

September 14, 2022

Crystal Mountain Society
Galiano Island BC V0N 1P0

**Re: 2022 Groundwater Level Monitoring, Crystal Mountain Retreat Centre,
Observation Well WID 23229 and Central Well WID 23227, Galiano Island**

Background

Further to my earlier report (Kohut, 2022) on water level monitoring carried out at the above site from September 17, 2021 to January 3, 2022 the water level dataloggers were reinstalled on February 13, 2022. This report summarizes the results of the water level monitoring carried out between February 13 and September 6, 2022.

Monitoring Results

Observation Well WID 23229

Figure 1 shows the water levels in the Observation Well from (a) February 13 to July 5, and (b) from July 5 to September 6, 2022. After rising about 0.7 m between late February and mid April 2022 the water level shows a relatively steady decline of about 2.5 m from April to September. The Observation Well does not show any discernable effects (interference) from the Central Well that was pumping intermittently during August 2022. Tidal effects ranging about 0.5 cm are observed in the water level hydrograph. The raw data for the above monitoring periods are provided in Excel[®] spreadsheets titled “Crystal Mtn Observation Well Feb to July 2022.csv”, and “Crystal Mtn Observation Well July to Sept 2022.csv”.

Central Well WID 23227

Figure 2 shows the water levels in the Central Well from (a) February 13 to July 5, and (b) from July 5 to September 6, 2022. After rising about 0.5 m between late February and early April 2022 the water level shows a relatively steady decline of about 2.7 m from April to September. Pumping effects in the well during August are apparent in hydrograph (b) as the well was pumped daily between August 5 and August 24.

Figure 3 shows the amount of water pumped daily from the well during this period. Figure 4 shows the number of persons using water each day. Based on the amount of water

pumped each day, the daily quantity of water available per capita ranged from 8.7 to 19.6 USgals. This is considerably less than the 60.8 USgals per capita quantity estimated for indoor water use for conventional water systems (Figure 3), based on the Design Guidelines for Rural Residential Community Systems (Ministry of Forests, Lands & Natural Resource Operations, 2012). The raw data for the above monitoring periods are provided in Excel[®] spreadsheets titled “Crystal Mtn Central Well Feb to July 2022.csv”, and “Crystal Mtn Central Well July to Sept 2022.csv”.

Discussion

While the quantity of water pumped each day in August ranged from 8.7 to 19.6 USgals per person, these values may not be equivalent to the actual water use per person as the water is being pumped to a relatively large 3000 USgal storage tank. My understanding is that the well pump is powered by an electric generator that was manually turned on each day. In addition to the flow meter at the pump, a second flow meter on the outflow from the tank would need to be installed to confirm the actual water use each day under the current operating conditions.

Conclusions

Based on the water level monitoring conducted on Observation Well WID 23229 and the Central Well WID 23227 between February 13, 2022 and September 6, 2022, the following conclusions can be made:

1. Water levels in both wells behaved in a similar fashion declining 2.5 to 2.7 m during the period April to September 2022.
2. Water levels in Observation Well WID 23229 showed daily tidal loading effects of about 5 cm.
3. Pumping of the Central Well in August 2022 showed no discernible interference effects of the Observation Well.
4. While the quantity of water pumped each day in August ranged from 8.7 to 19.6 USgals per person on site, these values may not be equivalent to the actual water use per person as the water is being pumped to a relatively large 3000 USgal storage tank.

