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.

GMF number	16857
Name of lead applicant (municipality or other partner)	City of Leduc
Name, title, full address, phone, fax and e-mail address of lead technical contact for this study	Michael Hancharyk, Manager of Environment 4300 – 56 Ave, Leduc, AB, T9E 0T1 mhancharyk@leduc.ca
Date of the report	January 17, 2023

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.

- Shawn Olsen, City of Leduc – Director of Engineering & Environment, solsen@leduc.ca
- Michael Hancharyk, City of Leduc – Manager of Environment, mhancharyk@leduc.ca
- Shelby Lowe, City of Leduc – Environmental Project Manager, slowe@leduc.ca
- Colleen Casey, City of Leduc – Environmental Inspector, ccasey@leduc.ca
- Sean Maloney, Trace Associates Inc. – Sr Environmental Scientist, smaloney@traceassociates.ca
- John Forbes, Trace Associates Inc. – Environmental Scientist, jforbes@traceassociates.ca

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.

The City of Leduc is a fast-growing community straddling one of the most important transportation corridors in the country and on the edge of the Edmonton International Airport. Leduc hosts the Nisku and Leduc business parks and Canada's largest developed energy services industrial park. Despite Alberta's economic downturn, Leduc is still experiencing growth with a 1.8 - 2 per cent growth annually, with a 2021 population of 34,094.

Telford Lake is an important natural feature and recreational amenity to the City of Leduc and to the citizens that enjoy it throughout the year. The lake is an anchor for some of Leduc's most important recreation facilities including multiway, Telford House Park, the Cultural Village and William F. Lede Regional Park, and is host to dragon boat competitions, Leduc Motorsports Club, and Alberta Endurance Ice Racing Association.

An Environmentally Significant Areas Study (Fiera Biological Consulting, 2018) identified Telford Lake as the number one environmentally significant area in Leduc given its size and habitat diversity. It is an important regional environmental feature, providing terrestrial and aquatic habitat, and a source of surface water and groundwater.

The City of Leduc owns three sites in the vicinity of Telford Lake and William F. Lede Park that are known to be, or have the potential to be, impacted by historical operations (all located within 4-25-49-25 NE):

Public Services Main Shop
Public Services Storage Yard
Former Sewage Lagoons

The City applied for the FCM Brownfields Grant to assess environmental site conditions and develop a risk management plan/remedial action plan as required, for the Public Services Main Shop and the Public Services Storage Yard. The City plans to assess the Former Sewage Lagoons separately in future years.

The City's intent was to conduct this work to meet applicable environmental regulations and public sector accounting board liability reporting requirements, however, assessment and remediation/risk management of these sites is also imperative as the Telford Lake Master Plan (2010) identifies a future Telford Community Park in the area. Once these sites have been remediated and/or have appropriate exposure control in place under a risk management plan, they can be revitalized into additional park space, that is proposed to offer a range of activities and open spaces to meet the recreational and social needs of the entire community for civic celebrations and events.

At the Main Shop a Limited Phase I Environmental Site Assessment (ESA) and Phase II ESA (Amec, 2012) identified salt impacts in the soil, groundwater, and surface water and the potential for impacts at the adjacent storage yard and sewage lagoons. In 2011, the City reported the salt contamination to Alberta Environment, who requested that the City continue to delineate and report back with a remedial action plan.

The City developed a Remedial Action Plan for the Main Shop (AECOM, 2014) which recommended some remedial action and the development of a Risk Management and Exposure Control Plan (RMEP). The City's RMEP (AMEC, 2016) states that the largest risk is the chloride plume migrating into Telford Lake, where aquatic receptors may be affected. Based on a conceptual site model developed for the site further delineation of the groundwater chloride plume both horizontally and vertically was required, to update the Risk Management Plan (Trace, 2019).

In 2019, the City also conducted a Phase I ESA (Trace, 2019) at the adjacent Storage Yard site which identified several areas of potential environmental concern. The Phase I ESA report recommended a Phase II ESA to identify and delineate potential contaminates and develop a future remedial action plan if required.

