



REPORT

TO: Mayor Bonnette and Members of Council

FROM: Stephen Hamilton, Manager of Facilities Capital Projects

DATE: May 2, 2022

REPORT NO.: RP-2022-0009

SUBJECT: Arenas Heat Recovery and Dehumidification Project Update

RECOMMENDATION:

THAT Report No. RP-2022-0009 dated May 2, 2022 regarding the Arenas Heat Recovery and Dehumidification Projects Update be received;

AND FURTHER THAT Council pre-approve the award of the two dehumidifiers at Mold-Masters Sportsplex and one dehumidifier at Acton Arena and Community Centre subject to awarding to the low compliant bid:

AND FURTHER THAT Council authorize the Senior Manager of Purchasing and Risk Management to issue a purchase order to the lowest compliant bidder for the purchase of the dehumidifiers at both arenas to an upset limit of \$1,572,327.00 plus applicable taxes;

AND FURTHER THAT Council approve an increase to the capital budget of \$1,787,084, (original budget of \$3,042,000 revised to \$4,829,084) for the design and construction of the heat recovery and dehumidification projects at Mold-Masters Sportsplex and the Acton Arena and Community Centre, including upgraded electrical services as outlined in this report;

AND FURTHER THAT Council direct staff to close 7300-02-2001, CEP-HVAC Performance Testing and Retrofit project and return \$382,000 to the capital replacement reserve;

AND FURTHER THAT Council direct staff to return \$386,224 of unused capital funding from project 8400-02-2005, Town Hall Renovations Phase 1 to the capital replacement reserve;

AND FURTHER THAT staff are authorized to transfer \$768,224 of funds from the capital replacement reserve to finance the net shortfall in the Arenas Heat Recovery and Dehumidification project (\$1,787,084 less \$1,018,860);

AND FURTHER THAT Council authorize the Senior Manager of Purchasing and Risk Management to issue a purchase order to Efficiency Engineering of 225 Pinebush Road, Suite 202, Cambridge, ON as a single source supplier of additional design and engineering services to an upset fee limit of \$80,645.00 +HST as outlined in this report;

AND FURTHER THAT Staff be directed to bring back any further update reports impacting the budget or timing for this project.

KEY POINTS:

The following are key points for consideration with respect to this report:

1. CCAM and Facilities Staff completed an Arenas Net Zero Study in 2021 to review the feasibility and projected paths for the Town arenas facilities to meet net zero objectives by the year 2030. The study proposed a phased approach of capital project developments in the arenas that built on the current projected ten (10) year capital forecast for the arenas and the need for “end of life” capital replacements of major dehumidification and HVAC equipment replacements. The study did not identify specific requirements for electrical infrastructure upgrades including transformers as it was considered outside of the study scope. The study scope was intended to result in a conceptual level technical solution to reduce greenhouse gas emissions including an outline of potential measures and lifecycle financial analysis for each measure.
2. The heat recovery and dehumidification replacement projects for the two arenas had a combined budget of \$3,042,000 for the projects inclusive of construction, design and engineering, and project management costs. The Class C estimated budget for the heat recovery and dehumidification projects, including additional electrical infrastructure upgrades is now estimated at \$4,829,084. The combined capital projects have \$3,042,000 in approved funding and \$1,018,860 in additional available funds for a total of \$4,060,860. This is a projected shortfall of \$768,224 in available funding.
3. The current construction environment has many unknown risks and challenges at this juncture. Chief among these now is cost escalations and supply chain issues with major pieces of HVAC equipment. Preliminary market reviews completed through our consultants indicate that the dehumidifiers have a much longer lead time for procurement than in the past. We are told to expect a lead time of 30 to 34 weeks for delivery of this equipment from the time of

initial order. Staff are attempting to ensure timely acquisition of equipment by procuring these major pieces of equipment in advance of engaging a general contractor for completion of this project.

