Scott Point Waterworks District
377 Scott Point Drive
Salt Spring Island, B.C.
V8K 2R2

(Via email)

Attention: Richard Ballantyne, P.Eng.

Re: Hydrogeological Characterization

GW Solutions Inc. (GW Solutions) is pleased to present the following letter-report summarizing our hydrogeological characterization of Scott Point Waterworks District.

Background

Scott Point Waterworks District (SPWD) has been issued a groundwater advisory letter from the Ministry of Forest, Lands and Natural Resources Operations (FLNRO) concerning saltwater intrusion (SWI) on two of the three production wells. The letter cites Section 78 of the *Water Act,* which states:

> A person must not operate a well in a manner that causes or is likely to cause:
> (a) the intrusion of salt water or contaminated water into
> (i) an aquifer from which that well draws ground water, or
> (ii) any well that draws ground water from that aquifer, and
> (b) a significant adverse impact on

(i) the quality of the ground water in that aquifer, or

(ii) the existing uses made of the ground water from any well that draws from that aquifer.

FLNRO utilizes chloride concentration greater than 250 ppm as an indicator for SWI. Well #1 was drilled in 1964 and has always been brackish with the lowest chloride concentration recorded of 700 ppm in 1973; Well #4 can produce water with chloride concentration less than 250 ppm. However, on October 6th 2014, chloride was measured at 299 ppm.

The BC Well Database identifies 19 wells along Scott Point on Salt Spring Island (SSI), including the two wells of concern (Figure 1).

Figure 1. Wells along Scott Point from BC Well Database.

The three wells follow different management practices: Well #1 is operating on an on-demand system, pumping whenever the above ground storage tank reaches a set level; Well #3 operates on a sipping mode all year due to the low water availability in the summer; and Well #4 operates on a timer system which is adjusted at the operators' discretion to meet the demands.

SPWD has set out to address this issue by answering the following four questions:

- Is the water resource from the aquifer and precipitation into the 3 wells sufficient to supply the system given the historic water consumption and a small amount of growth?
- What is the capacity of the water resource to recover from system failures such as leaks or over-pumping?
- Is there a growing potential for SWI to negatively impact the aquifer and further affect water supply and quality?
- What is the prospect of improvement if different management practices or equipment were implemented?

Environmental Setting

Well #1 and #4 are located in the bedrock aquifer identified as Aquifer No. 721 by the BC Ministry of Environment (MOE). Aquifer No. 721 is considered to have low productivity and moderate vulnerability and demand. Well #3 is located in the unconsolidated sand and gravel material above Aquifer No. 721. This aquifer has not been identified within the BC MOE aquifer classification. The recharge of groundwater across SSI is dependent on precipitation. The annual precipitation from Environment Canada's Saturna Island weather station (the closest to Scott Point) between 2010 and 2015 is depicted in Figure 2. The precipitation has remained relatively consistent over the last five years, with an average annual precipitation of 664mm.

