FORM A: BID
(See B6.2)

1. Project Title

SUPPLY AND DELIVERY OF BIOREACTOR AERATION EQUIPMENT FOR THE WEST END WATER POLLUTION CONTROL CENTRE BNR UPGRADE PROJECT

2. Bidder

_____
Name of Bidder

_____
Street

_____
City Province Postal Code

_____
Facsimile Number

(Mailing address if different)

_____
Street or P.O. Box

_____
City Province Postal Code

The Bidder is:

(Choose one)

☐ a sole proprietor

☐ a partnership

☐ a corporation

carrying on business under the above name.

3. Contact Person

The Bidder hereby authorizes the following contact person to represent the Bidder for purposes of the Bid.

_____
Contact Person Title

_____
Telephone Number Facsimile Number

4. Definitions

All capitalized terms used in the Contract shall have the meanings ascribed to them in the General Conditions and D3.

5. Offer

The Bidder hereby offers to perform the Work in accordance with the Contract for the price(s), in Canadian funds, set out on Form B: Prices, appended hereto.

6.	Qualification	The Bidder has in the past performed the works listed on Form C: Qualification, appended hereto, which were similar in nature, scope and value to the Work for which this offer is made.
7.	Execution of Contract	The Bidder agrees to execute and return the Contract no later than seven (7) Calendar Days after receipt of the Contract, in the manner specified in GC.3.01.
8.	Commencement of the Work	The Bidder agrees that no Work shall commence until he is in receipt of a letter of intent from the Award Authority authorizing the commencement of the Work.
9.	Contract	The Bidder agrees that the Bid Opportunity in its entirety shall be deemed to be incorporated in and to form a part of this offer notwithstanding that not all parts thereof are necessarily attached to or accompany this Bid Submission.
10.	Addenda	The Bidder certifies that the following addenda have been received and agrees that they shall be deemed to form a part of the Contract: No. _____ Dated _____ _____ _____ _____ _____
11.	Time	This offer shall be open for acceptance, binding and irrevocable for a period of ninety (90) Calendar Days following the Submission Deadline.

12. Signatures

In witness whereof the Bidder or the Bidder's authorized official or officials have signed this

_____ day of _____ , 20_____ .

(If no corporate seal) Signed and sealed in the presence of:	Signature of Bidder or Bidder's Authorized Official or Officials
_____ (Witness)	_____ _____ (Print here name and official capacity of individual whose signature appears above)
_____ (Witness)	_____ _____ (Print here name and official capacity of individual whose signature appears above)

SEAL

FORM B: PRICES
(See B7)

SUPPLY AND DELIVERY OF BIOREACTOR AERATION EQUIPMENT FOR THE WEST END WATER POLLUTION CONTROL CENTRE BNR UPGRADE PROJECT

LUMP SUM PRICE

TOTAL BID PRICE (GST and MRST (also known as PST) extra)

(in figures) $_____

(in words) _____

_____

SEPARATE PRICES TO BE DEDUCTED FROM LUMP SUM PRICE

ITEM NO.	DESCRIPTION	SPEC. REF.	UNIT	QUANTITY	UNIT PRICE	AMOUNT
1.	Guaranteed Performance Testing	11531.3.6	Each	1		

_____
Name of Bidder

FORM C: QUALIFICATION PAGE 1 OF 2
(See B9)

SUPPLY AND DELIVERY OF BIOREACTOR AERATION EQUIPMENT FOR THE WEST END WATER POLLUTION CONTROL CENTRE BNR UPGRADE PROJECT

Year: _____ Value: _____
Client:_____
Client Contact: _____ Telephone No.: _____
Description of contract: _____
_____
_____
_____

Year: _____ Value: _____
Client:_____
Client Contact: _____ Telephone No.: _____
Description of contract: _____
_____
_____
_____

Year: _____ Value: _____
Client: _____
Client Contact: _____ Telephone No.: _____
Description of contract: _____
_____
_____
_____

_____
Name of Bidder

FORM C: QUALIFICATION PAGE 2 OF 2
(See B9)

SUPPLY AND DELIVERY OF BIOREACTOR AERATION EQUIPMENT FOR THE WEST END WATER POLLUTION CONTROL CENTRE BNR UPGRADE PROJECT

Year: _____ Value: _____
Client:_____
Client Contact: _____ Telephone No.: _____
Description of contract: _____
_____
_____
_____

Year: _____ Value: _____
Client:_____
Client Contact: _____ Telephone No.: _____
Description of contract: _____
_____
_____
_____

_____
Name of Bidder

FORM E: EQUIPMENT PARAMETERS
(See B10)

Provide details of the equipment to be supplied.

