WATER MANAGEMENT PLAN -
SIJ ACRONI doo

Version 03

Jesenice, July 2025

Address: **WATER MANAGEMENT PLAN - SIJ ACRONI doo**

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Date: **04.07.2025**

SIJ ACRONI doo

Chief Executive Officer:

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sij acroni

10 WATER MANAGEMENT

SIJ Acroni doo (Cesta Borisa Kidriÿa 44, 4270 Jesenice) is located along the main road Žirovnica – Jesenice – Kranjska Gora in the Upper Sava Valley. The valley is narrow and has a distinctly longitudinal character in the east-west or northwest-southeast direction and separates the Julian Alps from the Karavanke. This area is defined by a tectonic fault line along which the Sava River flows, and is also followed by the main traffic axis. It is characterized by a relatively low bottom, which ends with steeply rising slopes with a dominant karst surface. In the Upper part, where the Heavy Plate Processing Plant is located, the altitude is 562 m above sea level, while the lower part is located at an altitude of 549 m above sea level.

10.1 WATER CONTEXT

10.1.1 Area of influence of water-related society

The Upper Sava Valley area has a distinctly longitudinal character in the east-west or northwest-southeast direction and separates the Julian Alps from the Karavanke. This area is defined by a tectonic fault line, along which the Sava River flows, and which is also followed by the main transport axis. It is characterized by a relatively low bottom, ending with steeply ascending slopes with a dominant karst surface.

The area under consideration of the company SIJ Acroni doo is located in the Jesenice area in the Upper Sava Valley. The Sava River divides the wider area into two halves. The northern part with the investigated area includes Hrušica, part of Jesenice, Slovenski Javornik and Koroška Bela. The northern part also contains the majority of industry. The remaining active areas of industry are on Slovenski Javornik and Koroška Bela – the largest of which is SIJ Acroni. The southern part includes the Ljubljana – Karavanke border crossing motorway route and settlements: part of Jesenice – Podmežakla and Podkoÿna, Lipce and Bledjska Dobrava. The terrain rises steeply outside the urban environment; on the southern side of Mežakla and on the northern side of Karavanke.

The most important surface watercourse in the area is the Sava Dolinka. The Sava receives several tributaries from Karavanke side; in the area under consideration there are two – Javornik from below Javorniški Rovt and Bela, which originates on Potoška Planina and flows into the Sava near Koroška Bela. The Javornik stream has a regulated bed in its entire lower part, from its entry into the valley to its outflow into the Sava River (the area of the settlement of Slovenski Javornik).

A larger body of water is a river lake on the Sava Dolinka, which was created by damming the Moste hydroelectric power plant. The reservoir and the sealing curtain ensuring the sealing of the reservoir basin extend from the mouth of the Javornik stream into the Sava Dolinka to the dam of the power plant in Moste. Today, approximately 1,200 m of the left bank of the reservoir below the SIJ Acroni is a landfill for iron ore slag.

10.1.1.1 Groundwater flow direction, flow velocity and gradient

The direction of groundwater flow in the area under consideration is from north-northwest to south-southeast, towards the Sava River.

The approximate measured groundwater levels are 561, 548, 523.5 and 525 m asl downstream towards the Sava River angle at 520 m. The water flow velocity in the area of the SIJ Acroni facility is determined based on measurements of groundwater levels and its gradient i.

Upper area of the device, piezometer PA-1/19 and PA-2/19

Hydraulic gradient i = **0.0206.**

Sediment permeability coefficient at the location in question (average from pumping experiments): **k = 1.33*10-5 m/s.**

The real flow velocity is calculated according to the equation; where ÿR… is the real water velocity, ÿ… Darcy velocity and ne… effective porosity (for gravel deposits in the upper Sava Valley, we assume a value of 0.2):

$\upsilon_R = \upsilon/n_e = k*i/n_e = 1.33*10^{-5}$ m/s * 0.0206 / 0.2 = $1.37*10^{-6}$ m/s = **0.12 m/day**

Lower area of the device, piezometers PA-3/19 and PA-4/19

Hydraulic gradient i = **0.002.**

Sediment permeability coefficient at the location in question (average from pumping experiments): **k = 3.37*10-3 m/s.**

The real flow velocity is calculated according to the equation; where ÿR… is the real water velocity, ÿ… Darcy velocity and ne… effective porosity (for gravel deposits in the upper Sava Valley, we assume a value of 0.2):

$\upsilon_R = \upsilon/n_e = k*i/n_e = 3.37*10^{-3}$ m/s * 0.002 / 0.2 = $3.37*10^{-5}$ m/s = **2.91 m/day**

The calculation shows that these are two separate areas with different hydraulic laws. In the upper area, where the leaching plant (hazardous substances storage facility PDP) is located, the groundwater flow is much slower because the permeability coefficient is two decades lower than in the lower area, where the alloy/acid storage facilities are located.

The calculation of the real flow velocity can also be used to estimate the speed of movement of potential contaminants that would spread from the location in question into the groundwater. However, it should be emphasized that most contaminants move slower than water - the estimate of the speed of movement of the contaminant is a conservative estimate.

Groundwater recharge is represented by infiltration in the carbonate hinterland of Javornik and Bela, and precipitation infiltration directly in the area under consideration. The sand-gravel aquifer drains into the Sava River.

The main watercourse in the area under consideration is the Sava Dolinka River with the Moste HPP reservoir, which is located on the southern side of the area under consideration at a distance of approximately 50 m.

According to ARSO data, the average annual flow of the Sava Dolinka at the Jesenice measuring point in 2013 was 11.3 m3 /s, and for the period 1918 – 2013 it was 11.0 m3 /s.

Table 1: Data on the monthly average flow of the Sava Dolinka River at the Jesenice measuring point for 2013 in m3 / s (ARSO, Hydrological Data Archive - daily data)

Month/	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**July.**	**Aug.**	**Sept.**	**Oct.**	**Nov.**	**Dec.**
Flow	8.49	6.55	7.82	15.5	21.3	15.3	8.95	6.63	7.05	8.18	18.0	12.3

The Javornik stream flows between the two SIJ Acroni doo locations (plants). On the eastern side of the location, the Bela stream flows, which is almost completely covered in the area of the SIJ Acroni doo land (252 m), and part of the stream from the end of the cover to the outlet into the Sava Dolinka flows in an artificially arranged culvert (53 m). The catchment area of the Bela stream, which is of a torrential nature, measures F = 6.4 km2 and encompasses the southwestern slope of Belšÿica. The area is 12.4 km in circumference, and the length of the watercourse is 5.4 km.

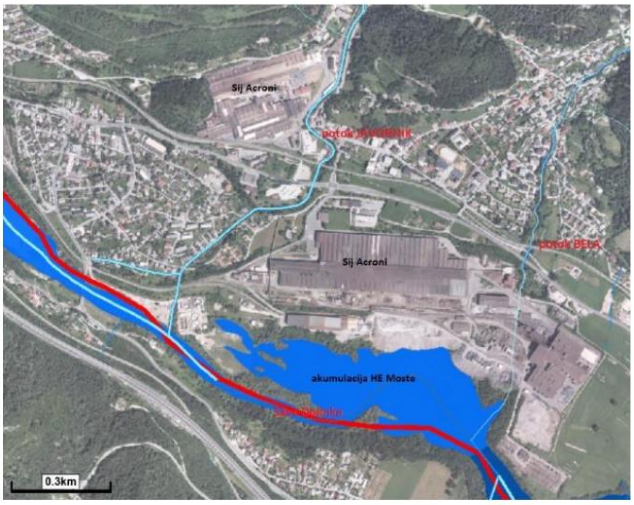


Figure 1: Surface waters in the Sij Acroni area. (source: Environmental Atlas, October 2016)

10.1.1.2 Groundwater and water protection areas

The area of SIJ Acroni doo is not within the water protection areas (VVO). The water protection area is upstream of the Bela stream, which does not include the site in question.

- The narrowest area is marked in orange (VVO I),
- Narrower areas are marked in yellow (VVO II),
- The wider area is marked in green (VVO III).

The captured springs Žvab and Vidic-Javornik are located 750 m and 500 m upstream of the Javornik stream and the location in question, therefore these captures are not affected by the activities carried out at the SIJ Acroni doo location.

The Zabukovje and Koniўev stan springs are located 1.5 km upstream of the Bela stream and the location in question, so these water bodies are not affected by the activities carried out at the SIJ Acroni doo location.