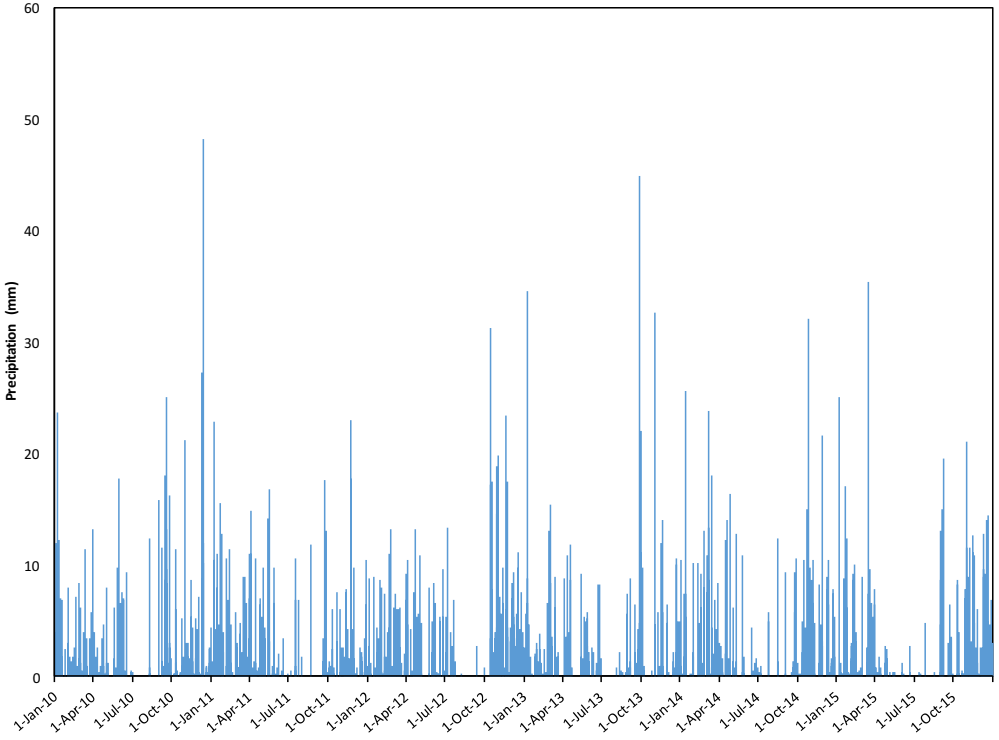


Figure 2. Precipitation from 2010-2015 on Saturna Island.

Water Level Analysis

Water level data for the three production Wells has been manually measured by North Salt Spring Waterworks using an air bubbler approximately once per week (depending on well usage) since 2010 and analyzed in this report to establish annual drawdown patterns. Reference elevations for the air bubblers were estimated and as a result the water elevations determined are approximate (+/- 3 m). Historical annual water table fluctuations were estimated for Well #1, #4 and #3 based on the provided water level data and were determined to be 20 m, 9.5 m and 9 m respectively (Figure 3). However, this water table fluctuation is not considered the natural fluctuation as the Wells were active. Well #1 and #3 consistently have water elevations below sea level during the summer season, both in response to water extraction.

In 2013 water levels in Well #1 does not extend below sea level. This could be attributed to the timing when water level measurements were made (pumping vs. no pumping).

