

APPROVAL
PROVINCE OF ALBERTA

ENVIRONMENTAL PROTECTION AND ENHANCEMENT ACT
R.S.A. 2000, c.E-12, as amended.

APPROVAL NO. 768-02-00

APPLICATION NO. 004-768 and 005-768

EFFECTIVE DATE: February 23, 2007

EXPIRY DATE: February 1, 2017

APPROVAL HOLDER Thornmark Utilities Corporation

.....
ACTIVITY: Construction, Operation and Reclamation of a waterworks system

.....
for the Heritage Pointe golf course and residential development

.....
is amended as per the attached terms and conditions..

David Ardell

Designated Director under the Act

David L. Ardell, P.Eng.

February 23, 2007

Date Signed

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PART 1: DEFINITIONS

SECTION 1.1: DEFINITIONS

- 1.1.1 All definitions from the Act and the regulations apply except where expressly defined in this approval.
- 1.1.2 In all PARTS of this approval:
- (a) "Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c.E-12, as amended;
 - (b) "Alternate Laboratory Program" means the program developed by Alberta Environment to assist municipal and industrial facilities that conduct limited analyses and use portable analysis equipment or simple bench instruments to provide the Alberta Environment analytical data that meets the objectives of Alberta Environment's Laboratory Data Quality Assurance Policy;
 - (c) "application" means the written submissions to the Director in respect of application number 004-768 and 005-768 and any subsequent applications for amendments of approval number 768-02-00;
 - (d) "Bacteriological Analysis" means the analysis of water for the presence of *E. coli* or total coliforms;
 - (e) "chemical" means any substance that is added or used as part of the treatment process;
 - (f) "commence operation" means to start operating the facility, plant, process unit or equipment for the first time, with the introduction of raw water to be treated and the production of treated water for distribution, for which the facility, plant, process unit or equipment was designed, excluding the pre-determined period of commissioning or operational testing;
 - (g) "commissioning" means the systematic process of achieving, verifying and documenting the performance of the constructed works which proves the owner's operational requirements and the design intent have been met. A facility, plant, process unit, system or sub-system is considered commissioned when it has been formally accepted by the owner;
 - (h) "contact time" means the T_{10} value established for that portion of the process by the most recent tracer studies undertaken by the approval holder where T_{10} is the time it takes for 10% of the tracer to pass through the contact section;

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- (i) "continuous monitoring" means sampling or flow measurement through equipment that creates an uninterrupted output of the analysis or flow measurement;
- (j) "CT" means disinfectant residual in mg/L multiplied by the contact time in minutes;
- (k) "CT performance ratio" means $CT_{\text{lowest actual}} / CT_{\text{required}}$, where:
 - (i) " $CT_{\text{lowest actual}}$ " means the lowest CT calculated in a day, and
 - (ii) " CT_{required} " means the CT required to demonstrate the specified Log reduction of *Giardia* Cysts as determined from the *CT Values for inactivation of Giardia Cysts by Free Chlorine* tables in Appendix A of the *Standards and Guidelines for Municipal Water, Wastewater and Storm Drainage Systems*, December 1997, as amended;
- (l) "day" means any sampling period of 24 consecutive hours;
- (m) "decommissioning" means the dismantling and decontamination of a water treatment plant undertaken subsequent to the termination or abandonment of any activity or any part of any activity regulated under the Act;
- (n) "Director" means an employee of the Government of Alberta designated as a Director under the Act;
- (o) "E. coli" means *Escherichia coli* bacteria;
- (p) "electronic reporting" means submitting monitoring results to the Director as required in this approval, electronically through the secure internet website provided by Alberta Environment at <http://www3.gov.ab.ca/env/water/dwq/disclaimer.cfm>;
- (q) "grab sample" means an individual sample collected in less than 30 minutes and which is representative of the substance sampled;
- (r) "ISO 17025" means the international standard, developed and published by International Organization for Standardization (ISO), specifying management and technical requirements for laboratories;
- (s) "independent laboratory" means a laboratory with documented quality assurance and quality control programs, including participation in inter-laboratory studies;

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- (t) "Log reduction " means the base 10 logarithm of the ratio of raw water concentrations divided by the treated water concentration of total (or viable) *Giardia* cysts or viruses;
- (u) "Log reduction ratio" means actual Log reduction / required Log reduction;
- (v) "Provincial Laboratory of Public Health" means the:
 - (i) Environmental Microbiology Provincial Laboratory of Public Health, University of Alberta Hospital, Edmonton, Alberta, or the
 - (ii) Provincial Laboratory of Public Health, Foothills Hospital, Calgary, Alberta;
- (w) "raw water" means untreated source water from water wells, surface water intakes or infiltration galleries that constitute the water supply;
- (x) "regulations" means the regulations issued pursuant to the Act and as amended;
- (y) "uncommitted hydraulic reserve capacity" means the design capacity of the water treatment plant minus the sum of the peak daily flow and the peak daily flow that would be used by development that is approved but not yet built;
- (z) "User Agreement" means the *Drinking Water Quality User Agreement* signed by the Approval Holder and the Director;
- (aa) "volume estimated" means approximate volume calculated from field measurements;
- (bb) "water distribution system" means a system of pipes, valves, fittings and appurtenances, including associated pressure reducing stations, that is used to convey potable water in a waterworks system to the service connection for a property;
- (cc) "water treatment plant" means the physical components of the waterworks system that are used to produce potable water including components associated with the management of any wastes generated during treatment and includes the land located within South ½ of Section 5, Township 22, Range 29, West of the 4th Meridian at # 2 Heritage Pointe Drive, RR # 1, DeWinton, Alberta;
- (dd) "waterworks system" means any system providing potable water to a municipality, municipal development, industrial development, privately-owned development, private utility or watering point and includes any or all of the following components:

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- (i) a source(s),
- (ii) water supply lines,
- (iii) on-stream and off-stream water storage facilities,
- (iv) water pumphouses,
- (v) water treatment plant(s),
- (vi) potable water transmission mains,
- (vii) potable water storage facilities,
- (viii) potable water pumping facilities,
- (ix) water distribution system(s);
- (ee) "week" means any consecutive 7-day period; and
- (ff) "year" means calendar year.