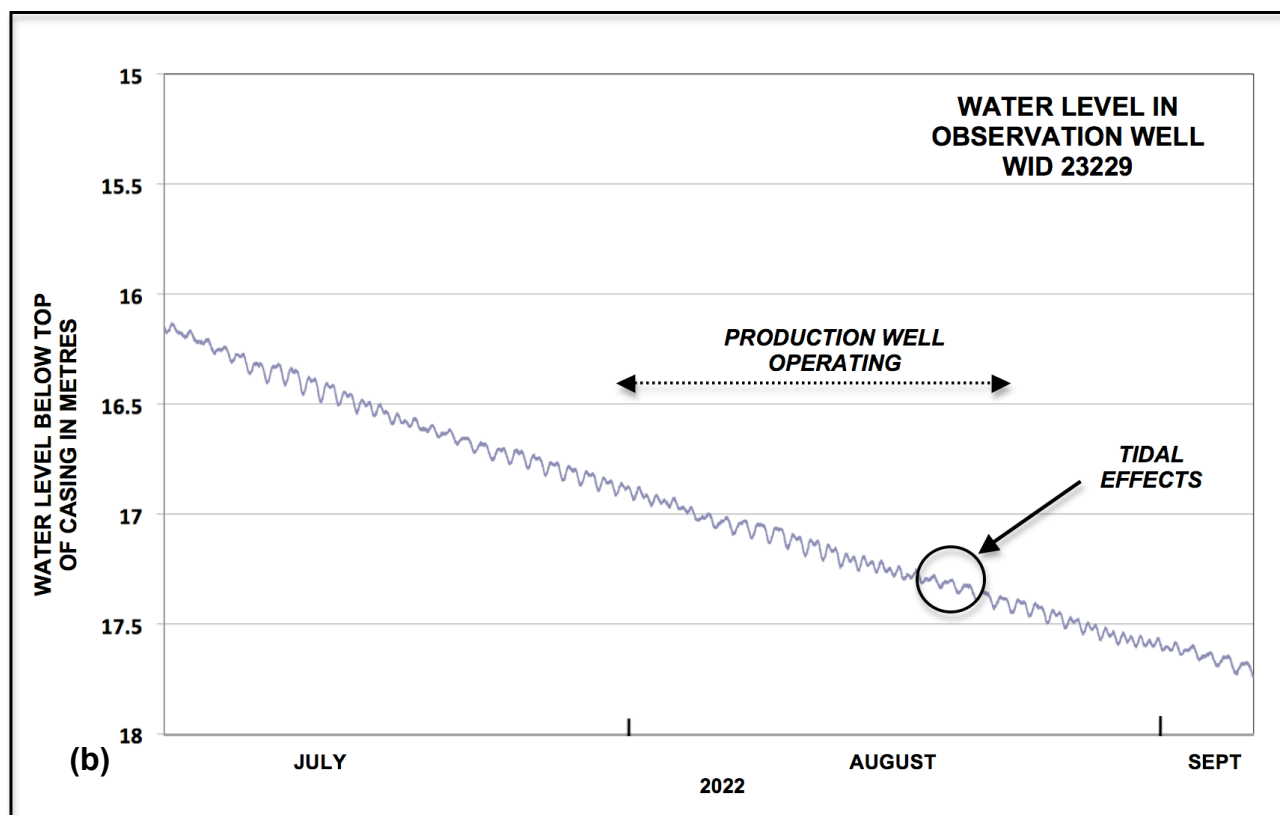
