D.T3.1.1 COMMON MANUAL ON FUA-LEVEL SELF-ASSESSMENT AND ANALYSIS OF GAPS & POTENTIAL OF CIRCULAR WATER USE

Subtitle

Version 1
MM YYYY

Sommario

A. CLIMATE, ENVIRONMENT AND POPULATION

A1) POPULATION

1) Population living in the FUA in 2018 [inh.]

110.871

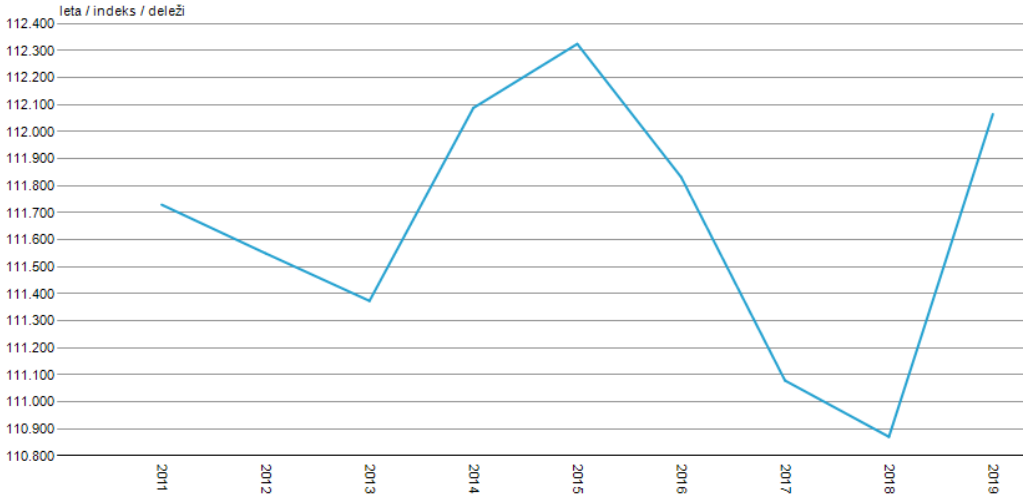
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses

2) Population change in the last 20 years in the FUA [inh.]

Table:

Year	2011	2012	2013	2014	2015	2016	2017	2018	2019
Population	111.730	111.550	111.374	112.088	112.325	111.832	111.079	110.871	112.065

Chart:



X Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

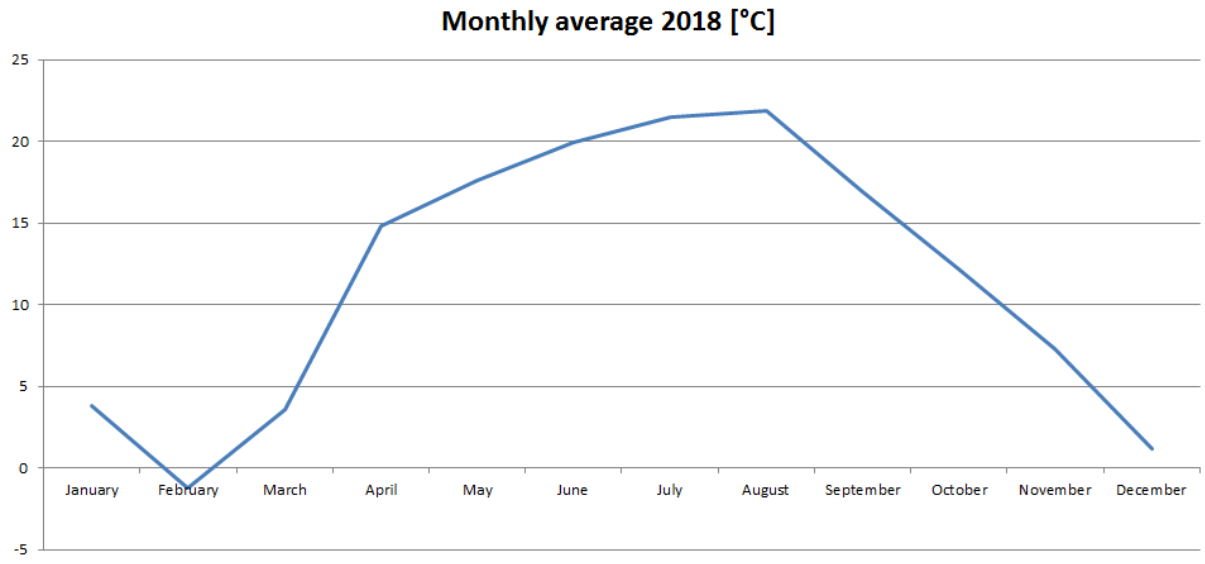
A2) CLIMATE

3) Monthly average temperature (max and min) [°C]

Table:

Month	1	2	3	4	5	6	7	8	9	10	11	12
average 2018	3,8	-1,2	3,6	14,8	17,6	19,9	21,5	21,9	16,9	12,2	7,3	1,2
average 1981-2010	-0,6	1,1	5,3	10,2	15,2	18,5	20,2	19,3	15,2	10,2	4,7	0,6

Chart:



