File: 0655.0170.11

REPORT

2015 Amendment to the Water Master Plan

District of Peachland

January 2015

304 - 1353 Ellis Street, Kelowna, BC V1Y 1Z9 | T: 250.762.2517

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Executive Summary

This document presents an update to the District of Peachland Water Master Plan (WMP), adopted by Peachland Council in 2007. The ensuing 8-year period has seen a number of WMP recommendations implemented, including:

- Portion of upper level transmission main to service Ponderosa and the Trepanier Bench area
- Adoption of a water conservation strategy and staged sprinkling restrictions
- Improvements to the Peachland Creek channel

During this period, the District has also received a number of development applications; two major applications include the Ponderosa/Pincushion proposal at 2,200 units and the New Monaco proposal at 2,300 units. The size of these proposed developments was not known in 2007 and will have an impact on the WMP strategy. Further, updated BC legislation on Drinking Water Treatment Objectives was adopted in 2012. These events prompted a revisit of both the growth forecasts and the water quality targets in the 2007 WMP.

Growth Forecast

Population projections are made on the basis of a 20-year horizon. The 2007 WMP projected the population for 2027 at approximately 12,000 people. The updated forecast in 2014 for the year 2034, including the two major proposed developments is approximately 19,000 people. This revised growth forecast has implications on the major components of the water system, including supply, treatment, storage and distribution.

BC Legislation

In March of 2012, the BC Ministry of Health released a document entitled **Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia.** This document presents the standards and objectives which water purveyors must meet when using surface water for community water supplies. These objectives are applicable throughout British Columbia with the goal of providing best practices for minimizing health risks to all consumers.

Recent Activities

Peachland recognized that the updated growth forecast and the updated legislation on water treatment meant that the WMP should be updated to reflect this new information. Accordingly, several studies were commissioned. These include:

- Peachland Creek Watershed Assessment for source protection planning
- Peachland Creek Habitat and Sediment Source Assessment to repair or improve areas where wildlife activities and erosion are impacting water quality
- Water treatment plant and reservoir site options and selection
- Water treatment process pilot plant testing
- Implementation of a universal metering program
- Water Efficiency Assessment Planning (WEAP) computer model to provide an analysis of consumption patterns
- Analysis of projected yield of the Peachland Creek watershed

Impact on 2007 WMP

The concept ratified in the 2007 WMP included a water filtration plant for the Peachland Creek source, eventual abandonment of the Trepanier Creek source and the Ponderosa wells, a filtered water trunk line for the entire service area from Princeton Ave through to the Trepanier Bench. The Okanagan Lake pump station supply was to be retained as a standby emergency source of water. The overall concept remains unchanged, but the sizing of the key components has been revisited to account for the proposed development of New Monaco (north of Trepanier Bench) and the increased projections for the Ponderosa/Pincushion development.

Some of the trunk main work has been completed in the intervening years. A check on the size of the mains reveals that these portions of trunk mains are of adequate size for the updated population.

The concept of a direct transmission main from the Peachland Lake Dam was also explored. The intent of this concept was to defer or avoid filtration by avoiding the erosion potential in the downstream reaches of Peachland Creek. A pipeline also presents an opportunity to generate hydroelectric power. However, the analysis and cost estimates for this concept revealed that it is not cost effective.

Pilot Plant Results

The pilot plant work revealed that both conventional filtration and direct filtration could meet the BC Objectives, but direct filtration would require additional disinfection provisions in the form of Ultra-Violet (UV) disinfection in order to ensure 3-log removal of Giardia and Cryptosporidium. The life cycle cost comparisons indicate only a small difference between conventional and direct filtration and Council has opted for conventional filtration, since it provides more barriers against micro-organism breakthrough.

Watershed Analysis Results

The watershed yield analysis indicates that there is sufficient water on an average year to meet the requirements of the projected 2034 annual demand from Peachland as well the environmental (fish) flow requirements from the Ministry of Environment.

WEAP Study Results

The WEAP study reveals that the effect of universal metering and the District's water conservation programs have been positive. Residents are now using significantly less water than previously allowed for in 2007. The impact on the WMP is that while it must plan for a greater population than previously predicted, the lower per capita demand allowance results in a small decrease in the design Maximum Day Demand (MDD) figure. The MDD provision in the 2007 plan was 43 ML/d, and the updated MDD is 38 ML/d.

The WEAP study also determined that there is an unacceptable amount of "unaccounted for" water being lost either through leakage or wastage. The District has committed to investigating the sources of the unaccounted for water and repairing leaks as well as reducing wastage.

