PROJECT ENGINEER'S REPORT

TOWN OF EASTEND
WTP, RAW WATER RESERVOIR & INTAKE UPGRADES
BCL File #103.02-7B
September 8, 2021

General Progress to Date
In August, project progress included all start-up and commissioning procedures for the water treatment plant, raw water reservoir and intake structures and formal turnover of the facility to the Town of Eastend. Overall, construction has reached Substantial Performance of Contract but there are still final deficiencies that require completion by Westridge Construction. The official plant commissioning and formal training took place on August 23-24, 2021 with the Town operators, contractors, subcontractors, suppliers and engineers present to do final checks. The existing water treatment plant was also decommissioned the same week, with capping of all the lines outside the plant completed.

During the next work period (month), construction is expected to include completing remaining deficiencies and ongoing adjustments with the treatment process vendor.

Progress Certificate
Progress No. 16 - Interim is certified and represents work completed to September 8, 2021. Westridge Construction Ltd. is eligible for payment in the amount of $344,978.06. Westridge provided their required WCB clearance and Statutory Declaration paperwork along with their invoice.

Payment in the amount of $34,532.34 should also be made to the holdback trust account, as required by the Builders' Lien Act. Total holdback to date should be $674,696.44 plus GST and PST. The date of Substantial Performance of Contract is August 25, 2021. As per the Builder's Lien Act, the Certificate is to be posted by the Contractor at the job site for 40 clear days to allow any subcontractors or suppliers to present claims of outstanding unpaid invoices or liens on the project. After the 40 clear days (on Monday, October 4, 2021), and if no claims or liens have been presented to BCL Engineering or the Town of Eastend, the $674,696.44 (plus taxes) holdback can be released at that time. A subsequent Invoice #17 will be sent to the Village for payment after that date.

Further to the Builders' Lien Holdback noted above, a deficiency holdback of $69,500.00 will also be retained until all deficiencies have been completed.

Remaining Work
A detailed list of the deficiencies noted during commissioning and remaining work was provided to the Contractor on September 2, 2021. Most of the outstanding deficiencies are aesthetic items, items that were already underway but not completed at the time of commissioning or items yet to be confirmed. No significant defects in the work were noted during commissioning.

Once the deficiency work is completed, BCL will conduct a follow up inspection to verify that all items have been addressed as per the Contract. At that time, we will make a separate recommendation for release of the deficiency holdback, separate from the Builders' Lien Holdback.

Insurance
Westridge Construction noted that since the project has reached Substantial Performance of Contract and the Town has taken occupancy of the building, the Town should now purchase insurance on the property. Westridge's insurance is set to expire on September 17, 2021 and the Town will need to arrange for insurance prior to that date.

Change Orders:
One change order was decided on and one more is being contemplated since the last report:

Change Order (#8)
It was decided by Town Council and the operators that the existing water treatment plant decommissioning scope of work could be reduced to the necessary items only as a way to recover some of the budget spent during construction. The Change Order advises Westridge that they are to cap and abandon all water main connections outside the existing building footprint, as per the original drawings. The work inside the building footprint, including removal of existing equipment and demolishing / modifying the building envelope is to be deleted from the contract and will be completed by the Town at a later date. The Contractor provided a credit of $42,000.00 plus taxes for the scope change. The Change Order was sent to the Contractor for signing and will be forwarded to the Town after it is received.

Contemplated Change Order (#9)
During start-up and commissioning, it was noted that the raw water feed pumps (from the reservoir/pond to the WTP process) have a significant water hammer within the new plant piping. Options for reducing the hammer were discussed with the mechanical and electrical subcontractors and determined that slower start motor drives, either soft starts or variable frequency drives (VFD), would help mitigate it. The electrical engineer is in the process of writing a Price Request wording for the Contractor to price out the drive installations. Costs will be relayed to the Town as soon as possible.

