



## **DONALD DEVELOPMENT CORPORATION WATER SYSTEM DESIGN BRIEF**

This design brief is in support of the Donald Development Corporation zoning application. The water system as proposed features the following components:

- Below Ground Concrete Reservoir or an above ground steel bolted reservoir – Volume to be determined
- Potable groundwater well(s) – 200mm to 250mm diameter casing – Location of Well, Number of Wells and Pump size / flow to be determined
- Primary Chlorination Building at well pump house and flow meter
- Secondary Chlorination Building at reservoir and flow meter
- Dedicated supply line to the reservoir
- 150mm to 250mm diameter PVC distribution pipe lines
- Minimum 150mm diameter water service to commercial buildings
- One pressure zone
- SCADA control system
- Other water treatment controls if deemed necessary by BC Interior Health Authority

The proposed water utility will be owned and operated by a newly formed Utility Company (name to be determined) and will service the commercial development to be situated on Lot 2 Section 16 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District Plan 11465 – PID 005-777-267 (“Lot 2”) as part of a CPCN application and approval process as regulated by the Water Stewardship Branch of the Ministry of Environment and as permitted by the BC Interior Health Authority.

This brief outlines the following items as per the CPCN application guidelines:

- Water system background
- Customer demands
- Fire protection provisions
- Capacity and characteristics of the groundwater source
- Capacity of features of the major system components
- Description of the system operation

The legal descriptions of the properties currently included in the water utility/sewer utility development for the Donald project include:

- 1) Lot 2 Section 16 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District Plan 11465 – PID 005-777-267 (“Lot 2”);
- 2) Block D Shown Coloured Pink on Plan 1717 of Legal Subdivisions 1, 2, 8 and 15 Sections 16 and 21 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District, Except (1) Plans 11465, R42 and NEP23756 – PID 008-262-519 (“Block D”); and
- 3) The Southwest  $\frac{1}{4}$  of Section 22 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District Except Parts included in Plans 11442, 16194 and 18358 – PID 011-603-721 (“Southwest Quarter of Section 22”)



### **Water Utility Considerations**

Application for both the land use zoning and subdivision to create commercial development nodes planned for the first stages of the development have been submitted for referral to the Columbia Shuswap Regional District (CSRD) and the Ministry of Transportation and Infrastructure (MoTI).

The nearest municipality to the subject property and proposed development is the Town of Golden, which is approximately 25 km away. No other private water utilities exist near the subject site.

### **Customer Demands**

The water demands will be determined using the Design Guidelines for Rural Residential Community Water Systems (2012, British Columbia). They are based upon a maximum day demand (MDD) value of 4.7 m<sup>3</sup>/day per equivalent dwelling unit in an intermediate climate where water meters are incorporated. Commercial water metering will be installed by the new owners/builders at their cost. Water meters cannot be installed outside due to winter freeze conditions. Upon installation of the water meter, the meter installation must be confirmed by a Qualified Professional.

Fire flows will be based on NFPA Standard 1142 (Standards for Suburban and Rural Fire Fighting) and the Fire Underwriters Survey “Water Supply for Public Fire Protection – A Guide to Recommended Practice” 1991. Peak Hour Demand (PHD) is determined to be 150% of MDD. Emergency storage and reservoir balancing are determined to be 25% each of MDD.

### **Fire Protection Provisions**

Currently, the Donald area is not serviced by a fire department. For the new development, fire hydrants will be installed at the necessary design interval (following the CSRD hydrant spacing requirements). Emergency response is under consideration to be provided in the future.

### **Capacity and Characteristics of the Groundwater Source**

The water system will be supplied by groundwater from a well to be located on “Lot 2” or on the adjacent neighbouring lands, depending on phase one of the construction costs, quality and quantity of the groundwater supply. The development of a potable groundwater supply on the adjacent property “Southwest Quarter of Section 22” (shortened legal description) is also possible, under agreement with the current landowner via granting of a Statutory Right-of-Way (SRW) or future Utility ownership of the land.



## **Capacity and Features of Major System Components**

The proposed water utility will consist of the following components:

- Groundwater Well and Primary Chlorination Station
- Dedicated Reservoir Supply Main
- Reservoir
- Secondary Chlorination Station
- Distribution System and Services
- SCADA

## **Groundwater Pump**

The groundwater pump will be sized to deliver water to the reservoir. The well will discharge to the system via the Primary Chlorination Building located adjacent to the well head and the dedicated supply main to the reservoir. The heated building will contain the pump controls and meters, SCADA, and primary chlorine injection.

