

## SCHEDULE G: PROJECT COMPLETION REPORT

### Part 1 – Instructions

**REQUIREMENT:** You must submit a Project Completion Report as a condition of the Final Loan Disbursement.

**PURPOSE:** Your Project Completion Report has three purposes:

1. **Project tracking:** This report enables FCM to confirm that your project was completed as described in the Agreement.
2. **Reporting on the impacts and lessons learned during the construction of the project:** This report includes any environmental, social and economic results as well as lessons learned during the *planning, design and construction of the project*. Ensure that you include in the report any processes or techniques that were implemented at these stages to address triple bottom line impacts. This could include dust minimization measures or the onsite use of electric vehicles instead of gas powered. All environmental, social and economic results *from the operation* of the project will be reported under a separate Environmental Results Report in the form set out in one of the schedules to the Agreement.
3. **Knowledge sharing:** FCM shares the lessons and expertise gained through GMF-funded initiatives with other communities across Canada. The findings and lessons learned documented in your Project Completion Report could be valuable for other municipal governments that are seeking to address sustainability issues in their own communities. FCM will post your reports on its website at the approved projects database<sup>1</sup>. This is the part of the GMF website which is most frequently visited. Your report will assist FCM in producing other materials related to your project, including a GMF case study. In addition, other municipalities may view your project completion report to improve the success of their project.

**COPYRIGHT:** You must hold the copyright to the reports that you submit to us and provide FCM with rights to reproduce and distribute it as set out in the Agreement.

**CONFIDENTIALITY:** If your report contains any confidential information that you would prefer not be made available to the public (e.g. through a case study or other materials produced by FCM that relate to your project), please submit two versions of the report:

1. **Complete report including confidential information:** Please clearly label this report with the word "**Confidential**". FCM will treat it as confidential.
2. **Abridged report excluding confidential information:** This report may be posted on the FCM website and otherwise made available to interested third parties.

**CONTENT OUTLINE:** Your Project Completion Report should be approximately **9 to 15 pages long**; some reports may be longer or shorter depending on the complexity of the Project. While there are no maximum word counts for each section, the most pertinent section of the report – Lessons Learned – should be given more weight.

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<sup>1</sup> <http://www.fcm.ca/home/programs/green-municipal-fund/funded-initiatives.htm>

## **SCHEDULE G: Project Completion Report**

Because your report may be read by non-technical municipal staff and similar readers, please assume a low to moderate level of technical knowledge and a preference for clear, direct and focused writing. Use simple language, and explain any highly technical terms or acronyms that are used.

**REPORT FORMAT:** Please request an electronic Form of Project Completion Report from the GMF Project Officer and submit your report in either .doc or .pdf (searchable) format. A scanned copy of the Project Completion Report will not be accepted. FCM endeavors to collect the most relevant project information and as such may amend the Form of Project Completion Report from time to time. If so, FCM will provide you with the latest Form of Project Completion Report.

## Part 2 –Project Completion Report Form

### Project information

GMF number: 15977

Name of funding recipient: The Corporation of the Township of St. Clair, ON

Project title: Courtright WWTP Final Effluent Reuse System

Date of Project Completion Report: October 28, 2019

Project Construction Start Date (MM/DD/YYYY): 09/17/2018

Project Substantial Completion Date (MM/DD/YYYY): 10/15/2019

Total Project Cost (Actual): \$1,578,112.88

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### QUESTIONS:

#### Project implementation

1. Was the Project implemented as outlined in the contract (or as amended)? Please identify any substantial changes, explaining why they happened (e.g. getting a new system to operate correctly, delays due bad weather, labour availability, etc.) and their impact on the project (e.g. higher overall costs, more staff training required, etc.).

The Project was implemented as outlined in the amended contract. The original Substantial Performance date was set as May 31, 2019; however, due to bad weather (i.e., wet spring conditions), equipment delivery delays, and labour availability, the date for Substantial Performance was shifted to October 15, 2019. In addition, several contract change orders were approved during the course of the construction work to capture extra work resulting from unforeseen conditions (i.e., subsurface/soils quality and groundwater) and other elements necessary for a properly functioning system (i.e., additional heat tracing and insulating of exposed lines for freeze protection during the winter, additional liner/protection material for the biofilter cells, final effluent reuse pumping skid relocation to accommodate suction line strainer access for operations, and electrical supply to the biofilter sound enclosure). These changes impacted the Project schedule (i.e., longer construction period) and also the Project budget (i.e., higher overall costs). The total value of contract change orders has been calculated at approximately 5% of the original contract amount.

