
Appendix F

TECHNICAL MEMORANDUM #5



Iron and Manganese Treatment Upgrades for the Shingletown Wells Class Environmental Assessment

Technical Memorandum #5

Evaluation of Alternative Design
Concepts- Preliminary Preferred
Location

FINAL

Prepared for:

Region of Waterloo

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RVA 184245

March 3, 2021



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March 3, 2021

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Attention: Nicole Sapeta

Dear Ms. Sapeta:

Re: Technical Memorandum #5 – Evaluation of Alternative Design Concepts-
Preliminary Preferred Location – FINAL

Iron and Manganese Treatment Upgrades for the Shingletown Wells Class
Environmental Assessment

Please see the enclosed Technical Memorandum #5 as a submittal for the Iron
and Manganese Treatment Upgrades for the Shingletown Wells Class
Environmental Assessment.

Yours very truly,

R.V. ANDERSON ASSOCIATES LIMITED

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Encls.

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Evaluation of Alternative Design Concepts FINAL.docx



**Iron and Manganese Treatment Upgrades for the Shingletown Wells Class
Environmental Assessment**

**Technical Memorandum #5
Evaluation of Alternative Design Concepts- Preliminary Preferred Location**

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1.0 INTRODUCTION

The Shingletown Wells (Wells K50, K51 and K52) and the existing treatment facility are located at 2324 Bleams Road in the Township of Wilmot.

The purpose of this technical memorandum is to evaluate the location design concepts for the new iron and manganese treatment facility based on the following Technical Memorandums:

- Technical Memorandum #3, Develop and Evaluate Alternative Solutions (TM#3): the preferred treatment and residual management solutions for the Shingletown Wells
- Technical Memorandum #4, Develop Alternative Design Concepts – Facility Sizing and Short-Listed Locations (TM#4): estimated footprint requirements and short-listed locations
- Technical Memorandum #2, Evaluation Criteria (TM#2): criteria and scoring method

2.0 FACILITY REQUIREMENTS FOR THE PREFERRED TREATMENT TECHNOLOGY AND RESIDUAL MANAGEMENT SOLUTION

The recommended treatment alternative from TM#3 was oxidation and filtration using chlorine as the oxidant with catalytic media. The residual management solution for the facility included a backwash equalization tank with recycling of supernatant, a settled sludge holding tank with sludge being hauled offsite as required.

For purposes of determining area of property required, as part of TM#4, RVA worked with the Region to develop a conservative building size. The building is estimated to be 28 m by 55 m. Additional space was included for building setbacks, parking and driveway access for deliveries, and a construction laydown area. It can be noted that stormwater management infrastructure will be selected based on the final facility design, the site layout and input from Township of Wilmot, the Region and the GRCA during detailed design.

On this basis, a site measuring 75 m by 75 m was determined to be required. The preliminary site layout is shown in **Figure 2.1**.

