



Staff Report

Operations – Water & Wastewater Services

Report To: Special Meeting of Council
Meeting Date: April 14, 2023
Report Number: CSOPS.23.017
Title: Thornbury Wastewater Treatment Plant Phase 1A Expansion
Budget Increase
Prepared by: Allison Kershaw, Manager of Water & Wastewater Services

A. Recommendations

THAT Council receive Staff Report CSOPS.23.017, entitled “Thornbury Wastewater Treatment Plant Phase 1A Expansion Budget Increase”;

AND THAT Council approve increasing the project budget for the Thornbury Wastewater Treatment Plant Phase 1A Expansion budget from \$24,127,000 to a total budget of \$29,000,000, to be funded \$2,900,000 from the Wastewater Asset Replacement Reserve Fund and \$26,100,000 from the Wastewater Development Charges Reserve Fund.

B. Overview

This staff report requests that the budget for the Thornbury Wastewater Treatment Plant (TWWTP) Expansion Phase 1A construction be increased by \$4,873,000. The tender bids for the construction were submitted on March 30, 2023. This staff report is being brought directly to council as there is an urgency to commence the project to meet the overall schedule and ensure there is adequate capacity to meet the needs of development, including the proposed Campus of Care.

C. Background

Project Overview

The TWWTP Expansion has been separated into three projects for execution. The first project was an Optimization Study that reviewed existing treatment unit capacities. Optimization strategies that could be implemented into the TWWTP Phase 1A project were also considered including alternate biological treatment options. Staff brought Staff Report [CSOPS.22.023](#) on May 3, 2022, that summarized the Optimization Study.

The second project was to provide standby generator capacity to the Phase 1A project. It was identified during a previous internal staff study that the standby generator located at the Thornbury Water Reservoir had surplus capacity. The Town was able to save money

by connecting to this existing generator rather than having a stand-alone one at the plant. The Town realized capital savings with this approach but also operating savings as the Town did not add an additional generator to our asset inventory.

The third project is the capacity increase of the TWWTP Phase 1A expansion. This project will be increasing the plant capacity from average day flow of 3,580 m³/day to 5,330 m³/day (roughly 1,800 units). The project is on schedule for full operation in Q4 2024. Commissioning of the plant for Q4 2024 is needed based on the current Town growth projections and available capacity of the TWWTP.

During the detailed engineering for the Phase 1A expansion, a review of the Stantec 30% engineering work (2009) a significant gap came to light. In 2009, Stantec's 30% engineering report determined that the plant's outfall would be sufficient until the Phase 3 expansion of the facility. Through a fulsome internal staff review, it was determined the sections of the outfall where undersized, therefore not adequate to be utilized for the Phase 1A expansion. Staff have commenced the detailed engineering, including various studies and consultation to construct a properly sized outfall into Georgian Bay. The budget for the Phase 1A expansion was increased in May 2022 to support the detailed engineering for the new outfall for the TWWTP. A budget for the tendering, contract administration and construction of the new outfall has not been required or approved yet. As the engineering and design progresses, staff will have a better understanding of the overall cost estimates for this portion of the project.

In consideration of the rapid growth in the Town of The Blue Mountains and the servicing requirements for the proposed Campus of Care staff wanted to ensure that the Town's servicing is strategically positioned to address future growth. During the engineering design of the Phase 1A expansion, considerations for Phase 1B expansion have been contemplated into the design of Phase 1A. Pre-investment in the Inlet Headworks/UV buildings and underground yard piping have been included in Phase 1A. All equipment and piping installed at the headworks and the UV buildings, as well as yard piping has been sized for Phase 1B. Phase 1B expansion will increase the TWWTP's rated capacity from 5330m³/day to 7080m³/day. This limited pre-investment into Phase 1B is cost effective to eliminate future work. The Optimization Study identified that a step change in biological treatment maybe a cost-effective solution for further expansion. Staff Report [CSOPS.22.023](#), The Optimization Study, identified an opportunity to increase the rated capacity of the treatment plant by up to 30% by utilizing an alternative treatment processes A full life-cycle cost analysis comparison between the current biological treatment and other options will be included in the Phase 1B scope. A pilot study, in conjunction with a Ministry of Environment, Conservation and Parks approval will be required.

Why Expand the TWWTP?

The current facility is at 80% capacity. Not moving ahead with Phase 1A expansion will halt all development within the Thornbury sewer shed, including the Campus of Care and

future development in Lora Bay.

