



**Subject:** *Servicing Capacity - Staff recommendations post reviews*  
**To:** Executive Committee  
**Date Prepared:** September 2024  
**Related Motions:** n/a  
**Prepared by:** Jesse Hulsman, Director of Infrastructure & Operations  
**Approved by:** Kim Ramsay, Chief Administrative Officer

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### Summary

This report summarizes the results of capacity reports that project capital costs out to 2050 for both water and wastewater infrastructure.

There are three main information contributions to the overall summary on capacity; the Lantz Lagoon Optimization Study (Dillon Consulting Apr 2022), the expansion of the Enfield Water Treatment Plant (Design by Dillon Consulting 2023), and the East Hants Servicing Capacity Study (RV Anderson Feb 2024). On the completion of those sources, Staff undertook further due diligence that included; addition of influent sampling at the Lantz Lagoon, operating changes to the Lantz Lagoon, infield testing of wastewater lift station pumps, and prolonged system monitoring.

This compiled information reflects the current state of capacity, gives a forecast of over \$66 million in capital project spending up to 2050, and flags additional capital spending that was not identified in the three information sources, such as the Lantz Lagoon De-Sludging and a potential Water Treatment Plant project.

### Financial Impact Statement

Capital spending of \$74,164,057 between the years 2024 and 2050

Individual projects not already approved within the 5-year capital budget will be brought forward for consideration within the next 5-year capital budget process for fiscal year 2025-26.

### Recommendation

To receive the report which is to be posted for the public and to add projects identified as needed within the next 5 years to the next capital budget review for consideration.

### Recommended Motion

*Move that the Infrastructure & Operations Committee recommend that Council receive the report which is to be posted for the public and to add projects identified as needed within the next 5 years to the next capital budget review for consideration.*

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## Background

The Municipality went out to market to have a capacity study conducted, which was awarded to RV Anderson. The scope was for the regional water and wastewater systems, excluding the Lantz Lagoon and the Enfield Water Treatment Plant. The Lantz Lagoon had already undergone a recent Optimization Study, completed by Dillon Consulting. The Enfield Water Treatment Plant just underwent a capital upgrade, designed by Dillon Consulting which comments on the plant capability post construction.

Staff have completed reviews of those 3 report/project results and have put together perspective on the results and a combined total capital outlook.

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## Discussion

### Enfield Water Treatment Plant Expansion

The Enfield Water Treatment Plant was first built in 1997. The next expansion was in 2007, and during that expansion the footprint was setup for further build out. The latest expansion was completed in 2023, designed by Dillon Consulting and constructed by Lindsay Construction.

Below is a summary of Equivalent Dwelling Units (EDU's) which was validated from a combination of the Dillon Consulting led expansion and staff review of the current system performance.

Stages and Factors	EDU's	Additional Comments
Pre-expansion total plant capability	3820	n/a
Post Dillon expansion plant capability through added dissolved air filtration unit and filter	5730	Assuming 80% equipment efficiency
New technical bottle neck found to be at high lift pumps	5498	n/a
Current approval limit to withdrawal from the river	4770	n/a
Average plant demand for 2023	3383	The year had measured water loss at 50% which doubles the EDU number versus actual customer usage.
Currently allocated but not built	964	This is approved development, and does not account for all phases forecasted development yet to seek technical approvals.
Average 2023 demand plus current allocated capacity	4347	This would leave 423 EDU's available. This does not factor in a notable effort on leak repairs since January 2024 that has substantially reduced water loss. That water loss improvement is not factored in yet, as it needs to be proven to be sustainable over time.

Further water capacity, beyond the approvals issued by Nova Scotia Environment will need to be explored either through increased withdrawal permitting from the river at the current location or the eventual adding water withdrawal and treatment directly from Grand Lake. Land in a strategic location has been acquired by the Water Utility with access directly to the lake to setup for the future. That direct lake withdrawal needs to be studied by an external expert to validate the total potential for withdrawal to setup long term growth planning for East Hants with respect to serviced development.

Staff had requested increases from Nova Scotia Environment for additional river withdrawal allowance. That hasn't been granted to this point, as NSE is waiting for the completion of the "Engineered Spring River Outfall Hydrogeological Study" which is currently underway. That study is focused on detailing the effect of the Engineered Spring on the river to create a more detailed setup for the next approvals. The report was delayed by a year due to the lack of low river levels in 2023 required to conduct the study. Upon completion of the study, there is opportunity to request increases to withdrawal limits which will enable further EDU allowances.