In the fall of 2020, the project was brought to Council as part of the 2021 Capital Budget presentation. The City then put out an RFP to find a qualified environmental consultant to conduct the environmental assessments and provide data analysis and recommendations in the form of a formal report. Trace Associates Inc (Trace). was the successful proponent and will manage the sites including the development of the remedial action/risk management plan as required, which will allow for informed and efficient implementation of all the aspects of the proposed initiative.

In 2020 Trace conducted bi-annual (spring and fall) groundwater and surface water monitoring at the Former Main Shop. Based on the 2020 monitoring program and the conceptual site model developed for the site, Trace recommended that one groundwater monitoring well be installed upgradient of the chloride plume, and four shallow and two deep monitoring wells be installed within the estimated plume's leading edge to assess the plume leading edge and plume width. In addition, a short-term pump test was recommended to assess attainable long-term pumping rates for a future extraction well system, and capture envelope size.

In 2020, Trace also conducted a Phase II Environmental Site Assessment at the adjacent Storage Yard site. The Phase II consisted of 16 boreholes, developing 5 boreholes into groundwater monitoring wells. Total barium exceedances were initially identified in the xylene burn pit area; however, they met the applicable extractable barium and total fusion barium guidelines for non-barite sites confirming no further soil assessment in relation to barium was required. Stockpiled street sweepings had elevated SAR and chloride ratings, therefore Trace recommended they be disposed of at an appropriate disposal location. The suspected contaminated soil storage area had some elevated SAR and chloride values however, the values were representative of those natural to the site. This indicated that the City could leave these soils on site. If the City wanted to consider spreading the stockpiles on-site, some additional sampling was warranted to further characterize the stockpile. Similarly soils in the hydrovac slurry pit and ash storage area had elevated SAR values but were also considered low risk/representative of natural conditions at the site. Groundwater results showed some exceedances for sodium, chloride, TDS and manganese, that

correlate with the elevated chloride concentrations at the adjacent Former Main Shop, and organic matter in the street sweepings pile. It was therefore recommended that the five monitoring wells be added to the bi-annual monitoring program for the Former Main Shop, as part of the overall risk management plan.

In 2021, two shallow groundwater monitoring wells and two nested pairs of shallow/deep groundwater monitoring wells were installed at the Former Main Shop to delineate the groundwater chloride plume leading edge and plume width. A low volume, constant rate (1 L/min) pumping test was conducted to estimate aquifer properties, and Neuman curve matching was used to estimate the aquifer transmissivity. The identified aquifer properties were used along with the predictive modeling function of AquiferTest to propose locations for extraction wells and the periodic pumping rates that would provide optimized capture of the plume. The modeling identified that three extraction wells would most effectively capture the plume.

In the summer of 2021, the City received Federal grant funding from the Investing in Canada Infrastructure Program (ICIP), which covered the capital expenses of installing three extraction wells at locations confirmed through the modeling work. This allowed the City to install the extraction wells sooner than originally expected and to have them operational in early 2022.

In 2021, Trace also continued the bi-annual (spring and fall) groundwater and surface water monitoring at the Former Main Shop, including the five monitoring wells from the Storage Yard site. The leading edge of the chloride groundwater plume was reviewed and evaluated using Mann-Kendall trend analysis to identify groundwater monitoring wells with increasing or decreasing trends. Elevated concentrations in monitoring wells downgradient to the historical source area, and decreased concentrations at the historical source area locations suggest that the chloride impacted groundwater may be migrating downgradient and should be closely monitored. Based on the findings of the 2021 sampling program it was recommended that eight additional monitoring wells be installed to further delineate the plume and monitor the efficacy of the new extraction well system that was installed.

