision, strategic goals and objectives together with the indicators and appropriate descriptions were determined in the fifth chapter. The last three chapters present the implementation of actions, evaluation and monitoring, and consistence with high-level documents.



# 1. Determination of the territory covered by the strategy

The City of Split is the second-largest city in Croatia and the largest city on the eastern Croatian Adriatic coast. Administratively, it belongs to Split-Dalmatia County. The City of Split consists of several urban and suburban settlements. The peninsula of the City of Split was determined as a Project functional urban area (FUA), excluding the suburban settlements (Donje Sitno, Gornje Sitno, Kamen, Slatine, Srinjine, Stobreč, and Žrnovnica). Hence, Split FUA does not correlate to any administrative area. Total area of the FUA is 79.38 km<sup>2</sup> and it refers to the urban area of the City as shown in the map below. It is important to state that although the key water supply source of Jadro spring as well as the key wastewater treatment plant (WWTP) Stupe (submarine discharge) do not belong territorially to FUA Split, they represent an integral part of its circular urban water system. Water supply and sewerage services in Split FUA are managed by the public company Water Supply and Sewerage Ltd. Split. In 2018, according to the report from the Croatian Bureau of Statistics, Split FUA had 170,419 inhabitants. However, a broader area around the city counts to 400,000 inhabitants that gravitate to the City’s urban area.



Source: Google Maps, processing: Author

Picture 1: Split FUA



## 2. Stakeholder involvement

Stakeholder group (SG), as well as stakeholder advisory panel (SAP), includes stakeholders who are responsible for water resources management via policy-making, legislation, regulation, infrastructure development, water, and wastewater treatment at the Split FUA level. Stakeholders involved in the Split FUA strategy building process belong to the following categories: local public authority, regional public authority, sectoral agencies, infrastructure and (public) service providers, interest groups including NGOs, higher education and research, general public, and SMEs. The stakeholders provided their contribution through the local competence building workshop, the second stakeholder meeting (SGM2) and the third stakeholder meeting (SGM3). Since the COVID-19 pandemic occurred, all the events were conducted online. The aim of the aforementioned events was to engage all relevant stakeholders in order to obtain important expert insights, educate and cooperatively build a strategy for circular water management at the FUA level and the goals of the meetings have been met. The stakeholders proactively shared their professional knowledge relevant to the subject of interest. Specifically, at the SGM2, the stakeholders contributed to determining the vision, strategic goals with relevant objectives and indicators. Finally, at the SGM3, the state of the art and further steps in FUA Split Strategy building process have been presented and discussed with the stakeholders, who agreed with the presented matter and confirmed their future engagement.



### 3. Baseline assessment

The following chapter provides a synthesis of quantitative and qualitative assessments of the previously produced project deliverables (FUA level self-assessment on background conditions related to circular water use - D.T3.1.3, FUA level water efficiency and reuse related public perception assessments - D.T3.1.4 and the Comprehensive FUA level status Quo studies D.T3.1.5). The synthesis illustrates the current situation at the Split FUA level, at the same time identifying the key issues related to circular water use. It presents all the relevant aspects of Split FUA circular water management: population, environment, climate, natural water resources, water infrastructure, water consumption, potential issues arising due to climate change, and local laws and rules regulating the anthropic and natural water cycle and good practices.

#### 3.1. Population and the territorial configuration (climate, environment)

According to the report from the Croatian Bureau of Statistics, Split FUA had 189,388 inhabitants in 1991 and 170,419 in 2018 (an estimation) which indicates a 10% decrease. However, considering the broader city area, approximately 400,000 inhabitants are gravitating to the City's urban area. In addition to the number of inhabitants and daily migrants, it is worth mentioning the number of tourist visits and overnight stays during the year. According to the available data from the Croatian Bureau of Statistics for 2018, there were: 846,308 arrivals and 2,480,598 tourist overnight stays at the Split FUA level (90% from May to September, with peak months July and August). Even though available data show a decrease in the number of inhabitants in Split FUA over the observed years, tourist visits during the year present a significant seasonal population influx.

The pleasant and mild Mediterranean climate is one of the most important attractive factors generating many tourist visits to the City of Split. The data from Table 1, observing the highest and lowest average monthly temperatures, shows that January records the lowest average temperature of 7,9°C, while the highest average temperature is observed during July - 26°C. These values, as well as humidity values during the summer months (varies from 49.3% to 59.1%), indicate favorable weather conditions.

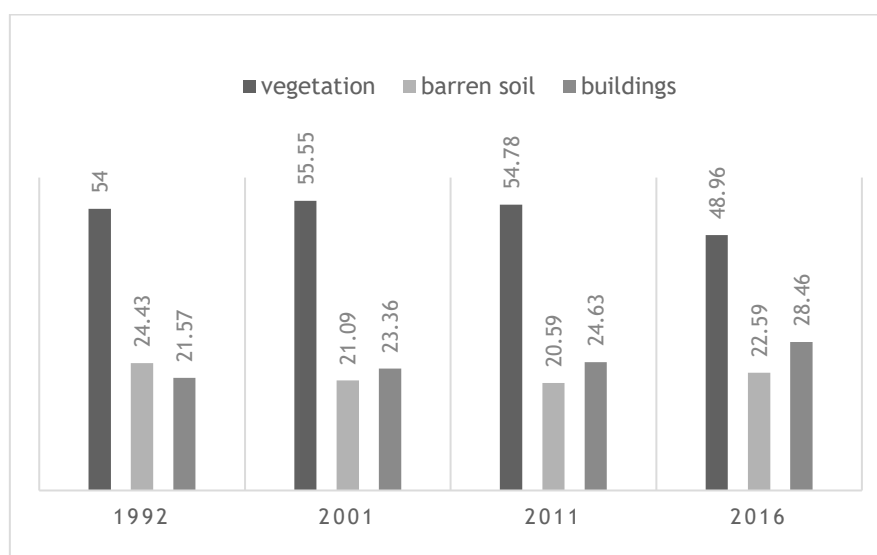


Table 1: Monthly average temperature and average humidity (Weather Station Marjan)

Period	Average temperature 1948 - 2018 (°C)	Average humidity in summer months 1971 - 2000 (%)
January	7,9	/
February	8,3	/
March	10,8	/
April	14,4	/
May	19,1	/
June	23,2	54.9
July	26	49.3
August	25,7	51.7
September	21,5	59.1
October	17,1	/
November	12,6	/
December	9,3	/

Source: Croatian Meteorological and Hydrological Service, processing: Author

Furthermore, regarding the sealed soil at Split FUA level, it is important to state that seasonal population influx due to tourism activities causes an overload of the city’s infrastructure. Hence, the available data show the tendency of reducing the percentage of green spaces (vegetation) and tendency of increasing the area covered by buildings, as presented in the Chart 2 below.



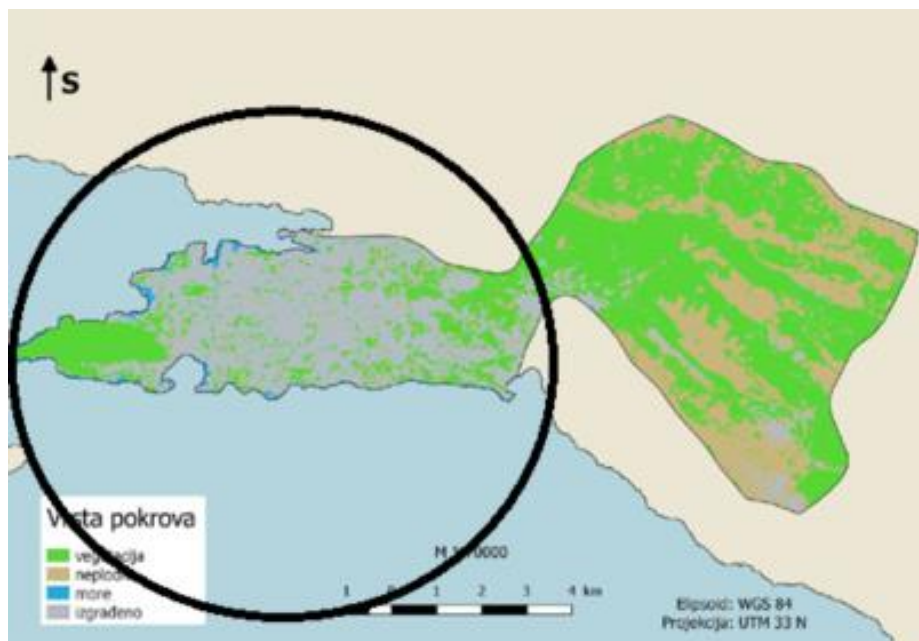
Source: Gudelj, M. (2017) *The Analysis of Urbanization of Split*. Graduate thesis. Zagreb: University of Zagreb, Faculty of Geodesy. Processing: Author

Chart 1: Sealed soil

Concerning green spaces, the Marjan Forest Park dominates in Split FUA (the peninsula’s edge). Besides Marjan, there are several city parks which are mostly separated and disconnected. Some of the larger parks in the urbanized section are: J.J. Strossmayer Park, Emanuel Vidović Park, Turska kula, Zvončac and



Sustipan. In addition to these parks, there are small parks in separate districts within the FUA, which are generally located between buildings.



Source: Gudelj, M. (2017) *The Analysis of Urbanization of Split*. Graduate thesis. Zagreb: University of Zagreb, Faculty of Geodesy. Processing: Author

Picture 2: Sealed soil

- **Key challenges:**
  - Seasonal population influx due to tourism activities
  - Reduced percentage of green spaces
  - High percentage of sealed soil.
- **Key strengths:**
  - Favorable geographic position
  - Pleasant Mediterranean climate.

