REGIONAL DISTRICT OF NORTH OKANAGAN

2012 Master Water Plan Review

Stakeholder Advisory Committee Report

Greater Vernon Water
May 2016

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EXECUTIVE SUMMARY

Greater Vernon Water (GVW) is a function of the Regional District of North Okanagan (RDNO) and is the public water utility that provides water services the City of Vernon, District of Coldstream and areas of Electoral Areas B, C, D and Spallumcheen. To meet the requirements of the Interior Health Authority under the BC Drinking Water Protection Act, GVW undertook a review of the GVW System under an order by Interior Health Authority through preparation of a Master Water Plan prepared by a consortium of consulting engineers. A referendum was held on November 15, 2014 to borrow up to $70M to undertake the Phase 1 projects identified in the 2012 Master Water Plan. The referendum failed and the RDNO Board of Director's moved to create a Stakeholder Advisory Committee (SAC) at their July 22, 2015 meeting to review the 2012 MWP and receive input from a stakeholder and community perspective as to the adequacy and completeness of the 2012 Master Water Plan which will be considered as part of the MWP review.

The Stakeholder Advisory Committee completed a complete review of the 2012 Master Water Plan through a series of eleven (11) meetings open to the public whereby each technical memorandum (TM) was presented by a representative of the consulting engineering firm that prepared the TM. These consulting engineering firms were AECOM, Kerr Wood Leidal and Associates and Associated Engineering. After review of the technical background of each TM, the SAC reviewed all of the 9 options that were presented in TM 9 and after much discussion resolved that there is a consensus of opinion that:

- all Options contained in TM9 (subject to variations) have adequately considered all feasible options available to meet Ministry of Health standards,
- all feasible options were considered, and
- the engineering and financial analyses comparison of options was complete and accurate.

The SAC went through a process to review the options from a non-cost consideration perspective. The committee rated all the options based on the following four (4) non-cost categories: supply, operations, finished product, and project timeliness. The SAC was divided into three (3) groups and submitted their ranking results and the weighted average of each group's result and the average of all the groups was then calculated and presented. The results of the group rankings is as follows:

- Group 1 ranked Option 5 as their first choice and Option 2 as their second choice.
- Group 2 ranked Options 1, 2 and 3 highest with each having an equivalent numerical ranking.
- Group 3 ranked Option 2 and 3 the highest with both having an equivalent numerical ranking.

The results of the non-cost analysis through ranking Option 1, 2, 3 and 5 highest over the remaining options demonstrated strong support to maintain the Mission Hill and Duteau Creek Water Treatment Plants as sources for potable water.

Through the review process, the following recommendations had consensus support by the SAC and are to be put forward to the Greater Vernon Advisory Committee for consideration and as recommendations with respect to their review of the GVW 2012 MWP:

I. That the request from the Citizens for Changes to the Master Water Plan to hire an independent engineering consultant to undertake a peer review of the 2012 Master Water Plan not go forward.

II. That any option that includes the DCWTP as a potable water source will examine using UV and air scrubbing in the DCWTP Reservoir to support a filtration exclusion application.

III. That the final Master Water Plan option provide for the use of two water sources and two water treatment plants.

IV. That Options 4, 6, 7, 8 and 9 be removed from the Options list based on the highest capital cost with lowest non-cost benefit ratio and not be considered in the Financial Planning Stage for the Stakeholder Advisory Committee review of the Greater Vernon Water 2012 Master Water Plan.

V. That the SAC is satisfied that all Options contained in TM9 (subject to variations) have adequately considered all feasible options available to meet Ministry of Health standards.

VI. That the staging of the treatment plants be changed so that MHWTP filtration is constructed first, noting that a filtration exclusion at DCWTP may be successful.

VII. That [regardless of the Option preferred, except Option 1] any separation should include sizing of the irrigation transmission main to allow for continued separation of domestic and irrigation water supplies and enable full separation in the future.

VIII. That alternative sources for irrigation be explored fully with the objective of reducing capital and operation costs.

IX. That a scheduled review of the MWP be completed every 5 - 10 years or prior to the construction of any significant capital project.

X. That the following points presented by the General Manager, Finance be considered by the Greater Vernon Advisory Committee when finalizing the financial strategy of the Master Water Plan:

- Finalize the Option, then develop a financial strategy.
- Use existing reserves as a funding source in plan.
- Use grants as a funding source in plan.
- Use DCC's as a funding source in plan.
- Use current revenue as a funding source – balance with renewal projects from year to year.
- Delay timing of major projects, where feasible.
- Increase annual contribution to reserves – balance with annual capital plan from year to year.

XI. That the SAC is satisfied with the level of detail provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

XII. That the SAC is satisfied with the engineering analysis provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

XIII. That the SAC is satisfied with the cost estimates provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

XIV. That the SAC put forth the following three (3) Options to the Greater Vernon Advisory Committee for consideration:

a. Option 1 - the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation;

b. Option 2 - the option with the highest benefit to cost ratio (NPV) with partial separation; and

c. Option 3 - the option with the highest benefit to cost ratio (NPV) that supports full separation.

XV. That the SAC select Option 2 being the option with the highest benefit to cost ratio (Net Present Value) with partial separation as their first choice moving forward with the 2012 Master Water Plan.

XVI. That the SAC select Option 1 being the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation as their second choice moving forward with the 2012 Master Water Plan.

XVII. That the Stakeholder Advisory Committee be reassembled after the Board of Directors has adopted a revised Master Water Plan, including a revised financial plan, to work with RDNO staff in preparation of a Communications Plan and an education package for distribution to the public prior to proceeding with a referendum.

XVIII. That a Stakeholder Advisory Working Group be formed to deal with Greater Vernon Water issues.

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Introduction

Greater Vernon Water (GVW) is a function of the Regional District of North Okanagan (RDNO) and is the public water utility that provides water services for the City of Vernon, District of Coldstream and areas of Electoral Areas "B", "C", "D" and the Township of Spallumcheen. GVW was formed as a regional water system in 2003 and is a consolidation of three (3) large water utilities: the City of Vernon, District of Coldstream and North Okanagan Water Authority (previously operated as Vernon Irrigation District) and a number of small private utilities.

To facilitate the formation of GVW and to guide infrastructure improvement required to meet legislative requirements for drinking water, the 2002 GVW Master Water Plan (MWP) was developed. This MWP was updated in 2004 to accommodate changes in the legislative environment and updated utility conditions. GVW continued to operate under the 2002/04 MWP until it was ordered by Interior Health (IH) on March 11, 2011 to update the MWP.

This order precipitated immediate action to update the MWP. The development of the 2012 GVW MWP took approximately two (2) years and at a cost of over $470,000 for consulting engineering services (not including staff time) and included:

- developing a work scope,
- hiring a team of consultants,
- compiling a Technical Advisory Committee (TAC) made up of engineers, technologists, corporate administrative officers, finance and other representatives from the RDNO, City of Vernon, District of Coldstream and agricultural community,
- developing ten (10) Technical Memorandums (TMs) to address the work scope components,
- presenting the findings to the RDNO Board of Directors (BoD)
- submission to IH for acceptance, and
- final adoption of the GVW 2012 MWP by the BoD.

In 2014, the BoD endorsed a referendum process to ask the electorate to endorse borrowing $70 Million to finance six (6) priority projects identified within the 2012 MWP. On November 15, 2014, the borrowing referendum failed and the BoD was asked to complete a peer review of the 2012 MWP. After deliberation, the BoD decided at their July 22, 2015 meeting to establish a Stakeholder Advisory Committee (SAC) to complete the review. The scope of the SAC was to *"review the 2012 MWP and provide input from a stakeholder and community perspective which will be considered as part of the 2012 MWP review."*

STAKEHOLDER ADVISORY COMMITTEE COMPOSITION

Terms of Reference (ToR) for the SAC were developed (see Schedule "A") and adopted by the BoD on July 22, 2015. The following are excerpts from the ToR as to committee characteristics and composition:

Stakeholders will have the following characteristics:

- *GVW Customers,*
- *Independent,*
- *Demographically diverse,*
- *Geographic representation within the GVW Service boundary*

Stakeholders of the SAC will consist of a group of 14 people who can commit to the MWP review process and with the following representation:

1. *One (1) representative from the GVAC who is a member of the Stakeholder group and who will act as Chair of the SAC meetings,*
2. *Two (2) representatives from Agricultural,*
3. *Two (2) representatives that are high water use consumers from the Non-Domestic Class,*
4. *Two (2) representatives from the Non-Domestic customer class that provides services to sensitive customers (i.e. Vernon Jubilee Hospital, School Board, care facility, etc.)*
5. *One (1) representative from a major Industrial user*
6. *Four (4) representatives from the residential user class*
7. *One (1) representative from the Developer class (Can be the Urban Development Institute or other representative group)*
8. *One (1) representative from a local service group*

Solicitation of SAC members was completed through advertising through local media, the RDNO website, posting at community sites throughout town and in some cases where a group outlined above was not represented by applicants, direct calls to businesses/organizations were made.

In the end, the BoD decided that residential users should have additional representation and the SAC was formed as outlined above with the exception that seven (7) residential users were invited to participate:

Category	**Name**
Two (2) representatives from the agricultural sector	1. Asif Mohammad 2. Michael Witt
Up to Three (3) representatives that are high water use consumers from the non-domestic class	1. Tekmar Control Systems - Don Gibbs 2. Best Western Plus Vernon Lodge and Conference Centre – Claus Larsen
Up to Three (3) representatives from the non-domestic customer class that provides services to sensitive customers (i.e. Vernon Jubilee Hospital, School Board, care facility, etc.)	1. Vernon Jubilee Hospital – David Frost 2. School District 22 – Jerry Westby
One (1) representative from a major Industrial user	1. Sleeman Breweries – Dave Etherington
Up to Seven (7) representatives from the residential user class	1. Doug Neden 2. Michael Carlson 3. Monique Hubbs-Michiel 4. Denise Bodenham 5. Paul Jeffry Williamson 6. John Lainsbury 7. Ray Foisy
One (1) representative from the developer class (can be the Urban Development Institute or other representative group)	1. Wesbild – Robert Evans*
One (1) representative from a local service group	1. Citizens for Changes to the Master Water Plan – Terry Mooney

* Representative resigned partway through the SAC review process.

The 2012 Master Water Plan "List of Assumptions" with amendments as provided by the Greater Vernon Advisory Committee (see Schedule "B") were reviewed at the BoD July 21, 2015 regular meeting and the following resolutions were carried:

> *"That the Master Water Plan List of Assumptions be endorsed as amended; and further"*
>
> *"That the Master Plan List of Assumptions be provided to the Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee as a guidance document."*

STAKEHOLDER ADVISORY COMMITTEE ACTIVITY SUMMARY

There was a total of eleven (11) SAC committee meetings held between October 1, 2015 and April 21, 2016 where each of the ten (10) Technical Memorandums (TMs) of the 2012 MWP were presented in detail. The SAC Committee was also provided with summaries of each TM. SAC members debated each TM and the recommendations for this report to be presented to the Greater Vernon Advisory Committee (GVAC) for consideration. Many members of the SAC also attended tours of the Duteau Creek Water Treatment Plant (DCWTP) and the Mission Hill Water Treatment Plant (MHWTP).

The minutes of the SAC meetings are provided in Schedule "C". Full meeting agenda packages, including presentation materials can be viewed at:

http://www.rdno.ca/index.php/meetings/committee-meetings/greater-vernon-water-2012-master-water-plan-stakeholder-advisory-committee

The Technical Memorandums of the 2012 MWP, including the summaries, can be viewed at:

http://www.rdno.ca/index.php/services/engineering/water/greater-vernon-water/master-water-plan

The following provides a brief summary of what was reviewed and deliberated at each meeting:

October 1, 2015 SAC Meeting

The initial meeting began with introductions around the table of the appointed SAC members and the RDNO staff. The SAC reviewed the Stakeholder Advisory Committee Terms of Reference and the list of assumptions the Board of Directors established as a guideline for the 2012 MWP and which the SAC were required to take into consideration for the MWP review.

The following presentation was received by the SAC:

- **Background to Greater Vernon Water** *by Manager – Greater Vernon Water*

  This presentation provided an overview of GVW from a historical perspective and discussed the migration of the old water system consisting of three (3) major and seven (7) minor source supply systems and seven (7) private water systems to the current two major surface water sources (Kalamalka Lake and Duteau Creek) and several backup supplies from deep well sources. The presentation also provided an overview of the operational programs provided by GVW to ensure a safe, reliable service to customers.

The SAC discussed the request for a peer review of the MWP and whether they would prefer the consulting engineers that compiled the MWP to present the information to the Committee.
Based on this discussion, the SAC decided the best direction would be to have the consulting engineering team that prepared the 2012 MWP present the background and recommendations contained in all ten (10) Technical Memorandums.

The rational was these presentations would provide the background and sufficient technical information so members would be fully informed on how the Long-term Treatment and Supply Options in TM 9 were developed.

October 22, 2015 SAC Meeting

The meeting was initiated with several presentations as follows:

- **Interior Health – BC Legislative Requirements for Drinking Water** *by Roger Parsonage, Regional Director, Interior Health.*

  Mr. Parsonage provided the SAC detailed information on the legislative requirements for potable water treatment and ongoing monitoring in the distribution system as it relates to the *Drinking Water Protection Act and Drinking Water Protection Regulations*. Interior Health is requiring a multiple barrier approach to achieve the key treatment objectives for surface water that the Province has adopted as a whole:

  - 4 log reduction or inactivation of viruses
  - 3 log reduction or inactivation of Giardia & Cryptosporidium
  - 2 treatment processes for surface water supplies
  - ≤ 1 Nephelometric Turbidity Unit (NTU) of turbidity
  - 0 detectable E.coli.

  The strategic direction of Interior Health is to "work towards the lowest reasonably achievable risk through strong, collaborative partnerships with water suppliers. Interior Health will be guided by the principles of best practices, continuous quality improvement, transparency and progressive compliance". The Master Water Plan must be developed with a goal of achieving these water treatment targets and must provide a schedule to complete these projects in a reasonable time frame.

- **MWP Overview** by *Brett deWynter, P.Eng., AECOM*

  A brief discussion on the three consulting engineering firms that prepared the 2012 Master Water Plan; AECOM, Kerr, Wood Leidal and Associated Engineering. A description of the key components and the approach taken by these consultants, including the main key technical assumptions that were utilized in the preparation of the final MWP was provided.

- **TM1 – Domestic & Agricultural Water Demand Forecast** by *Neil Whiteside, M.A.Sc., P.Eng., Whiteside Consulting (formerly of Kerr Wood Leidal) and Drew Lejbak, Hydrologist, Summit Environmental Consultants Inc.*

  Technical Memorandum No. 1 (TM1) reviews historical and current water use ("demand") for GVW and provides a prediction of how much water will be required in the future. The average demand from the 2009 water model was 271 litres/capita/day and based on the proposed Water Conservation Strategy to reduce residential water use the analysis predicts a future average daily residential demand of 250 litres/capita/day. Based on regional growth predictions the annual domestic growth rate was set at 1.3% and future agricultural demands based on total land available predict a total flow requirement of 292 million litres per day. These demands are then used as a basis for sizing infrastructure improvements in the MWP.

- **TM4 – Domestic Water System Analysis** by *Neil Whiteside, M.A.Sc., P.Eng., Whiteside Consulting*

  TM 4 reviewed the existing water supply system in relation to providing the same level of service to all domestic customers with respect to domestic water flows and fire protection. The analysis completed also provided a list of system improvements that must also be undertaken in conjunction with water treatment improvements. This TM lists ten (10) separate capital projects to be included in the financial summary of Master Water Plan improvements.

November 19, 2015 SAC Meeting

The meeting was initiated with several presentations followed by questions and answers as follows:

- **TM 2 – Evaluation of Water Supply Sources** *by Brett deWynter, P.Eng., AECOM*

  TM2 looked at all the water licenses that GVW holds, added up how much water this totals and reviewed where and how the water available to GVW could be best utilized. TM2 also assessed how vulnerable GVW's water sources are to drought and climate change and looked at other water sources that could be available to GVW. Each water source was assessed for the amount of water available, water quality, the impact of an extended drought and what type of use the source is suitable for (Domestic or Non-potable for irrigation). The water sources reviewed in detail included the following sources: Duteau Creek, Kalamalka Lake, Deer Creek, Okanagan Lake, BX Creek, Coldstream Creek and groundwater.

  It should be noted that the SAC were advised that they should assume that water licences can be either transferred or obtained for any new option. Staff have been working with the Ministry of Environment to develop a process for making a water licence reserve application on Okanagan Lake for some time. It was also noted that a transfer from Duteau Creek to Kalamalka Lake may be a difficult process because it results in a transfer between the Columbia River Basin and Fraser River Basin.

- **TM 3 – Source Storage & Supply** *by Brett deWynter, P.Eng., AECOM*

  TM3 built upon the work completed in TM1 and TM2 and looked at the total storage licenses GVW holds, how much water GVW can currently store and examined opportunities to develop water supply and increase storage to support growth within the GVW service area. This TM reviewed the water storage opportunities through existing water licences and the potential transfer of these licences between catchment basins.

  As outlined in TM1, the domestic demands for GVW will increase from 27,100 ML/yr to 30,800 ML/yr by 2052 while the agricultural demand remains consistent at 17,500 ML/yr. Based on this forecast, it is predicted that GVW will face increased water supply shortages in the future unless storage is increased to support the predicted growth in the domestic sector.

  To avoid increasing water supply shortages, GVW can increase its available storage to fully utilize its storage licenses and provide additional water during peak water use times. Within TM3, an options analysis was completed to increase storage and supply that examined opportunities to increase storage on existing reservoirs, construct new reservoirs and construct diversions to ensure sufficient supply to the areas of increased storage.

  Groundwater was identified as a potential water supply source for non-potable uses due to poor water quality within some areas of GVW. Wells would be installed at "point of use" and pumped directly into the non-potable distribution system without treatment.

However, a drawback identified was that this supply would be more expensive to supply due to pumping costs when compared to gravity fed sources available to GVW (i.e. Duteau Creek and Deer Creek (King Edward Lake)).

- **TM 5 – Independent Agricultural System** *by Brett deWynter, P.Eng., AECOM*

  TM5 reviewed the feasibility of constructing a completely independent potable water supply system with the current water system being dedicated to agricultural use through system separation. A large part of the GVW water system was initially built to support agriculture; however, domestic users began connecting to the water system in the 1960s as water delivery switched from canals to a pressurized water distribution system. This was at a time when water quality standards were low and treatment for potable water was a minimum. Legislation changed in 2001 with the enactment of the *Drinking Water Protection Act*, requiring a higher level of treatment for water used for domestic purposes. With the domestic users now connected to the irrigation system, and increased treatment requirements for domestic supplies, TM5 examines the capital costs to separate the domestic system from the agricultural system to provide non-potable water for irrigation and treated water for domestic use.

  The MWP includes a complete list of capital work projects required to achieve complete system separation of the domestic and agricultural supplies, for a total estimated cost of $80.9 million. This cost was used for all options within TM9 that considered/required full/partial separation to enable proper comparison of options. Varying degrees of separation were considered, however, the separation in the Lavington Area was proposed as the cut off for the following reasons:

  - The Lavington area is closest to the source water (Duteau Creek) and the parcels of land being farmed were relatively large and intensively irrigated,
  - The cost of construction per hectare of land separated was minimal,
  - In the BX area and many other areas of the community, the rural and urban landscapes are mixed. Water consumption in these areas may be lower than other more intensively irrigated areas,
  - Some areas are not intensively farmed, but require stock watering, pasture irrigation or small commercial supply, and
  - Some lots that are zoned for agricultural have farm status and were previously allocated, but no longer use that allocation.

December 3, 2015 SAC Meeting

This meeting was initiated with distribution of a table showing examples of the water quality parameters for Greater Vernon Water's three (3) different water sources: Duteau Creek (Duteau Creek Water Treatment Plant (DCWTP)), Kalamalka Lake (Mission Hill WTP) and Okanagan Lake (Outback Water System). Also included, were two (2) graphs of the Outback Water System (Okanagan Lake water source) that show the water quality testing for the two (2) disinfection by-products: trihalomethanes and haloacetic acids.

The meeting continued with the following two presentations:

- **TM 6 – Water Conservation Strategies** *by Brett deWynter, P.Eng., AECOM and the Water Sustainability Coordinator, RDNO*
  TM6 discussed water conservation as a strategy to reduce water demand to defer or eliminate the need for new capital projects and reduce operating costs by reducing energy and chemicals required for treatment and distribution.

In 2011, the average water consumption was approximately 271 liters/capita/day (l/c/d). Based on water conservation efforts the MWP established the target average domestic demand of 250 l/c/d.

For agriculture, it was assumed that the overall water demand was to remain the same at 550 mm/ha/year. Any additional water requirements due to climate change would be met by irrigation efficiency techniques. These assumptions were used to forecast future GVW water demands throughout the 2012 MWP to assess water supply, size infrastructure in conceptual designs, develop costs and stage projects for all options. In order to realize the planned reduction in customer water demand, TM6 recommended a Water Conservation Strategy to guide GVW in achieving these target goals.

Current and proposed GVW water conservation strategies include educational programs (workshops, public education, auditing programs, websites, media releases), financial programs (metering and tiered rates), regulatory programs (bylaws) and drought response (water restrictions).

- **TM 7 – Water Treatment** *by Brett deWynter, P.Eng., AECOM*

TM7 reviewed the water treatment requirements to ensure that clean, safe drinking water is delivered to domestic customers and that the proposed treatment methods would meet the BC legislative requirements as described in the Interior Health presentation provided at the October 22, 2015 SAC meeting. The legislative requirements are described in full in TM7 and form the basis for the recommended water treatment plant upgrades and associated cost estimates. The TM includes operation and maintenance estimates for various size of treatment plants based on wages, chemicals, energy, equipment maintenance and training. These cost estimates for different plant flows and capacities were estimated to accommodate a comparison of the nine (9) options for long term conceptual water supply planning examined in further detail in TM9.

December 17, 2015 SAC Meeting

The meeting included a presentation on TM9 as follows:

- **TM 9 – System Separation Option Analysis** *by Brett deWynter, P.Eng., AECOM*

TM9 used all the information assembled in TM 1 through TM 8 to develop nine (9) long term conceptual water supply options for GVW. Lifecycle costing for each option was prepared using unit estimates consistently applied to all options to complete an unbiased cost comparison between the options. Each option in the 2012 MWP was developed based on several key assumptions:

- All domestic customers would receive potable water that met Provincial Standards within 10 years and hence, treatment and system separation would be completed by 2022,
- Treatment facilities would be sized to meet the projected 20 year growth demands and expanded in the future to meet the projected 40 year growth demands,
- Pipes and related infrastructure were designed to meet the projected 40 year growth demands, and
- Lifecycle cost comparisons for all options were completed over a 50 year horizon based on the predicted life of the facilities and infrastructure.

To obtain an unbiased comparison of the options, the options were analyzed using equivalent parameters (or in other words to complete the comparison using an “apples to apples” approach):

- Options were developed at the conceptual level with costing out of the core infrastructure only (treatment, transmission, pumping and large pipes) and not for localized distribution needs,

- Unit costs, flows, storage and other design parameter estimates were developed and used consistently for all options,
- All capital costs included 15% engineering and 30% contingency,
- Timeframes for infrastructure improvements were developed and applied consistently to all options based on the key assumptions above, and
- A consistent increase in O&M costs were calculated based on current O&M costs and applied to each option based on infrastructure needs. Current O&M costs were determined to be applicable for all options, the analysis includes the increase in O&M specific for each option taking into consideration infrastructure expansion for water treatment and/or additional pipe for separation and where savings are realized if there was reduced treatment at DCWTP or MHWTP.

A summary of the nine (9) options provided in the MWP is as follows:

Table 5.1 Capital & Operating Cost Summary

Option	Estimated Total Capital Cost	Net Annual O&M Change ($ millions)
Option 1 – Maintain Current System	$ 89.1 M	$ 1.8 M
Option 2 – Partial System Separation – Two Treatment Facilities	$ 108.2 M	$ 1.4 M
Option 3 – Complete System Separation – Two Treatment Facilities	$ 146.2 M	$ 1.3 M
Option 4 – Complete System Separation – Centralized Treatment at Mission Hill	$ 162.6 M	$ 0.9 M
Option 5 – Complete System Separation – Centralized Treatment at Duteau Creek	$ 148.0 M	$ 1.2 M
Option 6 – Complete System Separation – Centralized Treatment at Mission Hill with Okanagan Lake Raw Water Source	$ 182.8 M	$ 1.3 M
Option 7 – Complete System Separation – Centralized Treatment at Mission Hill – Additional Flow from Kalamalka Lake	$ 158.1 M	$ 0.9 M
Option 8 – Complete System Separation – Centralized Treatment at Duteau Creek with Mission Hill Filtration Deferral	$ 145.0 M	$ 0.4 M
Option 9 – Partial System Separation – Centralized Treatment at Duteau Creek	$ 113.8 M	$ 1.4 M

January 14, 2016 SAC Meeting

The meeting was initiated with the following presentation:

- **Review of Non-Cost Considerations to evaluate the non cost benefits of the nine (9) Options within TM 9** *by Brett deWynter, P.Eng., AECOM*

  The presentation provided an outline of how the options were rated using the non-cost considerations in order of importance for operating a sustainable water utility. The categories of the non-cost considerations were reviewed with an explanation on how this rating system was used to highlight the preferred options based on a weighted Benefit-to-Cost Ratio of both the lifecycle cost and non-cost considerations.

The SAC had a discussion of the non-cost consideration categories and decided as a group to simplify and create four (4) new non-cost categories: supply, operations, finished product, and project timeliness.

January 21, 2016 SAC Meeting

The meeting was initiated with a presentation as follows:

- **Direction on evaluation of Options using Non Cost Considerations** *by Brett deWynter, P.Eng., AECOM*

  The presentation included a review of the key technical differences between the options and a summary of the non-cost considerations that were used by the Technical Advisory Committee and the final results obtained in preparation of the 2012 MWP. The challenges, solutions, environmental impacts of implementation on the proposed Option 2 vs. Option 3 were explained.

Further discussion ensued by the SAC regarding the non-cost considerations and it was agreed they would be weighted as follows: Supply 30 %, Operations 40%, Projects 10% and Water Quality 20%.

The SAC agreed that any option that includes the DCWTP as a potable water source must examine the addition of a ultra-violet light disinfection system and reservoir aeration after the DAF treatment process to support a filtration exclusion application.

February 18, 2016 SAC Meeting

The meeting was initiated with a presentation as follows:

- **Review of Non Cost Consideration process to assist SAC members to complete their rating** *by Brett deWynter, P.Eng., AECOM*

  The SAC was provided a review of the past non-cost consideration process that was completed in the technical review and provided an explanation of the "*Criterium Decision Plus Decision Modeling Software*" and how these decision model principals were used for the decision making process to rank the nine (9) Options.

After the presentation, the SAC agreed they would use the proposed 1 - 9 (9 being the highest) ranking system to implement the non-cost assessment. SAC members were then split into three (3) groups to complete the ranking of the nine (9) options presented in TM9 using the non cost consideration table developed by the SAC members. Due to time constraints, the SAC groups did not fully complete their ranking and agreed to resume at the next meeting.

February 25, 2016 SAC Meeting

The SAC members separated into the same three (3) groups as the previous meeting to continue with the exercise of ranking the nine (9) Long Term Water Supply Options presented in TM9. Each group submitted their ranking results. The weighted average of each group's final ranking result and the average of all the groups was then calculated and presented. The following provides each groups ranking results:

- Group 1 ranked Option 5 as their first choice and Option 2 as their second choice.
- Group 2 ranked Options 1, 2 and 3 highest with each having an equivalent numerical ranking.
- Group 3 ranked Option 2 and 3 the highest with both having an equivalent numerical ranking.

After discussion, by majority the SAC agreed that Option 2 was likely the preferred option but that the discussion would continue at the next meeting where the cost to benefit ratio would be presented and a final vote on the preferred option would occur.

March 17, 2016 SAC Meeting

The meeting was initiated with a presentation as follows:

- **Review of Technical Memorandum No. 8 – Greater Vernon Water Financial Issues and Principles to Support the Master Water Plan** *by D. Main, P.Eng., AECOM*

  This presentation provided an overview of financing considerations with respect to the significant investment required for GVW in order to meet provincial standards. The improvements that GVW must make will lead to water rate increases, which is a sensitive issue to political representatives and users, and must be completed in such a way to provide stability to customers and the utility. TM8 reviewed the progress made on key management and financial strategies recommended in the 2002 MWP and outlined water utility Best Management Practices for financial planning and administration to incorporate into GVW policies and financial strategies. This included a review of the GVW domestic and irrigation rates and how they comply with best management practice rules for water utilities set by the InfraGuide and AWWA. It was noted that there are several critical variables that may impact the Master Water Plan financial strategies and rates which are the availability of grant funding, timing of infrastructural renewal projects and water conservation trends.

- **G. Moseley, Specialist – Environmental Health Officer, Interior Health.**

- Mr. Mosely attended the meeting at the request of SAC members to answer questions. The following summary are points that were discussed with Mr. Mosely:

  - it is not IH's mandate to provide the timeline for utilities to meet treatment objectives. It is up to the utility to provide a timeline based on their situation in their Master Water Plan which needs to demonstrate compliance in a reasonable timeframe for acceptance by IH:
  - water quality sampling is ongoing daily, weekly, monthly and annually,
  - an enforcement order to comply with legislation will not be issued at this time to install Duteau filtration as long as continual improvement is seen by IH,
  - enforcement orders are typically issued to address immediate health hazards, but may be issued for non-compliance with the legislation,
  - all potable water is expected to meet provincial standards and treatment objectives,
  - health standards on agricultural water is not done by IH as they only deal with potable water,
  - both sources (Duteau and Kalamalka) would be expected to meet drinking water treatment objectives,
  - if a referendum fails, IH could pursue enforcement,
  - filtration is recognized as the best management practice/standard, most effective means for Duteau and Kalamalka, and
  - drinking water objectives are used to meet legislation requirements.

The SAC members were requested to submit resolutions for discussion and voting at the next meeting for inclusion in the final SAC report.

April 14, 2016 SAC Meeting

The resolutions that the SAC members submitted were compiled and developed into resolutions presented to the SAC for discussion. The SAC discussed the resolutions for consideration and some of these were postponed to the April 21, 2016 meeting in order that the SAC could review new information that was presented. The following resolutions were voted upon by SAC and carried:

- staging of the treatment plants be changed so that MHWTP filtration is constructed first, noting that a filtration exclusion at DCWTP may be successful.
- any separation (except Option 1 where there is no separation proposed) should include sizing of the irrigation transmission main to allow for continued separation of domestic and irrigation water supplies and enable full separation in the future.
- alternative sources for irrigation be explored fully with the objective of reducing capital and operation costs.
- a scheduled review of the MWP be completed every 5 - 10 years or prior to the construction of any significant capital project.

After this discussion and voting of the above by the SAC members, the SAC was provided with the following a presentations:

- **Review of Technical Memorandum No. 10 – Greater Vernon Water Financial Plan** by *Brett deWynter, P.Eng., AECOM*

  Mr. deWynter provided a presentation on Technical Memorandum No. 10 which discussed the potential impact on operating cost and revenue required for Options 1, 2, 3 and 7. Option 1a which did not follow the assumptions was also provided as an example to demonstrate how a comparison can be skewed if the assumptions are not followed. This example used only the addition of a ultra-violet light disinfection system and reservoir aeration after the DAF treatment process at the Duteau Creek Water Treatment Plant and assumed that a filtration exclusion would be granted. This example noted that the capital and long term operational cost was reduced significantly to implement the MWP; however, it is uncertain if it would be accepted by IH (a key assumption).

- **Review of Financial Options and Considerations – Greater Vernon Water Master Water Plan** *by Stephen Banmen, General Manager, Finance*

  The General Manager, Finance provided a presentation on the financial options and considerations to finance the GVW MWP moving forward. Options for funding the master water plan include using revenue, reserves, borrowing, grants and growth. The General Manager, Finance indicated that the rate increases from 2012/2014 provides financial capacity to fund a considerable portion of capital plan with minimal impact on user rates, significant borrowing capacity exists and once the process to finalize the MWP review concludes, the ability to take advantage of potential grant programs improves and the Development Cost Charge bylaw can be updated to generate increased revenue.

