



August 11, 2014
14-17

Van Anda Improvement District
Texada Island, B.C.

(Via email)

Attention: Karen May, Trustee

Re: **Van Anda Water System Review, Van Anda Improvement District**

GW Solutions Inc. (GW Solutions) is pleased to present the following letter-report outlining a proposed "road map" for the Van Anda water system.

Background

GW Solutions Inc (GW Solutions) has completed a brief review of the Van Anda water system from source to tap to address the reoccurring challenges that are faced from regular boil water advisories. McElhanney Consulting Services Ltd. produced in 2008 a report titled *Water System Assessment Study Report* for the Van Anda Improvement District (VAID). Their report delivered a good analysis of the conditions present in 2008 and was used by GW Solutions as a source of information about the system for this review. The goal of this review was not to duplicate the work completed by McElhanney but to provide additional recommendations that could assist the VAID in planning and prioritizing tasks.

GW Solutions has identified issues and recommendations and is presenting them in two tables. The first table recommends tasks from source to tap, and the second table presents the same tasks using a priority rating and sequence of completion, based on a cost/benefit matrix.

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Table Summary

Table 1. Summary of issues and proposed approaches from source to tap

Source	Issue	Rational	Proposed Approach	Priority	Timeline	Cost
Source (Priest Lake)	Existing information difficult to access	Having all information easily accessible in one location (e.g. web site) will save time for future work	Compile all available reports in one location to allow for easy access to information	high (5)	0.5 – 1 yr	Low
	Lack of information on source quality	Understanding baseline conditions helps to identify changes and allows VAID to be proactive when changes occur	Review and update source sampling program (min 3 year) to evaluate seasonal quality (could tie in with approach below or in collaboration with Texada stickleback group) and update analyses plan to both better characterize source water and to identify trends that could be indicative of water quality degradation.	medium (15)	2 - 5 yr	Medium
			Assess limnology and bathymetry of Priest Lake – project for academic community (UBC/UVIC)	Medium (16)	2 – 5 yr	Medium
	Lack of information available on watershed	The health of the watershed has a direct effect on quality of the lake and should be monitored.	Review previous watershed assessment (2000) and update according to current regulations and risks (e.g., effluent from Lafarge’s property, septic fields, etc.). Information will be valuable to locate suitable aquifers.	high (6)	1 – 2 yr	Low
			Development of Integrated Watershed Management (IWM) plan with a section for adaptation and change	medium (14)	5 yr	Medium

	Issue	Rationale	Proposed Approach	Priority	Timeline	Cost
	No alternative source	If the quality of water in the lake degrades and can not longer be used as a drinking source no alternative has been identified	Investigate alternative groundwater source options (presence and extent of shallow sand and gravel aquifers or fractured bedrock aquifers) – Desktop study (recommended to be combined with watershed study update)	Very high (4)	0.5 – 1 yr	Low
			Investigate alternative groundwater source options – Preliminary field study based on results of desktop study.	high (7)	0.5 – 3 yr	High
	Quarry discharge into watershed	This has the potential to negatively impact water quality	Start a dialogue with Lafarge to obtain an understanding of both the quantity and the quality of the effluent discharging into Priest Lake and identify potential alternatives for effluent discharge.	high (8)	2 yr	Low
Treatment	Lack of understanding what is causing current exceedances	In order to successfully address this issue, understanding where/when it is occurring is critical.	Create map showing date, residual chlorine, temperature, and location of exceedance to determine if a pattern exists – use easy-to-use tool (e.g. GoogleEarth or equivalent) to store, access and present information.	Very high (1)	0.5 – 1 yr	Low
	Treatment system does not currently meet VCH regulations	Help to determine which treatment option or alternative source would meet VCH regulations	Detailed investigation into cost analysis comparing upgrades to current system vs. alternative source options.	high (10)	0.5 – 2 yr	Medium
Storage and Distribution Network	Inadequate mapping of system	Being able to easily identify sample locations or sections that require maintenance	Create easy to use map of system that can be updated as tasks are completed (generated so VAID trustees can easily	Very high (2)	2yr	Low

	Issue	Rational	Proposed Approach	Priority	Timeline	Cost
			update it)			
	Distribution system has never been cleaned and is aging	Due to the age of system, slime and bacteria have built up in pipes and could be one cause of exceedances	Clean the system through pigging	High (9)	0.5 - 2 yr	High
	Not optimal design of distribution system	Promote continuous movement of water in delivery system	Reduce dead ends, replace undersize/ inadequate pipes	high (12)	10 yr	Very high
	Community water use	Knowing the community water demand allows for adequate planning and sizing of system	Water meters installed at more locations throughout community (ideally at each house) can assist in water management and pricing	medium (13)	5 yr	Medium
	Current water prices are insufficient	In order to maintain a healthy water distribution system capital investment must be ongoing	Evaluate cost of water within district to establish pricing regime (Econics could assist in this)	high (11)	2 - 5 yr	Low
Funding & Financing	Operating and managing water system is costly	VAID needs grants to support capital projects	Identify sources of funding and grants and submit applications	Very high (3)	0.5 - 1 year	Low