#### Lessons learned

### INSTRUCTIONS:

Lessons learned refer to knowledge gained from the Project that can be applied to other situations. For this report, GMF is interested in the lessons learned from the design, planning and construction phases of the project.

Answers in this section may refer to **positive** experiences (i.e. what worked or went well, and could serve as a model for future projects) or **negative** experiences (i.e. what didn't work, or went poorly, and should be avoided in future projects).

2. Describe what worked well and what did not work well, and why, for the project elements below, include a description of any solutions implemented to address challenges?

a. Design, procurement and contracting:

Design, procurement, and contracting all worked relatively well. In retrospect, choosing to pre-qualify the contractors may have helped identify whether specific firms had some experience gaps; however, overall these processes went as expected. The Township received three bids from general contractors, two of which were similar and one very high bid. The lowest bid was selected for contract award.

During contract execution, the decision was made to de-scope supervisory control and data acquisition (SCADA) programming from the contractor and provide to an integrator that the Township often works with. While this was beneficial, since the integrator is intimately familiar with the Township's expectations and the program at the Courtright Wastewater Treatment Plant (WWTP), it also created some challenges, notably that the contractor had no contractual relationship with the integrator performing the work. This has resulted in some challenges getting the SCADA programming updates completed in a timely fashion. In the future, the integrator should have been listed in the tender specifications so that the contractor could retain the integrator as a sub.

b. Consultation and community engagement (prior to and during construction):

Information was placed on the Township website and in the local newspaper (Beacon).

c. Construction of the project

The largest issue that cropped up during construction of the project was around a protective plastic liner in the biofilter cells, which was in place to protect the concrete cell from the acidic leachate water coming out of the biofilter drain lines. Without the liner, acidic leachate would eventually damage the concrete biofilter cell requiring substantial repair work on a regular basis. The liner specified was improperly installed by the contractor and failed leak testing, requiring replacement. This resulted in questions about the liner's suitability for the application. The issue was resolved by putting in a thicker liner, along with some additional protective materials designed to prevent the liner from being punctured by the media loaded into each biofilter cell, resulting in some additional costs and schedule delay to the project. Going forward, the liner specification used during this project will be updated to help avoid a similar situation from occurring in the future.

Another issue that was observed during construction was low site activity by the contractor while the biofilter liner issue was being resolved, leading to a backlog of other contract work that was not being completed in a timely fashion. Ultimately, this contributed to additional schedule delays. On-site presence from the engineering company was helpful to keep the contractor moving and additional time on-site was authorized by the Township. During this time the

Township agreed to work with the contractor and grant no-cost schedule extensions (i.e., waive the liquidated damages) to see the project come to an amicable conclusion.

During installation of the final effluent reuse pumping system, the contractor needed to gain access to the Courtright WWTP's final effluent channel, to install a baffle wall so that a wet well would be available for the pump skid suction lines (i.e., create water backup for the effluent reuse pumps to use). This was problematic, since the Courtright WWTP cannot be shut down long enough to accommodate the creation of a baffle wall in the effluent channel, and a bypass around the work area does not exist, and a temporary bypass would have likely been expensive if permissible by the Ministry of the Environment, Conservation and Parks (MECP). Fortunately, the Courtright WWTP currently operates at approximately half-capacity, which means that half the plant is not needed for treatment and sits in offline mode. It was determined that the offline tankage had sufficient volume to retain flows through the Courtright WWTP for several hours, which was enough time for the contractor to install a pre-cast concrete baffle wall in the final effluent channel. Operations diverted flow into the offline tanks for retention so that no flow was leaving the WWTP (i.e., no flow through the final effluent channel) so the contractor could work in the space to install the baffle wall. This saved significant cost and avoided schedule delays associated with obtaining MECP permission to temporarily bypass the final effluent channel.

d. Completing the project on time and on budget.

During construction of the project, six contract change orders were issued, which covered items identified by Operations, the contractor, and the engineering firm. Ultimately, the contract change order costs amounted to approximately 5% of the original contract price, which is on the low end of what is considered typical.

The largest variance experienced with this project was the schedule. The original date set for Substantial Performance was May 31, 2019. For reasons identified above, this date shifted several times during the construction period. The Township agreed to work with the contractor and grant no-cost schedule extensions (i.e., waive the liquidated damages) to see the project come to an amicable conclusion. Had liquidated damages been applied, the contractor may have completed their work more expeditiously, but the relationship would likely have suffered and it is hard to predict what the outcome would have been.

3. Describe your experience (e.g. trade-offs, surprises) when choosing a particular approach, technology or solution for this project. What would you do differently?