The SAC notes that the General Manager, Finance reviewed a possible scenario where GVW could utilize existing reserves, redirect transfer to reserves to debt repayments, minor borrowing of $10M, diversion of some capital funds to debt payment and a reasonable estimate of federal/provincial grant funding, GVW would have approximately $45M to fund several of the initial high priority capital projects in the MWP. These estimates should be refined and a similar presentation prepared for the Greater Vernon Advisory Committee in preparation of the financial plan as part of Recommendation No. 10.

April 21, 2016 SAC Meeting

The meeting was initiated with a presentation as follows:

- **Presentation of a comparison of Option 1a vs. Option 7a** *by Brett deWynter, P.Eng., AECOM*

  A presentation was prepared that compares the Options 1a and 7a. Option 7a was based on a proposal submitted by Representative Mooney's (Citizens for Changes to the Master Water Plan Representative) titled "Option 7 Analysed" dated April 11, 2016. Neither of these options currently meet the IH water treatment requirements (a key assumption); however, the comparison was provided to demonstrate how options can be skewed if the assumptions are not followed making one option seem more favourable in comparison to the others. Option 1a assumes that a filtration exclusion can be achieved at Duteau Creek Water Treatment Plant with the installation of UV disinfection and air scrubbing in the reservoir. Option 7a assumes that all domestic supplies are obtained from Kalamalka Lake source through water licence transfers, no treatment at Duteau (irrigation supply only) and full separation. Both do not follow key assumptions at this time and likely would not be acceptable to IH.

  The net result of this analysis was as follows:

OPTION	CAPITAL $	ANNUAL OPERATING $
Option 1a	$ 60.5 M	$ 1.24 M
Option 7a	$ 148.1 M	$ 0.88 M

  The payback period of Option 7a vs Option 1a based of operation & maintenance savings at 0% interest and 0% inflation rates is 243 years.

  The SAC discussed several motions and confirmed through three (3) separate motions that the SAC are satisfied with the level of detail, engineering analysis and cost estimates provided in TMs 1 through TM8 supplemented by the additional information provided within the SAC Question Papers 1 through 8.

  The SAC put forth the following three (3) Options to the Greater Vernon Advisory Committee for consideration:

  - Option 1 - the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation,
  - Option 2 - the option with the highest benefit to cost ratio (NPV) with partial separation, and
  - Option 3 - the option with the highest benefit to cost ratio (NPV) that supports full separation.

  The SAC continued discussion on their recommendations to GVAC and selected Option 2 with the highest benefit to cost ratio (Net Present Value) as the first choice moving forward. Option 2 includes two treatment facilities with partial separation.

  Option 1 their second choice with the lowest financial impact to water users based on the lowest Net Present Value (NPV). This option included two large treatment facilities with no further separation.

  By process of elimination, Option 3 being the third choice.

INFORMATION EXCHANGE – SAC QUESTION PAPERS

During the Master Water Plan review of the technical memorandums, the SAC members presented questions in a written format throughout the complete process. All questions were provided answers through a review process involving the consulting engineering team and staff with answers provided in the SAC Question Papers 1 through 8. All SAC Question Papers are provided in Schedule "D".

STAKEHOLDER ADVISORY COMMITTEE RECOMMENDATIONS AND COMMENTS

The following recommendations were carried with a majority of support to put forward to the Greater Vernon Advisory Committee with respect to the GVW 2012 MWP:

I. That the request from the Citizens for Changes to the Master Water Plan to hire an independent engineering consultant to undertake a peer review of the 2012 Master Water Plan not go forward.

II. That any option that includes the DCWTP as a potable water source will examine using UV and air scrubbing in the DCWTP Reservoir to support a filtration exclusion application.

III. That the final Master Water Plan option provide for the use of two water sources and two water treatment plants.

SAC comment: The opportunity to draw from two watersheds allows the utility to mitigate the impact of drought on the community as well as other source risks. Similarly, it is proposed that two treatment plants be maintained to mitigate risk. While two plants is not the only way to achieve redundancy, the committee supports this approach as there are already two new water treatment plants in operation.

IV. That Options 4, 6, 7, 8 and 9 be removed from the Options list based on the highest capital cost with lowest non-cost benefit ratio and not be considered in the Financial Planning Stage for the Stakeholder Advisory Committee review of the Greater Vernon Water 2012 Master Water Plan.

V. That the SAC is satisfied that all Options contained in TM9 (subject to variations) have adequately considered all feasible options available to meet Ministry of Health standards.

SAC comment: It should be pointed out that other scenarios, not presented in TM9, were brought up either in meetings or through questions submitted to staff. These were either found to be variations of existing options, not feasible or not as good as existing options.

VI. That the staging of the treatment plants be changed so that MHWTP filtration is constructed first, noting that a filtration exclusion at DCWTP may be successful.

VII. That [regardless of the Option preferred, except Option 1] any separation should include sizing of the irrigation transmission main to allow for continued separation of domestic and irrigation water supplies and enable full separation in the future.

VIII. That alternative sources for irrigation be explored fully with the objective of reducing capital and operation costs.

IX. That a scheduled review of the MWP be completed every 5 - 10 years or prior to the construction of any significant capital project.

X. That the following points presented by the General Manager, Finance be considered by the Greater Vernon Advisory Committee when finalizing the financial strategy of the Master Water Plan:

- Finalize the Option, then develop a financial strategy.

- Use existing reserves as a funding source in plan.
- Use grants as a funding source in plan.
- Use DCC's as a funding source in plan.
- Use current revenue as a funding source – balance with renewal projects from year to year.
- Delay timing of major projects, where feasible.
- Increase annual contribution to reserves – balance with annual capital plan from year to year.

XI. That the SAC is satisfied with the level of detail provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

XII. That the SAC is satisfied with the engineering analysis provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

XIII. That the SAC is satisfied with the cost estimates provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

SAC comment: Staff explained to the SAC that the 2012 unit prices were based on design details, actual constructability and construction costs from real separation projects including Bella Vista, West Swan Lake and Old Kamloops Road that were all constructed after the 2004 MWP.

XIV. That the SAC put forth the following three (3) Options to the Greater Vernon Advisory Committee for consideration:

a. Option 1 - the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation,
b. Option 2 - the option with the highest benefit to cost ratio (NPV) with partial separation, and
c. Option 3 - the option with the highest benefit to cost ratio (NPV) that supports full separation.

XV. That the SAC select Option 2 being the option with the highest benefit to cost ratio (Net Present Value) with partial separation as their first choice moving forward with the 2012 Master Water Plan.

XVI. That the SAC select Option 1 being the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation as their second choice moving forward with the 2012 Master Water Plan.

ATTACHMENTS

Schedule "A" – Terms of Reference for the Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee

Schedule "B" – Master Water Plan Review – List of Assumptions

Schedule "C" – Stakeholder Advisory Meeting Minutes – October 1, 2015 to April 21, 2016

Schedule "D" – Stakeholder Advisory Committee Question Papers

Respectfully submitted on behalf of the
Master Water Plan Stakeholder Advisory Committee

Jim Garlick
Chair

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SCHEDULE “A”

Terms of Reference for the Greater Vernon Water
2012 Master Water Plan
Stakeholder Advisory Committee

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REGIONAL DISTRICT OF NORTH OKANAGAN

TERMS OF REFERENCE – Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee **A SELECT COMMITTEE OF THE BOARD OF DIRECTORS OF THE REGIONAL DISTRICT OF NORTH OKANAGAN ESTABLISHED UNDER s. 795 OF THE *LOCAL GOVERNMENT ACT***	
ENDORSED BY THE BOARD OF DIRECTORS ON:	September 16, 2015
PURPOSE:	The purpose of the Stakeholder Advisory Committee (SAC) is to provide input on options for the future improvements to the Greater Vernon Water (GVW) System and provide for public participation in the Master Water Plan (MWP) review process. Input provided will be incorporated into decision making to the maximum extent possible. Overall, the SAC shall work together to satisfy the following roles and responsibilities: 1. Review the assumptions and determine if the objectives, development and recommended direction in each of the Technical Memoranda of the 2012 MWP corresponds with stakeholder and community perspectives, 2. Based on the review above, develop recommendations/ suggestions for consideration to amend the Technical Memorandum, 3. Ensure all options are considered, 4. Assist in effective public communication and education regarding the GVW MWP; and 5. Communicate directly with major water users about the water treatment and separation goals and their role in implementing the MWP.
SCOPE:	The scope of the SAC is to review the 2012 MWP and provide input from a stakeholder and community perspective which will be considered as part of the 2012 MWP review.
DEFINED RESPONSIBILITIES:	Responsibilities of committee members are: 1. Attend monthly meetings over a six month period. 2. Participate in the public meeting(s) (dates to be determined). 3. Identify an alternate representative in the event of a conflict with a scheduled meeting time. Allow us to post your name and organization on the project website.
COMPOSITION:	The overall SAC members are to be made up a group of stakeholders. These stakeholders will have the following characteristics: • GVW Customers, • Independent, • Demographically diverse, • Geographic representation within the GVW Service boundary

	A Technical Advisory Support Group shall be comprised of the following: 1. RDNO General Manager of Engineering 2. Manager – Greater Vernon Water (Alternate) 3. RDNO staff (as required for information) 4. Interior Health (as required) 5. AECOM – Author of 2012 MWP (as required) The Technical Advisory Support Group shall be non-voting members and will have a supporting function only for the SAC and will be responsible for reporting activities and recommendations from the SAC to the GVAC. Stakeholders of the SAC will consist of a group of up to 20 people who can commit to the MWP review process and with the following representation: 1. Two (2) representatives from the GVAC who are members of the Stakeholder group and who will act as Chair and Vice Chair of the SAC meetings, 2. Two (2) representatives from Agricultural, 3. Up to three (3) representatives that are high water use consumers from the Non-Domestic Class, 4. Up to three (3) representatives from the Non-Domestic customer class that provides services to sensitive customers (i.e. Vernon Jubilee Hospital, School Board, care facility, etc.) 5. One (1) representative from a major Industrial user 6. Up to seven (7) representatives from the residential user class 7. One (1) representative from the Developer class (Can be the Urban Development Institute or other representative group) 8. One (1) representative from a local service group The role of committee members is to invest time and energy in learning about the GVW System, water treatment and distribution, actively participate in meetings and work constructively and collaboratively with committee members to achieve the committee purpose. This is a voluntary position. Members shall be requested to provide one (1) months notice of membership termination in order to appoint an alternate representative.
APPOINTMENTS:	Appointments shall be selected by the GVAC and forwarded as a recommendation to the Board of Directors.
CHAIR AND VICE CHAIR:	1. The GVAC will elect a chairperson for the SAC from among its members and/or the Board of Directors before the first SAC meeting is held. 2. The role of the Chair will be to facilitate the SAC meetings according to Robert's Rules. In the absence of the Chair, an alternate GVAC member or staff representative will be Acting Chair for that meeting.

TERM:	1. It is anticipated that the SAC will meet monthly over a six month period to review the 2012 MWP and provide recommendations to the GVAC. 2. The SAC term for members is six (6) months.
REPORTING:	The SAC is an advisory Committee to the GVAC and recommendations from the SAC shall be forwarded to the following GVAC meeting for consideration.
REMUNERATION:	Committee member positions are deemed voluntary.
OTHER:	**1. RECORD OF MEETINGS** 1.1 The assigned Secretary (RDNO staff) will be responsible for preparation of the records (minutes) for all Committee meetings. 1.2 Records and all documents shall be forwarded to the GVAC to be received for information. **2. CONDUCT OF MEMBERS AT MEETINGS** Committee members are expected to be respectful of one another and to offer input and suggestions that are relevant, constructive and productive. Recommendations will be based on consensus of the stakeholders. No votes will be held to determine the group's position on issues or recommendations to the GVAC. Where consensus exists, it will be noted. Where it does not exist, majority opinions may be considered to have merit and will be noted. In the context of the committee, consensus will be defined as "I will support the decision of the group." 2.1 Members should be committed to providing advice on developing recommendations. 2.2 Members will respect the ideas, concerns and opinions of others. 2.3 Everyone will have an opportunity to speak, but only one person shall speak at a time as determined by the Chair. There will be a timekeeper to ensure all persons concerns are heard within an allotted time. For clarity, these Terms of Reference do not delegate any authority or corporate powers to the SAC.

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SCHEDULE “B”

Master Water Plan Review
List of Assumptions

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Greater Vernon Water - Master Water Plan
Summary of Key Assumptions that Impact the Master Water Plan

Item No.	Technical Memorandum	Item	Assumption Description	Impact to Plan	Comments
1	All	Level of Service	All customers within the GVW water service boundary shall be equal within their designated service class (i.e. domestic, non-domestic & agricultural class).	Providing domestic water that complies with the Provincial Legislation, Regulations and guidelines to all domestic and non-domestic customers impacts the treatment facilities location options and the long term distribution system costs. Deciding to not provide domestic water to customers in rural areas would save money, however, the legality of doing so is questionable.	Establishing separated service areas within the utility boundary could offer variable cost savings at the expense of administration/parity between users. Issues like serving properties on hillside slopes or near the end of the distribution system have higher cost water due to pumping, rechlorination and long distribution mains would make the analysis of the service areas very complex.
2	All	Level of Service	All water treatment systems would need to be owned and operated by GVW, including Point of Entry/Point of Use water treatment systems	Point of Entry/Point of Use water treatment systems have been investigated and are cost prohibitive from an ongoing operation & maintenance perspective.	See: www.interiorhealth.ca/YourEnvironment/DrinkingWater/Documents/823533_POE%20POU.pdf
3. a	All	Level of Service	Maintaining cost effective water supply to all customers.		
3. b	All	Level of Service	Maintaining agricultural water supply to all customers that have an agricultural water allocation.	Maintaining the supply of agricultural water to all ~~the current~~ customers with allocation within the service area results in high volumes of treated water being used for irrigation.	Of the options, three general scenarios have been investigated: Full separation, no separation and partial separation (Lavington Area only).
4	All	Interior Health	Provide domestic water that is fully compliant with Federal and Provincial Legislation.	The MWP is based on providing Federal (Health Canada) and Provincial Legislation (Interior Health) compliant treated water to all the domestic customers in a reasonable time period. If compliant treated water is not the goal the capital magnitude of the MWP could be significantly reduced. It may also be feasible to rework the schedule and this would impact financing by stretching the program out over many more years.	To obtain Interior Health approval of the MWP, we will need to prepare a plan that meets the microbiological drinking water treatment objectives for surface water supplies in British Columbia and the requirements of Health Canada.
5	1	Population Projections	Population projections were completed based on discussions with the Planning Department of the Regional District, Vernon, and Coldstream.	The planning is completed based on Regional Growth Strategies and member Planning Departments results in a total residential service population of 80,479 by 2052. The net growth rate to 2031 based on these projections averages to 1.3%/annum and no forecast exists for growth beyond 2031. The plan assumes a declining growth rate of 0.75%/annum system wide from 2032 to 2052.	Note: In the 2004 MWP the projected MDD for domestic consumption was 89 ML/d; the 2012 MWP projects 68 ML/d or a 23.6% reduction. The MDD impacts the size of infrastructure and facilities in the capital works program and overall costs.
6	1	Domestic Demand	Conservation for the per capita domestic demand is assumed to occur within the service area and water demand to be based on 250 l/c/d.	The planning is based on a domestic annual demand of 13,360 ML/yr (36.6 ML/d) and Maximum Day Demand (MDD) of 79 ML/d by 2052 (including leakage allowance). To meet these requirements domestic water conservation needs to occur. The plan reduced the per capita consumption from 270 l/c/d to 250 l/c/d to account for conservation efforts. Higher or lower actual water demand could impact the infrastructure required.	Same note as above, reductions in the demand per capita can have long term impacts on growth because the oversizing ~~sizing~~ of treatment plants and trunk supply mains is based fully on population growth. The current MWP projects both reductions in growth rate and consumption resulting in significantly lower long term demand projections.

Item No.	Technical Memorandum	Item	Assumption Description	Impact to Plan	Comments
7	1	Agricultural Demand	The agricultural design demand to remain at 17,400 ML/yr.	The master plan is based on maintaining the current annual agricultural demand of 17,400 ML/yr and a peak demand of 213 ML/d. The agricultural demand has remained unchanged and it was determined that the demand will vary up and down in the future in response to climate change, variable crops, improved technology and potentially increased agricultural land. The peak instantaneous flow is limited by bylaw; however, currently we have no provisions in place to control peak flows. Excessive use over and above the allocation results in additional water consumption fees.	In 2013, we implemented an additional fee for agricultural consumption exceeding their allocation through an inclining block water rate (domestic rates) is applied to over-consumption. This rate is for overall consumption for each property during the Irrigation Season and does not limit instantaneous flow.
8	2	Water Transfer	Diverting raw water from one watershed to another was assumed to be feasible and unlimited water licences could be obtained for all proposed Options.	The interbasin transfer of water would require the completion of a detailed environmental assessment report. It is expected that the interbasin transfer of water from Duteau Creek to Kal Lake (or vice versa) will be a long and arduous process requiring approvals from US and Canadian government approving agencies, Canadian Environmental Assessments, environmental groups and stakeholders and First Nations. The Province has indicated that formal applications must be made for assessment to determine the feasibility of water licence transfers or new water licence acquisitions.	From a GVW perspective an interbasin transfer impacts the Fraser River Basin and Columbia River Basin.
9	2	Kalamalka Lake Supply	The current water license on Kalamalka Lake is at capacity; however, it is assumed that obtaining water licenses and changing points of diversion are not a constraint.	The current water licence on Kalamalka Lake is 8,842 ML/yr, if we could transfer the full Coldstream Creek water licence to Kalamalka Lake it would increase this source by only 4.7% (415 ML/yr) to a maximum of 9,257 ML/yr. The water licence from Deer Creek/King Edward would not be transferred as this water is fully separated and used solely as a non potable irrigation supply.	It may be feasible to transfer the water licence (within water basin transfer) from Coldstream Creek (415 ML/yr) to Kalamalka Lake; however, there is a strong desire by fisheries to increase the base discharge from Kalamalka Lake to Vernon Creek.
10	2	Water Supply Source	At the end of the current 50-year planning horizon it is expected that more raw water supply will be required. It is recommended that a 50,000 ML/year water license reserve be established on Okanagan Lake to meet long term demands.	A review of the water sources feeding into GVW was made, with consideration given to climate change, future water demand, population growth, water efficiencies, and irrigation types. It is assumed that beyond the current planning horizon of this report, more raw water supply is expected to be required. Once the capacity of the Duteau Creek and Kalamalka Lake sources is reached the next logical raw water source is Okanagan Lake. For long term planning it is recommended that a water license reserve from Okanagan Lake for 50,000 ML/yr be established.	We have been in discussions with the Ministry of Environment with respect to this this water licence and they are suggesting that we consolidate all our water licences from Okanagan tributaries not currently being used and request to move these to Okanagan Lake and then request an allocation in addition to these consolidated water licences to meet the 50,000 ML/yr, which they would support.
11	3	Water Storage	Options that require expansion of the Duteau Creek Water Supply system must include the 2 projects: Aberdeen Dam be raised by a minimum of 4 metres and the Gold Paradise extension be constructed .	The proposed Gold Paradise diversion will provide a portion of the additional water required to fill the raised Aberdeen Reservoir and fully utilize the existing water licences in the Duteau Creek watershed to meet storage requirements for future development and for extended periods of drought.	The raising of Aberdeen Dam will increase the storage in the Duteau system by 11,670 ML and the diversion Gold Paradise extension will increase the annual supply by 3,000 - 7,600 ML/yr.
12	4	Domestic Water System Analysis	All options were completed based on design criteria from the GVW Waterworks Regulation Bylaws.	Provides consistent standards that are used in the development of all options and these are then used to develop costs, which again are consistently applied to all options.	

Item No.	Technical Memorandum	Item	Assumption Description	Impact to Plan	Comments
13	4	Fire Flow	It is assumed that bylaw compliant fire flow is provided eventually across the service area from either the domestic or agricultural distribution system.	Providing fire flow from either the domestic or agricultural results in a significant cost savings, but requires that the agricultural distribution system be designed to function all year. Based on the assessments completed during the MWP this is expected to be the lowest cost solution.	
14	5	Cost of System Separation	All Options are based on unit costs for reservoirs, pump stations and watermains complete with the associated restoration.	The infrastructure needed to further separate the agricultural and potable distribution systems is a function of the engineering requirements. The estimated cost to build the infrastructure is the direct result of the estimated unit costs. For all Option estimates, current and future options, the same unit prices, contingency (30%) and engineering (15%) must be utilized throughout to enable proper financial comparison.	
15	5	Independent Agricultural Distribution System	A fully separated agricultural system is technically feasible.	The total current replacement cost of existing infrastructure is $137,207,000 and the estimated construction cost of the infrastructure required to complete separation is $80,855,000.	
16	6	Water Conservation Strategies	The long term water demand projections are the direct result of climate change and assumed implementation of water conservation measures.	Recommendations include 1.90 full-time equivalent staff and a capital budget of $215,000/yr, maintaining and updating water use databases, reducing unaccounted for water losses, updating bylaws, and supporting research for general GVW operations. For user consumption, strategies include promoting workshops and marketing, performing audits, implementing education, reviewing consumption fees, and implementing rebate programs. If these measure are not implemented it is possible that the long term water demands are higher than currently projected resulting in the need for more infrastructure and more capital investment.	We currently have a 1.0 FTE staff member and utilize summer students (0.5 FTE) for education dedicated to Water Conservation. In assessing water use trends, staff must also consider climate change, drought, metering improvments and water losses.
17	7	Duteau Creek and Mission Hill WTPs	Moving towards filtration as it is a requirement of Interior Health to meet the Drinking Water Protection Act Regulations.	Biofiltration combined with ozonation is recommended to enhance the treatment for the Duteau Creek WTP. Membrane/granular filtration are the recommended treatment processes to be added to the existing Mission Hill WTP	These treatment options provide the basis for treatment plant estimates.
18. a	8	GVW Financial Issues	None of the costing for the Options is based on senior government grant funding.	The availability of senior government grants is variable and unknown. If senior government grants are available the cost impact to the GVW rate payers of implementing the MWP will be reduced.	
18. b	8	GVW Financial Issues	That the timing for the implementation for the Master Water Plan will consider the availability of funding from senior levels of government.		
19	9	Option Analysis	The options analysis is based on the long term supply of water were compared on a life cycle basis (50 year life cycle, inflation rate 2%, and discount rate 5%).	Life cycle cost ratio was used to evaluate the options to include the long term operations and maintenance costs of each Option. Using the life cycle cost ratio resulted in the selection of Option 2. If this approach is not followed and only capital cost is considered Option 1 is the preferred solution.	Changes to the inflation rate and discount rate did not appreciably affect the net results.

Item No.	Technical Memorandum	Item	Assumption Description	Impact to Plan	Comments
20	9	Option Analysis	The Options analysis was also conducted based on non-cost considerations, for example: System Operational Ease & Flexibility; Governance & Administration Variances; Emergency Preparedness; Average Finished Water Quality; Reliability & Availability of Supply; Ease of Implementation; Future Expansion ; Environmental Impacts; other non-cost considerations determined by the committee.		The evaluation factors and weighting to be confirmed. Must take emergent issues (i.e. mussels) into consideration.
21	9	Option Selection	The selected option be based on both financial and non-cost considerations.	The overall best solution to the Regional District was Option 2 that resulted in a slightly higher cost with more overall value.	Each group on the MWP Technical Advisory Committee completed the evaluation independently and each group was consistent in choosing Option 2 as their number 1 option based on the Benefit-to-cost Ratio (NPV) they rated Option 1 as the number 1 option based on the Benefit-to-cost Ratio (Capital).

SCHEDULE “C”

Stakeholder Advisory Meeting Minutes
October 1, 2015 to April 21, 2016

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REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, October 1, 2015.

Members:	Alt. Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	A. Mohammad	Agricultural Representative	
	D. Gibbs	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Etherington	Sleeman Breweries Representative	
	M. Schrott	Greater Vernon Chamber of Commerce Representative	
	P. Williamson	Residential Representative	
	D. Neden	Residential Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
	D. Bodenham	Residential Representative	
	R. Evans	Wesbild / Predator Ridge Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	S. Banmen	General Manager, Finance	
	Z. Marcolin	Manager, Greater Vernon Water	
	P. Juniper	Deputy Corporate Officer	
	L. Schrauwen	Executive Assistant, Engineering	
	C. Reardon	Clerk, Engineering	
Also Present:	Councillor G. Kiss	District of Coldstream	
	Media and Public		

CALL MEETING TO ORDER

The meeting was called to order at 8:02 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – October 1, 2015

Moved and seconded by Representatives Williamson and Frost
That the Agenda of the October 1, 2015 Greater Vernon Advisory Committee meeting be approved as presented.

CARRIED

NEW BUSINESS

Roundtable Introductions

The Committee and staff provided introductions including their background information.

Conduct at Meetings / Release of Information to the Media

The Chair provided information regarding conduct at meetings and the process for releasing information to the media.

Meeting Minutes

The General Manager, Engineering clarified how minutes for the Committee would be recorded. He advised the following:

- No verbatim minutes, decisions only are recorded
- Recommendations forwarded to the Greater Vernon Advisory Committee for consideration require a mover, seconder and approval of the majority

Background to Greater Vernon Water

The Manager – Greater Vernon Water provided a presentation that provided background on Greater Vernon Water.

Terms of Reference – Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee

The Committee was advised that two (2) letters received by the Regional District of North Okanagan, dated July 21, 2015 and September 15, 2015, from the Citizens for Changes to the Master Water Plan regarding hiring an independent engineering consultant to review the Master Water Plan will be discussed at the October, 8, 2015 Greater Vernon Advisory Committee.

Master Water Plan List of Assumptions

The General Manager, Engineering provided a presentation regarding the Master Water Plan List of Assumptions that have been adopted by the Board of Directors and are the guiding principals when considering all options.

Meeting Schedule

It was noted that the monthly Committee meetings will begin at 8:00 a.m. and last two (2) – three (3) hours and are scheduled for the following Thursdays:

- October 22, 2015
- November 19, 2015
- December 17, 2015
- January 21, 2016
- February 18, 2016
- March 17, 2016

It was also noted that the Committee may schedule additional meetings subject to availability of meeting rooms.

2012 Master Water Plan – Distribution / Process Used

The Manager – Greater Vernon Water provided the Committee with summaries of Technical Memorandums No. 1 – 3 from the Master Water Plan.

Moved and seconded by Representatives Williamson and Mohammad
That it be recommended to the Greater Vernon Advisory Committee, the request from the Citizens for Changes to the Master Water Plan to hire an independent engineering consultant be postponed pending review of the 2012 Master Water Plan by the Committee.

CARRIED
Opposed: Representatives Mooney and Foisy

Moved and seconded by Representatives Evans and Williamson
That it be recommended to the Greater Vernon Advisory Committee, a representative of the Consulting Engineering Technical Group be brought in to present the 2012 Master Water Plan to the Committee.

CARRIED

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:24 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

Deputy Corporate Officer
Paddy Juniper

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, October 22, 2015.

Members:	Director J. Cunningham	City of Vernon	Vice Chair
	M. Asif	Agricultural Representative	
	C. Laursen	Best Western Plus Vernon Lodge	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Etherington	Sleeman Breweries Representative	
	J. Westby	School District # 22	
	P. Williamson	Residential Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
	M. Witt	Agricultural Representative	
	D. Bodenham	Residential Representative	
	R. Evans	Wesbild / Predator Ridge Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	S. Banmen	General Manager, Finance	
	R. Clark	Manager, Greater Vernon Water	
	P. Juniper	Deputy Corporate Officer	
	C. Reardon	Clerk, Engineering	
Also Present:	Councillor G. Kiss	District of Coldstream	
	Director C. Lord	City of Vernon	
	Roger Parsonage	Interior Health Authority	
	Gordon Mosley	Interior Health Authority	
	Brent deWynter	AECOM	
	Neil Whiteside	Whiteside Consulting Ltd.	
	Drew Lejbak	Summit Environmental Consultants Inc.	
	Media and Public		

CALL MEETING TO ORDER

The meeting was called to order at 8:03 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – October 22, 2015

Moved and seconded by Representatives Williamson and Mooney
That the Agenda of the October 22, 2015 Greater Vernon Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – October 1, 2015

Moved and seconded by Representatives Bodenham and Hubbs-Michiel
That the minutes of the October 1, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

Committee members introduced themselves and acknowledged which type of water use group they represent. The Deputy Corporate Officer reviewed meeting conduct and procedures. It was noted that the Regional District of North Okanagan (RDNO) conducts Committee meetings in accordance with the *Community Charter, Local Government Act*, RDNO Procedures Bylaw No. 2413, 2009 and *Robert's Rules of Order*. The Committee was advised that the act of not raising your hand in a vote, will be counted as an affirmative vote and questions should be directed towards the Chair.

DELEGATIONS

Interior Health Authority (PARSONAGE, Roger)

Roger Parsonage, Regional Director, Health Protection of Interior Health Authority, (IHA) provided a presentation on the Drinking Water Protection Act and Regulations including drinking water treatment objectives for surface water supplies, forms of disinfection treatment, how IHA works with the Ministry of Health and the role the IHA takes with water utilities that are moving forward with compliance before issuing orders. The report on the BC Drinking Water Objectives for Surface Water Supplies prepared by the Ministry of Health referred to by Mr. Parsonage is located at the following web site:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/surfacewater-treatment-objectives.pdf

NEW BUSINESS

Meeting Schedule

The following meeting schedule was presented to the Committee:

Date	Technical Memorandums to be Reviewed	Engineers / Regional District of North Okanagan (RDNO) Staff to be Present
November 19, 2015	No. 2, 3 and 5	- Rod MacLean, P.Eng., Associated Engineering
December 3, 2015 (extra meeting date)	No. 6 and 7 plus non-cost	- Brett deWynter, P.Eng., AECOM - Jennifer Miles, MEDes, RDNO
December 17, 2015	No. 9	- Brett deWynter, P.Eng., AECOM
January 21, 2015	No. 8 and 10	- Brett deWynter, P.Eng., AECOM - David Main, AECOM

It was noted that an additional meeting was added to the Committee schedule for December 3, 2015 in order to advance the review of the Technical Memorandums.

Moved and seconded by Representatives Mooney and Carlson
That the review of Technical Memorandum No. 9 be advanced to the December 3, 2015 Committee meeting.

DEFEATED

Opposed: Director Cunningham and Representatives Asif, Laursen, Frost, Etherington, Westby, Lainsbury, Hubbs-Michiel, Witt, Bodenham and Evans

Review of Technical Memorandum No. 1 – Domestic and Agricultural Water Demand Forecast and No. 4 – Domestic Water System Analysis

Brett deWynter, P. Eng., AECOM, provided a presentation on the Master Water Plan (MWP) Overview which included an overview of the three (3) firms that put the plan together, key components of the MWP, the approach, and the key technical assumptions.

Neil Whiteside, M.A.Sc.,P. Eng., Whiteside Consulting, who was the main author of Technical Memorandum No. 1 (TM1) provided an overview of TM1 which included agricultural and domestic demand (historic water use, time of year, temperature and weather), domestic growth projections based on regional growth strategy, allocation vs. consumption and where main irrigation water is going.

Drew Lejbak, Hydrologist, Summit Environmental Consultants Inc. provided an overview of the following: the Okanagan Supply and Demand Project, Okanagan Water Demand Model, future agriculture water demand scenarios and comparison with dry and wet climate models, projections, allocation and actual consumption. An overview of the following sections of Technical Memorandum No. 4 (TM4) was provided: domestic water system analysis, overall demand projection and recommended upgrades.

2012 Master Water Plan Questions and Answers

The General Manager, Engineering reviewed the "Stakeholder Advisory Committee Questions 1" that included questions that were raised during the October 1, 2015 Committee meeting and questions that were submitted via email from Committee members. The Committee was advised that Appendix "A", 2015 Comparison of Agricultural Water Rates and Appendix "B", 2015 Comparison of Domestic Water Rates will be updated with detail on the similarities and differences as compared to GVW rates, cost per cubic meter and volumes of water permitted under agricultural allocation.

The Committee was advised that Technical Memorandums No. 2, 3 and 5 will be reviewed at the November 19, 2015 meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:41 a.m.