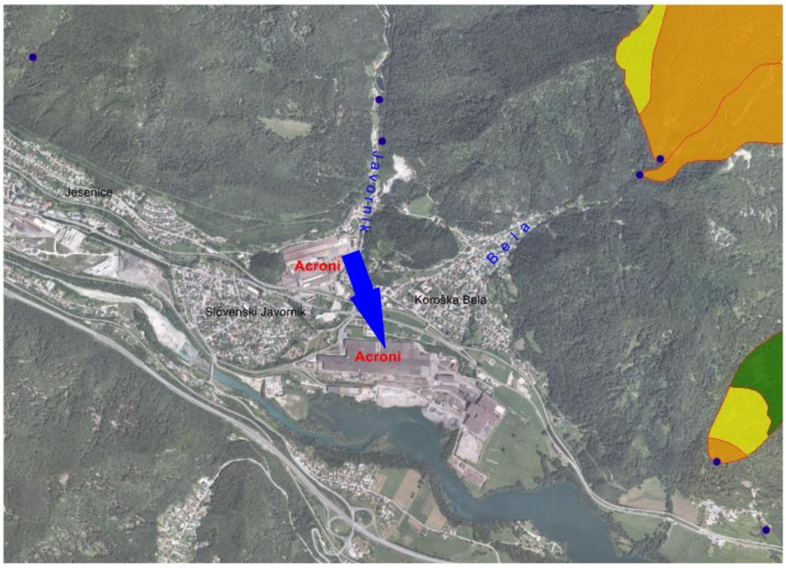


Figure 2: Water protection zones in the area under consideration and the direction of groundwater flow from the Acroni facility area (source: Atlas Environments; DOF and VVO)

The alluvial aquifer of the Sava Dolinka near Jesenice is composed of Quaternary gravel, sand and gravel. The Sava Dolinka River drains the aquifer. The groundwater level is mainly inclined from north-northwest to south-southeast. The sealed channel of the Moste HPP is not expected to have contact with the groundwater of the Quaternary aquifer (taken from http://www.he-moste.sel.si/). Precipitation is the main and most important source of groundwater recharge, but the aquifer is also partially recharged by the infiltration of watercourses from the Karavanke area. Gravel alluvium and slope gravel are a less abundant and moderately permeable intergranular aquifer. In the direction of groundwater flow, the ecosystem of the Sava Dolinka River is located, which is approximately 100 m south of the site under consideration. There are no groundwater springs.

10.1.1.3 Cooling water intake

SIJ Acroni doo uses water from reservoirs:

ÿ Catchment at the Javornik HPP, Gauss-Kruger coordinates Y = 430780, X = 144085, plot no. 259 ko 2177 Javorniški Rovt

ÿ Catchment of the Javornik stream in Trebež, Gauss-Kruger coordinates Y = 430742, X = 143582, parcel No. 1 /4 ko 2177 Javorniški Rovt

ÿ Catchment on the Sava Dolinka watercourse, Gauss-Kruger coordinates Y = 427783, X = 143719, parcel No. 909 ko 2175 Jesenice

The reservoir below the Javornik HPP is the primary source of supply, and water from the reservoir on the Sava is used only in the event that there is insufficient water in the reservoir below the Javornik HPP. Combined use of water from both reservoirs is also possible. simultaneously. According to the issued Water Permit, it is permitted to withdraw water from the Javornik HPP reservoir in a maximum amount of 550 l/s and from the Sava River reservoir in a maximum amount of 550 l/s. However, the total amount of water withdrawn from both reservoirs simultaneously may not exceed 550 l/s.

For the plants on Javornik, the primary source of water supply is the Javornik stream reservoir, while water from the Javornik HPP reservoir is used only when there is not enough water in the stream or during prolonged rains when the water is very dirty. According to the issued Water Permit, it is allowed to withdraw water from the Javornik stream in a maximum amount of 42 l/s.

In addition, drinking water is used for technological needs and for the supply of drinking water to employees through a public water supply system managed by the public utility company Jeko doo.

10.1.1.4 Draining cooling and process water

SIJ Acroni doo produces both cooling waste water and technological waste water, which are discharged directly into the Sava River through outlets and indirectly through the Javornik stream.

The pictures below show all the outlets.

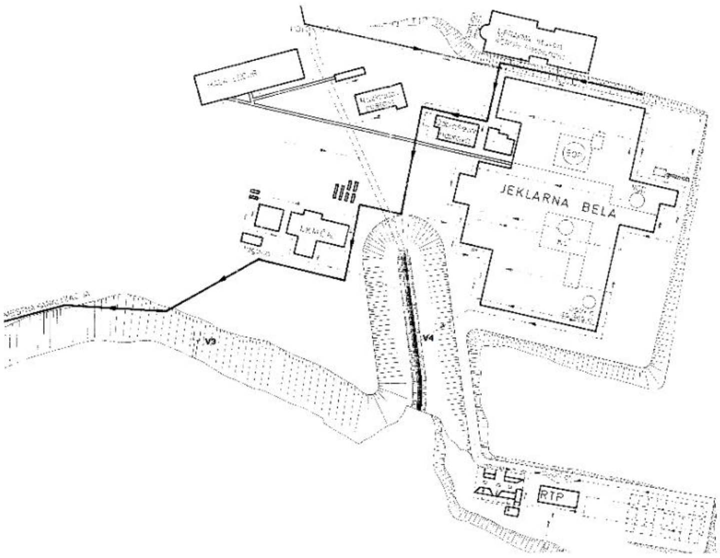


Figure 3: Outlets from the Steel Plant

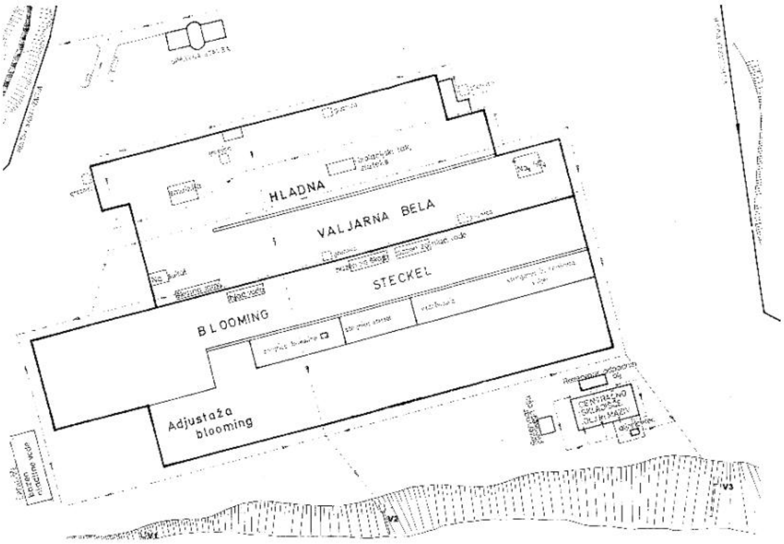


Figure 4: Outlets from Hot and Cold rolling mills

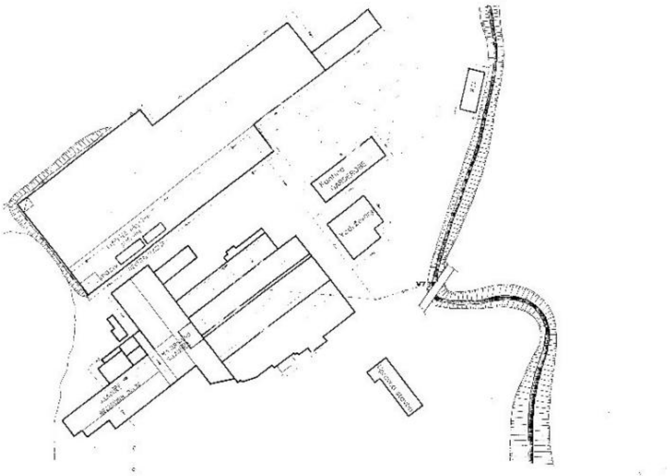


Figure 5: Output from Sheet Metal Processing

10.1.3 Collaboration with stakeholders

10.1.3.1 Seasonal and temporal variability in the quantity and quality of surface and groundwater water

The report Overview of Hydrological Conditions of Surface Waters in Slovenia for 2021 describes the hydrological drought indicator. The hydrological drought indicator for surface waters shows drought conditions based on river flows at selected water gauging stations. For each station, a drought flow index (SDI) is calculated based on annual, quarterly (January–March, April–June, July–September, October–December) and semi-annual (April–September) mean flow values.

The year 2021 was the fifth year in a series of typically dry years, based on the flow drought index. The growing season half of the year, from April to September, was also typically dry. The series of dry conditions during the growing season has continued since 2015, but the intensity of the drought is not great. All years were typical droughts, except for 2020, when the moderate drought limit was slightly exceeded. Much more intense hydrological droughts during the growing season were recorded in 1993, 2000, 2003 and 2011.

Looking even more closely, by quarter, we find that the first and second quarters of 2021 were above-average wet, while the third and fourth quarters were dry. The driest, moderately dry, was the third quarter, from July to September. All three months were significantly below-average wet, and the hydrologically driest was September, when only a good third of the normal amount of water flowed through Slovenian rivers. October was similarly dry, and then by the end of the year the drought conditions eased somewhat, so the last quarter of the year was normally dry.

According to the long-term trend, the frequency and intensity of droughts have been increasing in recent decades, especially in the second and third trimesters, while in the last decade there have been an increasing number of wet first trimesters of the year.