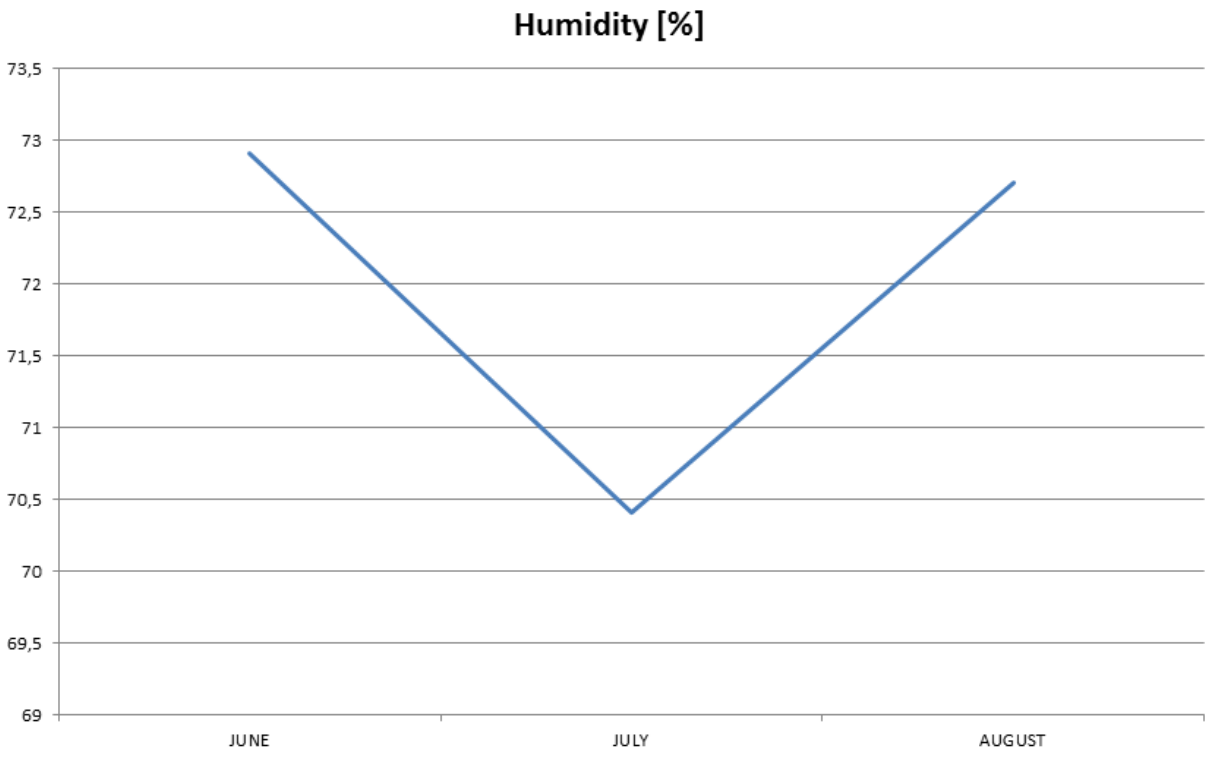
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

4) Average relative humidity in summer months [%]

Table:

Month	JUNE	JULY	AUGUST
Humidity [%]	72,9	70,4	72,7

Chart:



✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

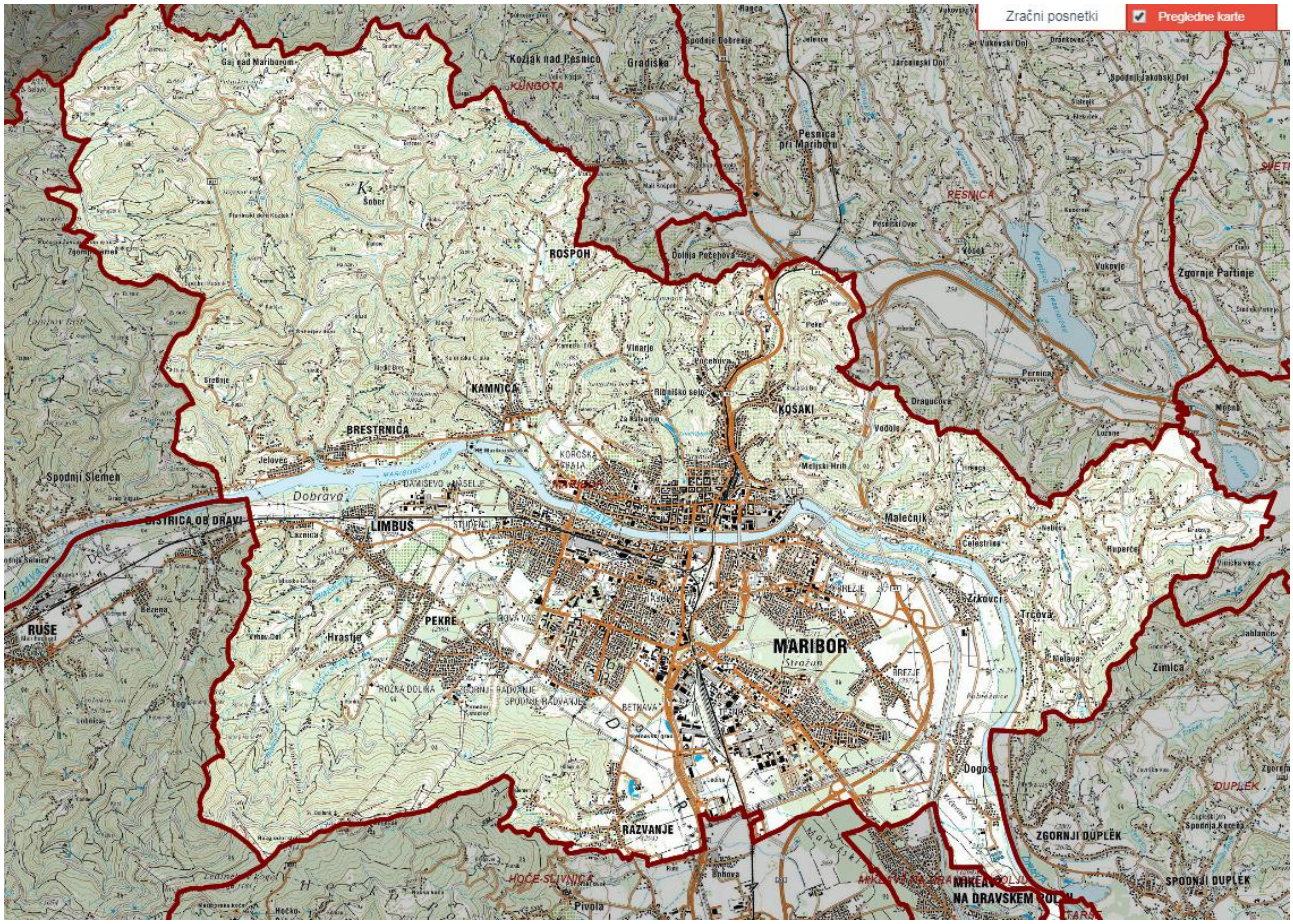
A3) SEALING SOIL

5) FUA total area [km^2]