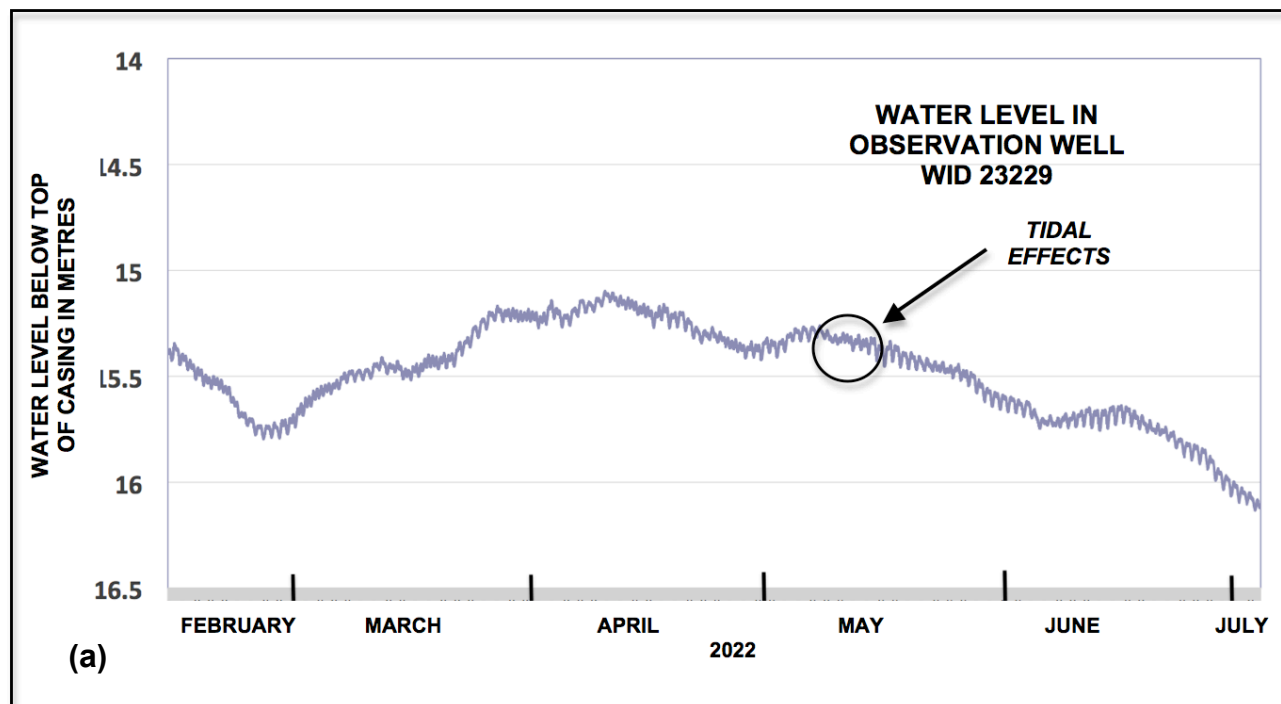


