#### **SCHEDULE 18**

#### TECHNICAL REQUIREMENTS

#### 1. GENERAL

#### 1.1 INTRODUCTION

This Schedule 18 (Technical Requirements) sets out the general technical requirements applicable to the design, construction, operation, maintenance and handback of the waterworks and wastewater systems. Any review by the Province or any representative appointed by the Province under the DBFO Agreement does not imply approval or acceptance and the responsibility remains with the Contractor to meet the requirements of the DBFO Agreement in every respect.

The information in the Technical Requirements is organized as follows:

Section 1 – Introduction & Definitions

Section 2 – Description of Water and Wastewater Systems

Section 3 – Contractor's Management Systems and Plans

Section 4 – Infrastructure Design and Performance Requirements

Section 5 – Infrastructure O&M Requirements

Section 6 – Handback Requirements

Section 7 – Existing Facilities O&M Requirements

References to section numbers are to section numbers of this Schedule 18 (Technical Requirements) unless noted otherwise.

References to the Standards and Guidelines are to the Standards and Guidelines that existed as of the deadline for the submission of SR Package 2 (as set out in the RFP), unless expressly stated otherwise.

#### 1.2 DEFINED TERMS

In this Schedule 18 (Technical Requirements), "includes" means "includes without limitation", "including" means "including without limitation", and "any" means "any and all".

In this Schedule 18 (Technical Requirements), capitalized terms shall have the meanings set out in section 1.1 of the DBFO Agreement (as defined below) and the following expressions shall have the following meanings (and where applicable their plurals have the corresponding meanings), except where a contrary meaning is clearly intended:

"14 Day Performance Test" means the demonstration and testing of the PWTP and the WWTP to successfully meet the Technical Requirements for a minimum of 14 consecutive days as described in Section 4.12.1;

"AE Standards and Guidelines" means the most current version of the Alberta Environment Standards and Guidelines for Municipal Waterworks, Wastewater and Storm Drainage Systems (the edition current as of the then relevant time of application);

- "Alberta Environment" means the Government of Alberta Ministry of Environment and Sustainable Resource Development;
- "Annual Asset Management Report" has the meaning ascribed in Section 5.7.7;
- "Annual Quality Management System Report" has the meaning ascribed in Section 3.2.5;
- "Annual Dependability Test" means the annual testing of the PWTP, the WWTP and the Potable Water Distribution System to demonstrate that the Infrastructure can deliver the Design Capacity; this will be evidenced by repeating the Hydraulic Capacity Tests (see Section 4.12.1.2 (Hydraulic Capacity Tests)) in accordance with the procedure set out in the Commissioning and Startup Plan, or an alternate procedure agreed to in advance and in writing by the Department;
- "Approved Planned Maintenance" has the meaning ascribed in Section 5.7.9;
- "Architect" means an individual who holds a certificate of registration to engage in the practice of architecture under the *Architects Act*, R.S.A. 2000, c. A-44, as may be amended or replaced from time to time;
- "Asset Management Plan" has the meaning defined in Section 3.8.13;
- "Asset Register" shall have the meaning ascribed in Section 3.8.13;
- "Available Capacity" means the hydraulic capacity of the PWTP, the Potable Water Distribution System, and the WWTP that is available to treat, store and convey Treated Water and Treated Wastewater respectively; the maximum Available Capacity is the Design Capacity;
- "BOD5" means the biochemical oxygen demand expressed as milligrams per litre measured at 20°C over a five day period;
- "Barrier Lake Lagoons and Sludge Drying Beds" means those lands and facilities located on the North ½ of Section 10 Township 24 Range 8 West of the 5th Meridian and as shown on drawing 12-13-2.36 forming part of the Schedule 12 Appendix B-Lands and Work Sites Drawings attached to Schedule 12 to the DBFO Agreement;
- "Boil Water Advisories" means a notice issued to the waterworks system End-users containing recommendations to boil water for human consumption in order to protect public health:
- "CaGBC" means the Canada Green Building Council;
- "cBOD5" means the carbonaceous biochemical oxygen demand expressed as milligrams per litre measured at 20°C over a five day period after the nitrogenous demand has been inhibited with an inhibitory chemical;