D. Analysis

The initial budget of \$18,000,000, for the TWWTP expansion was based on Stantec's 30% engineering estimate from 2009. The 30% design had some significant shortfalls and incorrect project estimating that were identified and corrected with the final design. Additionally, the cost of construction since 2019 has increased exponentially. The requirement to construct a new outfall was not considered in the initial budget. With the original budget, The Optimization Study was also not included; however, this study has been focal in recognizing cost savings, both during construction and operationally moving ahead. One of the significant cost savings identified with the Optimization Study was the need for a dissolved oxygen (DO) control loop. The blowers are used to provide oxygen to the biomass, this accounts for 39% of the energy used at the plant. By incorporating a DO control loop, the blowers will only provide the required oxygen, and reduce the energy load of the facility. Staff Report [CSOPS.22.025](#) provides a fulsome summary of the cost saving measures as well as challenges faced during final design.

Phase 1A expansion is required to be constructed and operational by Q4 2024. To achieve this goal, the prequalification of the general contractor took place in May 2022. To advance the project schedule and limit the ability of the general contractor to add profit margins, some equipment for the expansion was pre-purchased. This ensured there would not be delays with shop drawings and deliveries. The additional screening unit, the clarifiers and the UVs have all been pre-purchased directly by the Town.

As part of the Phase 1A detailed engineering, studies were completed to ensure "Fit for Purpose" design and look for efficiencies. The following were identified:

1. The plant effluent will be used to serve non-potable water demands throughout the TWWTP site. This will be used as wash water in the plant. It has a forecasted 14-year payback. This eliminates the need for potable water for washing and equipment cleaning.
2. Existing blower study to determine the best life-cycle cost investment for the aeration blowers.
3. Headworks Investment to understand the line sizing required for the Phase 1A and Phase 1B flows and recommendation for design. Increasing the piping from 450mm diameter to 550mm diameter to meet the Phase 1B flows.
4. Clarifier skimmers – to understand the options available for the installation of skimmers on all clarifiers. Three options were presented, ranging in costs from \$20,000 to \$60,000. Standard skimmers were selected for incorporation into the design, \$20,000 option to control scum and oil build-up on the clarifiers. This will be required in Phase 1B when tertiary equipment will be required.
5. Motor Control Centre (MCC) location options – to understand the options available for MCC equipment also considering the requirements for Phase 1B spacing. The 2009 Stantec report did not consider spacing for Phase 1B. Additionally, the initial report had the MCC directly below the main potable water supply for the facility. The MCC will be installed in the existing office space at the facility.

The detailed engineering included a program to reduce material quantities. The plant equipment layout was challenged resulting in the following being incorporated into the current design:

1. Buried pipe to be sized for Phase 1B to eliminate future pipe replacement. Consideration into fluid velocity in piping to ensure there will be no build-up of debris in piping.
2. Concrete clarifier flow distribution chamber was modified rather than build new concrete chamber, achieving some construction savings.
3. Yard Hydrant – elimination of 1 hydrant
4. Maintenance Holes- elimination of 2 maintenance holes
5. Buried pipe quantity reduction:
 - a. 169m of 350mm diameter line
 - b. 52m of 300mm diameter line
 - c. 54m of 100mm diameter line
 - d. 35m of 150mm diameter line

The final design incorporates some key considerations for operability. These include the following:

1. Allowance to complete wasting of activated sludge while still allowing the plant effluent to be discharged. Currently, to waste activated sludge, the effluent discharge has to be stopped.
2. Addition of metering of the flow discharging from the lagoon system and allowing for lagoon level control.
3. The addition of alum based on flow control; this will result in a reduction of the quantity of alum required.
4. Clarifiers and aeration basins to operate as three process trains for operational flexibility.
5. Scum skimming added to clarifiers, this will improve the effluent being discharged to the Beaver River.

In consideration of the Phase 1A expansion, it was determined that fill would be required for the construction of the works. During the construction for Phase 1A of the Thornbury West Reconstruction Project, the excess fill was brought to the TWWTP site. This reduced the financial burden of testing and disposing of the excess fill from Victoria Street reconstruction. The estimated savings for the Victoria Street project is \$210,000.