147.5 km2

Map:

Map should show the layout of urban areas, geographical and other features across the city; source GIS



✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

6) Percentage of sealed soil [%]

At the moment the city has not carried out studies that would reveal challenges caused by sealed surfaces. However, the municipality of Maribor is aware of the issue and we anticipate that it will be addressed as soon as the Master Plan will be adopted in 2020.

Population Density in 2016 in the municipality of Maribor was 749 Inh/km 2. The densely build-up areas present together approximately 3.325ha of surface equal to 33,35 km2 compared to the size of 41 km2 total.

X Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses: Only for Maribor

7) Time series of the percentage of sealed soil [%]

Table:

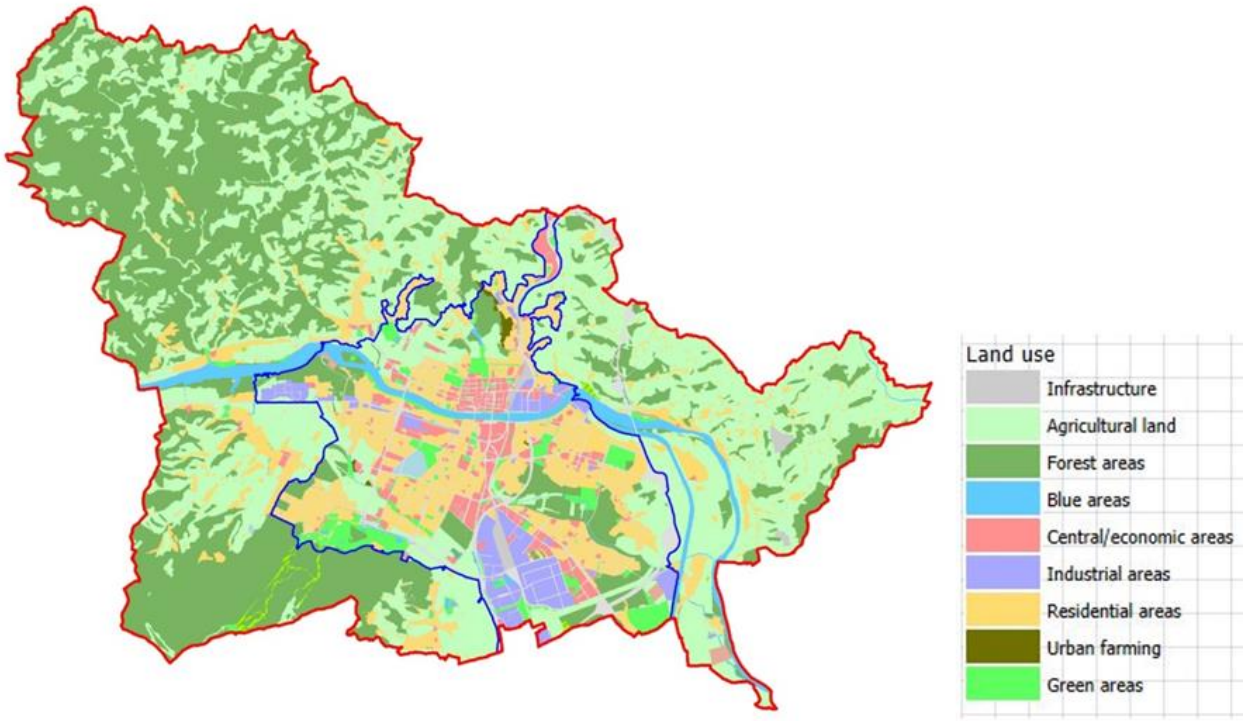
The specific data is not available, since many of buildings, streets and at some locations even entire parts of neighbourhoods have been built in 1970s' and 1980s' lacking any spatial planning and permitting; some of said parts are still not evidenced in the land registry.

Chart:

☐ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

A4) GREEN SPACES IN URBANIZED AREAS

8) Green area in the entire FUA [km^2]	
86,4	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

9) Percentage of green spaces within urbanized areas [%]	
58,6 Map:  Description: Municipality boundaries delineating the overall city area with highlighted inner-city area and land use; (Source: The City Municipality of Maribor, SUP (Spatial Planning Sector), GIS (Geographical Information System))	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

10) Time series of the percentage of green spaces within urbanized areas [%]	
Table: / Chart	
☐ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

