Memo

Date	AU/19/2021
Memo to	Dennis MacPherson, P.Eng., Town of Lunenburg
Project name	200308.01 – TOL WWTP & OUTFALL PREDESIGN AND BCA
Subject	Proposed Implementation Plan
From	Sarah Ensslin, P.Eng.
Copies to	Bea Renton, Lisa Dagley, John Lohnes, ODRC, Ian Tillard, P.Eng.

This memo should be read in conjunction with the following project reports: Town of Lunenburg Wastewater Outfall Extension Pre-Design, Town of Lunenburg Wastewater Treatment Plant (WWTP) Near-Term Upgrades Pre-Design, Town of Lunenburg WWTP Long Term Expansion Conceptual Design, and the Town of Lunenburg WWTP Building Condition Assessment.

The intent of this memo is to provide a proposed implementation plan, considering the recommendations from all four reports together. Each report will be discussed briefly in turn, including the ways in which it interconnects with other reports.

A proposed schedule is included with this memo (see Figure 1, attached) to illustrate potential timing and duration of the various items of work. This should be considered preliminary only, and is subject to change as the projects develop.

Outfall Extension Report

The main recommendation from the Outfall Extension report is to proceed with the detailed design and construction of a relocated effluent outfall near Burma Road. Next steps for this begin with sending the report to Nova Scotia Environment and Climate Change (NSECC) and getting confirmation of whether they will require a Receiving Water Study. If one is required, we recommend proceeding with this as soon as possible to confirm the design requirements for the outfall prior to the detailed design phase. Critical next steps for this option subsequently include obtaining access to the required land and beginning the Regulatory consultation process, which may take significant time to complete.

The outfall extension work could be done at any time compared to the work recommended in other reports. The new location would provide additional dispersion and reduce the effect on the commercial fishing fleet during tie-ins if it were complete prior to the WWTP expansion.

WWTP Near-Term Upgrades Report

The main recommendation from the Near-Term Upgrades Report is to proceed with the detailed design and construction of eight of the eleven items investigated. The remaining three items would not be required assuming that the WWTP Expansion is completed within the next ten years. The recommended items are summarized in the table below (highest priority items highlighted):

Item	When to implement	Interconnections and constraints
Headworks Modifications	2-6 years	During expansion if within 5-6 years
Aeration Upgrades	1-6 years	Inspect and refurbish by Manufacturer's Tech, and if there is 5 years' service life left, replace during expansion if within 5-6 years
Online instrumentation	1-3 years	Consider doing this as soon as Polymer Dosing Trials are complete, for best existing process performance.
Polymer pumps	0-1 year	Not required for SBR upgrades, but process-critical item.
UV upgrades	0-1 year	
Standby generator	3-6 years	During expansion if within 5-6 years
Building mechanical upgrades	1-6 years	Some overlap with Facility Maintenance Items, some items during expansion if within 5-6 years
Flood Control	0-1 year	

Next steps for this begin with sending the report to NSECC, and then proceeding with the three highest priority items as soon as possible. The opinion of probable cost for these items is $470,000, including design development and construction contingency, as well as an allowance for engineering.

For the Aeration Upgrades and the Standby Generator, there are some possible adaptations for an SBR expansion within about 5 years. The required blowers for the SBR

are smaller than the existing blowers, so it may be more cost-effective to replace these during the expansion, if the existing blowers can operate until that time. To evaluate the remaining future life of the blowers, we recommend having them inspected and refurbished by the manufacturer's technician. They will be able to determine whether the Town can have confidence in the existing blowers for another 5 years, as well as repair any issues found.

If the blowers are replaced as part of the expansion, they could be installed in the Process room, on an elevated housekeeping pad, allowing the additional electrical equipment required for the generator to be installed in the former Blower room, and potentially avoiding the need for a generator building extension. The air headers and pipework would be adjusted to suit once the blower location and configuration had been confirmed. It is not recommended to reduce the project budget at this point, however, until the timing and technical feasibility of this option is confirmed.

The online instrumentation is useful for the long-term expansion, but also in the short term to improve polymer dosing control. Although this could be combined with the expansion work, we recommend considering it as soon as the polymer dosing trials are complete, to improve the performance of the existing process.