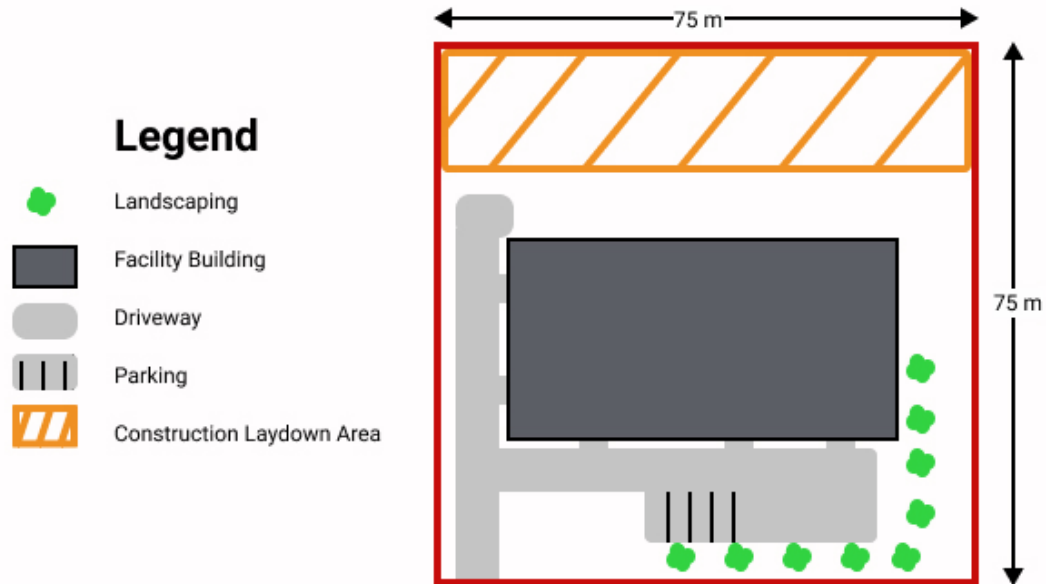


Figure 2.1: Preliminary site layout

3.0 LOCATION DESIGN ALTERNATIVES EVALUATION

Based on the preliminary site layout, three preliminary locations for the iron and manganese facility were identified as shown in **Figure 3.1**. The potential sites were identified based on considerations for:

- Land size available
- Vehicle Access
- Distance to the existing Shingletown wells and watermains
- Environmental features, culture heritage features and areas of archaeological potential
- Current and potential future land uses

The existing site of the Shingletown Wells was considered as a potential location, however, there was insufficient space for the new facility.

The three alternative facility locations to be evaluated were as follows:

- Location 1: Property to the west of the existing site
- Location 2: Property to the south of the existing site
- Location 3: Property to the east of the existing site



Figure 3.1: Preliminary site location alternatives

3.1 Facility Location Alternatives Site Investigations and Considerations

As part of Technical Memorandum #1 Project Background and Existing Conditions (TM#1), natural environment and archaeological desktop studies were conducted within 1 km in all directions surrounding the Shingletown Wells site. Considerations were also made regarding the Source Protection Policies in the area and supply of non potable water to the Eenkooren pond.

3.1.1 Natural Sciences Report

To supplement the natural environment existing conditions study, a Natural Sciences Report was completing including field visits on May 26, June 16 and July 29, 2020 at the location alternatives for a visual assessment of the habitat, flora, and fauna. Measures were recommended to mitigate impact during construction. The 'Iron and Manganese Treatment Upgrades for the Shingletown Wells Natural Sciences Report' is included in Appendix G.

The wildlife and wildlife habitat at all three locations is considered tolerant to human disturbance given the proximity to, and ongoing influence of, rural/agricultural landscapes. No species at risk impacts were identified at any of the three locations (Natural Environmental Existing Conditions Report, 2020).

The properties to the west and south (Locations 1 and 2) currently are used for row crops, while the property to the east (Location 3) is a pasture. Potential habitat may be available for sensitive (grassland) species if agricultural lands are used for pasture, though none were observed during the field visits.

For Location 1, the north end of the site is located inside the Grand River Conservation Authority (GRCA) Regulation Limit surrounding Hunsberger Creek. Location 2 is not located within the GRCA regulation limit. The south west corner of Location 3 is located within the GRCA regulation limit around a tributary that leads to the Hunsberger Creek (as is much of the existing well field site). Both Locations 1 and 2 would require pipe crossings of the tributary to connect the existing site to the new facility.

LGL has confirmed that the locations have a low potential for a gravel driveway to attract nesting turtles or other wildlife but consideration for driveway substrates should be evaluated at the detailed design phase of this project.

3.1.2 Archeological Report

Based on the Stage 1 archeological assessment (AA) completed and included in Technical Memorandum #1, all three locations were identified as retaining archeological potential and further archeological assessment is require through a Stage 2 AA. As part of the Stage 2 AA, any active or recently cultivated agricultural land must be ploughed before the site is visited by an archeologist.

Based on the potential disruption to landowners, it is recommended that a Stage 2AA be completed in the detailed design stage, after a preferred site has been identified. For the evaluation, it was assumed that all three sites are equal in archeological potential.