Water Loss was also high in 2023. A portion of that loss was the result of water leaks. Starting in January 2024, operators began weekend evening leak searches which has proven to be effective in getting back to a tighter overall system. From May 2023 to March 2024 the average monthly water produced at the Enfield Water Treatment Plant was 108,810,000 liters. From April 2024 to August 2024 that average monthly water production has been reduced to an average of 95,291,000 liters. There is further work to do in this category, which if sustainable over time could open up more EDU's.

### Lantz Lagoon Optimization Study

The Lantz Optimization study was completed in April 2022 by Dillon Consulting. Due to a lack of information available prior to going to market, it limited the accuracy of the advice that could be provided in the report. Critical assumptions made in the report were;

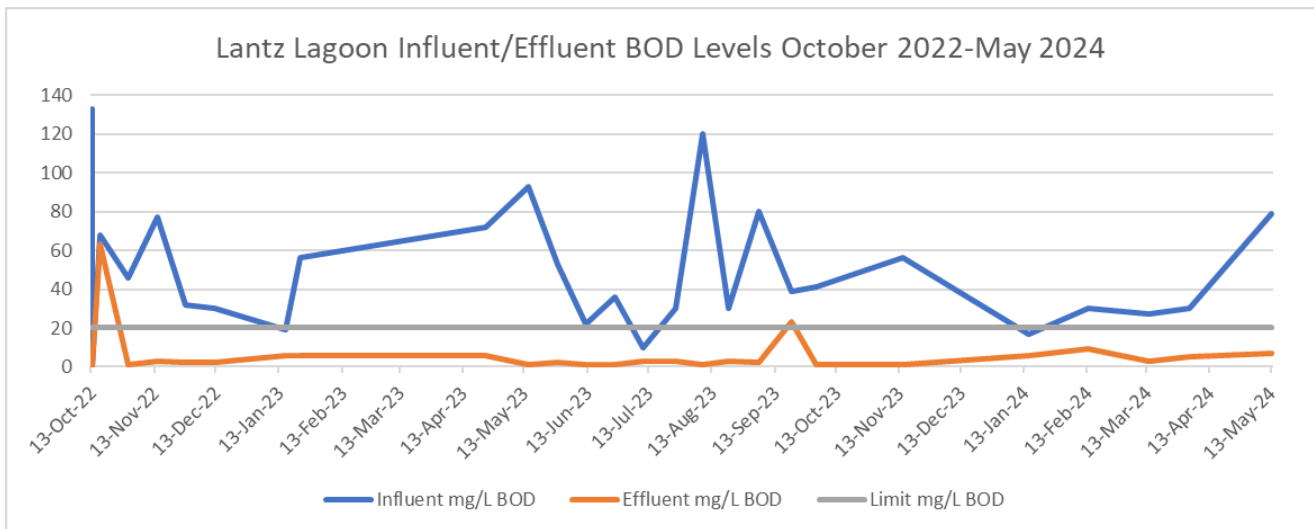
- a stated assumption that the phosphorus levels at the outflow of the plant should have targets below 0.5 mg/L,
- that the plant was already operating at its peak aeration levels which couldn't be improved,
- that capital improvement was constrained to existing footprint,
- the sludge would remain or be moved around in the existing cells, and
- that influent BOD concentration would be 150mg/L.

With those assumptions the report lists a theoretical capacity remaining of 400 dwelling units until a capital expansion would be required, towards capital plant upgrade estimated at \$16.1 Million, if using an "IDEAL" style treatment plant (Table 6-1 of the Dillon Report). That capital build-out was assuming a population of 20,879 by the year 2050 on the Regional System. Overall, the report did produce a useful overview of future plant treatment

technology options and leveraged data that was available at the time. The report also stated that the assumptions used were conservative and should be explored further.