4. Design and engineering for replacement of the major HVAC components of the arenas with systems relying on a combination heat recovery and electric supply to replace existing natural gas supply will require an upgrade to electrical supply systems at the arenas. At the AACC the arenas will require an upgrade to a 750/1000 KW transformer system. The process for ordering a new transformer and replacing this service is estimated to be approximately 10-12 months and would need to be initiated in 2022 to be ready for 2023 and the anticipated final completion of the heat recovery and dehumidifier installs at the AACC. The MMSP had a new transformer added during the 2013 expansion and has sufficient supply to the facility to accommodate all future measures for HVAC replacements as per the Net Zero Study, however the supply will need additional infrastructure to the Alcott/Fernbrook side of the facility.
5. Efficiency Engineering Inc. have been engaged to complete the design and engineering for the heat recovery and dehumidification projects for the AACC and MMSP. Additional scopes of construction work at both arenas are required to complete the projects. An additional scope of design and engineering work is required for both projects. Efficiency Engineering have proposed an additional set of fees to complete this work. In the interest of project integration and continuity, it is proposed to extend the additional works to Efficiency Engineering at the proposed fees.
6. Consultant cost estimates to date have been Class C estimates. The current market for procuring equipment and services has been described as challenging and uncertain with regards to cost escalations and availability. Scheduling and cost estimates could be further impacted by additional variables impacting the current projections negatively.

BACKGROUND AND DISCUSSION:

The major components of heating, ventilation and dehumidification for the Alcott/Fernbrook rinks at the MMSP and the Townsley rink within the AACC are nearing the end of their life cycle. As such most of these major components have been scheduled for replacement within the 2022 and 2023 budget years. Staff have been reviewing options for replacements of these units for the past several years in anticipation that the units will need replacement and have been looking for best options for the future with regards to the replacements of these critical pieces of equipment. In 2021 the Town had Enerlife Consulting, through the Mayor's Megawatt Challenge (MMC) complete a Net Zero Feasibility Study for the both the AACC and the MMSP. The study reviewed current equipment, energy consumption and intensity, capital

replacement planning and developed a strategy for the best path forward for each of these facilities to align with Council's objective to achieve net zero GHG emissions within Town facilities by the year 2030. For both arenas the study concluded that the best means of moving forward was to utilize the unused capacities of both arenas to harness the naturally occurring waste heat by-product from the refrigeration process and utilize this heat recovery to support the dehumidification, ventilation and heating systems of the arenas. This would allow the facilities to design and develop replacement systems that would replace direct supplied natural gas powered equipment with equipment that would re-use significant amounts of waste heat product generated from an ongoing refrigeration process (electric energy) supplemented with other electric energy heating sources. As the facilities were due for a substantial replacement of the equipment based on life-cycle costing, the opportunity to replace the systems with ones derived on newer technology and non-GHG emitting technologies was seen as the opportunity to complete needed capital replacements with upgraded systems aligning with the climate change objectives.

The key element of the initiative would be the full capacity development of heat recovery systems within each of the arenas. While the new refrigeration plant at MMSP substantively utilizes a full heat recovery system and employs this system for dehumidification, pre-heating domestic water, and some space heating, the older refrigeration plant at MMSP and the refrigeration plant at AACC were not designed to utilize heat recovery. Heat recovery for both refrigeration plants was added to the capital budget for 2022 as the implementation of the heat recovery system was key to any future additions to the dehumidification, ventilation or space heating systems of both arena facilities. The Net Zero Feasibility Study provided a budget estimate for the implementation of heat recovery systems for each refrigeration room. An amount of \$1,078,000 was added to the capital budgets for the 2022 year to design and construct heat recovery systems in the refrigeration rooms for each of the facilities. Heat recovery expansion into mechanical rooms to integrate with future HVAC and space heating upgrades would be done as part of the later phases of the project.

