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water bodies (TRANSWAT) LLI-533**

WATER LEVEL DATA SERIES FOR EVALUATION OF WATER RUNOFF

2022



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Abbreviations

HPP	Hydropower Plants
LAS	European Vertical Reference System (EVRS) in Latvia
LAS07	European Vertical Reference System (EVRS) in Lithuania
LEGMC	Latvian Environment, Geology and Meteorology Centre
LHMT	Lithuanian Hydrometeorological Service
LL	Levellogger
LT	Lithuania
LV	Latvia

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I. INTRODUCTION

Water level measurements were carried out in the frame of the “Joint management of Latvian – Lithuanian trans-boundary river and lake water bodies” project (TRANSWAT) LLI-533 financed by the Interreg V-A Latvia–Lithuania Programme 2014-2020.

River habitat suitability modelling and ecological flow (E-flow) evaluation procedure includes calculation of daily water flow in reference and altered conditions. Taking into account the lack of data for Varduva, Ciecere and Losis rivers, special water level data loggers were installed upstream and downstream of HPPs on these rivers.

Varduva, Ciecere and Losis rivers water level fluctuation in 2021-2022 (differs for LT and LV due to date of data logger installation) is described in this Report.

II. WATER LEVEL REGIME ON THE PROJECT RIVERS

Water level is one of the main parameters that characterise the hydrological regime of rivers, lakes and others water bodies. Natural water level regime mostly depends on the regional climate (air temperature, precipitation and evaporation) and on the ground water' rate in the feeding of water body. Rivers regulated by Hydropower Plants (HPP) has modified water level and water discharge regime, and it depends on the HPP operation only. In case of the cascade of HPP in the river the water level and flow regime also depends on the operation of HPP upstream.

2.1. Varduva River water level

The hydrological observations in Varduva River were done only for the period of 1956-1973, accordingly, a lot of changes happened since then. Anthropogenic activity in the Varduva River basin made a significant influence on the natural regime of the river. Even five hydropower plants (HPPs) were constructed and began to regulate the natural river runoff. The mentioned HPPs form a unique cascade structure where each of its units redistributes river runoff individually. Such a complex regulation causes environmental issues related to runoff sharing with the downstream HPPs. For this reason, the high fluctuations in the water level are inevitable especially in the cascade of 5 HPPs. The lack of available hydrological data on the operation of HPPs cascade induced to collect own water level data. Therefore, it was decided to install water leveloggers (LL) on the significant tributaries of natural inflow and below of each HPP. The collected data will let us find out the main hydrological patterns of the natural river regime and its distortion under the influence of the HPPs cascade during the calendar year. In total, seven leveloggers were installed in Varduva River basin (Fig. 2.1.1). The first levelogger (LL1) represented the natural inflow to the Varduva HPPs cascade because of its location directly downstream the confluence of the Varduva and Sruoja rivers. Next five leveloggers (LL2-LL6) were installed below the each of target HPPs. Additional levelogger (LL7) was used to measure the water level fluctuations of Kviste River which is one of the biggest natural inflow to the last section between Ukrinai and Juodeikiai HPPs.

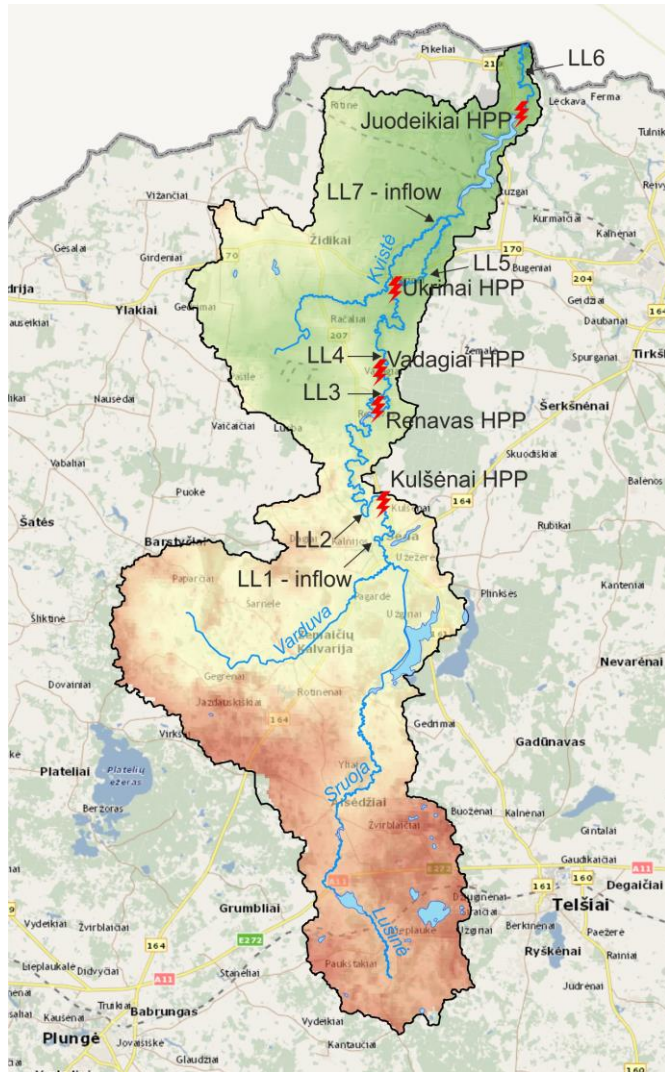


Figure 2.1.1. Scheme of the water data loggers' installation in Varduva River

The water level loggers were set to measure every 15 minutes in order to evaluate the potential hydropeaking below the HPP. Additionally, two barologgers were used for the compensation of fluctuations of atmospheric pressure in the water level data series. The planned observations period were one year period, therefore during the calendar 2021 year all water level data was recorded and analysed for the seven different sections.

Based on the water level dataset of the 2021, the water level fluctuations showed a natural hydrological regime which is inherent for the rivers from Western Lithuania (Fig. 2.1.2). The hydrograph describes the natural inflow to Varduva HPPs cascade. The water levels ranged between 80 and 150 cm up to middle of March 2021. It was clearly expressed peaks caused by sudden rainfall or winter thaw. In the rest part of the year the water level and its

amplitude slightly decreased while the minimum level was fixed at the end of July and the beginning of August. However, the water level didn't decrease less than 68 cm head above the levellogger. During the autumn season, the water level gained flash peaks which indicated decisive factor of rainfall influence on Varduva River hydrological regime.

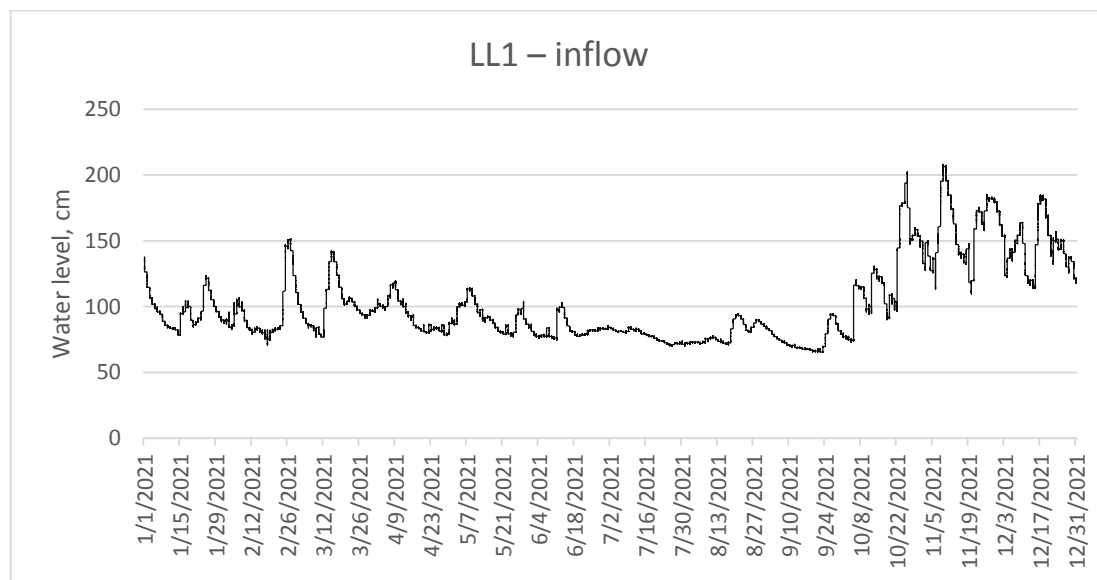


Fig. 2.1.2. Water level fluctuations in Varduva River at Seda (inflow to hydropower plants cascade)

Below the first Kulšėnai HPP, the installed levellogger (LL2) showed the first distortions in water level comparing with the natural regime (Fig. 2.1.3). The hydropeaking was fixed almost for half a year till the middle of June. On average the water level fluctuated in the range of 30 cm. Only in the second part of June, it seems the HPP stop its operation and water level gained near natural behaviour. Also, the compensating effect of HPP reservoir can be seen in the second part of August comparing with the LL1. At the beginning of October, the hydropeaking operating mode was renewed since the water level fluctuations become more sharper comparing with the natural inflow.

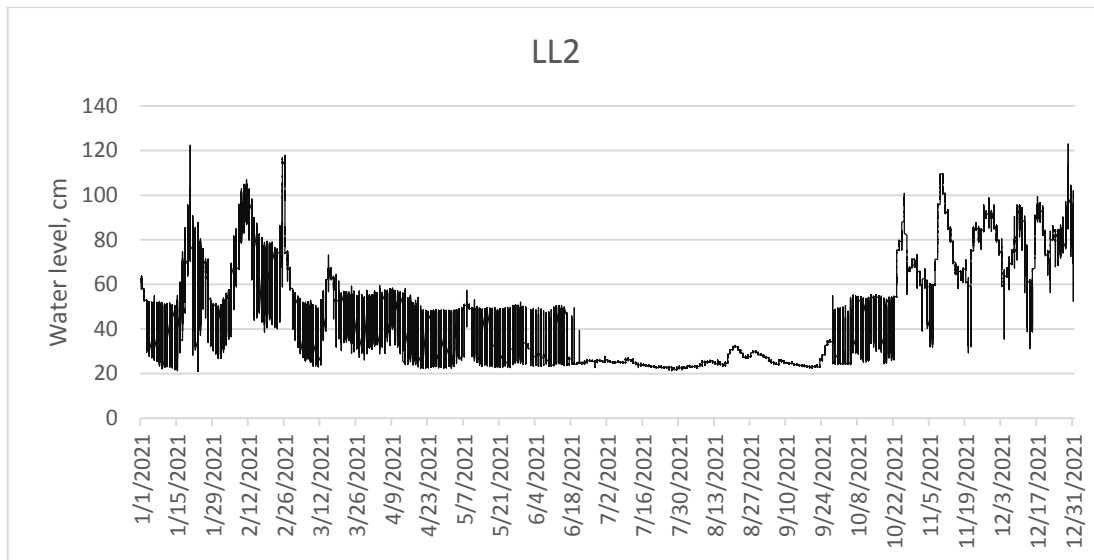


Figure 2.1.3. Water level fluctuations in Varduva River below Kulšėnai HPP

The records of water level below Renavas HPP disclosed one more operation model when HPP has a relatively high-capacity reservoir. During the watery period, Renavas HPP uses its reservoir volume to accumulate and redistribute runoff on a daily time scale. The levellogger (LL3) observations indicated high water level fluctuations and sharp alterations below the HPP (Fig. 2.1.4). The clearly expressed hydropeaking were fixed only from the middle of June 2021. Approximately at that time, the Kulšėnai HPP stopped its operation, however, the Renavas HPP thanks to its reservoir continued to work in the hydropeaking regime. Water level fluctuated around in 20 cm amplitude under the influence of Renavas HPP during the summer low-flow period.