CERTIFIED CORRECT

Vice Chair
Juliette Cunningham

Deputy Corporate Officer
Paddy Juniper

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, November 19, 2015.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	M. Asif	Agricultural Representative	
	D. Bodenham	Residential Representative	
	M. Carlson	Residential Representative	
	D. Etherington	Sleeman Breweries Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Gibbs	Tekmar Control Systems Representative	
	M. Hubbs-Michiel	Residential Representative	
	C. Laursen	Best Western Plus Vernon Lodge and Conference Centre Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	D. Neden	Residential Representative	
	J. Westby	School District # 22 Representative	
	P. Williamson*	Residential Representative	
	M. Witt	Agricultural Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	S. Banmen	General Manager, Finance	
	P. Juniper	Deputy Corporate Officer	
	C. Reardon	Clerk, Engineering	
Also Present:	Mike Baker	District of Coldstream, Director of Engineering	
	Kim Flick	City of Vernon, Director of Community Development, Engineering & GIS	
	Rod MacLean	Associated Engineering	
	Brent deWynter	AECOM	
	Media and Public		

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:01 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – November 19, 2015

Moved and seconded by Representatives Asif and Williamson
That the Agenda of the November 19, 2015 Greater Vernon Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – October 22, 2015

Moved and seconded by Representatives Williamson and Mooney
That the minutes of the October 22, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

NEW BUSINESS

Review of Technical Memorandum No. 2 – Evaluation of Water Supply Sources, Technical Memorandum No. 3 – Source Storage & Supply and Technical Memorandum No. 5 – Independent Agricultural System

Brett deWynter, P. Eng., AECOM, opened the presentation of Technical Memorandums with an overview of irrigation system water demand and domestic water demand. Brett introduced Rod MacLean, P. Eng., with Associated Engineering and Rod provided a presentation on Technical Memorandums 2, 3, and 5 for discussion.

Technical Memorandum 2, Evaluation of Water Supply Sources was reviewed. A summary of demand, licensing, hydrology and groundwater source supply available to Greater Vernon Water (GVW) was discussed. Locations of sources and their potential were reviewed.

Technical Memorandum 3, Source Storage and Supply was reviewed. Objectives of TM 3, examine potential future storage and supply projects, the costs associated with the projects, identifying the issues and prioritizing projects.

Technical Memorandum 5, Independent Agricultural System was reviewed. TM 5 examines the system separation of agricultural water from domestic water, the cost estimates associated with agricultural water separation and which areas in the GVW service area agricultural water would benefit the most.

2012 Master Water Plan Questions and Answers

The Chair reviewed the "Stakeholder Advisory Committee Questions 2" that included questions that were raised during the October 22, 2015 Committee meeting and the revision of Appendix "A", comparison of agricultural water rates, and Appendix "B", comparison of domestic rates. No questions were raised from the information provided.

The Committee was advised that Technical Memorandums No. 6 and No. 7 as well as non-cost will be reviewed at the December 3, 2015 meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:21a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

Deputy Corporate Officer
Paddy Juniper

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, December 3, 2015.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	D. Gibbs	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Etherington	Sleeman Breweries Representative	
	R. Evans	Wesbild / Predator Ridge Representative	
	J. Westby	School District No. 22 Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	A. Mohammad	Agricultural Representative	
	M. Witt	Agricultural Representative	
	P. Williamson	Residential Representative	
	D. Neden	Residential Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	S. Banmen	General Manager, Finance	
	Z. Marcolin	Manager, Greater Vernon Water	
	R. Clark	Water Quality Manager	
	*J. Miles	Water Sustainability Coordinator	
	D. Douglas	Clerk, Engineering	
Also Present:	B. deWynter	AECOM	
	*Director B. Fleming	Electoral Area "B"	
	*G. Kiss	District of Coldstream	
	J. Kidston	Agricultural Representative	
	*****Media and Public		

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:02 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – December 3, 2015

Moved and seconded by Representatives Asif and Mooney
That the Agenda of the December 3, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved with the following additions:

- Item E.1 - Water Quality: Comparison of Sources
- Item E.5 - News Articles that were published in the Morning Star on Sunday, November 22, 2015 and Sunday, November 29, 2015
- Item E.6 - SAC Questions and Answers Paper #3 moved from Item E.5

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – November 19, 2015

Moved and seconded by Representatives Foisy and Williamson
That the minutes of the November 19, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

NEW BUSINESS

Water Quality: Comparison of Sources

The General Manager, Engineering, provided a table showing examples of the water quality parameters for Greater Vernon Water's three (3) different water sources: Duteau Creek (Duteau Creek Water Treatment Plant (WTP)), Kalamalka Lake (Mission Hill WTP) and Okanagan Lake (Outback Water System). Also included, were two (2) graphs of the Outback Water System (Okanagan Lake water source) that show the water quality testing for the two (2) disinfection by-products: trihalomethanes and haloacetic acids. The Committee was advised that the City of Vernon and the Okanagan Basin Water Board have been requested to provide water quality testing results on Okanagan Lake. Staff will request water quality information from Canadian Lakeview Estates; however, it may be difficult since it is a private utility.

Review of Technical Memorandums No. 6 – Water Conservation Strategies

Brett deWynter, P. Eng., AECOM, and the Water Sustainability Coordinator, Regional District of North Okanagan, opened the presentation with Technical Memorandum No. 6, Water Conservation Strategies**.** A summary of methods used to reduce water demand for a water utility, defer or eliminate the need for new capital projects and reduce operating costs by reducing energy and chemicals required for treatment was discussed.

Review of Technical Memorandum No. 7 – Water Treatment

Brett deWynter, P. Eng. AECOM, reviewed Technical Memorandum No. 7, Water Treatment. Brett provided a summary of why water treatment is important to a water utility. It was noted that a critical component of any utilities' Master Water Plan is to identify the long term treatment needs based on legislative requirements and the specific characteristics of water source(s) used for potable water.

The presentation for the criteria review of Non-Cost Considerations, Technical Memorandum No. 9 (Section 5.4) and Acronyms was postponed until the December 17, 2015 meeting.
The Manager, Greater Vernon Water advised that the Committee should review the non-cost considerations as presented in Technical Memorandum No. 9 for the next meeting for discussion regarding the criteria used and weighting. The criteria development and weighting should be reviewed before an analysis of the options is completed.

regarding the criteria used and weighting. The criteria development and weighting should be reviewed before an analysis of the options is completed.

News Articles

Representative Williamson asked the Committee to respect the fact that the members of this Committee are volunteers and that they should be working together as a group to come up with a unified direction while this review process is going on. He suggested that the Committee should keep positive about the work they are doing. He also requested through the Chair that the Citizens for Change group invite a few representatives from this Committee to their groups meetings so they can understand their issues.

SAC Questions and Answers Paper #3

The Chair asked the Committee if there were any comments regarding the "Stakeholder Advisory Committee Questions and Answer Paper #3" document that included questions that were raised during the November 19, 2015 Committee meeting and submitted via email and corresponding answers. No comments or concerns were raised.

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:31 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, December 17, 2015.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	M. Asif	Agricultural Representative	
	D. Bodenham	Residential Representative	
	M. Carlson	Residential Representative	
	D. Etherington	Sleeman Breweries Representative	
	R. Foisy	Residential Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Gibbs	Tekmar Control Systems Representative	
	M. Hubbs-Michiel	Residential Representative	
	J. Lainsbury	Residential Representative	
	C. Laursen	Vernon Atrium Hotel & Conference Centre Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	D. Neden	Residential Representative	
	J. Westby	School District # 22 Representative	
	P. Williamson	Residential Representative	
	M. Witt	Agricultural Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	S. Banmen	General Manager, Finance	
	C. Reardon	Clerk, Engineering	
Also Present:	M. Baker	District of Coldstream, Director of Engineering	
	K. Flick	City of Vernon, Director of Community Development, Engineering & GIS	
	Councillor G. Kiss	District of Coldstream	
	Brent deWynter	AECOM	
	Media and Public		

CALL MEETING TO ORDER

The meeting was called to order at 8:00 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – December 17, 2015

Moved and seconded by Representatives Laursen and Williamson
That the Agenda of the December 17, 2015 Greater Vernon Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – December 3, 2015

Moved and seconded by Representatives Witt and Foisy
That the minutes of the December 3, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

NEW BUSINESS

Review of Technical Memorandum No. 9 – System Separation Option Analysis

Brett deWynter, P. Eng., AECOM, opened the presentation of Technical Memorandum No. 9, System Separation Option Analysis with an overview of the Greater Vernon Water (GVW) Utility Master Water Plan Update , December 17, 2015 Option Review.

Brett opened his presentation with a process diagram of the Duteau Creek Water Treatment Plant Dissolved Air Flotation (DAF) and explained how it worked. He discussed the City of Kelowna's Integrated Water Supply System from Okanagan Lake and two other Okanagan utilities, operated by the City of Penticton and the City of West Kelowna.

Technical Memorandum No. 9, System Separation Option Analysis was reviewed:

- A summary of the non-cost considerations and associated weighting factors was provided. The letter dated April 15, 2013 from Mike Stamhuis, former Chief Administrative Office of the District of Coldstream was reviewed**.** Discussion ensure about how Mr. Stamhuis concerns reflected the priorities of his role as CAO and how different personal had different weighting of the non-cost considerations based on their role at GVW. For example, emergency response is given a much higher weighting by operational staff than governance, which is a very low priority low from an operation perspective.
- Groundwater Domestic Supply was assessed, Point of Entry (POE), Point of Use (POU) and Community Water Systems liability, safety and operating costs of these systems were reviewed.
- Water Source Assumptions, Key Assumptions, Water Demand and Water Quality Assumptions were examined with a discussion on a combination of options to make a new option. The Committee was reminded that the objective of a MWP was to provide the big picture recommendation and the specific details of each recommendation are then sorted out during the pre design and design stages.
- The 2012 Master Water Plan Options 1 through 9 were then reviewed. Each option varies in water supply source, treatment location, complete/partial/no system separation, new

infrastructure, building new and/or decommissioning of existing facilities. Operating costs, water quality of sources, water licencing and transferring of water licences were discussed. A summary was provided of the nine (9) long term options along with the estimated operations & maintenance over 50 years and capital costs was provided for each.

2012 Master Water Plan Questions and Answers

The Chair asked the Committee if there were any comments regarding the "Stakeholder Advisory Committee Questions 4" document that included questions that were raised during the December 3, 2015 Committee meeting and sent in by email and corresponding answers.

Clarification was provided for "Question and Answer No. 14 – What are the current operating costs of the DCWTP and MHWTP? "

Answer: The table provided for Question 14 is the most accurate estimates we have for total treatment cost and total volume of water treated at the two GVW treatment plants. The costs reported in the 2011 GVW Annual Report were inaccurate because all staffing, some operational costs for other facilities and treatment administration costs were accounted for in the DCWTP budget in the first year of operations. It was noted that this was inaccurate accounting that over estimated the cost attributed to DCWTP and was rectified in following years with better accounting procedures and a better estimate of treatment costs of each treatment facility.

The Committee was advised to review the non-cost considerations for small group discussions to be completed in January. So as not to extend the MWP SAC review period, the Chair confirmed with the Committee that an additional meeting in January would be scheduled to complete the non-cost consideration review. Review of Technical Memorandums No. 8 and 10 would continue as scheduled on January 21, 2016. The Committee was advised that they would be emailed with the information of an additional scheduled date subject to availability of meeting rooms.

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:43 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, January 14, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	M. Asif	Agricultural Representative	
	D. Bodenham	Residential Representative	
	M. Carlson	Residential Representative	
	R. Foisy	Residential Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Gibbs	Tekmar Control Systems Representative	
	M. Hubbs-Michiel	Residential Representative	
	J. Lainsbury	Residential Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	D. Neden	Residential Representative	
	M. Witt	Agricultural Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	C. Reardon	Clerk, Engineering	
Also Present:	M. Baker *	District of Coldstream, Director of Engineering	
	K. Flick*	City of Vernon, Director of Community Development, Engineering & GIS	
	Brent deWynter	AECOM	
	Gordon Mosley*	Interior Health	
	Public		

*Denotes presence for part of the meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:10 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – January 14, 2016

Moved and seconded by Representatives Witt and Mooney
That the Agenda of the January 14, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – December 17, 2015

Moved and seconded by Representatives Witt and Hubbs-Michiel
That the minutes of the December 17, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

NEW BUSINESS

Review of Technical Memorandum No. 9 – System Separation Options
Presentation of Option Evaluations

Brett deWynter, P. Eng., AECOM reviewed the presentation of Option Evaluations with an outline of the evaluation factors:

- System Operational Ease & Flexibility;
- Governance & Administrative Variances;
- Emergency Preparedness
- Average Finished Water Quality
- Reliability & Availability of Supply
- Ease of Implementation
- Future Expansion
- Environmental Impacts

Flexibility and variations of the options were discussed. Representatives concerns over the categories and listing of the “criteria for consideration” began with a discussion regarding duplication throughout the factors and criteria. The Chair asked the Representatives to focus on the non-cost items as a whole opposed to the details. Representatives suggested that for ease of deliberation and for public awareness, the categories should be simplified.

Summary of the Evaluation Factors
Individual weighting of Non-Cost Considerations Sheet

The “Individual weighting of the MWP Non-Cost Considerations Sheet” provided by the Technical Advisory Committee Stakeholder representative group was reviewed for each “Criteria for Consideration” in the 8 Evaluation Factor groups. The following revisions were made:

Moved and seconded by Representatives Neden and Bodenham
That “Distribution system maintenance vs. treatment plant maintenance" be deleted from the Individual weighting of the MWP non-cost considerations sheet.

CARRIED

Moved and seconded by Representatives Neden and Bodenham
That "Occupational Health & Safety requirements" be deleted from the Individual weighting of the MWP non-cost considerations sheet.

CARRIED

Moved and seconded by Representatives Neden and Bodenham
That "Stakeholder Input" be deleted from the Individual weighting of the MWP non-cost considerations sheet

CARRIED

Moved and seconded by Representatives Neden and Bodenham
That "Ability to meet Interior Health 4-3-2-1-0 treatment rule" and "Meeting the Canadian Drinking Water Guidelines for Maximum Acceptable Concentrations" be deleted from the Individual weighting of the MWP non-cost considerations sheet.

CARRIED

Moved and seconded by Representatives Neden and Hubbs-Michiel
That "pH levels" be deleted from the Individual weighting of the MWP non-cost considerations sheet.

CARRIED

Moved and seconded by Representatives Neden and Bodenham
That "Deferral of capital costs" be deleted from the Individual weighting of the MWP non-cost considerations sheet.

CARRIED

Moved and seconded by Representatives Frost and Mooney
That the Evaluation Factors be moved from the Individual weighting of the MWP non-cost considerations sheet provided by the Technical Advisory Committee into the following four (4) categories: supply, operations, finished product, and project timeliness.

CARRIED

The Chair advised the Committee that the category names could be reconsidered again at a later date, and for each Representative to take their own direction distributing the criteria throughout the Evaluation Factor categories. The Committee was then advised if they were considering amendments or a combination of the options to create a new option, to provide the information of these options on paper as staff requires time to prepare additional options.

The Representatives requested to be provided with the email addresses of all other Representatives for the opportunity to discuss the Evaluation Factors and the Criteria for Consideration before the next meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned at 11:22 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, January 21, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	M. Asif	Agricultural Representative	
	D. Bodenham	Residential Representative	
	M. Carlson	Residential Representative	
	R. Foisy	Residential Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Gibbs	Tekmar Control Systems Representative	
	M. Hubbs-Michiel	Residential Representative	
	J. Lainsbury	Residential Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	J. Westby	School District 22 Representative	
	P Williamson	Residential Representative	
	M. Witt	Agricultural Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	C. Reardon	Clerk, Engineering	
Also Present:	K. Flick	City of Vernon, Director of Community Development, Engineering & GIS	
	B. deWynter	AECOM	
	T. Ouchi	Alternate Agricultural Representative, Greater Vernon Advisory Committee	
	J. Kidston	Alternate Agricultural Representative, Greater Vernon Advisory Committee	
	Media and Public		

CALL MEETING TO ORDER

The meeting was called to order at 8:10 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – January 21, 2016

Moved and seconded by Representatives Witt and Asif
That the Agenda of the January 21, 2016 Greater Vernon Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – January 14, 2016

Moved and seconded by Representatives Mooney and Lainsbury
That the minutes of the January 14, 2015 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

UNFINISHED BUSINESS

Option Evaluation Factors
Individual Weighting of the GVW 2012 Master Water Plan Non-Cost Considerations Provided by Each Technical Advisory Committee Stakeholder Representative

The Chair opened the meeting with discussion on the direction the Representatives were taking with the "Categories and Criteria" of the evaluation factors. Representative Frost's submitted for consideration as "Option 10" a proposal to amended "Option 2" to include installation of UV treatment and scrubbing the reservoir at the Duteau Creek Water Treatment Plant, (DCWTP) and not to install the a filter. Filters would be installed at the Mission Hill Water Treatment Plant to meet water quality specifications.

The General Manager, Engineering advised that we currently have a project scheduled in the 2016 budget to investigate the feasibility of filtration exclusion at the DCWTP and in it's place we would construct an ultraviolet disinfection system (to address protozoa treatment requirements) and aeration (air scrubbing) in the existing reservoir to reduce total trihalomethane levels to meet current standards. Until this study is completed and has the support of Interior Health for filtration exclusion, the proposal suggested by Representative Frost do not meet the assumptions that the SAC must work within as presented by the Board of Directors. Hence the proposal should not be listed as a viable option at this time. A report outlining the proposed pilot study to the Board of Directors dated December 21, 2015, and titled "2016 Infrastructure Planning Grant Program Application" was provided to the Committee. Should the results of the sampling plan and the pilot study show that the Provincial Health treatment guidelines are achieved through this alternate treatment plan then this data can be used to support a filtration exclusion application to the IHA.

Representatives discussed their direction of appointing the individual weighting of the MWP non-cost considerations evaluation factors categories listed as "Supply", "Operation", 'Quality" and "Projects", and with "Benefits" opposed to criteria for consideration. The "Benefits" were distributed as "must have's" and "nice to have" or "desirable".

Moved and seconded by Representatives Bodenham and Gibbs
That the "Finished Water Quality Category" be deleted from the individual weighting of the MWP non-cost considerations sheet and "Future Impacts" and "Adaptability" categories be added.

DEFEATED

Opposed: Representatives Asif, Carlson, Foisy, Frost, Gibbs, Hubbs-Michiel, Lainsbury, Mooney, Westby, Williamson, and Witt

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee
Presentation of Option Evaluations

Brett deWynter, P. Eng., AECOM opened the presentation of "Option Evaluations" with:

- Key Technical Differences
- Long Term Options
- Results of Net Present Value
- Non Cost Comparisons on:
    - System Optional Ease & Flexibility
    - Governance & Administration
    - Emergency Preparedness
    - Average Finished Water Quality
    - Reliability & Availability of Supply
    - Ease of Implementation
    - Future Expansion
    - Environmental Impacts
- Results of Non-Cost Evaluation
- Summary of Non-Cost Comparison
- Challenges and Solutions of Options 2
- System Separation for Options 1, 2, 3 and 7

The Representatives then questioned and discussed the weighting of 2012 GVW Master Water Plan options and how the non-cost evaluation factor benefits affected the options:

- Agricultural water system separation
- Dual water sources
- Water licenses - locations (Fraser River & Columbia River Basins), and transferability
- Capital costs
- Seasonal demand
- Land Acquisition
- Future expansion and variation of the plans
- Chemicals used regarding Environmental Impacts and Water Quality
- IHA requirements, ordering GVW to improve on Duteau Water Treatment Plant
- Filtration exclusion, and how to meet criteria for filtration deferral
- How the recommendations of the Technical Advisory Committee reached a consensus

Moved and seconded by Representatives Witt and Williamson
That " Categories" be weighted from the Individual weighting of the MWP non-cost considerations sheet as Supply 30 %, Operations 40%, Projects 10% and Water Quality 20%.

CARRIED

Moved and seconded by Representatives Williamson and Hubbs-Michiel
That it be recommended to Greater Vernon Advisory Committee, any option that includes the DWTP as a potable water source will examine using UV and reservoir aeration to support a filtration exclusion application.

CARRIED

Moved and seconded by Representatives Mooney and Foisy
That Option 4 amended with elements from Option 6 as proposed by Representative T. Mooney be included as an additional option.

DEFEATED

Opposed: Representatives Asif, Bodenham, Carlson, Frost, Hubbs-Michiel, Lainsbury, Westby, Williamson, and Witt

The Representatives were requested to review the options with the newly agreed upon weighting before the next meeting. A consensus was confirmed to break into groups to weight the options at the next Stakeholder Advisory Committee meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:33 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, February 18, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	D. Bodenham	Residential Representative	
	M. Carlson	Residential Representative	
	R. Foisy	Residential Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Gibbs	Tekmar Control Systems Representative	
	M. Hubbs-Michiel	Residential Representative	
	J. Lainsbury	Residential Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	D. Neden	Residential Representative	
	J. Westby	School District # 22 Representative	
	M. Witt	Agricultural Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	D. Douglas	Clerk, Engineering	
Also Present:	B. deWynter	AECOM	
	M. Baker	District of Coldstream, Director of Engineering	
	K. Flick	City of Vernon, Director of Community Development, Engineering & GIS	
	J. Kidston	Agricultural Representative	
	T. Ouchi	Agricultural Representative	
	B. Mitchell	Highlands Golf Course	
	Media and Public		

CALL MEETING TO ORDER

The meeting was called to order at 8:02 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – February 18, 2016

Moved and seconded by Representatives Lainsbury and Mooney
That the Agenda of the February 18, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – January 21, 2016

Moved and seconded by Representatives Frost and Witt
That the minutes of the January 21, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

UNFINISHED BUSINESS

Greater Vernon Water Master Water Plan – Decision Making Process Review

Brett deWynter, P.Eng., AECOM provided a presentation on the following:

- Review of the past non-cost consideration process; and
- The "*Criterium Decision Plus Decision Modeling Software*" was presented and how these decision model principals were used for the decision making process to rank the 9 Options.

Option Evaluations for the Non-Cost Considerations

Following discussion on the evaluation method of the non-cost considerations, the Committee agreed the Master Water Plan Options would be ranked as follows:

1 – low importance
9 – high importance

Moved and seconded by Representatives Frost and Bodenham
That the Greater Vernon Water Evaluation Factors Master Water Plan Non-Cost Considerations spreadsheet be used by the Committee for evaluating the different categories.

CARRIED
Opposed: Representative Mooney

The Committee split into three (3) groups according to their representation (residential, agriculture, commercial and industrial) excluding Greater Vernon Advisory Committee (GVAC) representation and RDNO staff, to begin the process of non-cost consideration ranking of Options.

The Committee members were split into the following groups to complete the ranking of the Non-Cost Considerations:

Group 1	Group 2	Group 3
Don Gibbs	Doug Neden	Jerry Westby
Ray Foisy	Terry Mooney	Michael Carlson
Denise Bodenham	David Frost	Michael Witt
	Monique Hubbs-Michiel	John Lainsbury

The Chair reviewed the following upcoming meeting schedule and advised that the Committee would be emailed once confirmed:

Date	Time
February 25, 2016	8:00 am – 11:00 am
March 17, 2016	8:00 am – 11:00 am
April 21, 2016	8:00 am – 11:00 am

Additional meetings to be determined.

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:26 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, February 25, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	D. Gibbs	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	J. Westby	School District No. 22 Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	A. Mohammad	Agricultural Representative	
	M. Witt	Agricultural Representative	
	D. Neden	Residential Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	D. Douglas	Clerk, Engineering	
	K. Witwicki	Clerk, Engineering	
Also Present:	B. deWynter	AECOM	
	Director D. Dirk	District of Coldstream	
	Councillor P. MacLean*	District of Coldstream	
	M. Baker	District of Coldstream	
	J. Kidston	Agricultural Representative	
	T. Ouchi	Agricultural Representative	
	K. Flick	City of Vernon, Director of Community Development, Engineering & GIS	

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:02 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – February 25, 2016

Moved and seconded by Representatives Foisy and Mooney
That the Agenda of the February 25, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – February 18, 2016

Moved and seconded by Representatives Neden and Frost
That the minutes of the February 18, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

UNFINISHED BUSINESS

Greater Vernon Water Master Water Plan - Option Evaluations using Non-Cost Considerations

The Committee separated into three (3) groups to continue with the exercise of ranking the nine Long Term Water Supply Options (Options) from TM9 of the 2012 Greater Vernon Water Master Water Plan (MWP) based on Non-Cost Considerations. The Chair added Representative Asif to Group 1 and the groups were as follows:

Group 1	Group 2	Group 3
Don Gibbs	Doug Neden	Jerry Westby
Ray Foisy	Terry Mooney	Michael Carlson
Denise Bodenham	David Frost	Michael Witt
Asif Mohammad	Monique Hubbs-Michiel	John Lainsbury

The groups completed their ranking of the Options based on the Non-Cost criteria developed and endorsed by the Stakeholder Advisory Committee (SAC) at the February 18 and February 25 SAC meetings. After a set time of approximately 1 hour and 45 minutes for group discussion, the groups submitted their ranking results to staff where the results were tabulated. The weighted average of each group's result and the average of all the groups was then calculated and presented. The attached table provides the rating and weighted results of each group and the numerical and weighted averages for each Option (Attachment 1).

Group 1 had Option 5 as their first choice and Option 2 as their second choice, Group 2 ranked Options 1, 2 and 3 highest with each having an equivalent numerical ranking and Group 3 had Option 2 and 3 ranked the highest with both having an equivalent numerical ranking. After discussion, the majority of the group agreed that Option 2 was likely the preferred option but that the discussion would continue at the next meeting where the cost to benefit ratio would be presented and a final vote on the preferred option would occur.

The Chair discussed the dates of the upcoming meetings. It was decided that the Committee would meet on the following dates:

February 29, 2016	3:30 PM – 5:00 PM	RDNO Boardroom	Choose Option
March 17, 2016	8:00 AM – 11:00 AM	RDNO Boardroom	TM 8 Review
April 14, 2016	8:00 AM – 11:00 AM	RDNO Boardroom	TM10 & Financial plan
April 21, 2016	8:00 AM – 11:00 AM	RDNO Boardroom	Financial plan continued if required

ADJOURNMENT

There being no further business, the meeting was adjourned at 10:54 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

GROUP 1

Categories	Benefit		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
S - Supply (water sources)	Weighting 30%		6	8	5	3	9	1	2	4	7
O - Operation (Treatment & Distributions Systems)	Weighting 40%		2	6	8	4	9	1	3	7	5
Q - Quality (of finished product)	Weighting 20%		6	7	4	1	8	2	5	3	9
P - Project (that are required to build the system)	Weighting 10%		9	7	5	6	8	1	3	2	4
		TOTAL	23	28	22	14	34	5	13	16	25
		Weighted average	4.7	6.9	6	3.3	8.7	1.2	3.1	4.8	6.3

GROUP 2

Categories	Benefit		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
S - Supply (water sources)	Weighting 30%		7	8	9	3	4	2	1	6	5
O - Operation (Treatment & Distributions Systems)	Weighting 40%		7	8	9	5	4	1	2	6	3
Q - Quality (of finished product)	Weighting 20%		6	5	4	3	9	8	1	2	7
P - Project (that are required to build the system)	Weighting 10%		9	8	7	4	5	1	2	3	6
		TOTAL	29	29	29	15	22	12	6	17	21
		Weighted average	7	7.4	7.8	3.9	5.1	2.7	1.5	4.9	4.7

GROUP 3

Categories	Benefit		Option 1	Option 2	Option 3	Option 4	Option 5	Option 6	Option 7	Option 8	Option 9
S - Supply (water sources)	Weighting 30%		7	8	9	2	6	1	3	5	4
O - Operation (Treatment & Distributions Systems)	Weighting 40%		7	8	9	6	4	3	2	5	1
Q - Quality (of finished product)	Weighting 20%		5	5	5	5	5	5	5	5	5
P - Project (that are required to build the system)	Weighting 10%		8	7	9	2	4	1	3	5	6
		TOTAL	27	28	32	15	19	10	13	20	16
		Weighted average	6.7	7.3	8.2	4.2	4.8	2.6	3	5	3.2
		AVERAGE OF ALL 3 GROUPS	26	28	28	15	25	9	11	18	21
		Weighted average	**6.1**	**7.2**	**7.3**	**3.8**	**6.2**	**2.2**	**2.5**	**4.9**	**4.7**

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Monday, February 29, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	D. Gibbs	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	A. Mohammad	Agricultural Representative	
	M. Witt	Agricultural Representative	
	D. Neden*	Residential Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
	D. Bodenham	Residential Representative	
	P. Williamson	Residential Representative	
Staff:	Z. Marcolin	Manager, Greater Vernon Water	
	P. Juniper*	Deputy Corporate Officer	
	D. Douglas	Clerk, Engineering	
Also Present:	B. deWynter	AECOM	
	Director D. Dirk	District of Coldstream	
	M. Baker	District of Coldstream, Director of Infrastructure Services	
	J. Kidston	Agricultural Representative, Greater Vernon Advisory Committee	

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 3:33 p.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – February 29, 2016

Moved and seconded by Representatives Asif and Hubbs-Michiel
That the Agenda of the February 29, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved as presented.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – February 25, 2016

Moved and seconded by Representatives Witt and Frost
That the minutes of the February 25, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

UNFINISHED BUSINESS

Greater Vernon Water 2012 Master Water Plan – Option Evaluations Using Non-Cost Considerations

The Chair advised that all Stakeholder Advisory Committee correspondence should be circulated to the entire Committee including the Chair, Vice Chair and Regional District of North Okanagan staff to ensure transparency of the process.

B. deWynter provided a presentation on the Options selection, Net Present Value (NPV) and the Benefit to Cost Ratio.

The Chair requested the Committee vote to remove some of the Options from the list to consider in the Greater Vernon Water Master Water Plan Financial Planning Stage in order to simplify the financial planning exercise. The following recommendations were made:

Moved and seconded by Representatives Frost and Hubbs-Michiel
That Options 4, 6, 7 and 8 be removed from the Options list based on the highest capital cost with lowest non-cost benefit ratio and not be considered in the Financial Planning Stage for the Stakeholder Advisory Committee review of the Greater Vernon Water 2012 Master Water Plan.

Moved and seconded by Representatives Neden and Lainsbury to amend the motion as follows:
That Options 5 and 9 also be removed.

DEFEATED
Opposed: Representatives Gibbs, Foisy, Frost, Williamson, Bodenham, Mooney

Moved and seconded by Representative Mooney and Bodenham to amend the motion as follows:
That Option 7 be retained.

DEFEATED
Opposed: Representatives Gibbs, Neden, Williamson, Hubbs-Michiel, Witt, Lainsbury, Mohammad, Foisy, Carlson, Frost

Moved and seconded by Representatives Mohammad and Hubbs-Michiel to amend the motion as follows:
That Option 9 be removed.

CARRIED
Opposed: Representatives Foisy, Frost, Gibbs, Bodenham

The main motion as amended was adopted with the final wording being as follows:
That Options 4, 6, 7, 8 and 9 be removed from the Options list based on the highest capital cost with lowest non-cost benefit ratio and not be considered in the Financial Planning Stage for the Stakeholder Advisory Committee review of the Greater Vernon Water 2012 Master Water Plan.

CARRIED

Representative Mohammad requested that a representative from Interior Health be at the next meeting.

Representative Gibbs requested that a detailed description of the remaining Options (1, 2, 3 and 5) be provided at the next meeting.

ADJOURNMENT

There being no further business, the meeting was adjourned at 4:56 p.m.

CERTIFIED CORRECT

Chair
Jim Garlick

Zee Marcolin
Manager – Greater Vernon Water

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, March 17, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	D. Gibbs	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	C. Larsen	Best Western Plus Vernon Lodge and Conference Centre Representative	
	J. Westby	School District No. 22 Representative	
	A. Mohammad	Agricultural Representative	
	M. Witt	Agricultural Representative	
	P. Williamson	Residential Representative	
	D. Neden	Residential Representative	
	R. Foisy	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
	D. Bodenham	Residential Representative	
	Alternate M. Besso	Citizens for Changes to the Master Water Plan Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	Z. Marcolin	Manager, Greater Vernon Water	
	D. Douglas	Clerk, Engineering	
	K. Witwicki	Clerk, Engineering	
Also Present:	B. deWynter	AECOM	
	D. Main	AECOM	
	G. Moseley*	Interior Health, Specialist – Environmental Health Officer	
	Director D. Dirk	District of Coldstream	
	Director B. Fleming*	Electoral Area “B”	
	Director M. Macnabb	Electoral Area “C”	
	Councillor G. Kiss	District of Coldstream	
	M. Baker	District of Coldstream, Director of Infrastructure Services	
	K. Flick	City of Vernon, Director, Community Infrastructure and Development Services	
	J. Kidston	Alternate Agricultural Representative, Greater Vernon Advisory Committee	
	T. Ouchi	Alternate Agricultural Representative, Greater Vernon Advisory Committee	
	Media and Public		

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:02 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – March 17, 2016

Moved and seconded by Representatives Williamson and Hubbs-Michiel
That the Agenda of the March 17, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved with the following amendments/additions:

- Item E.1 – D. Main, P.Eng., AECOM presentation on Technical Memorandum No. 8, Greater Vernon Water (GVW) Financial Issues and Principles to Support the Master Water Plan (MWP) be moved as first order of business following the adoption of minutes.
- G. Moseley, Interior Health, Specialist – Environmental Health Officer agreed to attend the meeting as requested by the Committee and answer questions following the presentation by D. Main.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – February 29, 2016

Moved and seconded by Representatives Neden and Bodenham
That the minutes of the February 29, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

Review of Technical Memorandum No. 8 – Greater Vernon Water Financial Issues and Principles to Support the Master Water Plan

D. Main, P.Eng., AECOM provided a presentation on Technical Memorandum No. 8, Greater Vernon Water Financial Issues and Principles to Support the Master Water Plan.