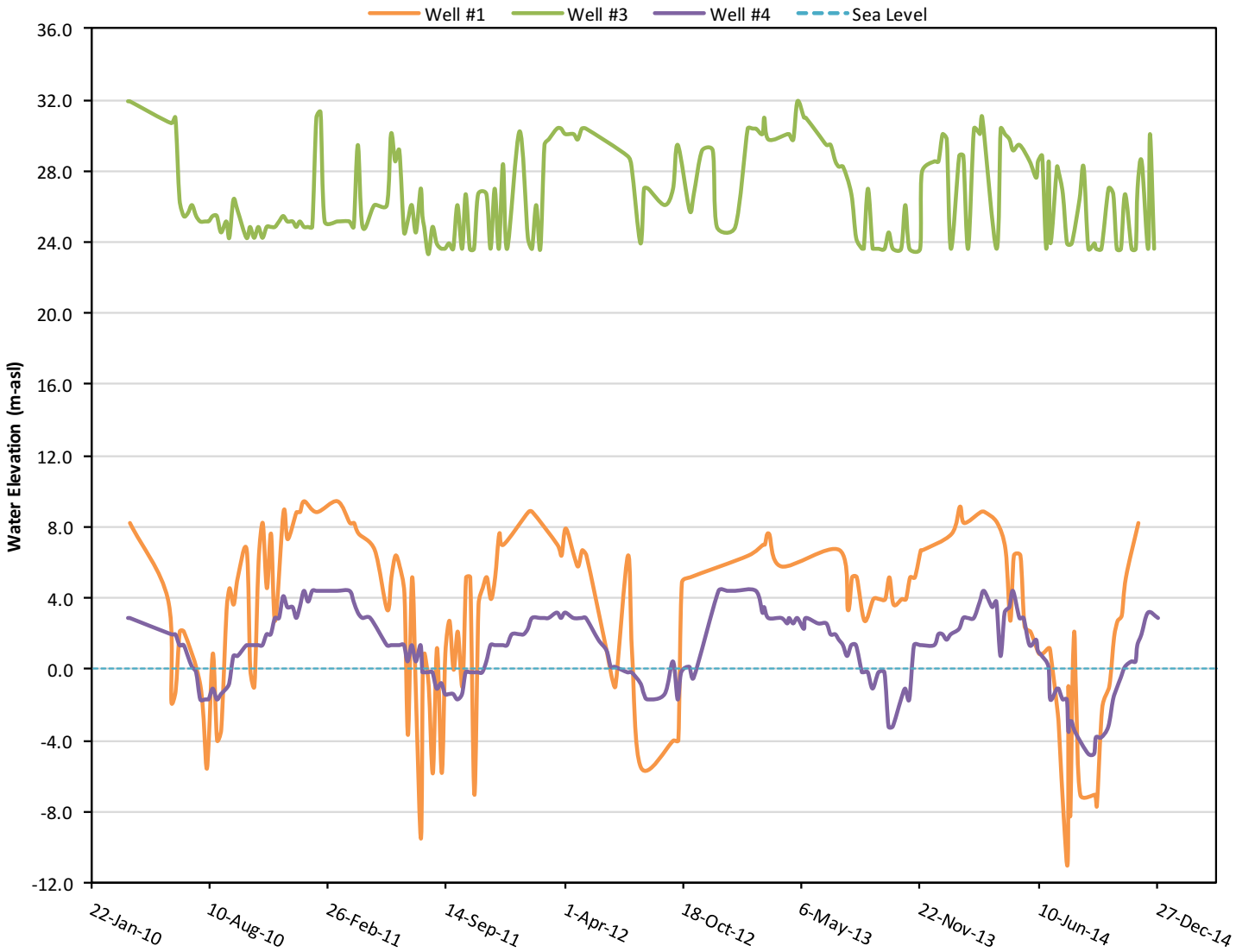


Figure 3. Historical water elevations of production Wells collected by North Salt Spring Waterworks

Four data loggers were deployed on April 15, 2015; three data loggers along Scott Point recording electrical conductivity, water level and temperature and the fourth in the production well on the foreshore (Well #3) recording water level and temperature (Figure 4). From July 9th to November 9th, 2015 Well #4 was not in use and the SPWD relied solely on Well #1 and #3 as its water source. The Monitoring Well (MW) is an inactive well along Scott Point that is used to understand the radius of influence of the production wells. The water levels depicted in Figure 2 were taken as the maximum water level for each day in attempts to negate the effects of pumping.

Well #1 shows a strong correlation between the decrease in water levels and an increase in conductivity. The fluctuation in conductivity may be attributed to the increase in turbidity, decrease in water temperature and/or the introduction of fresh water. The response of Well #3 was as expected with water levels decreasing throughout the summer, conductivity was not recorded in this well. As Well #4 was not actively pumped during the summer, it can be inferred that the decrease in water level and relatively stable conductivity (small increase of ~50 uS/cm) is the natural trend for this Well. The maximum conductivity in Well #4 reached just above 700 us/cm while the Well was pumped at the beginning of May, throughout the summer as the water level decreased naturally the conductivity remained relatively constant. The water level in the MW decreased approximately 3 m throughout the summer while the conductivity increased ~150 uS/cm. On October 31st, the water level in the MW increased approximately five meters, this dramatic increase in water level is unusual and could be the result of a direct connection to a surface fracture that is only active during times of high precipitation. Alternatively, it could be the result of a strong connection to a residential well in the immediate vicinity, although given the immediate and large increase in water level this is unlikely. This can be only confirmed with a long-term monitoring of the MW and neighboring wells.