In 2021, Trace conducted soil characterization at the Storage Yard to further assess soil quality in the suspected contaminated soil stockpile, and the hydrovac settling pond. Result of the stockpile sampling again showed SAR values comparable or lower than background samples, with some chloride values that were elevated compared to background. Trace therefore recommended that further options for the potential re-use of the stockpiled soil should be evaluated based on the final land use of the site. For example, elevated chloride values may be suitable for base layers below a future parking lot area. The groundwater monitoring network at the adjacent Former Main Shop extends around and onto the Storage Yard site and the groundwater monitoring results did not identify any chloride exceedances that indicate the soil stockpile is causing additional salinity impacts in that area. Further sampling at the hydrovac settling pond showed no EC or SAR values above the guidelines for the site based on background conditions. There were marginal chloride concentrations above background conditions, but they were interpreted to pose a low environmental risk. Recommended next steps for the site included hauling away the street sweepings to an approved disposal facility and evaluating further options for the potential re-use of the stockpiled soil with the Regulator (Alberta Environment and Parks) based on the proposed final land use at the site.

In 2022, Trace conducted another Phase II Environmental Site Assessment consisting of the installation of the additional eight groundwater monitoring wells at the Former Main Shop to further delineate the groundwater chloride plume leading edge and plume width. Trace also completed the bi-annual (spring and fall) groundwater and surface water monitoring at the Former Main Shop and Storage Yard including the three extraction wells. The leading edge of the chloride groundwater plume was reviewed and evaluated using Mann-Kendall trend analysis to identify groundwater monitoring wells with increasing or decreasing trends and the efficacy of the three extraction wells. Decreasing chloride concentrations were identified in some of the monitoring wells in close proximity to the extraction wells suggesting that the extraction wells are having a noticeable impact on the groundwater in the area. Based on the findings of the 2022 sampling program, it was recommended that three additional monitoring wells be installed west of the known plume to delineate the plume and determine if a fourth extraction well might be needed to expand the zone of capture of the extraction wells.

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

The City of Leduc's objectives included:

- remediate / risk management of soil, surface water and groundwater as per the Environmental Protection and Enhancement Act, Release Reporting Regulation, and the Remediation Regulation,
- quantify associated liabilities to meet Public Sector Accounting Board contaminated sites liability and asset retirement obligation reporting requirements, as necessary,
- protect sensitive receptors in the area of Telford Lake including root zone, freshwater aquatic life, and domestic use aquifer,
- improve both terrestrial and aquatic habitat conditions in the area of Telford Lake, and
- make land available for reuse in the future as per the Telford Lake Master Plan (2010), which identifies a future Telford Community Park in the area.

In addition, through the City's use of conceptual site models and the development of risk management plans, where applicable, the City will endeavor to reduce the need for expensive and environmentally intrusive remediation approaches, i.e. the complete excavation and off-site transportation of all identified impacted soils, as well as the hauling of large volumes of backfill to return the site to the original grade.

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

The City of Leduc has taken a stepwise approach to addressing contaminated sites in order to:

- identify risks and respond in a cost-effective manner that conforms to environmental regulations and,
- integrate environmental management practices into civic planning and operations.

The City developed a three-year work plan for the proposed environmental assessment and development/implementation of a remedial action/risk management plan for the former main shop and public works storage yard.

2020:

Former Main Shop

- Spring and fall groundwater monitoring and sampling

Public Works Storage Yard

- Phase II ESA (16 boreholes and 5 groundwater monitoring wells)

2021:

Former Main Shop

- Spring and fall groundwater monitoring and sampling
- Pump test to estimate aquifer properties to inform remedial action (such as the installation of interceptor wells)
- Phase II ESA to delineate chloride plume leading edge and width (two shallow groundwater monitoring wells and two nested pairs of shallow/deep groundwater monitoring wells)

Public Works Storage Yard

- Spring and fall groundwater monitoring and sampling
- Soil characterization study

2022:

Former Main Shop

- Spring and fall groundwater monitoring and sampling
- Phase II ESA to further delineate chloride plume leading edge and width (8 groundwater monitoring wells)

- Installation of three interceptor wells

Public Works Storage Yard
- Spring and fall groundwater monitoring and sampling

** Based on the results of the soil characterization study and the groundwater monitoring program as well as the City's future land use plans for this area (future parking lot and/or sports field) it was determined that concentrations were comparable to that of the surrounding soil conditions. Re-use of the stockpiled soil in this area is not expected to present a risk of adverse effects to human health or the environment (Soil Characterization Report – Trace 2022).