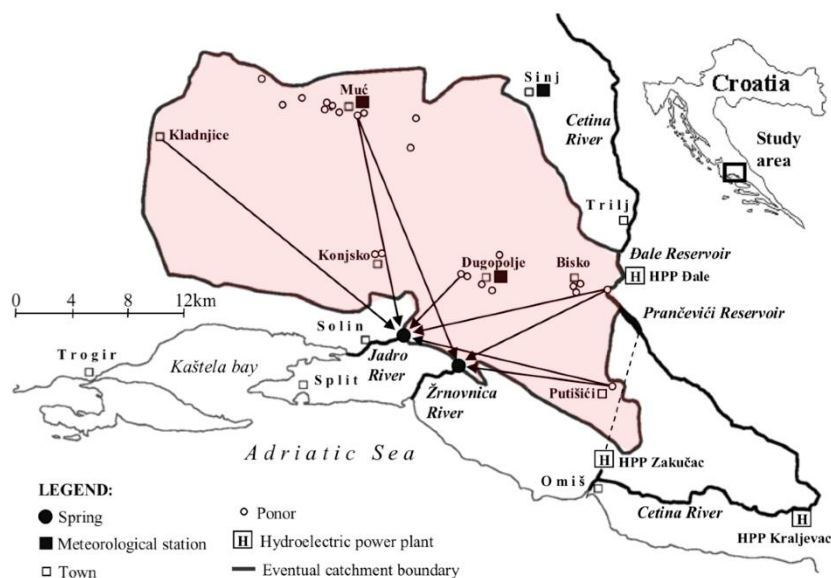
### 3.2. Natural water resources

Jadro is the only river at the Split FUA level with its average annual flow rate of 8,818 m<sup>3</sup>/s. Moreover, its karstic water spring is the main water supply source at the FUA level and beyond. It supplies the City of Split with water since the Roman times. Jadro water spring is affected by a sharp increase in the number of people in the area during seasonal months which makes it highly vulnerable to different pollution sources. Even though FUA Split does not receive water from other karstic springs, the Jadro karstic spring is interconnected with other karstic springs and waters, especially rivers Cetina and Žrnovnica. Additionally,



the Split peninsula area (FUA Split) is rich in groundwater resources, from which some are interconnected with sewage system, which has favorable impact on dilution processes.

Characteristic karst environment indicates a high vulnerability of karstic recharged area of Jadro water spring and significant oscillation in the average monthly spring water discharge. The recharge area of Jadro Spring covers an area significantly larger than FUA Split, and it is located in the City's hinterland as shown in Picture 4.



Source: Jukić D. & Denić-Jukić V. (2008) Estimating parameters of groundwater recharge model in frequency domain, Calibration and Reliability in Groundwater Modelling: Credibility of Modelling (Proceedings of ModelCARE 2007 Conference, held in Denmark, September 2007). IAHS Publ. 320, 2008.

**Picture 2: The map of recharge area of Jadro spring and its lateral outlet Žrnovnica spring**

It is located at an elevation of 35 m above sea level. The catchment is located in the central part of the bare Dinaric karst. It is mainly formed of carbonate rocks and partly of impermeable flysch. Carbonate layers differ in age, lithologic composition bedding and in structural-tectonic position. Different authors using different models and methods estimated that catchment is between 450 and 530 km<sup>2</sup>.

The yield of the Jadro spring is directly related to precipitation. Annual precipitation for 2018 in Split FUA was 72,4 mm. Table 2 shows monthly precipitation in mm for 2018 as well as a trend of monthly precipitation from 1948 - 2018. It can be seen from the table that the highest monthly precipitation value occurred in November (120.6 mm in 2018) and the lowest one in the summer months July and August (July - 14.1 mm and August - 11.1 mm in 2018).



Table 2: Average monthly and annual precipitation

Month	Monthly Precipitation for 2018 (mm)	Annual Precipitation 1948 - 2018 (mm)
I	76.0	78,3
II	118.5	67,5
III	145.3	64,4
IV	56.5	62,6
V	65.0	56,6
VI	50.9	51,1
VII	14.1	27,3
VIII	11.1	39,2
IX	20.9	71,1
X	97.4	79,6
XI	120.8	112,6
XII	91.9	100,7

Source: Croatian Meteorological and Hydrological Service, processing: Author

The water quality of river Jadro is monitored once a month. Chemical, biological, and physical parameters of groundwater indicate high tap water quality. However, occasional mild to significant increase in water turbidity occurs suddenly after heavy rainfall and can last for a few days. The turbidity values above 4 NTU appear from 8.2% to 13.5% of the days per year. The statistical analysis of water quality indicators (1975 to 2014) and its comparison with prescribed limited values (maximum allowable concentrations - MAC) show that spring water is usually polluted by occasional bacteriological contamination and other oxidizable substances, probably of organic origin.

Regarding the surface flows, at FUA Split level there are numerous intermitted water creeks and few permanent ones. The permanent ones such as Smrdečac creek are mostly channelized, with smaller parts in open stream flow. The main challenge in the future will be the restauration of natural flow and natural regeneration. Rainwater harvesting does not exist in the FUA Split at the moment, while its development represents one of the key challenges in the future.

It is important to mention that FUA Split circular urban waters are the integrated part of water food nexus of the broader area. Moreover, there are many present anthropogenic influences in FUA and its surrounding area on the water and its circulation: wildfires in the FUA hinterland which usually increase the influx of nutrients in sea water around peninsula, leachate waters from the landfill Karepovac that are interconnected with the sea (through underground karst massive) and are not currently treated, combined system overflow, stormwater, solid waste, and litter.



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**Key challenges:**

- High vulnerability of Jadro water spring to different pollution sources
- High vulnerability of karstic recharged area of Jadro water spring
- Occasional increase of turbidity values of Jadro spring water
- Constantly high bacteriological pollution
- Significant oscillation in the average monthly Jadro spring water discharge (especially between summer and winter months)
- Influence of Cetina and Žrnovnica rivers on Jadro spring recharge (spring water quantity and quality)
- Restauration of natural water flows and natural regeneration
- Lack of rainwater harvesting infrastructure
- Many present anthropogenic influences on the water and its circulation (wildfires, leachate waters, combine system overflow, stormwater, solid waste, and litter).

**Key strengths:**

- Jadro karstic water spring as the main water supply with sufficient average capacity
- Good Jadro spring water quality according to its physical and chemical indicators
- Many existing groundwater resources at Split peninsula
- High-quality bathing water during most of the year.

### 3.3. Water infrastructure

The water distribution system facilitates the access to the water supply network to 93% of the population. However, the water infrastructure itself is facing some major challenges in the form of seasonal load on infrastructure due to tourism activities, lack of a dual system, poor pipe and infrastructure conditions as well as high pressures in distribution system which result in increased water loss. Due to the current pipe conditions, the water supply network has a significant water loss of 58.2%. On the other hand, it is important to state that certain developed plans for reconstruction and expansion of water infrastructure exist. Furthermore, based on the results of the conducted public perception survey, it can be concluded that the actual state of water pipes and water loss in Split FUA is not well known by the population, even though they consider fixing this problem to be a priority. Concerning the purification treatment of spring water, Croatian Waters co-financed drinking water disinfection facilities at the spring of Jadro river.

The existing chlorination system that is based on gas chlorine (Cl<sub>2</sub>) is currently in use but has raised the questions of acceptability due to increasingly stringent handling measures of new bottles. Therefore, Water Supply and Sewerage Ltd. Split started installing new technology for disinfected water, using sodium



hypochlorite (NaOCl), a method of membrane electrolysis from freshwater and tableted salts. The treatment is practically harmless, and the devices are flexible and adapted to the current needs of the system. Now, devices are tuned with each parametrization required and the test run of the devices has been completed. The full operational drive of the new devices is expected after the consumption of current gas chlorine supplies.

Regarding the wastewater collection network, Split FUA has a sewerage system that is mostly made for the combined type of sewer (until 1995 a mixed system). The system is characterized by numerous overflows into the coastal sea which consequently cause pollution. In some parts, the modification and installation of a dual - separate sewerage system for wastewater and rainwater is planned. The percentage of households connected to the wastewater collection network is currently 78%. Table 3 shows Split FUA wastewater treatment plants and their population equivalent capacity compared to the actual population, as well as treated effluent values.

Table 3: Wastewater Treatment Plants

WASTEWATER TREATMENT PLANT	INHABITANT EQUIVALENT (IE)	TREATED EFFLUENT		Treatment level
		Per day/Per year		
Treatment plant <i>Katalinića brig</i>	110,000 IE	42,000 m <sup>3</sup>	15.512.500 m <sup>3</sup>	Mechanical/screens
Treatment plant <i>Stupe</i>	135,000 IE	37,500 m <sup>3</sup>	13.687.500 m <sup>3</sup>	Mechanical/preliminary
Treatment plant <i>Duilovo</i>	5,000 IE	4,000 m <sup>3</sup>	1.460.000 m <sup>3</sup>	Mechanical/preliminary

Source: Development strategy of the Urban Agglomeration of Split processing Author

Wastewater treatment plant *Katalinića brig* is designed to receive and treat the wastewater from the southern basin of Split, with a capacity for 110,000 population equivalents. The average flowrate around 42,000 m<sup>3</sup>/day with some oscillations during the year. The treated wastewater is discharged by a pumping station through submarine outfall with a diffuser. The key problems are related to poor treatment technology with no biological treatment, no nutrient, or sludge removal. In addition, the system combines rainfall-runoff and sewage wastewater. As a separate system within the Southern basin is the *Duilovo* sub-basin (separate system), which covers the area of Pazdigrad and Žnjan settlements. In this area, a separate sewerage system is built, which collects stormwater from separate channels and connects it to the Duilovo stream. Sanitary wastewater is taken to WWTP *Duilovo* and then discharged into the sea by a long submarine discharge. The existing solution represents only a transitional phase. Namely, the long-term solution according to the *Development strategy of the Urban Agglomeration of Split* project documentation envisages that this subsystem will be connected to the Stobreč drainage system and taken to the WWTP *Stupe*. The average flowrate of WWTP *Duilovo* is around 4,000 m<sup>3</sup>/day with some oscillations during the year. Wastewater treatment plant *Stupe* is located in the eastern part of Split, and it is designed to receive and treat the wastewater coming from the north-eastern part of Split as well as surrounding municipalities (Solin, Podstrana, Klis, Dugopolje). The design capacity is equal to 135,000 population equivalents. The average inflow is equal to approximately 37,500 m<sup>3</sup>/day with significant oscillations. The key problems are related to poor treatment technology with no primary and biological treatment. In addition, wastewater from septic tanks with unknown content is received at the facility. According to the Feasibility Study for



the Split-Solin agglomeration project (major project implemented within NSRF 2014-2020) there are several plans for upgrading and reconstruction of wastewater drainage systems such as: a) reconstruction and optimization of existing drainage system (construction of 7 retention pools, construction and reconstruction of 6 rainwater overflows, construction of 3 pumping stations, construction of 6,265 meters of a pipeline, reconstruction 16,565 meters of existing channels due to poor condition), b) Construction of compound objects for a unique system of drainage and wastewater treatment (construction of 9,875 meters of collectors and construction of 4 pumping plants), c) Upgrading the *Stupe* WWTP as a centralized WWTP and upgrading the wastewater treatment to primary and biological (secondary) level, d) Installation of additional submarine discharge pipeline for WWTP *Stupe*. There are also plans for expansion of treatment plant *Katalinića brig* up to 160,000 IE and treatment plant *Stupe* up to 250,000 IE.