The Updated Concepts and Cost Estimates

Full documentation of the foregoing studies and cost estimate breakdowns are provided as several appendices.

The key features of the updated WMP include:

1. A conventional water filtration plant and filtered water storage located on a Peachland-owned site in the vicinity of the current intake. The first phase of the plant is proposed at a capacity of 25 ML/d, or half of the ultimate size. The estimated capital cost of the phase 1 plant and storage is $18.8 million.
2. Completion of the remaining filtered water transmission trunk mains. The estimated capital cost is $18.5 million
3. Transfer of Trepanier water licenses to Okanagan Lake and upgrade of the Okanagan Lake pump station to allow it to be used as a standby source for emergencies and as a supplementary source in severe drought years. The estimated capital cost is $2.5 million
4. Installation of the McDonald Creek diversion to restore the original flow to Peachland Creek. Peachland will complete a preliminary investigation in 2015 to determine costs for this work.

The adjusted value of the WMP in 2014 is $39.8 million for the remaining priority upgrades (including the phase 1 plant cost and excluding the McDonald Creek diversion). An allowance for miscellaneous extensions for developments remains at approximately $10 million (not included in above figure), and this would be raised through developer contributions on a “pay-as-you-go” basis.

1.0 Background

The 2007 Water Master Plan (WMP) presented three concept scenarios for establishing the long term direction for major critical elements of the water system in the future to ensure compliance with Provincial regulations for public health and to meet future water demands based on predicted growth. The District of Peachland Council ultimately endorsed **Concept 3: Peachland Creek Gravity Supply**.

This concept included a 10km long water main to interconnect the Peachland Creek, Ponderosa and Trepanier Creek water systems. This concept provides adequate pressures and fire flows to each area and will service planned growth areas (not including the New Monaco area which was unknown when the WMP was originally prepared). The Ponderosa wells and Trepanier source would eventually be abandoned and the Okanagan Lake source would be retained for back-up supply. The concept also included a single new water treatment plant at the Peachland Creek intake. The capital cost estimate (in 2007 dollars) for constructing this concept is $55,400,000.

1.1 Changes since 2007

1.1.1 *GROWTH*

The District of Peachland is expected to experience significant growth over the next 20 years. The 20 year growth projections for Peachland in 2007 did not include any growth in the New Monaco Area and assumed approximately 900 new units for the Ponderosa/Pincushion development. Based on recent development applications, the Ponderosa/Pincushion development is anticipated to be built out to approximately 2,200 units and New Monaco to 2,340 units. This amount of growth would essentially triple the population of Peachland.

1.1.2 *DRINKING WATER LEGISLATION*

All water supply systems in BC must conform to the BC Drinking Water Protection Act (2001), and the accompanying Regulation adopted in 2003. A Comprehensive Drinking Water Source-to-Tap Assessment Guideline was published by the Ministry of Health in 2010.

The Comprehensive Drinking Water Source-to-Tap Assessment (CS2TA) process includes 8 Modules1, each briefly described as follows:

- Module 1: characterize the drinking water source
- Module 2: conduct a contaminant source inventory
- Module 3: assess the water supply elements
- Module 4: evaluate water system management, operation and maintenance
- Module 5: audit water quality and availability
- Module 6: review financial capacity and governance
- Module 7: characterize risks from source to tap
- Module 8: recommend actions to improve drinking water protection.

[1] The District of Peachland has completed Modules 1, 2, 7 and 8 as part of *Watershed Assessment Report for Drinking Water Source Protection*, 2010, Golder Associates

In March 2012, the BC Ministry of Health published a further document entitled: *Drinking Water Treatment Objectives (Microbiological) for Surface Water Supplies in British Columbia.*

A brief summary of the Treatment Objectives is provided as follows:

- 4-log (99.99%) reduction or inactivation of viruses
- 3-log (99.9%) reduction or inactivation of *Giardia* and *Cryptosporidium*
- (2) Two treatment processes for surface water
- (1) less than or equal to 1 nephelometric turbidity unit (NTU) of turbidity
- (0) zero E.Coli and Faecal coliform.

These have come to be known as the 4-3-2-1-0 Objectives. The March 2012 document goes on to express these objectives in terms of "Health Risk Management Outcomes". That is, if not all objectives are met, the purveyor must follow best practices for minimizing risk to the consumer and develop a plan for compliance within a reasonable time frame.

2.0 Purpose

The purpose of this report is to consolidate all pertinent reports completed since 2007 to form an amendment to the 2007 Water Master Plan.

This amendment will enable the District to implement further design development and financing next steps in the 2007 Water Master Plan such as applying for the upcoming Build Canada (Small Community Fund) grant programs. The treatment plant is anticipated to begin construction in 2018 in order to achieve the treatment requirements for the water system.

