

## SCHEDULE F – PROJECT COMPLETION REPORT TEMPLATE

### VERY IMPORTANT:

**Timing:** You need to email a report, to your GMF project officer (contact info is in Schedule C), on the dates indicated in Schedule C or whenever FCM asks for such a report.

**Copyright:** Before you submit a report to FCM, make sure you hold the copyright for the report. If you're hiring a consultant to prepare the report, please make sure to get the copyright (see FCM's copyright tips document), or else FCM will not be able to disburse the Grant Amount.

**Accessibility for people with disabilities:** Please do not change the format, font, layout, etc. of this report. This template has been specially designed, following FCM's Accessibility Guidelines, in order to be accessible to people with disabilities.

**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**" or similar wording and 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, to help FCM meet its knowledge sharing objectives.

Please contact your project officer to receive an electronic copy of the Completion Report Template.

**Upon completion of the project, a copy of the Final Deliverable must be submitted along with this Completion Report.**

FCM will post your report on the [Green Municipal Fund™ \(GMF\) website](#). This is because one of FCM's mandates is to help municipal governments share their knowledge and expertise regarding municipal environmental projects, plans and studies.

### How to complete the Completion Report

The purpose of the Completion Report is to share the story of your community's experience in undertaking your project with others seeking to address similar issues in their own communities.

Please write the report in plain language that can be understood by people who are not specialists on the subject. A Completion Report is typically in the range of 5–10 pages, but may be longer or shorter, depending on the complexity of the project.

GMF grant recipients must enclose **final** copies of the Completion Report and the Final Deliverable with their final Request for Contribution. The reports, including all attachments and appendices, must be submitted in PDF format with searchable text functionality. Reports that are not clearly identifiable as final reports, such as those displaying headers, footers, titles or watermarks containing terms like "draft" or "for internal use only," will not be accepted by GMF. Additionally, reports must be dated. If you have questions about completing this report, please consult GMF staff.

<b>GMF number</b>	16836
<b>Name of lead applicant (municipality or other partner)</b>	City of Prince Rupert
<b>Name, title, full address, phone, fax and e-mail address of lead technical contact for this study</b>	Richard Pucci, Director of Operations, 424 – 3 <sup>rd</sup> Avenue, Prince Rupert, BC, V8J 1L7 <a href="mailto:Richard.pucci@princerupert.ca">Richard.pucci@princerupert.ca</a> Phone: (250) 627-0937
<b>Date of the report</b>	March 27, 2020

## 1. Introduction

- a) Who was involved in doing the Feasibility Study, and what are their affiliations? Please include name, title and contact information. Those involved could include municipal staff, engineers and other consultants, a representative from a non-governmental organization, and others.

The City of Prince Rupert (the City) is located on Kaien Island, along the northern coast of British Columbia. The City's existing sewage network does not include any wastewater treatment facilities, resulting in the direct discharge of untreated sewage into the Pacific Ocean by way of the Prince Rupert Harbour. Changes to compliance around the federal wastewater system effluent regulations (WSER) and provincial regulations have triggered the requirement for upgrades to the existing system.

The City retained MAGNA Engineering Services Inc. (MAGNA) to develop the feasibility study determining how a wastewater treatment system utilizing engineered wetlands could address this wastewater challenge.

Project Team:

<b>Organization</b>	<b>Name</b>	<b>Title</b>	<b>Contact Information</b>
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## 2. The Feasibility Study

- a) Describe the process that you undertook to make this feasibility study a reality, from concept, to council approval, to RFP, to final deliverable.

Throughout 2019, the City of Prince Rupert was looking for an innovative wastewater solution that could be applied to bring the community into compliance. The connection with MAGNA was made at the 2019 FCM conference and discussions began on how the MAGNA Omni-Processor (MOP) treatment system

could help achieve Prince Rupert's goals. A work plan was requested from MAGNA in Fall 2019 and received council approval to move forward with an FCM grant application and feasibility study in December 2019. MAGNA wrote the FCM Green Municipal Fund Grant on Prince Rupert's behalf and it was submitted in early 2020 along with confirmation of funding from the City.

