Region of Waterloo

Spring Valley Sewage Pumping Station Municipal Class Environmental Assessment

Final Project File Report

Wednesday, November 17, 2021

C2018-27 / T001145A

CIMA+

900-101 Frederick Street
Kitchener, ON N2H 6R2
T 519 772 2299 **F** 519 772-2298
cima.ca

Contact

Kelly Frensch, M.Eng., P.Eng.
Kelly.Frensch@cima.ca
T 519 772-2299, 6224

Engineering for **people**

Executive Summary

Introduction

The Spring Valley Sewage Pumping Station (SPS) is located at 365 Riverbend Drive in the City of Kitchener and pumps wastewater from the north-eastern side of Kitchener to the Kitchener Wastewater Treatment Plant service area for treatment. The dry/wet well station, constructed in 1961 and upgraded in 1993 and 2012, has a firm capacity of 245 L/s with three pumps (two duty, one standby). Spring Valley SPS is owned by the Regional Municipality of Waterloo (Region) and operated by the Ontario Clean Water Agency.

The main objective of the Spring Valley SPS Class EA is to identify the preferred long-term solution to adequately meet the existing and future requirements of the Spring Valley SPS.

Municipal Class Environmental Assessment

All municipal infrastructure projects in Ontario must follow the Municipal Class Environmental Assessment (Class EA) process (Municipal Engineers Association, October 2000 as amended in 2007, 2011, and 2015) in order to meet the requirements of the Environmental Assessment Act.

This project was completed in accordance with the requirements of a Schedule B undertaking and as such, Phases 1 and 2 of the Municipal Class EA process were carried out. Consistent with the planning process for Schedule B undertakings, members of the public and interest groups were given opportunities to provide input and comments from the early stages of this study. Notification of study commencement and public notices for two public meetings were advertised in local newspapers and distributed to all on the project contact list. Information in regards to the progress of the Class EA study process for the Spring Valley SPS was provided at each public meeting and public feedback was requested.

This document summarizes Phases 1 and 2 of this Class EA process. This report will be placed on the public record for at least 30 calendar days for review by the public and stakeholders. Notification to the public, stakeholders and government agencies will take place through the issuance of a Notice of Study Completion. Any general concerns regarding the study during the review period should be directed to the Region. Unsolved concerns related to Indigenous or treaty rights during the review period should be directed to the Minister of the Environment, Conservation and Parks as a Part II Order request. Provided that no significant issues arise during the review period which cannot be resolved in consultation with the Region and that no Part II

Order requests are received, the project is then approved and may proceed to implementation.

Problem/Opportunity Statement

The Spring Valley SPS requires upgrades to ensure the continued reliable operation of the station for the future. The Region initiated a Class EA for the Spring Valley SPS to identify the long-term recommendations to:

- Meet future servicing requirements;
- Increase the flexibility and reliability of the station; and
- Meet current industry standards and best practices.

Public Consultation

Consultation with review agencies, stakeholders, Six Nations of the Grand River, Haudenosaunee Confederacy, Mississaugas of the Credit First Nation, and the public is an important part of the Municipal Class EA study process. Successful public consultation programs play an important part of building and maintaining community trust, improving project decision-making and notifying the community early. The public and agency consultation activities undertaken at key stages of this Class EA were designed to achieve the following:

- Inform the public and stakeholders about the project and provide accurate information in a timely fashion,
- Facilitate and communicate the opportunity for public input,
- Promote a public consultation strategy that includes the participation of stakeholders,
- Tailor the consultation and communication program to the specific needs of the interested members of the public and stakeholders, and
- Involve stakeholders by identifying appropriate mitigation measures and to provide assurance that the measures will be implemented.

The Region has met the Class EA consultation requirements with the following components for this study:

- Notice of Commencement and Public Consultation Centre 1,
- Direct mailings and e-mail correspondence to stakeholders,
- Accessible project documentation posted to the Region’s website,
- Public Consultation Centre 1,
- Agency consultation

- Six Nations of the Grand River, Haudenosaunee Confederacy, Mississaugas of the Credit First Nation consultation
- Notice of Public Consultation Centre 2,
- Public Consultation Centre 2, and
- Notice of Completion.

Project Study Area

The development of the study area for this project accounted for the possibility of upgrading the existing station or constructing a new station to accommodate future flows and planned changes to the forcemain alignment. Ground elevations and proximity to the existing station and sanitary sewer network were reviewed. The study area is bound by the west bank of the Grand River to the northeast, Guelph Street to the south, the Conestoga Parkway (Highway 85) to the west, and the sanitary catchment area boundary to the north.

Through a preliminary review of available background information, the project team identified an unevaluated wetland, woodland, steep-sloped land, and watercourses within the study area. Consequently, a smaller, more focused study area was developed for the siting of design alternatives to avoid sensitive natural features to the extent feasible. It is the focused study area where field investigations were conducted to assess natural, archaeological and cultural heritage impacts as they relate to design alternatives as part of the Class EA. The focused study area includes private and public property in the area of the existing Spring Valley SPS extending from Highway 85 to the banks of the Grand River.

Design Criteria

An important objective of the Spring Valley SPS Class EA was to review flow projections developed through the 2018 Wastewater Treatment Master Plan Update to confirm the recommended station capacity to meet future needs. Flow monitoring, analysis, and modelling that was performed during this and previous studies informed the recommendation for the following future station capacity.