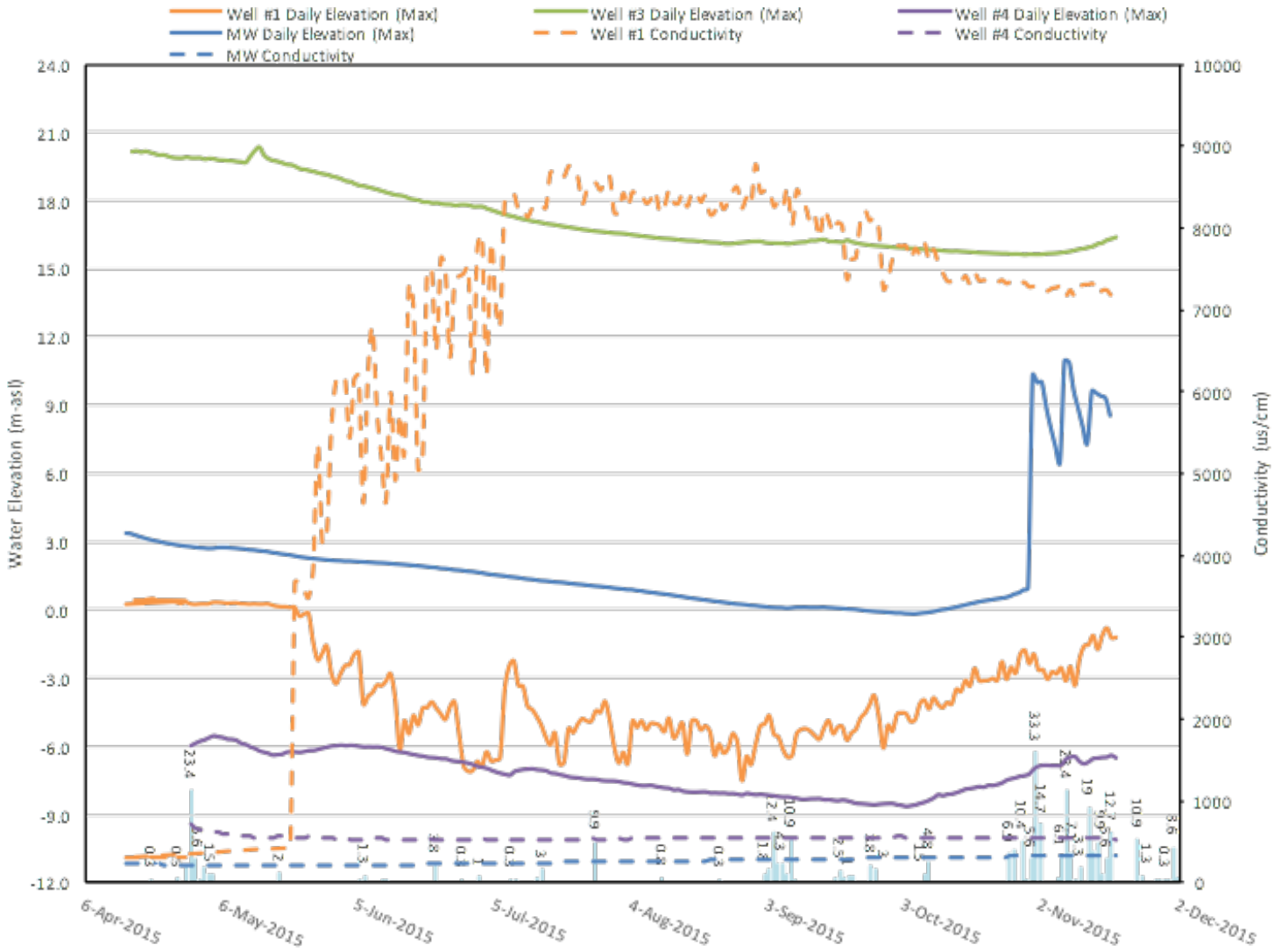


Figure 4. Production Wells and Monitoring Well water elevations and electrical conductivity between April and November 2015