B. WATER RESOURCES

B1) ANNUAL PRECIPITATION

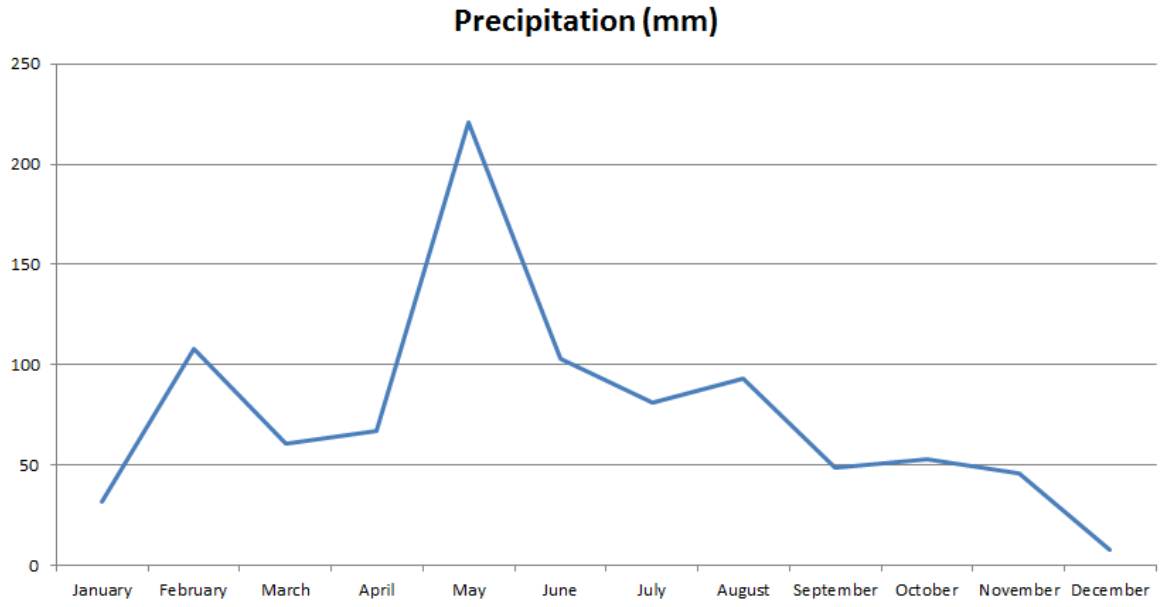
11) Average annual precipitation [mm]	
926	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

12) Monthly precipitation [mm]

Table:

Month	1	2	3	4	5	6	7	8	9	10	11	12
Precipitation (mm)	32	108	61	67	221	103	81	93	49	53	46	8

Chart:



✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

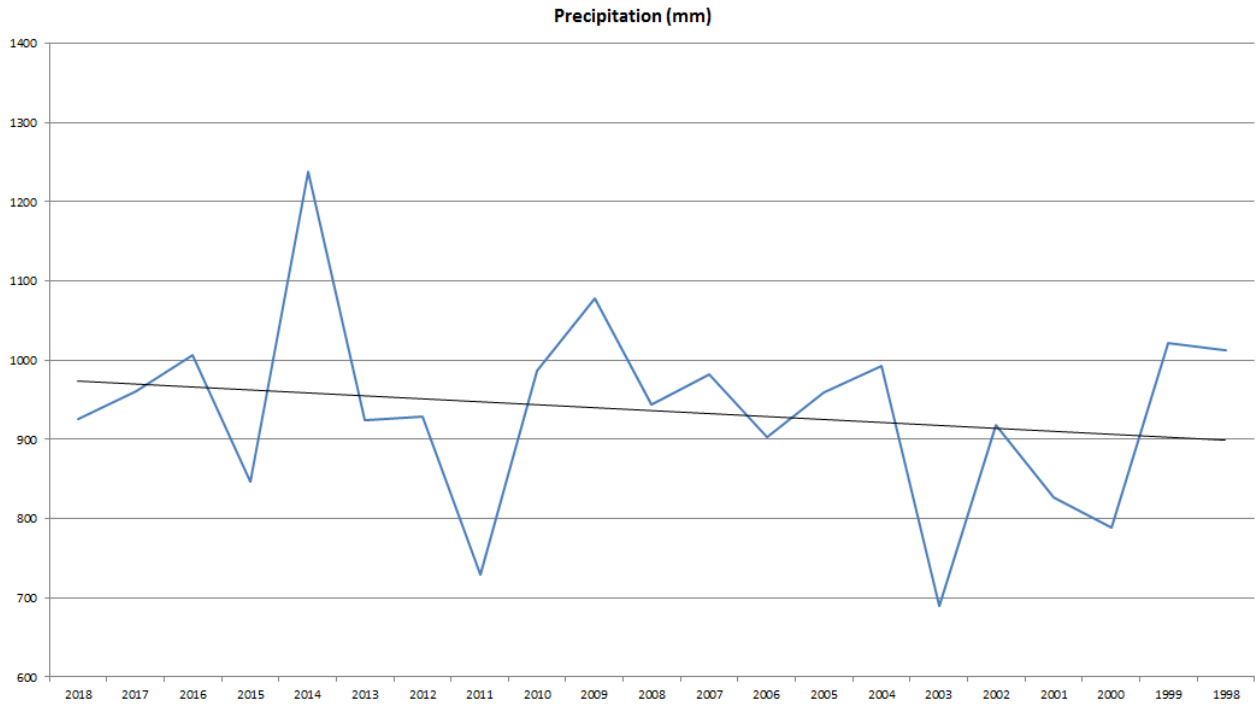
13) Trend of annual precipitation [mm]

Table:

Year	2018	2017	2016	2015	2014	2013	2012	2011	2010	2009	2008
Precipitation (mm)	926	961	1006	846	1238	924	929	730	986	1078	944

Year	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Precipitation (mm)	982	903	959	993	689	918	827	788	1022	1012

Chart:



✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

B2) RIVER, CHANNELS AND LAKES

14) List of main rivers and channels within the FUA, and their flow rate (average 2018 and monthly flow 2018) [-]

Water body name	Flow rate [m^3/s]
Drava	670

15) Synthetic water quality evaluation (ecological and chemical status) for each of the rivers and channels identified (include quantitative parameters, if available) [-]

Water body name	Water quality
Drava measured at the location of Mariborski otok in terms of chemical appropriateness	Good.

