December 4, 2013

File: W-CN-LQRV
Newcastle Eng Ref: L172-02

528872 BC Ltd.
dba Little Qualicum River Village
1625 Meadowood Way
Qualicum Beach BC V9K 2S3

Attention: Tim Peligren

Dear Sir:

Re: Water Supply System Construction Permit No. W-CN-2567 – Blending of Wells

This office is in receipt of the September 26, 2013 submission of drawings from Newcastle Engineering Ltd., for construction of a dedicated supply main from Wells # 1, #2 and #9 and a replacement watermain and extension to connect Well #13 to the existing reservoir to blend groundwater from the four well sources. The submission also proposes the installation of two, automatic flow proportional chlorinators on each inlet to provide a residual level of chlorine throughout the distribution system. Newcastle Engineering provided further clarification of their proposal on October 1st and 30th, 2013. The following is provided:

- The dedicated watermain from Wells #1, #2 and #9 is being proposed to allow blending from the low arsenic groundwater wells with the high arsenic ground water from Well #13.

- Well #13 (previously identified as Well #11) is only allowed to be used if arsenic treatment is provided or if blended with low arsenic water as required by the March 27, 2009 letter from Dwayne Stroh, Supervisor, Health Protection and Environmental Services (HPES), Island Health Authority (IHA). The level of arsenic through treatment or blending must produce a level of arsenic below the maximum acceptable concentration (MAC) level of 0.010 mg/L listed in the *Guidelines for Canadian Drinking Water Quality.*

- Blending is a viable mitigation strategy for conservative inorganic substances such as arsenic. Blending involves mixing two or more different source of water prior to distribution. At its most simple, a high arsenic source is mixed with a low arsenic source as they are fed into a reservoir or a common header.

- A chlorine residual throughout the distribution system is required as listed in the May 14, 2013 letter from Elizabeth Thomson, Environmental Health Officer, HPES, Island Health Authority.

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Health Protection & Environmental Services
3rd Floor – 6475 Metral Drive
Nanaimo BC V9T 2L9

Public Health Engineering
Tel: 250-755-6299 | Fax: 250-755-3372
viha.ca

Please find enclosed **Water Supply System Construction Permit No. W-CN-2567**, issued under Section 7 of the **Drinking Water Protection Act**, authorizing construction of a watermain extension along Meadowood Way and Warn Way and installation of two, flow proportional chlorinators to serve existing development in the subdivision known as Little Qualicum River Village near the Little Qualicum River, BC.

This permit is valid for one year and is not transferable unless the transfer is approved by the Issuing Official or the Drinking Water Officer. This permit is subject to the following terms:

Design Amendments and Conditions: The submitted design must be amended to address the following item(s), or during construction the following item(s) must be attended to, as a condition of this permit:

1. The water system owner shall retain the services of a professional engineer to prepare a standard operating procedure (SOP) manual for the operation of the water system. The SOP will include, but not necessarily be limited to, dosing rates for chlorine, blending procedures for arsenic, operating procedures and maintenance schedules.

2. The water system owner shall retain the services of a professional engineer to prepare a detailed submission for the pump control room. The submission shall include but may not necessary be limited to a description of the installation, the chemical feed pump specifications (including installation diagram, make and model, manufacturer's specifications, pressure range of water system, injection pressure, flow range of meter pump, desired chlorine dose, size of day tank, chlorine strength, concentration of feed solution, initial chlorine demand, etc.), the pump controls (including installation diagram, make and model, manufacturer's specifications, power supply, alarms, call status, etc.), flow meters, piping, valves, sampling ports, automatic and manual controls, etc. The submission shall be submitted to this office and approved in writing prior to construction.

3. In consultation with, and as approved by, the local Environmental Health Officer, the water system owner shall prepare and submit a water quality monitoring program to assess the operation of the blending, residual chlorine monitoring, chemical analysis and bacterial analysis. The monitoring program should consist of both a short term program to assess the start of blending and a long term program to monitor the ongoing operation of the water system.

Arsenic Blending

Well #13 shall not be used unless at least one other well is operating. Prior to using Well #13, a water sample shall be collected from Wells #1, #2, #9 and #13 and the water shall be analyzed for arsenic.