## **Treatment**

Water treatment requirements will be determined following a well drilling program and quality testing of the water supply aquifer. It must also be determined if the aquifer is confined and not under the influence of the nearby surface water such as the Columbia River, Waitabit Creek or Colepitts Creek, however, Colepitts Creek crosses through Lot 2. The Columbia River is 1.2 kilometres from the site and Waitabit Creek is situated approximately 700 metres away.

As such, the dual barrier treatment has not yet been considered for the system design. The dedicated pipeline to the reservoir added to the residence time in the reservoir will provide sufficient time for the added chlorine at the well house to meet the requirements for virus kill. The secondary chlorination system will boost chlorine levels to maintain residual levels in the distribution system. A sodium hypochlorite solution is proposed for the primary and secondary chlorination.

## **Chlorine Contact Time**

The chlorine contact time in the supply main to the reservoir will be calculated at the time of the detailed design stage. If necessary, baffles will be installed in the reservoir to increase chlorine contact time.

## **Dedicated Reservoir Supply Main**

From the well discharge, raw water will be pumped through a dedicated pipe line that will likely be a minimum 200mm diameter DR18 PVC water main, depending on the distance from the well pump to the reservoir. The dedicated main could include sections of HDPE pipe along steep terrain).



The dedicated main to the reservoir will be installed to allow for sufficient chlorine contact time within the main prior to the first service location.

### **Reservoir**

The reservoir location options are as follows:

- 1) On Lot 2;
- 2) On Southwest Quarter of Section 22;
- 3) Or both 1) and 2) above.

The options are presented based on possible timing of the development of the subject site currently presented to the CSRD for rezoning. From a capital investment analysis, a potable water well developed on “Lot 2” could be best served by a reservoir next to the well complete with a booster pump station to deliver flow and system pressures to the nearby commercial development. The piping infrastructure capital investment short term is more feasible in this scenario. However, this scenario uses prime real-estate.

Long-term, the reservoir could be located at an elevated location to provide for a pressurized water distribution system via gravity and without the need for additional pumping and/or generated power for emergency purposes. The location of the reservoir scenario will provide sufficient height to provide the minimum pressure to the highest developed site. The proposed reservoir site selected in this scenario is located at a relatively flat plateau on the “Southwest Quarter of Section 22” (shortened legal description). If possible, this scenario would also include a well pump house situated nearby reducing the total pipe length from the well to the reservoir. Reducing the pipe length will be important for the well pump selection. The well will have to be located away from any sewage treatment disposal system also planned on the “Southwest Quarter of Section 22” (shortened legal description).

The reservoir can be accessed via an existing Forest Service Road and driveway.

To maintain residual chlorine within the distribution system, a secondary point for chlorine addition will be located at the reservoir discharge. Secondary chlorine injection will be controlled by an online residual chlorine analyzer and paced with a flow meter. This configuration will ensure residual levels are maintained within the distribution system throughout the year (including low use times).

### **Distribution System and Services**

The distribution system will consist of 150mm to 250mm diameter DR18 PVC pipe. In keeping with regional design criteria, the pipe will be installed at a minimum bury of 2.5m below finished grade to protect it from frost/freezing in the winter months.

The distribution system will originate at the reservoir and be routed along existing and proposed road dedications as well as any necessary SRWs.



## System Operation

The proposed system will be controlled by SCADA instrumentation. The SCADA system will control both the water supply and distribution system as well as the wastewater treatment plant. For the purposes of this application, the control logic associated with the water system is described below:

### Reservoir and Well

- Water level in **reservoir** below LWL -> well pump turns on
- Water level in **reservoir** reaches HWL -> well pump turns off
- Water level in **reservoir** below Extreme LWL → alarm is activated
- Water level in **reservoir** above Extreme HWL → alarm is activated / pump turns off
- Extreme LWL in **well** → alarm is activated / pump turns off

### Primary Chlorination

- Well turns on – preset chlorination rate turns on based on flow rate signal from meter vault

### Secondary Chlorination

- Chlorine Residual Analyzer Reads less than 0.2 ppm chlorine solution – activates secondary chlorination set to the flow rate reading from water meter on reservoir discharge line

This design brief was prepared for the Donald Development Corporation by WSP Canada Inc on December 21, 2017.