- "CDWQG" means the Canadian Drinking Water Quality Guidelines developed by the Federal-Provincial-Territorial Committee on Drinking Water and published by Health Canada;
- "CMMS" (Computerized Maintenance Management System) means the hardware solution and a software system that is used to plan, organize and keep records of the maintenance of the equipment and facilities comprising the Infrastructure;
- "CT" means disinfectant residual in mg/L multiplied by the time taken in minutes for 10% of the water to pass through the particular process unit;
- "Call Centre" means the telephone contact line and database tracking system provided by the Contractor for the purposes of providing a single point of contact for receiving and recording all incidents and events related to the performance of the O&M as they pertain to the Endusers, as described in Sections 5.6.12;
- "Call Centre Plan" has the meaning ascribed in Section 3.8.11;
- "Code of Practice for Wastewater Systems Using a Wastewater Lagoon" means the Alberta Environment Code of Practice for Wastewater Systems using a wastewater lagoon made under the Environmental Protection and Enhancement Act, R.S.A. 2000, c. E-12 and the Wastewater and Storm Drainage Regulation, A.R. 119/1993, as may be amended or replaced from time to time;
- "Collaboration Plan" has the meaning ascribed in Section 3.5;
- "Commissioning and Startup Plan" has the meaning ascribed in Section 3.7.5;
- "Construction Management Plan" has the meaning ascribed in Section 3.7.3;
- "Construction Occupational Health and Safety Plan" has the meaning ascribed in Section 3.7.4;
- "Construction Period Plans" means the Contractor's Management Systems and Plans for the Construction Period as set out in Section 3.7;
- "Contractor Construction Representative" has the meaning ascribed thereto in Section 4.11.2;
- "Contractor's Engineer of Record" means the Professional Engineer or engineers that are employed by or retained by the Contractor and who have stamped and signed drawings for the Project as a Professional Engineer (P. Eng.);
- "Contractor O&M Representative" has the meaning as ascribed thereto in Section 5.3;
- "DBFO Agreement" means the Agreement to Design, Build, Finance and Operate Evan-Thomas Water and Wastewater Treatment Facilities Upgrade, Kananaskis Country, Alberta,

between Her Majesty the Queen in right of Alberta and the Contractor, as defined therein, to which agreement this Schedule 18 (Technical Requirements) is attached;

- "Declared Capacity" means the Available Capacity of the PWTP, the Potable Water Distribution System, and the WWTP declared by the Contractor in its Monthly Invoice; the maximum Declared Capacity is the Design Capacity;
- "Demolition and Decommissioning Plan" has the meaning ascribed in Section 3.7.9;
- "**Department**" means the Province, as represented by the Minister of Infrastructure, or it's expressly authorized representatives or agents;
- "**Design Capacity**" means the hydraulic capacity that the PWTP, the Potable Water Distribution System and the WWTP must be designed and constructed to achieve as defined in Tables 4.5.2.1.B, 4.5.2.1.C and 4.6.1.5, respectively;
- "**Design Plan**" has the meaning ascribed in Section 3.7.2;
- "**Detailed Designs**" means the plans, specifications and drawings that the Contractor is required to provide pursuant to section 5.9 of the DBFO Agreement;
- "Drinking Water Safety Plan" has the meaning ascribed in Section 3.8.4;
- "EPEA" or "Environmental Protection and Enhancement Act" means the *Environmental Protection and Enhancement Act*, R.S.A. 2000, c. E-12, as may be amended or replaced from time to time;
- "EQ Tank" means the equalization tank, discharge pumping, and all associated equipment and controls at Nakiska Base which forms part of the Existing Facilities as described in Section 2.9.6;
- "Emergency Response Plan" has the meaning ascribed in Section 3.8.2;
- "End-users" means the persons, residences, businesses, lessees, operators and institutions who are supplied with Treated Water by the PWTP, connected through the Potable Water Distribution System, or whose sanitary sewer systems are connected to the WWTP through the Wastewater Collection Network at the following facilities within or adjacent to the Evan-Thomas Provincial Recreation Area:
- (a) Mount Kidd R.V. Park;
- (b) Kananaskis Golf Course;
- (c) Kananaskis Village;
- (d) Kananaskis Village Staff Housing;
- (e) Kananaskis Emergency Services Centre;
- (f) Boundary Ranch; and
- (g) Nakiska Ski Hill.