This work plan was created using a number of initial studies that have been conducted in consultation with Alberta Environment and Parks and various City departments including Engineering, Public Services, Planning and Development, and Community Development, as detailed below:

Background Research

Former Main Shop
A Limited Phase I ESA and Phase II ESA of the Leduc Public Services Former Main Shop (Amec, 2012) identified salt impacts in the soil, groundwater, and surface water associated with historical salt storage at the site.

In 2011, the City reported the salt contamination to Alberta Environment, who then asked that the City continue to delineate and report back with a remedial action plan.

A supplementary Phase II ESA (AECOM, 2013) further delineated the extent of chloride impacts in the soil and groundwater. Groundwater flow was identified towards the north, towards Telford Lake.

The City developed a Remedial Action Plan (AECOM, 2014) which recommended some remedial action and the development of a Risk Management and Exposure Control Plan (RMEP). The City's draft RMEP (AMEC, 2016) states that the largest risk to the City is the chloride plume migrating into Telford Lake, where freshwater aquatic receptors may be affected. The RMECP recommends:
- annual groundwater monitoring,
- additional vertical and horizontal delineation of soil and groundwater,
- additional assessment to determine the feasibility of practical remedial options.

In 2016, the City updated Alberta Environment and Parks that a draft RMEP was in progress and that additional delineation of the contaminant plume and monitoring data is required.

A Preliminary Subsoil Salinity Tool (SST) Evaluation was conducted (Trace, 2018) to prepare a preliminary conceptual site model (CSM) and identify data gaps for the estimation of preliminary Tier 2 site-specific chloride guidelines for the site.

In 2018 the City's Engineering department worked with Trace Associates, Public Services and the Community Development department to pave an existing road and develop a new parking lot in the area of the former main shop, as per the Telford Lake Master Plan (2010). City departments worked together to consider the contamination and improve the conditions of the site, by removing soils with high chloride impacts along the ditch adjacent to the road and paving the parking lot area in a manner that reduced the potential for water infiltration and salt migration from the source.

A Technical Feasibility and cost analysis of groundwater remedial options for the site was conducted (Trace, 2019) which included the use of the CSM to define the extent of chloride groundwater impacts at the site, and identify the remedial efforts warranted. Groundwater management using capture wells was determined to provide the best option for remedial action.

The Former Main Shop required further horizontal and vertical delineation of the groundwater chloride plume to inform both the draft RMECP and implementation of the proposed interceptor well(s) as part of the remedial action plan. It was recommended that the City continue biannual (June and September) groundwater monitoring and install three additional groundwater wells to delineate chloride impacted groundwater (Trace, 2019).

Public Works Storage Yard

In 2019, the City conducted a Phase I ESA (Trace, 2019) at the Public Works Storage Yard which identified several areas of potential environmental concern including burn pits, a hydrovac settling pond, a fire training area, stockpiled fill of unknown quality, and stockpiled street sweepings. It was recommended that the City conduct a Phase II ESA to delineate potential contaminants, and develop a future remedial action plan.

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

Public consultation was not a part of this Feasibility Study.