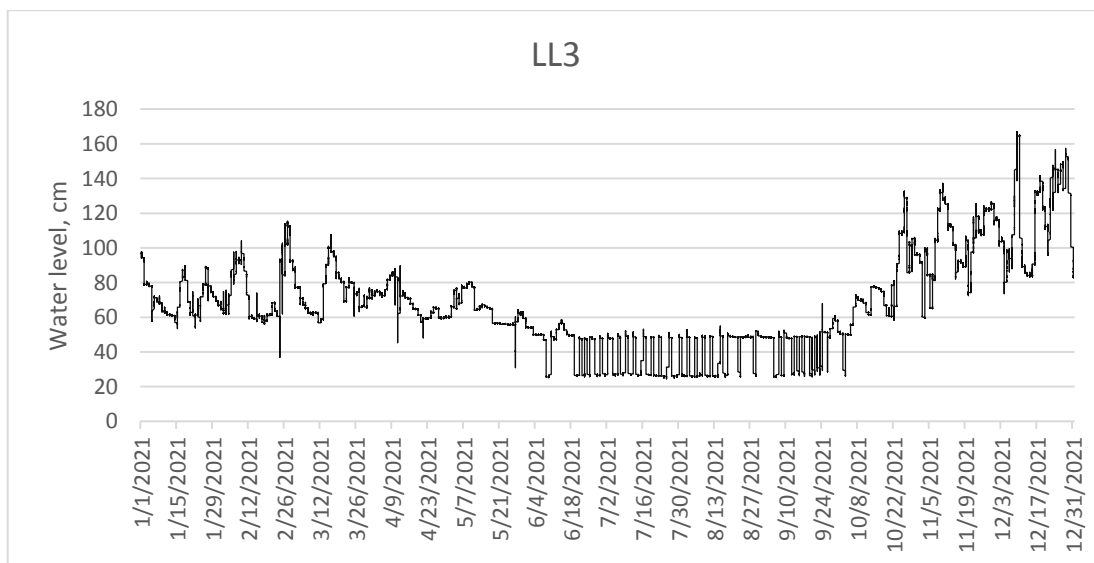


Figure 2.1.4. Water level fluctuations in Varduva River below Renavas HPP

The water level fluctuations at and below Vadagai HPP were closely related to the Renavas operation since Vadagai reservoir is ten times less in volume than Renavas Reservoir. The records of levellogger (LL4) below Vadagai HPP indicated similar patterns of water level fluctuations as below the Renavas HPP (Fig. 2.1.5). Additionally, the sharp alterations of Vadagai HPP were indicated till the end of May, whereas after that the operation of this HPP was stopped and all water level fluctuations with some lag (due to the compensating influence of the Vadagai HPP reservoir) were caused by Renavas HPP. Due to the different profiles of installed levelloggers, the amplitude of hydropeaking was a bit less (around 12 cm) comparing with the amplitude below Renavas HPP.

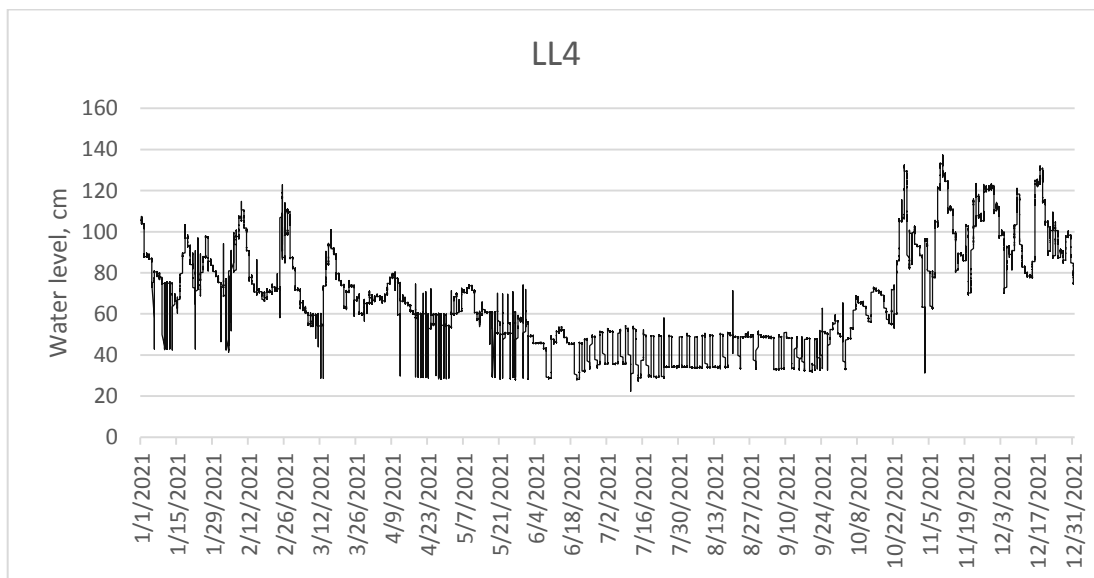


Figure 2.1.5. Water level fluctuations in Varduva River below Vadagai HPP

The installed levellogger (LL5) below Ukrinai HPP indicated the highest hydropeaking scope comparing with the upstream HPPs (Fig. 2.1.6). During the observational period, the hydropeaking was clearly expressed all year round. Only during the several weeks in spring, there was less amplitude. The range of hydropeaking increased closer to the warm season months and reached 30 cm of amplitude. From July, the amplitude rapidly increased up to 50 cm of water level fluctuations. The water head above the levellogger ranged between 20 and 75 cm. Such fluctuations caused a crucial impact on the aquatic environment below the Ukrinai HPP.

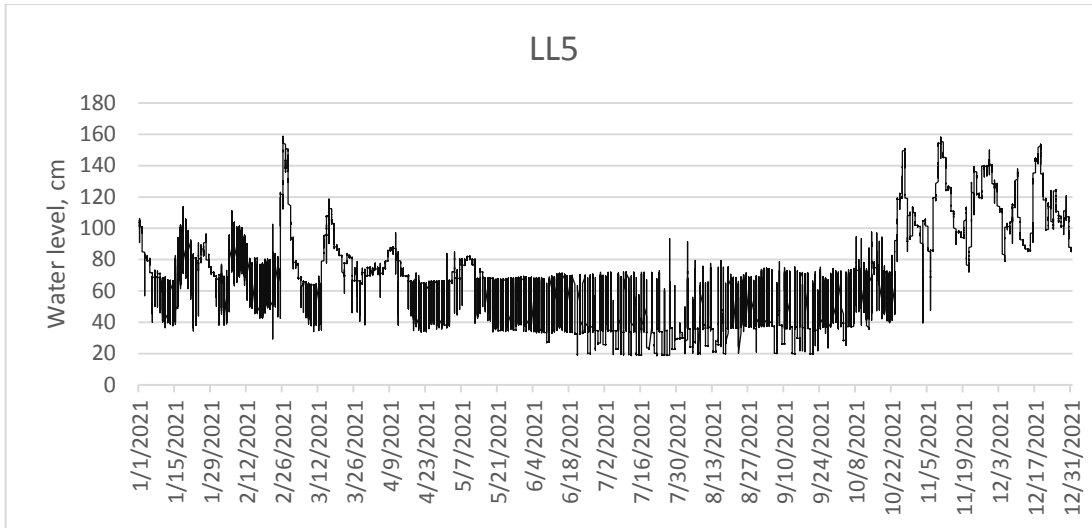


Figure 2.1.6. Water level fluctuations in Varduva River below Ukrinai HPP

Juodeikiai HPP represented the last structure of Varduva HPPs cascade. Owing the largest volume reservoir (even 15 times larger than Renavas HPP reservoir), this HPP is able to accumulate large amount of water and share it according to the need. Based on the levellogger (LL6) observations below Juodeikiai HPP, water level fluctuations gained quite a natural character up to May 2021 (Fig. 2.1.7). However, the situation changed from the beginning of June when HPP began to operate in clearly expressed hydropeaking mode. The obtained amplitude was around 25 cm in the first part of the summer months. One prolonged period with the very low water levels (only 12 cm head) was observed in the last decade of July. From the August, the amplitude in hydropeaking increased up to 40-50 cm. The water level increased in the autumn under the influence of rainfall and decrease of evaporation.

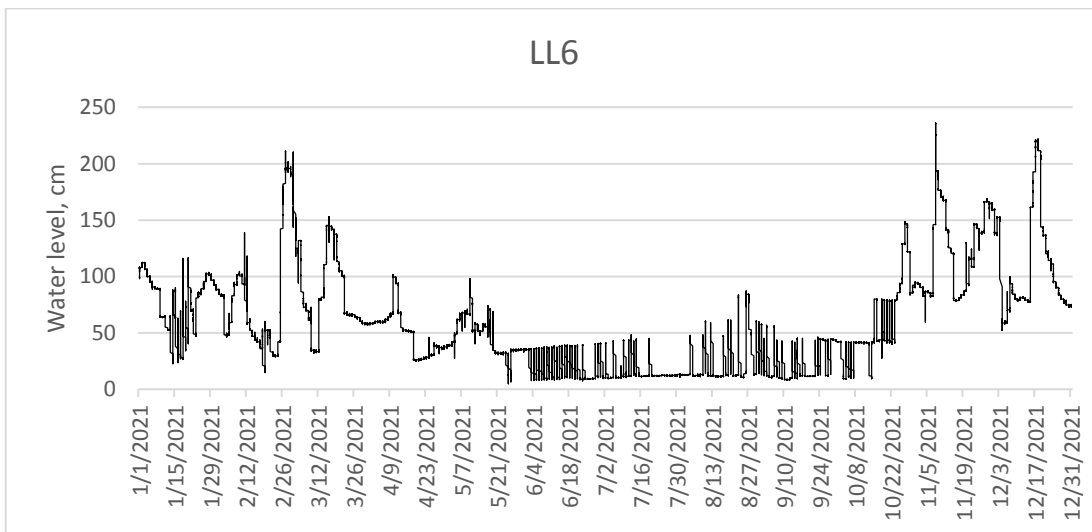


Figure 2.1.7. Water level fluctuations in Varduva River below Juodeikiai HPP

The water levellogger (LL7) installed in the Kvistė River was used to estimate the inflow to the reservoir of the last HPP (Juodeikiai) more precisely. There are a lot of different methods to evaluate runoff in the different places of the river basin, however, the presence of additional hydrological information enables to estimate target hydrological characteristics more accurately. Water levellogger in the Kvistė River observed natural water level fluctuations (Fig. 2.1.8). The amplitude and variability showed the usual character for the rivers of Western Lithuania since these rivers are sensitive to rainfall events. Accordingly, the hydrograph of water levels reflected each of meteorological events by sharp peaks. The highest water levels were fixed during the winter and spring months. The amplitude of sudden rise in water level fluctuated between 40-70 cm. From the middle of May 2021, the level began to decrease and stabilised at 30 cm water head above the levellogger during the summer months. In the autumn months, the water level was closely related to the meteorological conditions which caused several flash floods.

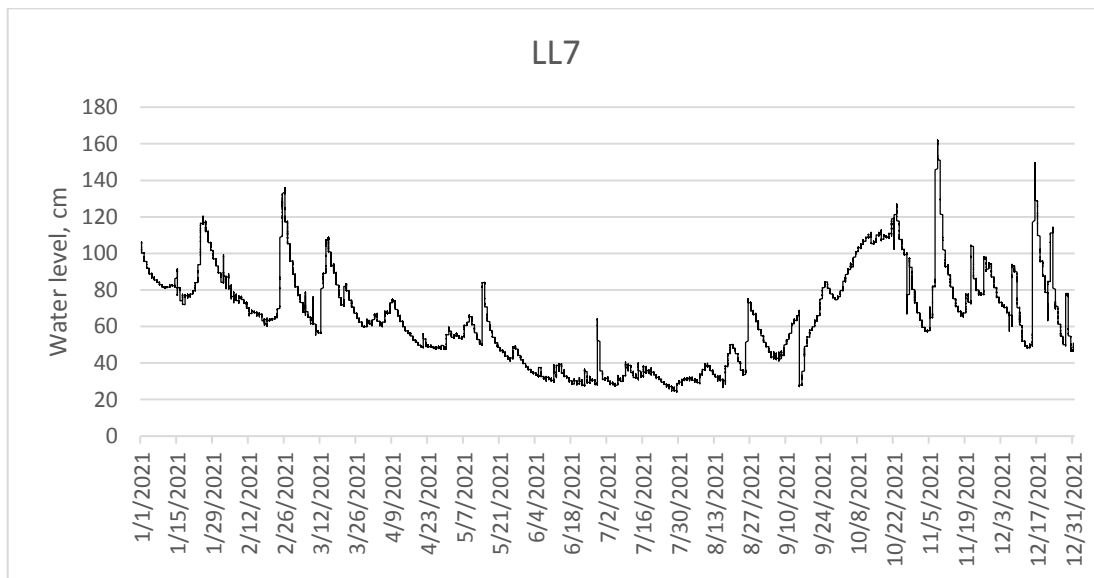


Figure 2.1.8. Water level fluctuations in Kvistė River (inflow to Juodeikiai HPP reservoir)

Daily data of the analysed water levels are provided in Tables 1-7 in the ANNEX I that include Varduva River daily data of water level (in LAS07) at inflows and downstream each of 5 analysed HPPs.

2.2. Ciecere River water level

“Ciecere – Pakuli HPP” is the only hydrological station of Latvian Environment, Geology and Meteorology Centre (LEGMC) that provides the monitor of Ciecere River’ water level downstream the third HPP – Pakuli. During the project in the Ciecere River water level data loggers have been installed at three pilot sites (Fig. 2.2.1) in the end of February – beginning of March 2021:

1. Upstream HPPs in the source of the Ciecere River,
2. Downstream the Ciecere HPP at the Saldus city park,
3. Downstream Dzirnavnieki HPP.