G. Moseley, Specialist – Environmental Health Officer, Interior Health answered questions from the Committee and the following was noted:

- Interior Health (IH) cannot provide a required timeline for meeting treatment objectives. The timeline needs to be in the Master Water Plan and needs to demonstrate compliance in a reasonable timeframe to be approved by IH;
- water quality sampling is ongoing daily, weekly, monthly and annually;
- an enforcement order to comply with legislation will not be issued at this time to install Duteau filtration as long as continual improvement is seen by IH;
- enforcement orders are typically issued to address immediate health hazards, but may be issued for non-compliance with the legislation;
- all potable water is expected to meet provincial standards and treatment objectives;
- health standards on agricultural water is not done by IH as they only deal with potable water;
- both sources (Duteau and Kalamalka) would be expected to meet drinking water treatment objectives;
- if IH finds the MWP acceptable, they will work with GVW on the timeline;

- if a referendum fails, IH could pursue enforcement;
- filtration is recognized as the best management practice/standard, most effective means for Duteau and Kalamalka;
- drinking water objectives are used to meet legislation requirements;

UNFINISHED BUSINESS

Greater Vernon Water 2012 Master Water Plan – Options Discussion

B. deWynter, P.Eng., AECOM provided a presentation on the Evaluation of Options 1, 2, 3 and 5.

NEW BUSINESS

Moved and seconded by Representatives Williamson and Bodenham
That the final Master Water Plan option provide for the use of two water sources and two water treatment plants.

CARRIED
Opposed by: Alternate Representative Besso

The Manager, Greater Vernon Water advised that SAC Question and Answer Paper #7 will be updated to address the unanswered questions and redistributed.

The Chair advised the Committee that resolutions the Members would like to vote on should be submitted to Staff who will compile them for the next meeting agenda. These will then be voted on at the next SAC meeting on April 14, 2016.

ADJOURNMENT

There being no further business, the meeting was adjourned at 11:21 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, April 14, 2016.

Members:	Alternate Director J. Garlick	District of Coldstream	Chair
	Director J. Cunningham	City of Vernon	Vice Chair
	D. Gibbs*	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	A. Mohammad	Agricultural Representative	
	M. Witt	Agricultural Representative	
	P. Williamson	Residential Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
	D. Bodenham	Residential Representative	
Staff:	D. Sewell*	Chief Administrative Officer	
	D. McTaggart	General Manager, Engineering	
	S. Banmen	General Manager, Finance	
	Z. Marcolin	Manager, Greater Vernon Water	
	D. Douglas	Clerk, Engineering	
Also Present:	Director R. Fairbairn*	Electoral Area "D"	Board Chair
	Councillor G. Kiss	District of Coldstream	
	M. Baker	District of Coldstream, Director of Infrastructure Services	
	J. Kidston	Alternative Agricultural Representative, Greater Vernon Advisory Committee	
	T. Ouchi	Alternative Agricultural Representative, Greater Vernon Advisory Committee	
	R. Miles	City of Vernon, Manager, Long Range Planning & Sustainability	

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:04 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – April 14, 2016

Moved and seconded by Representatives Asif and Williamson
That the Agenda of the April 14, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved with the following addition:

- Item E.5 – Option 7 Analysed (Email from Representative Mooney dated April 11, 2016) - forward to Committee with staff comments and bring back to the April 21, 2016 SAC meeting for discussion.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan (MWP) Stakeholder Advisory Committee (SAC) – March 17, 2016

Moved and seconded by Representatives Hubbs-Michiel and Witt
That the minutes of the March 17, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted with the following amendment:

Page 2 – 4th bullet under the heading "G. Moseley, Specialist – Environmental Health Officer, Interior Health answered questions from the Committee and the following was noted" be amended to read:

- *enforcement orders are typically issued to address immediate health hazards, but may also be issued for non-compliance with the legislation*.

CARRIED

NEW BUSINESS

MWP SAC Recommendations for the Greater Vernon Advisory Committee's Consideration

The Committee reviewed Table 1 – Considerations Submitted by SAC Members and SAC Recommendations for Consideration. Upon discussion, the following SAC recommendations were discussed and voted on:

Moved and seconded by Representatives Williamson and Hubbs-Michiel
That the following motion be postponed until the April 21, 2016 SAC meeting as the Committee requires more time to consider the proposal submitted by Representative Mooney:

That the SAC is satisfied with the level of detail, engineering analysis and cost estimates provided in TMs 1 through TM8 of the 2012 MWP.

CARRIED

Moved and seconded by Representatives Williamson and Hubbs-Michiel
That the SAC is satisfied that all Options contained in TM9 (subject to variations) have adequately considered all feasible options available to meet Ministry of Health standards.

CARRIED
Opposed by: Representative Lainsbury

Moved and seconded by Representatives Williamson and Hubbs-Michiel
That the following motion be postponed until the April 21, 2016 SAC meeting as the Committee requires more time to consider the proposal submitted by Representative Mooney:

> That the option with the lowest financial impact to water users be put forward as the preferred option based on lowest Net Present Value (NPV) (Note: will recommend Option 1 with no further separation);
>
> **OR**
> That the option with the highest benefit to cost ratio (NPV) be put forward as the preferred option (Note: will recommend Option 2 with partial separation);
>
> **OR**
> That the Option with the highest benefit to cost ratio (NPV) that supports full separation be put forward as the preferred option (Note: will recommend Option 3 with full separation).

CARRIED

Moved and seconded by Representatives Williamson and Hubbs-Michiel
That the staging of the treatment plants be changed so that MHWTP filtration is constructed first, noting that a filtration exclusion at DCWTP may be successful.

CARRIED
Opposed by: Representative Bodenham

Moved and seconded by Representatives Williamson and Mooney
That [regardless of the Option preferred, except Option 1] any separation should include sizing of the irrigation transmission main to allow for continued separation of domestic and irrigation water supplies and enable full separation in the future.

CARRIED

Moved and seconded by Representatives Williamson and Mooney
That alternative sources for irrigation be explored fully with the objective of reducing capital and operation costs.

CARRIED

Moved and seconded by Representatives Mooney and Foisy
That a scheduled review of the MWP be completed every 5 - 10 years or prior to the construction of any significant capital project.

CARRIED

Review of Technical Memorandum No. 10 – Greater Vernon Water Financial Plan

Brett deWynter, P.Eng., with AECOM provided a presentation on Technical Memorandum No. 10, Greater Vernon Water Financial Plan and Discussion on a Potential Option 1a.

Financial Options and Considerations – Greater Vernon Water Master Water Plan

The General Manager, Finance provided a presentation on the Financial Options and Considerations to finance the Greater Vernon Water Master Water Plan moving forward.

The Committee was asked to consider the following points moving forward for making recommendations within the SAC summary report to the Greater Vernon Advisory Committee:

- Finalize the Option, then develop a financial strategy
- Use existing reserves as a funding source in plan
- Use grants as a funding source in plan
- Use DCC's as a funding source in plan
- Use current revenue as a funding source – balance with renewal projects from year to year
- Delay timing of major projects, where feasible
- Increase annual contribution to reserves – balance with annual capital plan from year to year.

SAC Question and Answer Paper

The Chair advised that Representative Gibbs had some additional questions that would be addressed in SAC Question Paper #8.

ADJOURNMENT

There being no further business, the meeting was adjourned at 11:53 a.m.

CERTIFIED CORRECT

Chair
Jim Garlick

General Manager, Engineering
Dale McTaggart

REGIONAL DISTRICT OF NORTH OKANAGAN

MINUTES of a **REGULAR** meeting of the **GREATER VERNON WATER 2012 MASTER WATER PLAN STAKEHOLDER ADVISORY COMMITTEE** of the **REGIONAL DISTRICT OF NORTH OKANAGAN** held in the Boardroom at the Regional District Office on Thursday, April 21, 2016.

Members:	Director J. Cunningham	City of Vernon	Chair
	D. Gibbs	Tekmar Control Systems Representative	
	D. Frost	Vernon Jubilee Hospital Representative	
	D. Etherington	Sleeman Breweries Representative	
	T. Mooney	Citizens for Changes to the Master Water Plan Representative	
	A. Mohammad	Agricultural Representative	
	M. Witt	Agricultural Representative	
	R. Foisy	Residential Representative	
	M. Carlson	Residential Representative	
	J. Lainsbury	Residential Representative	
	M. Hubbs-Michiel	Residential Representative	
	D. Bodenham	Residential Representative	
Staff:	D. McTaggart	General Manager, Engineering	
	S. Banmen	General Manager, Finance	
	Z. Marcolin	Manager, Greater Vernon Water	
	R. Clark	Water Quality Manager	
	T. Nelson*	Community Development Coordinator	
	D. Douglas	Clerk, Engineering	
Also Present:	K. Flick	City of Vernon, Director, Community Infrastructure and Development Services	
	Director D. Dirk	District of Coldstream	
	Councillor G. Kiss	District of Coldstream	
	M. Baker	District of Coldstream, Director of Infrastructure Services	
	J. Kidston	Alternate Agricultural Representative, Greater Vernon Advisory Committee	
	T. Ouchi	Alternate Agricultural Representative, Greater Vernon Advisory Committee	

* Denotes presence for part of meeting

CALL MEETING TO ORDER

The meeting was called to order at 8:01 a.m.

APPROVAL OF AGENDA

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – April 21, 2016

Moved and seconded by Representatives Foisy and Mooney
That the Agenda of the April 21, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be approved with the following amendment and addition:

- Item E.1 – Option 7 Analysed (Email from Representative Mooney dated April 11, 2016) be moved as first order of business.
- Item E.2 – SAC Question and Answer Paper #8 – Questions submitted via email since the April 14, 2016 SAC meeting.

CARRIED

ADOPTION OF MINUTES

Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee – April 14, 2016

Moved and seconded by Representatives Frost and Mohammad
That the minutes of the April 14, 2016 Greater Vernon Water 2012 Master Water Plan Stakeholder Advisory Committee meeting be adopted as circulated.

CARRIED

Moved and seconded by Representatives Frost and Hubbs-Michiel
That the portion of the April 14, 2016 minutes titled "Financial Options and Considerations - Greater Vernon Water Master Water Plan" presented by the General Manager, Finance be included in the final SAC summary report for consideration to the Greater Vernon Advisory Committee.

CARRIED

The Chair advised the Committee that there were email submissions received from four (4) SAC Committee members; Claus Larsen, Doug Neden, Jerry Westby and Paul Williamson, stating that they wanted their votes counted towards voting on Option 7 Analysed, Recommendation 1 and 3. The Committee was unanimous in allowing these submissions on the above noted voting.

NEW BUSINESS

2012 Greater Vernon Water Master Water Plan - Option 7 Analysed – Complete Separation, One Treatment Facility at Mission Hill Water Treatment Plant with Additional Flow to Kalamalka Lake

The Committee reviewed and discussed Representative Mooney's submission titled "Option 7 Analysed" dated April 11, 2016.

Brett deWynter, P.Eng., AECOM provided a presentation on the comparison of Options 1a and 7a.

Moved and seconded by Representatives Mooney and Carlson
That Option 7 with modifications as proposed by Representative Mooney be forwarded to the Greater Vernon Advisory Committee for consideration.

DEFEATED

Opposed: Representatives Bodenham, Etherington, Frost, Gibbs, Hubbs-Michiel, Lainsbury, Mohammad, Neden, Westby, Williamson and Witt

UNFINISHED BUSINESS

MWP SAC Recommendations for the Greater Vernon Advisory Committee's Consideration

The Chair put forth the following recommendations to the Committee:

That the SAC is satisfied with the level of detail provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

CARRIED
Opposed: Representative Mooney

That the SAC is satisfied with the engineering analysis provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

CARRIED
Opposed: Representative Mooney

That the SAC is satisfied with the cost estimates provided in TMs 1 through TM8 supplemented by the additional information provided to the Committee within the SAC Question Papers provided throughout the 2012 MWP SAC review.

CARRIED
Opposed: Representatives Mooney

Moved and seconded by Representatives Lainsbury and Mohammad
That the SAC put forth the following three (3) Options to the Greater Vernon Advisory Committee for consideration:

- Option 1 - the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation;
- Option 2 - the option with the highest benefit to cost ratio (NPV) with partial separation; and
- Option 3 - the option with the highest benefit to cost ratio (NPV) that supports full separation.

CARRIED

Moved and seconded by Representatives Hubbs-Michiel and Bodenham
That the SAC select Option 2 being the option with the highest benefit to cost ratio (Net Present Value) with partial separation as their first choice moving forward with the 2012 Master Water Plan.

CARRIED
Opposed: Representatives Gibbs, Lainsbury, Mooney and Neden

Moved and seconded by Representatives Lainsbury and Gibbs
That the SAC select Option 1 being the option with the lowest financial impact to water users based on the lowest Net Present Value (NPV) with no further separation as their second choice moving forward with the 2012 Master Water Plan.

CARRIED
Opposed by: Representatives Foisy, Westby and Williamson

The Chair declared by process of elimination, Option 3 being the option with the highest benefit to cost ratio (Net Present Value) that supports full separation as the SAC's third choice moving forward with the 2012 Master Water Plan.

The Chair advised that the last meeting for this Committee will be held on May 19, 2016. The Committee will review and discuss the final summary report being forwarded to the Greater Vernon Advisory Committee.

ADJOURNMENT

There being no further business, the meeting was adjourned at 9:23 a.m.

CERTIFIED CORRECT

Chair
Juliette Cunningham

General Manager, Engineering
Dale McTaggart

SCHEDULE “D”

Stakeholder Advisory Committee
Question Papers

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REGIONAL DISTRICT of NORTH OKANAGAN

SAC Questions 1

DATE: October 22, 2015

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised during meeting/Submitted via email

The following questions have been raised either during the first SAC Meeting on October 1, 2015 or submitted by SAC Members since the first meeting:

1. How much water are we treating, from what sources and do they service potable or non-potable customers?

   Answer: The following table provides the total amount of water available from each source that can currently contribute to GVW at peak, how much water from each source is treated and how much was provided as non-potable water used for irrigation:

Annual Water Supply in megalitres (ML)

	Agriculture				Agriculture (treated water)				Domestic		
	2012	2013	2014	2015 (to Oct.)	2012	2013	2014	2015 (to Oct.)	2012	2013	2014
Duteau Creek[2]	N/A	N/A	326	585	9,005	7,821	6,270	5,728	3,859	3,352	3,085
Goose Lake	723	59	171	607	?	?	-		?	?	-
Kalamalka Lake[1]	-	-	-		13	13	13	21	7,399	5,090	4,595
Deer Creek/King Ed. Lake	498	673	899	1,055		-	-		-	-	-
Ranch Wells 1 & 2	132	50	245	466	-	-	-		-	-	-
Antwerp Wells, Shallow & Deep	-	-	-		-	-	-		-	-	-
Total	1,353	782	1,641	2,713	9,018	7,834	6,283	5,749	11,258	8,442	7,680

Note:

1. Kalamalka agricultural supply estimated from 2015 consumption and we are unable to accurately meter actual agricultural consumption from the Kalamalka Lake source.
2. 2012/13 - assumed same breakdown of ag vs. domestic for DCWTP (30% DOM)
3. Improvements to the SCADA system over the last 3 years has resulted in some loss of data.

	2012	2013	2014	2015
Total Agricultural Use	10,371	8,616	7,924	8,462

Duteau Creek – Headgates to DCWTP = 180 MLD without additional pumping at DCWTP (no filtration)

= 240 MLD with pumping to DCWTP, remaining flow for irrigation

Duteau Creek Water Treatment Plant = 160 MLD (no backup, DAF 6 cells x 25 MLD = 160 MLD)

= with filtration 80 MLD and irrigation 105 MLD, total 185 MLD with pumping at DCWTP intake

Goose Lake = 29 MLD (irrigation only)

King Edward/Deer Creek = 12 MLD (irrigation only)

Ranch Wells 1 & 2 = 6 MLD / 5 MLD (irrigation only, requires pumping)

Antwerp Wells = 3.5 MLD (irrigation only, requires pumping)

Kalamalka Lake = 56 MLD (domestic supply, 1 – 2 & irrigation)

Note: Electricity cost for Irrigation pumping is approximately $60./ML/day

2. Total cost of treating, distributing and management of the Duteau Creek Water Treatment Plant and Mission Hill Water Treatment Plant?

Answer: The following table summarizes treatment plant cost only.

Summary of Water Treatment Plant Cost per Megalitre

Duteau Creek Water Source	Water License available =		34,582 ML/year	
	2011	2012	2013	2014
Volume Treated (ML)	13,375	12,355	10,700	9,355
% of Water Licence	39%	36%	31%	27%
Total O&M Cost	$1,702,202	$1,451,830	$1,450,315	$1,133,260
Summer Average cost/ML		$87	$98	$83
Winter Average cost/ML		$325	$318	$409
Annual Average cost/ML	$127.27	$118	$136	$121

Kalamalka Lake Water Source	Water License available =		8,842 ML/year	
	2011	2012	2013	2014
Volume Treated (ML)	8,210	7,413	5,116	6,609
% of Water Licence	93%	84%	58%	75%
Total O&M Cost	$625,577	$524,275	$654,858	$690,135
Summer Average cost/ML		$59	$107	$82
Winter Average cost/ML		$83	$150	$131
Annual Average cost/ML	$76	$71	$128	$104

It should be noted that the difference in summer and winter costs is related to the differing volumes of water produced while maintaining a consistent staffing levels. Each plant directly employs 3 operators year round and the Duteau WTP employees a summer student from May to August. During summer months, operators are primarily concerned with providing the high flows required during the summer. During winter months, flows are low increasing the per ML costs, however, operations are completing required maintenance work that cannot be completed during the summer.

3. Difference of operations cost between agricultural and domestic customers?

   Answer: A detail cost analysis of operational costs between agricultural and domestic customers was completed in TM8 of the MWP. Appendices A, B, C1and C2 provides details of the analysis. The results are presented in TM8 – Table 4.1:

Table 4.1: Allocation of GVW O&M and Administrative Costs: 2011 Actual & 2012 Budgeted Costs

	Agricultural	Domestic	Total
2011 Actual Cost	$1,760,000	$8,170,000	$9,930,000
Percent of Total Cost	18%	82%	100%
2012 Budget Cost	$1,400,000	$8,580,000	$9,980,000
Percent of Total Cost	14%	86%	100%
Average of Percentage	**16%**	**84%**	**100%**

   Since the 2012 MWP analysis was completed, a number of initiatives were implemented to reduce the cost of the agricultural operations, such as strictly enforcing the early/late turn on/off dates, implementing an off season agricultural water use rate, increase the over consumption rates, updating the metering bylaw to reduce meter repair costs and installing radio reading equipment on the meters. There was an attempt to structure the general ledger (GL) codes to be able to provide the separated costs annually; however, a majority of the GVW system provides both domestic and agricultural water in the same pipes and due to the varied day of operations crews, this can be difficult on a day to day basis.

4. Are domestic customers paying for agricultural water?

   Answer: Yes, as noted above in Question 3, there is a shortfall between agriculture revenue compared to expenses; therefore the difference is funded by domestic, industrial, commercial and institutional customers. One of the guiding principles to the formation of GVW in 2003 was that agriculture would not pay for upgrades required for improved water quality and that agricultural rates would remain competitive with other communities within the Okanagan Basin. The agricultural water rates are set annually based on a review of other agricultural rates within the Okanagan Basin to ensure the agricultural sector can retain financial stability within the valley.

5. Can the SAC get a comparison of rates between other water utilities beyond the comparison with Kelowna and Penticton? What about other relevant factors such as are these utilities strictly urban, do they have agricultural customers, what is their source (lake, creek or wells)?

   Answer: See Appendix “A” for a comparative list of other agricultural water utility rates and Appendix “B” for ICI and residential water rates comparisons.

6. What about using Okanagan Lake as water source for GVW?

   Answer: Use of Okanagan Lake as the primary water source for GVW is examined in TM9 of the MWP as Option 6. See TM9 of a detailed discussion of this option. Discussion with the SAC will be completed when TM9 is reviewed at a future meeting (see proposed SAC agenda).

7. What is potential to get grants?

   Answer: Small, minor grants (i.e. between $10,000 to $50,000) are available from a number of private and public agencies and GVW applies for these grants annually. GVW receives approximately $15,000 to $50,000 in funding this way annually.

   Larger more substantial grants typically fund infrastructure projects through a shared funding formula that has contributions from the Province, the Federal government and the applicant. These grants are available, however, on an infrequent basis and are based on government policies and objectives of the day. For example, in 2012 – two infrastructure grants were announced with transportation projects listed as a priority. GVW submitted applications for both grants with one project not receiving a grant and the other project as yet to be announced. These grants are open to all eligible regional districts, cities, towns, first nations and not for profit organizations across the whole of Canada, therefore to secure a grant can be difficult.

   Previous to the 2012 grant announcements, the last round of significant infrastructure grants were awarded in approximately 2005 where treatment was a high priority for the provincial government due to the recent enactment of the *Drinking Water Protection Act.* GVW received $18.4 Million in grants for the DCWTP ($13.9 M) and the MHWTP ($4.5M).

   GVW projects must meet the grant criteria and these change based on current government policy. In 2005, the government would not fund separation projects but would fund treatment. This policy impacted the direction of the 2002 MWP resulting in a MWP amendment in 2004 in order to maximize grant funding received by GVW. In 2012, transportation or "buses and bridges" was listed as a high priority with water projects listed in the "other" section.

8. Are the potential for zebra and quagga mussels addressed in the MWP?

   Answer: The potential threat from zebra and quagga mussels was addressed in the MWP within the context of rating each of the nine (9) options presented in TM9 with the Non-Cost Considerations (Section 5.4)

   Water utilities are always actively assessing risks to their water supply and zebra and quagga mussels is an issue that GVW has been watching closely and planning for in the instance that this threat occurs. For instance, in a 2015-2016 capital works project to raise Kalamalka Lake Intake to improve water quality currently in design phase, the consultant has been instructed to recommend whether a chlorine line to the screen should be added during the construction phase, or whether it should be added when/if zebra and/or quagga mussels are found in Kalamalka Lake.

9. How many times in each of the past four years have the Duteau Creek domestic water users been on the Kal Lake water source?

   Answer: One time: June 21, 2013 – June 24, 2013 - due to an extremely high turbidity event

10. How many times in each of the past four years have the Kal Lake domestic water users been on the Duteau Creek water source?

    Answer: Several times as noted below:
    1. February 16, 2015 – March 9, 2015 - due to increased turbidity in the water from spring run-off and milfoil removal at the north end of Kalamalka Lake.

2. March 28, 2015 – April 7, 2015 - due to increased turbidity in the water from spring run-off caused by snow melt in the Coldstream Creek watershed
3. April 23, 2014 – April 29, 2014 - due to increased turbidity in the water from spring run-off caused by snow melt in the Coldstream Creek watershed
4. December 5, 2013 - due to a 10" main break which increased water demand over what the UV lamps at MHWTP could provide causing the plant to shut down
5. February 21, 2013 – March 25, 2013 - increased turbidity due to Milfoil rototilling being conducted in the North end of Kalamalka Lake
6. April 17, 2013 – April 18, 2013- planned shutdown to upgrade the Computer Server for the Mission Hill Water Treatment Plant
7. May 23, 2013 – May 30, 2013 - due to increased turbidity in the water from spring run-off caused by heavy rain fall
8. June 8, 2012 – June 11, 2012 - due to increased turbidity in the water from spring run-off caused by heavy rain fall
9. April 27 2012 – May 8, 2012 - due to increased turbidity in the water from spring run-off caused by heavy rain fall

11. In the GVW system – can you tell us **exactly** how much treated water is required and how much agricultural water is required? I don't mean what we are providing now – I just wish the figures as to what each area **requires**; residential as opposed to agricultural?

    Answer: TM1 of the MWP reviews in detail the current and future demands of GVW separated into Domestic and Agricultural use. Based on future demands to the year 2052, the maximum day demands are: Agriculture = 213 ML/day and Domestic = 79 ML/day. For futher detail, see TM1 and specifically Table 10-1 in TM1.

12. To that end – how much treated water do we really need to provide for? I am asking because at initial meeting it was said that it was cheaper to provide agriculture in the GVW with treated water as opposed to non-treated! If so – **we need an explanation as to why that is more feasible???**

    Answer: Currently a major portion of the domestic and agricultural systems are combined and the cost to fully separate these two systems is over $80M (2012 estimates). We will review the cost of separation vs. the cost of additional treatment within the context of the nine (9) options presented in TM9.

13. From reading TM 1 – I am to believe that the agricultural demands for water not increasing. Is that reason because it is found to be cheaper to provide both residential and agricultural properties with the same treated water? OR, is it because we expect no further agricultural growth?

    Answer: The current actual agricultural demand was determined to be 12,600 ML/yr and future consumption is estimated at 17,400 ML/yr for a growth of 5,200 ML/yr to meet the full demand of the current 3,452 hectares of allocation that could be utilized in the GVW service area. Allocation means the amount of water assigned to a property by the RDNO for irrigation purposes. The allocation is measured in hectares, and determines the maximum instantaneous flow rate permitted to the property, and the maximum total volume of water permitted per irrigation season and is equal to 5,500 cubic metres per hectare. Should additional allocation be added, then the additional irrigation demand would be met by the anticipated additional irrigation efficiency through improvements in crop irrigation technology.

14. The TM 1 also allows for same growth right through 2016. Then more demand predicted from 2021 to 2052. This is primarily residential with very minimal (if none) agricultural growth. That leads me back to my original question – shall we simply concentrate on providing treated water to the GVW from this year on and recognize that the small amount non treated we do provide to agriculture is cheaper to have their water treated than creating/maintaining a separate non treated system for agriculture?

    Answer: Same answer as #14, we will discuss these issues with TM9.

15. With respect to educating the public – will this committee be working toward developing a clear education plan so all residents can vote in confidence, with available information provided in lay mans' terms?
    Answer: Educating the public is a difficult task, a copy of the efforts that were provided through the referendum process will be distributed. A new public education process will be developed in consultation with the SAC.

16. Can it be explained once again the criteria/process where GVRD requires a referendum for water supply/utilities? I believe it has something to do with whether or not they had the funds initially to borrow? Please clarify.

    Answer: There are currently three (3) options available to GVW to fund major Master Water Plan Projects:

    Option 1 – Short Term Borrowing:

    Short term borrowing: capped at $5 million with a repayment term over 5 years. To meet the MWP schedules, a minimum of $70M is required for the first phase and this option falls far short of the funding required.

    Option 2 – Pay As You Go

    Pay as you go: this option would involve significant rate increases to be applied to the customer as capital projects are incurred. To meet the MWP schedule, the $70M would require an increase in revenue by $10M/year over 7 years resulting in a 63% increase in water rates immediately.

    Option 3 – Long Term Borrowing

    Approximately $70 Million (2012 estimate) is required to fund Phase 1 of the MWP. To meet the MWP schedule, the $70M would be borrowed over the next five (5) years and would achieve a slower increase in water rates being phased in over five (5) years. To facilitate long term borrowing in order to fund the works required, the following options are available:

    a) Alternative Approval Process (AAP): could borrow the $70 million over a 20 year repayment. The Regional District can use the AAP under Part 4, Division 2 of the *Community Charter*. The AAP is a more economical option than a referendum and can be used whenever the legislation requires approval of the electors. For an AAP process to proceed the RDNO would be required to publish notice of the intent to borrow in conformance with Section 86 (Alternative Approval Process) and Section 94 (Public Notice Requirements) of the *Local Government Act*. The electorate has 30 days following the final publication to register their opposition against the borrowing. If more than 10% of the electors respond against the borrowing then the RDNO could not proceed with the borrowing under the AAP process.

    b) Referendum: could borrow the $70 million over a 20 year repayment. In order to gain authority to borrow the funds under referendum, greater than 50% of the voters would have to vote in favor.

REGIONAL DISTRICT
of
NORTH OKANAGAN

SAC Questions 2

MEETING DATE: November 19, 2015

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised during the October 22, 2015 meeting

The following questions were raised during the SAC Meeting on October 22, 2015:

1. **Question**: Could you please provide the committee with results from 2012 to 2014/2015 for review of water demand projections verses actual use.

   Answer:

Annual Flow in Megalitres			
Year	Budget flow estimate	Actual	MWP Projection
2012	19.78	19.55	22.27
2013	18.86	16.22	22.42
2014	18.07	16.67	22.58
2015	18.49	19.45*	22.74
Note: 2015 actual estimated from 3rd Q Total			

2. **Question**: How does a property qualify to have agricultural water rates if they do not have "BC Farm Status" through BC Assessment?

   Answer: Customers who do not have BC Farm Status through BC Assessment must apply to Greater Vernon Water annually and staff assess if they meet the criteria set out by the RDNO Board of Directors. The Application for RDNO Farm Classification is attached that provides the criteria for agricultural water use rates on the back of the form.

3. **Question**: Provide an update of the table that provides a cost comparison for agricultural water rates of other water utilities.

   Answer: Please see the attached revised Appendix 'A" and Appendix "B" for review.

APPLICATION FOR RDNO FARM CLASSIFICATION
Greater Vernon Water

NOTE: If your property has BC ASSESSMENT FARM CLASSIFICATION, you are automatically eligible for the agricultural water rate and do not need to submit an appeal.

Name of Property Owner(S):	**Phone** #1:
	Phone #2:
Address of Property Applied for:	
Mailing Address (if different from above):	
Total Property Size (Acres):	**Existing** Water Allocation (Hectares):
Type of Irrigation System (eg. drip, hand set, overhead sprinkler, etc.):	**Income** from Farming (Previous Year): **PLEASE NOTE:** Applications require proof of income. New farms without farms income may apply and submit a New Farm supplemental application
Types of Crop and/or Livestock:	
Land **Leased**: ☐ Yes ☐ No (the owner or renter can provide proof of income)	If Yes, **Name of Renter:**
Do you have an Agricultural Water **Meter**: ☐ Yes ☐ No	**PLEASE NOTE:** water meters **must be** installed before turn on.
Do you have a **Backflow** Preventor? ☐ Yes ☐ No	**PLEASE NOTE:** testable backflow preventors **must be** installed before turn on and tested annually.

PLEASE SEE REVERSE SIDE FOR ADDITIONAL INFORMATION

THE APPLICANT ACCEPTS THE FOLLOWING TERMS:

1. All agricultural water used must be metered separately prior to approval of application;
2. All domestic water used must be metered prior to approval of application;
3. Only one appeal per property may be filed per calendar year, successful appeals are valid for one calendar year;
4. **$60 NON REFUNDABLE application fee made payable to the 'Regional District of North Okanagan';**
5. Applications received after February 15th will be subject to a $50 non refundable late fee;
6. Must meet Cross Connection Control Standards;
7. The applicant will notify Greater Vernon Water (GVW) if farming activity ceases;
8. GVW can conduct random audits, including site inspections, to confirm eligibility;
9. Eligibility for agricultural water may be withdrawn at the discretion of GVW if land use ceases to meet the criteria for agricultural use or if access for site inspections is denied; and
10. Current water restrictions must be adhered to at all times.

In the event of a successful application, the applicant will install (a) separate water meter(s) at their sole expense to measure all water used on the property. The meter(s) must be installed and inspected before the agricultural water rate comes into effect.