Regarding the rainwater and stormwater retention and reuse, currently there is no existing infrastructure for retention and reuse nor for wastewater recycling and reuse. At the moment high intensity rainfalls at FUA Split level in combination with steep sealed terrain cause an overload of the drainage system which results in numerous overflows, higher runoff coefficients, and significant pollution loads in runoff water. Natural drainage systems in urban areas filter and recycle the water and ensure peak flows are detained and safely conveyed to waterways and the sea. This concept is applied on small and large scales, with multifunctional areas combining blue, green, and grey infrastructure as integral parts of the urban environment. At the moment FUA Split does not have a water recycling system, but the natural-based solutions have a good perspective to be implemented. The implementation of these solutions would result in decrease in urban floods, rise of bathing water quality, reduction of heat island effects, and improvement of urban life quality (public health, security, economy, environment). It is important to emphasize that further reduction of water loss will ensure additional supplies of drinking water with lower prices, so the water recycle profitability will be questionable.

On the other side, regarding the possibilities of rainwater use and recycling, the conducted project research on Split FUA level indicates that four-fifths of the respondents knew about the possibilities of rainwater use (excluding drinking), such as watering plants, flushing toilets, washing cars and similar possibilities. Additionally, more than 95% of them believe that installations relating to it should be more widespread. Following the survey results, more than 40% of the respondents did not know about the possibility of water reuse at their homes - greywater (i.e. storing water from the shower or the sink for flushing toilets). Still, more than 90% of them believe that installations related to it should be used more often. Considering the attitude of the respondents concerning sustainable solutions of city water management, it can be assumed that they would probably accept changes on the aforementioned matter. Still, the results emphasize that the level of awareness is quite poor.



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**Key challenges:**

- Deterioration of infrastructure
- Seasonal variation, load on infrastructure due to tourism activities
- Change in rainfall patterns (sudden rainfall episodes with high intensity)
- Combining system overflows and coastal water pollution
- Insufficient capacity of the drainage system
- Lack of a dual system for the water supply network
- Poor pipe condition which causes significant water loss in the water supply network
- The non-existence of water purification plant on Jadro water spring
- The non-existence of infrastructure for rainwater retention and reuse as well as for wastewater recycling and reuse
- Significantly low public awareness of the high water loss level in the water supply network
- Significantly low public awareness in relation to the possibility of water reuse at home
- No integration with the local hydrological system
- The non-existence of green solutions in the drainage system.

**Key strengths:**

- High tap water quality during the most time of the year
- Installation of a new water disinfection technology and treatment plant
- Developed plans for reconstruction and expansion of water infrastructure
- Significant recipient capacity of the sea (auto-purification)
- Public perception survey results indicate a positive attitude towards fixing the leaks in the water supply network as the priority in the Split FUA
- Public perception survey results present awareness regarding some of the possibilities for rainwater use as well as the belief that the related rainwater use installations should be more widespread
- Existing public interest in life improvement through installation of green solutions.



### 3.4. Water consumption

Water Supply and Sewerage Ltd. Split is a public company that manages the public water supply and sewerage services in Split FUA and surrounding cities and municipalities. Specifically, the company serves an area and inhabitants of the following cities and municipalities: Split Solin, Kaštela, Trogir, Podstrana, Marina, Okrug, Seget, Klis, Muć, Dugopolje, Lećevica, and Šolta. The main water consumers on FUA Split level are: the civil sector (residents and tourist during the summer season), the industry, and the public sector (public area maintaining, hydrants, green areas watering, fountains etc.). The annual volume of fresh water extracted in 2018 was 55,755,423.00 m<sup>3</sup>, while the daily volume of freshwater used by each person was 149.95 l/day per capita.

The results of the conducted public perception survey (N - 402) provided an insight into citizens' water consumption habits, as presented in Table 4. It turns out that more than 70% of respondents turn off the tap while shaving or brushing teeth. More than a half of them responded that they make sure that water installations at their home are tightly closed and more than 90% of them drink tap water. While these results show a positive tendency regarding habits of water consumption, the following are not as quite positive. Namely, collecting water after washing fruit and vegetables and using it for watering plants as well as watering the garden/flowers on the balcony with rainwater are rarely practiced.

Table 4: Water use habits

HOW DO YOU USE WATER AT HOME?	YES	SOMETIMES	NO
Respondents turning off the tap when they shave or brush teeth	75%	21%	4%
Respondents making sure that water installation at their homes are tight (e.g. tube, taps)	60%	18%	22%
Respondents watering the garden/flowers on the balcony with rainwater	10%	17%	73%
Respondents collecting water from washing fruit and vegetables and later using it for watering plants	3%	9%	89%
Respondents drinking tap water	94%	4%	2%

Source: Author's own processing

Regarding the water-saving facilities, a significant rate of the households does not own these facilities, in specific about a third of the respondents own a dual flush toilet, 10% of them own water-saving faucets and less than 20% own a water-saving showerhead. A lot of respondents do not even know if they have the aforementioned facilities in their households. Still, most of them (63%) have a water meter.

Furthermore, public perception about bottled or tap water highlights the following factors as highly important while choosing between tap water and bottled water: reducing plastic consumption and bottle



transport (59%) as well as health effects (58%). In addition to environmental awareness, taste (49%) and cost (43%) have proven to also be of high importance, while convenience/carrying comfort was mostly of medium and high importance. Regarding the water footprint of different products, four-fifths of the respondents had no information about the products' water footprints (a piece of paper requires 10 liters of water, a steak 2,500 liters, 100 grams of bread requires 160 liters, coffee 130 liters, a t-shirt 1,000 liters). Nevertheless, almost every nine out of ten are open to change their habits in order to reduce their environmental impacts, which is commendable. Furthermore, almost half of all respondents (45%) are not aware of the annual costs of the water supply. On the other hand, motivation to save water is driven more by environmental reasons than economic ones. For more than two-thirds of the respondents, environmental reasons were of high importance while half of them believe economic reasons are highly important.

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▪ **Key challenges:**

- Low water supply and sewerage service prices not stimulating users for water savings
- No available data on bottled water consumption
- Lack of CE solutions in water consumption (water reuse)
- A significant number of respondents do not collect water after washing fruits and vegetables and use it for watering plants, neither they water the garden/balcony flowers with rainwater
- A significant rate of households does not own water-saving facilities, the respondents are not even aware of whether they have them in their households
- Extremely low public awareness about the water footprint of the production processes
- Almost half of the respondents are not aware of their annual costs for water supply.

▪ **Key strengths:**

- Existing initiatives for reducing the consumption of bottled water
- Centralized water management (single water utility)
- Public perception survey shows positive tendency regarding water-saving habits, in specific, turning off the water tap while brushing teeth or shaving, tightly shut water installations at home and drinking tap water
- Respondents consider reducing plastic consumption and bottle transport as most important when choosing between tap or bottled water
- A significant number of respondents are open to changing their habits in order to reduce their environmental impact
- Environmental reasons motivate the respondents more than economic reasons in relation to saving water.





### 3.5. Potential issues arising due to climate change

Split FUA is facing arising issues due to climate change that will affect not only the lives of residents but also the economy with an emphasis on tourism. European Centre for Medium Term Weather Forecasting (ECMWF) clearly indicates that, compared to the last century, temperatures in major European cities are increasing significantly. The data collected from a variety of sources (weather stations, meteorological balloons, buoys, satellite data) result in a fact that the City of Split is warmer by 1.3°C. Furthermore, according to the data of the Institute of Oceanography and Fisheries in Split, there is a possibility and an estimate that the sea level could be raised by half a meter by 2100. This scenario would significantly affect the population of the City of Split as well as tourism (floods in the key tourist sites - Riva and Diocletian's palace). The aforementioned increase in temperature will also affect fisheries. Moreover, a potential problem is the disappearance of some of the fish species as well as the reduction of freshwater fish. An increase in sea temperature or an increase in sea acidity in some areas will make it impossible to grow shellfish. Furthermore, high rain intensity and extreme meteorological situation could cause the drainage system overload which will result in more frequent urban floods, property damages, soil and water pollution and bathing water quality decrease. Increased temperature of wastewater will result in increase of gas emissions (CO<sub>2</sub>, methane, H<sub>2</sub>S, etc.) as well as odor, while increased temperature in potable water system will result in increase of water loss and deterioration of drinking water quality. All mentioned will cause negative impact on public health. Another potential issue arising due to climate change is drought. There are longer and more frequent droughts (especially in the summer) that will surely affect other vital industries of Split FUA, such as urban agriculture and urban green areas. Floods and droughts, combined with unfavorable rainfall distribution (lower availability in the summer, higher availability during the winter) present extreme hydrological conditions that will cause many problems. Flooding of low-land coastal areas and urban water infrastructure may cause interruptions and decline in water supply and related infrastructure. Sea level rise and storm surge will compromise functioning the submarine discharges and other coastal infrastructure, especially transport infrastructure. All this will lead to problems in energy and water supply. It is important to mention the document "Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070" which has the main long-term goal to reduce the vulnerability of social and natural systems to the adverse impacts of climate change, i.e. to strengthen their resilience and the ability to recover from these impacts. The Strategy is in the function of preserving the values of the society, the environment and the economy and ensuring the sustainable development of the Republic of Croatia in a long-term perspective.

Given the prior issues, survey respondents were asked about their attitude towards the effects of climate change. Water supply problems scare respondents the most (39% of them are very afraid). Concerning short but heavy rains, respondents are moderately afraid (49%) or not afraid (38%). In general, they are mostly moderately afraid of drought periods (52%) and very (32 %) or moderately (42%) afraid of floods. However, most of them (almost 60%) are moderately afraid of raising costs for water supply and wastewater collection. Taking into account the usefulness of information campaigns about proper use and reuse of water,



interesting results emerge. Most respondents believe that information campaigns are useful (about 50% of answers) and very useful (more than one-third of answers), while only around 15% of the respondents believe that information campaigns are not very useful.

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**Key challenges:**

- Rising temperatures due to climate change
- Extreme hydrological conditions seen through droughts and flash floods
- Sea level rise and impact on coastal water infrastructure
- Flooding of low-land areas and urban water infrastructure
- Increasing temperature of supply water and wastewater
- Climate change impact on the economy, especially tourism
- Public perception reflects the biggest fear of water supply problems when asked about the effects of climate change.

**Key strengths:**

- High resilience of Jadro water spring on different climate change scenarios
- The existence of “Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070”
- Informational campaigns are perceived as useful according to survey results.

### **3.6. Local laws and rules regulating the anthropic and natural water cycle and good practices**

Under the current Water Services Act (NN 66/19) by Article 13, a public water service provider may not perform activities other than water services. Exceptionally, the supply of water treated on a wastewater treatment plant for the purpose of reuse, including a sale, is permitted. The law does not regulate greywater and rainwater in Croatia. A proposal of the European Parliament and Council to the Republic of Croatia, for a regulation on minimum requirements for the reuse of water is worth mentioning. May 28, 2018, Bruxelles, 2018/0169 (COD).