PART 2: GENERAL

SECTION 2.1: GENERAL

- 2.1.1 The approval holder shall immediately report by telephone any contravention of the terms and conditions of this approval to the Director at 1-780-422-4505.
- 2.1.2 If any equipment used for disinfection fails or is shut down the approval holder shall immediately report this occurrence to the Director at 1-780-422-4505.
- 2.1.3 In addition to reporting pursuant to 2.1.1 and 2.1.2, the approval holder shall submit, within 7 days, a written report to the Director.
- 2.1.4 The terms and conditions of this approval are severable. If any term or condition of this approval or the application of any term or condition is held invalid, the application of such term or condition to other circumstances and the remainder of this approval shall not be affected thereby.
- 2.1.5 All abbreviations used in this approval follow those given in *Standard Methods for the Examination of Water and Wastewater*, published jointly by the American Public Health Association, the American Water Works Association, and the Water Environment Federation, as amended, unless otherwise specified in this approval.

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- 2.1.6 The approval holder shall carry out all electronic reporting, or cause all electronic reporting to be carried out in accordance with the User Agreement.
- 2.1.7 The approval holder shall comply with the terms and conditions of the User Agreement.
- 2.1.8 *Environmental Protection and Enhancement Act* Approval No. 768-01-00 is cancelled.

SECTION 2.2: RECORD KEEPING

- 2.2.1 The approval holder shall record and retain all the following information in respect of any sampling conducted or analyses performed for a minimum of three years:
- (a) the place, date and time of sampling;
 - (b) the dates the analyses were performed;
 - (c) the analytical techniques, methods or procedures used in the analyses;
 - (d) the names of the persons who collected and analyzed each sample; and
 - (e) the results of the analyses.

SECTION 2.3: ANALYTICAL REQUIREMENTS

- 2.3.1 Collection, preservation, storage, handling and analysis of samples, and reporting shall be conducted in the following manner or as otherwise specified in writing by the Director:
- (a) the *Standard Methods for the Examination of Water and Wastewater* published jointly by the American Public Health Association, American Water Works Association, and the Water Environment Federation, as amended;
 - (b) an analytical method as authorized in writing by the Director.
- 2.3.2 Analysis of samples required pursuant to this approval shall be done only in an approved laboratory, or in accordance with Alberta Environment's Alternate Laboratory Program.
- 2.3.3 The bacteriological samples that are required by this approval shall be forwarded to the Provincial Laboratory of Public Health unless otherwise authorized in writing by The Director.

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- 2.3.4 The approval holder shall analyze all samples that are required in this approval:
- (a) in a laboratory accredited pursuant to ISO 17025 standard, as amended, for the specific parameter to be analyzed;
 - (b) in accordance with Alberta Environment's Alternate Laboratory Program; or
 - (c) or as unless otherwise authorized in writing by the Director.
- 2.3.5 The term sample as used in 2.3.4 does not include samples directed to continuous or on-line monitoring equipment, until specifically required in writing by the Director.

PART 3: CONSTRUCTION AND UPGRADING REQUIREMENTS

SECTION 3.1: CONSTRUCTION AND UPGRADE

CONSTRUCTION REQUIREMENTS

- 3.1.1 Not used at this time.

WATERWORKS SYSTEM UPGRADE REQUIREMENTS

- 3.1.2 The approval holder shall expand and upgrade the water treatment plant according to applications 004-768 and 005-768, or as required in this approval.
- 3.1.3 If construction of the expansion and upgrade of the water treatment plant does not commence on or before December 1, 2007, the approval holder shall apply to the Director and obtain an amendment to this approval and/or written authorization prior to commencing construction.

PART 4: OPERATIONS

SECTION 4.1: WATERWORKS SYSTEM

PRIOR TO DAF / ULTRA VIOLET DISINFECTION WATERWORKS UPGRADE

- 4.1.1 The approval holder shall operate and maintain a waterworks system which shall include all of the following:
- (a) a source consisting of:
 - (i) surface water from the Bow River in SE ¼ 8-22-29-W4M;
 - (b) a water treatment plant with treatment capabilities for:
 - (i) pre-treatment chlorination,

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- (ii) preflocculation,
- (iii) flocculation,
- (iv) clarification,
- (v) filtration,
- (vi) disinfection,
- (c) treated water storage, and
- (d) a treated water distribution system.

AFTER DAF / ULTRA VIOLET DISINFECTION WATERWORKS UPGRADE

4.1.2 The approval holder shall operate and maintain a waterworks system which shall include all of the following:

- (a) a source consisting of:
 - (i) surface water from the Bow River in SE ¼ 8-22-29-W4M;
- (b) a water treatment plant with treatment capabilities for:
 - (i) flocculation,
 - (ii) clarification by Dissolved Air Flotation (DAF),
 - (iii) dual media rapid sand filtration,
 - (iv) Ultra Violet disinfection (primary disinfection),
 - (v) chlorine disinfection (Viruses and chlorine residual);
- (c) treated water storage; and
- (d) a treated water distribution system.

4.1.3 Prior to commencing operation of the upgraded waterworks system described in condition 4.1.2 the approval holder shall:

- (a) prepare a written operations program for the upgraded waterworks system;
- (b) maintain and retain the operations program at the water treatment plant.

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- 4.1.4 The operations program in condition 4.1.3 shall include, at a minimum, all of the following:
- (a) routine operational procedures for the upgraded waterworks system;
 - (b) maintenance instructions and schedule;
 - (c) the schedule and procedures for cleaning and flushing the entire treated water distribution system, including treated water storage reservoirs;
 - (d) routine operational procedures for monitoring and analysis;
 - (e) an emergency response plan; and
 - (f) the date of last operations program update.

SECTION 4.2: CERTIFIED OPERATOR REQUIREMENTS

- 4.2.1 At all times, the operation of the waterworks system shall be performed by, or under the direction of, a person who holds a valid certificate of qualification at the following minimum levels of certification:
- (a) a valid Level Class II Water Treatment Operator Certificate; and
 - (b) a valid Level Class II Water Distribution Operator Certificate.

SECTION 4.3: CHEMICALS USED

- 4.3.1 The approval holder shall not exceed the dosage specified as Maximum Use in *Standard 60*, published by the National Sanitation Foundation and the American National Standards Institute (NSF/ANSI), as amended, for any treatment chemical added to the waterworks system, unless otherwise authorized in writing by the Director.