Staff have worked with IBI, the Town's engineering consultant for this project, to build a solid tender document for the construction of Phase 1A expansion. A lot of dedicated work has gone into the tender document to identify risks to the contract and remove as much uncertainty as possible. Risk and uncertainty generally equates to increased cost to the Town either through scope changes, change orders, construction claims and overall project schedule delays. Three general contractors were pre-qualified to bid on the work, and all three submitted a tender bid. The three tender bids were very close in price, indicating that the tender document was clear and well defined. The current total budget for the TWWTP Phase 1A expansion is \$24,127,000,

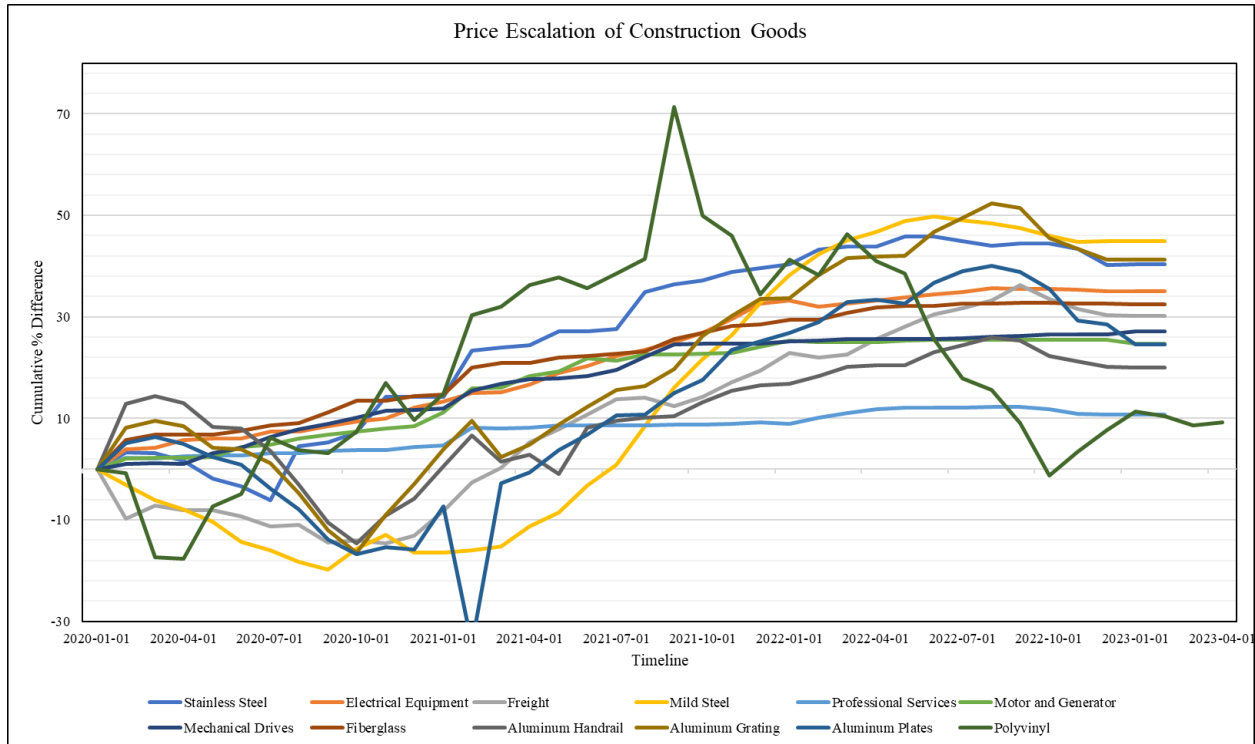
however, that includes a number of smaller projects that were untaken by staff to achieve a reduction in the overall cost of the project and assist in meeting the tight timelines. Attachment 1 provides an analysis of the bid submissions.

Below is breakdown of the overall capital budget:

Spent to Date	\$1,781,990
Committed Engineering (including the Outfall Design)	\$1,849,082
Pre-Purchased Equipment	\$1,877,348
Minor Additional Costs to be incurred	\$200,000
Construction and Contingency	\$23,291,580
Total Expected Costs	\$29,000,000
Initial Budget	\$18,027,000
CSOPS.22.025 Thornbury WWTP Expansion Update	\$6,100,000
Total Approved Budget	\$24,127,000
Required Increase	\$4,873,000

At 60% engineering design, the estimate for the expansion, plus the additional studies and engineering was \$21,100,000. At 90% engineering design, the estimate increased to \$25,000,000. In reviewing the breakdown of the construction, the costs for sites works, concrete and metals were significantly higher than we had anticipated. If the works had been constructed prior to COVID, it's anticipated that the overall construction would have cost \$15,000,000 to \$18,000,000.