Above fees are per Greater Vernon Water Rates Imposition Bylaw, as amended

Signature of Property Owner(s):	**Date**:

OFFICE USE ONLY

PID File No.:	CCC File #:
	Compliant: ❒ Yes ❒ No

Legal Description: Lot: Plan: Sec: Twp:

❒ Approved Valid Until: _____ Ref. No.: _____
❒ Denied

_____ _____ _____
Name Of Authorized Official (Print) Signature Date

Comments:
❒ On non-potable water source

❒ $60 Non-Refundable **Application Fee** ❒ $50 Non-Refundable **Late Fee** (In **Addition** to the $60 Application Fee After February 15)	❒ Cash	❒ Cheque	❒ Debit
	Receipt #:		

REGIONAL DISTRICT OF NORTH OKANAGAN
9848 Aberdeen Road
Coldstream, BC V1B 2K9
Phone: 250-550-3700 Fax: 250-550-3701 www.rdno.ca

CRITERIA FOR AGRICULTURAL WATER USE RATES

The following criteria must be met in order for landowners to receive irrigation water at the agricultural rate:

1. An annual application for RDNO Farm Classification must be applied for no later than February 15. Applications submitted after this date will be subject to a non-refundable late fee in addition to the appeal application fee.

2. Properties without BC Assessment Farm Classification with an existing irrigation allocation greater than 0.41 ha (1 acre) can apply annually to receive irrigation water at the agricultural water rate.

3. Properties with an existing irrigation allocation less than or equal to 0.41 ha (1 acre) will not be eligible for an appeal, and will be invoiced at the domestic rate.

4. Properties without BC Assessment Farm Classification or without a RDNO Farm Classification will be considered domestic. Domestic water use is required to be metered and is charged at the domestic water rate.

5. A successful application must meet the following conditions:

   a. Agricultural use of the property is permitted pursuant to the appropriate zoning regulations;
   b. The property is used for agricultural purposes, comprising at least one of the following uses:

- Apiculture;
- Aquaculture;
- Christmas tree culture;
- Dairying;
- Floriculture;
- Forage production;
- Forest seedling and seed production;
- Fruit and vegetable production;
- Herb production;
- Horse rearing;
- Horse Boarding;
- Horticulture;
- Populous species and salix species intensively cultivated in plantations;
- Insects raised for biological pest control;
- Livestock raising;
- Medicinal plant culture;
- Poultry and egg production;
- Seed production;
- Turf production;
- Wool, hide, feather or fur production; and
- The raising of crops or animals for human consumption

The following activities are **NOT** considered agricultural for the purposes of water billing:

- Production of manufactured derivatives from agricultural raw materials;
- Production for the occupants' own domestic consumption,
- Irrigation of lawns, gardens and landscaping;
- Agricultural support services; and
- Breeding and rearing of pets, except horses.

6. The property owner must purchase a second water meter from GVW and install it inside the property line to capture all water use. The cost to purchase and install the meter, pit and appurtenances will be borne by the property owner. The meter must be inspected by GVW before eligibility for the agricultural water rate is instated.

7. Landowners with water allocations less than or equal to 0.82 hectares (2 acres) will be required to meet the income threshold of $1,000 per year. Landowners with water allocations greater than 0.82 hectares will be required to meet the income threshold of $2,500 per year. Proof of income is required with **ALL** appeal applications made.

8. New farms may apply for an interim approval process as follows:

   a. Complete a "New Farm – SUPPLEMENTAL APPLICATION FOR RDNO FARM CLASSIFICATION".
   b. Provide receipts for purchases relating to new farm development.
   c. Provide receipts for gross farm income for previous year (if available), and estimated annual income projections that can be reasonably expected for the proposed farming operation (will be referenced in future applications).
   d. New farms will be required to meet and sustain the minimum income threshold (see item 7. above) following two years of operation. The RDNO Utility Manager may approve an extended interim approval period providing the new farm activity meets the BC Assessment criteria for the classification of land under development as a farm. Receipts will be required annually to demonstrate the income threshold has been met prior to approval of RDNO Farm Classification for the third year of new farm operation.

9. All properties must be assessed for backflow prevention and meet the Cross Connection Control Bylaw including installation of required backflow prevention devices and / or assemblies.

10. Notification regarding approved or rejected appeals will be mailed to the address provided. Rejected appeals will be informed of the reasons.

Greater Vernon Water (GVW) is a function of the Regional District of the North Okanagan, responsible for water supply, treatment and distribution. Please feel free to contact GVW for additional information at:

REGIONAL DISTRICT OF NORTH OKANAGAN
9848 Aberdeen Road
Coldstream, BC V1B 2K9
Phone: 250-550-3700 Fax: 250-550-3701 www.rdno.ca

			APPENDIX "A"		
2015 COMPARISON OF AGRICULTURAL WATER RATES-OKANAGAN/THOMPSON/SHUSWAP					
1. Information on rates was gathered through utility websites and provided by OBWB					
Utility	**Bylaw**	**Flow Rating**	**Description**	**Total/ha/yr**	**Comments**
Greater Vernon Water	Bylaw 2672 - 2015 GVW Rates	5.0 usg/m/acre allocation	Allocation Fee: $66.86/ha/quarter Off-Season Rate: $0.77/$m^3$ Over Consumption Rate: Tier A: 0 to 10% over allocation: $0.30 Tier B: Over 10 to 30%: $0.60 Tier C: Over 30 to 50%: $1.22 Tier D: Over 50 to 90%: $1.53 Tier E: Over 90%: $2.19	**Annual Cost: $264 /ha/yr** (other fees may apply if use over their Allocation or use water during the off-season)	Maximum annual usage of 5500 cubic meters per hectare, Equivalent to a duty [depth] of 0.55 meters
Black Mountain I.D.	Bylaw 698 - 2014 Irrigation Tax Bylaw	5.0 usg/m/acre	Grade " A" land: $84.00/acre/year Grade "C" land: $65.00/acre/year	**Grade " A" Annual Cost: $203 /ha/yr** **Grade "C" Annual Cost: $157 /ha/year**	Grade "A": irrigable land in a parcel of more than .50 acres) Grade "C": irrigable land in a parcel of more than .50 acres to which the District's works are extended, but which did not use water for irrigation purposes
Glenmore-Ellison I.D.	Bylaw 159 - 2015 Irrigation Rates	4.5-5.0 usg/m/acre	A grade: $102.00/acre/year A-2 grade: $80.00/acre/year	**A grade Annual Cost: $246.53 /ha/yr** **A-2 grade Annual Cost: $193.36 /ha/year**	A grade - Chlorinated water and/or well water delivered to property line A2 grade - Non Chlorinated water delivered with no guarantee of pressure.
Kaleden I.D.	Bylaw 374 - Current Rates	6.25 usg/m/acre	Tax: $126.35/acre/year Toll: $45.70/acre/year	**Annual Cost: $172.05 /ha/year**	note: tolls may be waived if a request is made in writing by April 1 of each year if outside watering is not required

Utility	Bylaw	Flow Rating	Description	Total/ha/yr	Comments
Lake Country	Water Regulation and Rates Bylaw 633, 2007 CONSOLIDATED 2015-03-17	5.0 usg/m/acre	User Fee $685.00 per year Irrigation Rate $91.00/acre/year (minimum charge: $91.00/parcel/year)	**Annual Cost: $909.86 /ha/yr** (Not a linear fee and depandant on land size due to flat fee, will increase $224.77 /ha/yr for each additional hectare irrigated)	No charge where all of the water supplied to the parcel is subject to the metered rates except where a seasonal irrigation service exists.
Peachland	Bylaw 1931, 2010 Water Rates	6.0 usg/m/acre	Base Fee: $0 Consumption Fee: $0.11 m^3	**Annual Cost: $605.00 /ha/year** (based on 5500 cu.m./year allowable for GVW)	
Regional District of Okanagan Similkameen - Naramata	Bylaw No. 2650, 2014 Fees and Charges Consolidated July 17 2014	7.0 usg/m/acre	Grade A $255.00/acre/year	**Annual Cost: $629.85 /ha/year**	
Regional District of Okanagan Similkameen - West Bench	Bylaw No. 2650, 2014 Fees and Charges Consolidated July 17 2014	7.0 usg/m/acre	$108.00/acre/year User Fee: $690.00/parcel/year Capital Assessment: $483.00 Renewal Fund: $356.00	**Annual Cost: $1795.76 /ha/yr** (Not a linear fee and depandant on land size due to flat fees, will increase $266.76 /ha/yr for each additional hectare irrigated)	
South East Kelowna Irrigation District	Bylaw 668 - Taxation Bylaw 2015	5.5 usg/m/acre	Grade A Lands $79.20/acre/year Rising Block Rate for use in excess of water allotment (per 1,000 US gallons). 0-10%: $0.10 10-20%: $0.13 20-30%:$0.16 30-40%: $0.20 40-50%: $0.25 50-60%: $0.31 60-70%: $0.38 70-80%: $0.46 80-90%: $0.55 >90%: $0.65	**Annual Cost: 195.62 /ha/yr** (SEKID has a maximum allocation of 6,855 cu.m/ha/yr that is assessed annually and may be reduced if in drought conditions)	Bylaw 579 - Irrigation Water Distribution and Regulation Bylaw

Utility	Bylaw	Flow Rating	Description	Total/ha/yr	Comments
Summerland	Bylaw 98-001 - Fees and Charges Consolidated	6.5 usg/m/acre	Non-Greenhouse: $144.89/acre/year Greenhouse: $312.83/acre/year Ground Water: $95.26/acre/year Parcel Tax: $285.00/year	**Non- Greenhouse Annual Cost: $643.02 ha/yr** **Greenhouse Annual Cost: $1,057.69 /ha/year** (Not a linear fee and depandant on land size due to flat parcel fee, will increase $357.89 /ha/yr non-greenhouse and $772.69 for each additional hectare irrigated)	Water Parcel Tax Bylaw 2000-234 and Water Parcel Tax Bylaw, Additional 2000-303 are both charged ($100 + $185 = $285).
West Kelowna - Lakeview I.D.	Fees and Charges Bylaw No. 0028		$71.88/ha/year	**Annual Cost: $177.54 ha/yr**	
West Kelowna - Sunnyside	Fees and Charges Bylaw No. 0028	5.0 usg/m/acre	Seasonal Flat Rate: $60.95 Per Acre Flat: $16.39/acre/year Allocation: 2778.13 m^3 allowable per acre per season $0.25	**Annual Cost: $101.17 /ha/yr** (Not a linear fee and depandant on land size due to flat fee, will increase $40.48 /ha/yr for each additional hectare irrigated)	
West Kelowna - Westbank I.D.	Fees and Charges Bylaw No. 0028		$48.01/ha/year	**Annual Cost: $118.58 ha/yr**	
					Revised: November 12, 2015

2015 COMPARISON OF DOMESTIC WATER RATES IN BC - (mainly Central)

Notes:

1. Total Annual Costs uses an annual consumption of 265 cubic metres as this is equivalent to the average annual consumption for Single Family Residence within GVW (2014). Consumption patterns range from 180 cubic meters/year in the City of Vernon (average over 2011-2014) to 407 cubic metres in the Stepping Stones Subdivision with large properties (2014).
2. Information on rates was gathered through utility websites and provided by OBWB

LOCAL

Water Utility	Bylaw	Fee Description (Billing Frequency)	Total Annual Charge For Single Family Dwelling (based on annual consumption of 265 cu.m)	Comments
Greater Vernon	Bylaw 2672, 2015 GVW Rates	Base: $101.80/quarter Metered (quarterly): Tier A: 0-10 cu.m. $0.51 Tier B: 10-20 cu.m. $1.07 Tier C: 20-40 cu.m. $1.22 Tier D: 40-80 cu.m. $1.53 Tier E: Over 80 cu.m. $2.19	Base: $407.20 Metered: $353.79 **Total Annual = $760.99**	Mix of agricultural & residential customers DAF and UV Treatment plus Chlorination
Black Mountain Irrigation District	2014 Domestic Toll Bylaw No. 695	Unmetered (monthly) Flat Fee: $115.80/quarter; If over ½ acre: Grade A = $88 (residential), Grade C = $68/acre annually (agricultural). New account start up = $10.00	**Flat Fee: $463.20** **If over ½ acre: $551.20**	Mix of agricultural & residential customers 2015: rate increase Coagulation, plans to install UV
Glenmore-Ellison Improvement District	Tolls Bylaw, 2015	Unmetered (Quarterly) Flat Fee: $150.75/quarter	**Flat Fee: $603.00**	Mix of agricultural & residential customers Ongoing Water Quality Advisory Recent $16M project to install Okanagan Lake intake, plans to install UV
Southeast Kelowna Irrigation District	2016 Domestic Tolls Bylaw	Unmetered Flat Fee: $150.00/quarter Parcel tax: $79.20/year Water Quality Improvement Levy: $60.00/quarter	Flat Fee: $600.00 Parcel tax+ Levy: $319.20 **Total Annual = $919.20**	Mix of agricultural & residential customers Failed referendum for capital improvements to meet provinical standards. Rate increase of $200 / year in 2015 with further increase predicted to complete improvements on "pay as you go".
Kaleden	Tax Bylaw No. 387	Unmetered (Annual Billing) Taxes: Group 1: $418.45/year- up to 1/4 acre Group 1: $187.50/yr/acre- over 1/4 acre Special Levy: $37.60 Intake Financing: $75/lot	**Flat Fee:** **$531.50 under 1/4 acre** Over 1/4 acre, add per acre fee	Mix of agricultural & residential customers Chlorination only with intake on Skaha Lake Planning for significant rate increases due to regulatory requirements and infrastructure renewal backlog
Oliver	Bylaw 1346 Water Rates	Metered (Quarterly) Base Rate: $136.80/quarterly Consumption: $0.52 per m^3 (Non-Ag irrigation) $0.58 per m^3 (All other uses, incl. domestic) Annual Parcel Tax: $120.35 Unmetered Flat Fee: $400.00	Flat Fees (incl. parcel): $667.55 Metered: $153.70 **Total Annual = $821.25**	Mix of agricultural & residential customers Agricultural system fully seperated, seperation fully funded by grants

Water Utility	Bylaw	Fee Description (Billing Frequency)	Total Annual Charge For Single Family Dwelling (based on annual consumption of 265 cu.m)	Comments
Regional District of Okanangan Similkameen	**Bylaw 2555**	West Bench Irrigation District (Annually) Flat Fee: $673.00/house Capital Assessment: $483.00 Renewal Fund: $356.00	**Total Annual = $1,512.00**	Mix of agricultural & residential customers Moving to base fee and metered rate next year
Regional District of Okanangan Similkameen	Parcel Tax Bylaw No. 1753, 1997	Faulder (Annually) Parcel Tax: $812.24/per parcel	**Total Annual = $812.24**	Mix of agricultural & residential customers Well source
Regional District of Okanangan Similkameen	Bylaw 2680, 2015 Fees and Charges Consolidated	Naramata Unmetered (Quarterly) Basic User Fee: $200.66/unit/quarter Service Connection Fee: $20.30/quarter Water Capital Charge-Seperation: $32.75/quarter Grade A Domestic: $259.00/acre/quarter	**Total Annual = $1,885.20**	Mix of agricultural & residential customers 825 customers 2015 completing a pilot to meter and plan to be fully metered in 10 years
Summerland	Bylaw 98-001 Fees and Charges	Metered (monthly) Flat Fee: $28.45/monthly plus November - March 0-25 m^3: $0.31 >25 m^3: $1.18 April - October Allotment based on lot size: $0.31/$m^3$ Over Allotment: $1.18/$m^3$ Environmental Levy:$40.56/annual Parcel Tax: $285.00/annual	Fixed Fees: $666.96 Metered: $82.15 **Total Annual = $708.55**	Mix of agricultural & residential customers
Kamloops	Waterworks Bylaw No. 12-31 Consolidated	Fixed Capital Charge (<20mm): $242.30 Unmetered Consumption Charge: $136.67 Variable Metered Consumption Charges: **October - March:** 0 - 45 cubic metres: $0.00 45 - 135 cubic metres: $0.614/cubic metre >135 cubic metres: $0.945/cubic metre **April - September**: 0 - 90 cubic metres: $0.00 90-135 cubic metres: $0.614/cubic metre >135 cubic metre: $0.945/cubic metre	Base: $242.30 Fixed Consumption: $136.67 Variable Consumption: $164.45 **Total Annual Metered = $476.33** **Total Annual Unmetered = $545.46**	Primarily domestic system. Full filtration (microfiltration) fully funded by grants after a community outbreak in the late 1990s.
Penticton	Bylaw 2014-07 Fees and Charges	Metered (monthly) Base Fee (13-19mm meter): $19.77/month Variable Consumption Charge: $1.67/100 cubic feet ($0.59/m^3).	Flat Fee: $237.24 Meter: $ 156.38 **Total Annual = $393.62**	Primarily domestic system. Full grant received for filtration plant after 2 community outbreaks in the 1990s. Proposed 17% increase for 2016 and an increase of 54% from 2015-2019.

Water Utility	Bylaw	Fee Description (Billing Frequency)	Total Annual Charge For Single Family Dwelling (based on annual consumption of 265 cu.m)	Comments
Kelowna	Water Regulation Bylaw No. 10480	Base: $24.10/bi-monthly Metered Rates/bi-monthly: 0-60 m^3: $0.412 60-100 m^3: $0.554 Next 90 m^3: $0.840 Balance of m^3: $1.681 Annual Parcel Tax: $50 Water Quality Enhancement Levy: $15.46/bi-monthly (15/20mm meter) Unmetered Flat Rate: $800 bi-monthly	Fixed fees: $287.36 Meter: $153.29 **Total Annual Metered = $440.65** **Total Annual Unmetered = $4,800**	Primarily domestic system. Four intakes on Okanagan Lake, with 2 intakes having UV treatment in addition to chlorination. Received filtration deferral but has $30 Million of interconnection work to complete and fitration plants in their MWP to be constructed in 30 years. Water Quality Enhancement Levy is put towards a reserve for the filtration plants to pay for 1/2 the construction costs.
Peachland	Bylaw 1931, 2010 Water Rates	Metered (Quarterly) Base Fee: $55.50/quarter 0-400 m^3 - $0.40 > 400 m^3 - $0.67	Base Fee: $ 222/yr Meter: $106 **Total Annual = $328.00**	Primarily domestic system. Two creek sources with coarse screening and chlorination. MWP indicates filtration is required in addition to interconnection of two creek sources
Lake Country	Bylaw 633, 2007 Water Reg and Rates Consolidated Mar 17 2015	Newly metered (semi-annual) Flat Fee: $593.00/year >130 m^3: $0.51 (6 month consumption) Unmetered: Flat Fee: $685.00/year Irrigation Rate: $91 min./year	Flat Fee: $593.00 Meter: $21.93 **Total Metered = $614.93** **Total Unmetered: $776.00/year**	Primarily domestic system. Creek source and lake intake with chlorination only, and UV on one source, seasonal Water Quality Advisories. Expected to increase base rate to $636 and consumption charge to $0.55/cu.m in 2016 26% increase in rates from 2013-2016 Unmetered expected to increase to $830/year in 2016
Osoyoos	Water Rates and Regulations Amendmend Bylaw No. 1242.07	Unmetered (Annually) Flat Fee: $314.00 Metered (Quarterly) Base Fee: $153.00/yr Consumption rate: $0.40 per m3	Metered Flat Fee: $153 Meter: $106 **Total Metered = $259.00** **Total Unmetered: $314.00**	Primarily domestic system, with some agriculture. Water sourced from wells only that require minimal treatment.
Rutland	2014 Toll Rates	Metered (quarterly) First 15,000 gallons: $52.14/quarter Next 24,000 gallons: $1.65/1000 ($0.44/m^3) Next 30,000 gallons: $1.86/1000 ($0.49/m^3) Gallons thereafter: $2.49/1000 ($0.66/m^3) Parcel Tax: $28.35 (Group A) Unmetered Flat Rate: $86.88/quarter	Base: $236.91 Meter: $ 33.44 **Total Metered = $270.35** **Total Unmetered: $347.52**	Primarily domestic system, with some agriculture. Water sourced from wells only that require minimal treatment.

Water Utility	Bylaw	Fee Description (Billing Frequency)	Total Annual Charge For Single Family Dwelling (based on annual consumption of 265 cu.m)	Comments
West Kelowna	Bylaw 0028 Fees and Charges	Westbank Metered (quarterly) Flat Fee: $99.48 per unit/quarter 0-100 m^3: $0.31 101-300 m^3: $0.59 >301 m^3: $0.94	Flat Fee: $397.92 Meter: $90.27 **Total = $488.19**	Multiple sources, mainly domestic. West Kelowna just completed their MWP that includes $110 Million worth of work including filtration. Proposed annual increases are recommended to finance MWP.
Vancouver	Bylaw 4848 Water Rates	Mostly unmetered (3 times per year billing) Single Dwelling Unit: $568.00 Single-Family: suite or laneway house: 771.00 Single-Family: suite & laneway house: 973.00 Each strata title duplex: 385.00 Metered Rates (quarterly): October 1 - May 31 Per unit $2.480 June 1 - September 30 Per unit $3.108	**Total Metered = $706.88** **Total Unmetered: $568.00/year**	Primarily domestic system. Undertaking multimillion dollar upgrades, including filtration. Metering program is relatively new and only being implemented on new construction, mostly on condos. Hence the unmetered annual rate is likely lower as condos do not use outdoor water - metered condo use is likely closer to $250 to $300/yr.

REGIONAL DISTRICT
of
NORTH OKANAGAN

SAC Questions 3

MEETING DATE: December 3, 2015

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised during Nov. 19 meeting or submitted via email

The following questions were raised during the SAC Meeting on November 19, 2015 or submitted via email:

1. **Question**: The following submission with questions was received regarding the Kalamalka Lake Water Source:

In preparation for the October 22 Agenda I posed two questions asking how many days over the past four years were the entire Greater Vernon domestic water users on the Duteau Creek Source and how many days on the Kal Lake Source.

The reply was:

i.) Duteau Creek Treatment Plant was shut down for a period of four (4) days in 2013 Due to increased turbidity.

ii.) Kal Lake Treatment Plant was shut down for a period of one hundred (100) days, one (1) day to repair a burst pipe and two (2) days for maintenance. The plant was closed for ninety seven (97) days due to increased turbidity.

Of the ninety seven (97) days of closure due to increased turbidity, thirty three days in 2013 were due to milfoil rototilling as well as a number of days in early 2015 for the same reason. The balance of the closure days was due to spring run-off.

It is well known that for most of the year Kal Lake raw water is virtually drinking water quality requiring very little treatment. On the other hand Duteau Creek water source requires a very high degree of costly treatment (with more being proposed).

> ***Staff notes to the statements above:*** *As a water utility, GVW and the authors of the MWP are bound by the BC Drinking Water Protection Act to meet Provincial standards at all times. TM7 completes the analysis necessary to assess if Kalamalka Lake raw water meets Provincial standards, which is the subject at the SAC meeting on December 3, 2015. As an additional note, each turbidity event listed in the Question Paper 1 would normally require a public notification (Water Quality Advisory or Boil Water Notice); however, since we shut dowm MHWTP and relied fully on DCWTP a water quality notice was not required. Public notification causes hardship to a community (stress to customers, increased treatment costs at a customer level, negative view of the community by visitors impacting tourism, etc.) and are expensive to manage for a water utility (increased notification and laboratory costs, dramatic increase in overtime wages, resource allocation to respond to operational issues and public taking staff away from regular duties, etc.).*

My questions are:

2. **Question:** With the milfoil-rototilling program being confined to the north end of Kal Lake would it not be possible to move the domestic water intake pipe further out into Kal Lake to avoid the fallout from rototilling?

Answer: Milfoil-rototilling is an extremely beneficial service that the Okanagan Basin Water Board (OBWB) provides to our community. Without it, Kal Lake and the local beaches would become overgrown with milfoil resulting in a loss to community recreation and tourist attraction. The extra plant life in the area would also increase the turbidity and organics in the Kalamalka Lake intake, therefore there are additional benefits to GVW as a water purveyor. OBWB staff indicate that all the milfoil must be rototilled to control its growth, hence, rototilling should not be isolated to certain areas.

Notwithstanding the benefits, milfoil-rototilling operations has been acknowledged to impact the Kalamalka Lake intake water quality. In response, GVW staff have been working closely with OBWB and FLNRO (who operate the Kalamalka Lake weir to Vernon Creek) to reduce the impact and are developing operations plans to address this and issues being examined are:

- Impact to water quality and area being rototilled (OBWB rototillers have installed a gps on their rototillers and location is being correlated to water quality impacts)
- Assessing impacts on water quality when the weir discharging to Vernon Creek is open verses when its closed. When it's open, flow from Coldstream Creek flows directly into Vernon Creek and does not reach the intake.
- Rototilling timing - there is some conflict between what is the best time for GVW and the time that is best time for OBWB which we are currently working through. OBWB's work window is October 15 to April 1 and the rototiller is shared between Wood Lake and Kalamalka Lake. Wood Lake is more likely to freeze over in early winter; therefore OBWB prefers to start their rototilling on Wood Lake or they may not get a chance if the lake freezes. However, during this window the weir is open and turbidity flows to Vernon Creek. The outflow is controlled by the Province and is shut down near the end of December for fishery purposes. An alternative time is when the water quality in Kalamalka Lake is naturally poor (freshet) and there is a high risk that this source must be turned off anyways; however, this is getting late in OBWB's season and they prefer completing in colder temperatures for better die off of the milfoil.
- GVW has been participating in a study in partnership with the District of Lake Country and MFLNRO since 1997. This study includes water sampling at various depths and is being conducted Larratt Aquatics. The sampling period of the study is completed during the growing season (May - November) due to safety issues thus there is water quality monitoring from December to April. It can only be speculated that the turbidity would be less if the intake was extended further and deeper in the lake, however, there is evidence that when the lake is fully mixed (no thermal stratification) and the weir is closed, the flow from Coldstream Creek can impact the water quality at all depths examined and at times, impact the deeper depth of 30 m more during large freshet events.
- Currently, from an operations point of view, it is a relatively easy task to shut off the Kalamalka Lake intake and service everyone with Duteau water during the times that OBWB rototills, especially when it is a planned shutdown. When OBWB is rototilling, the operations staff are fully aware of the potential water quality impacts and communicate frequently with our municipal operations partners and OBWB. The turbidity and UVT trends are watched closely and as the trend for increased turbidity and/or reduced UVT occurs relatively slowly, the intake is usually shut off before operational parameters are exceeded. This avoids middle of the night or weekend alarms with overtime as all operations groups (GVW, Vernon and Coldstream) and management have a role to play in decision making and turning valves. The switch in water sources is relatively easy from an operations perspective but must be completed in a coordinated fashion and customers must be notified.

3. **Question:** By increasing the intake distance further out into Kal Lake it would also increase the depth, would this not negate most of the spring run-off?

   Answer: Heather Larratt's study showed an improvement to water quality if the intake was located at 30 or 40 m in depth instead of the current depth of 20 m (see Table 1 below). However, when the spring freshet is large, the 30 m depth is impacted more than the 20 m depth. See plume diagram Attachment "A".

   It was recommended that if GVW considers increasing the intake that they also keep the ability to draw from the 20 m depth as well when the 30 m intake was impacted. The current intake pipe may result in insufficient suction pressure for the pumps to operate at maximum day demand and cannot be simply extended to the 30 m intake depth. Based on this, two configurations could occur, keeping the current 20 m intake operational and installing a separate larger intake pipe to a depth of 30 m. The study also investigated building a tower with the new intake that has the ability to take water from various depths.

   Nonetheless, even though there are benefits of deepening the intake depth, it is not guaranteed that GVW would never have water quality events on this source or that filtration could be avoided long term and hence the MWP recommended that the money would be better spent on filtration to meet the IH water quality objectives on a continuous basis.

Table 1 – Kalamalka Lake: Water Quality Parameters for Various Depths

Kalamalka Lake 2000-2014	**North 20 m**	**North 30 m**	**North 35 m‡**	**North 40 m**
Distance to pumphouse* m	315	680	900	1590
Average temperature ^{o}C	6.3	5	4.7	4.5
# of seiches over 2 ^{o}C/yr	10	4	2	1
Max seiche temperature fluctuation ^{o}C	11.7	9.9	7.5	4
pH	8.09	8.00	8.07	7.97
Hardness mg/L	171	173	184	172
Total calcium mg/L	37.5	37.9	39.9	37.6
Total organic carbon mg/L	4.7	4.7	4.1	4.7
Chlorophyll-a ug/L	1.9	1.5	1.1	1.2
Turbidity NTU	0.88	0.58	0.49	0.49
UV Transmissivity %	90.2	90.5	91.0	90.9
Avg algae counts cells/mL	60	92	113	174
E. coli cfu/100 mL	<1-270	<1-40	<1-1	<1-1
Total coliforms cfu/100mL	<1-3700	<1-530	<1-19	<1-1000

4.

4. **Question:** Would a deeper intake pipe all but eliminate the possibility of contamination and clogging from a possible Zebra Mussel infestation?

   Answer: No, once Kal Lake is impacted by Zebra or Quagga mussels an increased depth of the intake would not eliminate the issue of clogging. The following is a statement from the University of California, Center for Invasive Species Research, see link at: http://cisr.ucr.edu/quagga_zebra_mussels.html

   "*Where quagga and zebra mussels co-exist, quagga mussels appear to outcompete zebra mussels, and quagga mussels can colonize to depths greater than those achieved by zebra mussels and are more tolerant of colder water temperatures. For example, in Lake Michigan, zebra mussels made up 98.3% of mussels in 2000, by 2005 quagga mussels represented 97.7% of collected mussels. Zebra mussels were found at densities of around 899 per square meter, but quagga mussels now dominate at 7,790 mussels per square meter. Quagga mussels have been found at depths of up to 540 feet in Lake Michigan where they filter feed year round.*"

   The following link provides further information on the risks from zebra and quagga in the Aquatic Invasives! A Menace to the West produced by the Oregon Sea Grant: http://seagrant.oregonstate.edu/sites/default/files/invasive-species/toolkit/zebra-quagga-_mussels.pdf

5. **Question:** Why GVW is appear not to be attaching any priority on this situation?

   Answer: The question goes beyond the terms of reference for the committee; however, we will provide an answer. As shown in the answers above and in the assessment completed in TM7, it is apparent that GVW has been "putting a priority" on this option for many years now with an 18 year on-going study and more recently the Kalamalka Lake Assessment Plan. The following is a link to the Kalamalka Lake Assessment Plan and other work completed in the Duteau and Kalamalka Lake watersheds: http://www.rdno.ca/index.php/services/engineering/water/greater-vernon-water/watershed-source-assessments-and-protection

6. **Question:** (Question has been reworded slightly to provide clarity). There appears that there is a discrepancy in TM3 as it states that "*it is predicted that GVW will face increased water supply shortages in the future unless storage is increased to support the predicted growth in the domestic sector*." Then in Table 2 of the TM3 summary, the following is stated:

>2052	**Okanagan Lake License**	**50,000**	**50,000**	**N/A**	**N/A**	**Good**

   And then TM3 also says "*Other small transfers from within the same watershed are much more feasible such as transferring BX Creek, Coldstream Creek and other small licenses to either Kalamalka Lake or Okanagan Lake.*"

   Staff assumes the question is if GVW is at risk of increased water shortages unless storage is increased and there is a good chance that a license can be obtained for Okanagan Lake by transferring licenses, then why are we not doing this?

   Answer: The MWP review of options took the direction that the analysis would not be constrained by water licenses. This option was certainly explored fully as a viable option as will be seen in TM9, Options Analysis. Whatever option was recommended based on lifecycle costs and the non-cost considerations options rating, then any constraints would be worked through, including obtaining or transferring water licenses required by the option selected. This assumption eliminates the extensive work that may be required to transfer water licences or obtain new water licences to only find out that in the end option was not selected.

7. **Question**: (Question has been reworded slightly to provide clarity). Within TM5 there are the three numbers presented: $80.9 million, $137.2 million and $619.6 million. Why the huge discrepancy between these three numbers?

   Answer: Each number represents something different as follows:

   - $80.9 million is the amount that must be spent in order for GVW to install the pipes necessary to twin the distribution system and achieve full separation of the potable and non potable (agricultural) systems. It includes the projects in Table 7-1 of TM5 that are not yet constructed ($63.8 M) in addition to transmission main twinning ($17.1 M) that is required to support fully a separated system for a total of $80.9M.
   - $137.2 million represents the replacement costs of a fully separated agricultural distribution system (pipes only). This would include the $80.9 M that must still be spent to construct the pipes necessary and the infrastructure (pipes) that currently exists in the GVW distribution system that can be used for the separated system (valued at $57 M). In other words, if GVW were to construct a fully separated distribution system (pipes only) from scratch to service its agricultural customers, it would cost $137.2 M.
   - $619.6 million represents the replacement costs for the entire GVW distribution system (pipes only) and includes the domestic and agricultural system. In other words, if GVW did not exist and a water system had to be built to service all GVW customers to the current level of service (pipes only), it would cost $619.6 M to do so.