3.1.3 Source Protection Policies

Due to the proximity of these locations to the existing wells, certain activities under the Clean Water Act may be prohibited or require specific risk management measures. Different area designations determine what policies apply. All three locations and the study area shown in **Figure 3.1** are located within Well Head Protection Area (WHPA) B. Half of Location 2 and most of Location 3 are in the WHPA A. The extent of WHPA A is shown in **Figure 3.2**. Generally, the policies for land within the WHPA A are the most restrictive. These policies may impact the existing land use and consideration will need to be included in the design of the new facility.



Figure 3.2: Extent of WHPA-A in Study Area

3.1.4 Connection to Eenkooren pond

Non potable water from the Shingletown Wells discharges to the Eenkooren pond located approximately 530 m west of the Shingletown Wells at 2428 Bleams Rd. As outlined in Technical Memorandum #1, the Region provided a letter agreement to the property owner to confirm Wells K50 and K51 will continue to be operated to provide a minimum flow of 6 L/s of water to maintain water levels at the Eenkooren pond.

It will be determined during design if the connection point at the K50 and K51 Wells will need to be modified. For the evaluation, it was assumed the decision would be the same for all three location and will not impact the evaluation.

3.2 Facility Location Alternatives Evaluation

The alternative facility locations were evaluated following the evaluation criteria outlined in TM#2. **Table 3.1** below gives an example of the five possible scorings and their meanings relative to each other. The evaluation scoring is provided in **Table 3.2** to **Table 3.5** for technical, natural environmental, social, and financial categories. An overall summary of the evaluation is provided and summarized in **Table 3.6**.

Table 3.1: Example Scoring Graphics


















				
1	2	3	4	5
Low Alignment with Criteria	Not Well Aligned with Criteria	Somewhat Aligned with Criteria	Well Aligned with Criteria	Very Well Aligned with Criteria

Table 3.2: Evaluation of Location Alternatives- Technical Category

Evaluation Category	Criteria	Percentage	Location 1	Location 2	Location 3
Technical	Provides Reliable Service	3.6%	<ul style="list-style-type: none"> Distance of 250 m from wells may require more maintenance to maintain reliability Piping located in roadway more difficult to repair and replace 	<ul style="list-style-type: none"> Distance of 75 m to wells will minimize the risk of pipe leaks Piping located in roadway more difficult to repair and replace 	<ul style="list-style-type: none"> Distance of 50 m to wells will minimize the risk of pipe leaks Piping in grass area easier to repair 
Technical	Meets Existing and Future Needs	3.6%	<ul style="list-style-type: none"> Location meets existing and future needs for drinking water supply 	<ul style="list-style-type: none"> Location meets existing and future needs for drinking water supply 	<ul style="list-style-type: none"> Location meets existing and future needs for drinking water supply 
Technical	Aligns with Existing and Planned Infrastructure	3.6%	<ul style="list-style-type: none"> Location can connect with existing distribution system 	<ul style="list-style-type: none"> Location can connect with existing distribution system 	<ul style="list-style-type: none"> Location can connect with existing distribution system Location is adjacent to existing well site 
Technical	Aligns with Existing and Future Land Use	3.6%	<ul style="list-style-type: none"> Location is within existing agricultural land impacted by WHPA B Source Water Protection Policies 	<ul style="list-style-type: none"> Location is within existing agricultural land impacted by WHPA A and WHPA B Source Water Protection Policies 	<ul style="list-style-type: none"> Location is within existing agricultural land impacted by WHPA and WHPA B Source Water Protection Policies Due to the practice of organic farming principles, the future land use for this parcel is reduced due to source protection requirements. Potential future land use as a treatment facility to be beneficial for alignment with policy objectives 