16) List of main lakes and reservoirs within the FUA, an their water storage (average 2018 and monthly variation 2018) [-]

Water body name	Water storage [m^3]
/	

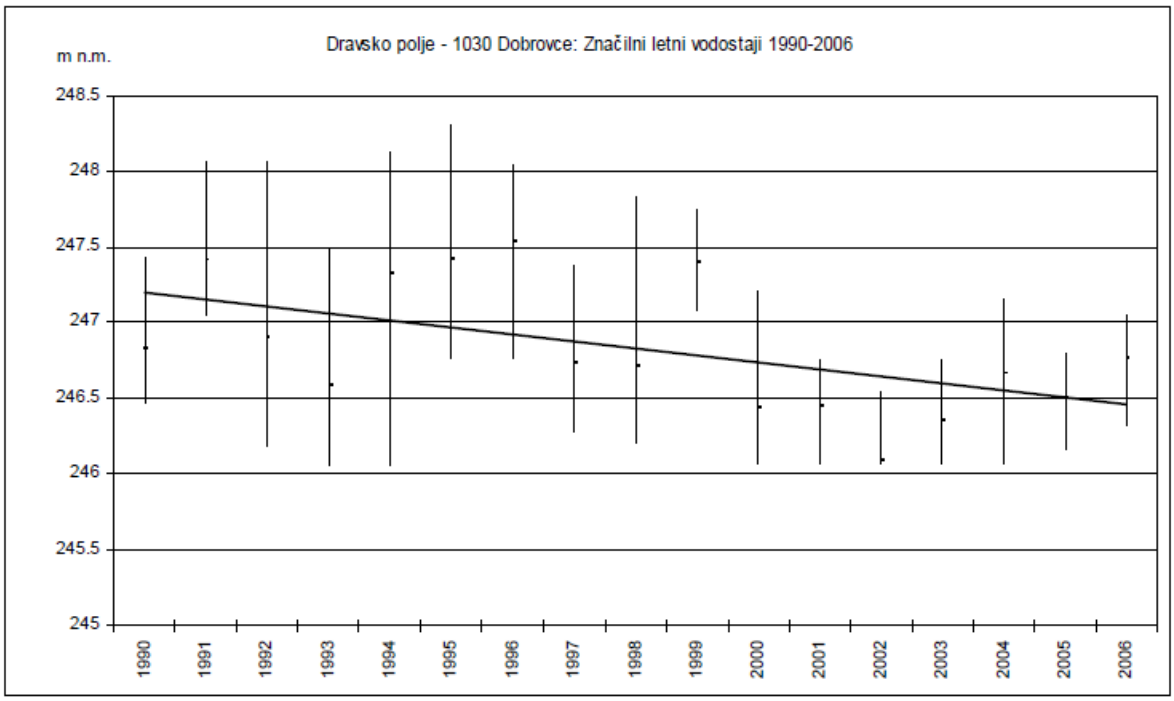
17) Synthetic water quality evaluation (ecological and chemical status) for each of the main lakes and reservoirs identified (include quantitative parameters, if available) [-]

Water body name	Water quality
/	

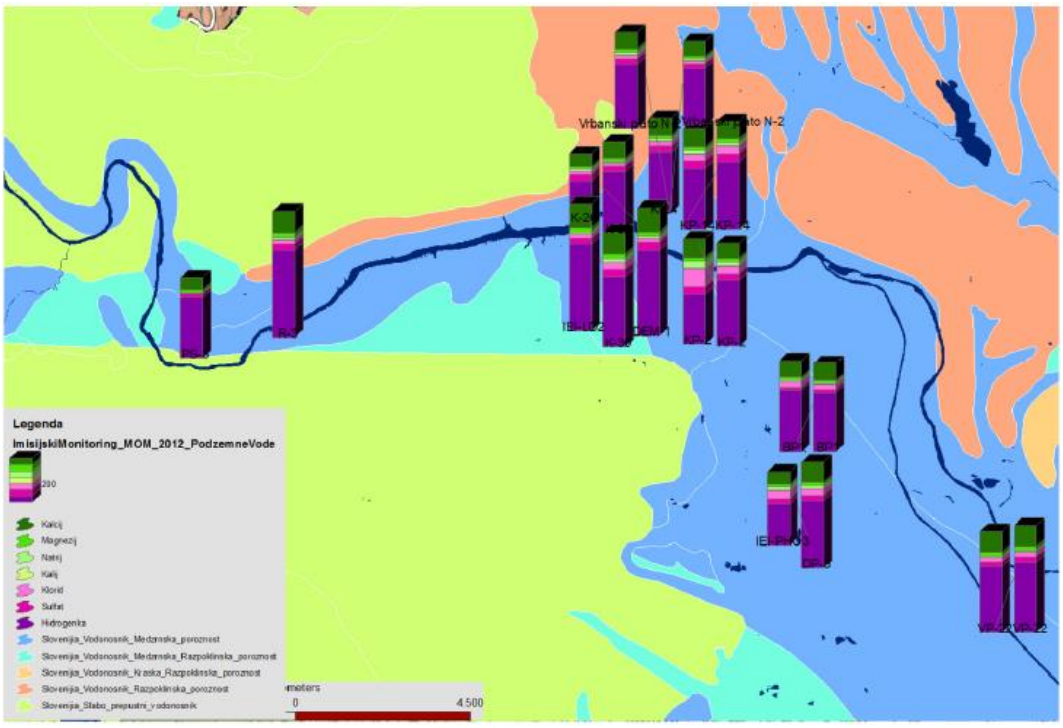
B3) GROUND WATER

18) Trend of water level of ground water [m]

Chart of decreasing groundwater level from 1990 - 2006:



Results of imissions monitoring for groundwater



C. INFRASTRUCTURES

C1) WATER DISTRIBUTION SYSTEM - POPULATION WITH ACCESS TO FRESH WATER

19) Percentage of population with access to the water supply network [%]	
98,1	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

20) What kind of water purification/treatment are in use, what is planned? [-]
Natural way - Iron and manganese are extracted from water by oxidation and filtered by sand filters. Once a year, for two weeks in summer months, we perform preventive disinfection of the water supply system with chlorine gas.   