SECTION 4.4: WASTE STREAMS

- 4.4.1 The approval holder shall release only the following waste streams from the water treatment plant:
- (a) clarifier blowdown;
 - (b) filter backwash;
 - (c) filter-to-waste;
 - (d) domestic wastewater; and

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- (e) any other waste stream authorized in writing by the Director.

4.4.2 Waste streams shall be released only as follows:

- (a) clarifier blowdown shall be discharged to the backwash retention sump with overflow to a golf course pond;
- (b) filter backwash shall be discharged to the backwash retention sump with overflow to a golf course pond;
- (c) filter-to-waste shall be discharged to the backwash retention sump with overflow to a golf course pond;
- (d) domestic wastewater shall be discharged to the Thornmark Waste Management Corporation's wastewater collection system; and
- (e) any other waste stream shall be discharged as authorized in writing by the Director.

SECTION 4.5: EMERGENCY OPERATION

PRIOR TO DAF / ULTRA VIOLET DISINFECTION WATERWORKS UPGRADE

CHLORINE CONTACT TIME

- 4.5.1 If the daily concentration of free chlorine residuals in the water measured at the location point where the Log reduction is determined is less than 0.8 mg/L as free, the approval holder shall immediately:
 - (a) increase disinfection until the concentration of free chlorine residuals of at least 0.2 mg/L free chlorine residual is achieved;
 - (b) increase free chlorine residuals monitoring frequency to a minimum of once per hour until a concentration of free or chlorine residuals of at least 0.2 mg/L as free chlorine is achieved; and
 - (c) report to the Director at 1-780-422-4505.
- 4.5.2 If residual disinfectant concentration in the water in the water distribution system measured as total is less than 0.1 mg/L, the approval holder shall take the following corrective action:
 - (a) flush the water distribution line(s) until a concentration of a total of at least 0.1 mg/L is achieved;

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- (b) increase monitoring frequency to a minimum of once per hour until a concentration of at least 0.1 mg/L as total chlorine in the water distribution system is achieved;
- (c) increase the chlorine feed rate, if required; and
- (d) report to the Director at 1-780-422-4505.

4.5.3 If the disinfection of the water entering the water distribution system does not meet the required Log reduction of Viruses, during periods that disinfection is based on Log reduction credits, the approval holder shall:

- (a) increase disinfection until the concentration of free chlorine residual within the treated water – chlorine contact clear well reservoir is able to achieve the required CT value; or
- (b) reduce flow to the water distribution system to achieve the required CT value;
- (c) take corrective action as authorized in writing by the Director; and
- (d) report to the Director at 1-780-422-4505.

AFTER DAF / ULTRA VIOLET DISINFECTION WATERWORKS UPGRADE

CHLORINE CONTACT TIME (VIRUSES)

4.5.4 If the daily concentration of free chlorine residuals in the water measured at the location point where the Log reduction (Viruses) is determined is less than 0.3 mg/L as free chlorine, the approval holder shall immediately:

- (a) increase disinfection until the concentration of free chlorine residuals of at least 0.3 mg/L free chlorine residuals is achieved;
- (b) increase free chlorine residuals monitoring frequency to a minimum of once per hour until a concentration of free chlorine residuals of at least 0.3 mg/L as free chlorine is achieved; and
- (c) report to the Director at 1-780-422-4505.

4.5.5 If residual disinfectant concentration in the water in the water distribution system measured as total is less than 0.1 mg/L, the approval holder shall take the following corrective action:

- (a) flush the water distribution line(s) until a concentration of a total of at least 0.1 mg/L is achieved;

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- (b) increase monitoring frequency to a minimum of once per hour until a concentration of at least 0.1 mg/L as total chlorine in the water distribution system is achieved;
- (c) increase the chlorine feed rate, if required; and
- (d) report to the Director at 1-780-422-4505.

4.5.6 If the disinfection of the water entering the distribution system does not meet the required Log reduction (Viruses), during periods that disinfection is based on Log reduction credits (Viruses), the approval holder shall:

- (a) increase disinfection until the concentration of free chlorine residual within the Heritage Pointe water treatment plant is able to achieve the required CT value; or
- (b) reduce flow to the distribution system to achieve the required CT value;
- (c) take corrective action as authorized in writing by the Director; and
- (d) report to the Director at 1-780-422-4505.

FLUORIDE RESIDUALS

Not used at this time.

BACTERIOLOGICAL ANALYSIS

4.5.7 The approval holder shall immediately take the corrective action outlined in the latest version of the *Communication and Action Protocol for Failed Bacteriological Results in Drinking Water for Waterworks Systems Authorized Under the Environmental Protection and Enhancement Act*, as amended, if any sample of treated water taken for bacteriological analysis contains:

- (a) any Total Coliform bacteria;
- (b) any E. coli.

4.5.8 The approval holder shall immediately report to the Director by telephone at 1-780-422-4505 if the presence of any organisms specified in 4.5.7(a) or 4.5.7(b) is detected in any sample of treated water.

TERMS AND CONDITIONS ATTACHED TO APPROVAL**PART 5: LIMITS****SECTION 5.1: WATERWORKS****PRIOR TO DAF/ULTRA VIOLET WATERWORKS UPGRADE**

5.1.1 The approval holder shall comply with the limits specified in TABLE 5-1.

TABLE 5-1: LIMITS – HERITAGE POINTE WATERWORKS

PARAMETERS	DESIGNATED SAMPLING LOCATION	LIMIT
Treated Water Turbidity	COMBINED FILTERED EFFLUENT (use: Combined filtered effluent entering the treated water reservoir)	a) When the monthly average of the daily raw water turbidity is ≥ 2.5 NTU the combined filtered effluent shall be: <ul style="list-style-type: none"> < 0.5 NTU in at least 95% of the samples per calendar month; and between 0.5 and 1.0 NTU in no more than 4% of the samples per calendar month. b) When the monthly average of daily raw water turbidity is < 2.5 NTU, the combined filtered effluent shall achieve: <ul style="list-style-type: none"> an 80% reduction in raw turbidity, based on the average of the daily reductions measured in a calendar month. No less than 50% reduction to be achieved each day; or a filtered water turbidity of ≤ 0.1 NTU.
CT performance ratio (Viruses)	ENTERING WATER DISTRIBUTION SYSTEM	≥ 1.0
Treated Water pH		6.5 – 8.5
Treated Water Free Chlorine Residual	ENTERING WATER DISTRIBUTION SYSTEM (At the point T_{10} is measured for CT calculation)	≥ 0.8 mg/L
Treated Water Free Chlorine Residual	DISTRIBUTION: RANDOM LOCATIONS	≥ 0.1 mg/L AND < 4.0 mg/L
Treated Water Turbidity		≤ 5 NTU