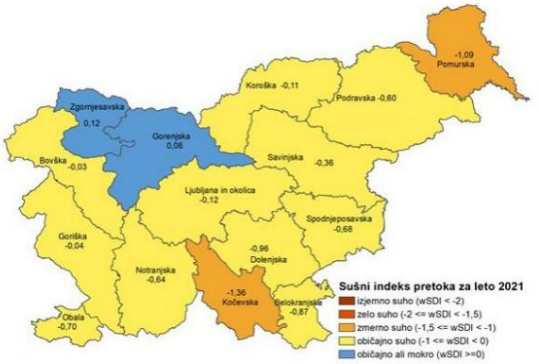


Figure 6: Drought flow index for 2021 by region

(source: ARSO)

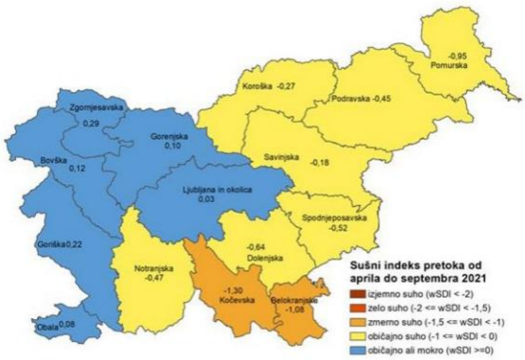


Figure 7: Semi-annual drought flow index from April to September 2021 by region (source: ARSO)

According to water risk data, the SIJ Acroni doo area is in the low to medium risk zone, as shown in the image below according to the Aqueduct Water Risk Atlas.

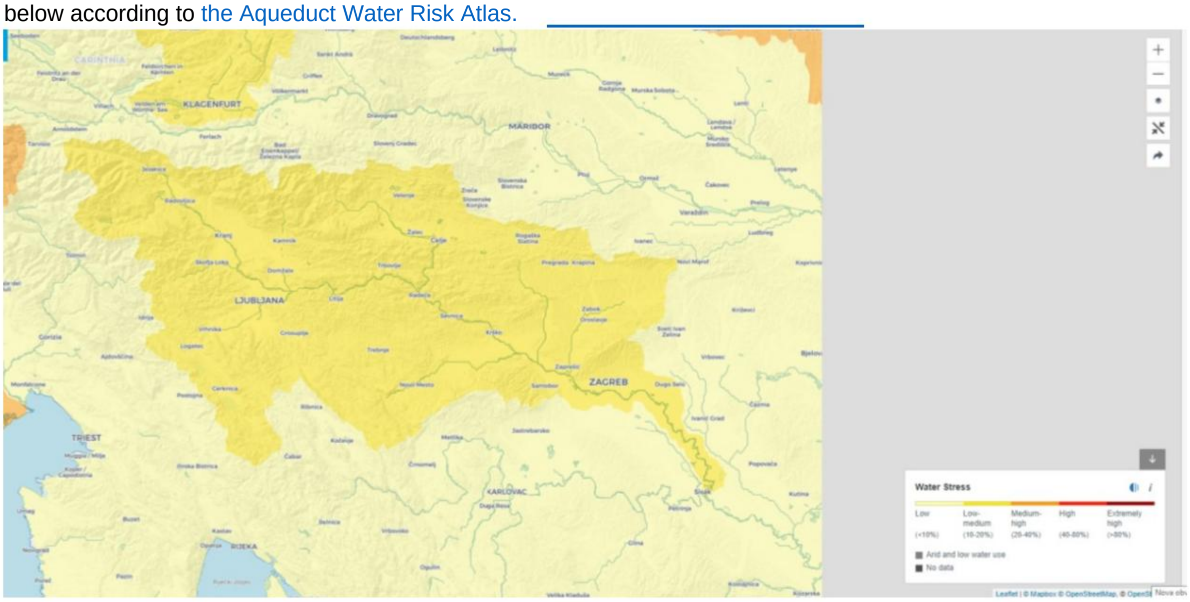


Figure 8: Risk area (https:// www.wri.org/ applications/ aqueduct/ water-risk-atlas

According to Risk Filter Suite data , the SIJ Acroni doo area is in a low risk area, as shown in the figure below.

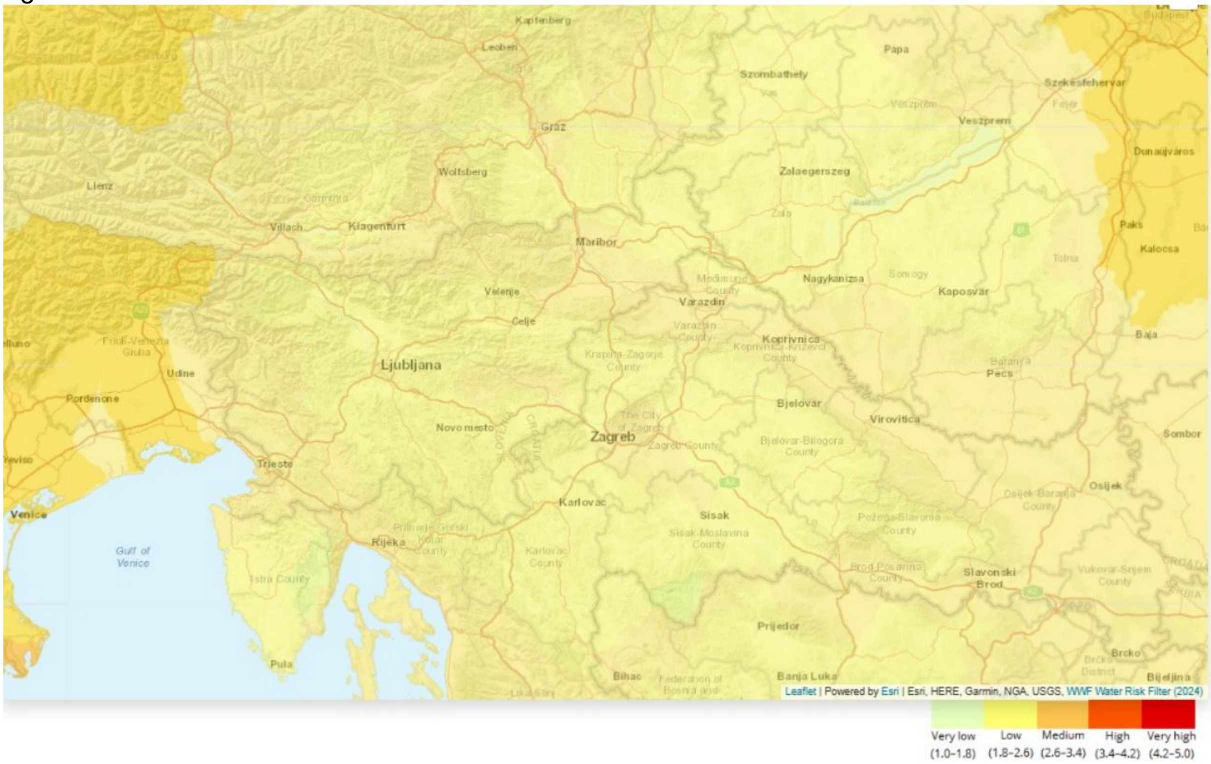


Figure 9: Risk area (https:// riskfilter.org/ water/ explore/ countryprofile)

10.1.3.2 Climate change projections

The Environmental Report shows that the temperature in Slovenia is rising faster than the global average. From the beginning of systematic measurements in 1961 to 2020, it has already increased by 2.4 °C. The temperature increased the most in summer, by 3.3 °C, slightly less in winter (2.7 °C) and spring (2.4 °C), and the least in autumn (1.5 °C).

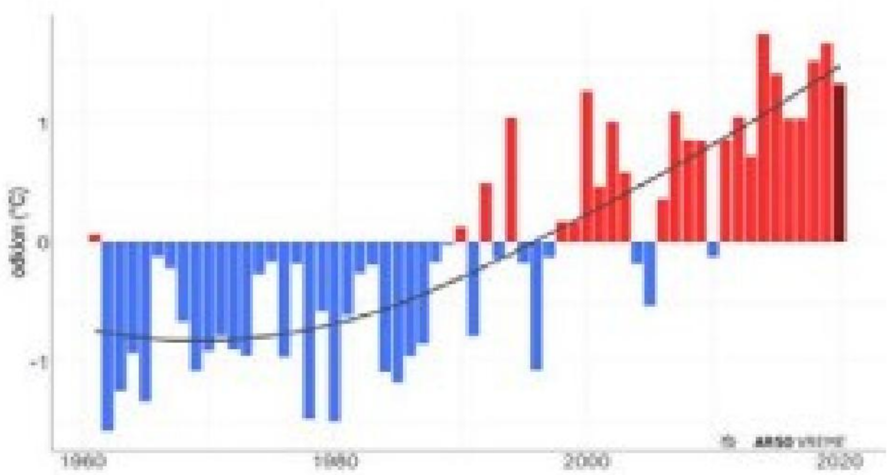


Figure 10: Deviation of the average annual temperature from the 1981ÿ2010 average (blue and red columns) and the multi-year smoothed average (black curve) (Source: Our Environment, ARSO monthly bulletin, 2020)

In line with the increase in temperature, the heat load increases in the warm part of the year. One of the simpler indicators is the number of hot days. A hot day is a day when the temperature exceeds 30 °C. With the increase in average temperatures, the number of such days has increased significantly in recent decades in all regions, with the exception of the highest parts of the Alpine world. In contrast to heat stress, the load due to cold is decreasing. The number of frost days, when the air temperature does not rise above freezing even during the day, is steadily decreasing, this decrease is most noticeable in the highlands (Kredarica), where from the average annual number of 165 frost days in the 1960s, this number has decreased to below 130 in recent years. We observe a similar trend with the absolute maximum temperature, the absolute minimum temperature is also steadily increasing.