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Table 2. Summary of issues and proposed approaches based on priority and cost

Issue	Rational	Proposed Approach	Priority	Timeline	Cost
Lack of understanding what is causing current exceedances	In order to successfully address this issue, understanding where/when it is occurring is critical.	Create map showing date, residual chlorine, temperature, and location of exceedance to determine if a pattern exists – use easy-to-use tool (e.g. GoogleEarth or equivalent) to store, access and present information.	1- Very high	0.5 – 1 yr	Low (1 – 3K)
Inadequate mapping of system	Being able to easily identify sample locations or sections that require maintenance	Create easy to use map of system that can be updated as tasks are completed (generated so VAID trustees can easily update it)	2- Very high	2yr	Low (< 5 K)
Operating and managing water system is costly	VAID needs grants to support capital projects	Identify sources of funding and grants and submit applications	3 - Very high	0.5 – 1 year	Low (< 5K)
No alternative source	If the quality of water in Priest Lake degrades and can not longer be used as a drinking source no alternative has been identified	Investigate alternative groundwater source options (presence and extent of shallow sand and gravel aquifers or fractured bedrock aquifers) – Desktop study (recommended to be combined with watershed study update)	4 - Very high	0.5 – 1 yr	Low (< 5K)
Existing information difficult to access	Having all information easily accessible in one location (e.g. web site) will save time for future work	Compile all available reports in one location to allow for easy access to information	5 - high	0.5 – 1 yr	Low (< 3K)
Lack of information available on watershed	The health of the watershed has a direct effect on quality of the lake and should be monitored.	Review previous watershed assessment (2000) and update according to current regulations and risks (e.g., effluent from Lafarge's property, septic fields, etc.). Information will be valuable to locate suitable aquifers.	6 - high	1 – 2 yr	Low (< 5K)
No alternative source		Investigate alternative groundwater source options – Preliminary field study based on results of desktop study	7- high	0.5 – 3 yr	High (> 50K)
Quarry discharge into watershed	This has the potential to negatively impact water quality	Start a dialogue with Lafarge to obtain an understanding of both the quantity and the	8 - high	2 yr	Low (< 3K)

Issue	Rational	Proposed Approach	Priority	Timeline	Cost
		quality of the effluent discharging into Priest Lake and identify potential alternatives for effluent discharge.			
Distribution system has never been cleaned and is aging	Due to the age of system, slime and bacteria have built up in pipes and could be one cause of exceedances	Clean the system through pigging	9 - High	0.5 - 2 yr	High (TBD)
Treatment system does not currently meet VCH regulations	Help to determine which treatment option or alternative source would meet VCH regulations	Detailed investigation into cost analysis comparing upgrades to current system vs. alternative source options.	10 - high	0.5 - 2 yr	Medium (5 - 10K)
Current water prices are insufficient	In order to maintain a healthy water distribution system capital investment must be ongoing	Evaluate cost of water within district to establish pricing regime (Econics could assist in this)	11 - high	2 - 5 yr	Low (TBD)
Not optimal design of distribution system	Promote continuous movement of water in delivery system	Reduce dead ends, replace undersize/ inadequate pipes	12 - high	10 yr	Very high
Community water use	Knowing the community water demand allows for adequate planning and sizing of system	Water meters installed at more locations throughout community (ideally at each house) can assist in water management and pricing	13 medium	5 yr	Medium
Lack of information available on watershed		Development of Integrated Watershed Management (IWM) plan with a section for adaptation and change	14 medium	5 yr	Medium (5 - 10K)
Lack of information on source quality	Understanding baseline conditions helps to identify changes and allows VAID to be proactive when changes occur	Source sampling program (min 3 year) to evaluate seasonal quality (could tie in with approach below or in collaboration with Texada stickleback group) and update analyses plan to both better characterize source water and to identify trends that could be indicative of water quality degradation.	15 medium	2 - 5 yr	Medium (3 - 5K)
Lack of information on source quality		Assess limnology and bathymetry of lake - project for academic community (UBC/UVIC)	16 medium	2 - 5 yr	Medium (5 - 15K)

Recommendation

This list of tasks has been prepared to help VAID in its planning and task implementation process. Several tasks could proceed in parallel and at different paces, depending on internal/external support and available funds.

The first two prioritized tasks could be accomplished in a few days with minimal cost. Ideally, a GW Solutions staff member could spend one day with some of the trustees and provide guidance and assistance on how to create and update GoogleEarth files (or another similar program) while simultaneously constructing a map of the water system (piping, sampling sites over time, etc.). Once this map has been completed information can be added and an understanding of exceedances can be developed. In addition, directions for Task 5 could also be provided while in Texada.

Limitations

GW Solutions is not a civil engineering firm. Therefore, issues related to the design and operation of the treatment, storage, and delivery of the water is beyond our expertise. GW Solutions recommends VAID to rely on the expertise of engineers with expertise in these domains for these specific issues. GW Solutions will be happy to assist VAID in coordinating efforts and communication to facilitate an integrated approach to the characterization, management, and protection of the water source.

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.

DRAFT – For Discussion

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