- "Environmental Management System" has the meaning ascribed thereto in Section 3.3;
- "Evan-Thomas Provincial Recreation Area" means the recreational area that forms part of Kananaskis Country; a network of provincial parks and recreational areas managed by Alberta Tourism, Parks and Recreation under the *Provincial Parks Act*, R.S.A. 2000, c. P-35, as may be amended or replaced from time to time;
- "Existing Facilities End-users" means the persons, residences, businesses, lessees, operators and institutions who are supplied with treated water by the existing Evan-Thomas potable water treatment plant, connected through the existing Evan-Thomas potable water distribution system, or whose sanitary sewer systems are connected to the existing Evan-Thomas wastewater treatment plant through the existing wastewater collection network at the following facilities within or adjacent to the Evan-Thomas Provincial Recreation Area:
- (a) Mount Kidd R.V. Park;
- (b) Kananaskis Golf Course;
- (c) Kananaskis Village;
- (d) Kananaskis Village Staff Housing;
- (e) Kananaskis Emergency Services Centre; and
- (f) Boundary Ranch.
- "Existing Facilities Licenses" means the EPEA registrations, approvals and licenses for the Existing Facilities, including (a copy of which the Contractor hereby acknowledges as having received):
- (a) Evan-Thomas WTP EPEA Approval EPEA license #1517-02;
- (b) Evan-Thomas Raw Water Well(s) EPEA License EPEA licence to Divert and Use Water #11148;
- (c) Evan-Thomas WWTP EPEA Approval EPEA license #1518-02; and
- (d) Barrier Lake Lagoon EPEA Registration EPEA Registration # 395-03;
- "Existing Facilities O&M Plan" has the meaning ascribed in Section 3.9.2;
- **"Existing Facilities Occupational Health and Safety Plan"** has the meaning ascribed in Section 3.9.3:
- "Flow Meters" means a metering device that measures, calculates and records flow as described in Section 4.7.3.1;
- "GWUDI" means groundwater under the direct influence of surface water as described in the AE Standards and Guidelines:
- "Good Industry Practice" means using standards, practices, methods and procedures to a good commercial standard, conforming to applicable laws and relevant Standards and Guidelines and exercising that degree of skill, care, prudence and foresight and industry

practices which could reasonably and ordinarily be expected from a qualified, skilled and experienced person engaged in the same type of undertaking as that of the Contractor, under the same or similar circumstances;

"Governmental Authority" means any federal, provincial, territorial, regional, municipal or local governmental authority, quasi-governmental authority, court, government or self-regulatory organization, commission, board, tribunal, organization or any regulatory, administrative or other agency or any political or other subdivision, department or branch of any of the foregoing, having jurisdiction in any way over any aspect of the performance of the Project, the O&M or the Existing Facilities O&M, in each case to the extent it has or performs legislative, judicial, regulatory, administrative or other functions within its jurisdiction;

"HMI" (Human-Machine Interface) means the industrial computer work station and portable personal display units which allow viewing of the various process area real-time graphics, alarms, changing of process parameters and modes and other operator control actions;

"HVAC" means heating, ventilation and air conditioning;

"Handback on Expiry Plan" has the meaning ascribed in Section 3.6;

"Hydraulic Capacity Tests" means the testing of the PWTP, the WWTP and the Potable Water Distribution System to demonstrate that it can successfully treat, store and convey the Design Capacity;

"Indicative Detailed Designs" means the detailed designs prepared by the Department and used for the purpose of environmental permit consultation and preliminary applications, a copy of which the Contractor hereby acknowledges as having received;