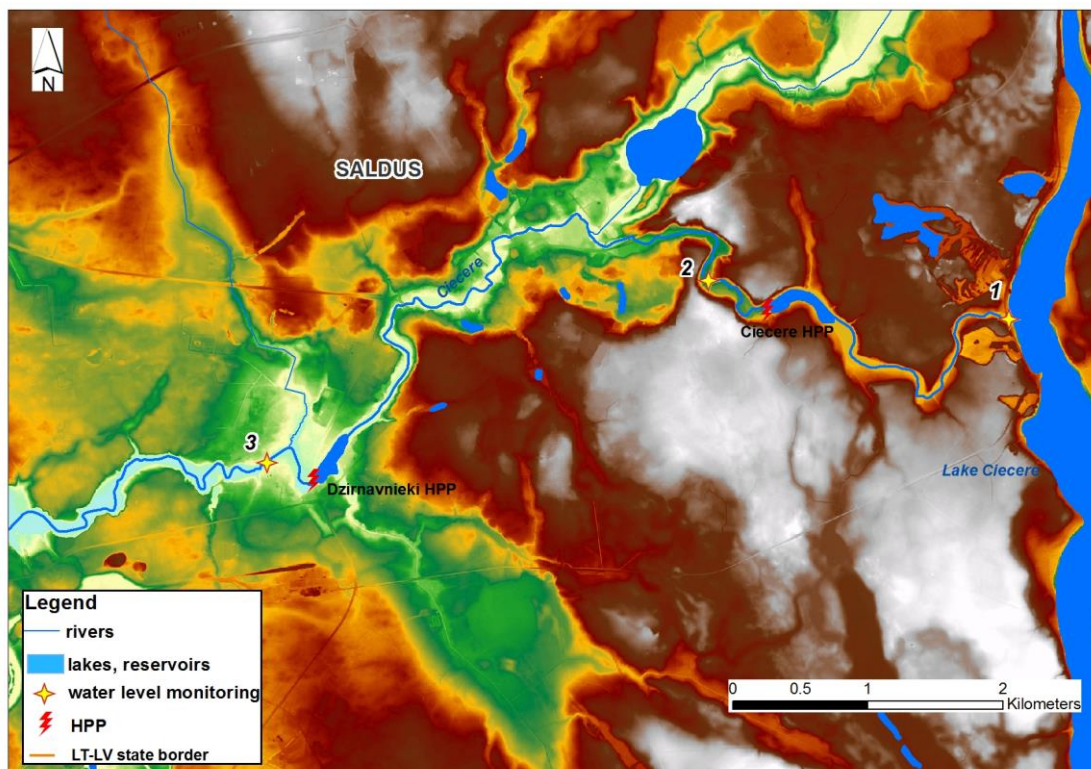


Figure 2.2.1. Scheme of the water data loggers’ installation in Ciecere River

The frequency used for the water level measurements was 10 minutes in order to check precisely the flow regulation by the HPP upstream.

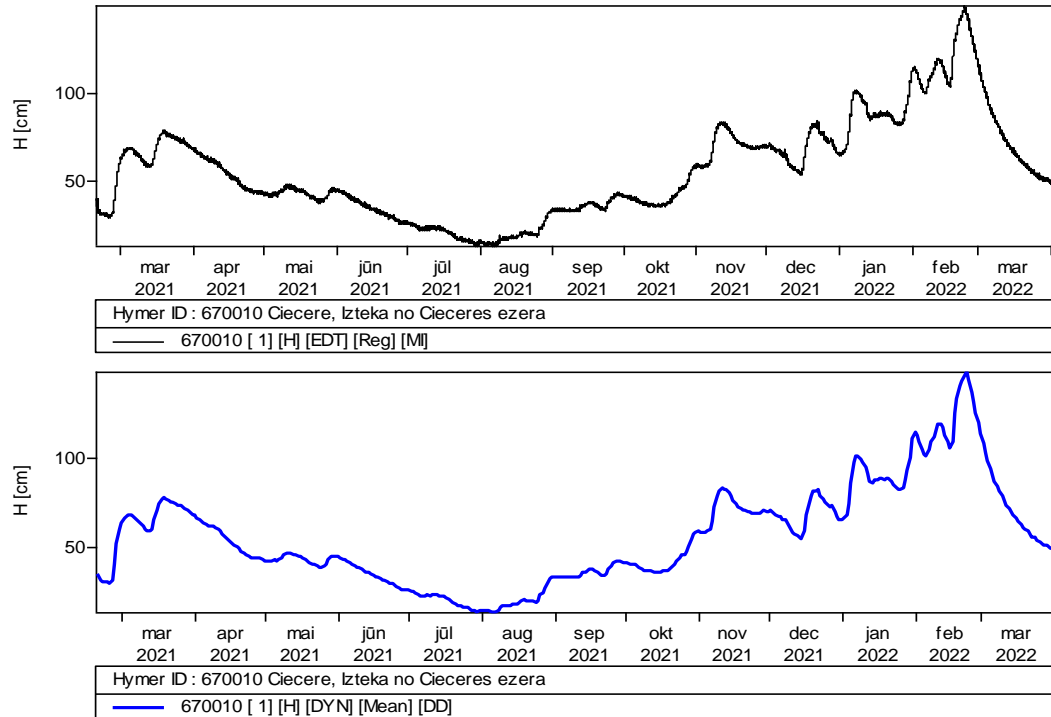


Figure 2.2.2. Ciecere River water level fluctuations at the river source (hourly data above and daily data below)

Water level regime in the Ciecere River source is naturally regulated by Ciecere Lake. One year period from March 2021 to March 2022 water level plot (Fig. 2.2.2) illustrates the spring flood in March 2021, low flow period from the end of July to August, different rain floods in autumn and winter-spring flood that started in the middle of December. Max water level observed in that site was 101.10 m LAS in 23.02.2022 but min water level 99.74 m LAS was observed in 06.08.2021. Table 1 in the ANNEX II includes Ciecere River water level daily data at the river source.

Second data logger fixed excessive water level fluctuations below Ciecere HPP that might be over 30 cm per day in high water periods and over 20 cm per 3 days in average flow periods. Even in presence of low flow the HPP water release was observed (Fig. 2.2.3). The max water level of one year period from March 2021 to March 2022 was 92.50 m LAS in 23.02.2022 but min water level 91.90 m LAS was observed in 23.10.2021. Table 2 in the ANNEX II includes Ciecere River water level daily data downstream Ciecere HPP at Saldus city park.

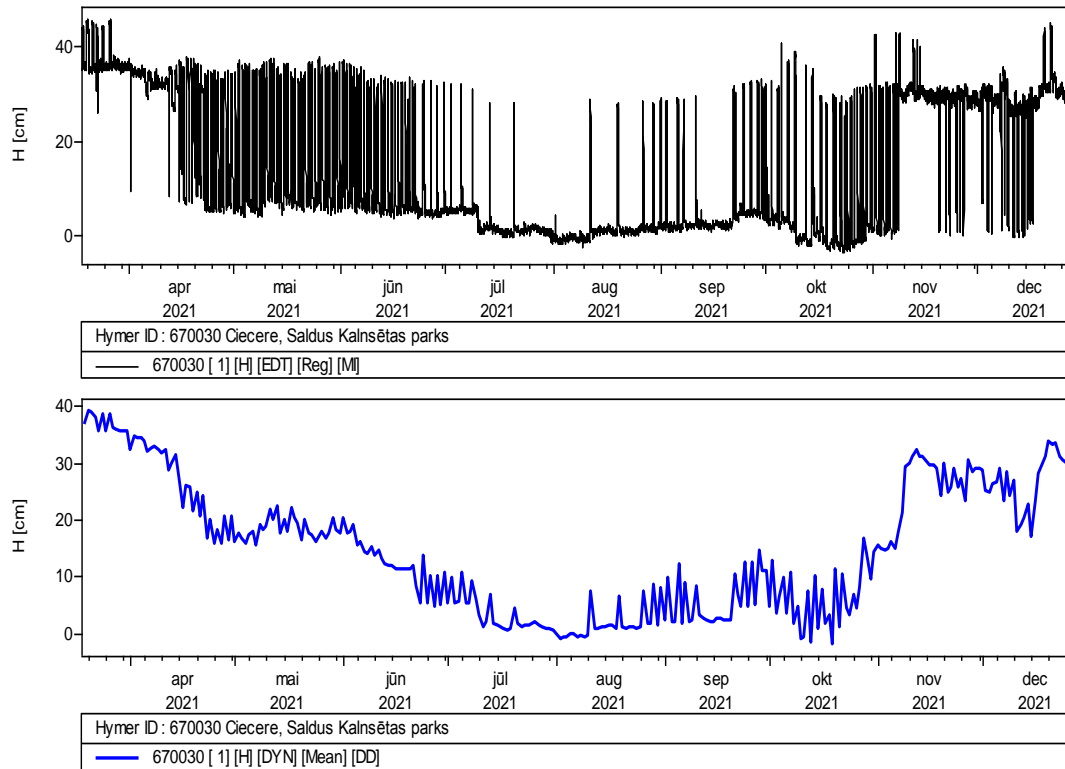


Figure 2.2.3. Ciecere River water level fluctuations downstream Ciecere HPP at Saldus city park (hourly data above and daily data below)

Ciecere River' water level regime downstream Dzirnāvnieki HPP is impacted by both Ciecere and Dzirnāvnieki HPPs operation. It leads excessive water level fluctuations all year around including low flow period (Fig. 2.2.4).

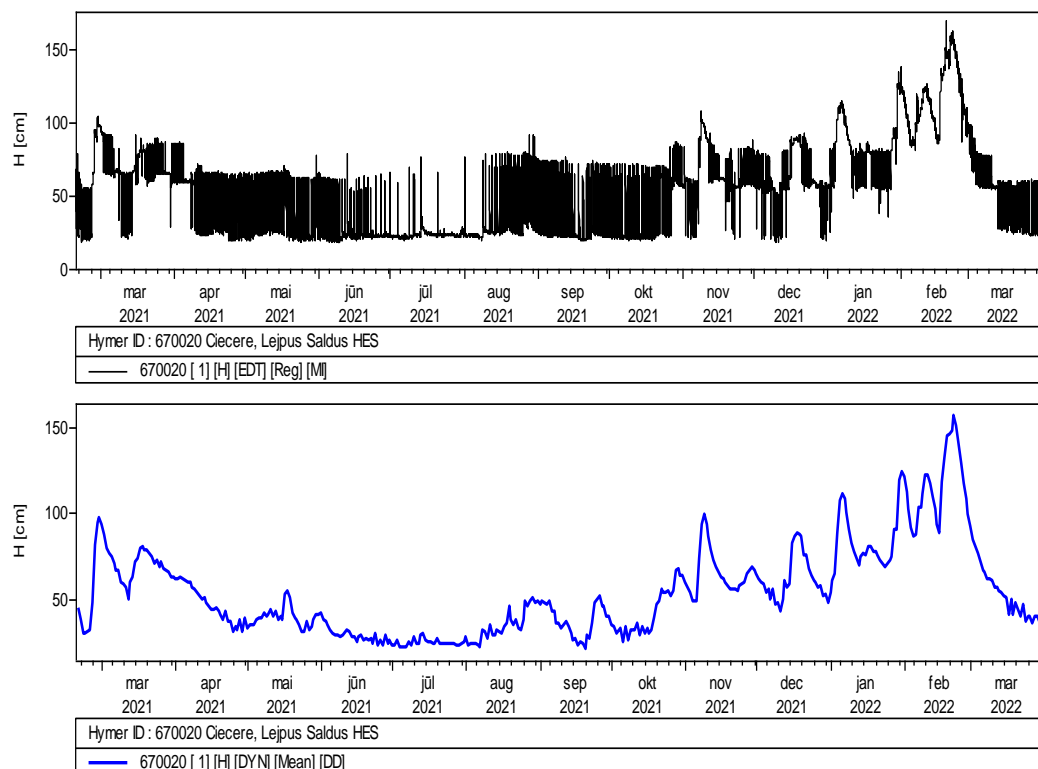


Figure 2.2.4. Ciecere River water level fluctuation downstream Dzirnavnieki HPP (hourly data above and daily data below)

From March 2021 to March 2022 the max water level was 85.03 m LAS in 19.02.2022 but min water level 83.52 m LAS was observed in 09.06.2021. Table 3 in the ANNEX II includes Ciecere River water level daily data downstream Dzirnavnieki HPP.