Water Supply and Sewerage Ltd. Split - a company that manages the public water supply and sewerage services in Split FUA adopted a business development strategy for the period from 2019 to 2030. The strategic vision aims for Water Supply and Sewerage Ltd. Split to be a role model in sustainable water and sewage utility sector. In order to reach the aforementioned vision, four main strategic goals were set, aiming to: improve communication and develop capacities for consumer support; improve the existing infrastructure; develop conditions for a stable and sustainable business; improve human resources management and capacity building.



A categorized pricing system for different water uses at Split FUA level is shown in Table 5.

Table 5: Pricing system

CATEGORY	PURPOSE	PRICES (HRK and EUR)
1	Housing purposes	1m <sup>3</sup> = 3.50 HRK =0.47 €
1a	Clinic hospital centre Split	1m <sup>3</sup> = 3.50 HRK =0.47 €
1b	Socially disadvantage citizens	1m <sup>3</sup> = 1.40 HRK =0.19 €
2	Industry	1m <sup>3</sup> = 6.0 HRK =0.80 €
2a	Consumers of water covered by item 2 (industry) who do not charge a water protection fee under the current Water Act	1m <sup>3</sup> = 6.0 HRK =0.80 €

Source: Water Supply and Sewerage Ltd. Split, processing: Author

It can be stated that the current water supply price is low, and it does not stimulate the users for water savings. The reason behind this is the underdeveloped drainage system characterized with a lack of centralised WWTP, and water disinfection plant at river Jadro spring. Further investments in water supply and drainage system improvements (including the new WWTP) will cause significant rise in capital and operational expenses which will consequently lead to a rise of the overall water supply price. It is expected that this will result in growing public interest in water savings.

Furthermore, water supply and sewage management at Split FUA level is characterized by the jurisdictional fragmentation. Water Supply and Sewerage Ltd. Split manages the water supply and sewerage. The local public authority - The City of Split is in charge of the urban drainage system, while the Croatian Waters have jurisdiction over surface flow.

Regarding the good practices, the Conference “Energy and water efficiency” organized by the Croatian Chamber of Economy, County Chamber of Split about efficiency in energetics and water management is noteworthy. There is also the Split-Solin agglomeration project which involves certain interventions on the water supply system. Interventions will lead to a significant reduction of losses (58% to 35%) and consequently to an increase of efficiency on the Split FUA water supply system. Furthermore, it involves an extension of the water supply network in order to cover about 10% of the population that is currently not connected to the water supply.



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**Key challenges:**

- Lack of legislation on greywater and rainwater in Croatia
- Water supply and sewage management at Split FUA level is characterized by the jurisdictional fragmentation
- No restrictions in water use.

**Key strengths:**

- Implementation of the integral major project (Split-Solin agglomeration)
- The existence of Water Supply and Sewerage Ltd. Split business development from 2019 to 2030
- Organized conferences on energy & water efficiency
- Different research initiatives on energy & water efficiency.



## 4. Vision

This chapter shows the vision that presents the desired future state of the Split FUA in 2030. The vision was developed by using the strategic planning technic - the SOAR analysis along with the strong participatory approach. The following table shows key strengths, opportunities, aspirations, and results, generated on the basis of stakeholders' involvement.

<b>STRENGTHS</b>	<ul style="list-style-type: none"> <li>✓ Favourable geographic position and pleasant Mediterranean climate</li> <li>✓ High spring Jadro karstic water quantity as well as quality according to its physical and chemical indicators</li> <li>✓ High resilience of Jadro water spring on different climate change scenarios</li> <li>✓ High tap water quality</li> <li>✓ High bathing water quality</li> <li>✓ Centralized water management (single water utility)</li> <li>✓ Developed plans for reconstruction and expansion of water infrastructure - Integral major project - agglomeration Split-Solin</li> <li>✓ Existing different research initiatives on energy &amp; water efficiency</li> <li>✓ Conferences on energy &amp; water efficiency</li> <li>✓ Positive tendency of the local community regarding water-saving habits which are motivated more by environmental reasons than economic reasons</li> <li>✓ Present awareness regarding the possibilities for rainwater use and widespread of the related rainwater installations</li> <li>✓ A significant number of respondents is open to changing their habits in order to reduce their negative environmental impact</li> </ul>
<b>OPPORTUNITIES</b>	<ul style="list-style-type: none"> <li>✓ Development and participation in projects which aim to increase the percentage of FUA's green spaces</li> <li>✓ The implementation of new water disinfection technology</li> <li>✓ Further realization of plans for reconstruction and expansion of water and sewerage infrastructure</li> <li>✓ Installation of rainwater retention and reuse infrastructure</li> <li>✓ Participation in the initiatives and projects on energy &amp; water efficiency in order to promote water reuse in households</li> <li>✓ Participation in the initiatives and projects that emphasize raising awareness about the water footprint of the production processes and reducing the consumption of bottled water</li> <li>✓ Impact mitigation and increase of resilience of climate change impacts and potential extreme hydrological conditions</li> <li>✓ Advocacy on creation and implementation of legislation on greywater and rainwater in Croatia</li> </ul>



ASPIRATIONS	<ul style="list-style-type: none"> <li>✓ Preserved and increased FUA green spaces</li> <li>✓ Preserved spring water quality</li> <li>✓ Improved tap water quality and reduced turbidity values</li> <li>✓ Increased efficiency in water distribution</li> <li>✓ Improved wastewater collection, recycle and reuse processes (CE solutions)</li> <li>✓ Increased public awareness on water (re)use and sustainable water usage</li> <li>✓ Established legislation on greywater and rainwater in Croatia</li> <li>✓ Climate change and extreme hydrological conditions adaptation</li> </ul>
RESULTS	<ul style="list-style-type: none"> <li>✓ Percentage of the FUA territory covered by green spaces</li> <li>✓ Dual system for the water supply network installed</li> <li>✓ Water purification plant on Jadro water spring installed</li> <li>✓ Infrastructure for wastewater management developed according to WFD requirements</li> <li>✓ Infrastructure for rainwater retention and reuse built and installed</li> <li>✓ Water loss reduction</li> <li>✓ Water supply network coverage</li> <li>✓ Local community awareness on water (re)use and sustainable water usage</li> </ul>

The vision on the desired future state of the Split FUA in 2030 developed based on the results of the conducted SOAR analysis will rest on the principle of “one water” solution. It implies holistic approach to manage the urban water cycle as a single integrated system where water streams are recognized as potential resources. A resource that must be managed holistically, viably, and sustainably. Hence, water supply, ground water, surface waters, stormwater, and wastewater management are all viewed as interconnected and optimized. Guided by “one water” principle, FUA Split vision in 2030 is:

*Split FUA is an area with a sustainably managed circular urban waters, which ensures efficiency in water use and distribution, by preserving high tap and bathing water quality and managing wastewater and rainwater sustainably, thus preserving water bodies and guaranteeing their quality, while promoting efficient multiple water (re)use at the same time.*



## 5. Strategic goals and objectives

The practical fulfilment of the vision will be achieved through strategic and related specific objectives. The detailed description of all the strategic and specific goals is shown below.

### 5.1. Strategic goal 1

#### To increase efficiency in water use and distribution

As shown in the previous analysis there are few key challenges regarding water infrastructure that affect water use and distribution such as: lack of a dual system for the water supply network; poor pipe condition which causes significant water loss in the water supply network and no integration with the local hydrological system. Hence, the first strategic goal is to increase efficiency in water use and distribution at the FUA level. This goal will be achieved through the realization of the following specific objectives:

#### 5.1.1. Objective 1.1.

##### To expand the water supply network

Currently, 93% of the population has access to the water supply network. This objective aims to ensure that the entire FUA Split population is covered with access to water supply network by 2030. In order to achieve this goal, the integral major project Split-Solin agglomeration has started and aims to reconstruct and expand the water supply network, thus ensuring that 100% of the FUA Split population has access to the water supply network.

#### 5.1.2. Objective 1.2.

##### To improve water supply network

As stated before, the FUA Split water supply network has poor pipe condition which causes significant water loss - 58%. This specific objective aims to reduce that percentage by 2030 to 35%. For the realization of this goal, the existing pipes will be repaired and reconstructed, and the dual system for the water supply network which currently does not exist will be installed. This will directly reduce the current high percentage of water loss.

#### 5.1.3. Objective 1.3.

##### To increase resilience of the urban water system to climate change impacts

The urban water system is heavily affected by climate change. Impacts of climate change can be seen through extreme hydrological conditions (droughts and flash floods), sea-level rise and impact on coastal water infrastructure, flooding of low-land areas and urban water infrastructure, as well as increasing temperature of supply water and wastewater. A holistic approach of all stakeholders is needed in order to overcome the impact of emerging climate issues. The set goals of the *Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070* represent guidelines and instructions for increasing resilience of the urban water system to climate change impacts. By 2040 FUA Split aims to reach the goals of the before mentioned strategy concerning the urban water system through encouraging and engaging relevant stakeholders to implement necessary changes.



## 5.2. Strategic goal 2

### To guarantee good quality of water bodies

The City of Split is located on the eastern Croatian Adriatic coast and Jadro is the only river at the Split FUA level, with its karstic water spring as the main water supply source at the FUA level and beyond. Accordingly, preserving and guaranteeing the good quality of water bodies is imperative. This goal will be achieved through the following two specific objectives:

#### 5.2.1. Objective 2.1.

##### To preserve excellent bathing water quality

According to the Regulation on sea bathing water quality parameters, the quality of bathing water is excellent. Such quality needs to remain preserved due to numerous reasons (ecological, social, economic, etc.). In order to preserve bathing water quality at Split FUA level this matter will be advocated and promoted among all relevant stakeholders as well as local community. Hence, this specific objective primarily implies raising awareness regarding seawater quality through organizing promotional campaigns and specific workshops. This objective aims to ensure that bathing water quality remains excellent by 2030.

#### 5.2.2. Objective 2.2.

##### To preserve Jadro recharge area water quality

The recharge area of Jadro Spring covers an area significantly larger than FUA Split, approximately over 500 square kilometres and it is located in the FUA's hinterland. The characteristic karst environment indicates high vulnerability of karstic recharge area of Jadro Spring and significant oscillation in the average monthly spring water discharge. According to the Regulation on water classification parameters, water quality is currently falling into the first (I) class during most time of the year, with occasional mild to significant increase in water turbidity which occurs suddenly after heavy rainfall, thus indicating problems in the Jadro spring recharge area. This specific objective aims to maintain the existing water quality constantly by installing a water purification system at Jadro Spring, which will ensure high water quality in 2030.