21) Tap water quality - lab test results

- PH [-] 7,5
- Fixed residue 180 ° C [mg/l] -
- Hardness [°F] 15,9 DHN
- Conductivity [µS/cm a 20°C] 516
- Calcium [mg/l] 70
- Magnesium [mg/l] 17
- Ammonium [mg/l] > 0,013
- Chlorides [mg/l] 27
- Sulphates [mg/l] 25
- Potassium [mg/l] -
- Sodium [mg/l] 15
- Arsenic [mg/l] -
- Bicarbonate [mg/l] -
- Residual chlorine [mg/l] 0,0 no desinfection
- Fluorides [mg/l] <0,2
- Nitrates [mg/l] 14
- Nitrites [mg/l] <0,007
- Manganese [mg/l] -

✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

C2) WATER DISTRIBUTION SYSTEM LOSS

22) Percentage of loss in the water supply network [%]	
31,5	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

C3) DUAL WATER DISTRIBUTION SYSTEM

23) Description of eventual dual system water supply network within the FUA [-]	
/	
☐ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

C4) FIRST FLUSH RAINWATER COLLECTION

24) Qualitative description of the first flush rainwater collection technique implemented, if any [-]
/
Is your description representative of the entire FUA? Please give a short explanation.

C5) WASTEWATER COLLECTION

25) Percentage of households and percentage of industries, connected to the wastewater collection network [%]	
• Together: 136.000 PE • Households 80% • industries 20%	
☐ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

C6) DUAL WASTEWATER COLLECTION SYSTEM

26) Description of eventual dual system wastewater collection network within the FUA [-]

/

☐ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

C7) WASTEWATER TREATMENT PLANTS

27) List of wastewater treatment plants and their population equivalent capacity compared to the actual population [-]

Wastewater treatment plants	Inhabitant equivalent (IE)
Aquasystems	195.000

Comment:

✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

28) What kind of wastewater treatment is realised, what is planned? [-]	
Mechanical pre-treatment takes place through the following processes: • removal of coarse particles from wastewater; waste is excreted in the entrance shaft, on rough and fine rakes, followed by the removal of sand and grease, • sewage pumping, • receiving and mechanical treatment of sewage from septic tanks, • sampling and flow measurements, • air purification from enclosed pre-treatment areas and flotation and dehydration. Biological treatment involves: • decomposition of carbon, nitrogen and phosphorus compounds by bacteria and micro-organisms, • additional phosphorus removal by adding coagulants, • air intake, mixing, • mud settling, • pumping excess sludge, • Sampling and flow measurements. Sludge treatment Within the treatment of sludge: • saturated air flotation, excess sludge thickens to 3-4% of dry matter, • storage and preparation of polyelectrolyte, • drainage (dehydration) by centrifugation, the sludge is concentrated to 20% dry matter content, • Sludge stabilization by adding lime, the sludge solids content increases to 25%.	
X Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

C8) TREATED EFFLUENT

29) Annual volume of waste water treated by the wastewater plants [m^3]	
9.318.969	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

D. WATER CONSUMPTION

D1) FRESHWATER EXTRACTED

30) Annual volume of freshwater extracted from the ground, surface water, other sources. (Specify sources) [m^3]	
Groundwater: 9.499.695	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

D2) FRESHWATER USED/CONSUMED BY POPULATION

31) Daily volume of freshwater used by each person for civil uses [l/day per capita]	
169 - Total usage (drinking water) 114 - Domestic usage (drinking water)	
✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

32) Consumption of bottled water for drinking purposes [l/day per capita]

There is no data available on local, regional or national level.

☐ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

33) Initiatives to reduce consumption of bottled water [-]

Pilot project KAPLJICA (A DROP) started in 2019 - clean drinking water as an innovative leading touristic product. The purpose of the project is to promote responsible use of clean tap water in tourism, hospitality and gastronomy. The aim of the collaboration is to propose and appoint touristic and hospitality workers as ambassadors for the responsible use of clean drinking water. One of the goals of the project is production and promotion of unique glasses and mugs in which the caterers will serve tap water.

In order to increase sustainable environmental development we encourage people to drink fresh tap water instead of buying plastic bottled water. Tap water is 98,8% cheaper than average plastic bottled water.

With the help of a mascot called “Vidra Vida” (Otter Vida) we seek to promote drinking tap water from young age though kindergartens, elementary schools and high schools. We are involved in learning processes from elementary education programs to university education programs with an emphasis on environmental protection and interdisciplinary and ensuring the participation of all participants in the space for the purpose of further safe and development-oriented supply of drinking water. Under the program Erasmus+ we’ve hosted two groups of students from European countries in 2016 and 2017.

We actively participate in various events and trade fairs and present our views on sustainable development and our strategies to general public. Every year the company hosts an event on May 22, the World Water Day, dedicated to raising awareness of limited water resources.

Please specify which municipalities within the FUA are involved in these initiatives.

Municipality of Maribor.