2.3. Losis River water level

In the Losis River as well three water level data loggers have been installed at pilot sites (Fig. 2.3.1) in the end of February – beginning of March 2021:

1. Upstream HPPs at the LT-LV state border,
2. Downstream the Grantini HPP at Kalni village,
3. Downstream Lejnieki HPP.

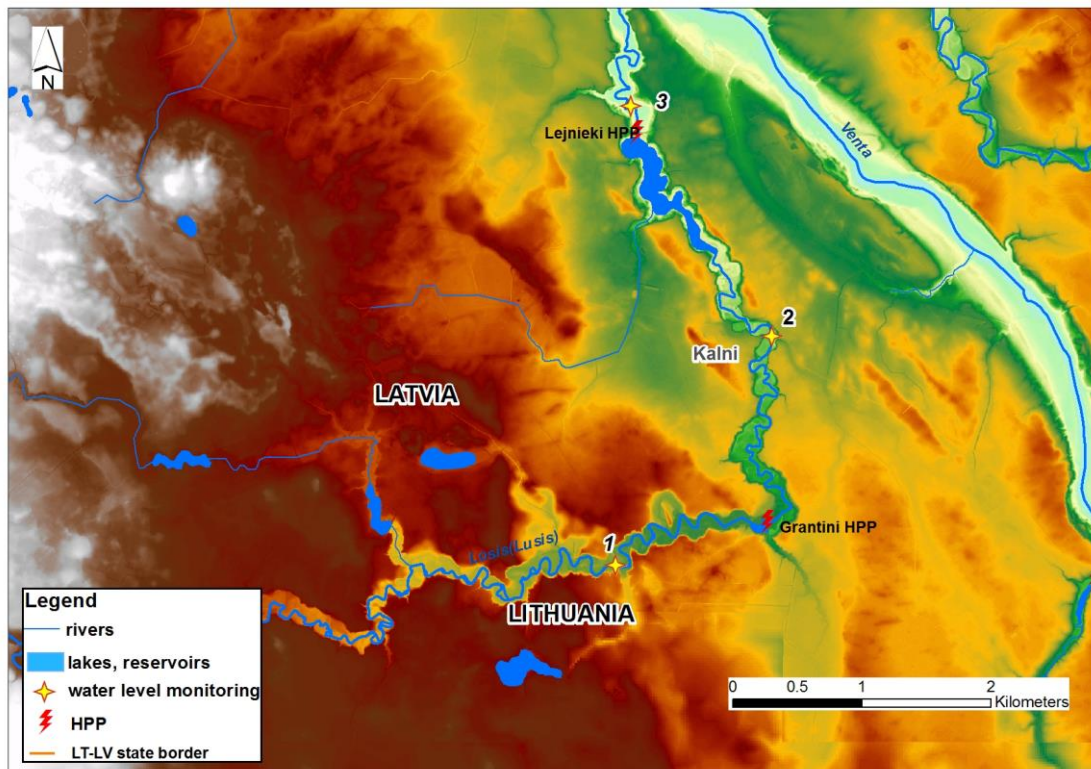


Figure 2.3.1. Scheme of the water data loggers' installation in Losis River

The frequency of water level measurements used in Losis River was 10 minutes in order to check precisely the flow regulation by the HPP upstream.

The first monitoring site on the Losis River locates at the LT-LV state border and upstream both HPPs. However the water level regime here is altered no natural due to Grantini HPP operation.

The plot of the water level from 18-th March of 2021 to the end of March 2022 shows not only spring floods in February-March 2021 and in February 2022 but many rain floods all year around as well as HPP downstream impact (Fig. 2.3.2).

Max water level observed in that site was 57.56 m LAS in 17.02.2022 but min water level 55.86 m LAS was observed in 13.08.2021. Table 1 in the ANNEX III includes Losis River water level daily data at the river source.

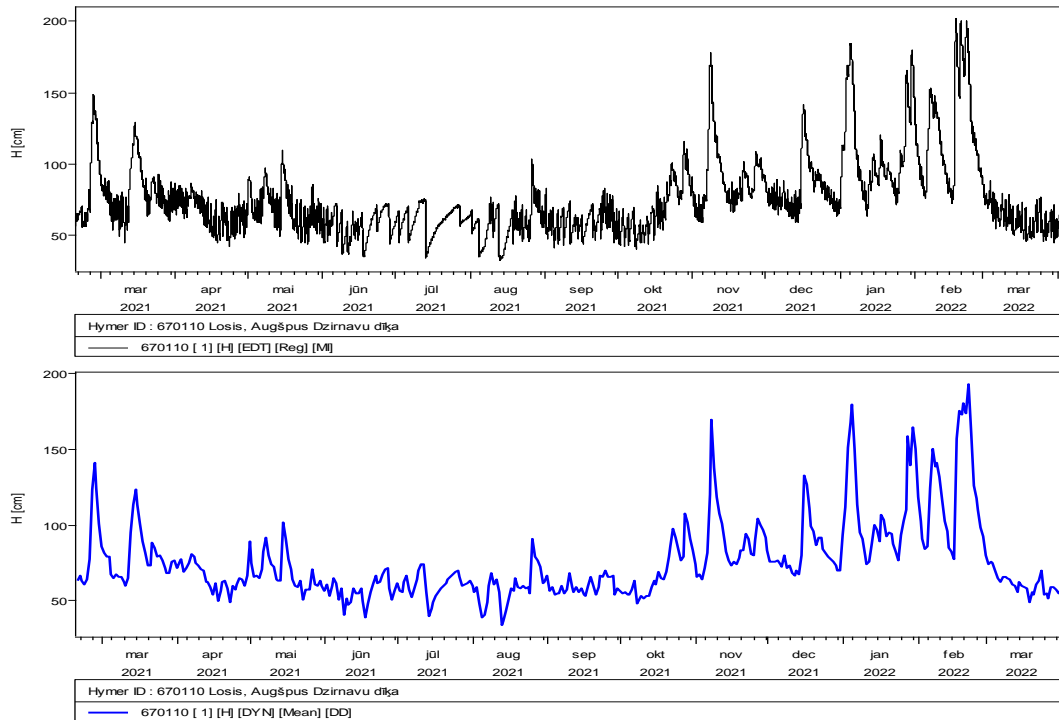


Figure 2.3.2. Losis River water level fluctuations at the LT-LV state border (hourly data above and daily data below)

Second data logger fixed water level fluctuations downstream Grantini HPP that might be over 50 cm per day in high water periods, about 30 cm per day in average flow and about 10 cm in low flow periods (Fig. 2.3.3).

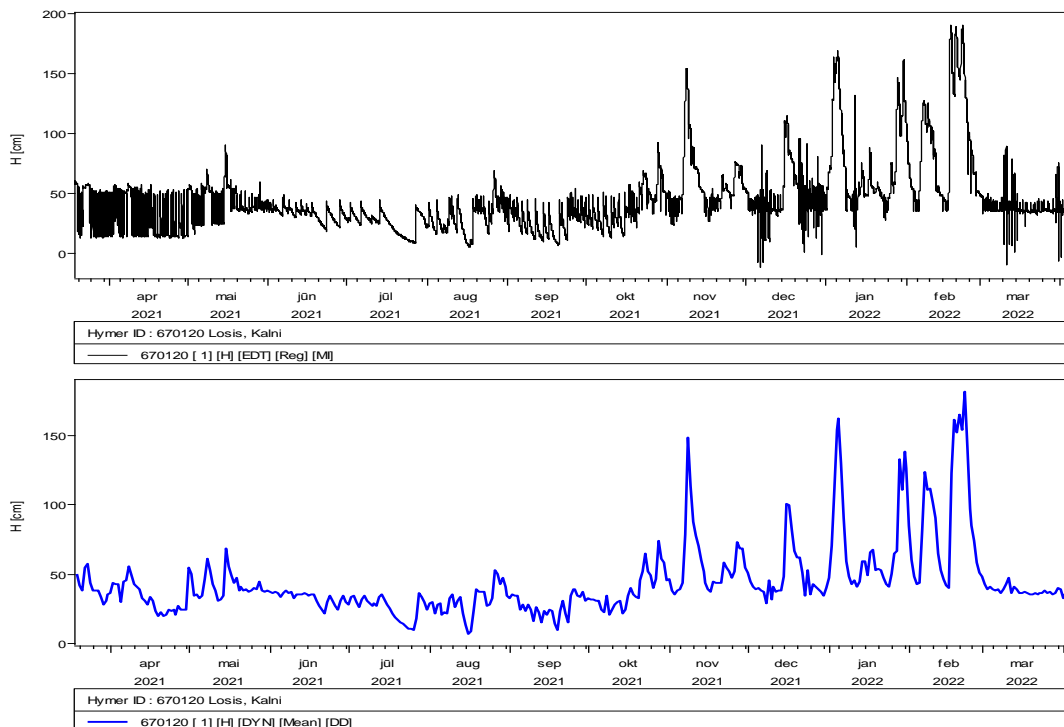


Figure 2.3.3. Losis River water level fluctuations downstream Grantini HPP at Kalni (hourly data above and daily data below)

The max water level of one year period from March 2021 to March 2022 was 49.30 m LAS in 28.02.2022 but min water level 47.39 m LAS was observed in 05-07.12.2021 and in 11.03.2022. Table 2 in the ANNEX II includes Losis River water level daily data downstream Grantini HPP.

Two HPPs in Losis River are working in the cascade' regime, therefore the graph of water level downstream Lejniki HPP is similar to the previous graph from the second data logger (Fig. 2.3.4).

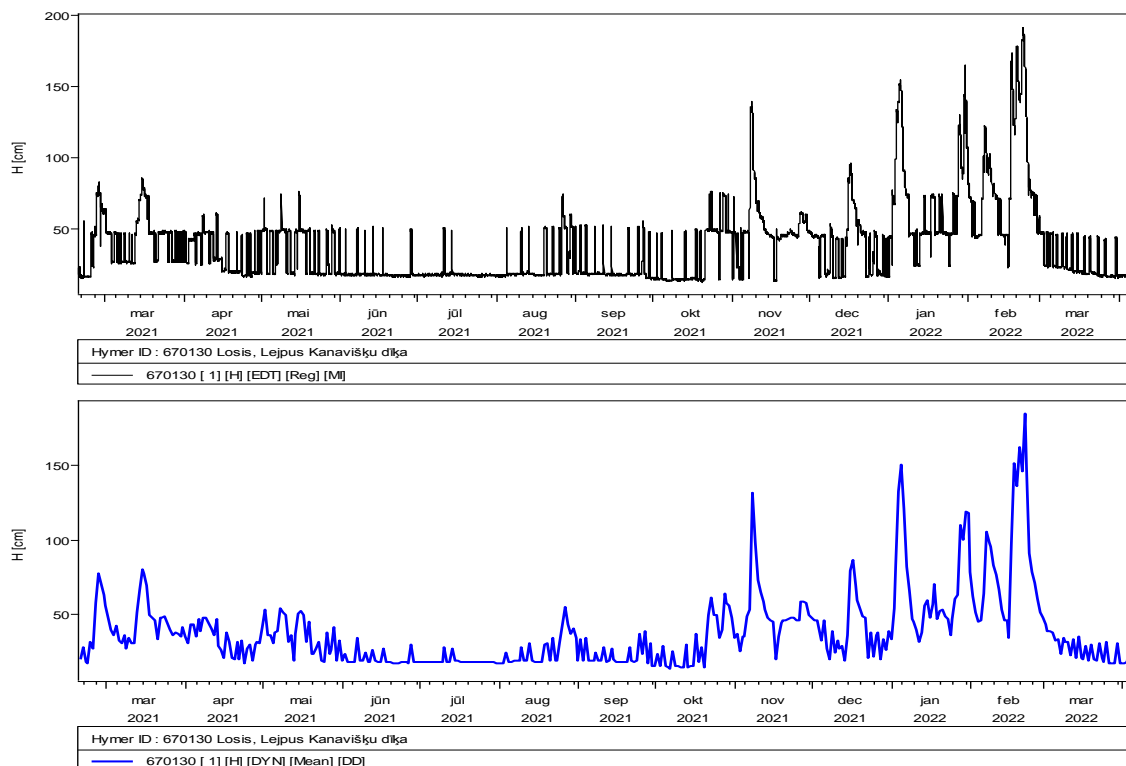


Figure 2.3.4. Losis River water level fluctuations downstream Lejniki HPP (hourly data above and daily data below)

The max water level of one year period from March 2021 to March 2022 was 44.16 m LAS in 22.02.2022 but min water level 42.37 m LAS was observed in 06-07.10 and 17.11.2021. Table 3 in the ANNEX II includes Losis River water level daily data downstream Lejniki HPP.

3. CONCLUSIONS

Seven water data loggers were installed in order to estimate natural water level fluctuations at the inflows and regulated water level fluctuations below the hydropower plants of Varduva River. Tree data loggers have been used for the water level' monitoring in Ciecere River and additional tree for the monitoring of Losis River' water level as upstream, as downstream of small HPPs in those rivers.

According to available data of water levels, the hydropeaking was clearly expressed below each of the studied hydropower plants, especially during the warm season.

The monitoring results will be used for the daily flow calculation and then for the modelling of rivers habitat suitability as well as for the E-flow evaluation.