The WMP is intended to be a living document that is updated periodically to address any changes in water supply, demand, treatment requirements and technology. The 2015 amendment will make the WMP relevant to current conditions.

2.1 Scope

The 2015 Amendment to the 2007 Water Master Plan consists of a consolidation of several independent reports, studies and technical memorandum. These documents provide a comprehensive summary of the engineering analysis and review of the water supply, demand and treatment process to achieve the implementation of the **Concept 3: Peachland Creek Gravity Supply** for the District of Peachland.

3.0 List of Pertinent Documents

3.1 Technical Documents
(Related Key Findings and Recommendations Identified below Documents)

The following list summarizes the technical documents included with this report. All documents are included in Appendix A.

Watershed and Water Supply

District of Peachland, *Watershed Assessment Report for Drinking Water Source Protection*, 2010, Golder Associates

- Seven intrinsic hazards and sixteen land use actives identified in the watershed assessment area.
- Nineteen (19) risk management action plans recommended.

District of Peachland, Peachland Creek Habitat and Sediment Source Assessment, 2014, Urban Systems Ltd

- This assessment was recommended in the Watershed Assessment Report for Drinking Water Source Protection.
- High surface erosion sites along Munro and Peachland Main Forest Service Roads to be addressed.
- Follow best practices to keep cattle away from creek.
- Remove beaver dam and relocate beaver(s).
- Add signage identifying creek and Peachland Lake as drinking water source.

Technical Memorandum #1 - Peachland Creek Water Supply and Demand Analysis, 2015, Urban Systems Ltd

- Sufficient water is available within the Peachland Creek watershed to meet estimated future demands provided that the MacDonald Creek diversion is restored or flow from Brenda Mines WTP is diverted to Peachland Lake. Diverting additional flow into Peachland Lake is required to ensure there is adequate supply for domestic demands and environmental flows.

Water Treatment

District of Peachland, Water Treatment Plant and Reservoir Siting Options, 2010, Urban Systems Ltd

- Site immediately north of existing intake identified as most advantageous location to build the proposed WTP.

District of Peachland, Peachland Creek Reservoir and Pump Station Preliminary Design, 2011, Urban Systems Ltd

- Predesign for low lift pump station and 2,500 m3 reservoir completed. Pump station would supply proposed WTP and reservoir would provide treated water storage.
- Site plan for WTP refined in predesign.

District of Peachland, Bench and Pilot Scale Testing, 2014, Urban Systems Ltd

- Testing of Peachland Lake and Peachland Creek completed.
- Peachland Lake was tested to determine if this source water could meet Province's drinking water objectives without filtration. Concept that involved moving intake to Peachland Lake was investigated and study concluded that option was high risk and cost prohibitive.
- Two treatment processes identified for Peachland Creek: 1) coagulation, flocculation, DAF, filtration and chlorine (conventional treatment). 2) coagulation, flocculation, direct filtration, chlorine and UV (direct filtration). Option 1 has highest ability to manage public health risks.

Technical Memorandum #2 - Peachland Creek Source Water Treatment Process Selection and Funding Strategy, 2015, Urban Systems Ltd

- Identified Conventional WTP as preferred treatment option.
- WTP to be built in two phases, each having a capacity of 25 ML/d.
- 2,500 m3 of treated water storage required for Phase 1.
- Additional 7,300 m3 of treated water storage required in Phase 2.
- Confirmed previously selected site as preferred location to build proposed WTP.
- Updated cost estimate provided for WTP.
- Funding strategy and critical next steps toward implementing WMP identified.

Technical Memorandum #3 - Peachland Creek Water Treatment Plant Anticipated Approvals, 2015, Urban Systems Ltd

- Located within the RDCO Aquatic Development Permit Area, may not need a permit.
- Federal and Provincial Approvals required.
- Legal obligation to consult with Westbank First Nation – located within traditional territory.

WMP Figure 10, Revision 1, 2015, Urban Systems Ltd.

- Identifies 2015 state of proposed Concept 3: Peachland Creek Gravity Supply priority projects.

3.2 Reference Documents

Drinking Water Protection Act, 2001

Drinking Water Protection Regulation, 2003

Guidelines for Canadian Drinking Water Quality, 2010

Comprehensive Drinking Water Source-to-Tap Assessment Guideline, 2010

Drinking Water Treatment Objectives (microbiological) for Surface Water Supplies in BC, 2012

District of Peachland, Water Master Plan, 2007, Urban Systems Ltd

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Appendix A

Technical Documents