Overall, the following Change Orders were processed through the project to address some unforeseen items or scope changes during construction:

Change Order #1	*Air Scour Line to River Intake*	*$6,773.50*
Change Order #2	*Water Hauling for Hydrostatic Test*	*$10,543.55*
Change Order #3	*Paint Ceiling in Existing WTP*	*$7,231.30*
Change Order #4	*MFU Strainers & Hoist Breakers*	*$5,365.62*
Change Order #5	*Electrical Coord. & Piping Changes*	*$23,857.74*
Change Order #6	*Reservoir Geogrid & Additional Fill*	*$33,000.00*
Change Order #7	*Hydrant & Additional Tie-in*	*$61,676.90*
Change Order #8	*Demolition Scope Revision (Credit)*	*($42,000.00)*
Change Order #9	*Raw Water Pump VFD Addition*	*TBD*

Testing

BCL took additional process water samples during the WTP commissioning on August 24, 2021, including process testing on the water treatment system and THM and HAA testing from the water plant, Town shop and gas station to determine that the distribution system has now flushed out any harmful by-products. Those results are summarized in the following tables.

Table 1: WTP Commissioning Removals

Parameter	WTP Commissioning Testing				Guidelines (Limits)
	Raw Water	Post UF	Post NF	Treated (Lab Sink)	
Ammonia	0.05 mg/L	0.05 mg/L	<0.01 mg/L	0.02 mg/L	1.0 mg/L*
Total Organic Carbon	**12.0 mg/L**	**9.3 mg/L**	<0.2 mg/L	0.3 mg/L	4.0 mg/L*
Total Dissolved Solids	284 mg/L	285 mg/L	<5 mg/L	9 mg/L	500 mg/L
Colour	**20 TCU**	**18 TCU**	<1 TCU	<1 TCU	15 TCU
pH	9.07	9.07	7.07	7.69	6.5 - 9.5
Iron	0.045 mg/L	0.0011 mg/L	<0.0005 mg/L	0.0034 mg/L	0.3 mg/L
Manganese	0.014 mg/L	0.0015 mg/L	<0.0005 mg/L	<0.0005 mg/L	0.02 mg/L
Arsenic	7.5 ug/L	7.7 ug/L	0.3 ug/L	0.2 ug/L	10 ug/L

* Design guideline to eliminate disinfection by-products, not regulated limit.

Table 2: THM and HAA Testing

Parameter	New WTP (Lab Sink)	Town Shop	Gas Station	Guidelines (Limits)
Trihalomethanes	3.8 ug/L	8.0 ug/L	5.6 ug/L	100 ug/L
Haloacetic Acids	<10 ug/L	<10 ug/L	<10 ug/L	80 ug/L

Discussion of Process Testing

Based on the above, the new treatment process was again confirmed to be removing organics, colour, and solids from the raw water with very high efficacy. The treated (lab sink) water has effectively zero organics in it which has significantly lowered THM and HAA production in the distribution system. This was the goal of the project to meet all regulated values.

The pH level of the treated water is also reported to be well within the acceptable range with very little chemical adjustment required post-treatment. The Town's operations staff will monitor all the main parameters required for the Permit to Operate. Iron, manganese, and arsenic also appear to be removed well through the UF / NF system. This will be of particular importance during spring operation when levels are elevated.

Table 2 shows that the disinfection by-product (THM and HAA) production in the distribution system has been effectively eliminated. THM values under 10 ug/L and HAA values below detection limits throughout the town's piping network indicates that the water quality is meeting all the intended goals.

Photos

Front of WTP – truck fill station completed and bollard painting underway.

Rear of WTP.

Ultrafiltration system skids – floor and curbs epoxy painted.

Nanofiltration skid; PLC wiring / program checks underway.

Piping insulation and colour coded jacketing work underway.

Distribution piping completed; floor epoxy coating applied.

Chemical room.

Electrical area – chemical storage pallets to be moved after floor cures.

Washroom and chemical room entry areas cleaned up and floor epoxy completed.

Office furniture is now set up and will be cleaned up following commissioning.

Prepared by: Matthew Feige, P.Eng.