3. Feasibility Study Findings and Recommendations

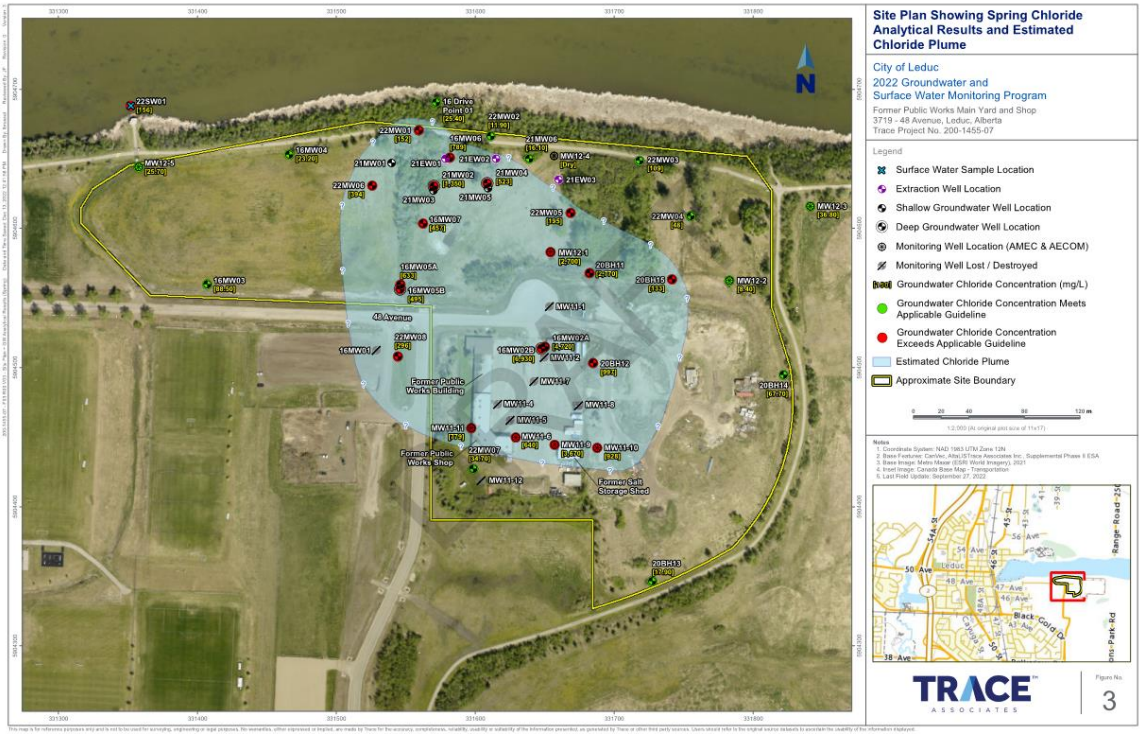
a) What were the environmental findings related to the options explored in the Feasibility Study? Please provide quantitative results and summary tables of these results (or the page numbers from the Feasibility Study report).

Several Phase II Environmental Site Assessments were completed during the course of the Feasibility Study in order to delineate and fill data gaps on the chloride plume and better understand its progress. In addition to soil data, groundwater data was assessed using the Mann-Kendall Trend Analysis to monitor the increasing and decreasing trends. Three extraction wells were installed along the northern side of the site to intercept chloride impacted groundwater from reaching Telford Lake. Decreasing chloride concentrations were identified in some of the monitoring wells in close proximity to the extraction wells suggesting that the extraction wells are having a noticeable impact on the groundwater in the area. The table below outlines the reduction in chloride levels observed from the spring sampling conducted June 1, 2022 and the fall sampling conducted September 27, 2022.