When all wells are running, the flowrate for the low arsenic wells (Wells #1, #2 and #9), that when blended with flow from the high arsenic well will produce a level of arsenic below the MAC, shall be based on the following equation:

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Where:

Q_T = combined flowrates of Wells #1, #2 and #9 (gallons per minute)
Q_{13} = flowrate of Well #13 (gallons per minute)
C_{MAC} = arsenic MAC (mg/L)
C_{AsT} = average arsenic concentration in Wells #1, #2, and #9 (mg/L)
C_{As13} = arsenic concentration in Well #13 (mg/L) level in
s = 0.20, safety margin (20% expressed as a decimal)

When only Well #1 is in operation, then
Q_T = Q_1 = the flowrate of Well #1 (gallons per minute)
C_{AsT} = C_{As1} = the arsenic concentration in Well #1

When only Well #2 is in operation, then
Q_T = Q_2 = the flowrate of Well #2 (gallons per minute)
C_{AsT} = C_{As2} = the arsenic concentration in Well #2

When only Well #9 is in operation, then
Q_T = Q_9 = the flowrate of Well #9 (gallons per minute)
C_{AsT} = C_{As9} = the arsenic concentration in Well #9

When Wells #1 and #2 are in operation, then
Q_T = $Q_1 + Q_2$= the combined flowrates of Well #1 and #2 (gallons per minute)
C_{AsT} = the average arsenic concentration between Well #1 and #2

When Wells #1 and #9 are in operation, then
Q_T = $Q_1 + Q_9$= the combined flowrates of Well #1 and #9 (gallons per minute)

C_{AsT} = the average arsenic concentration between Well #1 and #9

When Wells #2 and #9 are in operation, then
Q_T = $Q_2 + Q_9$= the combined flowrates of Well #2 and #9 (gallons per minute)
C_{AsT} = the average concentration between Well #2 and #9

During use of Well #13, the groundwater shall be sampled on a weekly basis and the blending ratio shall be adjusted as per the formula listed above. The Environmental Health Officer may adjust this sampling frequency as necessary.

The safety factor can be reduced if an on-line arsenic analyzer with data acquisition to control pumping rates is provided.

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Design Deviations: This permit applies exclusively to the works as approved. Any subsequent design modifications will require the submission of amended drawings to the Issuing Official or Drinking Water Officer and approval obtained before installation of the amended works.

Disinfection: It is the responsibility of the water distribution system owner (528872 BC Ltd.) to ensure that, following the completion of construction, repair, or draining and refilling of any portion of the system affected, and prior to the delivery of water to customers served by these works, all waterworks affected by this permit are disinfected in accordance with the appropriate American Water Works Association (AWWA) standard or equivalent.

Chlorinated water used for disinfection of all waterworks shall not be directly discharged into the environment without the permission of the Ministry of Environment, and/or Fisheries and Oceans Canada.

Sewers: It is the responsibility of the water distribution system owner (528872 BC Ltd.) to ensure that mains under construction or repair are not contaminated by seepage or effluent from sewers or storm drains.

Operating Permit: This permit does not constitute permission to operate the water system. Permission to operate the water system is given in the form of an operating permit, or as an amendment to an existing operating permit, issued under Section 8 of the **Drinking Water Protection Act**. The water system must be operated and maintained in accordance with its operating permit. The water system owner may need to obtain a new, or reaffirm the existing, operating permit for this water system.

An Issuing Official or the Environmental Health Officer may place additional conditions (for example, performance standards, monitoring requirements, operation and maintenance plans, emergency response plans, etc.) on your operating permit with respect to the installation of these works.

Notifications: It is a condition of this permit that the local Environmental Health Officer is:

a) notified upon completion of the permitted work;
b) consulted with to establish a monitoring program,
c) provided with a copy of the Standard Operating Procedures manual; and,
d) supplied with the results of all bacteriological testing conducted as part of the disinfection protocol.

Please contact Elizabeth Thomson, Environmental Health Officer, Vancouver Island Health Authority, Parksville office, 489 Alberni Hwy., Parksville, BC V9P 1J9 at telephone 250-947-8222, facsimile 250-951-9576 with the above notification and the results of the bacteriological testing.