TERMS AND CONDITIONS ATTACHED TO APPROVAL**AFTER DAF/ULTRA VIOLET WATERWORKS UPGRADE****TABLE 5-2: LIMITS – HERITAGE POINTE WATERWORKS**

PARAMETERS	DESIGNATED SAMPLING LOCATION	LIMIT
The UV Dose in each of the two UV reactors: <ul style="list-style-type: none"> shall be greater than the UV Dose specified by the UV system manufacturer's validation certificate to achieve the log reduction of <i>Giardia</i> and <i>Cryptosporidium</i> required in this approval; and may be out of the validated range for less than 2% of the time daily and 1% of the time monthly. 		
Treated Water Turbidity	FILTER UNIT #1 EFFLUENT FILTER UNIT #2 EFFLUENT FILTER UNIT #3 EFFLUENT FILTER UNIT #4 EFFLUENT (use: After each filter prior to entering the treated water reservoir)	≤ 0.3 NTU, and not to exceed 1 NTU for a cumulative period of 15 minutes per day per filter
Ultraviolet light Transmittance of filtered water	PRIOR TO ULTRAVIOLET LIGHT REACTOR UNIT #1 PRIOR TO ULTRAVIOLET LIGHT REACTOR UNIT #2 (use: Filtered water prior to ultraviolet light reactor)	$\geq 85\%$ per cm
Ultraviolet light Sensor Reading	ULTRAVIOLET LIGHT REACTOR UNIT #1	As a percentage to demonstrate > 40 mJ/cm ²
Maximum flow rate of water pumped through the Ultraviolet light Reactor	ULTRAVIOLET LIGHT REACTOR UNIT #2	29.0 L / sec
Volume (Minimum Reservoir volume)	CLEARWELL RESERVOIR	171.7 m ³
Treated Water Minimum Free Chlorine Residual	ENTERING WATER DISTRIBUTION SYSTEM (At the point T ₁₀ is measured for CT calculation)	≥ 0.3 mg/L
CT performance ratio (Viruses)	ENTERING WATER DISTRIBUTION SYSTEM	≥ 1.0
Treated Water pH		6.5 – 8.5
Treated Water Free Chlorine Residual	DISTRIBUTION: RANDOM LOCATIONS	≥ 0.1 mg/L and < 4.0 mg/L as Free Chlorine
Treated Water Turbidity		≤ 5 NTU

- 5.1.2 In addition to the limits specified in TABLE 5-1 and TABLE 5-2 as applicable, the waterworks system shall be maintained and operated in a manner so that the produced water and distributed water shall comply with the maximum acceptable concentrations specified in the *Guidelines for Canadian Drinking Water Quality* (GCDWQ), as amended.

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5.1.3 The approval holder shall receive the credits for log reduction of *Giardia* cysts, *Cryptosporidium* oocysts and viruses by:

- (a) DAF clarification and rapid sand filtration;
- (b) Ultraviolet disinfection; and
- (c) chlorine disinfection;

as listed in TABLE 5-3 when the approval holder meets all applicable requirements of this approval.

TABLE 5-3: LOG REDUCTION CREDITS OF *GIARDIA* CYSTS, *CRYPTOSPORIDIUM* OOCYSTS AND VIRUSES

WATER TREATMENT PROCESS	APPROVAL CONDITION THAT MUST BE ACHIEVED	LOG REDUCTION CREDIT		
		<i>Cryptosporidium</i>	<i>Giardia</i>	Viruses
DAF Clarification and rapid sand Filtration	5.1.4	3	3	2
Ultraviolet Disinfection	5.1.5	3	3	0
Chlorine Disinfection	5.1.8	0	0	2

DAF CLARIFICATION and FILTRATION

5.1.4 The DAF clarification and rapid sand filtration log reduction credit in TABLE 5-3 shall apply only when the water is treated to produce water entering the treated water chlorine contact storage that meets the treated water turbidity limits set in TABLE 5-2.

ULTRA VIOLET LIGHT DISINFECTION

5.1.5 The Ultra Violet disinfection log reduction credits in TABLE 5-3 shall apply only when the filtered water is disinfected by Ultra Violet equipment that:

- (a) has formal third party reactor validation that meets the requirements of one of the following standards:
 - (i) AWWARF/NWRI Ultraviolet Guideline,
 - (ii) USEPA Ultraviolet Guidance Manual, or
 - (iii) DVGW Technical Standard W 294;

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- (b) is installed in accordance with:
 - (i) the Ultraviolet system manufacturer's recommendations, and
 - (ii) the requirements of this approval;
- (c) is operated in accordance with:
 - (i) the Ultraviolet system manufacturer's recommendations for operation of the Ultraviolet system, and
 - (ii) the requirements of this approval;
- (d) achieves a Ultraviolet Dose greater than the required Ultraviolet Violet Dose specified in the Ultraviolet system manufacturer's validation certificate for the required log reduction of *Giardia* cysts and *Cryptosporidium* oocysts specified in TABLE 5-3; and
- (e) does not exceed the flow rate of 29.0 Liters per second through each Ultra Violet reactor.

CHLORINE DISINFECTION

5.1.6 The chlorine disinfection log reduction credit for viruses in TABLE 5-3 shall apply only when the approval holder achieves a CT performance ratio equal to or greater than 1, where:

- (a) CT_{achieved} is calculated using Equation 5.1; and
- (b) CT_{required} is determined from *Appendix B, Table B-1 - CT Values for Inactivation of Viruses By Free Chlorine*, of the Alberta Environment Standards, as amended, using daily water treatment plant data, as follows:
 - (i) treated water free chlorine residual concentration entering the water distribution system (at the point where the Log reduction is determined), as per TABLE 6-1,
 - (ii) raw water temperature, as per TABLE 6-1, and
 - (iii) treated water pH, as per TABLE 6-1.