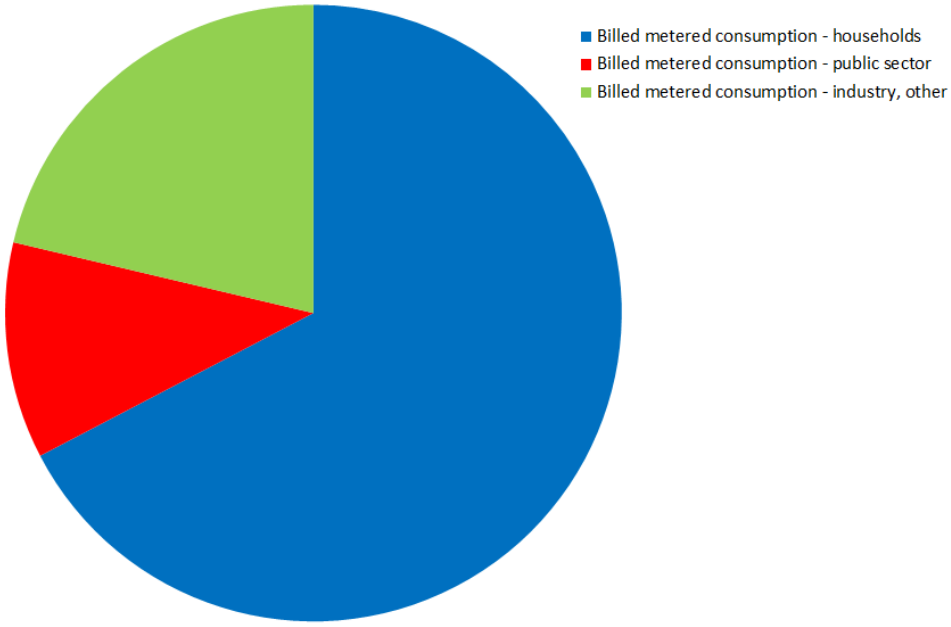
D3) WATER USE SHARES (CIVIL, INDUSTRY, AGRICOLTURE, …)

34) Percentages of water used by the civil, industry, and agriculture sectors [%]

Table

	[m3]	
Billed metered consumption - households	4.317.007	67%
Billed metered consumption - public sector	727.896	11%
Billed metered consumption - industry, other	1.366.075	21%

Chart



✓ Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

D4) WATER STRESS INDICATOR

35) Class of water stress of the FUA according to Falkenmark Indicator (water availability per capita per year within the FUA) [-]

Falkenmark Indicator: based on the measure of water availability per capita per year within the FUA.

Index (m3/capita/year)	Class
>1,700	No stress
1,000 - 1,700	Stress
500 - 1,000	Scarcity
< 500	Absolute scarcity

Cca 16.000 m3/capita/year – data for Slovenia for 2005	
X Measured at FUA level ☐ Estimated at FUA level	Estimate procedure and hypotheses:

D5) WATER MANAGEMENT COMPANIES

36) List of the private/public companies that manage the anthropic water cycle (extraction, sanitation, distribution, collection, depuration) [-]

Companies	Area served	Public/private	Function
Mariborski vodovod		Public	Extraction, sanitation, distribution
Nigrad		Public/private	Collection and transportation of wastewater
Aquasystems		Private	Purification/WWT

Is the list complete at FUA level?

Yes

E. CLIMATE CHANGE

E1) ISSUES ARISING DUE TO CLIMATE CHANGE

37) Description of the issues, if any, raised by climate change (e.g. floods, high temperature, water scarcity, …) [-]

The city of Maribor is very committed to the topic of climate change, since this is an important part of the city's vision. Climate change adaptation is for Maribor not just one topic, it is a topic that is a conglomerate of tackling different issues, such as mobility, waste management, air quality, energy efficiency and more, and this is what the city is currently doing and over the last years. Close collaboration of the city administration with the elected city council, citizens, public and private companies has been a step in the direction of climate change adaptation for years, regardless of the elected mayor or administration. Cross departmental collaboration is well established within the municipality, since different departments co-work on environmental projects, such as the project office, the office of public utilities, transport and space, as well as the Inter-municipal office for environmental protection and nature conservation. Political commitment of the city is on a high level, since the adoption of the Strategy for the transition to circular economy in the Municipality of Maribor in 2018, by the city council was a great step for the whole city. Before that, 5 city's public companies established the Wcycle Institute Maribor - Institute for Circular economy. The city does not have systematic vulnerability and risk assessment as stated in the table above, but has individual documents that regulate special topics. Beside that the city has adopted strategies for the future on this topics as Sustainable Urban Logistics plan of Maribor FUA, The Integrated Transport Strategy of the city of Maribor with a more detailed Action and Budget Plan by 2020, which is the central implementation part of the strategy, in march 2015 the city council of Maribor has adopted a document "Waste management status and strategy", Sustainable Energy Action Plan 2021 (SEAP) in 2018 also the Strategy for the transition to circular economy in the Municipality of Maribor and more that have great affects to climate change.

At the moment, the greatest challenge of the city is the air quality. The city has a decree on the Air Quality Plan in the Municipality of Maribor that defines measures in three main areas: energy, transport and the support area of information and awareness. Now the municipality is with the ministry in the phase of planning of the new decree and new measures that will be in force for the period 2020-2022. The measures relate to the behavior of many stakeholders in the city and, in addition to professional municipal services, involve public companies, regional chambers of commerce and industry, the Energy Agency for the Podravje region, as well as stakeholders at the national level (individual ministries, departments, directorates) and neighboring municipalities. The city does not face challenges with droughts, flooding or other, that are the consequence of climate change, but this still that does not mean that the city is neglecting these topics. When, approx. every 5 years in the summer, is a day that brings a lot of rainfall, it could happen that the sewer system is overloaded and water can, at that moment, overflow. To address this issue the city and the public company Nigrad are investing in the expansion of the sewerage system, but still this is not a prevalent problem for the city, since the Maribor region is the area of Dravsko polje, that is mainly on

gravel pebbles and the water drains into the groundwater.