## 5.3. Strategic goal 3

### To improve wastewater management

Split FUA has a sewerage system that is mostly made of a combined type of sewer. The system is characterized by numerous overflows into the coastal sea which consequently causes pollution. The improvement of wastewater management implies building necessary water infrastructure according to WFD requirements, and it will be achieved through the realization of the following specific objective:

#### 5.3.1. Objective 3.1.

##### To reconstruct and improve the wastewater drainage system

Currently, 78% of the FUA Split households are connected to the wastewater collection network. In order to achieve this goal, integral major project Split-Solin agglomeration has started and aims to reconstruct and expand the wastewater collection network. This will result in 95% of the households connected to





wastewater collection network by 2030. FUAS Split infrastructure for wastewater management will be developed according to WFD requirements.

## Strategic goal 4

### To retain water as long as possible on site

Retaining water as long as possible on site is extremely important in order to improve water use efficiency, water sustainability and favourable micro climate conditions of urban area. Population, urbanization, climate change, and many other factors are adding pressure on sustainable water supplies. Therefore, achieving this goal will be enabled by implementing circular water management solutions, shown in the following specific objectives:

#### 5.4.1 Objective 4.1.

##### To harvest rainwater and stormwater for non-potable purposes

Harvesting rainwater and stormwater for non-potable reasons will drastically improve water sustainability at the FUA level. One of the excellent solutions for circular water management is a green roof, which allows the reuse of rainwater and stormwater for non-potable reasons. A green roof is a layer of vegetation planted over a waterproof system that is installed on top of a flat or slightly-sloped roof. Currently there is only one green roof installation at the FUA Split level, while FUA Split aims to install at least five green roofs by 2030.

#### 5.4.2 Objective 4.2.

##### To interpolate green solutions into existing stormwater infrastructure

Sustainable urban drainage systems (SUDS) are systems designed to efficiently manage the drainage of surface water in the urban environment. This green solution delivers multiple benefits such as high-quality drainage, supporting areas to cope better with severe rainfall, making urban spaces more vibrant and sustainable and resilient to change by improving urban air quality, regulating building temperature, etc. At the FUA Split level there are no operational sustainable urban drainage systems, but it is planned to build at least two operational sustainable urban drainage systems by 2030.

## 5.5 Strategic goal 5

### To promote multiple water use and water sustainability

In order to implement circular urban water management at the FUA level, technical and green solutions are not sufficient. It is crucial to influence local community and relevant stakeholders' awareness. Water sustainability will be preserved by changing water consumption habits. Thus, this goal implies the accomplishment of the following specific objectives:



### 5.5.1 Objective 5.1.

To raise awareness about saving and efficient use of water, its reuse, and climate changes as well as promoting urban water systems (UWS) as the engine for circular economy development

The results of the conducted public perception survey (N - 402) provided an insight into citizens' water consumption habits and showed a positive tendency about water-saving habits, but at the same time extremely low awareness regarding water footprint of the production process as well as existing green and technical solutions and/or modes to save water. Therefore, by 2030, 25 promotional campaigns are planned to be held at the FUA Split level. These campaigns will raise awareness regarding water consumption, saving and efficient use of water, its reuse, and climate changes. They will also promote urban water systems (UWS) as the engine for circular economy development, among common people and relevant stakeholders.

### 5.5.2 Objective 5.2.

Continuous multi-stakeholder involvement in the system management activities

As stated before, achieving circular urban water management is a complex process, which requires the awareness and involvement of various relevant stakeholders. To influence the stakeholders' attitudes, besides the organized promotional campaigns, the specific workshops will be organized as well. Therefore, the target indicator implies that 10 workshops will be organized at the FUA level by 2030. The workshops will emphasize relevant topics concerning multiple water use, water sustainability and water management, thus educating different stakeholders and encouraging their future involvement.

## 5.6 Strategic goal 6

### To preserve flow in water bodies

Preserving flow in water bodies presents an important strategic goal that will contribute to the accomplishment of circular urban water management. The extraction of fresh water significantly affects the flow in water bodies. The main challenge in the future will be the restoration of natural flow and natural regeneration. Overcoming this challenge will be accomplished due to the realization of the following specific objective:

#### 5.6.1 Objective 6.1.

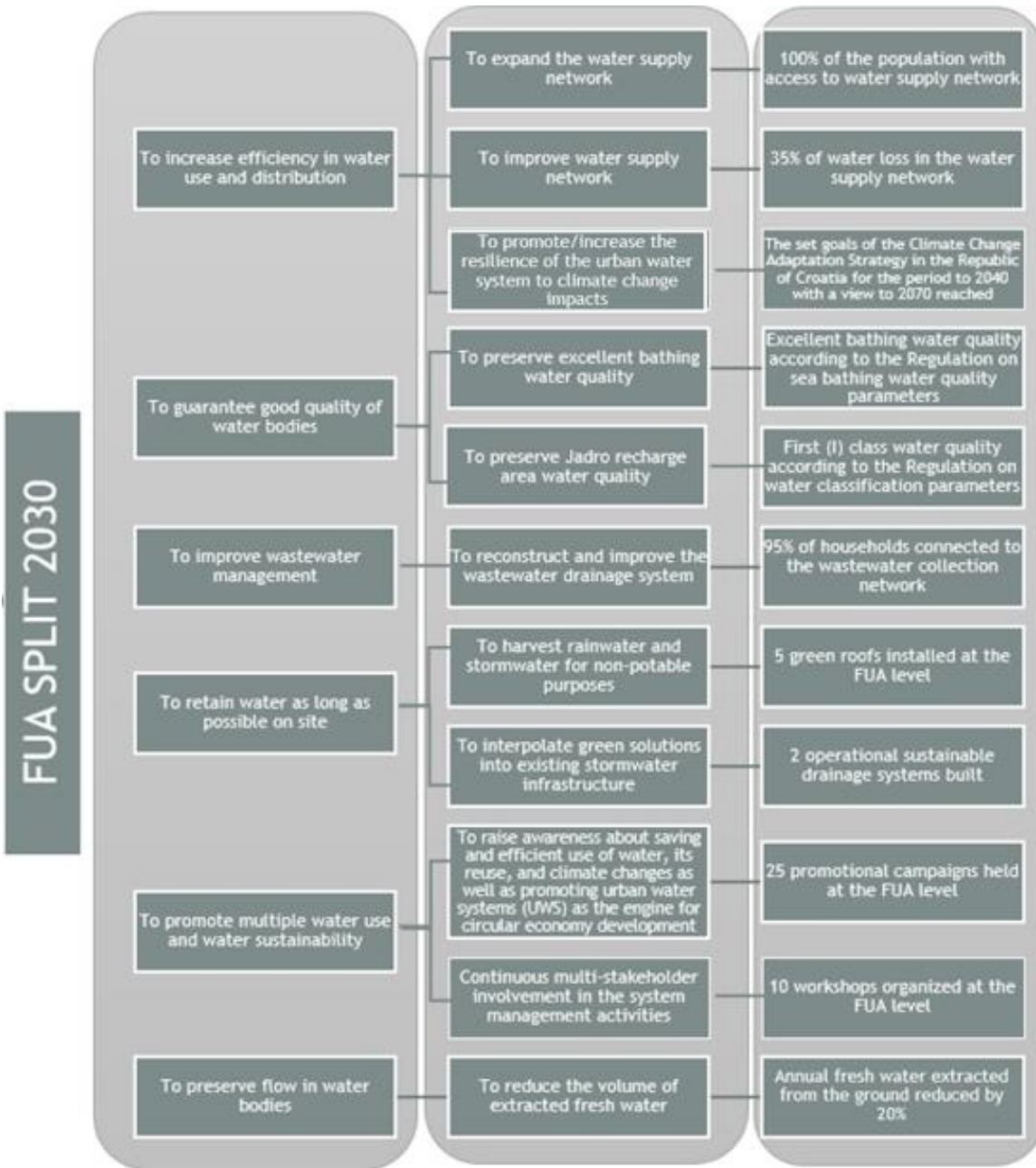
To reduce the volume of extracted fresh water

The annual volume of fresh water extracted from river Jadro source in 2018 was 55,755,423.00 m<sup>3</sup>, while the daily volume of freshwater used by each person was 149.95 l/day per capita. The specific objective targets to reduce the annual fresh water extracted from the ground by 20% in 2030. To reduce fresh water extracted from the ground, the water loss will be reduced through implementation of the integral major project Split-Solin agglomeration. Furthermore, the demand for the extraction of fresh water will be reduced by: implementing water saving habits, installing green solutions, advocating on creation and implementation of legislation on greywater and rainwater in Croatia, allowing re-usage and recycle of non-potable rainwater, stormwater, and greywater.

The following table shows all the described FUA Split strategic goals with related strategic objectives as well as their baseline and target indicators.



	STRATEGIC GOAL	SPECIFIC OBJECTIVE	BASELINE INDICATOR	TARGET INDICATOR
VISION	To increase efficiency in water use and distribution	To expand the water supply network	93% of the population with access to water supply network	100% of the population with access to water supply network
		To improve water supply network	58% of water loss in the water supply network	35% of water loss in the water supply network
		To increase resilience of the urban water system to climate change impacts	The set goals of the Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070	The set goals of the Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070 reached
	To guarantee good quality of water bodies	To preserve excellent bathing water quality	Excellent bathing water quality according to the Regulation on sea bathing water quality parameters	Excellent bathing water quality according to the Regulation on sea bathing water quality parameters preserved
		To preserve Jadro recharge area water quality	First (I) class water quality according to the Regulation on water classification parameters	First (I) class water quality according to the Regulation on water classification parameters preserved
	To improve wastewater management	To reconstruct and improve the wastewater drainage system	78% of households connected to the wastewater collection network	95% of households connected to the wastewater collection network
	To retain water as long as possible on site	To harvest rainwater and stormwater for non-potable purposes	1 green roof installed at the FUA level	5 green roofs installed at the FUA level
		To interpolate green solutions into existing stormwater infrastructure	0 operational sustainable drainage systems built	2 operational sustainable drainage systems built
	To promote multiple water use and water sustainability	To raise awareness about saving and efficient use of water, its reuse, and climate changes as well as promoting urban water system (UWS) as the engine for circular economy development	0	25 promotional campaigns held at the FUA level
		Continuous multi-stakeholder involvement in the system management activities	0	10 workshops organized at the FUA level
To preserve flow in water bodies	To reduce the volume of extracted fresh water	55,755,423.00 m <sup>3</sup> of annual fresh water extracted from the ground	Annual fresh water extracted from the ground reduced by 20%	