"Infrastructure Licenses" means any approval or permit from a Governmental Authority that permits or governs the use of the Infrastructure or permits an activity to take place within the Infrastructure, including but not limited to the Existing Facilities Licenses, any amendment to the Existing Facilities Licenses, and any new or replacement licenses obtained by the Contractor or in the name of the Contractor for or on behalf of the Department;

"Infrastructure Performance Failure" means a failure in the functional performance of the Infrastructure to fulfil the Technical Requirements resulting in an interruption, reduction, or degradation of the service delivered to the End-users, including but not limited to:

- (a) a failure to deliver the specified quantity and quality of Treated Water to the End-users including, interruption or abatement of the delivery of Treated Water, low Treated Water pressure in the Potable Water Distribution System, low Treated Water flow or no Treated Water flow to the End-user service connections, and taste or odour complaints from the End-users;
- (b) a failure of the Potable Water Distribution System to meet the specified fire-fighting requirements including, a shortfall in the fire-fighting water stocks, insufficient fire-fighting flows and/or pressures, and fire hydrants out of service; and

(c) a failure in the functional performance of the Wastewater Collection Network resulting in a service interruption to the End-users, or sewer flooding or sewer back-up(s);

"Interface Protocol" has the meaning ascribed in Section 3.7.8;

"Independent Reviewer" means the person or persons responsible for conducting independent checking and review of the Contractor's Designs and the Detailed Designs in fulfilment of the requirements of the QMS as defined in Section 3.2.4; the reviewer shall be a qualified Professional Engineer or Architect, as applicable in view of the design in issue, and may be employed by the legal entity doing the design work;

"Level Monitor" means a level measurement instrument that measures, calculates and records water level as described in Section 4.7.3.3;

"License Management Plan" has the meaning ascribed in Section 3.8.9;

"Log Reduction" means the base 10 logarithm of the ratio of raw water concentrations divided by the treated water concentration of total *Giardia cysts*, *Cryptosporidium oocysts* or viruses;

"Major Incidents" means any event or incident that is notifiable to Alberta Environment, Environment Canada or Alberta Health Services which presents a threat to public health or the environment, including Boil Water Advisories, Water Usage Advisories, any other public health warning and any environmental pollution event or incident;

"Megalitre" means one million litres;

"Monthly Call Centre Report" has the meaning ascribed in Section 5.6.12.3;

"Monthly Invoice" has the meaning ascribed in Section 5.7.5;

"Monthly Water and Wastewater Quality Reports" has the meaning ascribed in Section 5.6.2.6;

"Mount Kidd R.V. Park" means those lands and facilities located at Mount Kidd recreational service area, including the R.V. Park, campground and main lodge and as shown on drawings 12-B-2.01 to 12-B-2.03 forming part of the Schedule 12 Appendix B-Lands and Work Site Drawings attached to Schedule 12 to the DBFO Agreement;

"N+1" means unit(s) (N) that have at least one independent backup unit (+1) such that with the largest single unit out of service, the remaining unit(s) shall provide the required treatment capacity;

"NTU" means the unit of turbidity measured in Nephelometric Turbidity Units in which system water containing one milligram of finely divided silica per litre has a turbidity of one Nephelometric Turbidity Unit;