One of the major systems associated with this project, the new biofilter, was designed by the engineering firm rather than having a pre-engineered system installed by a vendor. This choice was made to reduce capital and on-going operation and maintenance (O&M) costs for the Township; however, it also created some issues with the vendor subcontracted by the contractor. The vendor was subcontracted to supply the majority of the materials required for the project. Since the vendor typically supplies their own pre-engineered systems, this arrangement resulted in a lot of back-and-forth between the engineering firm and the vendor during submittal reviews, and following on-site start-up and training, which was provided by the vendor and also by the design engineer. In addition, the contractor hired to complete the work was more familiar with installing pre-engineered systems supplied by the vendor than what was designed, which became an issue when they attempted to install the specified biofilter liner (see above).

4. Has the business case associated with the project changed since the planning stage (e.g. change in the level of service delivered by the project, expected revenues, capital or operating costs or payback, etc.)? Could anything have been done to better understand the business case at the application stage?

**No changes to the business case for the Project have been identified at this time.**

5. Did you use any approach(es), that are not business as usual over the course of the Project (e.g. decision making approach, consultation methodology, non-typical procurement, full-cost accounting)? Were there any benefits or drawbacks of this approach?

**No approaches used that were not business as usual over the course of the Project.**

**Sustainable Design and Construction:**

6. In your GMF application, you noted that the project would have sustainable design and construction measures as set out in column B of the table below.

Please complete the table below by inserting into column C the following information:

- Did the project implement the measures as described?
- Describe the effectiveness of the measures?
- Please provide reasons for any changes to the measures?
- Please include any measures that were taken beyond what you committed to in the application from.

A	B	C
Sustainable Design and Construction Element	As described in your GMF Application	Describe the Implementation of the Measure (one paragraph)
<b>Sustainable Design and procurement</b>		
Environmental considerations integrated at the design stage		
Green procurement		
<b>Site Characteristics</b>		
A remediated brownfield or underutilized site (i.e. is not a green field).		
Existing buildings/ infrastructure / equipment is used	The final effluent reuse system has been designed with sustainability in mind. Reuse of existing equipment and infrastructure was prioritized, when possible, as follows: · The existing odour treatment system (i.e., biotrickling filter) will be repurposed to provide preliminary treatment for H2S, upstream of the new odour treatment system expansion. As a result, the existing odour	<b>The Project implemented the measures as described in Column B. The effectiveness will be monitored on an on-going basis for reporting in one year.</b>

	<p>treatment system will reduce H2S concentration spikes and help ensure a more consistent feed to the new odour treatment system expansion.</p> <ul style="list-style-type: none"> <li>· Changes in return activated sludge (RAS) piping will be accommodated with the existing RAS pumps. Part of the new odour treatment system expansion will involve redirecting RAS to the Courtright WWTP headworks, and this change will not require replacement of the existing RAS pumps, or existing RAS pipeline.</li> <li>· No new buildings are included in the proposed construction.</li> </ul>	
Avoids, protects or enhances sensitive environmental areas	The proposed works avoid sensitive environmental areas by virtue of the fact that the new construction will occur all within the current site boundaries of the existing WWTP. No off-site construction or construction impacts are anticipated as part of this project.	The Project implemented the measures as described in Column B. No off-site work occurred.
Utilize natural systems to provide environmental benefits within the project (e.g. wetlands)		
Does not contribute to urban sprawl		
Part of the urban transport network and encourages the use of sustainable transportation		
<b>Construction activities:</b>		
Reuse of available construction material on-site		
Use of construction materials with recycled content		
Construction Waste management including diverting construction waste from the landfill through recycling and re-use (off-site)		

Minimize expected impacts of construction activities (e.g. dust minimization, minimise soil erosion)		
Biodiversity and ecosystem protection		
Use of energy efficient practices (e.g. reducing fuel consumption from transportation)	<ul style="list-style-type: none"> <li>· Yard piping will be buried to the extent practicable below the frost line, which will reduce the energy demand for heat tracing exposed lines during colder months for freeze protection.</li> <li>· Final effluent reuse pumps will be equipped with VFDs and operate to maintain a distribution line pressure set point. The VFD programming will ensure that the pumps only operate at the speed needed to maintain pressure, which minimizes their usage of electricity.</li> <li>· The new odour treatment system expansion will include a foul air fan that will be equipped with a VFD. The VFD will be programmed to operate the fan at the optimum speed to achieve the foul air draw-off rates needed for odour control in the facility's inlet channel, grit vortex channel, biosolids storage tank, and biosolids truck loading area. As a result, the fan's energy usage will be minimized.</li> </ul>	The Project implemented the measures as described in Column B. No deviations occurred.