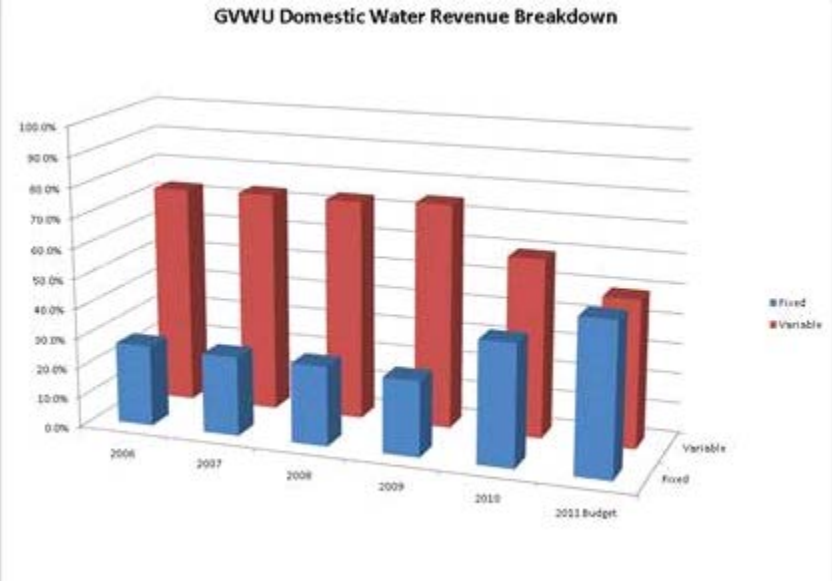
   The costs in the three points above only looked at pipes (mains and transmissions) and did not calculate the value of other infrastructure required to operate a water system, such as pump stations, PRV stations, reservoirs, tanks (enclosed reservoirs), service mains, etc. If these items had been included in the valuation of the above estimates, the costs for each would have been much higher.

8. **Question:** When comparing 2013 and 2014, what percentage of the total revenue for water was base rate revenue and what percentage was consumption revenue?

   Answer: Question 8 and 9 goes beyond the terms of reference for the committee, a discussion of rates and revenue is addressed by the Greater Vernon Advisory Committee (GVAC) and the RDNO Board as part of budget discussions and did not form part of the work scope of the MWP and hence, is not within the terms of the SAC mandate to discuss or make recommendations. However, we will provide an answer. It is assumed the question is around the ratio between the infrastructure base fee and the metered consumption fees. The following provides the percentage of that ratio calculation but does not include agricultural allocation fees, interest income, grants, meter sales, construction/development fees, etc.

   - 2013 Actuals – base 53.1%; consumption 46.9%
   - 2014 Actuals – base 54.0%; consumption 46.0%
   - 2015 Budget – base 54.8%; consumption 45.2%

   Based on YTD (third quarter (Q3) 2015), we currently estimate that 2015 will be approximately 54/46 split of base/metered. Below is a graph presented to GVAC in May regarding prior years ratio of base fee to metered rate.



9. Question: "Are base rate revenues and consumption revenues maintained in separate accounts"?

Answer: Yes, rate revenues and consumption revenues are tracked in separate general ledger (GL) accounts.

REGIONAL DISTRICT of NORTH OKANAGAN

SAC Questions 4

File: 5730.15.13.01.04

MEETING DATE: December 17, 2015

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised during Dec. 3, 2015 meeting / Submitted via email

The following questions were raised during the SAC Meeting on December 3, 2015 and submitted via email:

1. **Question**: The conservation strategy appears to start with getting reliable data (Table 4.1). Once this is done, the utility will start targeting user consumption (Table 4.2). How much of this latter effort will be focused on agricultural users versus domestic? I am wondering if the resources put into agricultural conservation will reflect that the agricultural MDD is over 3 times that of domestic, and the total supplied to agriculture is almost twice that of domestic (according to 2011 figures presented at the beginning of this TM anyways).

   Answer: Agriculture is an important industry in the Okanagan and is responsible for installing and financing (with the assistance of 2/3 Agricultural and Rural Development Act (ARDA) grant funding) the entire Duteau system to support their industry starting in the early 1900's with pressurized pipes being installed in the late 1960's. The continued support of agriculture was a key commitment at the formation of GVW in 2003. Due to the nature of their business, agriculture will always need a significant amount of water in comparison to residential use and are provided an Allocation (if purchased). It is the farmer's responsibility to manage their on-site water and not go over their Allocation. Nonetheless, there is a balance between needing a large amount of water (compared to residential needs) and using that resource wisely. As a result, there has been significant efforts directed towards agricultural water conservation since initiated about 2006 that continues today. The following provides a list of GVW initiatives directed towards agricultural conservation:

   - In early days, dole valves (which only allowed a certain flow) and water bailiffs were used to monitor water use on farm properties and count the number of sprinkler heads in use.
   - From 2006-2012 GVW participated in the Okanagan Irrigation Management Program (OKIM), a program to provide irrigation schedules to farmers and encourage efficient irrigation. In 2013, OKIM disbanded, and GVW developed the AgConnect Program to build on the knowledge gained through OKIM and create a more user friendly tool for customers to access their irrigation meter data and track their water use. The AgConnect web portal also offers irrigation efficiency and water conservation resources to customers.
   - Universal metering of farm properties began in 2008 with full metering completed in 2010. In 2011, Over–Consumption tiered rates were introduced to provide a financial incentive for farm properties to not exceed their Allocated amount. The program started out with a mock billing for one year (2011) as an education program and then real billing began in 2012. The tiered rates have been raised annually since the rate was first implemented.
   - GVW offers workshops on efficient irrigation and the Environmental Farm Plan Program that offers grants for irrigation upgrades.
   - GVW initiated installation of radio readers on agricultural meters in 2015 with a scheduled completion in 2016. This will allow timely meter data to be input into AgConnect to further assist farmers in managing their water.

2. **Question**: I do not understand the last sentence at the bottom of page 4, it sounds contradictory. If poor monitoring of irrigation systems contributes significantly to waste, then shouldn't agricultural users be encouraged to move to better irrigation control systems?

Answer: The last sentence at the bottom of page 4 is directed to Domestic irrigation systems (residential and commercial). The GVW rate system provides a financial incentive for more efficient irrigation systems and GVW hosts workshops and provides education information to encourage users to irrigate more efficiently. In addition, GVW bylaws prohibit wasting water and if inefficient irrigation is reported to GVW, staff will investigate.

With respect to agriculture, the Allocation fee farmers pay is a flat fee for an allotment of water (550 mm/ha/yr) and the only monetary incentive for farmers is to ensure they do not exceed that allotment so they do not pay Over Consumption fees. Allocations reflect the water needs of an average crop (grass/forage) so any producers using drip or other efficient systems should be well under their Allocation and most new operations usually install efficient irrigation. Agricultural customers are also being encouraged to be more efficient irrigators through other GVW initiatives such as workshops and providing information.

3. **Question**: Is GVW getting the raw water meter data from jurisdictions or just each jurisdiction's interpretation of the data? If not getting raw data, will that be changing?

Answer: Currently, GVW receives water consumption data from the billing jurisdictions. This is a legacy from the formation of GVW in 2003 with the amalgamation of the three water utilities (Vernon, Coldstream and RDNO). Although there have been improvements, this arrangement has caused many data issues as the data collection and software are geared towards billing and not towards planning needs, such that GVW requires. GVW initiated a Meter Improvement Program in 2015 with the installation of Automatic Meter Reading technology and swapping out old meters. The main driver behind this program was to improve data collection and obtain better access of this information in addition to reducing operations costs. Once this program is completed (estimated to be 3 to 5 years budget depending), GVW will be able to access much better information required for the level of water management outlined in the Water Conservation plan.

4. **Question**: Is there a breakdown of what the domestic flat rate is allocated to? I am assuming it is for infrastructure O&M as well as future capital works. Is this borne primarily by domestic users or is there an agricultural equivalent to this flat rate? If no agricultural equivalent, why not?

Answer: The issues around rates and how the rates are applied is not part of the terms of reference for the SAC committee. Rates (fixed and variable) for GVW customers is debated by GVAC and recommendations are passed on to the RDNO Board for ratification. Nonetheless, the following is a summary of the GVW rates and rates setting:

- The cost to maintain & operate the GVW system and complete capital improvements are fully funded through user rates less any grants received from other levels of government.
- The cost to run a water utility is about 80% fixed cost with only about 20% variable and dependent on water use (i.e. chemicals and electricity).
- A review of other water utility rates is variable across the board (i.e. 100% metered/ consumption charge to 100% fixed rates). However, there is a balance between these conflicting rate structures; fixed rates provide rate stability to a utility while metered charges send a price signal for water conservation efforts. Most utilities recognize the value of both and will charge a blend of fixed and consumption changes.

- Charging based on 100% metered rates is extremely risky to a public water utility who does not run a "profit" and hence must meet budget projects or risk running a deficit. Public utilities (and municipalities and local governments) are not legally allowed to run a deficit and if they do, must make up the deficit in the following year. This can lead to draining reserves and/or huge rate hikes and instability in rates, which is disconcerting to the public and does not follow industry best management practices.
- GVW has always had a fixed rate component, however it was quite low. During two consecutive wet years, GVW ran large deficits. At that time, GVAC decided to strive to obtain its budget requirements from a 50% fixed rate and 50% consumption based rate.
- The fixed and variable rates are accounted for as total revenue with specific distribution into separate operating and reserve funds.

5. **Question**: What is the state of GVW's distribution infrastructure... how much is in need of replacement? Are some areas in the utility in particular need of upgrades?

Answer: TM8 Section 5.1.2 provides an overview of the current state of GVW infrastructure although it does not provide much detail or direction to GVW staff. The MWP identified an infrastructure renewal amount of approximately $2.8 M per year for pipe renewal alone. GVW has been completing infrastructure renewal projects of varying amounts with an approximate budget of $2 M per year. Since the MWP was compiled in 2012, GVW has been working on developing a more detailed Asset Management Plan and has been working with UBCO to develop a GIS based risk assessment and prioritization tool which is just being rolled out to staff this month. In 2016, GVW will complete a Sustainable Infrastructure Plan that will assess the sustainable amount of renewal required for all GVW infrastructure. GVW is also developing a long range infrastructure plan to assist in identifying renewal projects in addition to completing other projects, such as in-situ pipe videoing to further assist our renewal efforts in a cost effective manner.

6. **Question**: Is there an estimate of how much leakage is contributing to UFW or is that unknown at this point? Is there an AWWA ILI (Infrastructure Leakage Index) benchmark? What is our target ILI and how far off are we?

Answer: GVW is continually looking for leaks and fixing them as required from an operational aspect. However, it was acknowledged that the high amount of unaccounted for water (UFW) identified in the MWP is not just from leakage and in 2014 GVW initiated an audit to get a better understanding of its UFW. The audit identified a number of areas where UFW was being lost and that GVW needed to focus on, such as allowed unmetered water, theft, and unaccounted for water, in addition to leaks. All of these areas are being addressed in various ways, such as:

- Allowed unmetered water use – which includes fire protection, flushing, analyzers and sampling. GVW staff worked with the various users (operations, fire department, water quality) to start to measure / meter and report these uses to GVW.
- Unaccounted for water – which is primarily old meters (greater than 15 to 20 years old) that lose efficiency and "read low". GVW has a large stock of old meters and has increased the budget to replace these in addition to completing a pilot project to estimate the losses from the old meter in stock. The pilot program will assist in directing the financial input and speed at which we replace these old meters.

- Theft – (known and unknown) GVW has updated a number of its bylaws in 2014 and 2015 to provide the tools to GVW staff to ensure bypasses and other theft mechanisms can be dealt with effectively (previously the only tool was to shut someone's water off, which is difficult to do from a legal perspective). GVW has also increased surveillance and will continue to identify and eliminate bypasses and unapproved unmetered water sources.
- Leaks - The American Water Works Association (AWWA) recommends a goal of less than 10% leakage. However, in order to assess leakage properly, the other UFW's needed to be addressed. Once completed, GVW will be better situated to estimate the loss from leakage. Nonetheless, on an operational level, GVW is continually looking for and fixing leaks and through the Asset Management plan and GIS tool, areas at high risk of leakage are being identified and GVW is initiating an assessment program to determine potential leaks in these areas.

7. **Question**: In 2011 there was 8000 ML of unaccounted for water (UFW). Was that about 25% of the total water supplied that year (top of page 8: 8,000ML / 22,440ML)? Is that a typical rate of water losses for the utility? How is the cost of UFW covered?

Answer: Your figures are correct. The "typical" rate of UFW is all over the place for water utilities depending on a number of factors (i.e. age, level of maintenance, record keeping, resources, etc.), however, the American Water Works Association (AWWA) recommends a goal of less than 10% leakage. Refer to Question 6 as to how GVW is responding.

The cost of UFW is offset through user rates.

8. **Question**: How often is the GVW MWP reviewed and updated?

Answer: MWPs are supposed to be updated every 5 – 10 year years if there are major changes completed to a water system, of which GVW has undergone many changes in the past 12 years. Updating a MWP for a water utility that is stable with little change may require the update to occur on a longer cycle. The Drinking Water Officer has the authority under the *BC Drinking Water Protection Act* (Section 19(1)) to order a water supplier to complete a MWP update. In 2010, GVW was ordered to update the MWP and the current MWP is a result of that order.

9. **Question**: Is there a synopsis of the 2002 and 2004 MWP available somewhere? Why was the 2002 MWP revised so soon after being adopted? My understanding is that there was a big change in direction between these two plans. It would be nice to have a bit of history on this.

Answer: There are no summaries of the 2002 and 2004 MWP similar to the current Technical Memorandum (TM) Summaries of the 2012 MWP, however 2002 and 2004 MWPs have been posted on the GVW – MWP website.

10. **Question**: What percentage of domestic consumption is ICI? Is total ICI demand seasonal, with summer peaks? I am wondering how much of this is process water versus, say, used for drinking and landscaping.

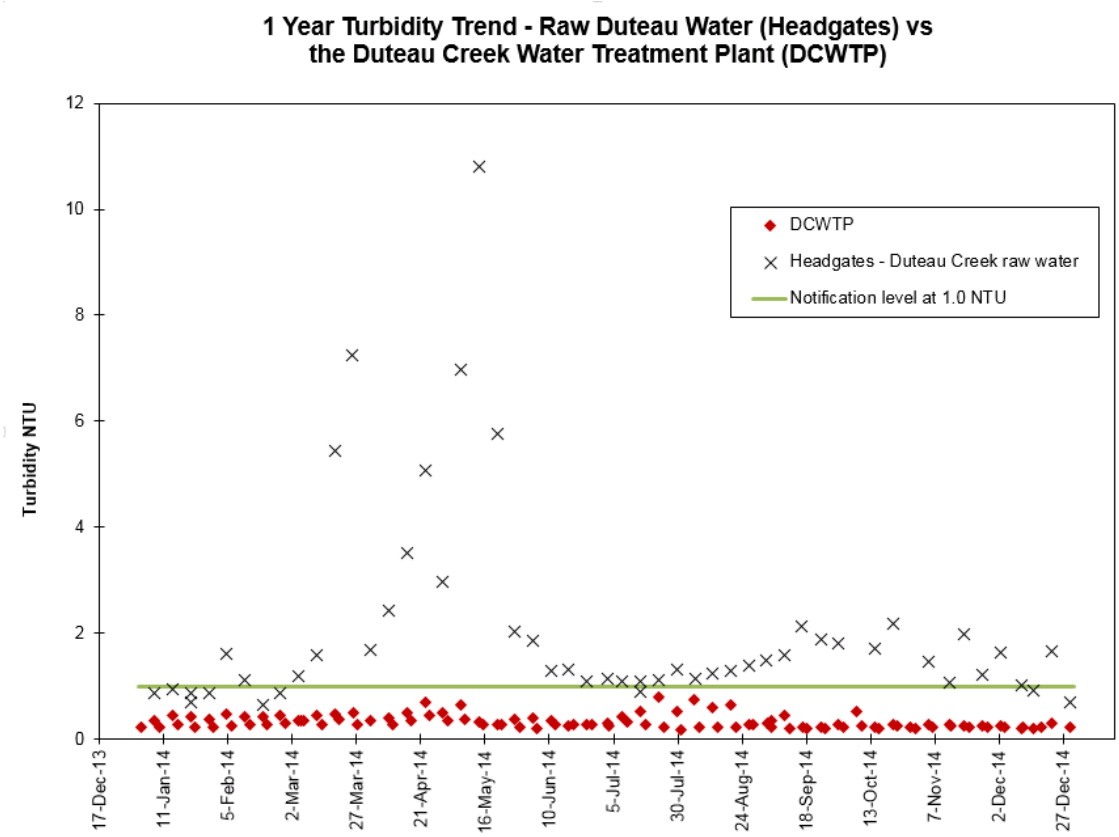
Answer: In 2014, 27% of GVW domestic consumption was considered Industrial, Commerical & Institutional (ICI). This percentage is somewhat skewed by the significant water use by the Okanagan Springs Brewery. Based on quarterly averages, ICI customers tend to follow a similar consumption pattern to residential. As part of the Drought Management Plan (2011) it was suggested that a waterwise certification program could be developed for ICI customers, but staff have prioritized conservation programs for the higher demand customer groups (agricultural and residential) and set ICI demand management as a long term goal.

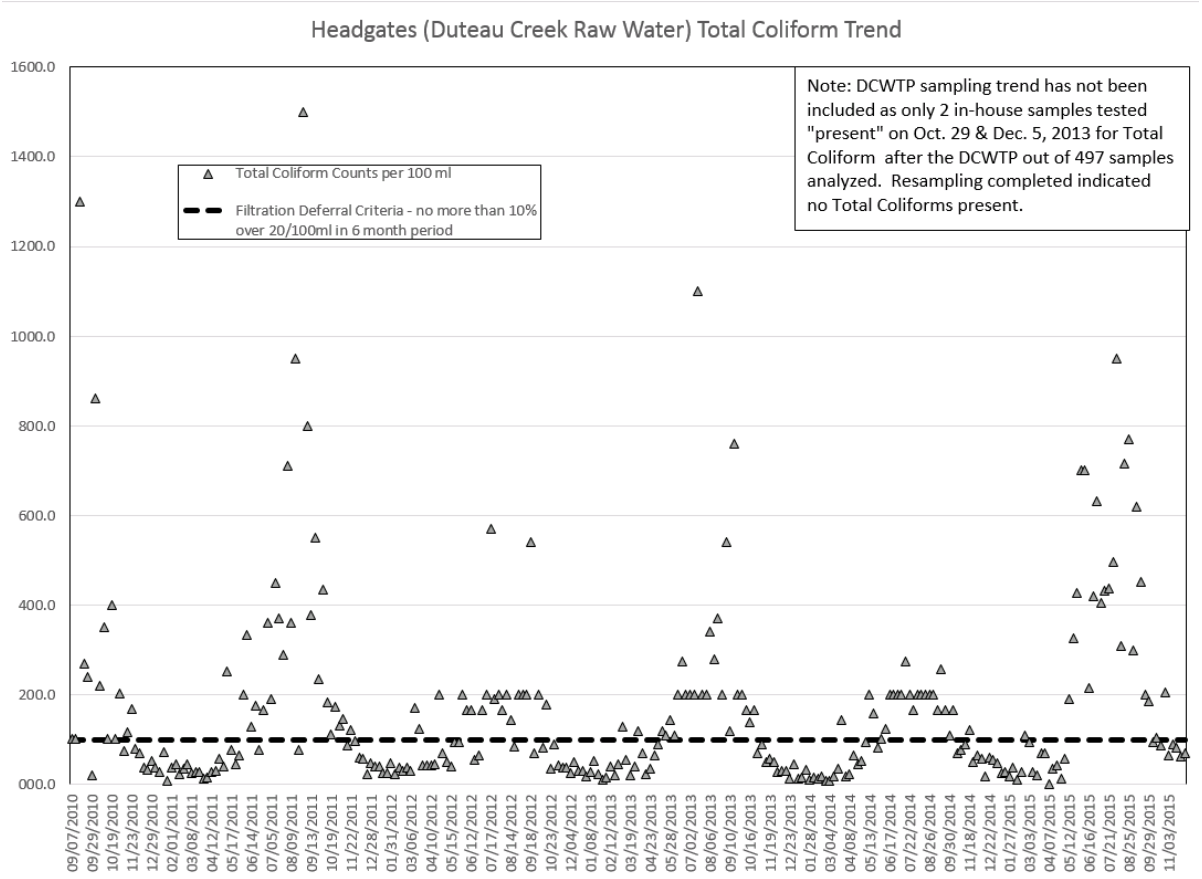
11. Question: Have any separation projects been completed since the 2012 MWP was published that would reduce the $ 80.9 M estimate for separation?

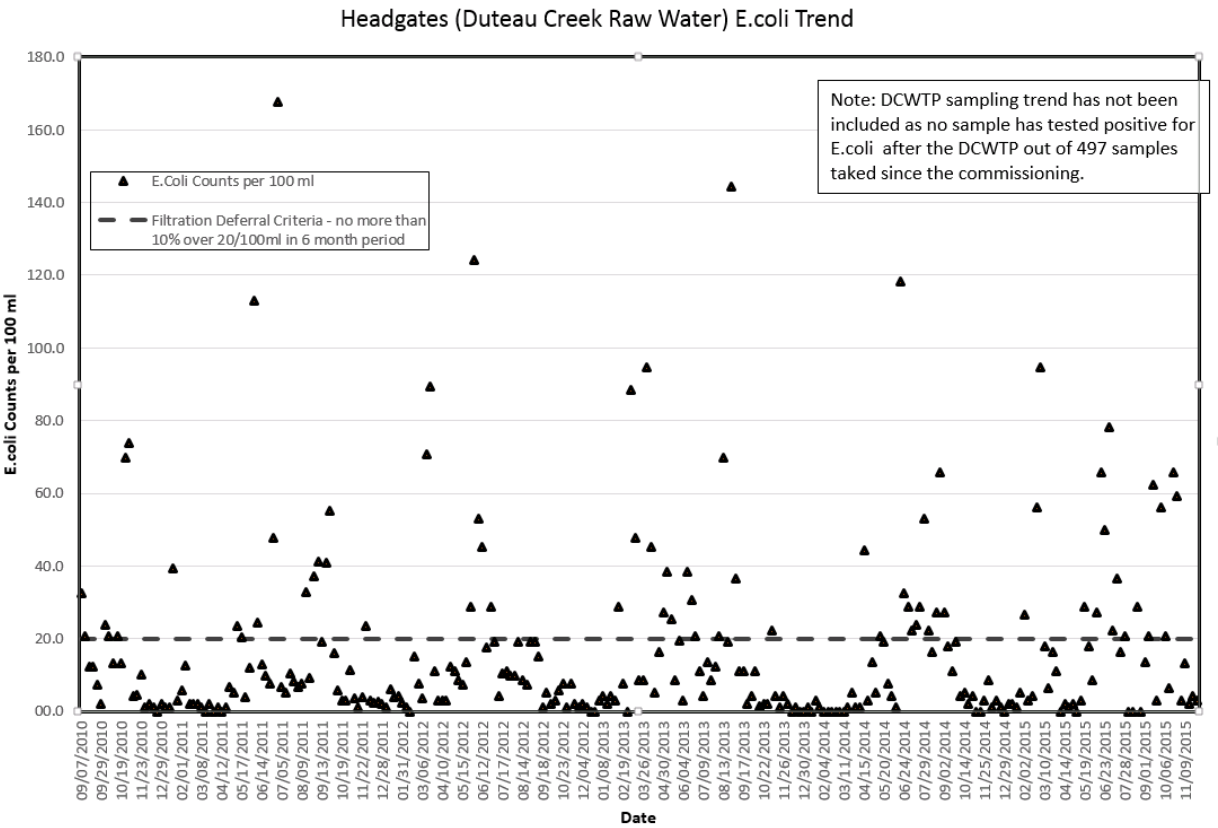
Answer: Of the separation projects identified in Table 7.1 of TM5, the projects listed as Springfield and King Edward – Remainder are about 80% completed and Binns – Stage 1C is about 50% complete. Please refer to the attached figure "GVW Completed Non-Potable Projects" that provides the areas currently separated and provided with non-potable water.

12. Question: What are the results for turbidity, total coliform and e.coli before and after treatment at the DAF at Duteau.

Answer: Please see the following three tables for the Turbidity, Total Coliform and E.coli trends before and after the DCWTP:




Headgates (Duteau Creek Raw Water) Total Coliform Trend
Note: DCWTP sampling trend has not been included as only 2 in-house samples tested "present" on Oct. 29 & Dec. 5, 2013 for Total Coliform after the DCWTP out of 497 samples analyzed. Resampling completed indicated no Total Coliforms present.
Total Coliform Counts per 100 ml
Filtration Deferral Criteria - no more than 10% over 20/100ml in 6 month period
1600.0
1400.0
1200.0
1000.0
800.0
600.0
400.0
200.0
000.0


Headgates (Duteau Creek Raw Water) E.coli Trend
Note: DCWTP sampling trend has not been included as no sample has tested positive for E.coli after the DCWTP out of 497 samples taked since the commissioning.
E.Coli Counts per 100 ml
Filtration Deferral Criteria - no more than 10% over 20/100ml in 6 month period
E.coli Counts per 100 ml
180.0
160.0
140.0
120.0
100.0
80.0
60.0
40.0
20.0
00.0
Date

13. Question: What is current percentage of treated water used on agriculture vs the amount non-potable during peak demand?

Answer: In terms of annual metered consumption, 27% of all agricultural consumption during the irrigation (peak demand) season was from non-potable sources in 2014 (2015 not yet available due to off season use). In terms of peak day demand (Max Day Demand – MDD), the max day for non-potable flows into the distribution system in 2015 was June 28. On that date, total non-potable inflows were 33 ML. That is 25% of the total combined inflows from non-potable sources and the Duteau Creek Water Treatment Plant (which includes domestic consumption). It should be noted that metered consumption between customer classes cannot be calculated on a daily basis, as meters are currently read quarterly, therefore the 25% is a slight under estimate due to the domestic customers included in the DCWTP potable inflows and the 27% determined via annual consumption analysis is similar to peak day demand (MDD).

14. Question: What are the current operating costs of the DCWTP and MHWTP (includes pumping from Kal Lake Pump Station)?

Answer:

Summary of Water Treatment Plant Cost per Megalitre

Duteau Creek Water Source	Water License available =		34,582 ML/year		2015 - DRAFT to Sept 30, 2015
	2011	2012	2013	2014	2015
Volume Treated (ML)	13,375	12,355	10,700	9,355	9,861
% of Water Licence	39%	36%	31%	27%	29%
Total O&M Cost	$1,702,202	$1,451,830	$1,450,315	$1,133,260	$1,156,903
Summer Average cost/ML		$87	$98	$83	$93
Winter Average cost/ML		$325	$318	$409	$248
Annual Average cost/ML	$127.27	$118	$136	$121	$117

Kalamalka Lake Water Source	Water License available =		8,842 ML/year		2015 - DRAFT to
	2011	2012	2013	2014	2015
Volume Treated (ML)	8,210	7,413	5,116	6,609	5,204
% of Water Licence	93%	84%	58%	75%	59%
Total O&M Cost	$625,577	$524,275	$654,858	$690,135	$516,154
Summer Average cost/ML		$59	$107	$82	$56
Winter Average cost/ML		$83	$150	$131	$227
Annual Average cost/ML	$76	$71	$128	$104	$99

15. Question: Has GVW completed any sampling for bromide and if yes, what are the results? (Purpose – bromide may become an issue if ozonation treatment is used)

Answer: GVW currently has only sampled bromide at two locations, however, if ozonation is used in the future, further bromide testing would be completed. The previous testing results are as follows:

Facility	Sampling Point	Collection Date	Bromide mg/L
Headgates Building	Headgates bldg. Raw	04/11/2005	< 0.01
North Kal Lake Pump station	N Kal Lake Pump station (Pre-Cl2)	04/19/2005	< 0.05

The followings provides information on bromide and their importance in drinking water:

Bromide (Br−) is the anion of the element bromine, which is a member of the common halogen element series that includes fluorine, chlorine, bromine and iodine. These elements have chemical similarities, but also important differences. They are oxidizing agents, and all form anions by accepting an electron. Bromide is commonly found in nature along with sodium chloride, owing to their similar physical and chemical properties, but in smaller quantities.

Bromate: the GCDWQ Maximum Acceptable Concentration 0.01 mg/L
Ozone reacts with naturally occurring bromide in treated water to produce bromate. The amount of bromate formed is principally dependent on the concentration of bromide in the water, and pH levels. In groundwater, the bromide concentration will vary with saltwater intrusion and bromide dissolution from sedimentary rocks. In surface water, bromide may originate from sewage, industrial effluents, and runoff from roads and agricultural surfaces. If the pH of the water is low, no bromate will be formed. Bromate does not appear to be formed as a byproduct of chlorination. Bromate Chemical Compound - the bromate anion, BrO^-_3, is a bromine-based oxoanion. A bromate is a chemical compound that contains this ion. Examples of bromates include sodium bromate, and potassium bromate

16. Question: Table 1, TM7 Summary, THM and HAA Standards are shown to be 100 and 80 respectively, with DCWTP levels exceeding by 400% the Standard (compared to MHWTP's lower levels). *(Staff note – although THMs still exceed Provincial Standards in the Duteau system, they were reduced significantly with the installation of the DCWTP as seen in Figure 2-10 of TM7 starting in Dec. 2010 when the plant was commissioned)*

a. Duteau average max indicates for both: "most samples exceed". What are the average max *numbers* for water from DCWTP? Doesn't flushing remove the higher levels associated with the end of distribution lines?

Answer 16a: Staff does not calculate the "average max numbers" and as the inquirer did not identify the range considered the "max numbers", this calculation cannot be completed. Please see Figure 2-10 and Figure 2-11 of TM7 for the trend of THMs and HAAs respectively. Flushing can improve levels, however, it often requires an excess of wasted water to ensure lower DBPs. It should be noted that staff are examining other operational methods to reduce THMs and HAAs.

b. Seniors, the very young and people with immune challenges are presumably at greater risk. What confidence/science exist that filtration at DCWTP will so substantially decrease THM and HAA levels that they parallel results of water from MHWTP?

Answer 16b: GVW completed a pilot study to examine the results of different filtration methods on polishing the water after the DAF at the DCWTP and which method would best reduce these DBPs. The pilot study indicated deep bed sand and gravel filter would be effective in reducing total organic carbon (the precursors of DBPs) with the addition of aeration to strip the chloroform based THMs in the DCWTP reservoir (and remote reservoirs if required) would reduce the THMs to meet the treatment objectives.

17. Question: Re the previous reply concerning percentages that ever-increasing base and consumption rates contribute to revenue, current residents appear to be paying for infrastructure that future residents will enjoy. What formula does GVW plan to remedy the inequity?

Answer: GVW completed a referendum process to borrow $70 M in the fall of 2014 to fund the 6 major priority projects identified in the MWP, which was subsequently defeated. This process proposed borrowing the funds over 20 years through the Municipal Finance Authority to spread the costs to current and future users.