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EQUATION 5.1:

$$CT_{\text{achieved}} = C \times \frac{T_{10}}{T} \times \frac{V_{\text{min}}}{Q_{\text{peak}}}$$

Where: C = free chorine residual concentration (in milligrams per litre) at the point T₁₀ is measured, as per TABLE 6-1;

T₁₀/T = 0.3 or

T₁₀ = the contact time (in minutes) established from the most recent tracer study;

T = the calculated contact time, assuming no short-circuiting, (in minutes) obtained by dividing the treated water chlorine contact storage volume that was used to determine the T₁₀, by the flow that was used to determine the T₁₀; and

V_{min} = the daily minimum volume of the treated water chlorine contact storage reservoir;

Q_{peak} = the maximum recorded hourly flow (Litres per minute) or twice the daily average flow (Litres per minute)

PART 6: MONITORING AND REPORTING

SECTION 6.1: WATERWORKS

6.1.1 The approval holder shall monitor the waterworks system as required in TABLE 6-1 or TABLE 6-2 (as applicable).

6.1.2 The approval holder shall record and report as required in TABLE 6-1 or TABLE 6-2 (as applicable).

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**TABLE 6-1: MONITORING AND REPORTING
HERITAGE POINTE WATERWORKS SYSTEM**

PARAMETERS	FREQUENCY	SAMPLE TYPE	SAMPLING LOCATION	REPORTING FREQUENCY		Report To
				MONTHLY	ANNUAL	
WATERWORKS SYSTEM						
<i>Giardia lamblia</i> concentration in raw water	Once every three months	Grab	ENTERING TREATMENT PLANT (PRIOR TO CHEMICAL ADDITION)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Raw water turbidity	Once / day	Grab				
Raw water pH	Once / day	Grab				
Raw water temperature	Once / day	Grab				
Treated Water Turbidity	Once / day	Grab	COMBINED FILTERED EFFLUENT (use: Combined filtered effluent entering the treated water reservoir)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Treated water Flow	Once / day	Continuously (recorded as Maximum hourly flow rate)	ENTERING CLEARWELL RESERVOIR	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Treated water volume	Once / day	Metered (recorded as m ³)	CLEARWELL RESERVOIR	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Treated Water pH	Once / day	Grab	ENTERING WATER DISTRIBUTION SYSTEM	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Treated Water Turbidity	Once / day	Grab				
CT Performance Ratio (CT _{actual} /CT _{required})	Once / day	Calculated				
Treated Water Free Chlorine Residual	Once / day	Grab	ENTERING WATER DISTRIBUTION SYSTEM (At the point T ₁₀ is measured for CT calculation)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Name, concentration and the dosage of the chemicals added	Once per week	N/A	To the water treatment process	As per 6.1.5	As per 6.1.8	Director
Treated Water Free Chlorine Residual	Once / week	Grab	DISTRIBUTION: RANDOM LOCATIONS	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director
Treated Water Turbidity	Once / week	Grab				
Bacteria in Treated Water (Bacteriological Analysis)	4 samples per month (or as required by the GCDWQ)	Grab	DISTRIBUTION: BACTERIOLOGICAL, RANDOM LOCATIONS	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8	Director

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**TABLE 6-2: MONITORING AND REPORTING
UPGRADED HERITAGE POINTE WATERWORKS SYSTEM**

PARAMETERS	FREQUENCY	SAMPLE TYPE	SAMPLING LOCATION	NON-EMERGENCY REPORTING FREQUENCY	
				MONTHLY	ANNUAL
RAW WATER					
Raw water pH	Once per day	Continuous monitoring	ENTERING TREATMENT PLANT (PRIOR TO CHEMICAL ADDITION)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8
Raw water Temperature (CT)					
Raw water Turbidity					
Raw water <i>Giardia lamblia</i> concentration	Once per year	Grab sample			
WATER TREATMENT PLANT (4 Filters)					
Treated Water Turbidity	Continuous	Continuous monitoring	FILTER UNIT #1 EFFLUENT FILTER UNIT #2 EFFLUENT FILTER UNIT #3 EFFLUENT FILTER UNIT #4 EFFLUENT (use: After each filter prior to entering the treated water reservoir)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8
pH of Treated Water	Once per day	Continuous monitoring	ENTERING WATER DISTRIBUTION SYSTEM		
Treated water volume	Continuous	Metered			
CONTACT TIME (CT-VIRUSES)					
Minimum volume in clear well reservoir (m³)	Once per day	Measured	CLEARWELL RESERVOIR	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8
Free Chlorine Residual of Treated Water	Continuous	Continuous monitoring	ENTERING WATER DISTRIBUTION SYSTEM (At the point T ₁₀ is measured for CT calculation)		

TERMS AND CONDITIONS ATTACHED TO APPROVAL

PARAMETERS	FREQUENCY	SAMPLE TYPE	SAMPLING LOCATION	NON-EMERGENCY REPORTING FREQUENCY	
				MONTHLY	ANNUAL
CTrequired by Free Chlorine (Viruses)	Once per day	Determined from the “CT Values for inactivation of Viruses by Free Chlorine” in Appendix B of the AENV Standards and Guidelines	ENTERING WATER DISTRIBUTION SYSTEM (At the point T ₁₀ is measured for CT calculation)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8
CTlowest actual by Free Chlorine (Viruses)	Once per day	Calculated			
CT performance ratio (Viruses)	Once per day	CTlowest actual / CTrequired			
ULTRA VIOLET LIGHT DISINFECTION (2 UV Reactors)					
Ultra Violet transmittance of filtered water	Once per day	Continuous monitoring	PRIOR TO ULTRAVIOLET LIGHT REACTOR UNIT #1 PRIOR TO ULTRAVIOLET LIGHT REACTOR UNIT #2 (use: Filtered water prior to ultraviolet light reactor)	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8
Ultra Violet sensor reading	Once per day (recorded as Average)	Continuous taken at instantaneous readings of no more than 5 minute intervals	ULTRAVIOLET LIGHT REACTOR UNIT #1		
Flow rate of water pumped through Ultra Violet reactor	Continuous taken at instantaneous readings of no more than 5 minute intervals.	Continuous monitoring with data logging to record daily minimum, maximum and total.	ULTRAVIOLET LIGHT REACTOR UNIT #2		
TREATED WATER DISTRIBUTION SYSTEM					
Free Chlorine Residual of Treated Water	Once per week	Grab sample	DISTRIBUTION: RANDOM LOCATIONS	As per 6.1.5 and Electronically as per 6.1.7	As per 6.1.8
Bacteria in Treated Water (Bacteriological Analysis)	4 samples per month (or as required by the GCDWQ)		DISTRIBUTION: BACTERIOLOGICAL, RANDOM LOCATIONS		

6.1.3 If the water treatment plant is not operated on any calendar day, then:

- (a) monitoring of the water treatment plant as outlined in TABLE 6-1 or TABLE 6-2 (as applicable), is not required on that calendar day; and

TERMS AND CONDITIONS ATTACHED TO APPROVAL

- (b) the monitoring report shall indicate that the water treatment plant did not produce water on that day.

