SCHEDULE F – PROJECT COMPLETION REPORT

GMF number	GMF 17546 PSP Grant Agreement
Name of lead applicant:	City of Ottawa
Name, title, full address, phone, fax and e-mail address of lead technical contact for this study	Janice Ashworth Project Manager, Climate Change and Resiliency Unit 101 Laurier Ave W Ottawa, ON K1P 1J1 Janice.ashworth@ottawa.ca
Date of the report	Nov 29, 2021

1. Introduction

a)

Name	Affiliation	Role in Project	Contact
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Sandra Gay	Senior Process Engineer, Wastewater, City of Ottawa	Project data collection support	Sandra.Gay@ottawa.ca
Andrea Flowers	Section Manager, Climate Change and Resiliency Unit, City of Ottawa	Project sponsor	Andrea.Flowers@ottawa.ca
Joan Haysom	Innovative Energy Market Chief, J.L. Richards & Associates Ltd	Consultant, Project lead	JHaysom@jlrichards.ca

2. The Feasibility Study

a) Explain the process of the project.

This project was conceived of in the Energy Evolution Strategy Phase 1 Report that was approved by Council in 2015. It was initially considered to look at wastewater heat sources, industrial process waste heat, and geothermal sources of heat. After conversations with consultants, it was decided that there is not enough industrial process heat in Ottawa for a study to be worthwhile, so the study was focused on the other two sources of heat.

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The City completed a request for quotations from consultants on our relevant Standing Offer list. After review of the applications, it was determined to select JL Richards for the study.

The scope of work and project charter was designed in collaboration with many other departments of the City including wastewater collections and processing, asset management, planning, and climate change.

Data collection took place over the heating season of 2019-2020 and the data analysis and report conclusions followed that work.

b) What were the objectives of the Feasibility Study (what was it seeking to determine)?

This study was looking to determine the potential and viability of wastewater energy transfer technologies as well as geothermal energy across the City of Ottawa.

c) What approach (or methodology) was used in the Feasibility Study to meet these objectives?

For the Geothermal Study, the provincial dataset of test wells was used as the primary source of information. This was layered with the geological datasets available to predict which geological layers would be most applicable to geothermal heating technologies.

For the Wastewater Energy Transfer (WET) Study, data on the flow and temperature of the wastewater in the sewers across Ottawa was gathered through various methods. This data was overlapped with modeled flow data provided by the planning department.

An assessment of three different types of WET technologies took place which identified three main technology types and compared their various potential applications and their relative cost of heating. Four case studies were completed to model how the three different technologies could be best deployed in a real location in Ottawa. Finally, the wrap up report summarized the potential for geothermal and WET technologies to contribute to reducing the GHG emissions from heating buildings and identified a series of follow up study recommendations to facilitate implementation.

d) Please describe any public consultations conducted as part of the Feasibility Study and their impact on the Study.

There were no public consultations. Consultations did take place both with technology providers as well as with potential users of the technology.

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3. Feasibility Study Findings and Recommendations

a) What were the environmental findings related to the options explored in the Feasibility Study? Please provide quantitative results and summary tables of these results (or the page numbers from the Feasibility Study report).

For the Geothermal Study, it was identified that a large portion of Ottawa's built-up area can take advantage of open loop geothermal energy technologies, which is a more cost effective source of zero-carbon space heating and cooling.

For the Wastewater Energy Transfer Study, this comes up in many locations in the report, but page 53 summarizes it best based on the case studies reviewed.

b) What were the financial findings related to the options explored in the Feasibility Study (for example, results of a cost-benefit analysis, financial savings identified, and so on)? Please provide quantitative results and summary tables of these results (or the page numbers from the Feasibility Study report).

For the Geothermal Study, it was identified that a large portion of Ottawa's built-up area can take advantage of open loop geothermal energy technologies, which is a more cost effective source of energy.