**Environmental, Social and Economic Outcomes:**

7. Please describe any additional environmental, social and economic outcomes your Project has achieved during the design, procurement and construction phases.

The contractor was able to re-use some of the soils excavated to construct the biofilter cells during final grading around the area/site, which diverted those materials from disposal off-site. Otherwise, the Project did not result in any additional environmental, social, and economic outcomes at this time.

**Project Champion:**

8. Do you have a Project champion who has been instrumental to the Project to date (design, procurement, construction)? If so, please include his or her name, title and contact information, and describe his or her role in the Project.



Chris Westbrook filled the role of Project Manager for the Township and was instrumental in the completion of this project, providing the majority of the day-to-day site presence necessary to witness the contractor performing work. Geoff Kooymans filled the role of Project Manager for Jacobs, the engineering firm responsible for performing design, contract administration, and construction support services. Their contact information is provided below:

Chris Westbrook  
Coordinator of Operations Water/Wastewater  
Project Manager: St. Clair Township Email:  
[chwestbrook@stclairtownship.ca](mailto:chwestbrook@stclairtownship.ca)

Geoff Kooymans, M.Eng., P.Eng.  
Project Manager/Contract Administrator:  
Jacobs Email: [geoff.kooymans@jacobs.com](mailto:geoff.kooymans@jacobs.com)

### Next steps

9. Please describe any steps you have taken or plan to take to ensure that the people, internal groups or other key stakeholders that are important to the operation of the project adopt the necessary behaviours and other practices to ensure successful performance?

The operational staff responsible for the performance of the Courtright WWTP have received the training required to operate the new systems in place (i.e., final effluent reuse system, biofilter, and activated sludge recycling). In addition, they have been provided with an Operations and Maintenance (O&M) manual, videos of the training sessions, and Excel templates to use for recording measurements and operational parameters taken during routine monitoring. Once the new systems have been established (namely the biofilter), follow-up testing will be conducted to verify whether further steps will be needed to address odours at the site.

10. Have the systems and technologies been established for measuring and monitoring the performance of the project during operation

Yes, operational parameters will be monitored so that the system performance can be measured on a regular basis. Monitoring will include regular readings from flowmeters, handheld instruments (i.e., gas detectors, pH sensors, humidity meters, etc.) and computer calculated outputs. Most of the routine monitoring will be as required by the MECP per the updated Environmental Compliance Approval (ECA) for the Courtright WWTP.

### Publicity

11. Briefly describe any recognition, media coverage, awards, or public support the Project has received to date.

The project was advertised in the local Township newspaper (Beacon). Details of the project were placed on the Township website.

### Photos and materials

FCM includes project photos and links to project materials in GMF case studies, website content, and other communication vehicles.

1. Identify and attach any materials resulting from the Project that would be useful to share with other communities, such as checklists, toolkits, guidelines, bylaws, videos or information brochures. If the material is available on your website, simply include the link to it.

For example, a water conservation project might result in a new municipal water use bylaw, or a series of householder information brochures or online video clips on ways to reduce water use.

2. Attach five high-quality photographs of the Project. Where possible, include photos that feature people in action, illustrate the progress of the project, or feature “before” and “after” perspectives. The photos must be in jpeg or tiff format and at least 300 dpi (up to 10 MB/10,000 KB but no smaller than 1 MB/1,000 KB in file size).

For each photo, please include:

- a) A caption describing what is featured in the photo.
- b) A photo credit that indicates who owns the copyright to the photo and the photographer (e.g. © 2010, City of Ottawa/Madison Brown).
- c) A written release signed by the individuals depicted in the photo granting FCM permission to use the images. **Please request an FCM Photo Consent Form from the GMF Project Officer.**



PICTURE OF THE INFLUENT CHANNEL BEFORE INSTALLATION OF THE ASR MANIFOLD



PICTURE OF THE INFLUENT CHANNEL AFTER ASR MANIFOLD INSTALLED



**PICTURE OF EFFLUENT CHANNEL BEFORE INSTALLATION OF REUSE SKID**



**PICTURE OF EFFLUENT CHANNEL AFTER INSTALLATION OF REUSE SKID**



**PICTURE OF AREA WHERE NEW BIOFILTER AND HUMIDIFIER WILL BE INSTALLED**



**PICTURE OF THE COMPLETED ODOUR CONTROL UNIT, PIPE RACK, HUMIDIFIER AND BLOWER**