Figure 1. Variations in water levels in Observation Well from (a) February 13 to July 5 and (b) July 5 to September 6, 2022.

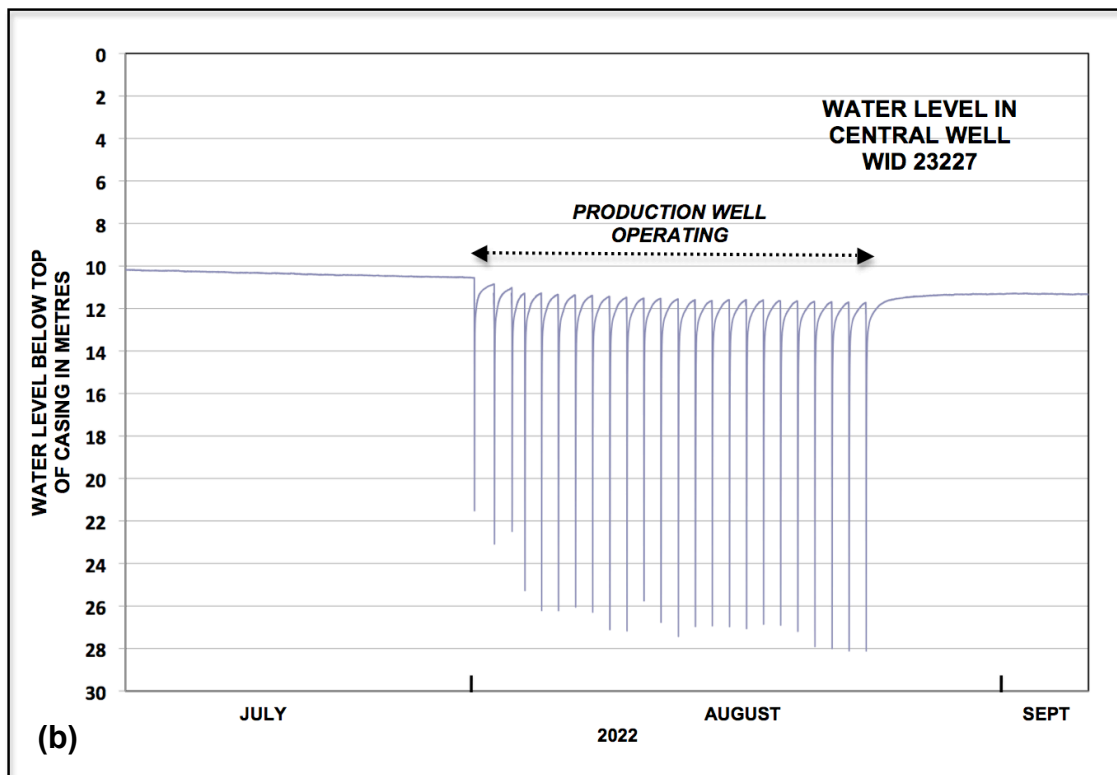
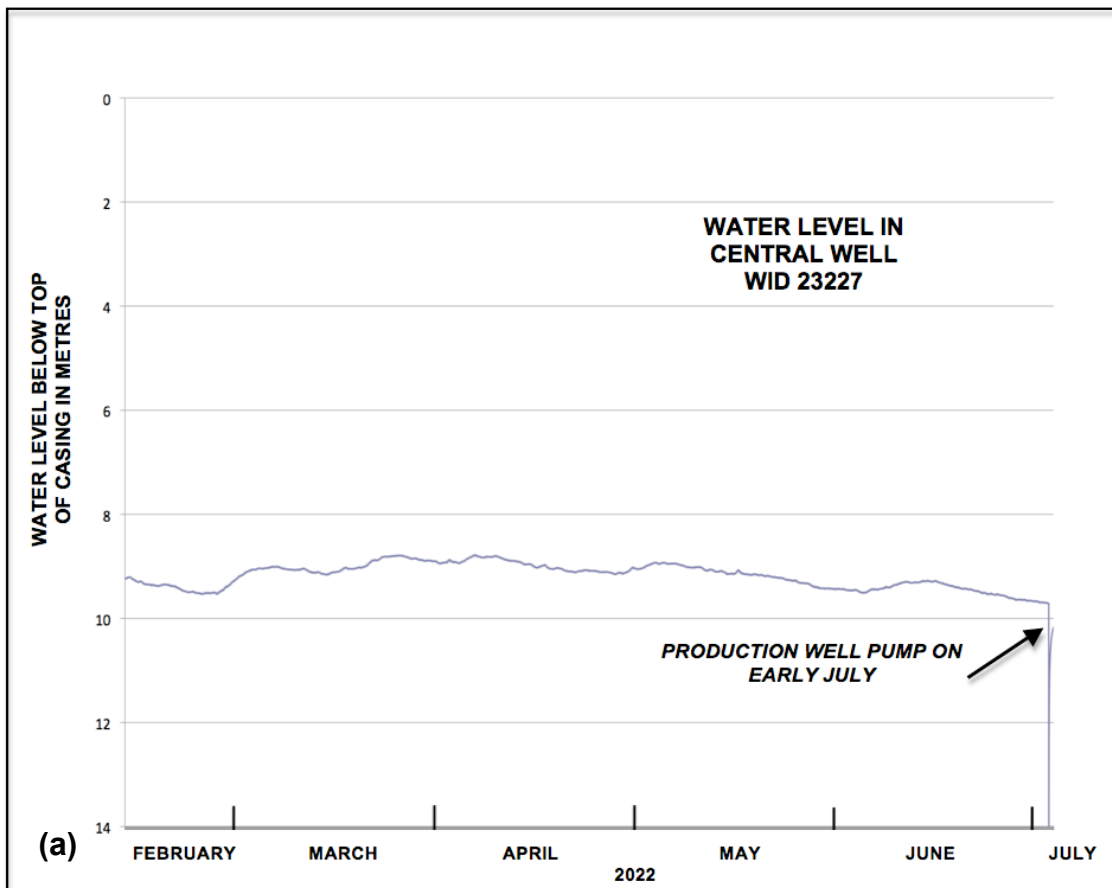


Figure 2. Variations in water levels in Central Well from (a) February 13 to July 5, and (b) July 5 to September 6, 2022.

