



SUBJECT: 2012 Greater Vernon Water Master Water Plan
Technical Memorandum No. 4.
Domestic Water System Analysis

Summary date: August 2015 / Updated: January 2016

TM4 PURPOSE:

The main objectives of completing a MWP are to:

1. Examine or benchmark the current state of the GVW system,
2. Compare it to where it should be in terms of desired level of service, water system standards, Provincial regulations and projected future water demands,
3. Identify where the system does not meet criteria (deficiencies) outlined in #2 above, and
4. Provide a direction on the capital improvements required to address the deficiencies and ensure an adequate level of service and ensure the utility is sustainable into the future.

Water systems can be divided into “supply” and “distribution” as each have different design criteria and legislative requirements. Supply looks at sources, storage and treatment requirements. Distribution includes the pipes, pumps, balancing reservoirs and pressure reducing valves (PRVs) needed to deliver water to customers. GVW’s distribution system is further divided into domestic and agricultural, which have different end goals and hence different design criteria. The main differences are that the domestic system requires a high level of treatment to deliver potable water and must provide fire protection, impacting design parameters such as pipe size, storage, pump redundancy and backup power. TM4 completes the analysis (1-4 above) on the domestic distribution system; and TM5 examines the Agricultural distribution system.

METHODS:

The analysis was completed using the GVW hydraulic computer model incorporating the following:

- Design criteria with the GVWU Waterworks Regulation Bylaw No. 2063, 2005,
- Demands and population forecasts developed in TM1,
- The model “scenario” used Option 1 of TM9 (no further pipe separation for Agriculture), and
- A standard set of base and unit costs for pipes, PRVs, pump stations and tank installation.

To complete the computer modeling analysis, the GVW domestic system was divided into sub-systems based on source (Duteau Creek or Kalamalka Lake) and major “pressure zones” which are distinct service areas controlled by pumps, PRVs and/or balancing tanks. The current supply capacity, fire flows, storage and pressure of each sub-system was compared to what should be available based on projected demands for water supply and fire flows. From this comparison, deficiencies were identified and capital improvements with estimated costs were recommended. Only major infrastructure was examined and only pipes 300 mm (12 inch) or larger were included.

RESULTS:

Table 1 and Table 2 below provide a summary of the deficiencies found in each sub-system. Table 3 provides a summary of the recommended capital works and estimated costs. TM4 provides details of each sub-system analysis and cost estimates and Figure 3.1 provides the sub-system areas. Note: KLPS refers to Kalamalka Lake Pumpstation and MHWTP refers to Mission Hill Water Treatment Plant.

Table 1 – Summary of Deficiencies on Sub-systems on Duteau Supply

Sub-system	Separated?	Deficiencies identified
Lavington - Area D	Yes	No Deficiencies
Coldstream East	Partially	Pressure deficiencies in Lavington
Coldstream Valley Estates	No	Minor local storage deficiency
PRV#1	No	No Deficiencies, however prime area for separation
Coldstream West	Partially	Local storage deficiency and low pressure areas
South BX, North BX & East Swan Lake	No	No Local storage – pumps designed for agriculture hence not appropriately sized and no backup power or redundancy
West Swan Lake	Yes, except Stepping Stones	Fire hydrants on agricultural lines hence fire protection is covered, however, pumps designed not appropriately sized

Table 2 – Summary of Deficiencies on Sub-systems on Kalamalka Lake Supply

Sub-system	Separated?	Deficiencies identified
Central Vernon	Yes (no agriculture)	Future Demands exceed current capacity required from KLPS to MHWTP ¹
Upper Mission Hill	Yes (no agriculture)	Pressure deficiency issues in Commonage area
East Vernon	Yes (no agriculture)	Energy efficiency projects could be completed at McMechan reservoir
Foothills	Yes (no agriculture)	Minor pressure deficiency
Southwest (SW) Vernon	Yes (no agriculture)	Local storage deficiency

Table 3 – Summary of Recommended Projects to Eliminate Deficiencies and Estimated Costs

Sub-System	Recommended work to eliminate deficiency	Cost (Millions)
Multiple on Duteau	Electrical upgrades for 10 pumpstations including variable frequency drives, instrumentation and controls.	\$ 2.4
Coldstream East	Installation of approximately 2 km of pipe needs to be upsized in Lavington area	\$ 0.7
Multiple on Kal Lake System	Upgrades to KLPH and upsizing the supply main between KLPH and MHWTP	\$ 3.5
Multiple on Kal Lake System	Upsizing the supply main between MHWTP and McMechan reservoir	\$ 1.7
SW Vernon	New PZ431 Balance reservoir	\$ 1.5
East Vernon	Switching supplies in areas of East Vernon and Middleton Mountain	Negligible
PRV1	Review the need for stand-by power for the PRV1 Pumpstation.	\$ 0.1
Upper Mission Hill	Commonage Road servicing study to address pressure issues	\$ 0.1
Duteau area	Separation - twinning of pipe mains	TM5 and TM9
Total	Domestic Distribution System Upgrades	\$ 10 Million