## 6. Action Plan

<b>STRATEGIC OBJECTIVE 1 To increase efficiency in water use and distribution</b>	
<b>SPECIFIC OBJECTIVE 1.1 To expand the water supply network</b>	
<b>ACTION 1.1.1 Expansion of the water supply network within the Split-Solin agglomeration project</b>	
<b>Related Objective and background (challenge)</b>	FUA Split water supply infrastructure is yet not aligned with The Drinking Water Directive (Council Directive 98/83/EC on the quality of water intended for human consumption), which is the reason why the key quality standards of water intended for human consumption cannot be ensured. Moreover, currently, 93% of the FUA Split population has the access to the public water supply network. Thus, this objective aims to ensure that the entire FUA Split population is covered with access to the water supply network.
<b>Description of the Action</b>	This action implies further expansion of the water supply network in the FUA Split which will be done within the already started Split-Solin agglomeration project. The project includes construction of new pipelines and household connections in the following cities and municipalities involved in the project: City of Split, City of Solin, Municipality of Klis, Municipality of Dugopolje and Municipality of Podstrana.
<b>Expected result</b>	The water supply network expanded
<b>Responsible institution/s, organizations for the implementation of the Action</b>	Split Water and Sewerage Company Ltd.
<b>Other partner organization that needs to be involved</b>	Croatian Waters, City of Split, City of Solin, Municipality of Dugopolje, Municipality of Klis, Municipality of Podstrana
<b>Time scale</b>	2027
<b>Estimated costs and resources needed</b>	26.5 million EUR
<b>Target indicator</b>	61,081 meters of the new pipelines constructed; 1,307 household connections installed



<b>STRATEGIC OBJECTIVE 1 To increase efficiency in water use and distribution</b>	
<b>SPECIFIC OBJECTIVE 1.1 To expand the water supply network</b>	
<b>ACTION 1.1.2 Installation of the dual system for the water supply network</b>	
Related Objective and background (challenge)	Due to the unfavourable gravitational line that is constructed as an open stream flow, FUA Split is facing several problems in regard to water quality and significant water loss. Moreover, currently, there is no dual system for the water supply network at FUA Split level. Thus, this specific objective aims to increase efficiency in water use and distribution through the reconstruction of the main water supply line.
Description of the Action	This action refers to the reconstruction of the main supply line by installing a pressurized pipeline which will help solve the existing problems with water quality and reduce significantly the leakage at the main water supply line.
Expected result	Dual water supply system installed
Responsible institution/s, organizations for the implementation of the Action	Split Water and Sewerage Company Ltd.
Other partner organization that needs to be involved	Croatian Waters
Time scale	2030
Estimated costs and resources needed	177 million EUR
Target indicator	1 alternative water supply line constructed



<b>STRATEGIC OBJECTIVE 1 To increase efficiency in water use and distribution</b>	
<b>SPECIFIC OBJECTIVE 1.2 To improve the water supply network</b>	
<b>ACTION 1.2.1 Reconstruction and renovation of the existing water supply infrastructure within the Split-Solin agglomeration Project</b>	
Related Objective and background (challenge)	FUA Split water supply infrastructure is facing some major challenges such as poor pipe condition, high pressures in the water distribution network and seasonal loads on infrastructure due to tourism activities. These challenges result in significant water loss in the water supply network. Currently, the FUA Split records a water loss of 58%. The objective aims at reducing that percentage to 35%, through reconstruction and renovation of the existing water supply infrastructure.
Description of the Action	This action includes reconstruction and renovation of water supply infrastructure at the FUA Split level which will be done within the already started Split-Solin agglomeration project. The project includes reconstruction of the existing pipelines, as well as construction of additional water reservoirs and pumping stations in the following cities and municipalities involved in the project: City of Split, City of Solin, Municipality of Klis, Municipality of Dugopolje and Municipality of Podstrana.
Expected result	Reduced water loss in the water supply network
Responsible institution/s, organizations for the implementation of the Action	Split Water and Sewerage Company Ltd.
Other partner organization that needs to be involved	Croatian Waters, City of Split, City of Solin, Municipality of Dugopolje, Municipality of Klis, Municipality of Podstrana
Time scale	2027
Estimated costs and resources needed	26.5 million EUR
Target indicator	4,299 meters of the pipeline reconstructed, 14 pumping stations built, 5,350 m <sup>3</sup> of water reservoirs constructed



<b>STRATEGIC OBJECTIVE 1 To increase efficiency in water use and distribution</b>	
<b>SPECIFIC OBJECTIVE 1.2 To improve the water supply network</b>	
<b>ACTION 1.2.2 Implementation of smart pressure management system within the water supply network</b>	
Related Objective and background (challenge)	Currently, one of the major drivers of significant water loss at the FUA Split water supply network is inadequate high pressure. Water loss is especially characterized by increasing leakages which are most often reported during the off-peak hours when the consumer demands are lower and system pressure tends to be higher. Moreover, the significant water loss is caused due to FUA Split water supply network topographic complexity. Therefore, this objective aims to increase efficiency in water use and distribution through the implementation of smart pressure management solutions.
Description of the Action	This action implies the establishment of sustainable pressure management within the system or problematic District metering areas (DMAs). In order to ensure efficient pressure management, an integrated system of the Pressure Reducing Valves (PRVs), Throttle Control Valves (TCVs), Flow Control Valves (FCVs) and Variable Speed Pumps (VSPs) will be implemented.
Expected result	Reduced water loss in the water supply network
Responsible institution/s, organizations for the implementation of the Action	Split Water and Sewerage Company Ltd.
Other partner organization that needs to be involved	Croatian Waters
Time scale	2030
Estimated costs and resources needed	4.4 million EUR
Target indicator	1 water pressure management system installed





<b>STRATEGIC OBJECTIVE 1 To increase efficiency in water use and distribution</b>	
<b>SPECIFIC OBJECTIVE 1.3 To promote/increase the resilience of the urban water system to climate change impacts</b>	
<b>ACTION 1.3.1 Organization of climate change promotional campaigns and workshops</b>	
Related Objective and background (challenge)	The FUA Split urban water system is heavily affected by climate change. The impacts of climate change can also be seen through extreme hydrological conditions (droughts and flash floods), sea-level rise and impact on coastal water infrastructure, flooding of low-land areas and urban water infrastructure, as well as the increasing temperature of supply water and wastewater. Hence, this objective aims to contribute to reaching the set goals of the <i>Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070</i> , by encouraging and engaging relevant stakeholders to implement necessary changes.
Description of the Action	This action includes the organization of promotional campaigns and workshops on the topic of climate change causes, effects and solutions, as well as on the importance of implementation of the <i>Climate Change Adaptation Strategy</i> . The promotional campaigns and workshops will be targeting the following stakeholder groups: local and regional public authorities, infrastructure and service providers, sectoral agencies, NGOs, SMEs. Both, the organized campaigns and workshops will encourage and engage the stakeholders to implement the necessary changes, and thus contribute to the achievement of the set Strategy's goals.
Expected result	Raised awareness of the stakeholders on the importance of Climate Change Adaptation Strategy implementation
Responsible institution/s, organizations for the implementation of the Action	PI RERA SD
Other partner organization that needs to be involved	Split Water and Sewerage Company Ltd., City of Split, Croatian Waters, NGOs, educational institutions
Time scale	2030
Estimated costs and resources needed	20,000 EUR
Target indicator	200 participants involved in the promotional campaigns and workshops



<b>STRATEGIC OBJECTIVE 2 To guarantee good quality of water bodies</b>	
<b>SPECIFIC OBJECTIVE 2.1 To preserve excellent bathing water quality</b>	
<b>ACTION 2.1.1 Organization of promotional campaigns on the importance of bathing water preservation</b>	
Related Objective and background (challenge)	According to the Regulation on sea bathing water quality (NN 73/08) parameters, current bathing water quality at FUA Split level is excellent. Such quality needs to remain preserved due to numerous reasons (ecological, social, economic, etc.). Hence, this specific objective primarily implies raising awareness of the importance of bathing water preservation.
Description of the Action	This action refers to the organization of the promotional campaigns and workshops targeting all the relevant stakeholders (local and regional public authorities, infrastructure and service providers, sectoral agencies, NGOs, SMEs), as well as the local community. The main aim of the organized campaigns and workshops is to promote the importance of bathing water preservation and to encourage relevant stakeholders to advocate the importance of bathing water preservation.
Expected result	Raised awareness of the relevant stakeholders and local community on the importance of bathing water preservation
Responsible institution/s, organizations for the implementation of the Action	PI RERA SD
Other partner organization that needs to be involved	Split Water and Sewerage Company Ltd., City of Split, Teaching Institute for Public Health of the Split-Dalmatia County, Croatian Waters, Split-Dalmatia County
Time scale	2030
Estimated costs and resources needed	15,000 EUR
Target indicator	150 participants involved in the organized promotional campaigns and workshops



<b>STRATEGIC OBJECTIVE 2 To guarantee good quality of water bodies</b>	
<b>SPECIFIC OBJECTIVE 2.2 To preserve Jadro recharge area water quality</b>	
<b>ACTION 2.2.1 Expansion and further development of water quality integrated monitoring system</b>	
Related Objective and background (challenge)	Since FUA Split main water supply source is the karstic Jadro spring that is an outlet of the larger karstic aquifer, its groundwater represents a body that needs to be protected and preserved. The Jadro spring catchment area covers a surface of around 500 m <sup>2</sup> . Several possible pollution hazards which could affect the water body quality in the area can be related to transport (highway); construction of Split-Dalmatia County Waste Management Centre Lećevice; and land use (agriculture and the use of fertilizers, herbicides and pesticides). Currently, there is a water quality monitoring system installed, but with very limited capacities. Thus, this objective aims to preserve Jadro recharge area water quality through further expansion and improvement of the existing water quality monitoring system.
Description of the Action	This action implies the expansion and further development of the existing water quality monitoring system, integrated with an early warning system (EWS). Within the upgraded system, 10 additional monitoring wells (deep piezometers) equipped with measuring instruments for physical and chemical water properties in the Jadro catchment wider area will be installed. The monitoring wells should be placed along the highway, near the Split-Dalmatia County Waste Management Centre Lećevice and along with the crossings of main regional underground water directions.
Expected result	High quality of Jadro spring water preserved
Responsible institution/s, organizations for the implementation of the Action	Croatian Waters
Other partner organization that needs to be involved	Split Water and Sewerage Company Ltd.
Time scale	2030
Estimated costs and resources needed	3.2 million EUR
Target indicator	10 monitoring wells (deep piezometers) with water quality sensors and system telemetry installed