Water Quality

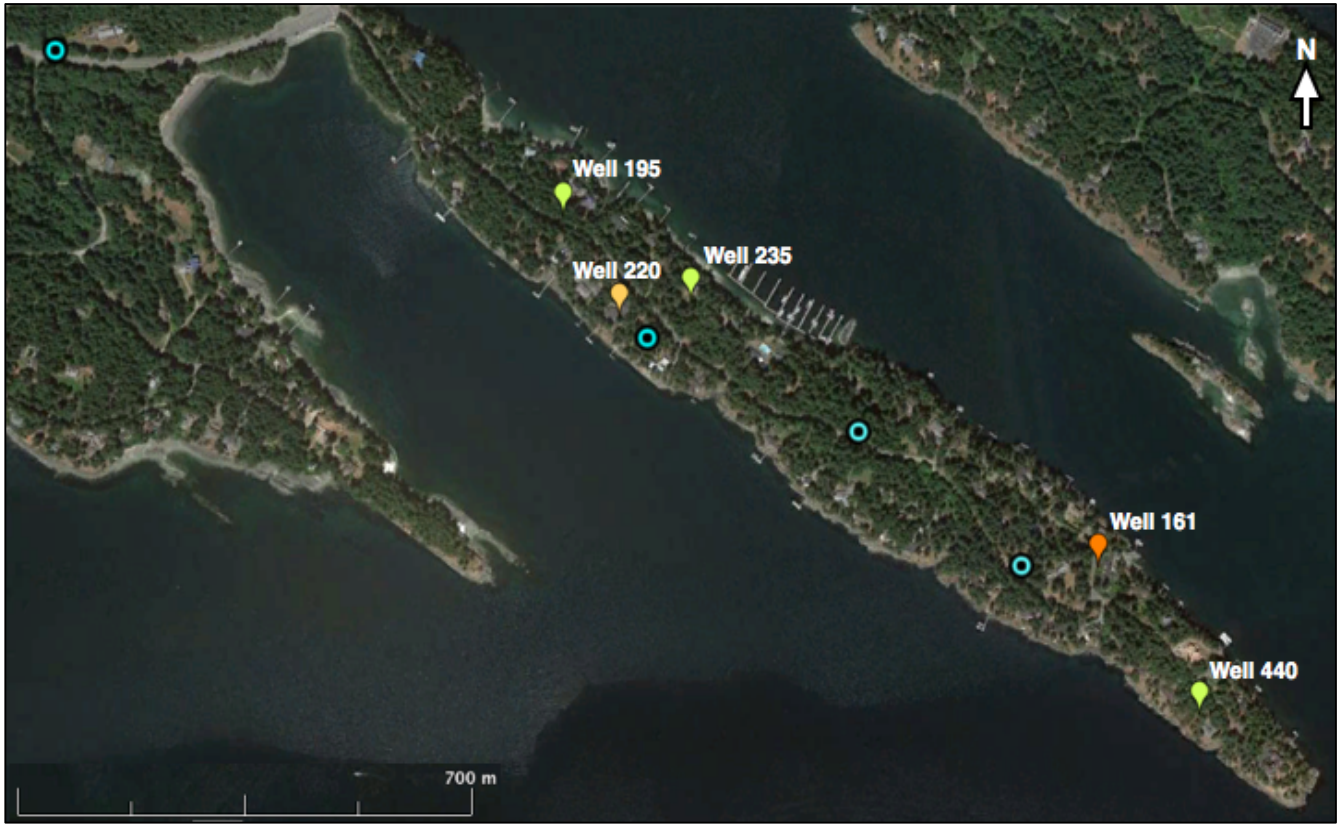


Figure 5. Relative chloride concentrations along Scott Point.

Water quality samples were collected on July 22nd, 2015 along Scott Point from five of the six utilized private wells. The samples were analyzed for conductivity and dissolved chloride. Figure 5 illustrates the sample location and relative dissolved chloride concentrations. The green locations indicate dissolved chloride concentrations less than 110 mg/L (below the 250 mg/L guideline), the light orange location has a concentration of 220 mg/L (just under the 250 mg/L guideline) and the orange location has a concentration of 1440 mg/L (well above the 250 mg/L guideline). Provided with the conductivity and dissolved chloride concentrations Figure 6 shows the strong (positive linear) correlation between the two parameters along Scott Point.

Conceptual Model

A 3D conceptual model of Scott Point was created with information from the BC Well Database, local geological information and data collected by North Salt Spring Waterworks. A cross section of the model is provided below highlighting the approximated water table along Scott Point (Figure 8). This model indicates that the fresh water table drops toward the end of the Point.

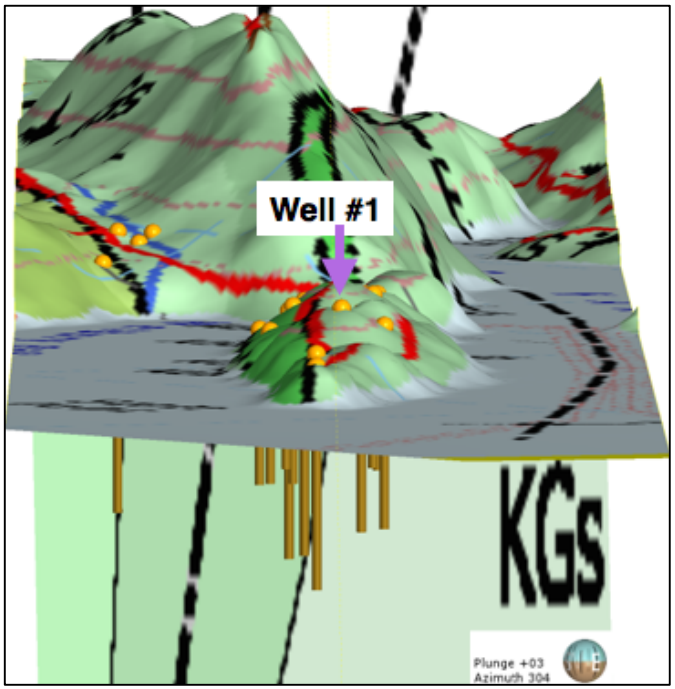


Figure 7. 3D image showing folding nature of bedrock along Scott Point.

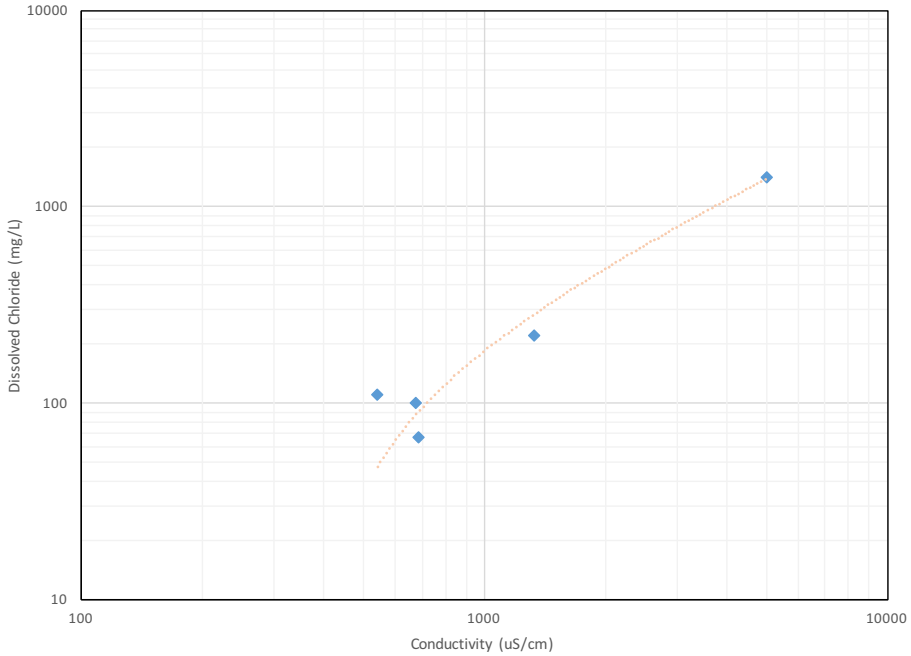


Figure 6. Conductivity vs. dissolved chloride for five residential wells along Scott Point.