6.1.4 In addition to complying with 6.1.1, the approval holder shall collect a minimum of two samples of *treated water* each year according to the following:

- (a) the treated water shall be collected prior to the water distribution system;
- (b) one grab sample shall be collected during the winter months of January, February, March;
- (c) one grab sample shall be collected during the summer months of July, August, September; and
- (d) the samples shall be analyzed for:
 - (i) Turbidity, Total Dissolved Solids, Calcium, Magnesium, Hardness, Sodium, Nitrite-Nitrogen + Nitrate-Nitrogen, Ammonia-Nitrogen, Total Alkalinity, Fluoride, Nitrite-Nitrogen, Total Organic Carbon, Aluminum, Copper, Lead, Trihalomethanes, and
 - (ii) any other parameters as may be required in writing by the Director;

and

- (e) the analyses shall be conducted by an independent laboratory.

6.1.5 The approval holder shall compile and retain a Monthly Waterworks Report which shall include all the following:

- (a) the requirements of TABLE 6-1 or TABLE 6-2 (as applicable);
- (b) name of the supervising operator responsible for the operation of the waterworks system;
- (c) on a daily basis, the name, concentration and dosage of each chemical that is added to the water treatment process;
- (d) a description of any incidence which required reporting as per 2.1.1; and
- (e) a summary of any operational problems.

6.1.6 Until otherwise notified in writing by the Director, submission of Monthly Waterworks Report to the Director is not required.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

- 6.1.7 When notified in writing by the Director the approval holder shall report MONTHLY by electronic reporting the requirements as specified in TABLE 6-1 or TABLE 6-2 as electronic, to the Director prior to the end of the month following the month in which the information on which the report is based was collected.
- 6.1.8 The approval holder shall compile an Annual Waterworks Report which shall include the following:
- (a) the monthly average of each parameter monitored, as outlined in TABLE 6-1 or TABLE 6-2 (as applicable);
 - (b) maximum and minimum daily value of each parameter monitored, as outlined in TABLE 6-1 or TABLE 6-2 (as applicable), for each month;
 - (c) the result of the chemical analysis of water as required in 6.1.4;
 - (d) name of the supervising operator responsible for the operation of the waterworks system;
 - (e) a calculation of the uncommitted hydraulic reserve capacity for the water treatment plant;
 - (f) any incidence which required reporting as per 2.1.1; and
 - (g) a summary of any operational problems.
- 6.1.9 If the approval holder monitors for any substances or parameters which are the subject of operational limits as set out in this approval more frequently than is required and using procedures authorized in this approval, then the approval holder shall provide the results of such monitoring as an addendum to the Annual Waterworks Report.
- 6.1.10 Until otherwise notified in writing by the Director, the approval holder shall submit one copy of the Annual Waterworks Report to the Director on or before February 28 of the year following the year in which the information on which the report is based was collected.
- 6.1.11 When notified in writing by the Director the approval holder shall report ANNUALLY by electronic reporting the requirements specified in the written notice, to the Director on or before February 28 of the year following the year in which the information on which the report is based was collected.

TERMS AND CONDITIONS ATTACHED TO APPROVAL

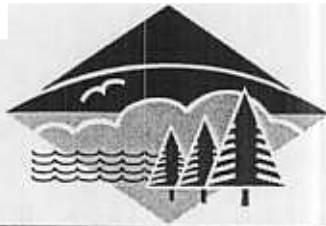
PART 7: RECLAMATION & DECOMMISSIONING

SECTION 7.1: GENERAL

- 7.1.1 Within six months of the water treatment plant permanently ceasing operation, the approval holder shall:
- (a) submit a decommissioning and land reclamation plan to the Director, and
 - (b) not commence reclamation or decommissioning until the approval holder has received written authorization from the Director.

DATED February 23, 2007

David Ardell
DESIGNATED DIRECTOR UNDER THE ACT
DAVID L. ARDELL, P.ENG.



L I C E N C E

PURSUANT TO THE PROVISIONS
OF THE *WATER ACT*

LICENCE No. 00145925-00-00

FILE No. 23549

PRIORITY No. 1989-06-01-003

Upper Lakes Group Inc.
RR 1
De Winton, Alberta
T0L 0X0

is authorized to divert 341,590 cubic metres of water annually from the Bow River in SE 08-022-29-W4 for the purpose of Golf Course Irrigation, Park Irrigation, and Storage subject to the attached conditions.

Upper, Bow Region

2001-07-10

Dated (Y/M/D)

CONDITIONS

DIVERSION OF WATER

1.

This licence is appurtenant to SE 08-022-29-W4, 05-022-29-W4. and E1/2 01-022-01-W5 as shown on Plan no. 00023549-P039.
2.

The licensee shall undertake the water diversion in accordance with the plans and/or reports filed in the following Departmental records:

NUMBER	TITLE
23549-10	Irrigation Supply Reservoir Sections and Details
23549-19	Plan Profile of Intake and Pumphouse Site Plan
23549-20	Intake Details
23549-34	Lower Reservoir Plan, Sections, and Details
23549-35	Upper Reservoir Plan, Sections and Details
23549-36	Upper Reservoir Sections and Details
23549-37	Impact Basin Details
00023549-P039	Heritage Pointe Master Plan

3.

The licensee shall only divert water from the Bow River when the flow passing the point of the water diversion is equal to or exceeds the instream objectives as defined in the attached Schedule 1 and after downstream prior licensees water needs have been fulfilled.
4.