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Project Engineer



## **DONALD DEVELOPMENT CORPORATION SANITARY SYSTEM DESIGN BRIEF**

This design brief is in support of the Donald Development Corporation zoning application. The sanitary system as proposed features the following components:

- Gravity Pipe Collection system
- Sewage Lift Station at the lowest point
- Sewage forcemain to the sewage treatment plant
- Wastewater Treatment plant
- Treated Sewage Effluent discharge to ground
- SCADA control system

The proposed sanitary utility will be owned and operated by a newly formed Utility Company (name to be determined) and will service the commercial development to be situated on Lot 2 Section 16 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District Plan 11465 – PID 005-777-267 (Lot 2) as part of a Ministry of Environment (MoE) Municipal Wastewater Regulation (Environmental Management Act) registration/filing and approval process.

This brief outlines the following short list items as per the Municipal Wastewater Regulation:

- Terms of Reference
- Environmental Impact Study
- Security and Assurance Plan
- Hydrogeotechnical Investigation and Monitoring
- Operating Plan
- Sewage collection design flows and analysis
- Sewage treatment selection and effluent requirements
- Design development of facilities, discharge points, nearby wells and water courses

The legal descriptions of the properties currently included in the sewer utility development for the Donald project include:

- 1) Lot 2 Section 16 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District Plan 11465 – PID 005-777-267 (“Lot 2”);
- 2) Block D Shown Coloured Pink on Plan 1717 of Legal Subdivisions 1, 2, 8 and 15 Sections 16 and 21 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District, Except (1) Plans 11465, R42 and NEP23756 – PID 008-262-519 (“Block D”); and
- 3) The Southwest  $\frac{1}{4}$  of Section 22 Township 29 Range 23 West of the 5<sup>th</sup> Meridian Kootenay District Except Parts included in Plans 11442, 16194 and 18358 – PID 011-603-721 (“Southwest Quarter of Section 22”)



### **Sewer Utility Considerations**

Application for both the land use zoning and subdivision to create commercial development nodes planned for the first stages of the development have been submitted for referral to the Columbia Shuswap Regional District (CSRD) and the Ministry of Transportation and Infrastructure (MoTI).

The nearest municipality to the subject property and proposed development is the Town of Golden, which is approximately 25 km away. No other sewer utilities exist near the subject site.

### **Sewage Generation**

The sewage flow estimates will be determined using standard sewage generation rates (municipal, BC Health or otherwise regulated) for the land use proposed (ie commercial / food services) for the initial development stage.

### **Capacity and Characteristics of the Sewage Effluent**

The sewage effluent must be treated to a class of effluent suited to the environment and will be determined as part of the Environmental Impact Study.

### **Capacity and Features of Major System Components**

The proposed sewer utility will consist of the following components:

- Gravity collection piping and manholes
- Services to each commercial building
- Sewage lift station situated at the lowest elevation
- Sewage forcemain to carry sewage from the lift station to the wastewater treatment plant
- Wastewater treatment plant
- Sewage effluent disposal to ground system
- Monitoring Wells
- SCADA

### **Gravity Piping and Manholes**

Gravity pipe lines will be installed a minimum 3 metres from all watermain trenches and will be a minimum 200mm diameter SDR35 PVC pipe connected by concrete manhole barrels spaced no more than 110 metres from each other. The gravity pipe will collect sewage generated from each commercial building and will discharge to a low point on “Lot 2” into a sewage pump/lift station.



### **Sewage Lift Station**

The sewage lift station will be a below ground sewage holding tank equipped with two pumps operating in an alternate use mode to pump peak sewage flows via a sewage forcemain to the sewage treatment facility to be located on the “Southwest Quarter of Section 22” (shortened legal description). The lift station likely will require odour control measures as well.

### **Forcemain**

The sewage forcemain will be a minimum 150mm diameter HDPE pipe or PVC pressure pipe that will convey pumped sewage from the sewage lift station to the waste water treatment facility to be located on the “Southwest Quarter of Section 22” (shortened legal description).

### **Wastewater Treatment Plant**

Several sewage treatment plants exist on the market with varying degrees of turn-key solutions and staged modules for expansion relating to stage commercial and residential development. Upon receipt of the hydrogeotechnical and environmental impact studies, the wastewater treatment facility will be selected based on the subsurface information and related regulatory requirements. The wastewater treatment facility will also be equipped with odour control.

### **Effluent Disposal**

It is anticipated that the soils on the “Southwest Quarter of Section 22” (shortened legal description) are suitable for effluent disposal to the ground as a broad discharge.

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