ANNEX I

Table 1. Varduva River water level at Seda (inflow to hydropower plants cascade), m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	106.22	105.77	106.06	105.91	105.82	105.73	105.74	105.62	105.73	105.68	106.31	106.58
2	106.10	105.78	105.95	105.97	105.80	105.70	105.74	105.62	105.73	105.67	106.24	106.47
3	105.99	105.78	105.93	105.96	105.86	105.68	105.73	105.63	105.70	105.66	106.37	106.35
4	105.97	105.73	105.90	105.94	105.91	105.67	105.72	105.63	105.68	105.64	106.20	106.18
5	105.96	105.83	105.84	105.92	105.91	105.68	105.71	105.63	105.66	105.74	106.20	106.30
6	105.93	105.90	105.80	105.99	105.91	105.68	105.71	105.62	105.65	105.86	106.12	106.29
7	105.90	105.92	105.80	106.04	106.00	105.68	105.71	105.63	105.64	105.92	106.41	106.36
8	105.86	105.89	105.77	106.12	106.03	105.69	105.71	105.64	105.63	105.97	106.70	106.41
9	105.80	105.83	105.74	106.14	106.00	105.67	105.73	105.65	105.61	105.96	106.94	106.49
10	105.77	105.76	105.74	106.03	105.94	105.66	105.74	105.66	105.60	105.91	106.92	106.48
11	105.76	105.73	105.71	105.97	105.88	105.70	105.72	105.67	105.60	105.89	106.79	106.24
12	105.75	105.71	105.78	105.97	105.84	105.86	105.72	105.66	105.60	105.87	106.68	106.10
13	105.75	105.72	105.98	105.92	105.82	105.90	105.72	105.64	105.59	106.00	106.59	106.07
14	105.75	105.74	106.12	105.87	105.79	105.84	105.70	105.64	105.59	106.02	106.45	106.06

15	105.79	105.72	106.30	105.85	105.81	105.77	105.69	105.63	105.58	106.00	106.32	106.12
16	105.92	105.71	106.29	105.82	105.80	105.73	105.69	105.62	105.58	105.99	106.29	106.58
17	105.97	105.69	106.19	105.76	105.78	105.71	105.68	105.62	105.58	105.98	106.26	106.72
18	105.98	105.66	106.08	105.75	105.75	105.69	105.68	105.67	105.57	105.83	106.25	106.73
19	105.89	105.69	105.99	105.73	105.73	105.68	105.66	105.77	105.56	105.85	106.32	106.65
20	105.80	105.72	105.93	105.74	105.71	105.68	105.65	105.82	105.56	105.95	106.04	106.51
21	105.80	105.73	105.92	105.72	105.70	105.69	105.64	105.83	105.56	105.90	106.27	106.36
22	105.79	105.73	106.01	105.73	105.71	105.69	105.64	105.81	105.57	106.00	106.57	106.33
23	105.81	105.74	105.99	105.74	105.73	105.70	105.63	105.78	105.56	106.47	106.64	106.43
24	105.95	105.85	105.96	105.75	105.69	105.72	105.62	105.73	105.65	106.67	106.57	106.37
25	106.11	106.23	105.93	105.75	105.68	105.72	105.61	105.71	105.74	106.71	106.52	106.38
26	106.07	106.36	105.90	105.75	105.76	105.72	105.60	105.73	105.82	106.86	106.71	106.37
27	105.98	106.39	105.87	105.73	105.86	105.72	105.62	105.74	105.83	106.45	106.71	106.26
28	105.92	106.23	105.85	105.74	105.85	105.73	105.62	105.78	105.80	106.42	106.72	106.22
29	105.88		105.85	105.70	105.87	105.73	105.62	105.79	105.74	106.48	106.71	106.27
30	105.83		105.88	105.76	105.78	105.73	105.63	105.77	105.70	106.45	106.66	106.17
31	105.80		105.90		105.74		105.61	105.75		106.39		106.09

Table 2. Varduva River water level downstream Kulšėnai HPP, m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	100.86	100.60	100.80	100.70	100.64	100.58	100.52	100.49	100.54	100.55	100.88	101.09
2	100.81	100.61	100.75	100.73	100.63	100.57	100.52	100.49	100.53	100.55	100.83	101.02
3	100.76	100.64	100.71	100.72	100.65	100.54	100.51	100.49	100.52	100.53	100.90	100.96
4	100.73	100.60	100.68	100.72	100.71	100.54	100.51	100.49	100.51	100.53	100.84	100.85
5	100.71	100.65	100.66	100.71	100.71	100.54	100.51	100.49	100.51	100.57	100.81	100.92
6	100.69	100.68	100.64	100.74	100.71	100.54	100.51	100.49	100.50	100.72	100.79	100.92
7	100.67	100.71	100.64	100.75	100.74	100.54	100.51	100.50	100.52	100.70	100.93	100.96
8	100.66	100.71	100.63	100.79	100.77	100.55	100.51	100.50	100.52	100.70	101.10	100.97
9	100.63	100.64	100.61	100.81	100.76	100.53	100.52	100.51	100.51	100.70	101.31	101.07
10	100.62	100.64	100.62	100.75	100.73	100.52	100.52	100.51	100.51	100.65	101.32	101.05
11	100.62	100.60	100.60	100.73	100.69	100.54	100.52	100.52	100.50	100.64	101.22	100.85
12	100.61	100.55	100.63	100.73	100.66	100.60	100.51	100.51	100.51	100.65	101.14	100.84
13	100.61	100.56	100.75	100.70	100.66	100.62	100.51	100.51	100.50	100.77	101.08	100.82
14	100.60	100.61	100.82	100.68	100.64	100.59	100.50	100.51	100.50	100.76	101.00	100.80

15	100.60	100.57	100.91	100.67	100.65	100.56	100.50	100.51	100.50	100.74	100.92	100.82
16	100.68	100.56	100.91	100.66	100.63	100.54	100.50	100.50	100.50	100.74	100.90	101.08
17	100.79	100.59	100.86	100.63	100.62	100.52	100.50	100.50	100.49	100.73	100.89	101.19
18	100.71	100.55	100.80	100.62	100.60	100.53	100.50	100.53	100.49	100.64	100.89	101.20
19	100.68	100.56	100.77	100.62	100.60	100.52	100.49	100.56	100.49	100.63	100.94	101.14
20	100.61	100.57	100.73	100.62	100.59	100.51	100.49	100.58	100.49	100.69	100.78	101.04
21	100.62	100.62	100.72	100.60	100.57	100.52	100.49	100.58	100.49	100.67	100.87	100.97
22	100.61	100.59	100.74	100.61	100.57	100.51	100.49	100.57	100.49	100.70	101.06	100.99
23	100.63	100.60	100.73	100.61	100.58	100.51	100.49	100.56	100.50	100.90	101.12	101.00
24	100.71	100.65	100.72	100.62	100.56	100.52	100.49	100.54	100.53	101.02	101.07	100.96
25	100.82	100.87	100.71	100.61	100.55	100.52	100.49	100.53	100.56	101.06	101.05	100.97
26	100.79	100.99	100.69	100.62	100.60	100.52	100.49	100.54	100.60	101.20	101.17	100.94
27	100.77	100.97	100.68	100.59	100.64	100.51	100.48	100.54	100.60	100.95	101.17	100.90
28	100.70	100.88	100.68	100.61	100.63	100.52	100.48	100.56	100.61	100.92	101.18	100.87
29	100.68		100.67	100.58	100.64	100.52	100.48	100.56	100.57	100.96	101.17	100.92
30	100.65		100.69	100.62	100.60	100.52	100.49	100.55	100.55	100.94	101.14	100.88
31	100.66		100.70		100.59		100.48	100.54		100.91		100.80

Table 3. Varduva River water level downstream Renavas HPP, m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	79.42	79.08	79.35	79.19	79.06	79.00	78.73	78.72	78.95	78.97	79.41	79.61
2	79.33	79.12	79.28	79.19	79.10	79.00	78.89	78.88	78.95	78.93	79.31	79.57
3	79.25	79.06	79.23	79.21	79.17	78.98	78.94	78.83	78.94	78.81	79.30	79.50
4	79.24	79.06	79.18	79.20	79.17	78.96	78.85	78.72	78.94	78.96	79.40	79.37
5	79.19	79.21	79.15	79.18	79.16	78.96	78.73	78.87	78.82	79.00	79.27	79.35
6	79.15	79.29	79.12	79.20	79.21	78.96	78.80	78.79	78.72	79.04	79.23	79.42
7	79.16	79.21	79.10	79.24	79.23	78.94	78.91	78.73	78.90	79.16	79.40	79.37
8	79.15	79.23	79.08	79.28	79.24	78.87	78.73	78.86	78.84	79.16	79.55	79.46
9	79.11	79.25	79.08	79.31	79.26	78.72	78.89	78.90	78.82	79.16	79.74	79.51
10	79.09	79.29	79.09	79.30	79.25	78.91	78.91	78.72	78.95	79.15	79.79	79.51
11	79.08	79.25	79.07	79.23	79.21	78.94	78.73	78.89	78.94	79.13	79.73	79.31
12	79.07	79.18	79.04	79.21	79.10	78.95	78.88	78.82	78.81	79.08	79.64	79.27
13	79.07	79.09	79.15	79.20	79.12	79.01	78.91	78.72	78.79	79.11	79.59	79.25
14	79.06	79.07	79.32	79.18	79.12	79.03	78.72	78.74	78.92	79.24	79.52	79.24

15	79.06	79.10	79.43	79.17	79.12	79.00	78.76	78.91	78.77	79.23	79.42	79.26
16	79.20	79.07	79.48	79.14	79.12	78.97	78.92	78.92	78.92	79.22	79.37	79.45
17	79.30	79.06	79.44	79.13	79.11	78.96	78.91	78.72	78.80	79.22	79.38	79.71
18	79.32	79.04	79.34	79.10	79.10	78.95	78.73	78.85	78.95	79.19	79.36	79.72
19	79.21	79.06	79.30	79.09	79.03	78.91	78.85	78.95	78.80	79.12	79.40	79.71
20	79.11	79.07	79.27	79.06	79.02	78.72	78.80	78.95	78.78	79.08	79.33	79.60
21	79.14	79.10	79.22	79.04	79.02	78.84	78.72	78.95	78.86	79.13	79.26	79.49
22	79.04	79.12	79.20	79.05	79.02	78.88	78.86	78.92	78.87	79.13	79.53	79.46
23	79.10	79.08	79.26	79.05	79.02	78.84	78.82	78.83	78.84	79.28	79.63	79.51
24	79.11	79.06	79.26	79.07	79.02	78.91	78.72	78.94	78.94	79.50	79.57	79.45
25	79.22	79.33	79.18	79.09	79.02	78.76	78.73	78.95	78.97	79.54	79.54	79.48
26	79.28	79.46	79.19	79.11	79.02	78.94	78.91	78.95	78.88	79.66	79.61	79.43
27	79.29	79.53	79.15	79.09	78.96	78.91	78.83	78.94	78.96	79.57	79.66	79.41
28	79.20	79.50	79.12	79.06	79.08	78.72	78.72	78.91	79.01	79.39	79.68	79.45
29	79.16		79.16	79.06	79.08	78.87	78.72	78.77	79.05	79.42	79.68	79.48
30	79.14		79.14	79.06	79.07	78.91	78.89	78.96	79.02	79.48	79.65	79.42
31	79.11		79.19		79.04		78.80	78.95		79.42		79.29

Table 4. Varduva River water level downstream Vadagiai HPP, m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	73.96	73.62	73.91	73.73	73.56	73.50	73.28	73.28	73.51	73.55	73.98	74.18
2	73.88	73.66	73.82	73.73	73.65	73.55	73.47	73.45	73.51	73.53	73.90	74.13
3	73.79	73.61	73.77	73.75	73.69	73.54	73.50	73.41	73.51	73.41	73.83	74.06
4	73.78	73.61	73.73	73.74	73.71	73.51	73.45	73.27	73.51	73.54	73.98	73.93
5	73.74	73.75	73.70	73.72	73.70	73.51	73.28	73.44	73.40	73.57	73.84	73.90
6	73.67	73.84	73.67	73.73	73.74	73.51	73.32	73.31	73.28	73.60	73.78	73.98
7	73.69	73.75	73.64	73.77	73.76	73.49	73.48	73.28	73.46	73.72	73.97	73.93
8	73.68	73.77	73.63	73.82	73.77	73.45	73.28	73.44	73.44	73.73	74.13	74.04
9	73.66	73.81	73.63	73.85	73.79	73.27	73.47	73.48	73.38	73.71	74.33	74.08
10	73.63	73.83	73.63	73.84	73.79	73.46	73.49	73.28	73.51	73.71	74.39	74.07
11	73.63	73.79	73.62	73.80	73.75	73.50	73.28	73.46	73.50	73.69	74.33	73.86
12	73.62	73.72	73.59	73.73	73.64	73.52	73.46	73.38	73.34	73.63	74.23	73.81
13	73.61	73.64	73.66	73.74	73.65	73.56	73.48	73.28	73.31	73.65	74.18	73.80
14	73.59	73.62	73.87	73.72	73.67	73.58	73.28	73.29	73.49	73.78	74.10	73.79