In addition, each of the facilities had dehumidification systems that were at the "end of life" and were historically under-sized for their respective facilities. Dehumidification is a critical function of an arena environment. It impacts the performance and capacities of the refrigeration system, space heating and thermal comfort, as well as the ventilation of the facility space. Properly designed and integrated dehumidification is key to creating a safe and comfortable environment within the facility as well as one that is energy efficient. Replacement dehumidification was included as a key first step in the plan to design a facility that could be a net zero facility in the future.

Design Study/Class C Cost Estimating

Efficiency Engineering Inc. of Cambridge ON were engaged in January 2022 as design consultants to complete a scope of work directly related to the design and engineering of each of the Acton Arena and MMSP heat recovery and dehumidification projects. A design study was completed including Class C costing estimates. The design study has affirmed several key understandings from the Net Zero Study but has also identified other key challenges with budgetary impacts for the project. They are as follows.

1. Both the MMSP and AACC generate sufficient capacity for heat recovery to support the dehumidification systems and therefore be able to switch them from direct gas fired units to units substantively using the reclaimed heat from the refrigeration process.
2. The conversion to the proposed dehumidification systems will significantly reduce the GHG emissions from both the arenas. The designed system for Acton will reduce the annual consumption of gas by 48,961m³ and will reduce the facilities GHG emissions by 93 tCO₂e. The MMSP system will reduce its annual consumption of gas by 58,248m³ and will reduce the facility's GHG emissions by 110.7 tCO₂e. This initial project in the net zero plan to reduce the carbon footprint is expected to reduce the facility GHG emissions in the AACC by 30% from its 2019 level of 311.7 tCO₂e. In MMSP the implementation of the heat recovery system in conjunction with a new dehumidification system for Alcott/Fernbrook rinks is expected to reduce the overall facility GHG emissions by 18% from its 2019 level of 628.4 tCO₂e.
3. The design study has determined that the existing dehumidification systems in both the Townsley rink and the Alcott/Fernbrook rinks are substantially undersized for the building envelope spaces and uses of the facilities. At MMSP the two rinks were serviced by a single 10,000 CFM unit. This created issues with adequate and specific controls for each building, ventilation, and efficiency in dehumidification. Additionally, the demands upon the system have created significantly higher wear on the unit and a shortened life cycle. At AACC Townsley rink the existing dehumidification unit is also significantly undersized leading to all the same types of issues. The current unit is a 2500 CFM unit housed within the building envelope. A new unit needs to be a 12000 CFM unit and consequently will need to be placed on a built pad outside the existing building envelope. The additional sizing of units, coupled with recent inflationary cost escalations of equipment have led to increased cost estimating for each of the dehumidification projects.

Additional Electrical Upgrade Projects

The Net Zero Feasibility Study completed by Enerlife Consulting had been tasked with identifying a feasibility plan to achieve net zero by 2030 in the Town's arena facilities as part of a cohort of municipalities and partially funded by FCM (Federation of Canadian Municipalities) Green Municipal Fund. The study resulted in a high-level technical solution to reduce greenhouse gas emissions including an outline of potential measures and lifecycle financial analysis for each measure. One of the areas that was outside the scope of the study was the potential need and costing should additional electrical infrastructure in the facilities be required. A review by Efficiency Engineering has concluded that the equipment additions to meet net zero objectives at each facility will require the following electrical upgrades;

1. The AACC operates at 85-90% of its current transformer capacity. New equipment for heat recovery and dehumidifiers will require an increased capacity. A new transformer upgrade to a 750/1000 KW unit, including the purchase of a unit, a connection to the 44KVA service and design works is estimated to cost \$412,000 inclusive of construction and design costs. The process of design works, approvals and the lead time for the purchase of transformers is expected to be 10-12 months. A new transformer would need to be in place by the time a new dehumidifier, and heat recovery equipment is in place and operating fully. At the earliest this would be expected to be the Spring of 2023 at the conclusion of the next ice season and at the latest this would be required in advance of the 2023/2024 ice season.
2. The MMSP has an upgraded transformer and a review of its available capacity indicates that it has the capability to accept new equipment forecast for the projected HVAC upgrades consistent with the Net Zero Study blueprint. However, the heat recovery and dehumidifier projects will require additional feed and panel upgrading to bring the required power from the transformer location on site to the proposed dehumidifier units. This is expected to cost an additional \$100,000 inclusive of construction and design costs.