Some of the building mechanical upgrades are also included as Facility Maintenance items. Please see discussion below in the WWTP Building Condition Assessment section.

WWTP Long-Term Expansion Report

The main recommendation from the Long-Term Expansion report is to proceed with pre-design, including a thorough geotechnical investigation, followed by detailed design and construction of an SBR-based expansion at the WWTP. Steps for this begin with sending the report to NSECC.

The expansion could potentially take place in conjunction with the near-term items, or could be initiated at the point when Project Lunenburg initiatives are seeing clear results in terms of population growth. It should be noted that design and construction will take several years, and this lead time needs to be planned for. Benefits of starting sooner rather than later include possible cost savings on the near-term items (both the items that would not be necessary and the possible measures discussed above) as well as the ability to eliminate polymer dosing and reduce annual operations costs.

This expansion would increase the organic loading treatment capacity of the existing WWTP by 50%. The work would be carried out assuming that ongoing efforts to exclude salt water from the collection system, as well as targeted reduction of stormwater inflow and infiltration, prioritized through modeling of the sanitary and storm sewer systems, can hold future flows at current levels, while allowing significant population growth in the Town. The Town has very high wastewater flows per person, showing that a large amount of stormwater is sent to the WWTP for treatment, and there is opportunity to reduce flows gradually. Plans to move towards the goal of excluding extraneous flows must be developed and refined during the design period of the SBR expansion.

The possible addition of sanitary flows from the Garden Lots area should also be considered during the design period. Bringing in unserviced households from a neighbouring municipality could help strengthen the funding application, by allowing support from both municipalities.

This report was a conceptual design rather than a pre-design, so it needs to be further developed to get to the preliminary design level. This could be done immediately before starting detailed design, essentially leading up to detailed design, or could be completed as a separate project prior to or during the funding application. At this stage, geotechnical investigation will help to refine the tank dimensions and give better cost certainty once the subsurface conditions are confirmed.

WWTP Building Condition Assessment

The WWTP Building Condition Assessment identifies a number of items for future Facility Maintenance at the WWTP over the next 20+ years. The items recommended for the 0−5 year period should be considered and prioritized at this point and worked into the annual budgeting process.

The most significant item in this category is the replacement of the Process Building roof. This is necessary for the recommended SBR expansion, since this building will continue to be used, as will all the other buildings and areas of the existing plant.

Two of the mechanical items identified in the Building Condition Assessment are also carried in the Near-Term items: replacement of the asset-expired Blower room supply fan with a Blower room exhaust fan to provide renewed service life and improve heat control, and replacement of the damaged service water supply pipework in the headworks room. These items can be carried out at the time that makes most sense, either as Facility Maintenance or as Near-Term process improvements.

ID	Task Name
1	**TOL WWTP & Outfall Predesign and BCA**
2	**Outfall**
3	Predesign sent to NSECC
4	Receiving water study required?
5	Receiving water study, if needed
6	Obtain land
7	Regulatory consultation, applications, and approval
8	Apply for funding as soon as opportunity allows
9	Geotechnical investigation and bathymetric survey
10	Detailed design
11	Tender construction
12	Construction
13	Operational
14	**Near-Term Upgrades**
15	Predesign sent to NSECC
16	Detailed design of flood control including Regulatory Approval
17	Detailed design of UV disinfection and polymer pumps including Regulatory Approval
18	Develop plan for other near-term items relevant to SBR expansion
19	Tender and construct UV disinfection and polymer pumps
20	Tender and construct flood control
21	Detailed design and construction of other near-term items relevant to SBR expansion, as needed prior to expansion
22	**Long-Term Expansion**
23	Conceptual Report sent to NSECC
24	Continue influent sampling
25	Saltwater exclusion work plan and implementation
26	Develop sewer separation plan
27	Apply for funding as soon as opportunity allows
28	Predesign of expansion
29	Geotechnical Investigation
30	Predesign Report sent to NSECC
31	Detailed design
32	Regulatory package and approval
33	Tender construction
34	Construction
35	Operational
36	**WWTP Facility Maintenance**
37	Plan roof replacement for main process building
38	Plan blower room fan replacement and headworks plumbing repairs, and other 0-5 items
39	Implement 0-5 year facility maintenance