15	73.60	73.64	73.95	73.70	73.67	73.56	73.30	73.45	73.30	73.78	74.01	73.81
16	73.71	73.62	74.01	73.69	73.67	73.53	73.49	73.49	73.49	73.76	73.88	74.03
17	73.82	73.61	73.97	73.67	73.65	73.51	73.48	73.28	73.32	73.76	73.93	74.29
18	73.86	73.60	73.88	73.63	73.63	73.51	73.28	73.45	73.51	73.73	73.90	74.32
19	73.80	73.62	73.83	73.63	73.54	73.48	73.45	73.52	73.32	73.67	73.97	74.30
20	73.72	73.63	73.81	73.57	73.59	73.28	73.32	73.51	73.39	73.63	73.91	74.17
21	73.71	73.64	73.76	73.56	73.53	73.42	73.28	73.51	73.45	73.66	73.82	74.04
22	73.63	73.67	73.73	73.58	73.55	73.47	73.45	73.49	73.48	73.68	74.10	74.03
23	73.67	73.65	73.79	73.55	73.56	73.45	73.39	73.44	73.45	73.81	74.21	74.05
24	73.70	73.64	73.80	73.62	73.57	73.48	73.27	73.51	73.53	74.05	74.17	74.02
25	73.78	73.93	73.73	73.62	73.52	73.30	73.28	73.51	73.56	74.12	74.13	74.00
26	73.82	74.03	73.73	73.64	73.57	73.50	73.46	73.51	73.48	74.24	74.19	73.96
27	73.83	74.09	73.70	73.62	73.47	73.48	73.42	73.51	73.54	74.20	74.27	73.95
28	73.74	74.02	73.66	73.58	73.62	73.28	73.28	73.49	73.60	73.95	74.27	74.00
29	73.70		73.69	73.58	73.63	73.46	73.28	73.30	73.64	73.98	74.28	74.05
30	73.68		73.68	73.59	73.62	73.49	73.43	73.53	73.61	74.07	74.24	73.99
31	73.65		73.74		73.59		73.32	73.51		73.99		73.85

Table 5. Varduva River water level downstream Ukrinai HPP, m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	62.14	61.73	62.12	61.84	61.65	61.60	61.46	61.42	61.58	61.60	62.12	62.39
2	62.08	61.79	61.99	61.83	61.72	61.63	61.42	61.38	61.58	61.60	62.07	62.36
3	61.92	61.71	61.88	61.85	61.78	61.61	61.57	61.57	61.57	61.46	61.89	62.23
4	61.92	61.72	61.85	61.85	61.86	61.58	61.56	61.39	61.59	61.52	62.15	62.16
5	61.90	61.90	61.79	61.83	61.80	61.58	61.41	61.41	61.54	61.61	62.00	61.98
6	61.77	62.02	61.76	61.84	61.84	61.58	61.38	61.50	61.38	61.66	61.86	62.13
7	61.81	61.91	61.73	61.88	61.90	61.57	61.50	61.37	61.38	61.83	62.07	62.11
8	61.79	61.94	61.69	61.94	61.89	61.54	61.44	61.40	61.58	61.89	62.31	62.20
9	61.78	61.97	61.70	61.98	61.92	61.42	61.42	61.58	61.41	61.86	62.55	62.32
10	61.72	62.02	61.70	61.98	61.92	61.44	61.59	61.44	61.52	61.85	62.67	62.35
11	61.72	61.96	61.71	61.95	61.90	61.56	61.45	61.42	61.57	61.83	62.59	62.08
12	61.70	61.87	61.67	61.83	61.75	61.57	61.38	61.56	61.54	61.75	62.49	62.02
13	61.69	61.75	61.71	61.84	61.74	61.64	61.58	61.38	61.37	61.74	62.37	61.99
14	61.66	61.73	62.00	61.82	61.80	61.67	61.41	61.35	61.49	61.92	62.31	61.97

15	61.69	61.74	62.11	61.81	61.80	61.66	61.37	61.44	61.47	61.92	62.20	61.99
16	61.80	61.73	62.22	61.78	61.77	61.61	61.44	61.53	61.48	61.91	62.05	62.25
17	61.92	61.71	62.17	61.76	61.76	61.59	61.58	61.48	61.47	61.91	62.09	62.54
18	62.03	61.70	62.08	61.70	61.74	61.58	61.45	61.42	61.48	61.88	62.07	62.57
19	61.99	61.74	61.99	61.73	61.63	61.58	61.34	61.60	61.53	61.80	62.08	62.59
20	61.92	61.75	61.95	61.67	61.64	61.45	61.52	61.60	61.37	61.74	62.12	62.40
21	61.87	61.75	61.92	61.62	61.65	61.36	61.39	61.58	61.38	61.74	61.91	62.25
22	61.78	61.77	61.83	61.64	61.64	61.55	61.34	61.58	61.53	61.78	62.23	62.21
23	61.79	61.78	61.91	61.65	61.61	61.45	61.55	61.45	61.44	61.84	62.38	62.28
24	61.87	61.77	61.93	61.68	61.65	61.56	61.36	61.57	61.58	62.16	62.40	62.18
25	61.94	62.13	61.87	61.72	61.62	61.43	61.39	61.60	61.63	62.30	62.32	62.28
26	61.97	62.45	61.83	61.74	61.68	61.50	61.36	61.62	61.57	62.39	62.35	62.17
27	62.02	62.54	61.83	61.73	61.62	61.56	61.56	61.59	61.53	62.49	62.50	62.16
28	61.90	62.50	61.75	61.68	61.63	61.47	61.39	61.59	61.65	62.10	62.50	62.15
29	61.85		61.78	61.67	61.73	61.40	61.41	61.49	61.71	62.15	62.52	62.22
30	61.82		61.78	61.70	61.75	61.57	61.40	61.52	61.70	62.21	62.49	62.11
31	61.78		61.82		61.69		61.44	61.59		62.14		61.97

Table 6. Varduva River water level downstream Juodeikiai HPP, m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	39.58	39.39	40.46	39.11	38.91	38.88	38.65	38.66	38.91	38.95	39.61	39.99
2	39.64	39.36	40.27	39.11	38.92	38.87	38.75	38.66	38.80	38.94	39.59	39.95
3	39.63	39.31	39.91	39.12	38.93	38.76	38.63	38.66	38.88	38.65	39.52	40.02
4	39.56	39.01	39.71	39.13	38.96	38.74	38.63	38.84	38.66	38.77	39.48	39.14
5	39.51	39.09	39.64	39.13	39.11	38.74	38.79	38.69	38.64	38.78	39.52	39.12
6	39.46	39.26	39.32	39.13	39.18	38.75	38.66	38.65	38.87	38.78	39.37	39.20
7	39.43	39.44	39.26	39.14	39.18	38.75	38.63	38.65	38.81	38.80	39.65	39.39
8	39.42	39.50	39.19	39.16	39.20	38.71	38.66	38.65	38.65	38.94	40.46	39.41
9	39.30	39.55	39.02	39.19	39.22	38.77	38.81	38.84	38.79	38.94	40.41	39.35
10	39.17	39.52	38.87	39.37	39.36	38.77	38.66	38.93	38.64	38.94	40.26	39.32
11	39.17	39.62	38.86	39.50	39.16	38.73	38.77	38.68	38.61	38.94	40.22	39.34
12	39.06	39.34	39.08	39.32	39.05	38.76	38.82	38.79	38.62	38.94	40.06	39.34
13	39.08	39.11	39.33	39.20	39.07	38.72	38.76	38.68	38.78	38.86	39.90	39.33
14	39.12	39.03	39.43	39.05	39.03	38.75	38.79	38.64	38.77	38.80	39.90	39.31

15	39.28	38.99	39.84	39.05	39.08	38.74	38.66	38.64	38.80	39.01	39.61	39.44
16	38.90	38.96	39.99	39.05	39.10	38.80	38.64	38.65	38.66	39.12	39.51	40.30
17	38.94	38.93	39.96	39.04	39.12	38.80	38.65	38.82	38.81	38.96	39.53	40.62
18	39.17	38.96	39.91	38.97	39.13	38.80	38.65	38.67	38.66	39.09	39.55	40.69
19	39.09	38.92	39.78	38.78	39.06	38.79	38.80	38.91	38.64	39.13	39.57	40.47
20	39.35	39.02	39.61	38.79	38.85	38.75	38.66	38.93	38.65	39.11	39.62	39.93
21	39.32	39.02	39.56	38.80	38.85	38.77	38.65	38.67	38.64	39.12	39.70	39.82
22	39.16	38.84	39.36	38.80	38.85	38.63	38.65	38.65	38.72	39.12	39.82	39.81
23	39.05	38.83	39.20	38.81	38.85	38.76	38.65	39.00	38.79	39.13	39.82	39.79
24	39.37	38.84	39.19	38.84	38.85	38.63	38.65	38.66	38.83	39.35	39.98	39.66
25	39.39	39.26	39.19	38.83	38.74	38.62	38.65	38.64	38.97	39.43	39.92	39.55
26	39.45	40.19	39.18	38.88	38.77	38.62	38.65	39.13	38.82	39.57	39.92	39.49
27	39.52	40.52	39.17	38.91	38.88	38.62	38.65	39.33	38.81	39.92	40.07	39.43
28	39.55	40.49	39.15	38.90	38.88	38.73	38.65	39.01	38.84	39.91	40.21	39.39
29	39.52		39.12	38.89	38.88	38.80	38.65	38.68	38.97	39.67	40.16	39.38
30	39.47		39.11	38.90	38.88	38.80	38.65	38.92	38.96	39.72	40.15	39.35
31	39.43		39.11		38.88		38.66	38.93		39.60		39.35

Table 7. Kvistė River water level (inflow to Juodeikiai HPP reservoir), m LAS07

Date	2021											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
1	60.09	59.94	59.98	59.68	59.64	59.43	59.37	59.37	59.59	59.84	59.71	59.84
2	60.04	59.96	59.92	59.72	59.62	59.42	59.37	59.37	59.56	59.87	59.67	59.80
3	60.00	59.90	59.85	59.71	59.61	59.41	59.35	59.38	59.53	59.92	59.64	59.78
4	59.96	59.91	59.81	59.68	59.62	59.40	59.35	59.38	59.50	59.96	59.64	59.77
5	59.94	59.84	59.77	59.67	59.60	59.39	59.34	59.37	59.50	59.99	59.68	59.75
6	59.92	59.82	59.79	59.72	59.60	59.40	59.37	59.36	59.50	60.02	59.76	59.71
7	59.91	59.82	59.72	59.74	59.64	59.38	59.37	59.38	59.50	60.06	60.17	59.85
8	59.90	59.81	59.70	59.75	59.67	59.38	59.38	59.40	59.51	60.09	60.63	59.97
9	59.88	59.82	59.74	59.80	59.71	59.37	59.44	59.44	59.53	60.10	60.43	59.87
10	59.87	59.80	59.64	59.78	59.69	59.37	59.44	59.44	59.58	60.13	60.17	59.71
11	59.88	59.78	59.63	59.74	59.65	59.38	59.43	59.43	59.61	60.14	60.02	59.61
12	59.88	59.75	59.68	59.70	59.61	59.40	59.40	59.41	59.66	60.15	59.98	59.57
13	59.89	59.74	59.92	59.67	59.58	59.43	59.39	59.39	59.69	60.15	59.91	59.55
14	59.88	59.74	60.05	59.65	59.69	59.43	59.43	59.38	59.70	60.12	59.84	59.55

15	59.89	59.73	60.12	59.63	59.83	59.40	59.40	59.38	59.60	60.13	59.79	59.73
16	59.85	59.73	60.02	59.62	59.72	59.38	59.42	59.36	59.38	60.16	59.75	60.46
17	59.81	59.72	59.99	59.60	59.66	59.37	59.43	59.42	59.49	60.16	59.73	60.26
18	59.82	59.69	59.92	59.58	59.62	59.35	59.41	59.48	59.58	60.15	59.72	60.07
19	59.83	59.69	59.85	59.56	59.59	59.36	59.42	59.54	59.62	60.15	59.80	59.97
20	59.83	59.70	59.79	59.55	59.56	59.35	59.41	59.55	59.65	60.15	59.82	59.90
21	59.85	59.70	59.79	59.59	59.54	59.37	59.39	59.53	59.68	60.21	59.91	59.78
22	59.88	59.71	59.88	59.57	59.52	59.36	59.38	59.49	59.71	60.18	60.00	60.07
23	59.94	59.73	59.83	59.55	59.51	59.40	59.36	59.45	59.76	60.29	59.89	60.10
24	60.11	59.91	59.78	59.55	59.49	59.38	59.35	59.41	59.84	60.18	59.84	59.78
25	60.24	60.29	59.75	59.55	59.48	59.37	59.34	59.44	59.90	60.11	59.84	59.71
26	60.21	60.31	59.72	59.54	59.52	59.37	59.33	59.73	59.88	60.06	59.94	59.63
27	60.15	60.17	59.70	59.55	59.55	59.36	59.32	59.77	59.85	59.87	59.99	59.59
28	60.10	60.06	59.67	59.54	59.52	59.46	59.32	59.73	59.83	59.99	60.00	59.73
29	60.05		59.66	59.54	59.49	59.47	59.33	59.71	59.81	59.92	59.96	59.74
30	60.01		59.69	59.57	59.47	59.40	59.36	59.67	59.82	59.83	59.91	59.55
31	59.97		59.68		59.45		59.36	59.63		59.76		59.53