Global warming also affects the precipitation regime. Until the beginning of the 21st century, the average annual precipitation in Slovenia was steadily decreasing. In the last two decades, this trend has stopped and started to reverse upwards. The annual precipitation has been increasing in the last decade mainly due to the increase in winter precipitation. In autumn and spring, no major changes in the average seasonal amount have been observed in recent decades. The average summer precipitation is steadily decreasing, but the rate of decrease is significantly lower than the rate of increase in winter precipitation. Although it is expected that precipitation intensity will increase with global warming, measurements do not yet show this due to the very high natural variability of extreme precipitation events. Namely, the change due to the climate signal must be greater than the natural variability (interannual fluctuations in precipitation) in order to be statistically confirmed.

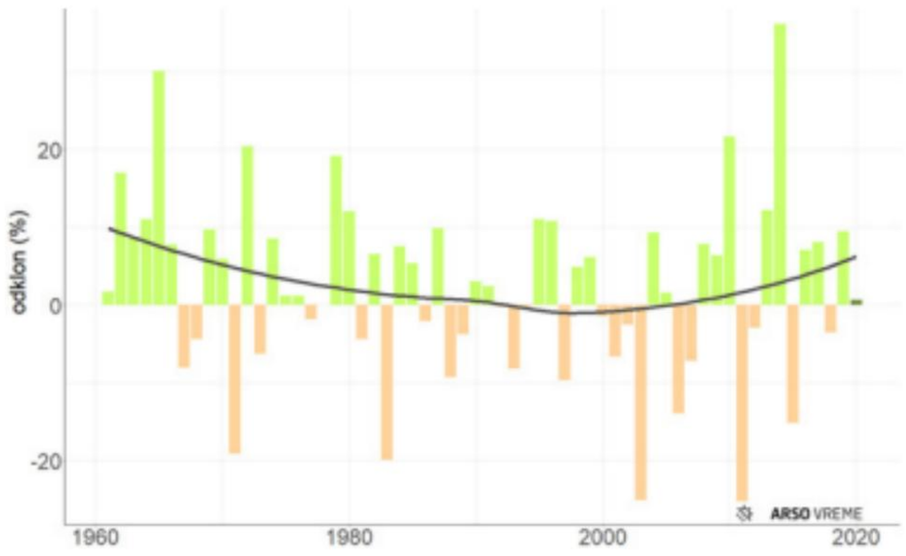


Figure 11: Deviation of the average seasonal precipitation amount from the 1981ÿ2010 average (green and brown columns) and the multi-year smoothed average (black curve) Source: ARSO, Environmental indicators in Slovenia. Taken from indicator PP11 – Temperature deficit and excess, 2021

As temperatures rise, the hydrological cycle intensifies, increasing the risk of both hydrological extremes, droughts and floods. Changes in the precipitation regime, shrinking snow cover and increasing evaporation are reflected in changes in Slovenia's annual river balance. In the period 1961–2019, a trend of decreasing total river runoff was detected. This was most evident until the turn of the century, but in the last two decades the decrease stopped. The trend of annual river runoff also indirectly indicates an increasing or decreasing probability of low water (droughts) and flood risk.

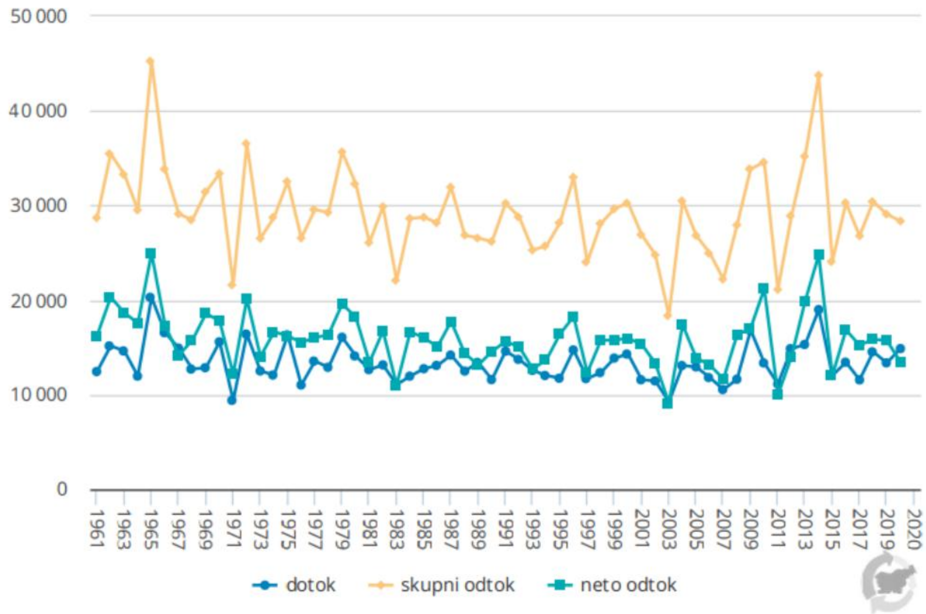


Figure 12: Annual river balance of Slovenia (net runoff as the difference between total runoff and inflow) Source: ARSO, Environmental indicators in Slovenia. Taken from indicator MR02 – Sea level, 2021

The main source of drinking water in Slovenia is groundwater, which provides the majority of the required quantities. Groundwater sources show great spatial and temporal variability. Recently, there has been a tendency towards increasingly frequent and pronounced extremes, both positive and negative, which indicates the high quantitative sensitivity of groundwater in shallow aquifers in Slovenia.

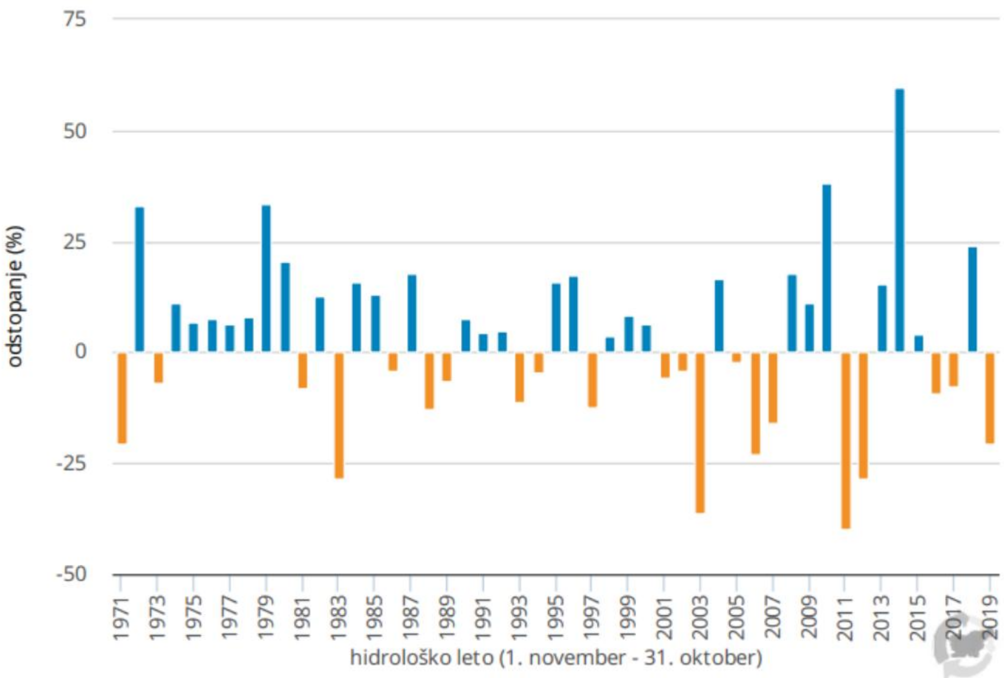


Figure 13: Deviation of quantitative groundwater recharge in shallow aquifers in Slovenia by individual hydrological years from the average of the hydrological water balance period 1981–2010 Source: ARSO, Environmental Indicators in Slovenia. Taken from indicator VD15 – Quantitative treatment of groundwater, 2021

10.1.3.3 Expected population growth

The population of Slovenia is increasing. In 2020, it amounted to 2.096 million. Natural increase has decreased significantly (-5.2 persons per 1000 inhabitants), on the other hand, the migration increase of 6.2 persons per 1000 inhabitants ranks Slovenia in 4th place among the EU-27 member states. Population projections for the future show that by 2100 the population of Slovenia will decrease significantly (to 1,888,364).