Dehumidifier Purchase

The design consultants have reviewed the current market with regards to dehumidifier suppliers for the types and sizes of dehumidification units that we will require. There are several manufacturers capable of construction and supplying units that would meet our design and performance specifications as designed for our system. However, they are units that are made to order to specific design specifications and as such do have a significant lead time for supply. We have been advised to expect lead times of thirty (30) weeks or more for the manufacture and delivery of units from the time of an issued purchase order (PO) and accepted shop drawings. In the interest of ensuring the supply of these units, fundamental to the completion of the project, in a timely fashion to meet the requirements of the CCRF funding agreement, it was decided to bid this equipment separately from the bid to engage a constructor for the construction of the heat recovery system and installation of the dehumidification system. As this bid couldn't be finalized and awarded until later in June, making the opportunity to acquire the dehumidifiers in a timely fashion riskier, the dehumidifiers were bid separately.

Tender T-078-22 - Purchase of Three (3) Dehumidification Units for Arena Heat Recovery System & Dehumidification Renovations Project was issued on April 5, 2022. The bid was posted on Bids and Tenders (www.bidsandtenders.ca). The tender was scheduled to close on April 28, 2022.

The bid submissions are to be reviewed by the consulting firm, Efficiency Engineering and by Town Staff, but at the time of the writing of this report, bids had not closed and were not available. Staff are seeking approval to accept the lowest compliant bid meeting all the design requirements and within an upset limit of \$1,572,327 plus applicable taxes. Bids within this upset limit be consistent with the expected budget

forecast for equipment purchases within the dehumidifier project cost estimates. Selecting a vendor at this juncture will advance the order of the equipment by an estimated 6-8 weeks and will give the project an additional window to ensure that the supply of the equipment can meet other requirements of the project.

The issuance of the bid to complete the full scope of heat recovery works as well as the dehumidification install and commensurate works for that construction will be issued as per the original schedule plan and be brought to Council on July 4th for final approval.

Additional Design and Engineering Scope of Work

Staff had engaged Efficiency Engineering Inc. for the completion of the Design and engineering works for the heat recovery and Dehumidification projects at both arenas. The contract with Efficiency Engineering is for a full scope of standard design and engineering services specific to the heat recovery and dehumidification projects of these two facilities including design development, schematic design, specifications and tender documents and construction administration.

The preliminary project schedule had anticipated completing design development schematic design, specification, and tender documents for the full scope of the projects by May 2022 and to finalize the procurement process for a general contractor (GC) for the full scope of the project by July 2022. It is now anticipated that this schedule would not allow for the Town to acquire the major pieces of dehumidification equipment prior to February 2023.

The project now has a need for significant additional design and engineering scope of work to implement the heat recovery and dehumidification projects in order to successfully complete the projects.

Additionally, the Town has added another project to the AACC net zero study phasing of projects by advancing the space heating and ventilation projects at AACC from 2023 to 2022 in accordance with the requirements of the Ontario Trillium Fund (OTF) grant that was awarded for this project.

Staff are seeking to sole source Efficiency Engineering for the added design works and fees for both projects in the interest of maintaining continuity and integration in design with the larger heat recovery and dehumidification projects as well as maintaining consistency with the tight timelines for completion of the projects.

Efficiency Engineering have provided the following list of fees for design and engineering of the additional scope of project work.