Web links of information or reports:

RDNO Watershed / Source Assessment and Protection:

http://www.rdno.ca/index.php/services/engineering/water/greater-vernon-water/watershed-source-assessments-and-protection

Larrett Aquatics, Sept. 9, 2011. Source Assessment of the Regional District of North Okanagan – Greater Vernon Water Utility North Kalamalka Lake Intake:

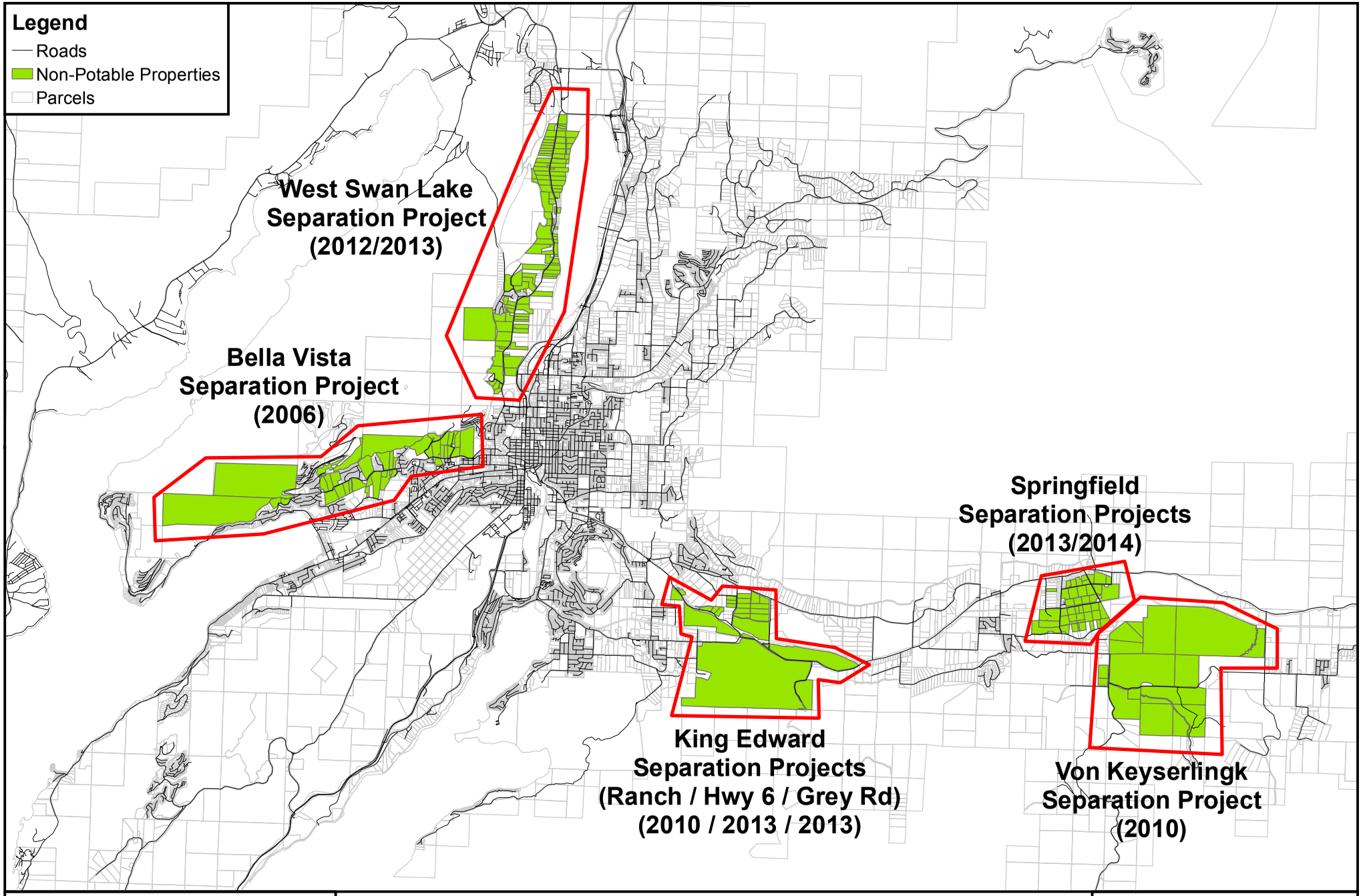
http://www.rdno.ca/docs/111015_GVW_Kal_Source_Assessment.pdf

Health Canada, Canadian Drinking Water Guidelines:

http://hc-sc.gc.ca/ewh-semt/water-eau/drink-potab/guide/index-eng.php

Attachment:

Figure: GVW Completed Non-Potable Projects (reference in Question 11)



GVW Completed Non-Potable Projects

Plot Date: Mar 20, 2015

Scale: 1:125,000

0 2.5 5 10 Kilometers

REGIONAL DISTRICT NORTH OKANAGAN

RDNO

REGIONAL DISTRICT of NORTH OKANAGAN

SAC Question Paper 5

File: 5730.15.13.01.04

MEETING DATE: February 10, 2016

SUBJECT: Stakeholder Advisory Committee (SAC)
Non-Cost Consideration Procedure & Questions

The first section provides the procedure for filling out the non-cost consideration evaluation table and following that are questions submitted by SAC members who requested the information to assist in filling out the non-cost consideration evaluation table.

Non-Cost Consideration Procedure

The goal of the non-cost evaluation criteria is to determine the non-cost differences between the options. To achieve this each of the non-cost criteria need to be evaluated independently without duplicating the impacts of issues. For example the impact of obtaining sufficient water license needs to only be evaluated once for one of the non-cost evaluation criteria. The goal of the process is not to rank an option low in multiple categories for the same issue. It is important that evaluators pay close attention to the potential duplication of ranking water supply options high or low for the same issue.

While completing the valuation it is also important that every option receives an independent ranking between 1 to 9. For the option that most satisfies the criteria a ranking of 1 should be applied and for the option that least meets the requirements assign a ranking of 9. All the other options should be provided an independent value relative to each option as determined by the evaluator. Each option is independent and selection of the preferred option for the non-cost criteria is important. Each option must be provided an independent value to ensure the evaluation process is useful.

Based on the comments above, the recommended process for the option non-cost evaluation is:

1. Review the non-cost category and the associated supporting information;
2. Determine the top and bottom ranked option for the non-cost category being considered;
3. Assign independent values for the remainder of the options;
4. Review the rankings and make adjustments as required;
5. Complete the above process for the other non-cost evaluation criteria;
6. Once the evaluation is complete submit your completed form to the Greater Vernon Water staff. The results will then be compiled, averaged and distributed to the SAC.

Questions

1. Question: After considerable discussion and reflection and varying levels of input from water customers and critics who have followed the progress of the water system in its evolution, I am beginning to question the scope of the Evaluation process as it is unfolding. My concerns centre around the status of the Distribution system, particularly the status of the aging AC piping. In order

to do justice to the weighting process in this and other categories, I would appreciate your input in providing a management perspective on a few issues.

What is your assessment of the overall condition of the AC piping components in the system?
I am aware of the risks to the system and its user base in prolonging the reliance on aging AC piping through exposure from asbestos leaching to water, soil and air.

Answer: Infrastructure renewal is part of the GVW Asset Management Program and specific details are beyond the scope of the Master Water Plan with the exception of specifying that $2 million/year be included in the budget for this purpose. No matter what option is chosen, infrastructure renewal will be the same and is independent of source and treatment.

That being said, for your general information, the condition of the AC pipe in the GVW system is pretty good relative to the cast iron (CI) pipe in the system based on age, breaks and water quality issues. As to the health risk - asbestos is a health risk when friable (i.e. fibers are airborne) and hence the health risk of AC pipe is to workers removing it and not as a risk within our drinking water source. The following are statements from the guidelines from the Canadian Drinking Water Guidelines and the World Health Organization (WHO):

- GUIDELINES FOR CANADIAN DRINKING WATER QUALITY:
  GUIDELINE TECHNICAL DOCUMENT – ASBESTOS

  GUIDELINE:
  There is no consistent, convincing evidence that ingested asbestos is hazardous. There is, therefore, no need to establish a maximum acceptable concentration (MAC) for asbestos in drinking water.
  (http://healthycanadians.gc.ca/publications/healthy-living-vie-saine/water-asbestos-amiante-eau/index-eng.php)

- ASBESTOS IN DRINKING-WATER
  BACKGROUND DOCUMENT FOR DEVELOPMENT OF WHO GUIDELINES FOR DRINKING-WATER QUALITY

  CONCLUSIONS:
  Although asbestos is a known human carcinogen by the inhalation route, available epidemiological studies do not support the hypothesis that an increased cancer risk is associated with the ingestion of asbestos in drinking-water. Moreover, in extensive feeding studies in animals, asbestos has not consistently increased the incidence of tumours of the gastrointestinal tract. There is therefore no consistent, convincing evidence that ingested asbestos is hazardous to health, and it is concluded that there is no need to establish a guideline for asbestos in drinking-water.
  (http://www.who.int/water_sanitation_health/dwq/asbestos.pdf)

2. **Question**: What is your assessment of the overall condition of the Woodstaking components in the current system, particularly in the Hospital hill piping structure? Woodstaking tends to deteriorate over time and our replacement timeline would be nearing its end.

Answer: We do not have any documented woodstave pipes in the GVW system. We may have a few woodstave conduits for our pipes (i.e. under railways) but replace these as necessary.

3. **Question**: What is your assessment of the timeline and costs involved in UV bulb replacement at MH ?

I am mindful of the situation at the Rec.Centre wherein the chlorine-based treatment system was replaced with multiple UV bulb costing in the neighbourhood of $900 each following an estimation

error in life expectancy of the UV bulbs. The City of Vernon reverted to another version of the chlorine based treatment system abandoning the UV system.

Answer: These costs are accounted for in the lifecycle costs (that includes operations & maintenance) for the Mission Hill Water Treatment Plant over the 50 year time horizon of the MWP (TM9 and 10).

We are unsure why the Rec. Centre was treating their water, but UV is a requirement that GVW must utilize in order to increase the safety of our water and to meet Provincial standards for drinking water. Most significantly, UV is able to inactivate pathogens such as giardia and cryptosporidium, which are chlorine-resistant, which meets the "3 log removal of protozoa" of the 4-3-3-1-0 rule for drinking water. Chlorine alone would not meet Provincial standards (unless you were using groundwater that was not influenced by surface water – which is not applicable to GVW).

Another key benefit of UV over gaseous chlorine or liquid sodium hypochlorite is that it doesn't add anything to the water — except UV light. UV also has a significantly lower carbon footprint versus chlorine, as well as a smaller physical footprint due to shorter contact time. No disinfection byproducts are generated with UV, and it is a safer option for the operator and the community than other disinfectants, i.e. ozone, chlorine gas, sodium hypochlorite, chlorine dioxide, etc. Municipal drinking water distribution systems; however, require a residual disinfectant (i.e. chlorine residual) to ensure water remains safe and clean throughout the distribution. To achieve this, a small chlorine residual is added after UV disinfection to maintain the water's quality until its final destination.

As per the operation and maintenance costs for the UV reactors, the following is provided for information (although is beyond the scope of the committee's review of the MWP):

- 2 UV reactors at Mission Hill (one for redundancy),
- 6 ballast per reactor, which are at the end of their life now (9 to 10 years) and we are replacing a few a year. They cost about $7,500 each, and
- 6 UV bulbs per reactor, changed at 10,000 hrs, $600 each.

4. **Question**: With respect to the new 2015 water meter replacement program; will these new meters (to be replaced over next 2/3 years) have any impact on decisions/suggestions we make today as the current committee? When considering an option – do these meters factor into that at all?

Answer: No the water meter replacement program does not impact the source/treatment option, this program will proceed regardless of which option is ultimately decided upon.

5. **Question**: Say, for example, option #2 goes ahead: Based on capital costs projected in addition to the O&M costs – are you able to forecast the increase/rate each user would be paying annually with these new improvements? Bottom line – what would be the annual increased costs to each user? If we are able to make some projections – easier to break down and explain to public.

Answer: Yes we can calculate an estimate for the amount of the work based on the financial plan put forward as we did in the referendum. The financial plan sets timelines, financing strategies (pay as you go, referendum, etc.) which are integral to predicting the impact on rates. However, the SAC has not reviewed/debated TM10 yet which is the financial plan. So at this junction, the process is to identify the best option and then go through the financial plan exercise.

6. **Question**: Confirm option 2 includes upgrade/increase to storage facilities, as this was identified as an issue in earlier meetings

Answer: If you mean increasing the storage on Aberdeen, then yes this is included in Option 2. In fact all options include "Aberdeen Dam Improvements – Raise Dam by 4 metres" with the exception of Option 6 - using OK lake as the sole potable water source.

If you mean increasing storage in a tank (concrete reservoir) for additional fire flows – then yes all options include this.

7. **Question:** Confirm the new water rate structure is being reduced from 5 tiers to 3 tiers. Does this new rate structure impact at all any weighting we put to any option? I imagine the setting of water rates is not entirely in the scope of this committee; however it would be nice to touch on it as it relates to what users pay and will tie into how we do go about educating and "selling" an option to the public in the future.

Answer: The GVW rate structure is a political decision so it is outside of the scope of the SAC. GVAC is an advisory committee to the RDNO Board so any decision GVAC makes will be in the form of a recommendation to the Board for endorsement. GVAC debated the rate structure at the Special GVAC meeting on Jan. 20th, 2016 and has made the following recommendation that will go to the Board on Feb. 10th:

"That a Greater Vernon Water strategic plan for rates and fees structure workshop to identify multiple objectives be scheduled in May 2016."

Here is the link to the meeting if you would like more information:

http://www.rdno.ca/agendas/160120_AGN_GVAC_SPEC_Amended_Full.pdf

8. **Question:** It was mentioned last meeting that IH would not defer filtration at any plant location (for example: the new UV project applied for at Duteau), without first having all the sample results/facts to say that water is up to standards. That is clear but are there any other situations/reasons where IH may defer filtration at an existing plant? *(Something perhaps that the RDNO could apply for now; with the idea of perhaps working on Mission Hill first rather than Duteau?)*

Answer: GVW has been completing the necessary sampling to assess if this source will meet the criteria to successfully make an application for a filtration deferral on the Kalamalka Lake. As stated previously, Kalamalka Lake source alone would not meet Filtration Deferral criteria as there are times that the water quality does not meet Provincial standards, which is when GVW switches the source to Duteau Creek WTP to avoid public notifications (i.e. Boil Water Notification or Water Quality Advisory). GVW can only switch Kalamalka Lake source to Duteau Creek source during non peak times because delivery of maximum day flows in the summer months is not possible from one source. In addition, IH has indicated to GVW that we currently do not meet exclusion criteria when we switch because Duteau Creek WTP is not compliant. If GVW can get a filtration exclusion on Duteau Creek WTP, then there is a possibility that GVW could also get an exclusion on MHWTP, but this is an ongoing discussion with Interior Health and not a guarantee that this will be approved.

That being said, even if GVW obtained a filtration exclusion on both Duteau (with UV & air scrubbing in the reservoir) and on Kalamalka Lake, the Kalamalka Lake source would always be vulnerable to losing the filtration exclusion if there was a water quality event in the summer when the Duteau Creek source could not be switched over due to high flows or if the lake started to experience high levels of Blue Green Algae blooms due to mussel invasion and/or climate change (taste, odour and toxins would become a long standing issue).

The following link provides the criteria for a Filtration Exclusion in the Drinking Water Treatment Objectives (Microbiological) For Surface Water Supplies In British Columbia:

http://www2.gov.bc.ca/assets/gov/environment/air-land-water/surfacewater-treatment-objectives.pdf

9. **Question:** I was just going over my notes from previous meeting regarding government grants: Am I correct in thinking that in this current political climate the government grants given are for "treatment portion" of MWP only?

Answer: Grant initiatives always have "priority projects" listed. There was a large money grant program in the early 2000's where potable water treatment was listed as a priority project (in connection with the Provincial enactment of the *Drinking Water Protection Act)*. This is the main reason why the 2002 MWP was amended in 2004. The 2002 MWP planned on completing all separator before building the treatment plant and with this plan, GVW would not receive any grant money for installing pipes for separation. The change included building the DCWTP in phases and installing UV and MHWTP which resulted in GVW receiving $18.4 million in grants (Duteau Creek WTP ($14.4M) and MHWTP ($4M)).

After this grant opportunity, there were many years where no sizable grant programs were available and then in 2015, two significant grant opportunities arose. GVW submitted applications under both grant opportunities to fund the following projects (1) raising Aberdeen Dam and (2) Installing radio readers for the Meter Improvement Program. Due to an overwhelming number of applications, GVW did not receive approval from either grant application.

REGIONAL DISTRICT
of
NORTH OKANAGAN

SAC Question Paper 6

File: 5730.15.13.01.04

MEETING DATE: February 18, 2016

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised during January 14, 2016 meeting / Submitted via email

The following questions were raised during the SAC Meeting on January 14, 2016 and submitted via email:

1. **Question**: With respect to the new 2015 meter replacement project; does it involve Vernon, Coldstream and the RDNO? Which user areas will receive/get meters replaced? Will these new meters (to be completed in 2/3 years so we understand) have much, if any impact on decisions/suggestions to be made by this current committee?

   Answer: All GVW customers will have a radio reading devise installed to read their meter (see: www.rdno.ca/watermetering for more information) including customers in Vernon, Coldstream, Electoral Areas B, C and D and Spallumcheen. Customers with old meters that are beyond the recommended life of the meter (generally 20 years and older) will also have their meter replaced as part of the infrastructure renewal process of GVW. Currently GVW has a large stock of old meters that require replacement and GVW is conducting a pilot program that will bench test old meters to assess how inaccurate these are to guide our renewal program.

   While the installation of new meters will likely not have a direct impact on the decisions of the committee, it should be noted that the initiation of GVW Meter Improvement Program is partially in response to recommendations made in TM6, page 8 and as follows:

   Significant effort is needed by the Master Water Plan partners to coordinate data collection, quality assurance and quality control to successfully measure water, as well as implement consumption based fee systems. Evidence of this problem is the under-reporting and comparison of accounted water through the meter system to measured flows through the distribution system. For this Master Water Plan, the water meter data was cross-referenced with the GVW GIS water connection layer. Several gaps were visibly identified in the analysis (GVW later noted over 20 percent of information was missing or unaccounted for).

   When properly functioning, water meter information can provide detailed information on consumptive use practices within the various zones and groupings. It can, if effectively used, assist in leak detection. The meters can also be used to measure individual consumption and potential usage rates.

2. **Question:** Would this new meter program impact any major leakage costs/problems (such as in 2011)? I understand consumers pay the "treated water" rate (involving costs related to getting water treated up to that point and ready for distribution) regardless of water unaccounted for after it has been treated; as opposed to users simply paying their metered or "consumed" rate? I believe I am not wording this correctly; but the question I have is, is it an acceptable practice to bill users the treated water rate as opposed to what they actually consumed? Please feel free to reword this or address another way, as I do understand it was partially addressed in last questions but I simply wanted to understand how users are billed. I believe this will have an impact down the road when explaining a new water referendum/rates to the GV area. I am asking as it has already been brought up by letters in the Morning Star. Possibly part of this will tie in when we receive the updated water treatment plant costs and my question will be answered.

Answer: GVW is a public utility and is owned and operated as a function of the Regional District of North Okanagan (RDNO), which manages a number of water and sewer utilities as well as other services (i.e. Solid Waste, Noxious Weeds, etc.). Each utility/service operated by RDNO is managed as a separate entity with their own budget, revenue sources and expenditures hence each utility is responsible to fully fund their own operations, maintenance and infrastructure improvements, with the exception of any grant funding received for specific projects. Any budget surplus for a utility is put to that utility's reserve fund(s) and any budget deficiencies are taken out of that utility's reserves. Property tax money is not used for to fund any RDNO utilities and these are fully funded by user fees (i.e. water rates), including GVW. Furthermore, utilities managed by the RDNO are not allowed to run a deficient. If no reserves are available, legislation dictates that budget deficiencies must be collected from the user group in the following year, which usually means rate increases.

Baring the above in mind, GVW develops the water rates based on the required annual budget to fund O&M, debt financing, capital works and reserve input/output (as directed by the RDNO Board). Hence unaccounted for water (UFW) is a cost to the utility and must be funding through water rates, which is taken into consideration as part of the budget when rates are set. In addition, the RDNO Board has set a target of deriving 50% of the GVW income from fixed base fees.

Questions 6 and 7 within the SAC Question Paper #4 outline in detail steps that GVW are undertaking to address and reduce the amount UFW for GVW. One step is to replace aging meters as studies indicate that old meters are inaccurate and read lower than actual when they wear out. These inaccuracy amount will result in UFW to the utility as we are still providing the water but the meter is not recording the use. The bench testing pilot program will assist GVW is estimating the amount of UFW being lost due to older meters and as the older meters are replaced, the UFW due to older meters should be reduced.

3. Question:

3a) If Option #2 is decided on, can you again outline the priority projects for this option as opposed to the deferred ones? Which is more preferable – to start the work at Lavington or Duteau? If we could have more detail on those options.

3b) Lastly – does option #2 (any option really) include upgrade/increase to storage facilities, as this was identified as an issue in earlier meetings?

Answer: Staff has separated this question into 3 a and b as they are separate answers as follows:

3a) A key assumption within TM9 for costing and scheduling the chosen option (in this case Option 2) was that all domestic customers would receive water that met Provincial Standards within 10 years and hence, treatment and system separation would be completed by 2022.

Based on this key assumption, the timing of projects for Option 2 in the 2012 GVW MWP are outlined in Table 4.4 of TM9 (below – page 3) and within TM10. The referendum for $70 million completed in the fall of 2014 included the 6 key projects required by 2022 in Table 4.4 below which included raising Aberdeen Dam but not filtration at MHWTP. See Attachment 1 for the information pamphlet provided during the referendum to customers.

Description	Year	Cost ($ million)	Net Annual O&M Change ($ millions)
1. Water Supply and Treatment			
a. Duteau Creek Filtration – 110 ML/d	2017	$ 26.5	$ 0.12
b. Mission Hill Filtration – 56 ML/d	2022	$ 30.0	$ 0.84
c. Aberdeen Dam Improvements – Raise Dam by 4 m	2022	$ 6.41	-
d. Goose Lake Supply from Okanagan Lake	2014	$ 2.6	$ 0.16
e. Gold-Paradise Extension	2037	$ 3.60	-
Sub-Total Water Supply and Treatment		***$ 69.11***	***$ 1.12***
2. Domestic System Distribution Improvements			
a. Domestic System Investments		$ 9.80	$ 0.09
Sub-Total Domestic System Distribution Improvements		***$ 9.80***	***$ 0.09***
3. System Separation Implementation/Expansion			
a. Lavington System Separation	2017	$ 19.5	$ 0.21
b. Transmission Main	2017	$ 9.80	-
Sub-Total Agricultural Irrigation Improvements		***$ 29.3***	***$ 0.21***
TOTAL OPTION 2 CAPITAL COSTS		**$ 108.2**	**$ 1.42**

Different timing and funding options could occur but the timing of projects must take into account that the Duteau filtration plant was sized for the flow capacity that would occur after the Lavington separation was completed. Hence, separation in Lavington should be completed before the Duteau filtration plant was completed. To a certain extent, the construction of the Duteau filtration could occur at the same time as separation projects.

3b) Upgrades/increase to the storage facilities identified in the MWP include:

- Increasing storage to the main balancing reservoir (McMechan which is an enclosed reservoir to store treated water) to increase storage for fire flow as there is a deficiency in south Vernon. All nine options have this recommendation, and
- Increasing the height of Aberdeen Reservoir which is an open reservoir that stores raw water for supply. Option 6 which includes using Okanagan Lake as the potable source is the only option of the nine (9) options that does not recommend this.

4. **Question**: Say option #2, for example, goes ahead. Based on capital costs projected as well as O&M costs – are you able to forecast the increase/rate each user would be paying annually with these new improvements? Bottom line – what are the increased costs to each individual user to pay for new improvements overall?

Answer: For the purposes of the 2014 GVW MWP referendum, it was estimated that borrowing $70 million over 20 years to fund the 6 priority projects would result in a rate increase of $36 / year for five years (by the 5th year the total increase would be $180/yr for the remaining amortization). Using the average GVW residential customer water use of 275 m^3/year, it was estimated that their rate would increase from $585 / year in 2014 to $765 / year by 2019 if the referendum was successful. This increase was to fund the 6 priority projects, it can be assumed that an addition increase of approximately 2% per year would occur in the O&M budget to account for inflation assuming further budget requirements were not required to sustain the utility (i.e. increased funding for infrastructure renewal, etc.).

5. **Question**: Is the committee going to discuss the alternate rate structure presented by Gyula Kiss and reported in the 13th Dec. Morning Star? Is this something in the committees' scope?

Answer: This is not within the committee's scope with the exception that best management practices for setting water rates will be discussed in TM8.

6. **Question**: A request from the SAC that the costs for the last three years for the Duteau Plant be provided, specifically 2013, 2014 and 2015.

Answer: The following table provides the costs from 2013 to 2015, which is when RDNO took over direct operations the treatment plants. Previous to this, the City of Vernon was contract to operate the treatment plants and based on the financial information provided, RDNO was unable to accurately separate the treatments costs from the distribution costs:

Total of both sources	Water License available =		43,424 ML/year	
	2011	2012	2013	2014
Volume Treated (ML)	21,585	19,768	15,816	15,964
% of Water Licence	50%	46%	36%	37%
Total O&M Cost	$2,327,779	$1,976,104	$2,105,173	$1,823,395
Summer Average cost/ML	$0	$146	$205	$165
Winter Average cost/ML	$0	$408	$468	$540
Annual Average cost/ML	$108	$100	$133	$114

7. **Question:** Provide a summary of important chemical parameters for Kalamalka Lake and Duteau Creek, their impacts and the difference between each source.

Answer: A table was provided in the TM7 Summary that provides a comparison of chemical parameters of each source and their impact on drinking water. This table is provided on the following page.

Attachment 1: Water Vote Flyer for 2014 GVW Referendum

Attachment 2: Zebra & Quagga Mussels – Summary Information submitted by Dennis Windsor

Table 1 – Summary of health and aesthetic water quality parameters of concern for Kalamalka Lake (Kal) and Duteau Creek (Duteau).

Parameter (Unit)	Standard[1]	Parameter Impact to Drinking water	Kal Average (max)	Duteau Average (max)	Long Term Treatment Goals	Comments
Chlorophyll "a" (µg/L)	n/a	Represents algae growth, some algae produce toxins, taste and/or odour issues	2.3 (5.3)	1.1 (1.5)	n/a	Main risk on Kal, if becomes an issue, treatment via clarification would be required.
Colour (TCU)	15	Source of TOC and could be aesthetically unacceptable (i.e. brown colour to water)	3.7 (5.3)	57 (81)	<15	Issue on Duteau, current treatment at DCWTP addresses by reducing colour to < 5 TCU.
Turbidity (NTU)	**0.3/1.0 /0.1**[2]	Increased health risk with increased turbidity as reduces effectiveness of disinfection	1.4 (8.3)	1.5 (10.1)	< 3.5 Kal, < 1 Duteau	Main risk on Kal as no treatment to remove turbidity and water quality is dependent on variable lake conditions, if over 3.5 must go on water quality notification. DCWTP is consistently <0.3 NTU.
Total Coliform (CFU/100ml)	0 per 100 mL[3]	Indicator of bacteria present in raw water	65 (1500)	235 (1700)	Note 1	Neither raw water source meets standard, but current treated water does.
E.coli (CFU /100ml)	**0 per 100 mL**	Indicator of presence of fecal material in source	12 (250)	13 (170)	0 per 100 mL	Neither raw water source meets standard, but current treated water does
Cryptosporidium (Count/100ml)	**Treat if known to exist**	Disease causing organism	51 (408)	0.2 (0.2)	> 3 log removal	Main risk on Duteau as does not meet 3 log removal. Kal meets standard most of the time, except with high turbidity events
Giardia (Count/100ml)	**Treat if known to exist**	Disease causing organism	4.7 (8.1)	0.45 (1.0)	> 3 log removal	Main risk on Duteau as does not meet 3 log removal. Kal meets standard most of the time, except with high turbidity events
TOC - Total Organic Carbon (mg/L)	n/a	Causes formation of THM's and HAA's with chlorination of supply	5.4 (14.8)	17.4 (70.6)	Reduce by 60%	Main risk on Duteau and requires further reduction of TOCs.
pH	6.5 – 8.5	Impacts corrosiveness of water	7.96 (8.71)	7.2 (7.8)	Stable, non-aggressive	Issue on Duteau, low pH is corrosive to metallic pipes, use chemical adjustment.
THM's - Trihalomethanes (µg/L)	**100**	Potential carcinogen	Only one sample exceeds	Most samples exceed	< 80	Main risk on Duteau at end of system (note, reviewing other treatment and operational options to reduce)
HAA's - Haloacetic Acids (µg/L)	**80**	Potential carcinogen	No samples exceed	Most samples exceed	< 60	Main risk on Duteau at end of system (note, reviewing other treatment and operational options to reduce)

Notes
1. Health parameters **bolded and underlined**
2. Standard depends on treatment, < 0.3 is for granular media filtration and <0.1 is membrane filtration with filtration not to exceed 1 NTU (GVW has a exclusion to this of the 1.0 NTU turbidity rule on Kal if turbidity is due to the marl (inorganic) and not impacting UV,
3. Total Coliform – applicable to raw water for filtration deferral with no more than 10% of samples exceeding 100 CFU/100ml in 6 month

WATER VOTE
November 15, 2014

Greater Vernon Water (GVW) is proceeding with water system improvements recommended in the Master Water Plan (MWP) to minimize health risks, comply with regulatory requirements, and reduce the impacts of drought on our community.

The Province of BC requires public approval of long-term borrowing for water system upgrades. On **November 15, 2014**, GVW will conduct a borrowing referendum.

Are you in favour of borrowing up to $70 million to complete MWP Priority (Phase 1) Projects?

Compare the consequences of a **YES** or **NO** vote on this page, and view **MWP Priority Projects** on the reverse side.

Learn more about our MWP:
www.rdno.ca/water

Greater Vernon Water
250.550.3700

... stay tuned to local media!

On November 15, 2014, Greater Vernon residents will decide how to fund water system improvements.

What happens if we vote YES?

A **YES** vote means that long-term borrowing of $70 million is approved.

Priority (Phase 1) projects will be completed in seven years. Costs will be spread out over the next twenty years, similar to a mortgage.

What happens if we vote NO?

A **NO** vote means no long-term borrowing. Priority (Phase 1) projects will not be completed as outlined in the Master Water Plan, and GVW will not be compliant with provincial regulations.

Interior Health may order GVW to complete some of the projects at any time to ensure compliance.

It is important to understand the consequences of a YES or NO vote. Below is a summary:

	YES **Long-term borrowing of $70 million is approved.**	NO **Long-term borrowing of $70 million is not approved.**
Outcome	**Priority (Phase 1) system improvements** proceed as outlined in the Master Water Plan.	**System improvements will not proceed** as outlined in the Master Water Plan.
Health	**Filtration lowers the risk of health issues** related to parasitic infections e.g. *Giardia* and *Cryptosporidium*. **Filtration also lowers levels of Trihalomethanes and Haloacetic Acids** to within recommended guidelines.	**Higher risk of water quality advisories** Without filtration to remove parasites, there is increased risk of human infection. **Trihalomethanes and Haloacetic Acids** are disinfection by-products that are formed when chlorine reacts with dissolved organics in the water. Without filtration, levels of these potential carcinogens will continue to exceed the Guidelines for Canadian Drinking Water Quality.
Supply	**Lower risk of water supply issues** Timely implementation of MWP priority projects lowers the risk of insufficient water supply during fire, emergency, or peak demand.	**Higher risk of water supply issues** Higher risk of insufficient protection against fire, emergency, and peak demand with delayed system improvements.
Timeline	**2015 to 2022**	**Timeline is not certain** and is based on available funds to complete the projects.
Costs	**Costs are shared by customers over the next 20 years** with less reliance on current user fees.	**Costs are uncertain.** Higher overall costs are expected. **Current customers will be solely responsible** for funding projects that also benefit future customers.