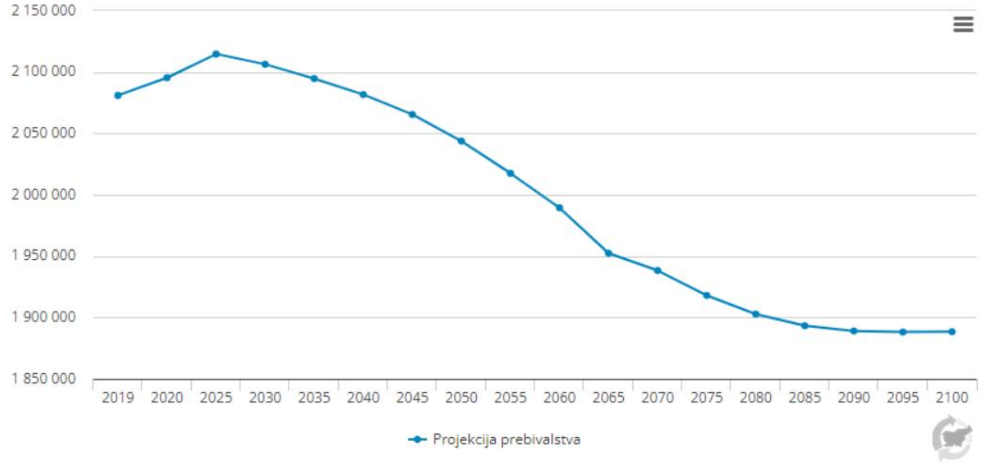


Figure 14: Projection of the population in Slovenia, until 2100 Sources: Eurostat, 2021 (25. 08. 2021)

10.2 MANAGED BALANCE SHEET AND ISSUES

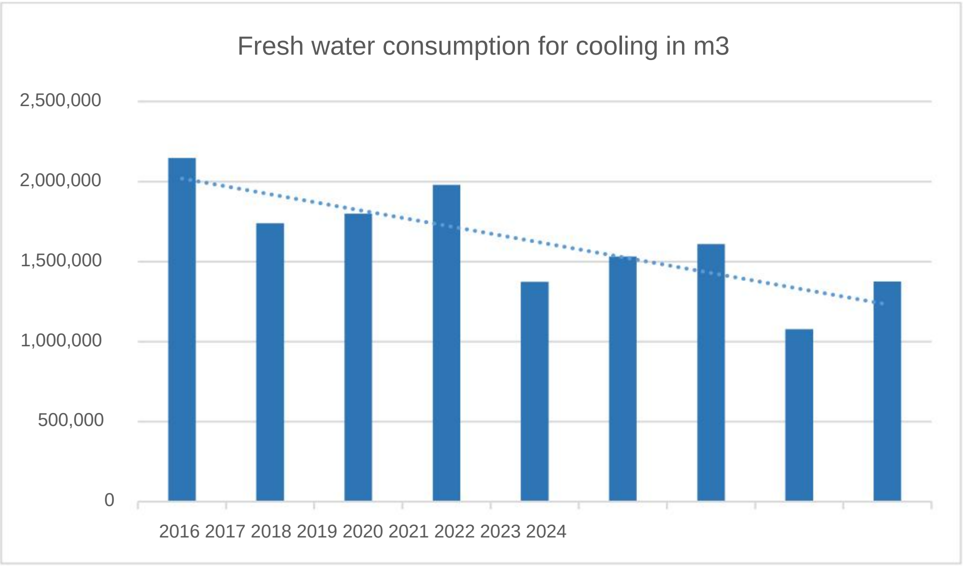
This section is described in the Report on Operational Monitoring of Wastewater, which is prepared annually and sent to ARSO by the end of March. Therefore, it is not addressed in the Water Management Plan.

10.3 HARMFUL IMPACT RELATED TO WATER

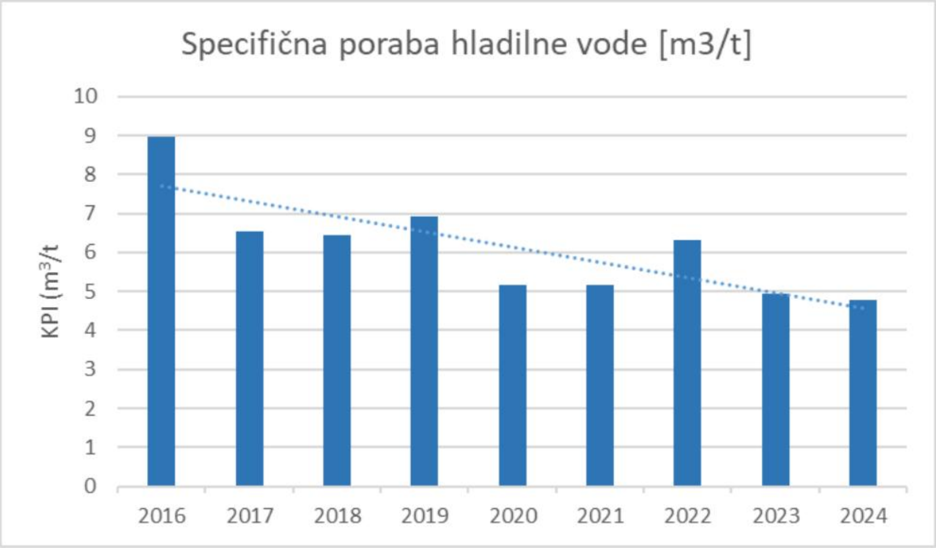
10.3.1 Identification and assessment of current and potential future environmental and social harmful effects

10.3.1.1 Quantity of water consumption and quality of water discharges

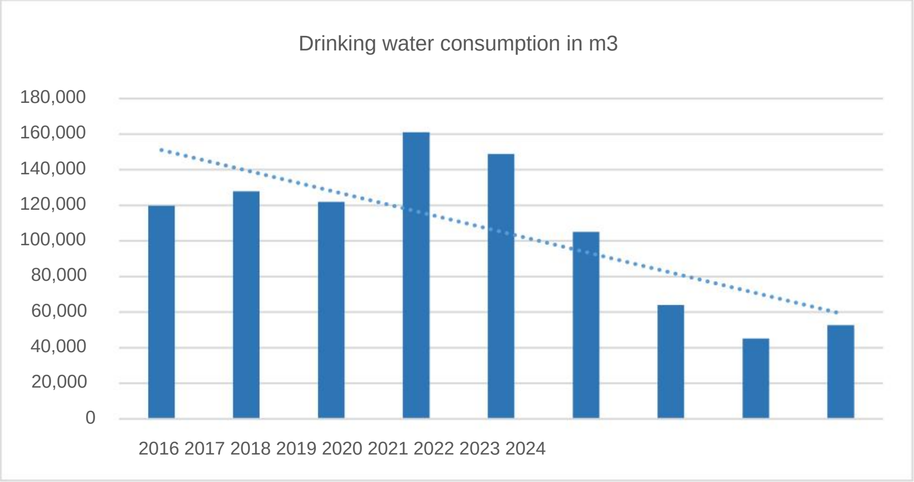
Cooling water from reservoirs is used for the technological process of cooling the devices. The graph below shows water consumption by year.



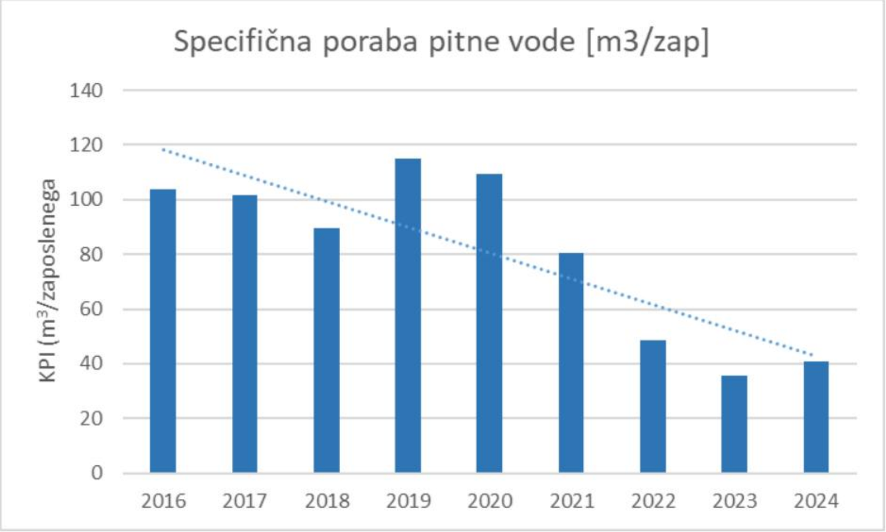
The graph below shows the specific cooling water consumption per ton of product.