<b>STRATEGIC OBJECTIVE 3 To improve wastewater management</b>	
<b>SPECIFIC OBJECTIVE 3.1 To reconstruct and improve the wastewater drainage system</b>	
<b>ACTION 3.1.1 Reconstruction and expansion of the wastewater drainage system within the Split-Solin agglomeration Project</b>	
Related Objective and background (challenge)	The FUA Split has a sewerage system that is mostly made of a combined type of sewer. The system is characterized by numerous overflows into the coastal sea which consequently causes pollution. Moreover, only 78% of the FUA Split households are connected to the wastewater collection network. Thus, the objective aims to improve the overall wastewater management and to ensure that 95% of households are connected to the wastewater collection network.
Description of the Action	This action implies reconstruction and expansion of the FUA Split wastewater drainage system within the already started Split-Solin agglomeration project. The project includes construction of a drainage and sewerage system (pipelines, rainwater overflows, household connections, pumping stations, retention pools, WWTP upgrade) in the following cities and municipalities involved in the project: City of Split, City of Solin, Municipality of Klis, Municipality of Dugopolje and Municipality of Podstrana.
Expected result	Wastewater drainage system expanded and reconstructed
Responsible institution/s, organizations for the implementation of the Action	Split Water and Sewerage Company Ltd.
Other partner organization that needs to be involved	City of Split, City of Solin, Municipality of Dugopolje, Municipality of Klis, Municipality of Podstrana, Croatian Waters
Time scale	2027
Estimated costs and resources needed	128.4 million EUR
Target indicator	110,694 meters of wastewater drainage system pipelines, channels and collectors constructed and 15,169 meters reconstructed; 34 pumping stations constructed; 7 retention pools constructed; 5 rainwater overflows constructed; 7,392 household connections installed; 4,139 meters of additional submarine discharge pipelines at WWTP Stupe installed; WWTP Stupe upgraded to biological (secondary) treatment



<b>STRATEGIC OBJECTIVE 4 To retain water as long as possible on site</b>	
<b>SPECIFIC OBJECTIVE 4.1 To harvest rainwater and stormwater for non-potable purposes</b>	
<b>ACTION 4.1.1 Installation of green roofs on University of Split Campus buildings</b>	
Related Objective and background (challenge)	Rainwater and stormwater harvesting infrastructure for non-potable reasons at FUA Split level is currently undeveloped. As stated in the baseline assessment, one of the excellent solutions for circular water management is a green roof, which allows the reuse of rainwater and stormwater for non-potable reasons. Currently, there is only one green roof installation at the FUA Split level. This objective aims to increase the number of urban green spaces at the FUA Split level.
Description of the Action	This action includes the construction of green roof solution at the six buildings of the University of Split Campus, as follows: Faculty of Electrical Engineering, Mechanical Engineering and Naval Architecture; Faculty of Science; Faculty of Maritime Studies, Chemical and Environmental Technology; Faculty of Civil Engineering, Architecture, and Geodesy; Faculty of Economics, Business and Tourism; Student dormitory and Library. Within this action, a total of 33,126 m <sup>2</sup> of the green roof will be installed at the University of Split Campus buildings.
Expected result	Increased urban green spaces
Responsible institution/s, organizations for the implementation of the Action	University of Split
Other partner organization that needs to be involved	City of Split
Time scale	2030
Estimated costs and resources needed	3.5 million EUR
Target indicator	33,126 m <sup>2</sup> of green roof installed at the University of Split Campus



<b>STRATEGIC OBJECTIVE 4 To retain water as long as possible on site</b>	
<b>SPECIFIC OBJECTIVE 4.2 To interpolate green solutions into existing stormwater infrastructure</b>	
<b>ACTION 4.2.1 Construction of operational SuDS within FUA Split</b>	
Related Objective and background (challenge)	The FUA Split is characterized by a high mean runoff coefficient since many of the areas are sealed with impermeable layers (asphalt and concrete). Therefore, rainwater harvesting and reducing direct runoff by extreme rain events has to be ensured, and it will consequently result in a reduction of urban floods as well as rainwater reuse (especially for green areas irrigation). Currently, at the FUA Split there are no operational sustainable urban drainage systems (SuDS) constructed. This objective aims to construct the operational sustainable urban drainage systems within FUA Split.
Description of the Action	This action implies the construction of 2 operational SuDS within FUA Split, which will be done through the installation of porous pavements (parking lots, roads) that will be collecting rainwater, as well as underground storage volumes next to parks, or recreational areas that use substantial amounts of water for irrigation. More specifically, the SuDS will be able to: accumulate water from roofs, parking lots and outside areas, clean water through filters and separators; transport and redirect water and store water for future use.
Expected result	Reduction of water consumption due to the rainwater reuse
Responsible institution/s, organizations for the implementation of the Action	City of Split
Other partner organization that needs to be involved	Čistoća Ltd.
Time scale	2030
Estimated costs and resources needed	1.1 million EUR
Target indicator	1,000 m <sup>3</sup> of accumulation volume for rainwater harvesting installed



<b>STRATEGIC OBJECTIVE 5 To promote multiple water use and water sustainability</b>	
<b>SPECIFIC OBJECTIVE 5.1 To raise awareness about saving and efficient use of water, its reuse, and climate changes as well as promoting urban water systems (UWS) as the engine for circular economy development</b>	
<b>ACTION 5.1.1 Organization of promotional campaigns on water efficiency and water (re)use</b>	
Related Objective and background (challenge)	The results of the conducted public perception survey (N - 402) provided an insight into citizens' water consumption habits and showed a positive tendency about water-saving habits but at the same time extremely low awareness regarding water footprint of the production process as well as existing green and technical solutions and/or modes to save water. Therefore, this objective aims at raising awareness on water consumption, saving and efficient use of water, its reuse, and climate changes.
Description of the Action	This action includes the organization of promotional campaigns aiming to impact the change in behaviour on water consumption, promotion of water-saving habits and water (re)use. The campaign will be targeting, both the relevant stakeholders (local and regional authorities, infrastructure and service providers, NGOs, sectoral agencies, SMEs) and the local community. The promotion of urban water systems (UWS) as the engine for circular economy development will be highlighted during the organized campaigns.
Expected result	Raised awareness of relevant stakeholders and local community on efficiency and water (re)use water
Responsible institution/s, organizations for the implementation of the Action	PI RERA SD
Other partner organization that needs to be involved	City of Split, Split-Dalmatia County, Croatian Waters, Split Water and Sewerage Company Ltd., University of Split, NGO Sunce
Time scale	2030
Estimated costs and resources needed	25,000 EUR
Target indicator	500 participants involved in the organized promotional campaigns



<b>STRATEGIC OBJECTIVE 5 To promote multiple water use and water sustainability</b>	
<b>SPECIFIC OBJECTIVE 5.2 Continuous multi-stakeholder involvement in the system management activities</b>	
<b>ACTION 5.2.1 Organization of the educational workshops</b>	
Related Objective and background (challenge)	The establishment of the circular urban water management system at the FUA Split level is a complex process, which requires the awareness and involvement of various relevant stakeholders. In order to influence the FUA Split stakeholders' attitudes, various educational and promotional activities need to be performed in order to encourage stakeholders' involvement, as well as to ensure their continuous engagement.
Description of the Action	This action implies the organization of educational workshops targeting the relevant stakeholders (local and regional public authorities, infrastructure and service providers, sectoral agencies, NGOs, SMEs) on the topics of water use and reuse, water sustainability and water management, thus building their capacities and encouraging their future involvement in the system management activities.
Expected result	Increased involvement of stakeholders in water management activities
Responsible institution/s, organizations for the implementation of the Action	PI RERA SD
Other partner organization that needs to be involved	City of Split, Split-Dalmatia County, Croatian Waters, Split Water and Sewerage Company Ltd., University of Split, NGO Sunce
Time scale	2030
Estimated costs and resources needed	10,000 EUR
Target indicator	150 participants involved in the organized educational workshops





<b>STRATEGIC GOAL 6 To preserve flow in water bodies</b>	
<b>SPECIFIC OBJECTIVE 6.1 To reduce the volume of extracted freshwater</b>	
<b>ACTION 6.1.1 Reconstruction and expansion of the water supply network within Split-Solin agglomeration project</b>	
Related Objective and background (challenge)	The annual volume of fresh water extracted from the river Jadro source in 2018 was 55,755,423.00 m <sup>3</sup> , while the daily volume of freshwater used by each person was 149.95 l/day per capita. The specific objective targets to reduce the annual freshwater extracted from the ground by 20% in 2030.
Description of the Action	This action implies infrastructural works which will be done within the already started Split-Solin agglomeration project. The planned infrastructural works include (re)construction and expansion of the existing pipelines; construction of additional pumping stations; and construction of new water reservoirs in the following cities and municipalities involved in the project: City of Split, City of Solin, Municipality of Klis, Municipality of Dugopolje and Municipality of Podstrana.
Expected result	Reduced extraction of fresh water from the ground
Responsible institution/s, organizations for the implementation of the Action	Split Water and Sewerage Company Ltd.
Other partner organization that needs to be involved	Croatian Waters, City of Split, City of Solin, Municipality of Dugopolje, Municipality of Klis, Municipality of Podstrana
Time scale	2027
Estimated costs and resources needed	26.5 million EUR
Target indicator	65,380 meters of pipelines installed and reconstructed, 14 pumping stations constructed and 25,350 m <sup>3</sup> of water reservoirs built



<b>STRATEGIC GOAL 6 To preserve flow in water bodies</b>	
<b>SPECIFIC OBJECTIVE 6.1 To reduce the volume of extracted freshwater</b>	
<b>ACTION 6.1.2 Organization of promotional campaigns and workshops aiming to raise awareness on the implementation of water-saving habits, installation of green solutions, and implementation of legislation on greywater and rainwater</b>	
Related Objective and background (challenge)	Freshwater extraction significantly affects the flow in water bodies. The daily volume of freshwater from the Jadro river in 2018 was 149.95 l/day per capita. In order to reduce the amount of freshwater used, it is important to raise awareness of relevant stakeholders and the local community on the implementation of water-saving habits; installation of green solutions, and advocating for the creation and implementation of relevant circular water legislation.
Description of the Action	This action implies the organization of promotional campaigns and workshops, both for the relevant stakeholders (local and regional public authorities, infrastructure and service providers, sectoral agencies, NGOs, SMEs) and the local community. The main topics of the campaigns and workshops will be the importance and benefits of water-saving habits implementation; the importance and benefits of green solutions installation, as well as the importance of creating and advocating for the implementation of greywater, stormwater and rainwater reuse legislation.
Expected result	Raised awareness of the relevant stakeholders and local community on the benefits of implementation of water-saving habits, installation of green solutions, and advocating for creation and implementation of legislation on rainwater, stormwater, and greywater.
Responsible institution/s, organizations for the implementation of the Action	PI RERA SD
Other partner organization that needs to be involved	City of Split, Split-Dalmatia County, Croatian Waters, Split Water and Sewerage Company Ltd., University of Split, NGO Sunce
Time scale	2030
Estimated costs and resources needed	20,000 EUR
Target indicator	200 participants involved in the organized promotional campaigns and workshops



## 7. Implementation

Implementation is the carrying out of planned actions and needs the cooperation of a range of local government departments, institutions, and organizations whose participation in the planned activities is necessary. The previous chapter presents all institutions and organizations which are responsible for the implementation of each action, as well as partner organizations that should be involved.