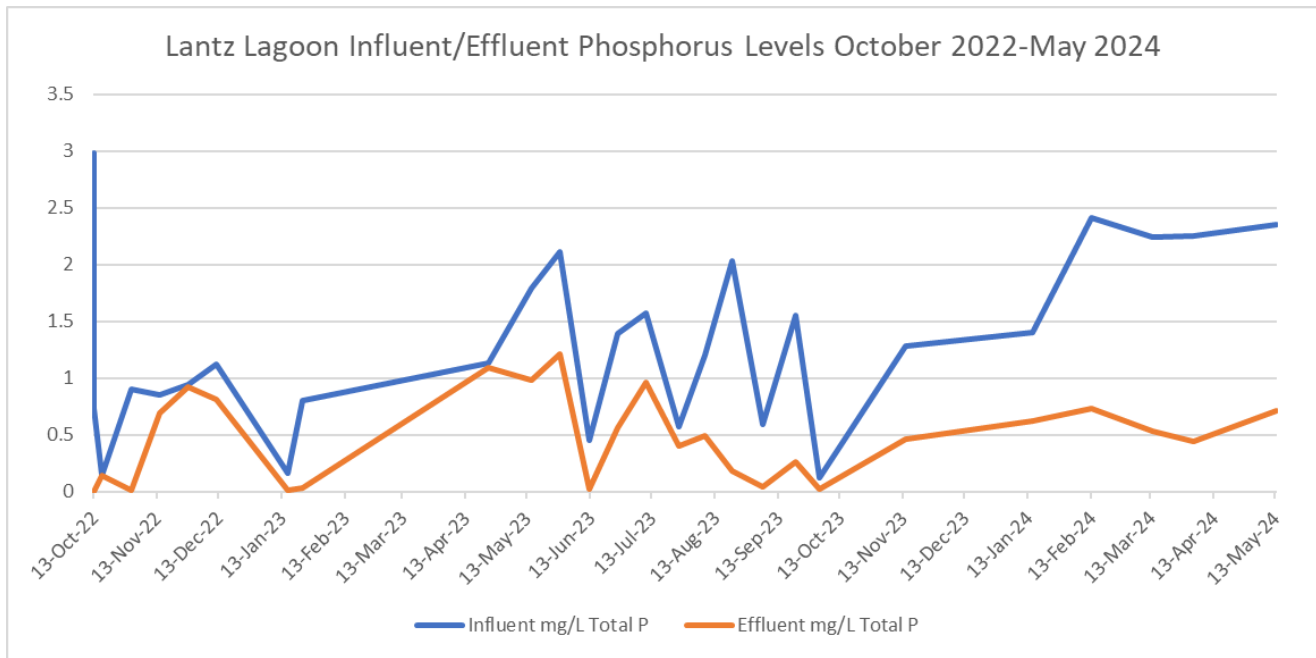
From operator experience and reviewing actual treatment results of the plant, staff put together a plan to fill in the information gap and build-out what is a realistic plan for the renewal of the treatment plant. Over the next year, staff focused on both operational changes to the blower system (optimize aeration) and installed sampling ability for influent flows which were sampled over a year.

The BOD assumptions were proven through tracking post study to be too high once monitoring for influent was setup. Historic flooding in July 2023 was the only time BOD was over 100 mg/L, which is an extreme condition;



The effluent results also demonstrate the current treatment plant is effectively reducing BOD.

Also, once the aeration set up was changed there has been a noticeable demonstrated control of Phosphorus in the effluent discharge versus influent coming into the plant. This staff led operating change, although consuming more power to achieve, has effectively stabilize performance on Phosphorus even during a year of significant development growth that is within the regional service catchment. Results also showcase that the current plant could already achieve a future phosphorus limit of 1 mg/L, which should be requested for the next approval to operate from Nova Scotia Environment;



The phosphorus outflow recommendation of 0.5 mg/L was flagged by Dillon in the report as a measure used for the equipment sizing, however it also mentions that a 1.0 mg/L may be a reasonable limit to set compared with other regions in North America. The current plant, once adjustments have been made to the aeration rate is now always below a 1 mg/L Phosphorus result. With the next Approval to Operate and the current plant being due for review in 2026 with Nova Scotia Environment, staff intend to request that any phosphorus limits be no lower than 1.0 mg/L. Staff may also request for higher limits if there is an ability to have more detailed information from a further study completed by 2026 to provide an exact limit established through a receiving water study. The dynamics of the river are complex, highlighted by the Municipality opening a brand-new Wastewater Treatment Plant in Shubenacadie in July of 2024 that has an outfall into the same river. The outfall mixes with tidal water at that location, having been granted an approval limit of 10 mg/L phosphorus based on what could reasonably be received by the river in that location, and on what could be built by a technology approach that was suitable for that area.

The depth of the lagoon is 40 ft deep in some locations, which is unique for the industry. There had been several attempts to find companies who could support desludging work since the last sludge volume assessment took place by Stantec in 2015. In the years that followed, no viable desludging equipment or contractor could be found, which in part influenced the Dillon report on how to deal with existing sludge volumes. As a part of Staff’s post-Dillon report review, a company merger in 2023 was identified that created new regional access to larger scale equipment capability of reaching all sludge in the Lantz Lagoon. This has led to staff working towards a new sludge management plan that will also prolong capacity improvement requirements. In 2024, Divetech was hired to complete a new sludge profile assessment within the lagoon. That data has been shared with a company that can de-sludge the Lantz Lagoon. Staff aim to start a desludging plan well before the next 2026 Approval to

Operate timeline, which should yield more information by that time on what a future capital plan will need to encompass.