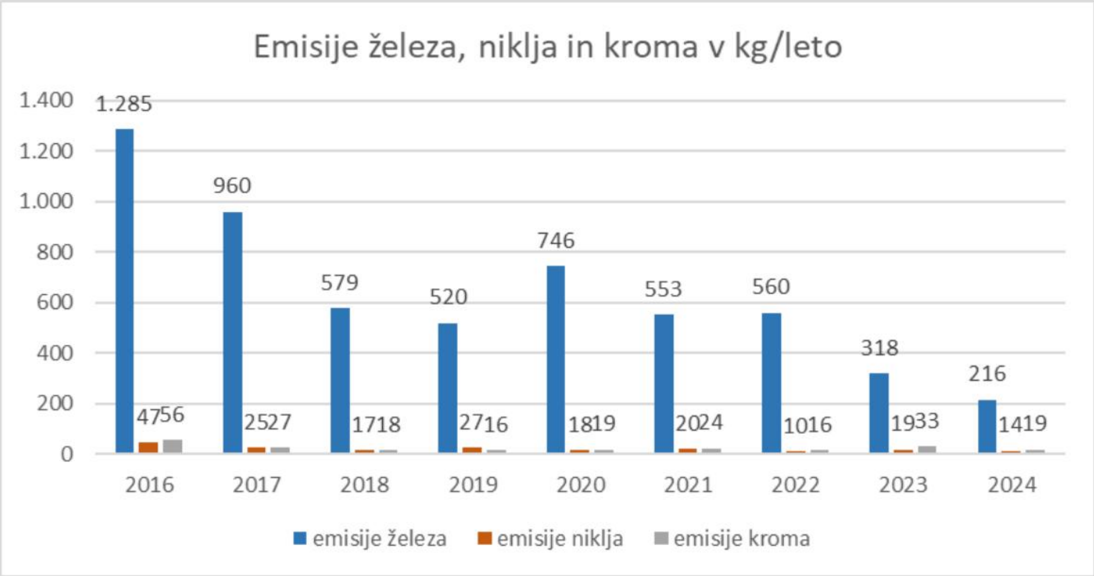
Some of the more demanding technological units have been cooled with drinking water from the very beginning, but in recent years, wherever possible, we have been systematically replacing this with appropriately prepared technological water, which is reflected in our drinking water consumption indicator.



The graph below shows the specific consumption of drinking water per employee.



The quality of discharges is monitored through operational monitoring. The graph below shows the quantities of parameters iron, nickel and chromium discharged into the Sava River in each year.



10.3.1.2 Consideration of extreme events such as floods or drought

According to the flood risk scenario, SIJ Acroni doo is classified as having a very low flood risk.

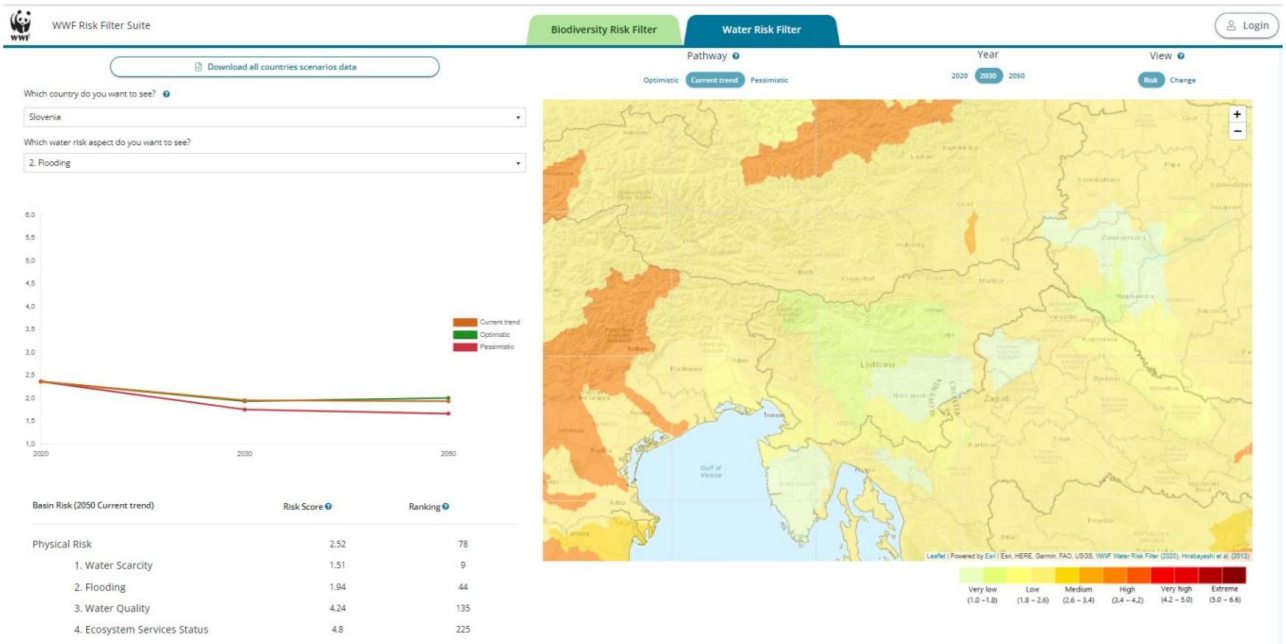


Figure 15: Flood scenario, source: WWF Water Risk Filter

The Drought Risk Indicator measures where droughts are likely to occur, the exposure of people and assets, and the vulnerability of people and assets to adverse impacts. The figure below shows a moderate risk of drought occurrence.

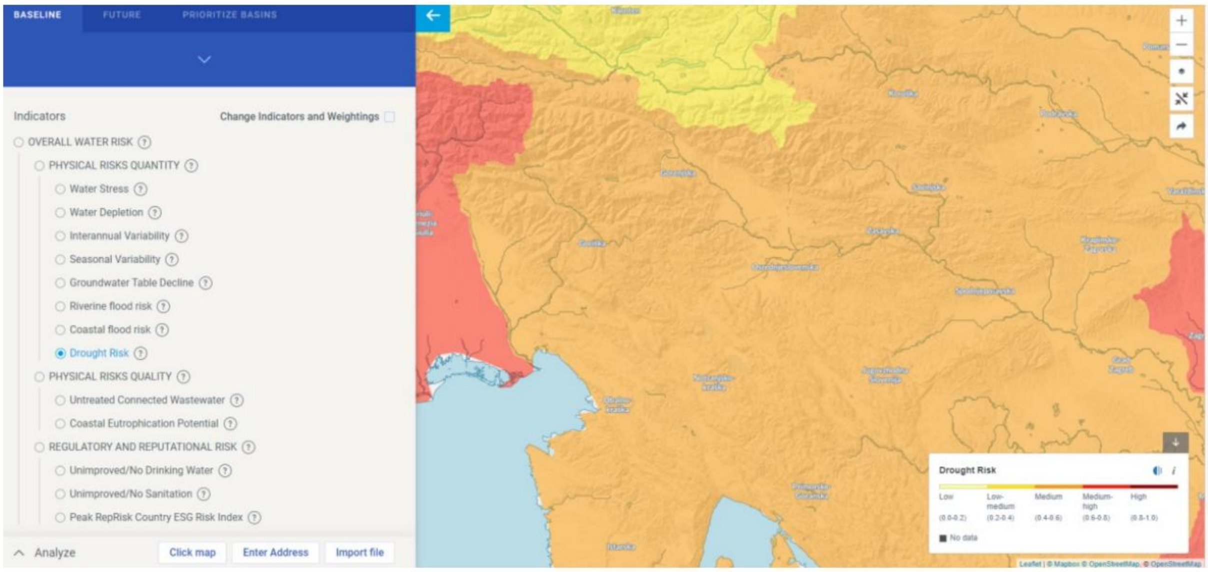


Figure 16: Drought risk, source: Aqueduct Water Risk Atlas

The measures are in the process of being determined and approved by the responsible persons.

10.3.1.3 Consideration of stakeholders

SIJ Acroni doo cooperates with Energetika-ŽJ doo regarding the collection of cooling water and with the municipal company Jeko doo for the use of drinking water.

The highest level of preparedness in the event of low water levels at the Javornik HPP or Javornik stream occurs in the spring and autumn months. In the event of a lack of upstream sources, cooling water from the Sava River catchment is used via an automatic regulation system.

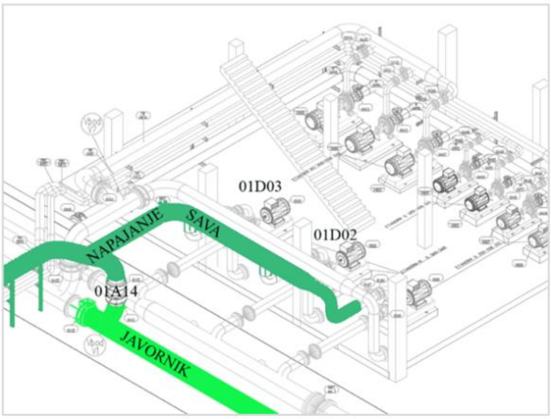


Figure 17: Automated switching Javornik - Sava

Figure 18: Javornik Reservoir Figure 19: Sava Reservoir

Energetika-ŽJ doo and the Public Utility Company JEKO, SIJ Acroni doo regularly provide information about water levels in reservoirs and report on potential problems with water consumption in the wider area of the municipality of Jesenice. For the efficient use of cooling water, SIJ Acroni doo has established an appropriate management service that takes appropriate action in cases of changed water levels. This is also ensured by partially automated systems with regulation, which regulate all 6 closed cooling circuits. For appropriate adjustment

Some of the internal consumption and water levels are also interconnected. In order to carefully consume cooling water in the event of low water levels, SIJ Acroni doo tries to adapt and reduce consumption as much as possible by prioritizing shutdowns of generators according to the production plan and reducing production intensity.