Project	Projected Construction Budget	Fee Proposal
AACC HVAC Replacements	\$380,000	\$40,140 + HST
AACC Transformer Replacement	\$371,500	\$ 37, 505 + HST
MMSP Electrical Upgrade	\$97,000	\$3,000 +HST

STRATEGIC PLAN ALIGNMENT:

This report aligns to the Town’s Strategic plan recognizing the value to provide responsive, effective municipal government and strong leadership in the effective and efficient delivery of municipal services.

This report also identifies climate change and the environment as one of the Town’s Strategic priorities.

RELATIONSHIP TO CLIMATE CHANGE:

This report impacts and/or helps address climate change and the Town's Net Zero target through corporate energy savings.

The implementation of these projects in the arenas as recommended by the Net Zero Arenas study is critical to ensuring alignment with the town’s target of net zero carbon emissions by 2030. It is expected that as a result of the implementation the town would avoid 203.7 tCO2e on annual basis which is 21.7% reduction below the 2019 level of 940.4 tCO2e of annual carbon emissions for both AACC and MMSP.

PUBLIC ENGAGEMENT:

Public Engagement was not needed as this report is administrative in nature.

INTERNAL CONSULTATION:

This report has been reviewed with staff of Finance, Purchasing, Corporate Climate Change and Asset Management and Recreation & Parks.

FINANCIAL IMPLICATIONS:

This report has an immediate financial impact and requires a funding source.

The scheduled replacement of the dehumidification and heat recovery systems at the MMSP and AACC are being designed to meet the net zero objectives for the arena facilities. The following costs have been identified to achieve this objective:

Element	Cost
Design & Engineering (HR & Dehumidification)	\$ 200,000
Design and Engineering (electrical upgrades)	\$40,505
Design & Engineering (AACC HVAC)	\$40,140
Installation and construction	\$3,562,004
Electrical system cost escalation	\$471,500
Sub-Total	\$4,314,149
Contingency (10%)	\$431,414
HST	83,521
Total Project Costs	\$ 4,829,084

The work will be completed through the following approved capital projects:

Budget			
Year	Project		Total
2021	8251-06-1901	MMSP Replace Dehumidifiers	\$585,000
2022	8251-02-2224	MMSP LCDB Phased Dehumidification	\$841,000
2022	8251-02-2223	MMSP LCDB Heat Recovery System	\$538,000
2022	8211-02-2210	Acton Arena LCDB Heat Recovery System	\$539,000
2022	8211-02-2204	Acton Arena LCDB Dehumidification Unit	\$539,000
Total Approved Budget			\$3,042,000
Increases			\$1,787,084
Total Revised Project Cost			\$4,829,084
FUNDING SOURCES			
Canada Community Building Fund		\$150,000	
Approved Budget Funding (Capital Replacement Reserve)		\$2,892,000	
Other Available Funding		<u>\$1,018,860</u>	
			\$4,060,860
Shortfall Requiring Funding			\$768,224

The MMSP Replace Dehumidifiers (project 8251-06-1901) was previously funded through \$150,000 from the Canada Community-Building Fund and \$435,000 from the Capital Replacement Reserve. The 2022 capital projects were funded through the Capital Replacement Reserve and there is another \$1,018,860 in additional available funds.

The existing funding structure leaves a shortfall of \$768,224 for the updated project scope and costs. Staff recommend that this shortfall be funded through the capital replacement reserve should no additional or alternative funding sources be secured. In addition, staff are recommending that the capital replacement reserve be replenished by returning unspent funds from the following two projects to the reserve:

Project		Total	Comments
7300-02-2001	CEP-HVAC Perf Testing & Retrofit	\$382,000	Close project
8400-02-2005	Town Hall Renovations Ph 1	<u>\$386,224</u>	Partial transfer of balance
Total		<u>\$768,224</u>	

Staff will report back if additional grant monies are made available for this project or if any further project requirements have an additional financial impact.

Reviewed and approved by,

Moya Jane Leighton, Director of Finance and Town Treasurer

Warren Harris, Commissioner of Recreation and Parks

Chris Mills, Chief Administrative Officer