The Director reserves the right to establish water conservation objectives upon 12 months written notice to the licensee.
5.

This licence is based on knowledge available at the time of issue, and therefore the Director reserves the right to amend the

(a)

instream objectives in schedule 1 above which the licensee may divert water under this licence

(b)

monitoring systems and the annual water monitoring information requirements

(c)

rate of water diversion and quantity of water allocated, and

(d)

offstream storage or alternative sources of water supply,

anytime there is information indicating unreasonable interference due to the operation of the project on

- (e)

the source of water supply
- (f)

other water users



CONDITIONS

- (g) instream objectives, and
- (h) the aquatic environment

which cannot be satisfactorily remedied.

6. To protect the aquatic environment, the licensee shall reduce the rate of water diversion or cease diverting when ordered by the Director or other authorized officer of the department.

MONITORING AND REPORTING

7. The licensee shall submit an annual water monitoring report to the Director on or before January 31st in each year for that calendar year indicating

- (a) periods and rates of water diversion
- (b) total annual quantity of water diverted
- (c) total area irrigated

and any other information requested by the Director.

GENERAL

8. The licensee shall hold harmless the Minister of Environment or any other agent of the Government of Alberta for damage or damage claims arising out of the water diversion.

9. When requested by the Director, the licensee shall release water to household users and prior licensees.

The licensee shall install facilities for the release of water to household users and prior licensees, when requested by the Director.

The rights and privileges granted are subject to periodic review by the Director to ensure the most beneficial use of the water in the public interest.

12. Where applicable, the licensee shall only release water to a water body when the quality of water is equal to or better than the quality of water in the receiving water body.



Licence No. 00145925-00-00
File No. 23549

CONDITIONS

gion

2001-07-10
Dated (Y/M/D)



ENVIRONMENT

LICENCE to DIVERT AND USE WATER

Pursuant to the
WATER RESOURCES ACT

File No. 23548
Priority No. 1990-12-21-01

Purpose Municipal
Drainage Basin Bow River
First Issued 1993-07-26
Thornmark Utilities Corporation
R.R. 1
DeWinton, Alberta
T0L 0X0

HAVING COMPLIED with the applicable provisions of the Water Resources Act and the regulations thereunder and Interim Licence No. 16896, a copy of which is attached hereto and incorporated herein,

IS HEREBY GRANTED LICENCE to divert and use the quantities of water prescribed in the interim licence in accordance with and subject to all other applicable provisions of the Act and the regulations thereunder, and the conditions attached hereto and incorporated herein, at locations described in the interim licence,

BY MEANS AND THROUGH works and undertakings described in the interim licence

1993-07-26

Dated



ENVIRONMENT

INTERIM LICENCE

Pursuant to the
WATER RESOURCES ACT
Nº 16896

Thornmark Capital Corporation
Suite 520, 333 - 5th Avenue, S.W.
Calgary, Alberta
T2P 3B6

TRANSFER RECORDED

File No. 23548
Priority No. 1990-12-21-01

having complied with the applicable provisions of the Water Resources Act and the regulations thereunder is hereby authorized, as soon as right-of-way is obtained:

A. To construct works as shown on plans and reports filed, approved and identified in departmental records as:

W.R. NO.	DRAWING	TITLE
23548-8	2199-32	Location and Key Plan
23548-9	2199-33	Water and Sanitary Piping Overall
23549-10	2199-34	Water Treatment Plan - Site Plan
23548-11	2199-35	Water Treatment Plan - Floor Plan
23548-16	2199-40	Upper Reservoir Valve Chamber Detail

B. To divert and use water as hereinafter specified and described subject to the terms and conditions attached hereto and incorporated herein:

PURPOSE: Municipal (community water supply)

SOURCE OF SUPPLY: Bow River through existing works
(Priority No. 1989-06-01-03)

POINT OF DIVERSION: SE 8-22-29-4 rediverted at NW 5-22-29-4

GROSS DIVERSION: Up to 183.0 acre-feet annually consisting of

1. Estimated Consumptive Use: 183.0 acre-feet
2. Estimated Losses: NIL
3. Estimated Return Flow: NIL

DIVERSION RATE: 0.59 cubic feet per second
(220 gallons per minute)

The term within which construction is to be completed expires on 992 - 01-23

1991 - 01-23
Date Issued

TERM EXT
1993 - 01-23

Original — Department
Copy — Licensee (See over for excerpts)
WR2 (Jan./89)

s/2680

CONDITIONS - INTERIM LICENCE NO. 16896

1. The licensee is responsible for the construction, operation and maintenance of the works and for any damages that may result.
2. The licensee shall submit an annual water use return to the Controller of Water Resources, Alberta Environment on or before January 31st in each year for the preceding calendar year showing:
 - (a) periods and rates of diversion;
 - (b) the total monthly quantity of water diverted;
 - (c) the total annual quantity of water diverted;
 - (d) such other information as may be required from time to time.
3. This interim licence and any subsequent licence is subject to the letter dated January 23, 1991 from the Municipal District of Foothills No. 31 to the Water Resources Administration Division, Alberta Environment granting permission for the works to affect public road allowances.
4. The rights and privileges hereby granted are subject to periodic review and to modification to ensure the most beneficial use of the water in the public interest and more particularly to ensure preservation of the rights of other water users.
5. The rights and privileges granted can only be extended or modified with the approval of the Controller of Water Resources and are subject to cancellation or modification as provided in the Water Resources Act.
6. Following completion of the authorized works this interim licence and its conditions shall be attached to and become part of the licence to use water issued under the provisions of the Water Resources Act.

1991-01-23
Dated at Edmonton

**LICENCE TO DIVERT WATER
PROVINCE OF ALBERTA
WATER ACT, R.S.A. 2000, c.W-3, as amended**

LICENCE NO.: 00221643-00-00

FILE NO.: 23548

PRIORITY NO.: 2003-04-16-005

EFFECTIVE DATE: 2007-

EXPIRY DATE: 2032-

SOURCE OF WATER: Bow River

POINT OF DIVERSION: SE 08-22-29-W4

POINT OF USE: 05-22-29-W4 and E1/2 01-22-01-W5

LICENSEE: Corix Utilities (Foothills Water) Inc.