It also indicates that Well #1, which has always had high chloride concentration since its installation in 1967, is likely connected to a fracture in contact with the ocean, due to the sub-vertical folding nature of the bedrock, as shown in Figure 7.

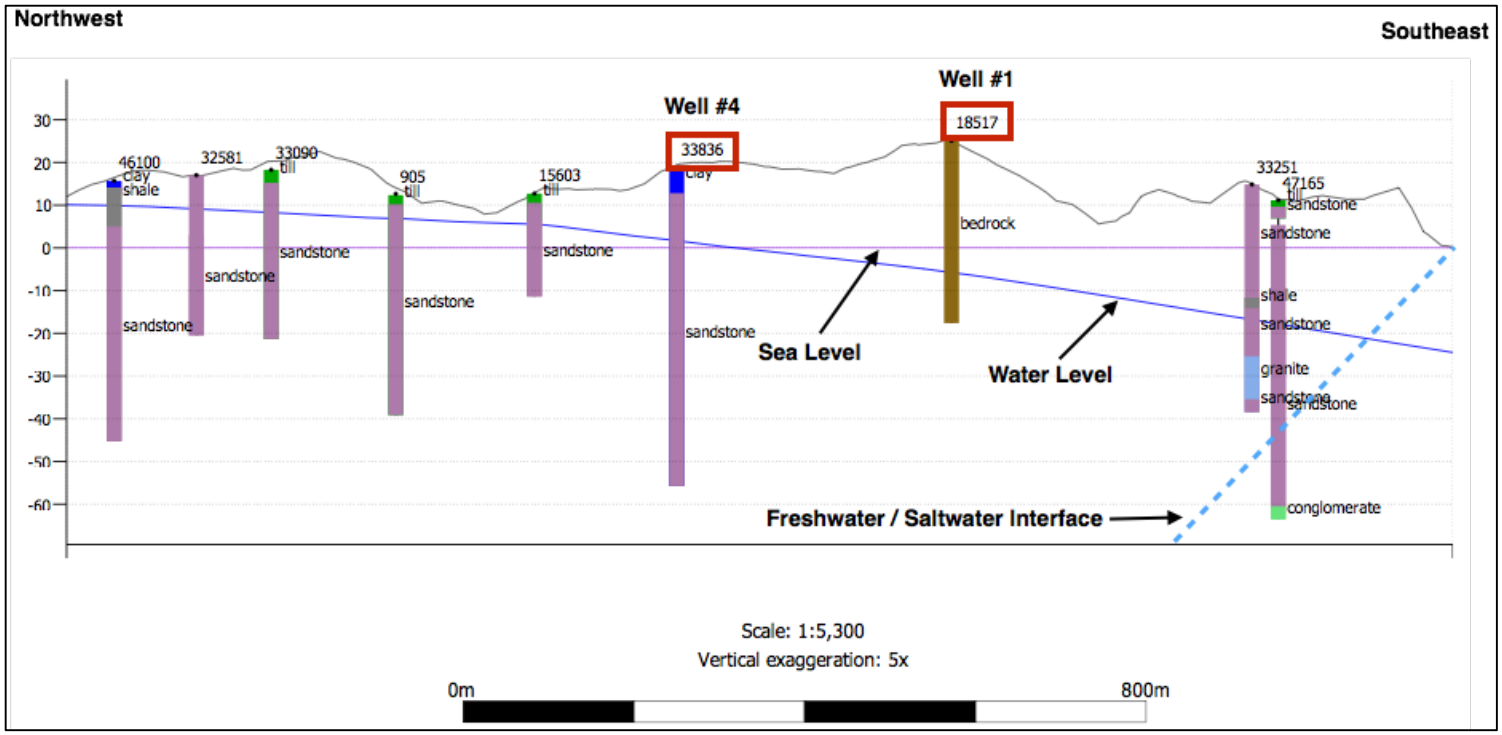


Figure 8. Cross section from 3D model highlighting estimated water table elevation along Scott Point.