- "Nakiska Base" means those lands and facilities located at the base of the Nakiska Ski Hill and shown on drawings 12-B-2.32 to 12-B-2.35 included in the Schedule 12 Appendix B-Lands and Work Sites Drawings in Schedule 12 to the DBFO Agreement;
- "Nakiska Ski Hill" means those lands and facilities located at the Nakiska Ski area, including but not limited to the Nakiska Base and Snowmaking Building, and shown on drawings 12-B-2.32 to 12-B-2.35 forming part of the Schedule 12 Appendix B-Lands and Work Sites Drawings attached to Schedule 12 to the DBFO;
- "Noise Control Plan" has the meaning ascribed in Section 3.8.6;
- "**O&M Manuals**" means the manuals prepared by the Contractor for the Infrastructure containing detailed operating and maintenance procedures and other specific instructions, policies, directives, routines, schedules, and other matters related to the O&M, as is more particularly described in Section 5.5.2;
- "O&M Occupational Health and Safety Plan" has the meaning ascribed in Section 3.8.3;
- "Occupational Health and Safety Act" means the *Occupation Health and Safety Act*, R.S.A. 2000, c. O-2, as may be amended or replaced from time to time;
- "Odour Management Plan" has the meaning ascribed in Section 3.8.5;
- "Operating Period Plans" means the Contractor's Management Systems and Plans for the Operating Period as set out in Section 3.8;
- "Operation and Maintenance Plan" has the meaning ascribed in Section 3.8.1;
- "PCS" (Plant Control System) means a HMI/PLC based data acquisition and control based on local control panels that performs the plant-wide functions of data acquisition, distributed control, and operator interface. The PCS system will consist of HMI servers and workstations, PLCs and HMIs connected by Ethernet and wireless communications;
- "PLC" (Programmable Logic Controller) means digital systems that perform digital and analog control in a stand-alone or shared control system;
- "PWTP" means the new Evan-Thomas water treatment plant that forms part of the Infrastructure, including the two existing wells that supply raw water to the said treatment plant;
- "Permitting Plan" has the meaning ascribed in Section 3.7.1;
- "Potable Water Distribution System" means the conveyance and storage parts of the waterworks system including: reservoirs; pumping stations; hydrants; valves and valve chambers; all inter-connecting pipework up to the End-user service valves; and all other appurtenances to deliver and convey Treated Water;

- "**Prime Contractor**" has the same meaning "prime contractor" has ascribed in the Occupational Health and Safety Act;
- "**Professional Engineer**" means an individual who holds a certificate of registration to engage in the practice of engineering under the *Engineering, Geological and Geophysical Professions Act*, R.S.A. 2000, c. E-11, as may be amended or replaced from time to time;
- "Proposed Planned Maintenance" has the meaning ascribed in Section 5.7.9;
- "Provincial Construction Representative" has the meaning as ascribed thereto in Section 4.11.2;
- "Provincial O&M Representative" has the meaning as ascribed thereto in Section 5.3;
- "Public Communication Plan" has the meaning ascribed in Section 3.7.7;
- "Quality Management System" has the meaning ascribed thereto in Section 3.2;
- "Quality Monitor" means the online water quality monitoring devices which are described in Section 4.7.3.2;
- "Raw Water" means the water abstracted from the ground water wells at the PWTP;
- "Raw Water Quality Monitoring Point" is the location at which raw water quality is monitored and shall be a fixed point identified by the Contractor on the Raw Water pipework system as "Raw Water Quality Monitoring Point(s)" in the Contractor's Designs;
- "Reasonable Wear and Tear" means wear and tear that is reasonable given the use and age of the water and wastewater systems, and consistent with wear and tear that could reasonably be expected to exist at similar water and wastewater facilities, operating in a similar environment and similar circumstances and of a similar age, but does not include any degradation in the operability or performance of the water and wastewater systems, including the distribution and collection system infrastructure and all water and wastewater system components and infrastructure so that the water and wastewater systems fail to meet the Project Requirements or fail to comply with applicable laws, any authorizations or Standards and Guidelines:
- "Residuals Management Plan" has the meaning ascribed in Section 3.8.8;
- "SCADA System" (Supervisory Control and Data Acquisition) means the digital control system that performs the plant wide functions of data acquisition, distributed remote control, and plant HMI control;
- "SOP" means standard operating procedures, being quality management procedures for specific components of the Project or the O&M, that form part of the Contractor's Management Systems and Plans;

"Safety Management Plan" has the meaning ascribed in Section 3.4;

"Security Plan" has the meaning ascribed in Section 3.8.10;

"Semi-Annual Asset Management System Report" has the meaning ascribed in Section 5.7.6;

"Service Area" means any of the following facility areas that are supplied with Treated Water by the PWTP, connected through the Potable Water Distribution System, or whose sanitary sewer systems are connected to the WWTP through the Wastewater Collection Network within or adjacent to the Evan-Thomas Provincial Recreation Area:

- (a) Mount Kidd R.V. Park;
- (b) Kananaskis Golf Course;
- (c) Kananaskis Village;
- (d) Kananaskis Village Staff Housing;
- (e) Kananaskis Emergency Services Centre;
- (f) Boundary Ranch; and
- (g) Nakiska Ski Hill.