Pursuant to Division 2, of Part 4, of the *Water Act*, R.S.A. 2000, c.W-3, as amended, and the Approved Water Management Plan for the South Saskatchewan River Basin (Alberta) and the South Saskatchewan Basin Water Allocation Regulation, a licence is issued to the Licensee to:

operate a works and to divert up to 304,119 cubic metres of water annually at a maximum rate of diversion of 0.057 cubic metres per second from the source of water for the purpose(s) of Municipal (Subdivision Water Supply)

subject to the attached terms and conditions.

Designated Director under the Act: David L. Ardell, P. Eng.

Date Signed: 2007-

DEFINITIONS

- 1.0 All definitions from the Act and the Regulations apply except where expressly defined in this licence.
- 1.1 In all parts of this licence:
- (a) "Act" means the Water Act, RSA 2000, c. W-3, as amended;
 - (b) "Application" means the written submissions to the Director in respect of application number 001-00221643;
 - (c) "Director" means an employee of the Government of Alberta designated as a Director under the Act;
 - (d) "Point(s) of diversion" means the location(s) where water is diverted from the source of water;
 - (e) "Point of use" means the location(s) in which the diverted water is used by the Licensee for the licenced purpose;
 - (f) "Regulations" means the regulations, as amended, enacted under the authority of the Act.

GENERAL

- 2.0 The Licensee shall immediately report to the Director by telephone any contravention of the terms and conditions of this licence at 1-780-422-4505.
- 2.1 The terms and conditions of this licence are severable. If any term or condition of this licence is held invalid, the application of such term or condition to other circumstances and the remainder of this licence shall not be affected thereby.
- 2.2 The Licensee shall not deposit or cause to be deposited any substance in, on or around the source of water that has or may have the potential to adversely affect the source of water.

DIVERSION OF WATER

- 3.0 This licence is appurtenant to the following:
- (a) SE 08-22-29-W4 (Point of diversion); and
 - (b) 05-22-29-W4 and E1/2 01-22-01-W5 (Point of use) as shown of Plan no. 23548-P020;
- 3.1 The Licensee shall divert water only for the purpose(s) specified in this licence.
- 3.2 The Licensee shall divert water only from the source of water specified in this licence.
- 3.3 The Licensee shall divert water only from the following point(s) of diversion:

- (a) SE 08-22-29-W4;
- 3.4 The Licensee shall divert the water only to the following point(s) of use:
 - (a) 05-22-29-W4 and E1/2 01-22-01-W5 as shown of Plan no. 23548-P020
- 3.5 The works used to divert the water authorized by this licence shall include, at a minimum, all of the following:
 - (a) the raw water reservoir referred to in Plan nos. 23549-10 and 23548-P020 submitted with the Application;
 - (b) the intake structure referred to in Plan no. 23548-P020 submitted with the Application; and
 - (c) the screen on the pump intake with:
 - (i) openings no larger than 2.54 millimetres; and
 - (ii) a velocity of flow through the screen not exceeding 0.038 metres/second
- 3.6 The licensee shall cause any water entering a pump to first pass through the screen required in 3.5(c).
- 3.7 The Licensee shall not divert more than 304,119 cubic metres of water per year.
- 3.8 The Licensee shall not divert water at a rate of diversion greater than 0.057 cubic metres per second.
- 3.9 Prior to diverting any water from the source of water, the Licensee shall equip (the point of diversion/other works) with a (meter/or other specified device), which measures:
 - (a) cumulatively, the quantity of all water diverted; and
 - (b) the instantaneous rate of diversion.
- 3.10 The Licensee shall maintain each measuring device referred to in 3.9 at all times.
- 3.11 The Licensee shall calibrate each measuring device referred to in 3.9 in accordance with manufacturer's specifications.
- 3.12 The Director may amend this license to establish or change the In-stream Objectives or Water Conservation Objectives upon a minimum of 12 months written notice to the licensee.
- 3.13 The In-stream Objectives is as set out in Schedule 1 for the periods of time specified.
- 3.14 The licensee shall divert the water authorized by this licence only when there is sufficient water flow in the source of water to meet or exceed the In-stream Objectives set out in 3.13.

- 3.15 Unless otherwise authorized in writing by the Director, the In-stream Objectives in 3.13 is to be met at Water Survey of Canada Station No 05BH004 (Bow River at Calgary).

MONITORING AND REPORTING

- 4.0 Unless otherwise authorized in writing by the Director, the Licensee shall:
- (a) measure the total volume of water diverted each month using the meter specified in 3.9(a);
 - (b) measure the rate of diversion on a daily basis using the device specified in 3.9(b);
 - (c) monitor the rate of flow of water in the source of water, at the Water Survey of Canada Station No. 05BH004 daily, while water is being diverted
- 4.1 The Licensee shall record and retain all of the following information for a minimum of 5 years after being collected:
- (a) the place, date and time of all monitoring and measuring;
 - (b) the results obtained pursuant to 4.0; and
 - (c) the name of the individual who conducted the monitoring and measuring stipulated in (a) and (b).
- 4.2 The licensee shall compile an Annual Water Use Report on or before February 28th of each year following the year in which the information on which the report is based was collected.
- 4.3 The licensee shall retain each Annual Water Use Report for a minimum of 5 years.
- 4.4 The Licensee shall submit an Annual Water Use Report to the Director:
- (a) on or before February 28th of each year following the year in which the information on which the report is based was collected; or
 - (b) within a time period specified in writing by the Director.
- 4.5 The Annual Water Use Report shall include, at a minimum, the following information collected during the previous year:
- (a) the total annual number of cubic metres of water diverted from the source of water;
 - (b) the results obtained pursuant to 4.0; and
 - (c) any other information required in writing by the Director.

COMPLAINT INVESTIGATION

5.0 The Licensee shall:

- (a) investigate all written complaints accepted by the Director relating to allegations of surface water and groundwater interference as a result of the diversion of the water or operation of the works; and
- (b) provide a written report to the Director, within a time specified in writing by the Director, detailing the results of the investigation relating to the complaint accepted by the Director in 5.0(a).

5.1 The Licensee shall satisfy the Director that the report submitted pursuant to 5.0(b) has identified remedial and/or mitigative measures relating to the alleged interference.

DATE SIGNED: _____

DESIGNATED DIRECTOR UNDER THE ACT

David L. Ardell, P. Eng.