Conclusions and Recommendations

Based on our assessment of available information, we have formed the following conclusions:

1. There is a strong correlation between the increase in conductivity and decrease in water level in Well #1.
2. The 2010-2014 water levels for Well#1 seem to indicate that the water recovers following the winter precipitations. In addition, the water level recovers relatively quickly, on a short-term basis, as observed in the pumping cycles.
3. The conductivity levels will likely not decrease in Well #1 below the FLNRO standard of 250 mg/L chloride.
4. Well 161, which has the second highest dissolved chloride concentration of the sampled wells, may be affected by the operation of Well #1.
5. Given the nature and complexity of bedrock aquifers, the SWI will likely continue and increase with time if Well #1 continues to be operated as is. A focus should be given to reduce the reliance on Well #1.

Due to the complexity of groundwater flow in bedrock and the lack of alternative water sources we make the following recommendations:

1. Conduct pumping tests on Well #1 and #4 and monitor water levels in surrounding wells to define the connectivity of fractures (aquifer) and the level of hydraulic connection between the SPWD wells and neighbouring wells.

2. Conduct an electrical conductivity profile of each SPWD Well to potentially identify major saline water bearing fractures. This knowledge will assist in pumping management (i.e., to understand what fractures should either be blocked or protected to help minimize the introduction of saline water);

3. Integrate real time water quality information into the pump management to mitigate SWI. This would include setting water levels and EC ranges which would be safe for water extraction;

4. Collect additional usage information about the private Wells along Scott Point and establish a baseline water sampling program to monitor for SWI indicators (i.e. chloride), beyond the three production Wells;

5. Assess the feasibility of alternative practices such as residential rainwater harvesting and the addition of more above ground storage tanks to maximize the collection of water during the winter months and decrease the demand on the aquifer during the summer.

Closure

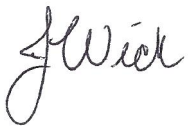
Conclusions and recommendations presented herein are based on available information at the time of the study. The work has been carried out in accordance with generally accepted engineering practice. No other warranty is made, either expressed or implied. Engineering judgement has been applied in producing this letter-report.

This letter report was prepared by personnel with professional experience in the fields covered. Reference should be made to the General Conditions and Limitations attached in Appendix 1.

GW Solutions was pleased to produce this document. If you have any questions, please contact me.

Yours truly,

GW Solutions Inc



Gilles Wendling, Ph.D., P.Eng.
President

Johanna Wick, M.Sc
Hydrogeologist

Appendices
Appendix 1. GW Solutions Inc. General Conditions and Limitations

APPENDIX 1

GW SOLUTIONS INC. GENERAL CONDITIONS AND LIMITATIONS

This report incorporates and is subject to these "General Conditions and Limitations".

1.0 USE OF REPORT

This report pertains to a specific area, a specific site, a specific development, and a specific scope of work. It is not applicable to any other sites, nor should it be relied upon for types of development other than those to which it refers. Any variation from the site or proposed development would necessitate a supplementary investigation and assessment. This report and the assessments and recommendations contained in it are intended for the sole use of GW SOLUTIONS's client. GW SOLUTIONS does not accept any responsibility for the accuracy of any of the data, the analysis or the recommendations contained or referenced in the report when the report is used or relied upon by any party other than GW SOLUTIONS's client unless otherwise authorized in writing by GW SOLUTIONS. Any unauthorized use of the report is at the sole risk of the user. This report is subject to copyright and shall not be reproduced either wholly or in part without the prior, written permission of GW SOLUTIONS. Additional copies of the report, if required, may be obtained upon request.

2.0 LIMITATIONS OF REPORT

This report is based solely on the conditions which existed within the study area or on site at the time of GW SOLUTIONS's investigation. The client, and any other parties using this report with the express written consent of the client and GW SOLUTIONS, acknowledge that conditions affecting the environmental assessment of the site can vary with time and that the conclusions and recommendations set out in this report are time sensitive. The client, and any other party using this report with the express written consent of the client and GW SOLUTIONS, also acknowledge that the conclusions and recommendations set out in this report are based on limited observations and testing on the area or subject site and that conditions may vary across the site which, in turn, could affect the conclusions and recommendations made. The client acknowledges that GW SOLUTIONS is neither qualified to, nor is it making, any recommendations with respect to the purchase, sale, investment or development of the property, the decisions on which are the sole responsibility of the client.

2.1 INFORMATION PROVIDED TO GW SOLUTIONS BY OTHERS

During the performance of the work and the preparation of this report, GW SOLUTIONS may have relied on information provided by persons other than the client. While GW SOLUTIONS endeavours to verify the accuracy of such information when instructed to do so by the client, GW SOLUTIONS accepts no responsibility for the accuracy or the reliability of such information which may affect the report.