Table 1. Ciecere River water level in the river source, m LAS

Date	2021											2022		
	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III
1		100.25	100.29	100.04	100.06	99.87	99.76	99.95	100.02	100.20	100.31	100.27	100.75	100.74
2		100.27	100.28	100.04	100.06	99.87	99.76	99.95	100.02	100.20	100.31	100.27	100.73	100.69
3		100.29	100.27	100.03	100.05	99.86	99.76	99.95	100.02	100.19	100.30	100.29	100.70	100.64
4		100.29	100.26	100.03	100.04	99.86	99.76	99.95	100.02	100.20	100.29	100.35	100.66	100.59
5		100.29	100.25	100.04	100.03	99.85	99.75	99.95	100.01	100.20	100.28	100.47	100.62	100.55
6		100.28	100.24	100.04	100.02	99.84	99.75	99.95	100.01	100.21	100.28	100.58	100.61	100.51
7		100.27	100.23	100.05	100.01	99.84	99.75	99.95	100.00	100.26	100.26	100.62	100.66	100.48
8		100.26	100.23	100.05	100.01	99.84	99.76	99.94	99.99	100.33	100.27	100.62	100.70	100.45
9		100.24	100.23	100.07	100.00	99.85	99.78	99.94	99.98	100.40	100.25	100.60	100.72	100.42
10		100.23	100.22	100.08	99.99	99.84	99.78	99.95	99.98	100.43	100.21	100.58	100.76	100.40
11		100.21	100.21	100.08	99.99	99.85	99.79	99.95	99.98	100.44	100.19	100.56	100.79	100.37
12		100.20	100.20	100.08	99.98	99.85	99.79	99.96	99.98	100.44	100.18	100.52	100.80	100.34
13		100.20	100.18	100.07	99.97	99.84	99.79	99.97	99.97	100.43	100.17	100.48	100.77	100.32
14		100.21	100.17	100.07	99.97	99.84	99.79	99.97	99.97	100.41	100.16	100.47	100.74	100.31

15		100.26	100.16	100.06	99.96	99.84	99.79	99.98	99.97	100.39	100.16	100.49	100.69	100.29
16		100.32	100.14	100.06	99.95	99.84	99.80	99.99	99.97	100.37	100.20	100.48	100.66	100.27
17		100.35	100.14	100.05	99.95	99.83	99.80	99.99	99.98	100.35	100.29	100.49	100.70	100.26
18		100.38	100.12	100.05	99.94	99.82	99.81	99.98	99.98	100.34	100.36	100.49	100.86	100.23
19	99.96	100.39	100.11	100.03	99.94	99.81	99.82	99.97	99.98	100.32	100.40	100.49	100.94	100.22
20	99.93	100.38	100.10	100.03	99.93	99.80	99.82	99.96	99.99	100.32	100.42	100.49	101.00	100.21
21	99.92	100.37	100.08	100.02	99.92	99.80	99.81	99.96	100.01	100.32	100.43	100.49	101.03	100.20
22	99.92	100.36	100.07	100.01	99.92	99.78	99.81	99.95	100.02	100.31	100.43	100.48	101.07	100.18
23	99.92	100.36	100.07	100.00	99.91	99.78	99.81	99.96	100.03	100.30	100.40	100.46	101.09	100.17
24	99.91	100.36	100.06	100.00	99.91	99.78	99.81	99.99	100.05	100.30	100.38	100.44	101.04	100.16
25	99.93	100.35	100.05	100.00	99.90	99.78	99.81	100.01	100.07	100.30	100.36	100.44	100.97	100.15
26	100.02	100.34	100.05	100.01	99.89	99.78	99.85	100.02	100.07	100.30	100.35	100.43	100.91	100.14
27	100.13	100.34	100.05	100.02	99.88	99.77	99.85	100.03	100.08	100.30	100.33	100.44	100.86	100.13
28	100.21	100.33	100.05	100.04	99.88	99.76	99.89	100.04	100.12	100.31	100.34	100.48	100.80	100.13
29		100.32	100.05	100.06	99.88	99.76	99.91	100.04	100.16	100.31	100.31	100.54		100.12
30		100.31	100.04	100.06	99.88	99.75	99.94	100.03	100.18	100.31	100.28	100.61		100.11
31		100.29		100.06		99.76	99.95		100.19		100.27	100.71		100.11

Table 2. Ciecere River water level downstream Ciecere HPP, m LAS

Date	2021										2022		
	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III
1		92.25	92.09	92.13	91.98	91.93	91.95	91.98	92.09	92.22	92.18	92.43	92.37
2		92.28	92.11	92.11	92.03	91.92	92.03	92.06	92.08	92.18	92.21	92.41	92.35
3		92.27	92.10	92.11	91.98	91.92	91.95	91.96	92.08	92.18	92.22	92.39	92.34
4		92.27	92.09	92.12	91.98	91.92	91.95	92.00	92.08	92.19	92.36	92.36	92.32
5		92.27	92.10	92.08	92.04	91.93	92.05	92.03	92.09	92.20	92.40	92.35	92.31
6		92.25	92.11	92.09	91.98	91.93	91.95	91.97	92.08	92.22	92.41	92.35	92.29
7		92.26	92.09	92.07	91.98	91.92	92.02	92.04	92.11	92.16	92.41	92.39	92.29
8		92.26	92.12	92.07	92.02	91.93	91.95	91.95	92.14	92.21	92.39	92.39	92.27
9		92.25	92.11	92.08	91.99	91.92	91.95	91.98	92.22	92.17	92.36	92.41	92.27
10		92.25	92.12	92.07	91.96	91.93	92.01	91.92	92.23	92.20	92.34	92.43	92.27
11		92.25	92.15	92.07	91.94	92.00	91.96	91.92	92.24	92.11	92.32	92.44	92.25
12		92.22	92.13	92.06	91.95	91.94	91.96	92.00	92.25	92.12	92.31	92.42	92.25
13		92.23	92.15	92.05	92.00	91.94	91.95	91.92	92.24	92.13	92.30	92.41	92.24
14		92.24	92.10	92.05	91.95	91.94	91.95	92.03	92.24	92.16	92.32	92.39	92.23

15		92.21	92.13	92.05	91.94	91.94	91.95	91.94	92.23	92.10	92.32	92.37	92.23
16		92.15	92.11	92.04	91.94	91.94	91.96	92.01	92.23	92.16	92.32	92.36	92.22
17		92.19	92.15	92.04	91.94	91.94	91.96	91.95	92.23	92.21	92.34	92.43	92.17
18		92.19	92.13	92.04	91.94	91.94	91.95	91.96	92.22	92.22	92.34	92.45	92.21
19	92.30	92.15	92.12	92.04	91.94	92.00	91.95	91.91	92.17	92.24	92.32	92.48	92.17
20	92.32	92.18	92.09	92.04	91.97	91.94	91.95	92.04	92.23	92.27	92.32	92.48	92.20
21	92.32	92.14	92.13	92.05	91.95	91.94	92.03	91.94	92.18	92.26	92.32	92.48	92.19
22	92.31	92.17	92.10	92.01	91.94	91.94	92.00	92.04	92.19	92.27	92.31	92.49	92.17
23	92.28	92.10	92.10	91.98	91.94	91.94	91.98	91.97	92.22	92.24	92.30	92.48	92.20
24	92.32	92.13	92.09	92.07	91.94	91.94	92.06	91.96	92.19	92.24	92.29	92.47	92.15
25	92.29	92.09	92.10	91.98	91.95	91.94	91.98	92.00	92.20	92.23	92.30	92.45	92.17
26	92.32	92.11	92.11	92.03	91.95	92.00	92.06	91.97	92.16	92.22	92.31	92.43	92.17
27	92.29	92.09	92.10	91.98	91.94	91.95	91.98	92.01	92.23	92.20	92.32	92.41	92.13
28	92.29	92.14	92.11	92.03	91.94	91.95	92.08	92.10	92.21	92.20	92.36	92.39	92.16
29	92.29	92.10	92.13	91.98	91.94	92.02	92.04	92.07	92.22	92.17	92.36		92.16
30	92.29	92.14	92.11	92.04	91.94	91.94	92.04	92.03	92.22	92.18	92.43		92.14
31	92.29		92.11		91.93	92.01		92.07		92.16	92.44		92.17

Table 3. Ciecere River water level downstream Dzirnavnieki HPP, m LAS

Date	2021											2022		
	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III
1		84.27	83.96	83.67	83.76	83.57	83.61	83.81	83.68	83.94	83.98	83.87	84.55	84.27
2		84.22	83.96	83.68	83.71	83.56	83.57	83.83	83.68	83.91	83.96	83.95	84.46	84.19
3		84.14	83.96	83.69	83.70	83.60	83.57	83.82	83.63	83.88	83.94	83.99	84.36	84.15
4		84.11	83.96	83.69	83.69	83.56	83.57	83.81	83.65	83.83	83.93	84.23	84.25	84.11
5		84.09	83.94	83.71	83.66	83.56	83.57	83.82	83.67	83.82	83.88	84.42	84.20	84.06
6		84.05	83.94	83.73	83.63	83.56	83.57	83.77	83.59	83.83	83.90	84.46	84.22	84.00
7		84.01	83.94	83.72	83.63	83.56	83.56	83.77	83.67	84.07	83.84	84.43	84.37	84.00
8		84.01	83.91	83.76	83.62	83.59	83.66	83.70	83.59	84.28	83.89	84.34	84.38	83.95
9		83.94	83.90	83.73	83.62	83.57	83.65	83.70	83.66	84.33	83.80	84.25	84.45	83.95
10		83.92	83.88	83.74	83.63	83.61	83.60	83.67	83.65	84.28	83.82	84.16	84.56	83.95
11		83.91	83.86	83.78	83.64	83.58	83.69	83.69	83.66	84.20	83.77	84.11	84.57	83.90
12		83.84	83.83	83.74	83.66	83.58	83.63	83.71	83.70	84.13	83.84	84.07	84.51	83.90
13		83.93	83.84	83.77	83.65	83.62	83.63	83.67	83.63	84.07	83.94	84.03	84.44	83.89
14		83.97	83.82	83.72	83.62	83.64	83.66	83.64	83.68	84.03	83.91	84.09	84.36	83.87

15		84.06	83.79	83.73	83.62	83.60	83.64	83.60	83.64	84.00	83.93	84.11	84.27	83.86
16		84.08	83.78	83.72	83.59	83.59	83.64	83.61	83.66	83.96	84.16	84.09	84.23	83.85
17		84.14	83.78	83.87	83.62	83.59	83.68	83.57	83.64	83.96	84.21	84.15	84.53	83.75
18		84.14	83.79	83.89	83.63	83.58	83.70	83.58	83.66	83.94	84.23	84.15	84.66	83.83
19	83.79	84.13	83.77	83.84	83.60	83.58	83.80	83.58	83.73	83.91	84.22	84.11	84.80	83.75
20	83.72	84.13	83.75	83.76	83.61	83.61	83.72	83.55	83.81	83.90	84.21	84.11	84.80	83.81
21	83.64	84.10	83.72	83.73	83.59	83.58	83.69	83.63	83.83	83.90	84.10	84.10	84.82	83.78
22	83.64	84.08	83.77	83.72	83.60	83.58	83.72	83.60	83.90	83.89	84.10	84.07	84.91	83.74
23	83.65	84.04	83.71	83.69	83.57	83.58	83.67	83.69	83.88	83.89	84.02	84.05	84.85	83.81
24	83.66	84.06	83.70	83.65	83.64	83.58	83.66	83.82	83.88	83.91	83.97	84.02	84.75	83.71
25	83.82	84.03	83.65	83.64	83.57	83.58	83.72	83.83	83.88	83.93	83.94	84.05	84.63	83.74
26	84.16	84.05	83.68	83.71	83.60	83.58	83.83	83.86	83.86	83.94	83.94	84.07	84.52	83.74
27	84.28	84.01	83.66	83.66	83.57	83.58	83.80	83.80	83.89	83.99	83.91	84.09	84.43	83.69
28	84.32	84.01	83.71	83.67	83.63	83.57	83.83	83.80	84.00	84.01	83.92	84.24	84.34	83.73
29		83.99	83.65	83.72	83.57	83.57	83.85	83.74	84.02	84.02	83.85	84.25		83.73
30		83.97	83.73	83.75	83.60	83.58	83.82	83.74	83.98	84.00	83.87	84.54		83.70
31		83.97		83.75		83.59	83.82		83.97		83.82	84.58		83.74