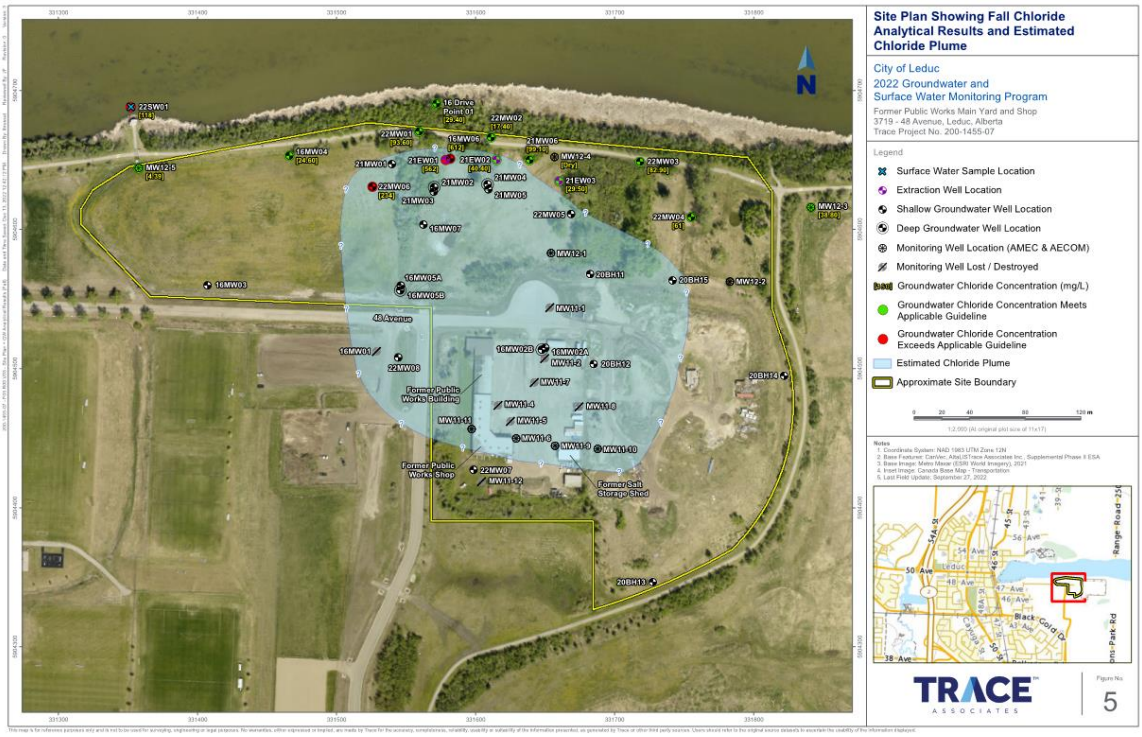
Guideline Selection			Routine Parameters
Regulatory Guidelines		Land Use / Water Use	Chloride (mg/L)
AEP 2019		Residential/Parkland	120
Sample Location and Description			
16MW06	01-Jun-2022	Residential/Parkland	**789**
	27-Sep-2022	Residential/Parkland	**612**
22MW01	01-Jun-2022	Residential/Parkland	**152**
	27-Sep-2022	Residential/Parkland	93.6
22MW03	01-Jun-2022	Residential/Parkland	109
	27-Sep-2022	Residential/Parkland	82.9
22MW06	01-Jun-2022	Residential/Parkland	**394**
	27-Sep-2022	Residential/Parkland	**234**

Changes in the chloride plume from the spring sampling event to the fall sampling event are shown in the flowing two figures. It can be observed that during the fall sampling, the chloride plume is reduced specifically along the northern edge.

Chloride Plume – Spring 2022



Chloride Plume – Fall 2022



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).

Cost Savings 1

Different remediation methods were explored (Technical Feasibility and Conceptual Site Model - Trace, 2019) and are outlined in the table below.