Once the grant application was submitted, the project team undertook the following steps to make the feasibility study a reality:

1. **Technology Brief:** The project team completed a technology brief complete with performance objectives and Prince Rupert specific projects needs and opportunities that was used as part of the stakeholder engagement meetings as background information.
2. **Stakeholder Engagements:** Stakeholder engagement meetings / presentations with key stakeholders to support approval of the feasibility study and subsequent steps were completed. These stakeholder groups included:
  - a. **Prince Rupert Administration:** Kick-off meeting to gain confirmation of community metrics and project objectives and relationship to recommended technologies.
  - b. **Provincial Regulatory, Infrastructure, and Advocacy Departments:** Identify key stakeholder needs to support future grant funding and overall project support. Presentation of technologies and their high-level application in the City of Prince Rupert to gain support around realistic project objectives and support for federal government approvals and grant funding opportunities.
  - c. **Federal Regulatory, Infrastructure, and BC Specific Federal Advocacy Departments:** Confirmation and discussion related to design objectives and overall project intent from an approvals perspective. These meetings also included presentation of technologies and their application in the City of Prince Rupert to support alignment with approval requirements and future grant funding support.
3. **Background Data and Technical Brief:** MAGNA worked closely with the City to review all available background data, including opportunities for value-add, innovation, and re-use. MAGNA provided a technical brief confirming the background data findings and associated design parameters. Background data review included:
  - a. Wastewater and solid waste planning documents;
  - b. Municipal Development Plans and Strategic Planning Documents;
  - c. Historical Municipal solid waste and wastewater usage and associated fees, rates, levies, etc.; and
  - d. Capital Budget planning information.
4. **Pre-Conceptual Technology Package:** High-level pre-conceptual graphics and design narrative for recommended applications was compiled by MAGNA. This was based on the agreed upon design parameters set out in the previous task. This task created a defined direction related to the specifics of the treatment technologies, operation and maintenance, high-level option of probable cost, and suggested construction timelines. Technology Package included pre-conceptual design information related to:
  - a. Combined sewer wastewater treatment technology opportunities
  - b. Screening Technology for potable water turbidity improvement
5. **Follow-Up Stakeholder engagement:** Follow-up stakeholder engagement meetings / presentations with key stakeholders.
6. **Draft Feasibility Study:** Compiled a pre-conceptual technology package as refined based on the follow-up stakeholder engagement task. The final outcome of the feasibility study is to present a robust review of the innovative opportunities in relation to the unique need and opportunity related to Prince Rupert. The study presented:
  - a. Review of opportunities for each option, broken down by unique catchment area, where appropriate.

- b. Review of the range of opportunities including advantages and disadvantages for each application.
  - c. Conceptual cost estimates and construction schedule for all recommendations.
  - d. Approval requirements and timelines for all recommendations.
  - e. List of grant funding opportunities to apply for pilot/Phase 1 projects.
  - f. Weighted comparative analysis for recommendations list based on project team identified metrics (i.e, cost, service population, approvability)
7. **Final Feasibility Study:** Feasibility Study was updated as per the comments received. The final feasibility study was submitted to Prince Rupert administration. Prince Rupert advised the team to move to build a pilot project for the innovative technology.

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

The objective of the feasibility study were to examine the Innovative Wastewater technologies as an infrastructure solution for the City of Prince Rupert considering the complex nature of their sewerage system, which may not be appropriately managed by traditional wastewater treatment methods. The technologies considered were the MOP wastewater treatment system and the Stormwater Kidney™ (SWK) stormwater treatment system. This is due to the presence of combined and separated sewers within the City. Large stormwater inflows to the sanitary system shape the approach to managing wastewater flows within each catchment.

In general, the objectives of the feasibility study were as follows:

- Examine whether the innovative stormwater and wastewater technologies can bring the City into compliance with federal and provincial wastewater regulations;
- Evaluate how the MOP and SWK can be utilized to provide end-of pipe treatment for sewage effluent discharged to the ocean from the combined sewer system;
- Evaluate how the green infrastructure can reduce green house gas emissions through low material requirements and simplified construction, compared to traditional treatment facilities;
- Determine the ability of MAGNA's green infrastructure portfolio to help the City avoid the capital cost of a full sewer separation project; and
- Engage with provincial government and other key stakeholders to streamline the approvals process of the MOP engineered wetland treatment systems.