Certificate of Public Convenience and Necessity: The issuance of this Construction Permit relates only to the **Drinking Water Protection Act**. Under the ***Water Utility Act*** a utility may need a Certificate of Public Convenience and Necessity prior to commencement of construction.

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Blending Dissimilar Waters: Please note, it is possible to create water quality problems when blending water sources with dissimilar chemistries. This can cause, for example, iron or manganese to be precipitated, scale forming water, increased corrosivity, etc. In some cases additional treatment or a public information program may be necessary.

This document grants authorization under Section 7 of the **Drinking Water Protection Act** only, and does not constitute permission or consent under any other Act or authority.

The remaining terms and conditions of Dwayne Stroh's source approval letter dated March 27, 2009, the terms and conditions of Elizabeth Thomson's letter of May 14, 2013, and any subsequent amendments to those terms and condition, if any, remain in force and effect.

Please contact Public Health Engineering through the Vancouver Island Health Authority in Nanaimo, should there be any questions concerning the above.

Yours truly,

Original signed by

Murray M. Sexton, P. Eng.
Public Health Engineer

ec: Dr. Paul Hasselback, Medical Health Officer, Vancouver Island Health Authority, Nanaimo
Dwayne Stroh, Supervisor, Health Protection and Environmental Services, VIHA, Courtenay
Shaun Malakoe, Senior Environmental Health Officer, VIHA, Nanaimo
Elizabeth Thomson, Environmental Health Officer, VIHA, Parksville
Approving Officer, Ministry of Transportation, Nanaimo
Christoph Moch, P. Eng., Utility Regulation Section, Land and Water BC Inc., Victoria
Mark Warbrick, P. Eng,. Newcastle Engineering, Nanaimo
cc: Trish Curtin, Strata Council, 1773 Country Road, Qualicum Beach, B. C. V9V 2S3

Enclosure

Little Qualicum River Village

Water Supply System Construction Permit
NO. W-CN-2567

To: **528872 BC Ltd.** **Reservoir Supply Main Extension**
(dba Little Qualicum River Village)

This is to certify that drawings numbered L172-02-201 (Rev. 0) and L172-02-202 (Rev. 0) dated August 2, 2013, prepared and submitted September 26, 2013 by M. I. Warbrick, P. Eng. of Newcastle Engineering Ltd., a letter of clarification dated October 1, 2013 and an electronic mail transmission dated October 30, 2013 prepared and submitted by M. I. Warbrick, P. Eng. of Newcastle Engineering Ltd., portraying a proposed watermain extension comprising of *approximately* of 295 metres of 50-mm diameter DR11 HDPE pipe or SCH160 PE pipe, two automatic flow proportional chlorinators and other related appurtenances to serve existing development in the subdivision known as Little Qualicum River Village near Little Qualicum River, BC, and submitted in accordance with Section 7 of the **Drinking Water Protection Act** have been reviewed and proposed construction, alteration or extension may be commenced in accordance with the approved plans and the terms and conditions contained in the letter of transmittal.

This document certifies that the plans and specifications for the proposed works have been reviewed pursuant to the current "Guidelines for the Approval of Water Supply Systems" issued by the Island Health Authority and that the plans and specifications meet the protection requirements outlined in the Guidelines.

The standards of structural integrity and safety of the works have not been considered and are not the subject of this Permit. This document grants authorization under Section 7 of the ***Drinking Water Protection Act*** *only, and does not constitute permission or consent under any other Act or authority.*

Original dated December 4, 2013
Date Issued

Original signed by
Murray M. Sexton, P. Eng.
Public Health Engineer

ec: Dr. Paul Hasselback, Medical Health Officer, Island Health Authority, Nanaimo
Dwayne Stroh, Supervisor, Health Protection and Environmental Services, IHA, Courtenay
Shaun Malakoe, Senior Environmental Health Officer, IHA, Nanaimo
Elizabeth Thomson, Environmental Health Officer, IHA, Parksville
Approving Officer, Ministry of Transportation, Nanaimo
Christoph Moch, P. Eng., Utility Regulation Section, Land and Water BC Inc., Victoria
Mark Warbrick, P. Eng., Newcastle Engineering, Nanaimo
cc: Trish Curtin, Strata Council, 1773 Country Road, Qualicum Beach, B. C. V9V 2S3