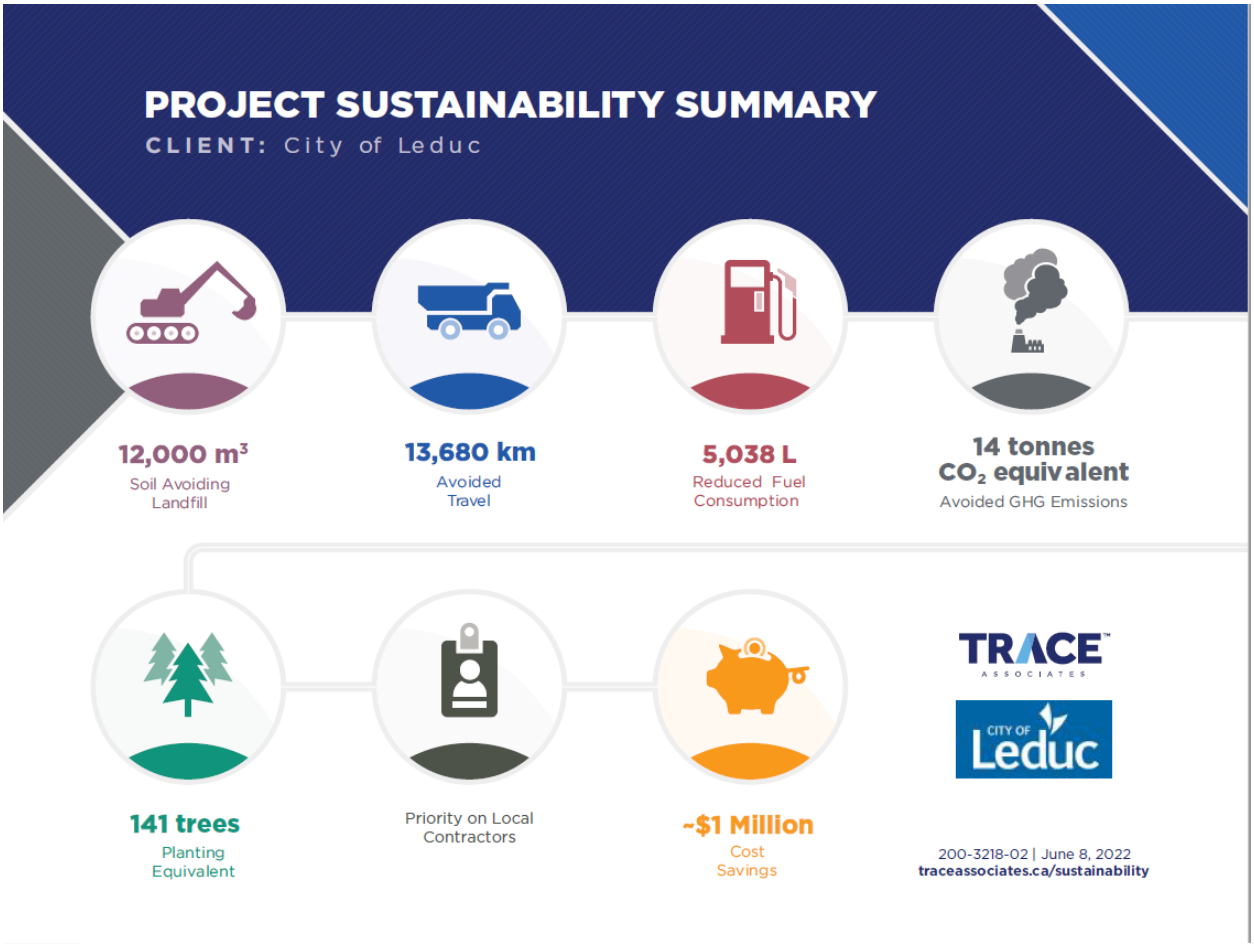
The installation of the extraction wells north of the Former Main Shop and Storage Yard will significantly reduce/eliminate the amount of chloride impacted groundwater entering Telford Lake north of site. This will result in future cost savings by reducing the need for expensive and environmentally intrusive remediation approaches and mitigation actions in the area of Telford Lake.

Technical Feasibility and Cost Analyses of Groundwater Remedial Options - City of Leduc
Public Works Former Main Yard and Shop, 3719 - 48 Avenue, Leduc, Alberta
Trace Project No. 200-1455-04

Item	Option 1 Interceptor Trench		Option 2 Extraction Wells	
	Quantity	Cost	Quantity	Cost
Capital Costs ($)				
Interceptor Trench	1	$ 120,000		
Extraction / Pumping Wells	1	$ 2,000	1	$ 20,000
Monitoring Wells	4	$ 6,000	4	$ 7
Pipelines (Water)	1	$ 3,000		$ 3,000
Solar/Electrical tie-in	1	$ 4,000		$ 4,000
Solar power for pump	1	$ 3,000		$ 3,000
Project Management and Engineering (10%)	1	$ 14,500		$ 4,000
Total capital		$ 152,500		$ 34,007
Operating Costs ($/Yr)				
Electrical		$ 1,000		$ 1,000
Water disposal		$ 12,000		$ 12,000
Monitoring		$ 5,000		$ 5,000
Maintenance		$ 2,000		$ 2,000
Total operating		$ 20,000		$ 20,000
Total Costs (Year 1)		$ 172,500		$ 54,007
3 Year Total Cost		$ 212,500		$ 94,007
10 Year Cost		$ 352,500		$ 234,007

Cost Savings 2

Based on the results of the soil characterization study at the Storage Yard and the groundwater monitoring program as well as the City's future land use plans for this area (future parking lot and/or sports field) it was determined that EC, SAR, and chloride concentrations in the soils were comparable to that of the surrounding soil conditions. Re-use of the stockpiled soil in this area is not expected to present a risk of adverse effects to human health or the environment (Soil Characterization Report – Trace 2022) and therefore, because no further assessment / action was required for the Storage Yard, this resulted in significant cost savings as shown in the following graphic.