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

In order to meet the objectives outlined above, the study was divided into three parts, summarized below:

1. Part 1: City-Wide Assessment
2. Part 2: Site Specific Assessment

### **Part 1: City Wide Assessment**

In Part 1 of the feasibility study, submitted to the City in June 2020, MAGNA conducted a high-level analysis for the City as a whole, to determine whether several MOP facilities would be an economically viable, socially suitable, and environmentally conscious wastewater management solution for the City. Through the analysis carried out in Part 1, high-level recommendations were presented for each wastewater catchment, and a weighted analysis was carried out to identify the most favourable solution for the first phase of a new wastewater treatment system. This included a boundary condition analysis and pre-conceptual planning of the combined sewer and wastewater management facilities within each catchment of the City. The characteristic of each catchment within the city were analyzed including their type (wastewater or combined), conveyance pattern, population served, area, and anticipated flows.

From this analysis, MAGNA proposed several different city-wide solutions for proposed treatment facilities. The proposed solutions for each specific catchment included the location, solution type (MOP or Combined MOP/ Stormwater Kidney™), anticipated footprint, and anticipated Class D cost estimate

for each proposed facility. Finally, MAGNA completed a ranking matrix to identify optimal phasing options and timelines for the City based on several factors. In this initial impact assessment, Catchment L was determined to be favoured for the Phase 1 Project.

## Part 2: Site Specific Assessment

The Part 2: Site Specific Assessment initially included the targeted detailed system analysis and conceptual design of a wastewater management facility for a Phase 1 project used to demonstrate the effectiveness of a MOP treatment facility. The far northeast catchment (Catchment L) was selected through this process for Part 2 of the feasibility study.

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

Substantial public consultation was completed within the community prior to the work commencing. The feasibility study began with consultation at the Environment Canada in Ottawa. As the regulators responsible for enforcing the WSER standards, it was important for the team to gauge interest in this project and openness to an innovative technology early on. Feedback was positive and gave the City confidence to continue moving forward with the study. These discussions were continued at both the federal and provincial levels throughout the process. Now that the process is complete a public outreach campaign is being planned to bring the outcomes to the community and gain support in moving the project forward.

### 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).

It was determined through the Prince Rupert Innovative Wastewater Treatment Feasibility Study that using a combination of MOP and Stormwater Kidney™ treatment systems is an economically and environmentally friendly option to treat the water being discharged to the Prince Rupert Harbour and meet regulatory requirements. This passive treatment option preserves and reclaims habitat for native plant and animal species. Additionally, by forgoing conventional mechanical and chemical treatment methods, the MOP provides the community with a low-impact, lower-maintenance wastewater treatment solution that increases their environmental resources. The following table outlines that expected concentration of various pollutants at each stage of the treatment.

Parameter	Concentration After Treatment Stage (mg/L)			
	Intake	Primary	Secondary	Tertiary
CBOD	86	65	17	8
TSS	120	103	21	Further Reduction <sup>2</sup>
Total/ Ortho-Phosphate	5	5	3	2.5
Total Ammonia	4.00	4.00	0.26	0.21
Unionized Ammonia	0.11	0.11	0.01	0.01

Through implementing these technologies, the City will be acting as ambassadors of sustainable infrastructure that can help other BC communities adhere to regulatory requirements and protect natural systems while optimizing project footprint, resource efficiency, and land use. The systems preserve and reclaim habitat for native plant and animal species.

- 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).

A comparison of total capital cost for the proposed treatment facilities was conducted to compare the MOP technology for treatment solution solutions proposed by Associated Engineering in the 2010 Liquid Waste Management Plan. The following facility options are compared in the following table. This comparison is further described in page 45 of the Innovative Wastewater Treatment Feasibility Study.