The materials involved in the expansion, such as mechanical drives, aluminum materials, motors and generators, electrical equipment, as well as the raw material for yard piping (polyvinyl) have steadily increased in price. From the graph you can see that construction goods have cumulatively increased anywhere from 25-50% since January of 2020. This indicates that prices are likely to continue following this trend, with prices even escalating during the period of construction. We have only recently begun to track these price increases, so when budget estimates for the Thornbury WWTP Expansion were created, the Town did not have current escalated pricing.



The addition of the engineering for the design of the outfall added an additional \$1,600,000 to the project. This work was not considered when setting the initial budget.

Staff recommend increasing the budget to \$29,000,000 so that this work can proceed as planned. Significant work has already been completed to reduce the overall burden of this project. At this point in time, considering reengineering to save minor amounts will result in delays that will put this project in jeopardy, extras engineering fees, plus additional construction costs during Phase 1B construction, significantly outweighing the potential savings.

E. Strategic Priorities

1. Communication and Engagement

We will enhance communications and engagement between Town Staff, Town residents and stakeholders

2. Organizational Excellence

We will continually seek out ways to improve the internal organization of Town Staff and the management of Town assets.

3. Community

We will protect and enhance the community feel and the character of the Town, while ensuring the responsible use of resources and restoration of nature.

4. Quality of Life

We will foster a high quality of life for full-time and part-time residents of all ages and stages, while welcoming visitors.

F. Environmental Impacts

The phase 1A expansion of the TWWTP is essential to ensure the treatment capacity is available to meet the needs of the Town. The TWWTP treats the wastewater of Thornbury and surrounding areas, prior to discharging to the Beaver River. Properly treated effluent protects the health of the users and natural environment.

G. Financial Impacts

This project is funded from two sources: the Wastewater Asset Replacement Reserve Fund and Wastewater Treatment Development Charges. The split between the funded is 10% replacement and 90% growth. Staff have included a 10% replacement funding as the current users of the Thornbury WWTP will get some benefit from these works. On the growth side the funding will come from the Thornbury Sewer Capacity Development Charges.

The Town's Wastewater Asset Replacement Reserve Fund has a 2022 unaudited year-end balance of \$16M; with current commitments of \$6.3M leaving an adjusted balance of \$9.7M. The sole source of funding going into this reserve fund is from the fixed charge collected on bi-monthly utility bills. For 2023 the Town increased the fixed charge by 15.6%; this increase was required to fund these critical projects and keep up with the increasing construction costs.

The Thornbury Sewer Development Charge Reserve Fund has a 2022 unaudited year-end balance of \$3.7M with the solely commitment for this reserve fund being this capital project. This Development Charge is collected solely for the expansion requirements of the Thornbury WWTP as development occurs in the Thornbury East/West, Camperdown, Lora Bay, and Clarksburg Service Areas. For 2023 the development charge for this plant is \$7,544 which is less than the \$12,400 ($\$26.1M - \$3.7M / 1,800$) that will be required per unit to fully fund this expansion.

The Town is in a good position given the fact that the Development Charges Background Study and By-law will be updated in Q4 of 2023 or Q1 of 2024 which will allow the Town to carry the correct cost of this project and correctly collected from these benefiting units. In addition, the benchmark costs established through this tender process will provide good data for more accurately costing out the future expansion requirements within the background study.

H. In Consultation With

Sam Dinsmore, Deputy Treasurer/Manager of Accounting & Budgets

Serena Wilgress, Manager of Purchasing & Risk Management

Mark Service, Wastewater Supervisor

I. Public Engagement

The topic of this Staff Report has not been the subject of a Public Meeting and/or a Public Information Centre as neither a Public Meeting nor a Public Information Centre are required. However, any comments regarding this report should be submitted to Allison Kershaw, Manager of Water & Wastewater Services managerwww@thebluemountains.ca .

Any comments regarding this report should be submitted to Allison Kershaw, Manager of Water & Wastewater Services managerwww@thebluemountains.ca .