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

Based on the findings of the 2022 sampling program, in addition to continued bi-annual groundwater monitoring, it was recommended that three additional groundwater monitoring wells be installed west of the known chloride plume to further delineate the plume and determine if a fourth extraction well might be needed to expand the zone of influence of the extraction wells to capture all of the chloride plume.

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?

Going forward, the City will continue to monitor the groundwater at the site and assess the increasing and decreasing chloride trends. Additional monitoring wells will be installed to further delineate the plume to the west and determine if a fourth extraction well might be needed to expand the zone of influence of the extraction wells.

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?

The City's combined risk management and remedial action work to manage contamination on public property as a result of historic municipal operations utilizes a pragmatic, step wise approach that can be replicated in other communities. The City recommends that other communities consider site-specific risk assessment and conceptual site modeling in the early stages of environmental assessment to minimize the need for costly remediation work where possible (i.e. remediation of deep soil impacts, or hauling away impacted material that can safely be left on-site).

In addition, the City recommends that other communities develop multi-year work plans for their contaminated sites that help anticipate next steps and approximate costs so that they can budget accordingly. This will allow communities to proactively address their contaminated sites, rather than reactively manage them and respond to unanticipated costs. Doing so also allows communities to secure consultants for a multi-year term which creates continuity in work that often takes several years to make progress on (i.e., delineation, monitoring for trends).

When the Federal grant funding came available for the installation of the extraction wells, the City and Trace had to respond quickly. Ideally there would have been an opportunity to complete an updated and full delineation of the chloride plume extents prior to the extraction well installation. This may help to eliminate the potential need to add additional extraction wells at a later date to ensure that none of the chloride plume is missed by the extraction wells.

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

On-going work has been required at the Former Main Shop to adequately delineate the chloride plume and meet the requirements of the City's Risk Management Plan; Trace has utilized a conceptual site model and trend analysis to understand the movement of the chloride plume and provide recommendations on the location and depth of additional groundwater monitoring wells for further delineation.

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.

n/a

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).

<u>Development of a Three-Year Work Plan</u>
The City has mapped out a three-year work plan for the assessment and development of a remedial action plan/risk management plan for the proposed sites. This has been helpful in obtaining Council approved budget and ensuring that proactive rather than reactive progress on these sites continues. Development of a three-year work plan shows strategic planning and could easily be adopted by other municipalities as well to:

- identify risks and respond in a cost-effective manner that conforms to environmental regulations and,
- integrate environmental management practices into civic planning and operations.

Use of the Subsoil Salinity Tool and the Conceptual Site Model

At the Former Main Shop, the City has worked with Trace Associates to conduct a preliminary subsoil salinity tool (SST) evaluation (Trace, 2018) and a conceptual site model (CSM) (Trace, 2019). An SST and a CSM model:

- summarize known conditions of a site,
- identify data gaps to achieve project goals,
- improve decision making by allowing:
    - More targeted investigation, monitoring and sampling,
    - Better modelling to address data uncertainty and sensitivity, and
- document the rationale for decision making.

These models can be used to identify trends and assess the potential requirement for additional groundwater monitoring wells or boreholes to further delineate soils and groundwater impacts. They provide a realistic but simplified representation of known site conditions necessary for informed decision-making and can often help reduce unnecessary costs associated with expensive and environmentally intrusive remediation approaches of a site.

For example, the City conducted a preliminary SST evaluation at the former main shop (Trace, 2018) which evaluated pathways/receptors specific to the site and identified data gaps for the estimation of preliminary Tier 2 site-specific chloride guidelines.

The City's work with the subsoil salinity tool and the conceptual site model provides an effective method to understand the true exposure risk and associated liability at complicated sites. This tool could be utilized by other municipalities at their sites as they work towards the development of a remedial action plan and/or risk management plan and can often help reduce unnecessary costs associated with remediation of a site.

This project was carried out with assistance from the Green Municipal Fund, a Fund financed by the Government of Canada and administered by the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.