10.4 WATER MANAGEMENT

10.4.1 Integrating water considerations into business planning

The company SIJ Acroni doo includes water consumption through its KPIs in each annual Business Plan. The KPI being pursued is:

ÿ the amount of cooling water collected and the associated costs
ÿ amount of drinking water used

10.4.1.1 Monitoring of cooling and drinking water:

Three cooling water consumption meters are also installed at the entrance to the area and at individual branches - water meters. The equipment is properly implemented into the energy information system to facilitate management and monitoring of consumption and possible leaks. We have an effective alarm system in place if hourly/daily/monthly consumption is exceeded.

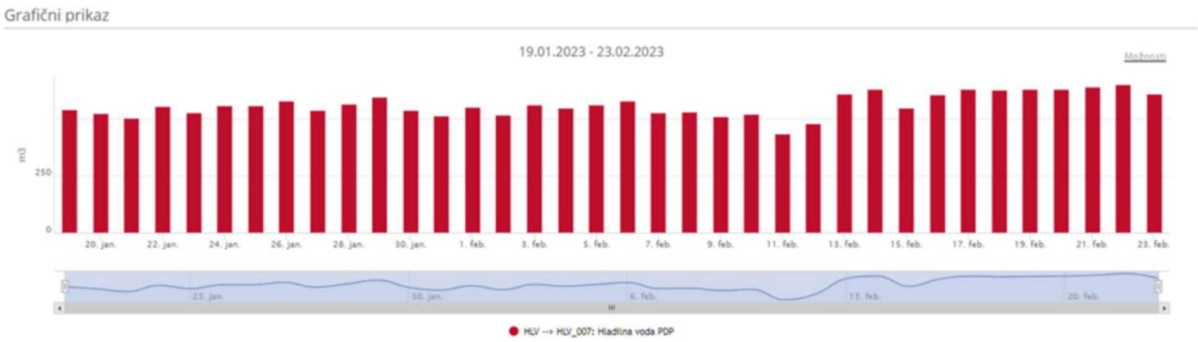


Figure 20: Monitoring cooling water consumption on a daily basis

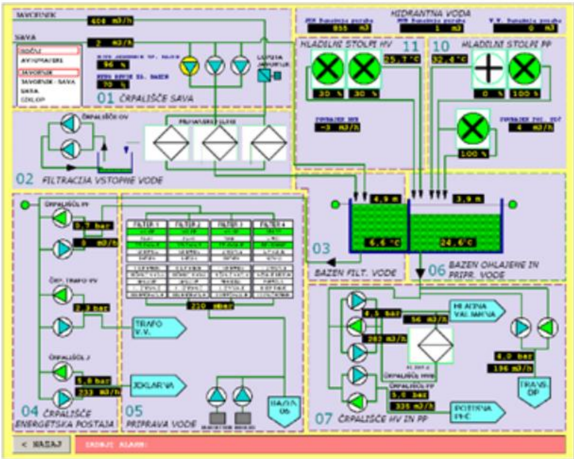


Figure 21: Example of a ZPHV (Closed Cooling Water System) control system

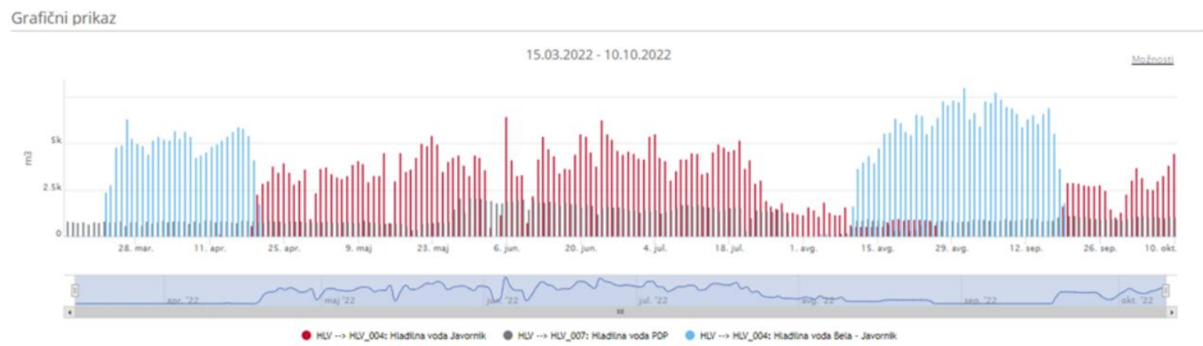


Figure 22: Measurement of cooling water consumption and display of switchover to the Sava catchment

The drinking water network is spread throughout the entire company area. Consumption meters - water meters - are installed at the entrance to the area and at individual branches. Strategically important measuring equipment is appropriately implemented in the energy information system to facilitate management and monitoring of consumption and possible leaks. We have an effective alarm system in place if hourly/daily/monthly consumption is exceeded.

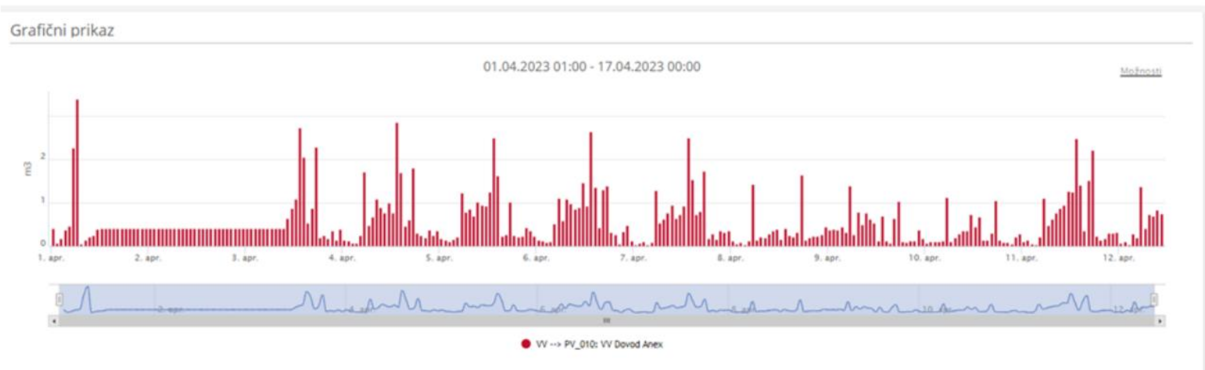


Figure 23: Monitoring drinking water consumption at the hourly level

In addition, the quality of cooling water and water used for technological purposes is monitored through technological parameters.

In the issued environmental permit, SIJ Acroni doo has limited quantities of water at individual sites.
emissions, which we monitor regularly.

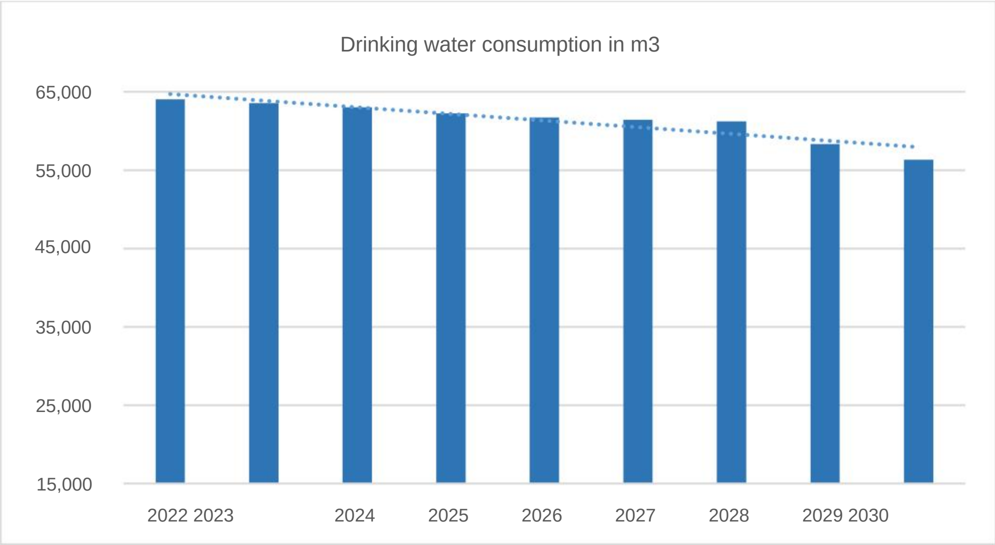
10.4.2 The company involves stakeholders in its area of influence in the development and maintenance of a water management plan

An integral part of the preparation of investment projects is a review of optimal water consumption. Where possible, closed water use circuits are taken into account, so that water is returned to the basic technological process. If this cannot be fully used, it is added to another technological process.