**Combined Capital Spending Projection**

Taking the capital replacement requirements highlighted from the RV Anderson Capacity report, along with the new plant cost estimated from the Dillon Consulting Lantz Optimization Study, and factoring in some edits from staff reviews, the following is a condensed spend table showing \$74,164,054 in capital spending up to the year 2050.

Year	Water Treatment	Water Distribution	Wastewater Treatment	Wastewater Collection
2024	\$300,000			\$2,685,418
2025		\$200,000		\$21,314,700
2026	\$378,000	\$3,792,000		\$2,500,000
2027	\$180,000			
2028	\$20,000	\$2,067,000		\$1,005,550
2029		\$10,500,000		
2030				
2031			\$960,000	\$3,873,389
2032				
2033				
2034				
2035				
2036	\$1,200,000		\$165,000	
2042	\$110,000			
2046			\$285,000	
2050	\$128,000		\$22,500,000	

The \$22,500,000 listed in 2050 is the plant upgrade for the Lantz Lagoon, for the option of a Post Lagoon MBBR style plant (Table 6-1 of the Dillon report). Staff are suggesting this as a more realistic capital cost versus the IDEAL plant costing option listed within the report as the study was completed before significant market pricing increases that the Municipality has experienced during capital projects over the last 2 years. This project is listed in 2050 as that was the end of the timeline reviewed in the Dillon report, however that spend is more likely to be required sooner due to the age of the existing equipment and the need to adjust with future updates to environmental regulations and conditions within Approvals to Operate issued by the province. Staff would suggest a timeline range for this project is more likely to be needed between 2030 and 2035 based on, the time needed to ramp up sludge management programming, and to build up a technical scope requirement after studying receiving waters further to work towards updated effluent targets for future Approvals to Operate.

What is not in that table is a project cost for a new Water Treatment Plant located on Grand Lake. This type of project could realistically have a capital cost higher than the cost of a Lantz Lagoon upgrade project, and will also require significant water transmission main work

which will add to the total capital cost. Based on the capacity findings detailed in this report, that will need to be brought forward in project priorities to enable further growth of the serviced area of East Hants.

De-sludging of the Lantz Lagoon is also not listed in the capital table. There is pricing and planning in development that is projected to be presented in October 2024. The historic pricing projection is being updated and from learnings over the last year of review the process will be across multiple years. There is active funding setup for that work (excess of \$1 million in operating reserves set aside for desludging), which will be available for the start of de-sludging work and then require additional funding.

### Enhanced Staff Capability Post RV Anderson Report

Part of the RV Anderson capacity report included the Municipality receiving the CAD (computer assisted drafting) models of the system. With that, staff are able to access the updated modelling for the future capital project list and now work towards being able to update the model inhouse.

The capacity report scope was to identify required upgrades to existing infrastructure as laid out, but didn't look at alternatives or innovative improvement concepts. However, with this updated information staff have been able to explore innovative alternatives due to the quality of the information in the report. An example of this is a capital upgrade of existing pipes in the Poplar Drive area that staff have estimated current market pricing to be \$8.8M capital project for pipe upsizing work that could take 2 to 3 years to construct. Using the new access to modeling information for the East Hants systems, staff have come up with an alternative to that project that is estimated to be \$4.3M of capital, which will be faster, cost effective and with longer-term benefits for the wastewater system.

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### Alternatives

n/a

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### Attachments

RV Anderson Report;

- 226421-20240222-East Hants - Revised Final Report
- APPENDIX A - Tech Memo #1 - Sanitary Sewer Pump Stations Assessment & Conditions
- APPENDIX B - Tech Memo #2 - Milford Wastewater Treatment Plant Assessment (1)
- APPENDIX C - Tech Memo #3 - Shubenacadie Water Treatment Plant
- APPENDIX D - Tech Memo #4 - Water Distribution Capacity Assessment Report
- APPENDIX E - Tech Memo #5 - Sanitary Collection Capacity Report
- APPENDIX F - Tech Memo #6 - Storm Water Culverts Assessment Report
- APPENDIX G - Tech Memo #7 - State of Infrastructure Assessment
- APPENDIX H - Costs & Recommendations

Regional Wastewater Treatment Plant - Optimization Report (Dillon Consulting)