Table 1. Losis River water level at LT-LV state border, m LAS

Date	2021										2022		
	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III
1		47.75	47.93	47.76	47.67	47.68	47.71	47.71	47.85	47.90	47.86	48.23	47.87
2		47.82	47.89	47.75	47.72	47.68	47.74	47.71	47.77	47.83	48.09	47.99	47.81
3		47.81	47.73	47.76	47.73	47.60	47.73	47.70	47.74	47.80	48.49	47.87	47.78
4		47.81	47.74	47.75	47.68	47.66	47.73	47.69	47.77	47.78	48.93	47.81	47.79
5		47.68	47.71	47.73	47.65	47.67	47.63	47.69	47.78	47.78	49.01	47.83	47.78
6		47.83	47.73	47.75	47.71	47.59	47.67	47.62	47.82	47.77	48.69	48.20	47.77
7		47.84	47.85	47.76	47.73	47.61	47.61	47.61	48.18	47.76	48.30	48.62	47.78
8		47.95	48.00	47.75	47.70	47.60	47.67	47.73	48.87	47.68	47.98	48.50	47.75
9		47.88	47.92	47.76	47.67	47.71	47.63	47.60	48.52	47.84	47.87	48.51	47.78
10		47.81	47.81	47.72	47.66	47.74	47.54	47.63	48.27	47.70	47.81	48.40	47.81
11		47.80	47.77	47.74	47.68	47.64	47.65	47.67	48.16	47.79	47.84	48.29	47.85
12		47.78	47.70	47.74	47.65	47.69	47.61	47.68	48.09	47.76	47.80	48.04	47.75
13		47.71	47.71	47.74	47.72	47.72	47.53	47.70	47.99	47.77	47.83	47.92	47.79
14		47.69	47.73	47.75	47.74	47.60	47.62	47.60	47.91	47.77	47.98	47.85	47.78

15		47.66	48.07	47.74	47.70	47.52	47.60	47.63	47.82	47.87	47.98	47.81	47.75
16		47.72	47.95	47.73	47.67	47.46	47.63	47.73	47.78	48.39	47.88	47.79	47.75
17		47.69	47.88	47.74	47.64	47.47	47.62	47.78	47.76	48.39	48.05	48.62	47.76
18		47.62	47.83	47.73	47.60	47.62	47.53	47.74	47.83	48.21	48.06	49.00	47.74
19	47.88	47.58	47.86	47.69	47.58	47.78	47.48	47.72	47.82	48.06	47.91	48.92	47.74
20	47.81	47.61	47.77	47.66	47.55	47.76	47.62	47.71	47.82	48.01	47.93	49.04	47.74
21	47.77	47.58	47.80	47.63	47.54	47.76	47.70	47.84	47.83	48.01	47.92	48.93	47.74
22	47.94	47.60	47.77	47.60	47.52	47.76	47.60	47.90	47.97	47.90	47.86	49.21	47.74
23	47.96	47.63	47.78	47.69	47.51	47.66	47.54	48.03	47.94	47.73	47.81	48.80	47.75
24	47.82	47.62	47.76	47.73	47.49	47.66	47.73	47.91	47.91	47.92	47.79	48.35	47.75
25	47.77	47.63	47.76	47.69	47.49	47.71	47.77	47.88	47.86	47.74	47.89	48.24	47.76
26	47.77	47.59	47.79	47.65	47.48	47.92	47.78	47.79	47.90	47.81	48.03	48.13	47.75
27	47.76	47.65	47.78	47.62	47.57	47.88	47.73	47.85	48.12	47.80	48.05	47.97	47.75
28	47.72	47.63	47.83	47.70	47.75	47.81	47.72	48.13	48.07	47.77	48.72	47.90	47.74
29	47.66	47.63	47.77	47.73	47.72	47.86	47.75	48.00	48.07	47.76	48.50		47.75
30	47.70	47.63	47.76	47.69	47.68	47.79	47.69	47.97	47.93	47.73	48.77		47.79
31	47.74		47.77		47.62	47.73		47.84		47.78	48.65		47.77

Table 2. Losis River water level downstream Grantini HPP, m LAS

Date	2021											2022		
	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III
1		56.40	56.25	56.43	56.10	56.15	56.14	56.20	56.10	56.27	56.37	56.47	56.72	56.34
2		56.35	56.29	56.29	56.14	56.10	56.09	56.10	56.08	56.19	56.30	56.65	56.56	56.28
3		56.33	56.31	56.19	56.07	56.09	56.13	56.13	56.09	56.21	56.29	57.05	56.45	56.29
4		56.33	56.22	56.20	56.13	56.16	56.02	56.07	56.08	56.18	56.29	57.22	56.38	56.28
5		56.21	56.25	56.18	56.19	56.20	55.92	56.09	56.08	56.25	56.30	57.33	56.39	56.24
6		56.18	56.29	56.24	56.15	56.11	55.94	56.09	56.11	56.36	56.28	57.04	56.78	56.19
7		56.21	56.35	56.36	56.05	56.06	56.02	56.14	56.17	56.74	56.26	56.67	57.03	56.16
8		56.19	56.33	56.45	56.12	56.12	56.13	56.09	56.02	57.23	56.34	56.49	56.92	56.19
9		56.20	56.29	56.33	55.95	56.18	56.21	56.11	56.05	56.91	56.25	56.44	56.95	56.19
10		56.16	56.27	56.28	56.05	56.23	56.14	56.22	56.07	56.72	56.27	56.34	56.86	56.18
11		56.13	56.24	56.26	56.01	56.27	56.18	56.12	56.05	56.61	56.22	56.28	56.70	56.18
12		56.19	56.24	56.18	56.02	56.28	56.09	56.09	56.07	56.55	56.20	56.30	56.56	56.14
13		56.49	56.16	56.17	56.12	56.09	55.88	56.12	56.07	56.43	56.23	56.41	56.50	56.13
14		56.67	56.16	56.17	56.08	55.93	55.90	56.09	56.13	56.36	56.21	56.53	56.38	56.09

15		56.77	56.13	56.55	56.08	55.98	55.97	56.12	56.16	56.30	56.33	56.50	56.36	56.16
16		56.67	56.07	56.45	56.12	56.03	56.04	56.08	56.14	56.27	56.87	56.42	56.31	56.14
17		56.55	56.15	56.31	56.04	56.07	56.12	56.06	56.23	56.29	56.80	56.60	57.11	56.13
18		56.43	56.03	56.24	55.93	56.09	56.10	56.14	56.18	56.28	56.64	56.57	57.29	56.12
19		56.35	56.10	56.18	56.02	56.12	56.19	56.20	56.17	56.31	56.53	56.46	57.26	56.03
20		56.27	56.16	56.13	56.09	56.14	56.12	56.13	56.22	56.37	56.49	56.48	57.34	56.09
21	56.17	56.27	56.17	56.13	56.15	56.15	56.12	56.08	56.33	56.37	56.41	56.48	57.27	56.08
22	56.14	56.42	56.12	56.17	56.20	56.18	56.13	56.13	56.39	56.48	56.45	56.41	57.47	56.14
23	56.17	56.39	56.03	56.04	56.15	56.19	56.11	56.20	56.51	56.44	56.45	56.36	57.14	56.17
24	56.31	56.33	56.13	56.11	56.16	56.21	56.12	56.19	56.45	56.34	56.38	56.30	56.80	56.23
25	56.77	56.34	56.11	56.11	56.21	56.23	56.08	56.23	56.37	56.34	56.35	56.47	56.71	56.08
26	56.95	56.30	56.14	56.11	56.24	56.24	56.44	56.19	56.30	56.44	56.33	56.56	56.63	56.09
27	56.78	56.25	56.18	56.24	56.25	56.20	56.33	56.19	56.33	56.58	56.31	56.63	56.52	56.05
28	56.55	56.22	56.18	56.14	56.12	56.13	56.30	56.20	56.61	56.54	56.30	57.12	56.46	56.13
29		56.22	56.14	56.14	56.04	56.14	56.26	56.08	56.55	56.51	56.27	56.93		56.13
30		56.29	56.20	56.17	56.10	56.15	56.15	56.12	56.44	56.45	56.23	57.18		56.11
31		56.30		56.14		56.17	56.16		56.37		56.23	57.04		56.09

Table 3. Losis River water level downstream Lejnieki HPP, m LAS

Date	2021											2022		
	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	I	II	III
1		40.79	40.58	40.65	40.42	40.42	40.41	40.43	40.39	40.58	40.71	40.58	41.02	40.71
2		40.72	40.54	40.77	40.48	40.42	40.41	40.57	40.47	40.61	40.70	40.78	40.86	40.67
3		40.63	40.67	40.59	40.42	40.42	40.41	40.43	40.39	40.49	40.70	41.06	40.75	40.62
4		40.60	40.67	40.59	40.42	40.42	40.48	40.58	40.53	40.59	40.60	41.56	40.69	40.63
5		40.66	40.59	40.55	40.42	40.42	40.42	40.42	40.39	40.59	40.56	41.74	40.70	40.62
6		40.57	40.71	40.62	40.42	40.42	40.42	40.42	40.38	40.72	40.69	41.45	40.88	40.56
7		40.55	40.63	40.63	40.58	40.42	40.42	40.43	40.38	40.77	40.50	41.06	41.29	40.57
8		40.60	40.71	40.78	40.42	40.42	40.42	40.48	40.49	41.55	40.43	40.90	41.22	40.47
9		40.51	40.72	40.75	40.42	40.42	40.42	40.43	40.39	41.22	40.63	40.71	41.19	40.58
10		40.58	40.68	40.73	40.48	40.42	40.52	40.43	40.39	40.97	40.48	40.69	41.07	40.55
11		40.55	40.64	40.56	40.42	40.52	40.43	40.52	40.38	40.88	40.56	40.63	41.00	40.56
12		40.54	40.60	40.60	40.42	40.42	40.43	40.42	40.39	40.82	40.51	40.55	40.91	40.46
13		40.75	40.70	40.43	40.50	40.42	40.54	40.42	40.54	40.77	40.52	40.62	40.77	40.57
14		40.90	40.53	40.61	40.42	40.51	40.43	40.51	40.39	40.71	40.42	40.79	40.70	40.44

15		41.04	40.50	40.74	40.42	40.42	40.42	40.43	40.39	40.70	40.60	40.84	40.70	40.59
16		41.01	40.45	40.76	40.42	40.42	40.42	40.42	40.39	40.69	41.02	40.71	40.58	40.44
17		40.93	40.62	40.73	40.51	40.42	40.42	40.42	40.61	40.44	41.10	40.80	41.21	40.44
18		40.74	40.55	40.55	40.42	40.42	40.42	40.42	40.42	40.59	40.93	40.94	41.75	40.52
19	40.43	40.71	40.44	40.69	40.42	40.42	40.54	40.42	40.52	40.68	40.83	40.71	41.60	40.43
20	40.52	40.70	40.44	40.47	40.42	40.42	40.54	40.42	40.38	40.70	40.78	40.76	41.86	40.54
21	40.41	40.57	40.55	40.47	40.41	40.42	40.42	40.52	40.63	40.70	40.72	40.77	41.70	40.44
22	40.41	40.71	40.44	40.51	40.41	40.42	40.58	40.42	40.73	40.71	40.71	40.73	42.09	40.43
23	40.55	40.72	40.56	40.55	40.41	40.42	40.42	40.42	40.85	40.72	40.45	40.71	41.72	40.54
24	40.50	40.72	40.41	40.42	40.41	40.42	40.43	40.43	40.73	40.71	40.61	40.59	41.15	40.44
25	40.81	40.68	40.50	40.42	40.41	40.42	40.55	40.61	40.73	40.70	40.45	40.71	41.02	40.41
26	41.01	40.63	40.53	40.61	40.41	40.42	40.67	40.47	40.58	40.69	40.60	40.84	40.95	40.55
27	40.94	40.60	40.43	40.48	40.41	40.42	40.78	40.62	40.63	40.83	40.62	40.86	40.84	40.41
28	40.86	40.62	40.54	40.50	40.53	40.42	40.67	40.41	40.87	40.83	40.43	41.33	40.75	40.41
29		40.61	40.56	40.65	40.42	40.42	40.60	40.54	40.81	40.81	40.57	41.24		40.41
30		40.59	40.54	40.43	40.42	40.42	40.64	40.39	40.79	40.74	40.50	41.43		40.54
31		40.66		40.56		40.41	40.58		40.72		40.63	41.42		40.41