Water intake and consumption are monitored daily via an information system. Internal regulation of cooling and process water circuits prevents uncontrolled releases.

The quality of wastewater discharged into the environment through outfalls is monitored through operational monitoring.

The projected value of drinking water consumption in the period from 2022 to 2030 is shown in the graph below.

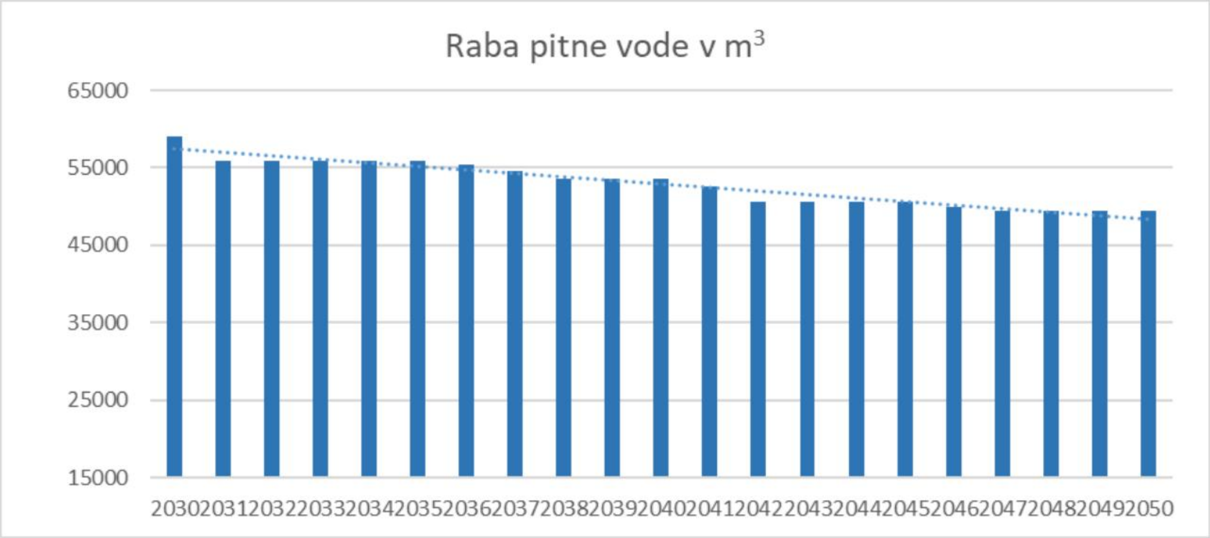


Planned activities to reduce drinking water consumption:

ÿ Period between 2023 and 2028; Improving the efficiency of drinking water consumption; detection and elimination of leaks, perfection of monitoring for monitoring consumption and alarming…

ÿ After 2029, we expect investments in more efficient use of drinking water; partial purification systems, Pilot launch of the use of rainwater for sanitary purposes.

The graph below shows the projected value of drinking water consumption in the period from 2030 to 2050.

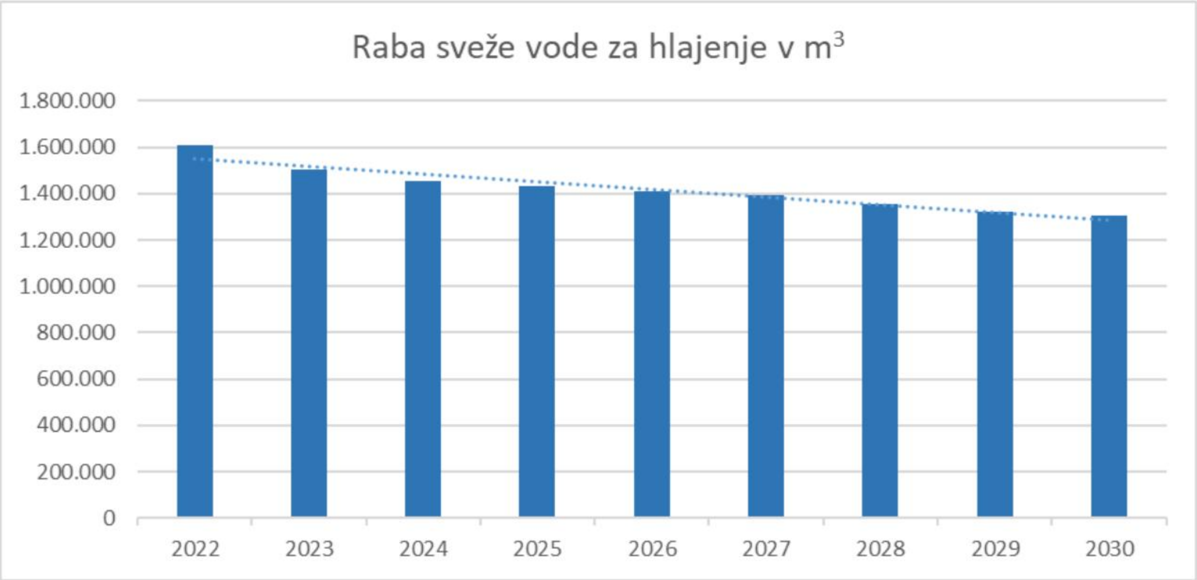


Planned activities to reduce drinking water consumption:

ÿ Improving the efficiency of drinking water consumption; new technologies for purifying and using rainwater for sanitary purposes, improving leak detection and more efficient leak repair.

ÿ After 2040, we expect a complete transition to the use of new technologies for wastewater treatment. municipal water, such as recycling and use of rainwater.

The projected value of cooling water consumption in the period from 2022 to 2030 is shown in the graph below.



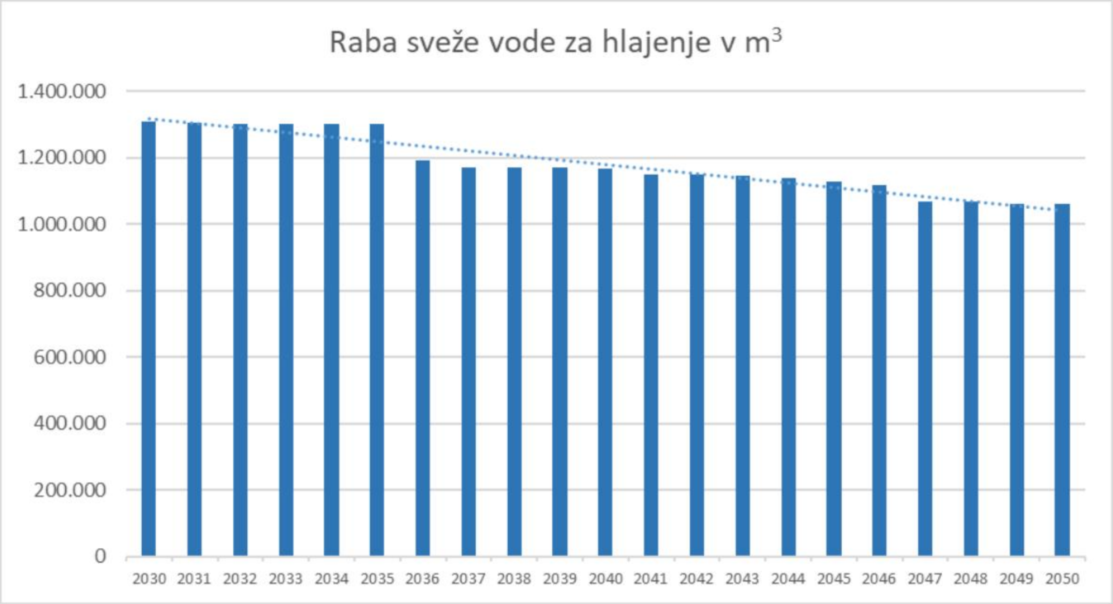
Planned activities to reduce cooling water consumption:

ÿ In 2024 and beyond, improving the operation of regulatory systems and eliminating leaks more effectively.

ÿ In 2026, regulation of the operation and improved efficiency of cooling towers with minimal evaporation of the medium.

ÿ In 2028, the use of a rainwater storage tank for technological purposes will begin.

The graph below shows the projected value of cooling water consumption in the period from 2030 to 2050.



Planned activities to reduce cooling water consumption:

ÿ After 2036, the start of the use of a fully automated replenishment system based on production needs.

10.4.3 There are documented procedures or action plans for implementing the risk management plan. water.

The management system monitors both risks and opportunities for the entire business and operation of SIJ Acroni doo. We see the capture and use of rainwater as an opportunity for water management.

10.4.4 The company monitors and documents its performance against the water management plan. Where there is no progress, the company reviews and adjusts the plan

The water management plan is presented once a year at the management review of the environmental management system and the energy management system. Based on the KPIs, appropriate measures are taken and the water management plan is adjusted.

10.5 RESOURCES

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7. Aqueduct Water Risk Atlas, https://www.wri.org/applications/aqueduct/water-risk-atlas
8. ARSO: Report on the Environment in the Republic of Slovenia 2022: Climate Change
9. ARSO: Environmental indicators in Slovenia
10. WWF Water Risk Filter: https://riskfilter.org/water/home