Item	SYSTEM PARAMETERS	VALUE			
		Aerobic 1	Aerobic 2	Aerobic 3	Aerobic 4
1A	Diameter of drop leg, mm				
2A	Number of diffusers (or tubes) per grid based on two grids per cell				
3A	Total number of diffusers (or tubes) per cell				
4A	Diameter of diffusers (or tubes), mm				
5A	Length of tubes, mm				
6A	Spacing between laterals, mm				
7A	Air flow per each cell of the bioreactor Average, Nm^3/min Maximum, Nm^3/min				
8A	Maximum headloss from drop leg to diffuser (or tube), kPag				

	YES / NO
Equipment meets all SOTE requirements listed in 11531.2.3	
Equipment meets all SOTR requirements listed in 11531.2.3	

Note: Refer to Technical Specifications for definition of terms and acronyms.

FORM F: LIFE CYCLE COST PAGE 1 OF 3
(See B11)

All prices are to be in Canadian dollars.
Life cycle cost will be calculated based on a twenty-year period using a discount rate of four and a half percent and based on information provided in the following tables.

Aerobic Cell 1		Aerobic Cell 2		Aerobic Cell 3		Aerobic Cell 4		Total	Weighting Factor[1]
SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	
6172		5350		4676		3858		20056	0.02
4772		4392		3676		3112		15952	0.20
4670		4236		3456		2650		15012	0.56
4002		3538		2740		2048		12328	0.20
3410		2770		1842		1288		9310	0.02

1. Weighting factor is an estimate of the overall total percent of time for which the specified SOTR will be required
2. Guaranteed SOTE (%) as per Form Q
3. SOTRs shown are the combined SOTRs of both reactors in service

Note: Refer to Technical Specifications for definition of terms and acronyms.

FORM F: LIFE CYCLE COST PAGE 2 OF 3
(See B11)

CAPITAL COSTS		
1B	Total Price (from Form B)	
2B	Related Structural, Process Equipment, Instrumentation and Electrical Costs based on Equipment Plan and Section Drawings Provided by Supplier and Specific to the West End Water Pollution Control Centre Upgrade	Estimate to be provided by the Contract Administrator, if required
	TOTAL CAPITAL COSTS (1B+2B)	**$**

ANNUAL POWER COST		
1C	Annual Operation, Hours	8760
2C	Total Evaluated Power(1)	
3C	Power Cost	$0.05/kW-hr
4C	**TOTAL POWER COSTS (1C x 2C x 3C)**	**$**

ANNUAL MAINTENANCE COST		
1D	Diffuser Membrane Replacement Cost(2)	
2D	Number of Membranes Installed	
3D	Average Diffuser or Tube Life, yr	
4D	Time Required to Change Each Membrane, hours	
5D	Labour Cost, $/hr	**$**50.00
6D	Average Number Replaced per year (2D/3D)	
7D	**TOTAL MAINTENANCE COST ((1D x 6D) + (4D x 5D x 6D))**	**$**

	TOTAL ANNUAL COST (4C + 7D)	***$***

FORM F: LIFE CYCLE COST PAGE 3 OF 3
(See B11)

FORM F NOTES:

1. Total evaluated power will be calculated using information on guaranteed SOTE provided by Bidder, as follows:

$$P = \frac{wRT_1}{29.7ne} \times \left[\left(\frac{p_2}{p_1}\right)^{0.283} - 1 \right]$$

