REGIONAL DISTRICT OF NANAIMO

REGIONAL GROUNDWATER LEVEL ANALYSIS PRE-SUMMER 2024

RECOMMENDATION

That the Board receives the report of Regional Groundwater Level Analysis Pre-Summer 2024 for information.

BACKGROUND

Most communities within our region rely on groundwater for their water supply. This includes water service areas operated by the Regional District of Nanaimo (RDN), District of Lantzville, City of Parksville and Town of Qualicum Beach. Four improvement districts also source groundwater for their waterworks systems, including Deep Bay Improvement District, Bowser Waterworks, Qualicum Bay Horne Lake Waterworks and North Cedar Improvement District. EPCOR, a private water system, provides groundwater for residents in French Creek. Additionally, Snaw-naw-as First Nation and Stz'uminus First Nation operate water supply systems that rely on groundwater from regional aquifers. There are also many residents across the RDN's electoral areas who maintain and rely on private domestic wells for their drinking water.

The RDN Drinking Water and Watershed Protection (DWWP) program monitors groundwater levels in aquifers across the region, through the RDN Volunteer Observation Well Network, to understand water availability and assess trends over time. This supplements the monitoring done by the Province via the Provincial Observation Wells within the region.

Since 2020, the RDN DWWP program has completed an annual regional analysis of groundwater levels to support preparation for the summer period ahead and provide an update on longer-term and seasonal trends observed in the aquifers within our region. This reporting has been supported by consulting professional hydrogeologists from Waterline Resources Inc (2020 and 2021) and GW Solutions Inc (2022, 2023, and 2024).

The 2024 analysis includes 61 wells – 27 RDN Volunteer Observation Wells (VOW) and 34 Provincial Groundwater Observation Network Wells (OW) – which monitor 13 surficial (sand and gravel) aquifers and 9 bedrock aquifers. The historical analysis considers all available data within the range between 2013-2024.

This memo will summarize both the seasonal and longer-term trends of the above-mentioned wells and aquifers and discuss the application of this information. The updated data tables and graphs provided as appendices.

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SUMMARY

Seasonal Conditions and Longer-Term Trends

Of the 22 aquifers that have 2024 monitoring data for the spring (April – June) season: 5 are at above average levels for this time of year; 9 are at average levels, while 8 are reporting below average levels for this season. This is in the context of a drier than average winter and an unusually low snowpack accumulation, with little to no contribution of snowmelt in the early spring. The variability across aquifers illustrates the complex nature of groundwater in our region and how different conditions exist in different locations. These trends are influenced by the physical attributes of the aquifers (bedrock or sand and gravel; confined or unconfined), the level of demand and pumping, the distribution and volume of precipitation received, among other factors.

Seasonally *above average* with increasing or stable historic trend:

- Aquifer 216 – Parksville – surficial
- Aquifer 1098 – Nanoose – surficial
- Aquifer 165 – South Wellington – bedrock

Seasonally *above average* with variable historic trend:

- Aquifer 217 – Qualicum Beach – surficial
- Aquifer 219 – Nanoose – surficial (3 monitoring wells reporting: 2 stable and 1 increasing)

Seasonally *at average* with increasing or stable historic trend:

- Aquifer 664 – Little Qualicum – surficial
- Aquifer 1250 – French Creek – surficial
- Aquifer 167 – Millstone Valley – surficial
- Aquifer 213 – Upper Lantzville – bedrock
- Aquifer 161 – Upper Cassidy – surficial

Seasonally *at average* with variable historic trend:

- Aquifer 214 – Nanoose – bedrock (5 monitoring wells reporting: 4 average levels + 1 below to average)
- Aquifer 215 – Lantzville – surficial (3 monitoring wells, 1 showing stable, 1 decline, and 1 increasing)
- Aquifer 162 – Cedar Yellowpoint – bedrock (6 monitoring wells: 3 increasing + 3 large to mod. decline)

Seasonally *at average* with decreasing historic trend:

- Aquifer 218 – Nanoose Peninsula – bedrock

Seasonally *below average* with increasing or stable historic trend:

- Aquifer 416 – Deep Bay – surficial
- Aquifer 662 – Dashwood – surficial
- Aquifer 160 – Lower Cassidy – surficial
- Aquifer 163 – Cedar – surficial
- Aquifer 709 – Gabriola Island – bedrock (5 monitoring wells, reporting from below average to above average for the season)

Seasonally *below average* with variable historic trend:

- Aquifer 212 – Oceanside – bedrock
- Aquifer 220 – Errington - bedrock (2 monitoring wells reporting: 1 increasing and 1 large decline)
- Aquifer 211 – Mt Benson foothills - bedrock

Application

This information provides a snapshot of groundwater conditions in the region heading into the summer months. The seasonal conditions observed in spring, as reported in this memo, can provide an early indication of where heightened water conservation measures may be needed this summer. Watching weather patterns over July and August and how that translates into community water demand and / or low streamflow, will further inform water service providers and well owners across the region.

Water purveyors have implemented the annual outdoor water conservation framework to promote water use reduction. This year's reporting will be shared with municipal, improvement district, and small water system staff to provide an outlook for groundwater conditions this coming summer and support their management considerations and communications to customers.

As it has been identified that it is also important to share this information with residents on private wells who play a role in protecting our shared groundwater resources, data from this analysis will be featured in a mailed-out and web-published 2024 edition of the *State of our Aquifers newsletter*. This publication, and its associated engagement page on the RDN's *Get Involved* platform, will include groundwater information, presented in a clear and engaging format with a mix of text and graphics, that educates residents about groundwater science and the role they play in protecting this vital resource. The *Get Involved* page will also feature interactive opportunities which serve to gather information to better enhance residents understanding of groundwater and will inform future publications, workshops, and engagement for the DWWP program's Team WaterSmart outreach strategies.

The primary measures to respond to potential groundwater shortages include water conservation (efficient irrigation, rainwater harvesting, soil improvements, efficient appliances) and eliminating leaks. Understanding the seasonal conditions of a well or aquifer in relation to longer-term groundwater level trends offers important context and can help prioritize policy solutions for areas that are regularly under more water stress due to aquifer characteristics, climate impacts and localized demand. Where trends indicate declining levels over time, as well as below average seasonal levels, it points not only to the need for increased water conservation measures going into the summer period but also to the longer-term need to encourage groundwater recharge across the landscape, supplement water storage, and practice water efficiency year-round. Increasing trends and above average seasonal levels may help to indicate where water management actions are having a positive effect.

Data Tables and Graphs

The updated data tables and hydrographs attached to this report include the following:

Appendix A – Summary of Groundwater Observation Well Data provides a detailed table that reports the historical and seasonal groundwater level trend per mapped aquifer, based on either Provincial or RDN observation wells with available data at time of reporting. It also notes which community water service areas, if any, are associated with which aquifer and lists the total number of registered wells correlated to each mapped aquifer to get a sense of the density of private wells relying on the aquifer outside the serviced areas. [Note that this number of private wells is not exhaustive as, a) there are also many registered wells that are uncorrelated to an aquifer but fall within the spatial extent of the aquifer and, b) there are many unregistered wells that are not accounted for].

Appendix B – Historical Groundwater Level Trend Results provides a table with the long-term groundwater level trend results calculations and hydrographs for each observation well used for this reporting, showing the full dataset available 2013-2024 for level fluctuations over time.

Appendix C – Seasonal Groundwater Level Trend Results provides hydrographs for each observation well that has updated data since the last report in 2023. These charts plot each year of data to see inter-annual variation compared with the average across the data record to 2024. Fifty-eight of the 61 graphs include 2024 data that was available at time of reporting to provide the seasonal trend analysis that is summarized in the table in Appendix A.

FINANCIAL IMPLICATIONS

This report has no financial implications.

STRATEGIC PLAN ALIGNMENT

Water Security - Understand our water resources and their risks, to manage our water resources effectively and sustainably.

REVIEWED BY:

- M. Walters, A/ General Manager, Regional and Community Utilities
- D. Holmes, Chief Administrative Officer

ATTACHMENTS

1. Figure 1 – Observation Well Locations
2. Appendix A – Overview of Groundwater Observation Well Data 2024
3. Appendix B – Historical Groundwater Level Results 2013-2024
4. Appendix C – Seasonal Groundwater Level Results