The coordination unit is an organization in charge of carrying out Strategy successfully (ensuring that deadlines are being met, the quality of results is satisfactory, budgets are being correctly managed and up-to-date information is distributed to stakeholders). The coordination unit which will carry out this Strategy is JI RERA S.D. According to the Regional Development Act (NN 147/14, 123/17, and 118/18), JI RERA S.D. is an accredited regional coordinator and performs activities of public interest, with the aim of effective coordination and encouragement of regional development in the Split-Dalmatia County, and performs the following tasks of public authority: prepares county development strategy and other strategic and development documents for the county and their implementation documents authorized by the founder, checks the compliance of strategic development planning documents of the county with hierarchically higher strategic planning documents and makes decisions confirming compliance, provides professional assistance in preparing and implementing support programs for public bodies and public institutions in the Split-Dalmatia County founded by The Republic of Croatia or the county, in the preparation and implementation of development projects of interest for the development of the county, etc. JI RERA SD as a responsible body will coordinate activities and responsible stakeholders, ensure their engagement and cooperation, as well as effective communication and timely exchange of information among stakeholders involved.

Implementation of the Strategy will be financed from national, regional, and local public authorities' budget, 2021-2027 long-term EU budget, and NextGenerationEU.

Successful implementation, in addition to the implementation of actions, can be influenced by several other factors such as financial, logistical, political, and social factors specific to the local context. Croatian water management faces limitations within some of these factors. Political issues are the awareness of national authorities on water reuse and recycling (water management issues), level of administrative obstacles associated with water management systems (spatial limitations, longevity of the approval processes), lack of the promotion of sustainable water economy by the national/regional/local government, and the scope of relevant strategic documents regarding water conservation, rainwater collection, water reuse on a national level.

Besides these political issues, social issues are recognized as well. These are the willingness to cooperate between different groups of stakeholders in the decision-making process associated with water management, the level of social awareness concerning water conservation and reuse, residents' safety level regarding water and wastewater quality and infrastructure safety levels, the level of social losses due to inappropriate water management and, the susceptibility of the society to use innovative water management solutions.

In regards to the legal framework, Croatia lacks special documents on rainwater, stormwater runoffs, water scarcity alleviation, or water reuse, as opposed to the other EU Member States.



## 8. Monitoring and Evaluation

The implementation of the Strategy is subject to cyclical monitoring, reporting, and assessment of the obtained results, and evaluation. The purpose of monitoring and evaluation is to check whether the course of activities leads to the desired results. The table below shows the monitoring and evaluation according to the corresponding specific objectives. The corresponding indicators, baseline, and target values, and how the assessment was performed are briefly presented. The responsible bodies are listed, as well as reporting documentation that will contain the results given by each specific objective.



Table 6: Monitoring and evaluation

	Indicator	Definition (How is it calculated?)	Baseline (What is the current value?)	Target (What is the target value?)	Data source (How will it be measured?)	Frequency (How often will it be measured?)	Responsible (Who will measure it?)	Reporting (Where will it be reported?)
Objective 1.1 To expand the water supply network	Percentage of population with access to water supply network	Estimate based on predicted population and possible infrastructure interventions	93%	100%	Application for data entry on drainage and treatment and water supply (Croatian Waters)	Annually	Croatian Waters	EC reporting system for water directives Croatian Waters
Objective 1.2 To improve the water supply network	Percentage of water loss in the water supply network	Water balance - Ratio of non-revenue water and supplied water	58%	35%	Application for data entry on drainage and treatment and water supply (Croatian Waters)	Annually	Croatian Waters	EC reporting system for water directives Croatian Waters
Objective 1.3 To promote/increase the resilience of the urban water system to climate change impacts	The set goals of the Climate Change Adaptation Strategy in the Republic of Croatia for the period to 2040 with a view to 2070 reached	n/a	0	1	Climate change promotional campaigns and workshops	By the end of the observed period (2030)	PI RERA SD	Project final reports from various beneficiaries (Split Water and Sewerage Company Ltd., City of Split, Croatian Waters, PI RERA SD, NGOs, educational institutions)



<p>2.1 To preserve excellent bathing water quality</p>	<p>Bathing water quality according to the Regulation on sea bathing water quality parameters</p>	<p>Bathing sea quality testing includes field observations and laboratory tests. During sampling, basic meteorological conditions, sea temperature and salinity, and visible pollution are recorded.</p>	<p>Excellent</p>	<p>Excellent</p>	<p>Field observations and laboratory tests (physicochemical and microbiological).</p>	<p>Annually</p>	<p>Split-Dalmatia County, Teaching Institute for Public Health of the Split-Dalmatia County, Administrative Department for Environmental Protection, Utilities, infrastructure and investment</p>	<p>Report on testing the quality of the sea for bathing in the territory of Split-Dalmatia County</p>
<p>2.2 To preserve Jadro recharge area water quality</p>	<p>Water quality according to the Regulation on water classification parameters</p>	<p>Values of indicators for individual types of water</p>	<p>First (I) class</p>	<p>First (I) class</p>	<p>Physico-chemical parameters, oxygen regime, nutrients, microbiological indicators, biological indicators, metals, organic compounds and radioactivity  (Regulation on water classification 77/98)</p>	<p>Annually</p>	<p>Croatian Waters</p>	<p>Annual Monitoring Report, Croatian Waters</p>



3.1 To reconstruct and improve the wastewater drainage system	Percentage of households connected to the wastewater collection network	The ratio of the number of connections to the total number of households	78%	95%	Wastewater collection network connection request / contract	Annually	Split Water and Sewerage Company Ltd	Annual report of Split Water and Sewerage Company Ltd
4.1 To harvest rainwater and stormwater for non-potable purposes	Number of green roofs installed at the FUA level	n/a	1	5	n/a	By the end of the observed period (2030)	University of Split	Project final reports from various beneficiaries (University of Split, City of Split)
4.2 To interpolate green solutions into existing stormwater infrastructure	Number of operational sustainable drainage systems built	n/a	0	2	n/a	By the end of the observed period (2030)	City of Split	Project final reports from various beneficiaries (City of Split, Čistoća Ltd.)
5.1 To raise awareness about saving and efficient use of water, its reuse, and climate changes as well as promoting urban water systems (UWS) as the engine for circular economy development	Number of promotional campaigns held at the FUA level	n/a	0	25	Promotional campaigns	By the end of the observed period (2030)	PI RERA SD	Project final reports from various beneficiaries (PI RERA SD, City of Split, Split-Dalmatia County, Croatian Waters, Split Water and Sewerage Company Ltd., University of Split, NGO Sunce)



5.2 Continuous multi-stakeholder involvement in the system management activities	Number of workshops organized at the FUA level	n/a	0	10	Workshops organized	n/a	PI RERA SD	Project final reports from various beneficiaries (PI RERA SD, City of Split, Split-Dalmatia County, Croatian Waters, Split Water and Sewerage Company Ltd., University of Split, NGO Sunce)
6.1 To reduce the volume of extracted freshwater	Reduction of annual fresh water extracted from the ground	Annual fresh water is calculated as difference between the total water introduced into the system (m3) and the water introduced from other sources.	55,755,423.00 m3 of annual fresh water extracted from the ground	Annual fresh water extracted from the ground reduced by 20%	Annual report of Split Water and Sewerage Company Ltd.	Annually	Split Water and Sewerage Company Ltd.	Annual report of Split Water and Sewerage Company Ltd.





## 9. Consistence with other documents

The implementation of the Strategy is interdependent with current strategies, policies, and programs at the national, regional, and local levels. Consistency with other documents is currently lacking because most of the relevant documents for this Strategy are in progress or are in the conceptual phase. The Development Strategy of the City of Split until 2030 is in a high stage of development, but it has not been completed yet. This document presents a strategic act that defines the direction of development of the city of Split in the third decade of the 21st century. Also, as part of the recently adopted National Recovery and Resilience Plan 2021-2026, several sectoral documents will potentially be developed. Also, the activities of the Strategy for the Development of the Urban Agglomeration of Split for the financial period 2021-2027 have begun, i.e., the Agreement on Cooperation has been signed. The National Development Strategy of the Republic of Croatia until 2030 is an important document whose main goal is to eliminate economic and social damage caused by the global crisis and encourage recovery., but it is not observed in the table because its strategic goals cannot be compared with strategic goals of this document due to their wide range of areas.

The most important document in this context is the National Water Management Strategy (NN 91/08), within which the vision, mission, goals, and tasks of the state policy in water management are determined. It provides strategic commitments and guidelines for water management development starting from the current state of the water sector, development needs, economic opportunities, international obligations, the need to preserve and improve water conditions, and aquatic and water-dependent ecosystems.

Multi-year Program for the Construction of Regulatory and Protective Water Structures and Buildings for Land Reclamation which establishes a framework program for investment in water management in order to protect against the harmful effects of water, through the construction of regulatory and protective water structures and buildings for basic reclamation drainage that can serve the reception and evacuation of large waters, and irrigation is shown as well.

The relation between the strategic objectives set out in this Strategy and the strategic objectives of the higher documents, i.e., the National Water Management Strategy and Multi-year Program for the Construction of Regulatory and Protective Water Structures and Buildings for Land Reclamation, are shown in the tables below.

National Water Management Strategy (NN 91/08)	Strategic goals of Strategy					
	To increase efficiency in water use and distribution	To guarantee good quality of water bodies	To improve wastewater management	To retain water as long as possible on site	To promote multiple water use and water sustainability	To preserve flow in water bodies
Regulation of watercourses and other waters and protection against the harmful effects of water	*	0	**	*	0	*
Water use	**	**	0	0	**	**
Water protection	*	*	**	*	*	*
Protected areas - areas of special water protection	0	0	0	0	0	0
Professional and operational framework for water management	*	**	0	0	*	**

Multi-year Program for the Construction of Regulatory and Protective Water Structures and Buildings for Land Reclamation (NN 117/15)	Strategic goals of Strategy					
	To increase efficiency in water use and distribution	To guarantee good quality of water bodies	To improve wastewater management	To retain water as long as possible on site	To promote multiple water use and water sustainability	To preserve flow in water bodies
Protection against the harmful effects of water	**	*	0	0	0	*
Irrigation	**	*	*	0	0	0

*In assessing the relationship / impact of the Strategy on the implementation of a given goal (of other strategy, policy, program), the following scale can be adopted:*



(\*\*\*) - *very strong positive impact;*

(\*\*) - *strong positive influence;*

(\*) - *positive influence;*

(0) - *no relation;*

(-) - *negative impact;*

(- -) - *strong negative;*

(- - -) - *very strong negative influence*