As stated above the city does not yet have a Climate Change Strategy or Action plan, but one is in preparation within another document. That will be valid in 2021 and will include the topics of heat/temperature, drought, current and future climate risks as well as floods. In addition, linked to watercourses in the city, the city has no jurisdiction but the authorities at national level have it. The city has repeatedly engaged in unsuccessful endeavours with appeals to the responsible parties related to a sustainable regulation of the problem of river Drava and other watercourses. Other city plans and strategies are in line with each other; they are just in different fields and tackle specific topics. In 2021 the city will present the new version of Sustainable Energy Action Plan 2020, since now the revised version is from 2017, that will include many aspects of climate change, but this is not the only strategy or action plan as mentioned. Adaptation measures are integrated in every decision and document that the city adopts. Sustainable Urban Logistics plan and The Integrated Transport Strategy of the city of Maribor on CO_2 emissions, the Waste management status and strategy in their way, the action plan to promote electro mobility by 2020 and more. The city and the public companies try to secure EU funds for the realization of these projects and to raise awareness among the citizens and to activate them to participate. To participate in workshops, to apply for an urban garden, to co-create the ideas for the city's future, to participate in diverse campaigns on waste and clean up days, The city does not have a designated "climate change adaptation" budget, since all project have to have their own budget line, but the budget for environmentally sustainable projects in the year 2019 is aprox. 22M EUR and approx. 18M EUR in 2020 that includes diverse projects from different sectors in the municipality and municipality owned public companies.

F. RULES, LAWS AND GOOD PRACTICES

F1) PRICING SYSTEM FOR WATER

38) Pricing system for different water uses (e.g. Irrigation, Civil, Industrial) [€/m^3]

Water use and wastewater collection pricing is the same for all types of consumers. Network charge is different for users depending on the diameter of water meter (larger water meter – larger monthly price).

Total price of water: 2,66324 €/m3

	Unit	Network charge (Water Supply)	Network charge (Wastewater Collection)	Total
DN ≤ 20	€/month	3,73	4,2486	7,9786
20 < DN < 40	€/month	11,19	12,7568	23,9468
40 ≤ DN < 50	€/month	37,32	42,5408	79,8608
50 ≤ DN < 65	€/month	55,98	63,8057	119,7857
80 ≤ DN < 100	€/month	186,58	212,6928	399,2728
100 ≤ DN < 150	€/month	373,15	425,3747	798,5247
150 ≤ DN	€/month	746,31	850,7493	1597,0593

Is the pricing system described above valid for the entire FUA?

Yes.

F2) RESTRICTION IN WATER USE

39) Description of restrictions in water use, if any [-]

No restrictions.

Are the restrictions described above valid for the entire FUA?

Yes.

F3) LEGISLATION ABOUT DUAL WATER DISTRIBUTION SYSTEM

40) Description of the legislation about dual water distribution system, if any [-]

There is no local or national regulation.

Is the legislation described above valid for the entire FUA? Please specify

F4) LEGISLATION ABOUT WATER REUSE

41) Description of the legislation about water reuse, if any [-]

The legislative framework for water reuse is currently under development in Slovenia, supposedly. In Slovenian legislation, waste water reuse is currently mentioned in the Decree on the Discharge and Treatment of Municipal Waste Water (Official Gazette of the Republic of Slovenia, No. 98/2015) and the Decree on the Emission of Substances and Heat in the Discharge of Waste Water into Water and Public Sewerage (Official Gazette of the RS, No. 98/2015). Article 27 [10] stipulates that the public service provider must keep a record of the quantities of reused municipal wastewater, records of treatment plants from which the reused municipal wastewater is discharged and the purpose of its use. However, Article 13 [5] defines the reuse of water as a mandatory measure in the production of industrial waste water. The reuse of waste water is also regulated by certain other regulations related to specific activities, such as the farming of domestic animals (Decree on the emission of substances from the discharge of waste water from farms, Official Gazette RS, No. 41/04), the production of pharmaceuticals. of the Decree on the Emission of Substances and Heat from the Discharge of Waste Water from Installations for the Production of Pharmaceutical Products and Substances, Official Gazette of the Republic of Slovenia, No. 94/07) for cooling and steam and hot water production plants (Official Gazette RS, No. 41/04) and the like. The Environmental Protection Act (Official Gazette RS, No. 21/18) does not yet address the reuse of treated municipal waste water.

Is the legislation described above valid for the entire FUA? Please specify National level

F5) LEGISLATION ABOUT FIRST FLUSH RAINWATER COLLECTION (e.g. streets)

42) Description of the legislation about first rainwater collection, if any [-]
There is currently no regulation in this area, national or local.
Is the legislation described above valid for the entire FUA? Please specify

F6) RULES FOR GREEN SPACES IRRIGATION

43) Description of the rules about urban green spaces irrigation, if any [-]
There is no particular regulatory framework addressing this subject matter. The municipality of Maribor currently does not irrigate green urban surfaces since there is no funding ensured for it.
Are the rules described above valid for the entire FUA? Please specify

F7) DIFFUSION OF WATER SAVING GOOD PRACTICES

44) List of good practices in place for water saving [-]
✓ More than 100 groundwater monitoring stations are placed throughout the water supply system, with 42 of stations equipped with remote data transmission. ✓ In 2013, implementation of water loss reduction program started by building shafts with measuring points. There are more than 60 control points with flow and pressure measurements within Maribor and more than 25 District Meter Areas are formed currently. ✓ Quality improvement of installed pipelines that caused most losses reduced the number of leakages, interventions, costs, water losses and consumption of energy. Poor materials were replaced by quality PEHD and ductile materials. ✓ Reducing water losses has intensified since 2011, when intensive realization of EU funded projects (cohesion) took place. The number of leakages and interventions has dropped significantly in the area of project implementation.

Losses dropped from 32% to 30% in 2018. Infrastructure Leakage Index (ILI) is used as the main performance indicator – ILI index for 2018 is 3,7.

- ✓ Smaller investments in recent years have led to a slowdown in downward trend of water loss. To optimize the situation, it is essential to completely replace the critical sections of network.