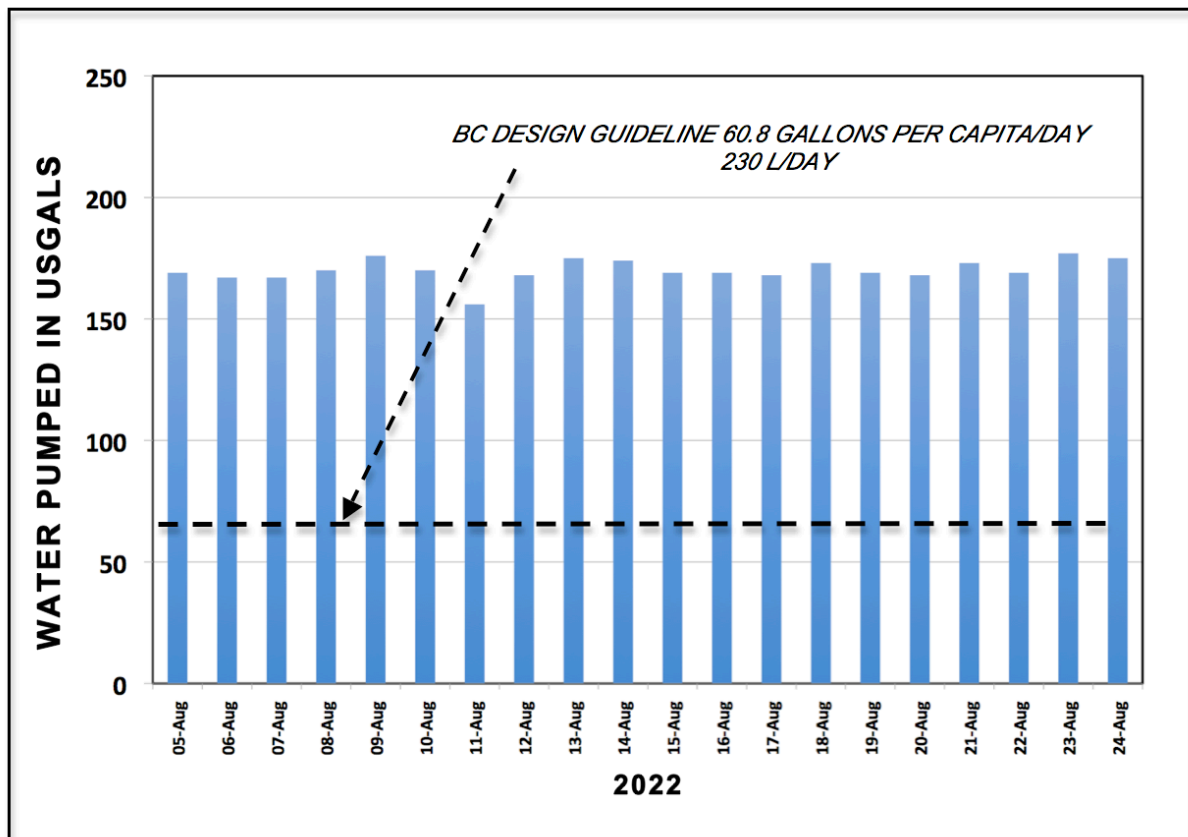


Figure 3. Water quantity pumped daily between August 5 and August 24, 2022.