"Snowmaking Building" means the snow-making building located in the Nakiska Base area that houses the existing Nakiska Base water treatment plant and equipment for the purposes of making snow. The Snowmaking Building is shown on drawing 12-B-2.32 in the Schedule 12 Appendix B-Lands and Work Sites Drawings attached to Schedule 12 to the DBFO Agreement;

"Staffing and Training Plan" has the meaning ascribed in Section 3.8.7;

"Standards and Guidelines" means the standards, guidelines, policies or requirements, prescribed by the Province or any professional body, industry association or similar organization, specifically referred to or incorporated by reference in this Schedule 18 (Technical Requirements);

"Storm Water Management Guidelines for the Province of Alberta" means the most current version of the Alberta Environment Storm Water Management Guidelines for the Province of Alberta (the edition current as of the then relevant time of application);

"Transition Plan for Existing Facilities O&M" has the meaning ascribed in Section 3.9.1;

"Transition Target Date" means the planned date on which the Contractor intends to start the Existing Facilities O&M, and which forms the basis of the schedule set out in the Transition Plan for Existing Facilities O&M, as defined in Section 3.9.1;

"Treated Wastewater" means the treated wastewater that is produced by the WWTP that is fully treated and discharged to the Kananaskis River through the WWTP outfall;

- "Treated Wastewater Quality Monitoring Point" means the location at which Treated Wastewater quality is monitored and shall be the point identified by the Contractor for the WWTP as "Treated Wastewater Quality Monitoring Point" in the Contractor's Designs;
- "Treated Water" means the drinking water produced by the PWTP that is fully treated and placed into the waterworks distribution system;
- "Treated Water Quality Monitoring Point" means the location at which the Treated Water quality is monitored and shall be the points identified by the Contractor for the PWTP and the potable water distribution system as "Treated Water Quality Monitoring Point(s)" in the Contractor's Designs;
- "UV" means electromagnetic radiation in the ultraviolet frequency range;
- "University of Calgary Field Station" means the University of Calgary facilities which discharge wastewater to the Barrier Lake Lagoons and Sludge Drying Beds as described in Section 2.8;
- "Unplanned Maintenance" means any maintenance that reduces the Available Capacity which is not approved in advance by the Province as Approved Planned Maintenance, or any Approved Planned Maintenance which is performed outside of the approved timescales, or which exceeds the approved duration;
- "Utility Failure" means any failure or shortage in the supply of natural gas, electricity or other utilities to the water and/or wastewater facilities provided that such failure or shortage is not caused or contributed to by the Contractor, its agents, contractors or subcontractors or those for whom the Contractor is legally responsible;
- "WWTP" means the new Evan-Thomas wastewater treatment plant that forms part of the Infrastructure, including the existing aerobic sludge digesters which process the residual waste materials produced by the said treatment plant;
- "Wastewater Collection Network" means the wastewater collection system for conveyance of sewage and untreated wastewater including: gravity sewer mains; sewage manholes; and all other appurtenances to receive and convey wastewater between the End-user sanitary connections to the network and the WWTP;
- "Water and Wastewater Quality Reports" has the meaning ascribed at Section 5.6.2.6;
- "Water and Wastewater Sampling and Analysis Plan" has the meaning ascribed in Section 3.8.12; and
- "Water Usage Advisories" means an advisory notice issued to the waterworks system endusers limiting the uses for which the drinking water can be used or restricting the availability of drinking water.

Words and abbreviations which are not defined in Schedule 18 (Technical Requirements) or the DBFO Agreement and which have well known technical or trade meanings shall be used in accordance with such recognized meanings.

Standard units of measurement may be abbreviated in Schedule 18 (Technical Requirements).