Where:

w = weight of flow of air, kg/s

$$Qair = \frac{SOTR}{\rho \times f \times SOTE \times 1440} \text{ Nm}^3/\text{min}$$

w = (Qair x ρ) / 60

ρ: density = 1.2015 kg/m^3
f: oxygen fraction by weight = 0.232
T = 15°C

R = 8.314 kJ/k mol ºK

T_1 = Absolute inlet temperature, ºK

n = (k-1)/k = 0.283 for air

29.7 = constant for SI units conversion

e = efficiency, normal range is 0.7 to 0.9

e = 0.72

p1 = absolute inlet pressure, atm

p1 = patm – inlet headlosses estimated at 3kPa
p_{atm} = 98.4 kPa

p2 = absolute outlet pressure, atm

p2 = patm + D + H
p_{atm} = 98.4 kPa
D: average diffuser submergence = 5.7 m
H: blower backpressure = line losses (calculated by Engineer) + required pressure at the dropleg from Schedule M

2. Diffuser membrane replacement cost will be calculated based on guaranteed useful life of the diffuser membranes N1 provided in Form Q and cost for diffuser membranes provided in Form N.

FORM N: LIST OF RECOMMENDED SPARE PARTS, DELIVERY TIME AND STORAGE LOCATION
(See B12)

Table 1: Provide all replacement parts that are listed in accordance with Section 11531.2.7 with prices current at the time of the Bid submission. Include standard delivery time and location of supplier for all equipment. The unit prices shall include all applicable custom duties and shipping charges to site.

Table 1: Replacement Parts for **Fine Bubble Aeration System**

Description	Quantity	Unit Price	Delivery Time	Location
Diffuser elements and assemblies (1)		$		
Diffuser holders (2)		$		
Piping supports	50	$		
Plugs for unused diffuser locations (3)		$		
Distribution lateral fixed joints (4)		$		
Distribution lateral repair coupling	20	$		
19 mm PVC purge valves	4	$		
Attach additional sheets as required and label as Form N				
Notes 1. 11531.2.7 specifies a minimum 2 percent of total supplied 2. 11531.2.7 specifies a minimum 1 percent of total supplied 3. 11531.2.7 specifies a minimum 10 percent of total supplied 4. 11531.2.7 specifies a minimum 20 percent of total supplied				

Table 2: Provide a list the parts required for five years of operation with prices current at the time of the Bid submission. Include standard delivery time and location of supplier for all equipment. The unit prices shall include all applicable custom duties and shipping charges to site.

Table 2: Recommended Replacement Parts for **Fine Bubble Aeration** for **FIVE YEARS** of operation

Description	Quantity	Unit Price	Delivery Time	Location
		$		
		$		
		$		
		$		
		$		
Attach additional sheets as required and label as Form N				

FORM O: SUPERVISION OF INSTALLATION, COMMISSIONING, OPERATOR TRAINING AND MAINTENANCE INSTRUCTIONS

(See B13)

(a)	The rate per day for additional days of operator training and maintenance instructions is:	$

FORM Q: GUARANTEED PERFORMANCE

(See B14)

Aerobic Cell 1		Aerobic Cell 2		Aerobic Cell 3		Aerobic Cell 4		Total	Weighting Factor[1]
SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	**Guaranteed SOTE (%)[2]**	SOTR (kg/d)[3]	
6172		5350		4676		3858		20056	0.02
4772		4392		3676		3112		15952	0.20
4670		4236		3456		2650		15012	0.56
4002		3538		2740		2048		12328	0.20
3410		2770		1842		1288		9310	0.02

1. Weighting factor is an estimate of the overall total percent of time for which the specified SOTR will be required
2. Refer to Form F
3. SOTRs shown are the combined SOTRs of both reactors in service; eg 6172 kg/d consists of 3086 kg/d into Aerobic 1 of Bioreactor 1 and 3086 kg/d into Aerobic 1 of Bioreactor 2

Guaranteed required pressure at each dropleg under maximum airflow conditions. Maximum air flow conditions as defined in Specification Section 11351, item 2.3.1.5

Bioreactor Cell	**Required pressure at the dropleg (kPa)**
Aerobic 1	
Aerobic 2	
Aerobic 3	
Aerobic 4	

Guaranteed useful life of the diffuser membranes, N1= _____ years