For the Wastewater Energy Transfer Study, page 52 summarizes the levelized cost of heat for this technology as compared to alternative heating sources. Page 53 shows the levelized cost of energy for each of the case studies.

c) Based on the environmental and financial findings above, what does the Feasibility Study recommend?

For the Geothermal Study, the findings suggested that most of Ottawa has a good chance for deploying successful open loop geothermal technologies. It identified "likely", "possible", and "unlikely" areas. Test wells in the urban areas

For the Wastewater Energy Transfer Study, the feasibility study recommends that the technology 3 (the largest technology option) is the most viable technology to compete with current energy prices. This technology is best applied to large new developments. As such, the study recommends that specific flow and temperature data be collected for sewer pipes in prime locations of large developments in the urban area where sewer flow is highest.

4. Lead Applicant's Next Steps

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a) Taking the Feasibility Study's recommendations into account, what next steps do you as the municipality plan to take? What potential benefits or internal municipal improvements would result from these next steps?

For the Geothermal Study, we intend to publish the map that identifies the "likely, "possible", and "unlikely" zones to inform property owners and developers of the resource available in their area. We may also be looking to invest in some test wells in key development areas.

For the WET Study, The City is deploying more accurate flow and temperature collection technologies in key locations of interest over this winter to further quantify opportunities for specific development projects. The City will also be developing a policy to inform how private parties can access thermal energy from the sewer system. We intend to amend the questionnaire used in the development application process to ensure that developers are considering this technology as an option. Finally, we intend to publish this report as well as other sewer information that can help project developers with assessing the potential for WET technologies.

5. Lessons Learned

a) What would you recommend to other municipalities interested in doing a similar Feasibility Study? What would you do differently if you were to do this again?

For the Geothermal Study, we learned that the public dataset of wells was very useful. It did not include all test wells, however, so collecting test well data in addition to the public data would be additive.

For the WET Study, we determined that the odalogs (which measure the temperature of the air in the sewer pipe) are affected by air flowing through the system and therefore are not accurate enough to quantify the potential of a WET system. We would recommend the use of probe sensors for temperature data in the future. Alternatively, smart covers may be an effective way to model temperature and flow simultaneously.

We learned that the City's modeled flow data can be very different depending on the approach used. Getting alignment on these flow models and publishing this data (at least the minimum flow data) can help developers considering this technology.

We also learned that we should have included an analysis of cooling potential in the scope of work, as this will help the financial viability of the study.

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Technology 3 was the most financially viable, so focusing a study on that may be the most cost-effective place to start.

b) What barriers or challenges (if any) did you encounter in doing this Feasibility Study? How did you overcome them?

For the Geothermal Study, no barriers or challenges were faced.

For the WET Study, we encountered challenges with data collection. Some of the data sensors used were not accurate enough and some of them broke throughout the process. As a result, we used modeled data from historical flow patterns to substitute where measured data was not available. For temperature data, we made some assumptions based on the trends identified in the data available. A follow up action will be to measure actual temperature throughout the winter months to confirm the assumptions made in this study and to inform potential sites for application.

6. Knowledge Sharing

a) Is there a website where more information about the Feasibility Study can be found? If so, please provide the relevant URL.

We will post the final report on https://ottawa.ca/en/living-ottawa/environment-conservation-and-climate/climate-change-and-energy/energy-evolution.

We will also be uploading the geothermal potential map into geoottawa.

b) In addition to the Feasibility Study results, has your Feasibility Study led to other activities that could be of interest to another municipality (for example, a new policy for sustainable community development, a series of model by-laws, the design of a new operating practice, a manual on public consultation or a measurement tool to assess progress in moving toward greater sustainability)? If so, please list these outcomes, and include copies of the relevant documents (or website links).

We gave a presentation on the results of the study through Clean Air Partnership. That webinar are PDF are available here:
Webinar Recording-Sewer Waste Heat Ottawa
Janice Ashworth & Joan Haysom, PDF Presentation

We will soon be developing a questionnaire and a policy to identify how private parties can access thermal energy from the wastewater system. This policy will be shared when it is complete.

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