Technical	Aligns with Approval and Permitting Process	3.6%	<ul style="list-style-type: none"> Standard permits and approvals are required Location is partially located within the Grand River Conservation Area and consultation is required. 	<ul style="list-style-type: none"> Standard permits and approvals are required 	<ul style="list-style-type: none"> Standard permits and approvals are required Location is partially located within the Grand River Conservation Area and consultation is required.
Technical	Manages and Minimizes Construction Risks	3.6%	<ul style="list-style-type: none"> Location would require construction in Bleams Road that would increase complexity 	<ul style="list-style-type: none"> Location would require construction in Bleams Road that would increase complexity 	<ul style="list-style-type: none"> Location does not require working within the roadway
Technical	Ability to Adapt to Climate Change	3.6%	<ul style="list-style-type: none"> Location is resilient to high precipitation and flooding since it is not located within the flood plain 	<ul style="list-style-type: none"> Location is resilient to high precipitation and flooding since it is not located within the flood plain 	<ul style="list-style-type: none"> Location is resilient to high precipitation and flooding since it is not located within the flood plain
Overall Technical Score					

Table 3.3: Evaluation of Location Alternatives- Natural Environment Category






























Evaluation Category	Criteria	Percentage	Location 1	Location 2	Location 3
Natural Environment	Protects Environmental Features	6.3%	<ul style="list-style-type: none"> Building of facility at this location has minimal impacts to environmental features Part of location is on land regulated by the GRCA Piping crossing to this location will be built under tributary in land regulated by the GRCA 	<ul style="list-style-type: none"> Building of facility at this location has minimal impacts to environmental features Piping crossing to this location will be built under tributary in land regulated by the GRCA 	<ul style="list-style-type: none"> Building of facility at this location has minimal impacts to environmental features Part of location is on land regulated by the GRCA 
Natural Environment	Protects Wildlife and Species at Risk	6.3%	<ul style="list-style-type: none"> Removal of agriculture at this location has minimal impact on wildlife No Species at Risk impacts are anticipated 	<ul style="list-style-type: none"> Removal of agriculture at this location has minimal impact on wildlife No Species at Risk impacts are anticipated 	<ul style="list-style-type: none"> Removal of pasture at this location has a potential impact on wildlife habitat though none were observed No Species at Risk impacts are anticipated 
Natural Environment	Protects Groundwater, Streams and Rivers	6.3%	<ul style="list-style-type: none"> Location will require piping to cross local tributary 	<ul style="list-style-type: none"> Location will require piping to cross local tributary 	<ul style="list-style-type: none"> Location will have minimal impacts to the local water sources 
Natural Environment	Minimizes Climate Change Impacts	6.3%	<ul style="list-style-type: none"> No relative difference between locations with respect to possible climate change impacts 	<ul style="list-style-type: none"> No relative difference between locations with respect to possible climate change impacts 	<ul style="list-style-type: none"> No relative difference between locations with respect to possible climate change impacts 
Overall Natural Environment Score					

Table 3.4: Evaluation of Location Alternatives- Social Category

Evaluation Category	Criteria	Percentage	Location 1	Location 2	Location 3
Social	Minimizes Impacts to Residents Related to Noise, Odour, Traffic, and Aesthetics	4.2%	<ul style="list-style-type: none"> Location is closest to existing houses and will have largest potential for impact with respect to noise, traffic, and aesthetics No odour is expected for this facility 	<ul style="list-style-type: none"> Location is a medium distance from existing houses and will have a moderate potential for impact with respect to noise, traffic, and aesthetics No odour is expected for this facility 	<ul style="list-style-type: none"> Location is furthest from existing houses and will have smallest potential for impact with respect to noise, traffic, and aesthetics impact No odour is expected for this facility 
Social	Minimizes Impacts to Businesses	4.2%	<ul style="list-style-type: none"> Location will have minimal impact on local businesses 	<ul style="list-style-type: none"> Location will have minimal impact on local businesses 	<ul style="list-style-type: none"> Location has potential to have the least impact to business because of existing source water protection policies 
Social	Manages and Minimizes Construction Impact	4.2%	<ul style="list-style-type: none"> Piping required in roadway to get to this location has the largest construction impact 	<ul style="list-style-type: none"> Piping required in roadway to get to this location has a moderate construction impact 	<ul style="list-style-type: none"> No piping in roadway required to connect location to existing wells Location is furthest from existing houses 
Social	Protects Cultural Heritage Features	4.2%	<ul style="list-style-type: none"> Cultural heritage features will not be impacted by the location 	<ul style="list-style-type: none"> Cultural heritage features will not be impacted by the location 	<ul style="list-style-type: none"> Cultural heritage features will not be impacted by the location 
Social	Protects Archaeological Features	4.2%	<ul style="list-style-type: none"> Location has archaeological potential 	<ul style="list-style-type: none"> Location has archaeological potential 	<ul style="list-style-type: none"> Location has archaeological potential 