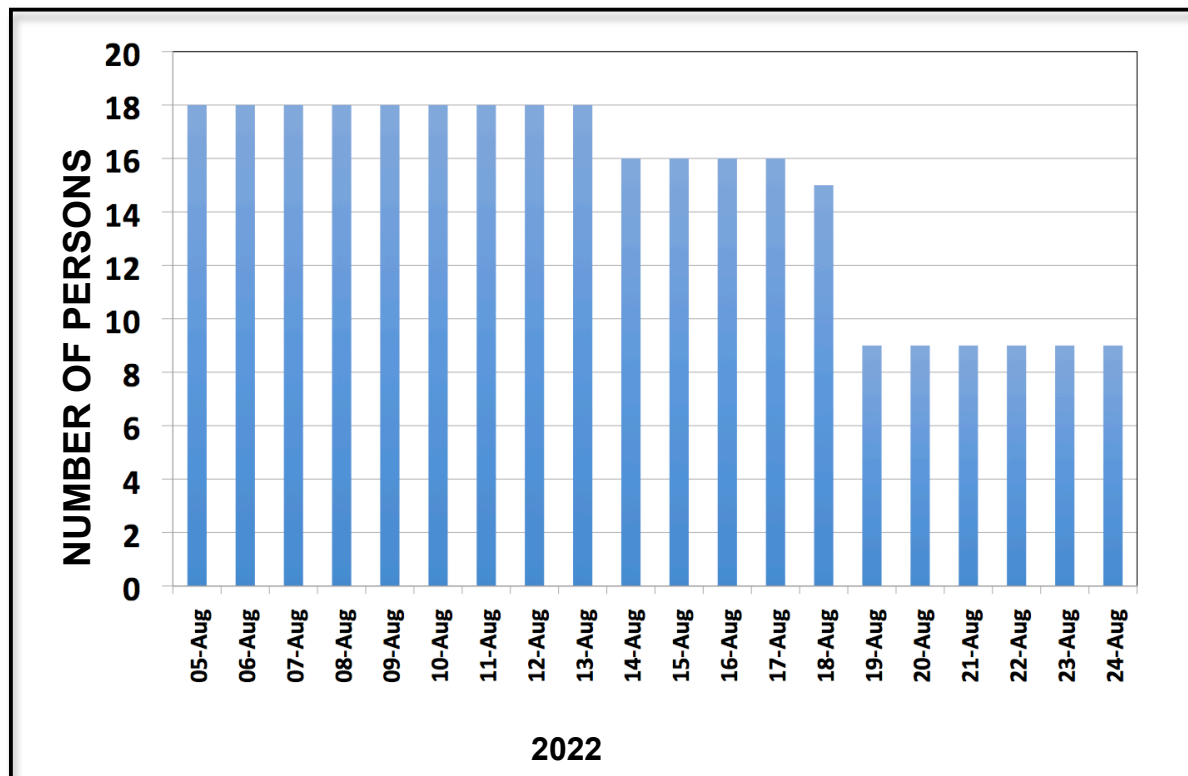


Figure 4. Number of persons using water daily between August 5 and August 24, 2022.

CLOSURE

This report was prepared in accordance with generally accepted engineering, hydro-geological and consulting practices. It is intended for the prime use of Crystal Mountain Society, in connection with its purpose as outlined under the scope of work for this project. This report is based on data and information available to the author from various sources at the time of its preparation and the findings of this report may therefore be subject to revision. Data and information supplied by others has not been independently confirmed or verified to be correct or accurate in all cases. Any errors, omissions or issues requiring clarification should be brought to the attention of the author. The author retains full copyright of the material contained in the report. The author and Hy-Geo Consulting accepts no responsibility for damages suffered by any third party as a result of any unauthorized use of this report.

Respectfully submitted:


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Permit to Practice Number: 1001034

References

Ministry of Forests, Lands & Natural Resource Operations. 2012. *Design Guidelines for Rural Residential Community Water Systems*. Utility Regulation Section, Water Management Branch, Government of British Columbia. Internet website https://www2.gov.bc.ca/assets/gov/environment/air-land-water/water/water-rights/water-utilities/design_guidelines_rural_residential_water_mar2012.pdf

Kohut, A.P. 2022. *Groundwater Level Monitoring, Crystal Mountain Retreat Centre, Observation Well WID 23229 and Central Well WID 23227, Galiano Island*. Report prepared of Crystal Mountain Society. Hy-Geo Consulting, Victoria, British Columbia. January 2022. File: 1508141.