3.0 LIMITATION OF LIABILITY

The client recognizes that property containing contaminants and hazardous wastes creates a high risk of claims brought by third parties arising out of the presence of those materials. In consideration of these risks, and in consideration of GW SOLUTIONS providing the services requested, the client agrees that GW SOLUTIONS's liability to the client, with respect to any issues relating to contaminants or other hazardous wastes located on the subject site shall be limited as follows:

(1) With respect to any claims brought against GW SOLUTIONS by the client arising out of the provision or failure to provide services hereunder shall be limited to the amount of fees paid by the client to GW SOLUTIONS under this Agreement, whether the action is based on breach of contract or tort;

(2) With respect to claims brought by third parties arising out of the presence of contaminants or hazardous wastes on the subject site, the client agrees to indemnify, defend and hold harmless GW SOLUTIONS from and against any and all claim or claims, action or actions, demands, damages, penalties, fines, losses, costs and expenses of every nature and kind whatsoever, including solicitor-client costs, arising or alleged to arise either in whole or part out of services provided by GW SOLUTIONS, whether the claim be brought against GW SOLUTIONS for breach of contract or tort.

4.0 JOB SITE SAFETY

GW SOLUTIONS is only responsible for the activities of its employees on the job site and is not responsible for the supervision of any other persons whatsoever. The presence of GW SOLUTIONS personnel on site shall not be construed in any way to relieve the client or any other persons on site from their responsibility for job site safety.

5.0 DISCLOSURE OF INFORMATION BY CLIENT

The client agrees to fully cooperate with GW SOLUTIONS with respect to the provision of all available information on the past, present, and proposed conditions on the site, including historical information

respecting the use of the site. The client acknowledges that in order for GW SOLUTIONS to properly provide the service, GW SOLUTIONS is relying upon the full disclosure and accuracy of any such information.

6.0 STANDARD OF CARE

Services performed by GW SOLUTIONS for this report have been conducted in a manner consistent with the level of skill ordinarily exercised by members of the profession currently practicing under similar conditions in the jurisdiction in which the services are provided. Engineering judgement has been applied in developing the conclusions and/or recommendations provided in this report. No warranty or guarantee, express or implied, is made concerning the test results, comments, recommendations, or any other portion of this report.

7.0 EMERGENCY PROCEDURES

The client undertakes to inform GW SOLUTIONS of all hazardous conditions, or possible hazardous conditions which are known to it. The client recognizes that the activities of GW SOLUTIONS may uncover previously unknown hazardous materials or conditions and that such discovery may result in the necessity to undertake emergency procedures to protect GW SOLUTIONS employees, other persons and the environment. These
procedures may involve additional costs outside of any budgets previously agreed upon. The client agrees to pay GW SOLUTIONS for any expenses incurred as a result of such discoveries and to compensate GW SOLUTIONS through payment of additional fees and expenses for time spent by GW SOLUTIONS to deal with the consequences of such discoveries.

8.0 NOTIFICATION OF AUTHORITIES

The client acknowledges that in certain instances the discovery of hazardous substances or conditions and materials may require that regulatory agencies and other persons be informed and the client agrees that notification to such bodies or persons as required may be done by GW SOLUTIONS in its reasonably exercised discretion.

9.0 OWNERSHIP OF INSTRUMENTS OF SERVICE

The client acknowledges that all reports, plans, and data generated by GW SOLUTIONS during the performance of the work and other documents prepared by GW SOLUTIONS are considered its professional work product and shall remain the copyright property of GW SOLUTIONS.

10.0 ALTERNATE REPORT FORMAT

Where GW SOLUTIONS submits both electronic file and hard copy versions of reports, drawings and other project-related documents and deliverables (collectively termed GW SOLUTIONS's instruments of professional service), the Client agrees that only the signed and sealed hard copy versions shall be considered final and legally binding. The hard copy versions submitted by GW SOLUTIONS shall be the original documents for record and working purposes, and, in the event of a dispute or discrepancies, the hard copy versions shall govern over the electronic versions. Furthermore, the Client agrees and waives all future right of dispute that the original hard copy signed version archived by GW SOLUTIONS shall be deemed to be the overall original for the Project. The Client agrees that both electronic file and hard copy versions of GW SOLUTIONS's instruments of professional service shall not, under any circumstances, no matter who owns or uses them, be altered by any party except GW SOLUTIONS. The Client warrants that GW SOLUTIONS's instruments of professional service will be used only and exactly as submitted by GW SOLUTIONS. The Client recognizes and agrees that electronic files submitted by GW SOLUTIONS have been prepared and submitted using specific software and hardware systems. GW SOLUTIONS makes no representation about the compatibility of these files with the Client's current or future software and hardware system.