Evaluation Category	Criteria	Percentage	Location 1	Location 2	Location 3
Social	Protects Health and Safety	4.2%	<ul style="list-style-type: none"> Region staff and public health and safety will not be impacted by the location 	<ul style="list-style-type: none"> Region staff and public health and safety will not be impacted by the location 	<ul style="list-style-type: none"> Region staff and public health and safety will not be impacted by the location 
Overall Social Score					

Table 3.5: Evaluation of Location Alternatives- Financial Category
















Evaluation Category	Criteria	Percentage	Location 1	Location 2	Location 3
Financial	Provides Low Lifecycle Costs	25%	<ul style="list-style-type: none"> Location has the highest estimated comparative lifecycle Location is the largest distance from existing wells resulting in highest costs for piping and duct bank between existing wells and new facility Excavation in the roadway increases installation cost 	<ul style="list-style-type: none"> Location has medium estimated lifecycle cost Location is the medium distance from existing wells resulting in medium costs for piping and duct bank between existing wells and new facility Small excavation in the roadway increases installation cost 	<ul style="list-style-type: none"> Location has lowest estimated lifecycle cost Proximity to existing wells result in lowest costs for piping and duct bank between existing wells and new facility
					
Overall Financial Score					

3.3 Preferred Facility Location Alternative

Based on the detailed evaluation of the three locations as summarized in **Table 3.6**, Location 3 is the preferred location since it is well aligned with the criteria in all four categories. It is recommended for the following reasons:

- Location does not require construction to take place in Bleams Rd
- Location has closest proximity to existing wells, resulting in simpler connections, with less disturbance to the environment
- Location does not require piping crossing to be built across local tributary
- Location is furthest from existing houses resulting in less disturbances to locals during construction
- Location has lower costs than the other design concepts

Table 3.6: Summary of Evaluation Criteria Location Alternatives

Evaluation Category	Percentage	Location 1	Location 2	Location 3
Technical	25%			
Natural Environment	25%			
Social	25%			
Financial	25%			
Overall Score				

3.4 Sensitivity Analysis

The four evaluation categories were presented to the public during Public Consultation Centre (PCC) #1 on October 23, 2019 to determine what is

important to the public. During PCC#2 on March 5, 2020, the short-listed alternative locations were presented to the public. Based on PCC#1, no preference was given to a specific category. No comments were received regarding the three short-listed locations presented in PCC#2. A sensitivity analysis was conducted by evaluating the short-listed locations using different weighting of the categories. Different weightings of the categories were analyzed with increased weightings for each category:

1. Technical: 40%, Natural Environment: 20%, Social: 20%, Financial: 20%.
2. Technical: 20%, natural Environment: 40%, Social: 20%, Financial: 20%.
3. Technical: 20%, Natural Environment: 20%, Social: 40%, Financial: 20%.
4. Technical: 20%, Natural Environment: 20%, Social: 20%, Financial: 40%.

In all four scenarios, the preliminary preferred location was not impacted by the variation in weighing. It is therefore determined that the recommended alternative is not sensitive to minor changes in scoring and remained Location 3.

4.0 NEXT STEPS

Following the finalization of TM#5, Public Consultation Center #3 (PCC#3) will be conducted to present the findings from TM#5 and receive public input and feedback.

After TM#5 and PCC#3 is complete, the Environmental Study Report will be completed to document project information and the decision-making process. Region of Waterloo Council will provide approval to file the Environmental Study Report for a 30-day review period for public comment.

Following the 30-day review period, unless there is further comment from the various stakeholders, the project can proceed into the detailed design phase.

APPENDIX A:

Iron and Manganese Treatment Upgrades for the Shingletown Wells Natural Sciences Report (LGL Limited, March 2021)

APPENDIX B:

Cost Comparison of Facility Location Alternatives