Priority Projects

Greater Vernon
MASTER WATER PLAN

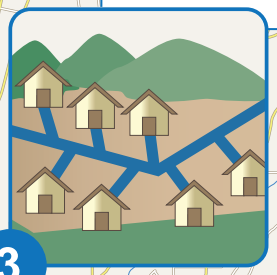
Find out more about our Master Water Plan and priority projects:
www.rdno.ca/water

Master Water Plan > Phase 1

Priority:		2012 Cost Estimate:
1	Filtration	$26.5 M
2	System Separation	$19.5 M
3	Domestic Distribution	$9.8 M
4	Twinning Irrigation	$3.5 M
5	New Pump Station	$2.6 M
6	Raising Aberdeen Dam	$6.4 M

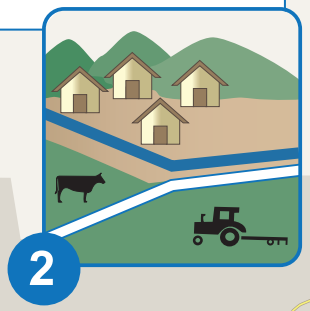
Phase 1 Total: $68.3 million

Improving the Domestic Distribution System
Timeline: 2015-2020
Budget: $9.8 million
- ✓ *Reduces capacity bottlenecks*
- ✓ *Increases amount of water available for fire, emergency or peak demand*
- ✓ *Reduces operating costs*

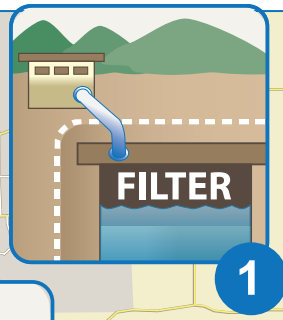


Adding A Pump Station for Agricultural Water Supply
Timeline: 2015-2016
Budget: $2.6 million
- ✓ *Reduces treatment costs*
- ✓ *Establishes a water reserve on Okanagan Lake*

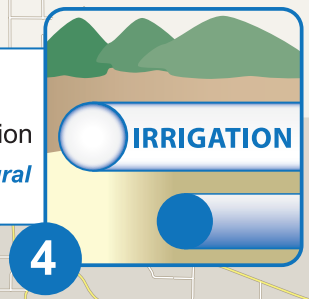
Separating Agricultural & Domestic Water Use in Lavington/Coldstream
Timeline: 2014-2019
Budget: $19.5 million
- ✓ *Reduces treatment costs*
- ✓ *Connects agricultural customers to untreated water supply*



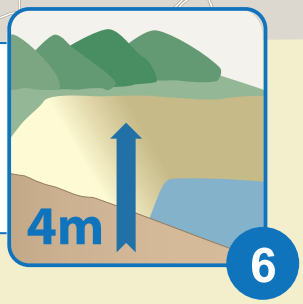
Installing Filtration at the Duteau Creek Water Treatment Plant
Timeline: 2017
Budget: $26.5 million
- ✓ *Reduces health risks*
- ✓ *Improves water quality*
- ✓ *Ensures all customers receive the best quality water, at any time of year*
- ✓ *Reduces Total Organic Carbon & thereby reduces levels of Trihalomethanes and Haloacetic Acids to within Canadian Drinking Water Guidelines*



Twinning for the Future: Oversizing the Irrigation Main Line
Timeline: 2014-2019 Budget: $3.5 million
- ✓ *Allows for future connection of agricultural customers to untreated water supply*



Raising Aberdeen Dam
Timeline: 2022 Budget: $6.4 million
- ✓ *Increases water storage capacity to meet overall demands during a two year drought*
- ✓ *Makes more water available in the summer*



INTAKE
Goose Lake
Swan Lake
Electoral Area "B"
City of VERNON
MCMECHAN RESERVOIR
Electoral Area "C"
Okanagan Lake
MISSION HILL WATER TREATMENT PLANT
INTAKE
District of COLDSTREAM
Electoral Area "B"
Kalamalka Lake
DUTEAU CREEK WATER TREATMENT PLANT
INTAKE
ABERDEEN LAKE
Electoral Area "D"

Greater Vernon Water
www.rdno.ca/water
250.550.3700

WATER VOTE
... stay tuned to local media!
November 15, 2014

ZEBRA & QUAGGA MUSSELS – SUMMARY INFORMATION

Zebra and quagga mussels are invasive fresh water mollusks that have raised significant concerns in the USA and Canada in recent decades. These mussels were introduced into North American waters in the mid 1980's, probably from the bilge of ships from Europe. Both species established relatively quickly in the St. Lawrence River and the Great Lakes as well as in Eastern USA seaports and associated drainages. Invasive mussels are now present in most eastern US states and are also found in several western states including California, Nevada, Colorado, Arizona and Utah. Zebra mussels have recently become established in the southern basin of Lake Winnipeg in Manitoba.

Invasive mussels cause significant changes to species diversity and water chemistry in aquatic ecosystems. They encrust in-water structures and can even reduce the capacity of water intakes. Shells from dead mussels contaminate shorelines and cause safety concerns.

It was initially thought the two mussel species had common habitat requirements and life histories but recent monitoring has identified notable differences between the species. In particular, quagga mussels appear to be out-competing zebra mussels in North America because quagga mussels tolerate a wider range of habitat conditions.

Two of the most comprehensive reference texts for invasive mussels in North America are "*Monitoring and Control of Macrofouling Mollusks in Fresh Water Systems*" and *"Practical Manual for Zebra Mussel Monitoring and Control"*, both co-authored by Canadian scientists Gerald Mackie and Renata Claudi. Dr. Mackie and Ms. Claudi have been investigating invasive mussels for nearly two decades, conducting both applied and laboratory research. They began their mussels work at the Universities of Guelph and McGill, respectively. Currently, they are both principles in consulting firms that advise and assist industries and governments as they monitor and deal with mussels; their services include training field staff. In 2010, Dr. Mackie issued a report assessing the risk of mussel infestation in Okanagan Lake.

GENERAL

- Adult mussel females live 2 – 5 years and usually begin to produce eggs in their second year. Each female can produce as many as 1 million eggs in each spawning cycle and may spawn twice a year; about 10% of the eggs survive. The larval life stage is called viligers; they are microscopic and neutrally buoyant, moving with the water. They attach themselves to suitable surfaces with sticky threads called byssel fibers.
- Mussels feed by filtering nutrients from the water. Mussels can tolerate ranges of temperature and water conditions providing there are suitable nutrients and temperatures available during their summer reproductive and growth period. Adult

mussels can survive out of water for several days; viligers can survive for many days in small amounts of residual water in boat ballasts and wet wells.

- High concentrations of mussels usually cause initial increases in water clarity, increased growth of substrate vegetation, and higher success rates for predatory aquatic species. Through their filtering processes, mussels bio-accumulate toxins contained the water. Over time, areas with established concentrations of mussels show decreases in species diversity, shifts in dominant species and increased algal activity; eventually some areas may become sterilized and the mussel colony dies out.
- Crayfish are a natural predator of mussels but have little impact on overall mussel concentrations. In some locations fish such as perch have also been found to feed on mussels. Some birds also prey on mussels, but birds can also contribute to spread of these invasive species by relocating adults to other waters. Any species that consumes mussels further concentrate the toxins accumulated in the mussels, such as botulism.
- Mussel viligers and adults transfer from one location to another on the hulls, trailers and in the water and ballast systems of recreational and commercial watercraft. Programs to limit the spread of mussels include public information bulletins, water craft inspections and decontamination stations.
- Mussel colonies can constrict water intakes; foul boat hulls; and grow on structures such as piers and docks. Soft tissue from dead mussels makes shorelines and beaches unsightly and smelly; shells are sharp and hazardous.
- Several common chemicals are known to be toxic to mussels and are used in sprays and washes for decontamination of watercraft. However, most chemicals toxic to mussels can't be used in aquatic habitat because they are also toxic to desirable aquatic species. Some copper/nickel alloys and special coatings such as silicone can be effective in preventing mussel attachment to metal structures. However, replacement or upgrading of existing structures such as large intakes of water systems and of hydroelectric dams can be very expensive. In some instances mechanical scrubbers and human divers have been used to remove mussel accumulations.

ZEBRA MUSSELS

- An adult zebra mussel is about 1 to 2 cm in diameter; it is triangular or 'D' shaped and has light and dark stripes. One side of a zebra mussel shell is usually relatively flat. Adult zebra mussels can occur in concentrations greater than 100,000 per square meter.
- Zebra mussels thrive in aquatic habitat that is slightly alkaline, rich in nutrients, with summer temperatures of 20 - 25 ^{o}C and calcium concentrations greater than 30 ppm. They colonize on hard surfaces – rock, wood, metal, fiberglass as well as other mussels at 2 to 15 m depth. They usually do not attach to sand or mud or to surfaces exposed to flows greater than 2 m per second.

- In 2014 a large scale experiment to exterminate zebra mussels in selected harbours in Lake Winnipeg was temporarily successful. Liquid potash was applied in enclosed areas and almost all the invasive mussels were killed without evident effects on native aquatic species. However, the technique was quite labour intensive and expensive. Monitoring in 2015 found that mussels from adjacent areas were re-infesting the treated areas.

QUAGGA MUSSELS

- An adult quagga mussel shell is usually slightly larger and paler than zebra mussel shell and is more convex, with no flat side. Quagga mussels are often found in larger numbers and denser concentrations than zebra mussels. They are significantly out-competing zebra mussels in most North American locations due to their tolerance of a wider range of temperatures, depths, and substrates.
- Quagga mussels can tolerate colder and warmer temperatures than zebra mussels, surviving temperatures as high as 32 ^{o}C and as low as 7.5^{o}C. The quagga mussel has a longer intake siphon than the zebra mussel enabling it to colonize both hard and soft substrates, including sand and mud. Quagga mussels have been found at depths in excess of 130 m.; the greatest concentrations in Lake Michigan occur at 30 – 50 m. depth. It appears wave action limits quagga mussel colonization at depths shallower than 3 m.

Disclaimer: The forgoing information about invasive quagga and zebra mussels is believed to be accurate and current. It has been compiled from i) personal communications with persons currently dealing with invasive mussels, ii) facts sheets and articles published by government agencies in the USA and Canada with responsibilities relating to management of mussel infestations and iii) media reports from the regions identified in source group ii).

POTENTIAL FOR MUSSEL ESTABLISHMENT IN GREATER VERNON WATER SOURCES

Invasive mussels can become established in a water body if they i) are introduced into the water body, and ii) encounter suitable nutrients, water quality, temperatures, and substrate for survival and reproduction. Assessment of the raw water quality and habitat information from the two main water sources for the Greater Vernon Water system using the criteria applied by Dr. Mackie in the Okanagan Lake publication, indicates the potential for invasive mussels to become established in three water bodies would be:

Duteau lakes – Low (potential limited by few transient boats and low calcium concentrations)

Kalamalka Lake – Moderate (potential limited by low nutrient levels)

Okanagan Lake – High (many transient boats with all factors in suitable ranges)

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SAC Question Paper 7 Final

File: 5730.15.13.01.04

MEETING DATE: April 14, 2016

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised since the February 29, 2016 meeting and submitted via email

The following questions were submitted via email since the February 29, 2016 SAC meeting:

1. **Question**: Re GVW's data/comment that "**ingesting** asbestos isn't harmful, **inhaling** it is", have a look at this Oregon State University document:

   "not generally considered to be harmful unless it is releasing dust or fibers into the air where they can be inhaled **or ingested**. Many of the fibers will become trapped in the mucous membranes of the nose and throat where they can then be removed, but some may pass deep into the lungs, or, **if swallowed, into the digestive tract**. Once they are trapped in the body, the fibers can cause health problems."

   "**Water damage**, continual vibration, **aging**, and physical impact such as drilling, grinding, buffing, cutting, sawing, or striking can break the materials down making fiber release more likely."
   Document here: http://oregonstate.edu/ehs/asb-when.

   Can you include the above in your answer to the posted question regarding AC piping?

   Answer: This question was in relation to Question 1 of the SAC Question Paper 5, which is repeated here for context:

   > **Question 1 from SAC Question Paper 5**: After considerable discussion and reflection and varying levels of input from water customers and critics who have followed the progress of the water system in its evolution, I am beginning to question the scope of the Evaluation process as it is unfolding. My concerns centre on the status of the Distribution system, particularly the status of the aging AC piping. In order to do justice to the weighting process in this and other categories, I would appreciate your input in providing a management perspective on a few issues.
   >
   > What is your assessment of the overall condition of the AC piping components in the system?
   > I am aware of the risks to the system and its user base in prolonging the reliance on aging AC piping through exposure from asbestos leaching to water, soil and air.
   >
   > **Answer from SAC Question Paper 5:** Infrastructure renewal is part of the GVW Asset Management Program and specific details are beyond the scope of the Master Water Plan with the exception of specifying that $2 million/year be included in the budget for this purpose. No matter what option is chosen, infrastructure renewal will be the same and is independent of source and treatment.
   >
   > That being said, for your general information, the condition of the AC pipe in the GVW system is pretty good relative to the cast iron (CI) pipe in the system based on age, breaks and water quality issues.

As to the health risk - asbestos is a health risk when friable (i.e. fibers are airborne) and hence the health risk of AC pipe is to workers removing it and not as a risk within our drinking water source. The following are statements from the guidelines from the Canadian Drinking Water Guidelines and the World Health Organization (WHO):

- GUIDELINES FOR CANADIAN DRINKING WATER QUALITY:
  GUIDELINE TECHNICAL DOCUMENT – ASBESTOS

  GUIDELINE:
  There is no consistent, convincing evidence that ingested asbestos is hazardous. There is, therefore, no need to establish a maximum acceptable concentration (MAC) for asbestos in drinking water.
  (http://healthycanadians.gc.ca/publications/healthy-living-vie-saine/water-asbestos-amiante-eau/index-eng.php)

- ASBESTOS IN DRINKING-WATER
  BACKGROUND DOCUMENT FOR DEVELOPMENT OF WORLD HEALTH ORGANIZATION GUIDELINES FOR DRINKING-WATER QUALITY

  CONCLUSIONS:
  Although asbestos is a known human carcinogen by the inhalation route, available epidemiological studies do not support the hypothesis that an increased cancer risk is associated with the ingestion of asbestos in drinking-water. Moreover, in extensive feeding studies in animals, asbestos has not consistently increased the incidence of tumors of the gastrointestinal tract. There is therefore no consistent, convincing evidence that ingested asbestos is hazardous to health, and it is concluded that there is no need to establish a guideline for asbestos in drinking-water.
  (http://www.who.int/water_sanitation_health/dwq/asbestos.pdf)

Answer comments to the comments in Question 1 above: The Oregon State document referenced above is for building materials and includes the following:

> *"Asbestos-containing ceiling tiles, floor tiles, undamaged laboratory cabinet tops, shingles, fire doors, siding shingles, etc.* ***will not release asbestos fibers*** *unless they are disturbed or damaged in some way. If an asbestos ceiling tile is drilled or broken, for example, it may release fibers into the air. If it is left alone and not disturbed, it will not."*

This document does not reference AC pipe. The impact of AC pipe to health via ingestion in drinking water has been studied extensively as outlined in the above documents and the studies have concluded that the type of asbestos found in drinking water are not a concern as per the following quote from "Asbestos Cement Drinking Water Pipes And Possible Health Risks Review For DWI by John K Fawell Published May. 2002:

> *"The World Health Organization considered asbestos in drinking water arising from asbestos cement pipe in their 1993 edition of the Guidelines for Drinking Water Quality. The guidelines state "Although well studied, there has been little convincing evidence of the carcinogenicity of ingested asbestos in epidemiological studies of populations with drinking water supplies containing high concentrations of asbestos. Moreover in extensive studies in laboratory species, asbestos has not consistently increased the incidence of tumors of the gastrointestinal tract. There is therefore no consistent evidence that ingested asbestos is hazardous to health and thus it was concluded that there was no need to establish a health-based guideline value for asbestos in drinking water".*

In addition, due to the limited funding available to GVW for infrastructure renewal (approximately $2M/year) this budget must be spent strategically and wisely. GVW uses a risk assessment and renewal criteria to prioritize where this funding should be directed.

From a financial perspective, the replacement cost for all the GVW pipe infrastructure is $620M based on the estimate within the MWP. 31% of GVW pipe is AC pipe with most installed after 1978 (or pipe age of 38 years or younger) and an estimated replacement cost of $192M. As the health risk has been determined to be minimal as per the WHO and Guidelines for Canadian Drinking Water Quality and as GVW has 10% Cast Iron (CI) and Steel (S) pipe which are old (i.e. 80 years plus) with a replacement value of $62M which most of this pipe being in questionable shape with certain sections having frequent breaks, GVW must prioritize and concentrate their replacement efforts on the worse of these pipes.

2. **Question**: Are there sufficient pumping stations currently in place to supply all domestic customers (e.g. Lavington) with water from MHWTP? This assumes there is little or no agricultural demand at that time.

   Answer: Yes, during off peak times (i.e. little or no agriculture or domestic irrigation demands), domestic use can be supplied from MHWTP.

3. **Question:** Under the current plan for separation of agricultural water, can the piping be shut down and drained during the winter so the pipes will not need to be (generally) buried more than 3 feet deep?

   Answer: Depends on whether fire flows are supplied on the separated agriculture or domestic line, for the current areas that are separated, fire flows are provided on the agricultural lines which has saved GVW money by being able to reduce the domestic line pipe and eliminate the need for building tanks (enclosed reservoirs) to store capacity for fire flows.

   Another consideration for the shallow bury of the pipes is the pipes will need to be drained for winter and draining is time consuming and a maintenance issue. Draining all the low points is typically not practical and compressed air can be dangerous for large diameter piping.

4. **Question:** Can the branch piping (< 100 mm) be continuous lengths of high density polyethylene installed by a pipe pulling machine rather than the common gasketed / glued PVC in a trench? If so, would these design changes reduce the cost of system separation? An estimated savings would be appreciated.

   Answer: The use of HPDE was considered and was actually used for a section of the irrigation main near the Duteau Creek WTP. The challenge with this pipe is the installation at utility crossings and connections. These become expensive for the parts and labour to complete. Also, the irrigation system operates at high pressure meaning a thick wall HDPE pipe will be required. Thick wall HPDE is often a higher installed cost than bell and spigot PVC pipe. For select situations where there is a benefit to the utility HDPE will be used, but for the majority of the system other pipe systems are expected to be a lower cost. HDPE pipe is very difficult to repair in the event of accidental damage due to the price and type of fittings required.

5. **Question:** (i) Are all agricultural customers metered separately for agricultural water vs domestic water? (ii) In the meter replacement plan, could new agricultural meters record water use by time of day and day of week? (iii) For sizing of the piping, can agricultural customers generally be limited to a particular water flow rate per hectare?

Answer: (i) Yes all agricultural customers are metered separately. (ii) Yes, once all the infrastructure is in place, time of day and day of week flows can be recorded; however, this information gathering can significantly reduce battery life. (iii) There is currently a limit on flow for agricultural customers which is 0.78 L/sec per hectare as per GVW Water Use and Regulation Bylaw no. 2545. It would be difficult to reduce this flow as many of the large fields are on a 2 week watering rotation with a 24 hour watering schedule. Reducing this flow would likely reduce the productivity of the many fields.

6. **Question:** I have the following table of actual usage, but don't have the peak water flows from each treatment plant during that time. Can the highlighted cells of this spreadsheet be filled out and returned to me before our next meeting?

   Answer: Staff will not have the domestic use number for a few weeks as the information was just received from the municipalities and takes considerable staff time to manipulate into useable data for planning purposes. (Which is one of the reason that GVW is pursuing the meter improvement program for better data management).

Year	Annual Useage			Max. Daily Demand	
	Domestic use	Ag use	Total use	DCWTP	MHWTP
	ML/yr	*ML/yr*	*ML/yr*	*ML/day*	*ML/day*
2011	6,359	7,810	14,169	129.9	45.1
2012	5,720	5,986	11,706	122.2	42.6
2013	6,043	6,815	12,858	127.2	32.5
2014	5,618	6,812	12,430	120.0	46.3
2015	6,816	7,420	14,236	106.7	41.0
MWP projected 2016	9,880	12,600	22,480	215.0	58.0
Average actual use	6,111	6,969	13,080		

7. **Question**: (i) Is it worth considering using the BX aquifer (270) as an agricultural source for the BX? This area has been lumped in with the rest of the Ag load but it seems to be different in nature. Smaller hobby farms meaning a smaller load and more connections to the distribution than the rest of the Ag system. Tbl 7.1 in TM7 shows the peak demand is only 20ML/d and aquifer 270 can support 35ML/d. I'm only looking at the 2 N BX and 2 S BX pressure zones however. I am not sure if Pleasant Valley should be included in this. (ii) Could the existing distribution system in this area be used for domestic and smaller ag distribution be added from aq270? Does this help overall capital and O&M costs? (iii) Alternatively, can the license on BX Creek be used effectively in this area? I'm not sure what can be used for storage in this regard however.

   Answer: The current system separation costs for the BX area cover all the distribution piping cost. There is no cost for the supply of water included in the capital cost estimates as the water supply will be gravity water supply from the existing Duteau Creek source. During detailed design of the system separation groundwater should be considered on a case by case basis to confirm that the use of groundwater does not offer a lower life cycle cost solution. However, during the development of the Master Water Plan it was determined that the cost of developing, plumbing and operating a groundwater well will be more expensive than using the existing gravity water supply from Duteau Creek. This determination resulted in groundwater not being part of the recommended plan. The

Master Water Plan should be updated every 10 years when there is a high level of change and this issue can be re-examined again.

The challenge with the BX Creek source is the lack of storage. Construction of a dam or raw water reservoir was reviewed at a conceptual level, but quickly determined to be more expensive than other water supply options. This means BX Creek can be used as a raw water source, but at a higher cost than other available raw water sources. The lowest cost solution for BX creek is to likely transfer the license to Okanagan Lake in the future and install an intake in Okanagan Lake to use the storage from the lake instead of building an upstream dam/reservoir.

8. **Question:** TM3 Section 4 states that the Gold-Paradise extension can provide 3000 to 7000ML/y. Is raising the Aberdeen Dam by 4m really necessary? Raising it 2m gains 5300ML of additional storage and 4m gets 10,000ML of storage. Is 2m sufficient?

   Answer: Currently the Aberdeen Dam complex (Aberdeen, Haddo and Grizzley) only stores about half of GVW's upland water licenses. The Aberdeen Dam and license is configured to be raised by 4 m to fully capture the entire water license. It is cost effective and practical to raise the Aberdeen as a single project for the full 4m. Raising the Aberdeen dam project is estimated to cost roughly $ 640/ML, whereas the Gold-Paradise extension offers $ 900/ML. The lowest cost capital solution per ML of additional storage is the basis of the recommended approach.

9. **Question:** TM3 Section 4 also states that there are significant regulatory hurdles for this project due to the inter-basin transfer. (i) Does this so hold true? (ii) Current plan suggests raising the dam 15yrs before the Gold Paradise extension.
   Would it make sense to push this out closer to the GP project? (iii) What is the driving motivation for this particular project? Is the increased storage needed for 1:10 drought, 1:50, changing precipitation and flow patterns due to climate change?
   (iv) what is the utilities obligation to meet the Ag allocation as opposed to actual consumption? The former is about 50% more than the latter.

   Answer: The transfer of water from the Duteau Creek watershed (i.e. the Fraser River water basin) to Kalamalka Lake (i.e. the Columbia River water basin) will required significant agency approvals. Approvals for this transfer will likely require all levels of government (i.e. municipal, provincial, federal). Given the number of stakeholders involved it is a reasonable statement based on the Consultant's past experience that obtaining approval for the inter-basin transfer of water will be challenging (i.e. expensive and time consuming) without a guarantee of success.

   Regarding the development of additional raw water storage in the Duteau Creek watershed, the raising of the Aberdeen dam offers GVW the most additional storage at the lowest cost per ML resulting in this project being the first recommended raw water project. Additional storage is recommended based on meeting the projected water demand during consecutive droughts as noted in the Technical Memorandums. Part of the projected water demands is ensuring the supply of water to all the agricultural land with allocation within the GVW service area. It is acknowledged and known that the actual agricultural consumption during the past few years is less than the total of the agricultural water allocations, but the Master Water Plan is projecting the water demand 50 years in to the future. It is expected that the agricultural land use could change in the future. This has resulted in all agricultural allocation being accounted for in the annual water projections.

10. <u>Option Submission – Option 3 Hybrid</u>: The following is a submission to the SAC Agenda for March 17th:

Option 3-amended (or Option 3 Hybrid):
"Complete Separation, Two Treatment Facilities: Complete separation of domestic and agricultural with filtration at MHWTP and DCWTP deferred."

1. Diversion of King Edward license and supply by pipeline to MHWTP (Deer Creek license transfer and flow via Coldstream Creek)
2. Aggressively apply for license for Okanagan Lake in support of the current 50k ML reserve.
3. Continue water supply from DUC to Goose Lake.....Ag/raw water only.
4. 90%/10% Ag/Dom from DCWTP....all Vernon Ag. supply, domestic supply for Lavington/East Coldstream areas only.
5. Initiate talks with The Province for use of reclaimed wastewater water for food crops.....a practice currently underway in other parts of Western N.A.
6. Consideration for expansion of domestic and agricultural supply to Spallumcheen, OKIB, areas north from a future Okanagan Lake licence/source.

<u>Comments</u>: The existing Deer Creek water license is a critical part of the existing separated agricultural water system. Near the intersection of Kalamalka Lake Road and Highway 6 there is a separated agricultural water system that is supplied water by Deer Creek. If this license is transferred to Kalamalka Lake an alternate water supply for the existing agricultural irrigation system will need to be developed. This area could be fed by the Duteau Creek system, but the pipes are currently not sized to provide water during peak demand.

The practical approach in our opinion is to wait until raw Duteau Creek water is available assuming that system separation is completed in the Lavington area. Once this work is complete Duteau Creek water could be used to supply the existing agricultural distribution system in the vicinity of Kalamalka Lake Road and Highway 6. At this time diverting the Deer Creek license to the existing Kalamalka Lake intake should be considered if there is an economic benefit to the water utility.

All the other items within this Option 3 Hybrid proposal are part of the plan and are ongoing incentives. An item like changing the provincial regulations around the use of reclaimed wastewater is well beyond the scope of a local water utility, but something that needs to be monitored and proposed regulation changes supported. Additional, as recommended, the Master Plan needs to remain flexible to allow the water utility to respond to changes in the future needs and regulations.

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SAC Question Paper 8

File: 5730.15.13.01.04

MEETING DATE: April 21, 2016

SUBJECT: Stakeholder Advisory Committee (SAC)
Questions Raised since the March 17, 2016 Meeting

The following technical information was requested regarding GVW's current piping (distribution) system:

1. **Question:** What is the number of domestic users (connections) to the piping from DCWTP to the NORD office? (This would be the area that is the first part of system separation.)

   Answer: Over 2,000 connections from DCWTP to PRV 24 (Buchanan Rd @ Hwy 6) via Bessette PRV and PRV 1.

2. **Question:** Approximately what size of water main would be required to only supply that domestic water flow? I think most of these domestic customers are supplied through local subdivision networks so there should be a limited number of branches required off the trunk main. Correct? Do you have an approximate number of these branches?

   Answer: The over 2,000 customers cannot be sized from a single main, as there are multiple pressure zones and distribution paths from DCWTP to PRV 1 and subsequently PRV 24 – this includes the area fed through PRV 14 (Hwy 6 @ Kalamalka Rd) and Grey Rd PRV (see attached GVW pressure zone map). The downstream demands would also need to be factored in for sizing.

3. **Question:** What is the number of domestic users (connections) to the old VID piping from the NORD office through the BX? (This would be the area that is the second part of system separation.)

   Answer: Over 4,000 connections from PRV 1 / PRV 24 to the northernmost section of BX within GVW. PRV 1 also feeds West Swan Lake via Rimer Rd Valve Chamber, so around 700 more can be added.

4. **Question:** Approximately what size of water main would be required to only supply that domestic water flow?

   Answer: There is no one size of pipe that would be sufficient to service all properties in the separated areas as there are numerous pipes required to service all properties. That being said, there is a transmission main where the service mains are fed from. Currently, GVW is in design phase for the Lavington separation area and although the transmission size is not yet finalized, it will be between 900mm and 750mm depending on the location (there is a size reduction as the main progresses down the valley). GVW cannot determine the required transmission main through a future separated area of BX at this time, but it is estimated that the main size would be between 500mm and 750mm.

5. **Question:** I think this is an area with more scattered domestic customers with only a few subdivision networks, so that is the primary reason this will be a more expensive area to separate. Correct?

   Answer: It is mainly due to the properties being smaller so more pipe installation is required. Hence it is more expensive per hectare of allocation – Lavington has larger parcels and hence less distribution pipe to be installed than BX.

6. Question: What route does the current water main take through the BX? Is it proposed that the new domestic main would parallel it?

Answer: For the following, please refer to the map attached.
Duteau water feeds through the supply main from DCWTP to PRV 1 (Grey Rd @ Buchanan), to PRV 2 (PV RD S of 48 Ave), to Rimer Rd Valve Chamber to West Swan Lake.

The main branches are (in order from DCWTP Westward):

Coldstream:

- Bessette PRV to feed from the far East Coldstream to Grey Rd PRV (Grey Rd @ Hwy 6)
- Grey Rd PRV to backfeed the far East Coldstream (not too likely)
- Grey Rd PRV to south of the railway to Kal lake (and a little north of the railway)
- PRV 1 to PRV 14 (Kalamalka Rd @ Hwy 6) to Palfrey Rd
- PRV 24 (Buchanan Rd @ Hwy 6) to Middleton Mtn

BX:

- PRV 27 (Pottery Rd @ E Vernon Rd) to Mountview / Shantz / 30 Avenue
- South BX 1 Pump Station (Welker Rd) to French / Hughes / Haynes to South BX 2 Pump Station (Dixon Dam Rd) to Dixon Dam / Maddock to Malim Rd Pump Station
- McMechan Pump Station (39 Ave) to the Foothills (and all of Vernon if necessary, via an interconnect)
- McMechan Pump Station to some of East Hill (via a PRV)
- Rimer Rd Valve Chamber (Rimer Rd @ PV Rd) to West Swan Lake
- Rimer Rd Valve Chamber to Silver Star / Elmwood to PRV 39 (Elmwood Rd) to L&A Cross to West Swan Lake (loop)
- Rimer Rd Valve Chamber to North BX 1 Pump Station (Rimer Rd @ MacDonald Rd) to Silver Star / McKoryk to North BX 2 Pump Station (Apple Lane) to E Vernon / E Dedecker / Glenhayes

Attachments

- GVW Pressure Zones Map

Legend

- Main Duteau Facilities
- All Other Facilities (Duteau and Kal)
- Duteau Primary Supply Main
- Duteau Distribution Main > 250mm
- Duteau Distribution Main
- Jurisdiction Boundary
- GVW Boundary
- Parcels

Blue / Green Shades = Duteau Pressure Zones

Grey Shades = Kalamalka Pressure Zones

In Bella Vista area, zones with Kal source are shown above Duteau non-potable (Goose Lake)

Spallumcheen

Area B

Vernon

Area C

Coldstream

Area D

PRV_076
PRV_042
Goose Lake Dam
Goose Lake Chlorinator
PRV_043
Swan Lake
PRV_039
Rugg Road
Sun Peaks
PRV_087
PRV_109
Foothills Booster
PRV_103
Goose Lake Road
Ricketts PRV
Bellavista
North B.X. #2
Star Road
Mallm Road
750mm
PRV_078
PRV_038
North B.X. #1
PRV_037
PRV_036
South B.X. #2
Rimer Rd Valve Chamber (PRV 38)
PRV_002
PRV_034
PRV_116
Turtle Mountain Reservoir
PRV_032
PRV_083
PRV_031
McMechan Booster
PRV_030
McMechan Reservoir
Turtle Mountain
PRV_102
PRV_028
South B.X. #1
Balsam
Balsam Reservoir
New Allenby
PRV_066
PRV_106
PRV_086
PRV_085
PRV_081
PRV_080
PRV_054
PRV_053
PRV_110
PRV_055
PRV_057
PRV_065
PRV_059
PRV_060
PRV_056
PRV_111
PRV_079
PRV_112
PRV_027
Valencia Heights
PRV_117
PRV_025
PRV_026
PRV_064
PRV_063
South Vernon Irrigation Dist.
PRV_101
Tronson Road Pump Station
PRV_084
Coldstream Valley Ventures #3
Ravine Drive
Ravine Drive Reservoir
PRV_104
DND Reservoir
PRV_024
Coldstream Valley Ventures #2
PRV_128
Tavistock Reservoir
Upper Mission Reservoir
PRV_062
Buchanan Road
PRV_001
Middleton Way
PRV_068
Kalview Metering Station
OK Landing 1
PRV_089
PRV_126
PRV_129
Husband Road
PRV_061
PRV_067
PRV_069
PRV #4 Pump Station
PRV_012
PRV_071
PRV_004
Antwerp Springs
PRV_090
Upper Commonage Booster Station
PRV_097
PRV_132
Beverly Hills Reservoir
Kal Lake Intake
PRV_107
PRV_011
PRV_010
PRV_009
PRV_008
PRV_007
PRV_023
Bossette PRV
PRV_003
Lateral #3
PRV_098
PRV_115
Gray Rd PRV
PRV_014
PRV_013
Well No. 2
PRV_015
PRV_006
LOCHEED TOWER
PRV_091
PRV_105
PRV_093
PRV_021
PRV_020
PRV_017
PRV_077
Brewer Road PS
Lavington Reservoir
von Keyserlingk
OK Landing 2
Palfrey Drive
PRV_022
PRV_018
PRV_019
PRV_070
Brewer Road Booster
PRV_096
Lateral #2
PRV_130
PRV_131
Cunliffe Reservoir
King Edward Chlorinator
Whisper Ridge Reservoir
Lateral #1
PRV_099
PRV_100
Duteau Creek Water Treatment Plant
Kokanee Booster
King Edward Intake
900mm
Mount Royce Reservoir
1270mm
Headgates Screens
Headgates Chlorinator

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Pressure Zones Map

Plot Date: Apr 18, 2016

Scale: 1:75,000

0 2 4 8 Kilometers

Plot Size: 17" x 11"

REGIONAL DISTRICT NORTH OKANAGAN

RDNO