- Associated Engineering Option 1: Hays Creek Treatment Facility;
- Associated Engineering Option 2: Hays Creek and Morse Creek Treatment Facilities;
- Associated Engineering Option 3: Hays Creek, Morse Creek, and Ritchie Point Treatment Facilities; and
- MAGNA Engineering Option 1: Facilities for Catchment AB, Catchment FGH, Catchment I1-I2-I3, Catchment I4, Catchment JK, and Catchment L.

<b>Proposed Facility</b>	<b>Capital Cost Estimate (\$, 2010)</b>	<b>Average Annual Inflation (%)</b>	<b>Capital Cost Estimate (\$, 2020)</b>
Associated Engineering Option 1	86,000,000	1.68	101,600,000
Associated Engineering Option 2	90,000,000	1.68	106,400,000
Associated Engineering Option 3	91,000,000	1.68	107,500,000
MAGNA Engineering Option 1	-	-	68,000,000

It is clear from the above table that the innovative wastewater technology solution is a more cost-effective solution than the proposed wastewater treatment facilities.

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

**Select a Pilot Facility Location:**

The feasibility study found that a MOP treatment system will be able to provide the City with wastewater treatment for our entire future population projections and recommended that a pilot facility be constructed to validate the operations of the engineered wetlands in our climate.

**Pre-Engineering Analysis:**

Once a pilot facility location has been selected, pre-engineering analysis should be conducted to gather information that will be required for detailed design. This work will include:

- Site surveying;
- Flow monitoring in the sanitary network to determine accurate wastewater inflow;
- Geotechnical analysis of the pilot site to predict groundwater and cut and fill requirements;
- Precipitation monitoring to determine effects of inflow and infiltration; and
- Wastewater laboratory analysis.

**4. Lead Applicant’s Next Steps**

- 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?

A tentative pilot facility location has been selected near Omineca Avenue and would move forward on the construction of a pilot facility in the next year or so. After successful operation of the pilot facility, Prince Rupert will select a preferred concept design based on the options for discharge and access

provided in the associated feasibility study. Prince Rupert is currently applying for an FCM Green Municipal Fund Grant to fund the pilot project, including hiring additional subconsultants for the pre-engineering works and detailed design for the facility.

## 5. Lessons Learned

In answering the questions in this section, please consider all aspects of undertaking the Study — from the initial planning through each essential task until the Final Study was prepared.

- 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?

Get a good understanding on the community values around green technology and risk assessment. This gives them an idea of how their stakeholders will receive the outcomes and will ensure there is the necessary engagement in moving these types of project forward. Is your community open to innovation already, is there a path to move your community towards being more innovative. It is very important to have stakeholder buy-in from Council, Administration, and the general public.

Years previous, when we first started looking at how to address wastewater, we were only looking at the more traditional models. If we had to start the whole process over again, we would have started with a more open-minded outlook. If we had taken that step back and started with an open-minded outlook to green technologies, we could have been much farther along now.

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

Flushing out what regulators needed or should've been involved and finding out who the actual stakeholders are. There are just so many different regulators from the provincial and federal levels. This was mainly overcome through A LOT of engagement through calls and meetings with multiple levels of government early in process asking everyone who would listen, who else was there to talk to. Engaging them, getting in front of them. Keeping the community fully engaged in the process and not just leaving it up to the consultants.

## 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.

There will be a link on the website, once complete. Really looking forward to the outreach of this based out of our community website. With hopes to include testimonials from all stakeholders involved. From the regulators to First Nations, port authorities, and local businesses. A key part of it will be the community pride, so we are looking forward to including a specific response from the community.

- 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).

One major item is the engagement with multi-levels of regulators and the outcomes of those discussions. Also, updating by-laws around how coastal communities can integrate these types of facilities including updating their OCPs to put room aside for these types of infrastructure. This will definitely be key in making sure the administrative actions around land-use, by-law, etc. are in place to support this work. This will be submitted to the provincial regulators to show that this is part of the

overall community planning to support future grant funding and provincial supports. The work our community does around this will be fully repeatable for future municipalities in this position.

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