J. Attached

1. Arcadis IBI Group Bid Analysis

Respectfully submitted,

Allison Kershaw,
Manager of Water & Wastewater Services

Shawn Carey
Director Operations

For more information, please contact:
Allison Kershaw, Manager of Water & Wastewater Services
managerwww@thebluemountains.ca
519-599-3131 extension 226

Report Approval Details

Document Title:	CSOPS.23.017 Thornbury Wastewater Treatment Plant Expansion Budget Increase .docx
Attachments:	- CSOPS.23.017 Attachment 1.pdf
Final Approval Date:	Apr 6, 2023

This report and all of its attachments were approved and signed as outlined below:

Allison Kershaw - Apr 6, 2023 - 1:32 PM

Shawn Carey - Apr 6, 2023 - 3:46 PM

 **ARCADIS** | IBI GROUP

8133 Warden Avenue, Unit 300
Markham ON L6G 1B3 Canada
tel 905 763 2322 fax 905 763 9983
ibigroup.com



Report on Tenders
Town of the Blue Mountains Bid: 2022-41-T-OPS

Thornbury Wastewater Treatment Plant Phase 1A Expansion

Prepared for The Town of the Blue Mountains
by Arcadis IBI Group
April 6, 2023

 **ARCADIS** | IBI GROUP
8133 Warden Avenue, Unit 300
Markham ON L6G 1B3 Canada
tel 905 763 2322 fax 905 763 9983
ibigroup.com

Reference 137022

Allison Kershaw
The Town of the Blue Mountains
32 Mill Street, P.O. Box 310,
Thornbury, ON NOH 2P0

Attention: Ms. Allison Kershaw

**Thornbury Wastewater Treatment Plant Phase 1A
Expansion - Contract 2022-41-T-OPS
Report on Tenders**

Please find enclosed our Report on Tenders for the above noted contract. The purpose of this letter is to assist the Town of the Blue Mountains (Town) and provide recommendations to the Town regarding the selection of the preferred bidder.

The low bidder, North America Construction (1993) Ltd. (NAC), is known to the IBI Group, has good references, successfully completed similar projects, and was pre-qualified to bid on this project. Consequently, it is our recommendation that the Contract be awarded to North America Construction (1993) Ltd. for the tendered price of \$20,229,115.80 (not including taxes).

Best Regards,
IBI GROUP



Glen Douglas
Senior Project Manager

gd/pd

c.: File
Encls. Report on Tenders

Document Control Page

CLIENT:	The Town of the Blue Mountains
PROJECT NAME:	
REPORT TITLE:	Thornbury Wastewater Treatment Plant Phase 1A Expansion
IBI REFERENCE:	137022
VERSION:	1
DIGITAL MASTER:	
ORIGINATOR:	Paul Dagenais
REVIEWER:	Glen Douglas
AUTHORIZATION:	Glen Douglas
CIRCULATION LIST:	Town of the Blue Mountains File
HISTORY:	April 6, 2023 - Submitted to The Town of the Blue Mountains

Table of Contents

1	General.....	1
2	Tender Issued	1
3	List of Vendors and Tender Range Overview	1
4	Lowest Bidder Analysis	1
5	Recommendations.....	1

1 General

IBI Group Professional Services (Canada) Inc. (Arcadis IBI Group) is pleased to submit the following Bid Analysis for the Thornbury Wastewater Treatment Plant Phase 1A Expansion, Contract 2022-41-T-OPS. The purpose of this letter is to assist The Town of the Blue Mountains (Town) and provide recommendations to the Town regarding the selection of the preferred bidder.

2 Tender Issued

The Tender Documents were issued on February 1, 2023, and ten (10) addenda were released to clarify the questions received from bidders. The tender closing date was Thursday, March 30, 2023.

3 List of Vendors and Tender Range Overview

Three (3) tenders were received for the above noted project on March 30, 2023. All three tenders are approved prequalified contractors for this project. Participated bidders and the range of their tender prices are presented in the following table:

Vendor	Unofficial Values	Difference from Lowest Bidder
North America Construction	\$20,229,115.80	
Bennett	\$21,709,000.00	\$1,479,884.20
Maple Reinders	\$23,428,000.80	\$3,198,885.00

4 Lowest Bidder Analysis

Based on the Bids received, North America Construction (1993) Ltd. (NAC) has offered the lowest bid price.

NAC's tendered price of \$20,229,115.80 is \$1,479,884.20 (7.3%) less than the second low bidder, \$3,198,885.00 (15.8%) less than the third bidder. NAC's tendered price is \$1,944,329.70 (8.8%) less than the Engineer's Estimate.

5 Recommendations

Based on the analysis and the above commentary, Arcadis IBI Group confirms that North America Construction (1993) Ltd. is the apparent lowest bidder, and the bid provides fair value for money for The Town of the Blue Mountains.

The information contained herein is provided to you for reference in your decision to award the contract and Order to Commence Work upon following all administrative procedures and any legal consultation as recommended.