Table ES-1: Spring Valley SPS Future Capacity Design Basis

Design Horizon	Firm Capacity (L/s)	Applicable Assets
Current Upgrades (based on 2016 10-year storm event)	350	Pumps, process equipment, standby power, instrumentation

Design Horizon	Firm Capacity (L/s)	Applicable Assets
Ultimate Station Buildout (based on 2051 10-year design storm with climate change scenario)	470	Property requirements, SPS building, wet and dry wells, forcemain, electrical service line, HVAC

Ensuring that each proposed solution provides sufficient footprint to install emergency storage is recommended based on the City of Kitchener Design Standards and best management practices from other municipalities. The capacity of emergency storage can be increased in stages to meet the above noted firm capacities.

Evaluation Methodology

The following decision-making methodology was used for the Spring Valley SPS Class EA:

- Development of evaluation categories and criteria to assess a list of alternative solutions for the Spring Valley SPS,
- Development of alternative solutions for the Spring Valley SPS,
- Detailed evaluation of the alternative solutions using a multi-criteria analysis decision-making process, and
- Identification of the preliminary preferred alternative solution based on the results of the decision-making process.

A set of criteria were developed for four main categories:

- Environmental,
- Social,
- Technical, and
- Financial.

The evaluation methodology consisted of a descriptive or qualitative evaluation of alternative solutions/strategies and identified advantages and disadvantages of each alternative option with respect to the evaluation criteria.

Life cycle costs were evaluated using quantitative means. High-level estimates were generated for this criterion and they were evaluated using a relative rating provided for each alternative as it compares to each of the other alternatives.

An evaluation matrix was prepared describing the specific advantages and disadvantages that each alternative option offers for each criterion under consideration. For each option, detailed information was provided with a description of:

- Risk and/or potential impacts for each criterion,
- Approaches to mitigating risks and/or impacts,
- Scoring rationale, based on degree of risk and/or mitigation required, and
- Score, which were assigned as follows:

Table ES-2: Scoring Legend

Graphic	Rating	Description
	5	Very well aligned with criteria
	4	Well aligned with criteria
	3	Somewhat aligned with criteria
	2	Not well aligned with criteria
	1	Low alignment with criteria

The total score within the category was determined by summing the individual scores assigned to each evaluation criterion. Category scores were then summed to determine the overall score of an alternative solution. The alternative solution that scored the highest was ranked first and selected as the preliminary preferred solution. The alternative solution with the second highest score was ranked second, and so on.

A sensitivity analysis was performed by category (Environmental, Social, Technical, and Financial) by increasing the relative importance of each category sequentially. Based on the sensitivity analysis results, Alternative 2B – new station in open area north of existing station remained the preliminary preferred alternative for the majority of adjustments to the category weightings.

Identification of Alternative Solutions

In accordance with Phase 2 of the Municipal Class EA process, alternative solutions were identified to address the existing opportunities and constraints associated with the Spring Valley SPS.

The following general alternative solutions were identified:

- Do nothing;
- Limit community growth;
- Upgrade existing station with offsite emergency storage; and
- Construct a new station offsite, including the following potential siting locations:
    - Walter Bean Trail parking lot,
    - Open area north of existing station, and
    - Industrial land south of existing station.

“Do nothing” and “Limit community growth” options were considered; however, these options did not meet the project objectives.

Upgrading the existing station and providing offsite emergency storage was identified as a feasible alternative. This alternative focuses on upgrades within the existing building and existing site, however, the size of the property is not large enough to accommodate the emergency storage tanks. As a result, off-site storage was identified in the area north of the existing station. Upgrade the existing station with offsite emergency storage is referred to as Alternative 1.

The second feasible alternative involves three (3) sub-options for constructing a new station on an offsite property, close to the existing station.

The potential siting locations for a new station include:

- The Walter Bean Trail parking lot area on City of Kitchener property, north of Riverbend Drive, referred to as Alternative 2A,
- The open area north of the existing station on City of Kitchener property, west of Riverbend Drive, referred to as Alternative 2B, and
- The industrial land south of the existing station on private property, west of Riverbend Drive, referred to as Alternative 2C.

Alternative solutions 1, 2A, 2B, and 2C were carried forward into the detailed evaluation process.

Evaluation of Alternative Solutions

Alternative solutions 1, 2A, 2B, and 2C were subjected to a detailed evaluation that included environmental, social, technical, and financial considerations. Higher scores were assigned to solutions that would reduce or eliminate potential impacts.

Alternative 2C scored the highest in the environmental category because construction of a new station on industrial land presents minimal environmental impacts. Alternative 2B scored the highest in both the social and technical categories as construction of a new station in an open area close to the existing station is expected to have minimal impacts on the community and the existing station operation. Alternatives 1 and 2B are anticipated to have similar 50-year lifecycle costs and therefore both achieved the highest score in the financial category.

Preferred Solution

The results of the detailed evaluation and sensitivity analysis support the selection of Alternative 2B – new station in open area north of existing station as the preferred solution for the Spring Valley SPS. A simplified site plan of the preferred alternative solution is shown in Figure ES-1.

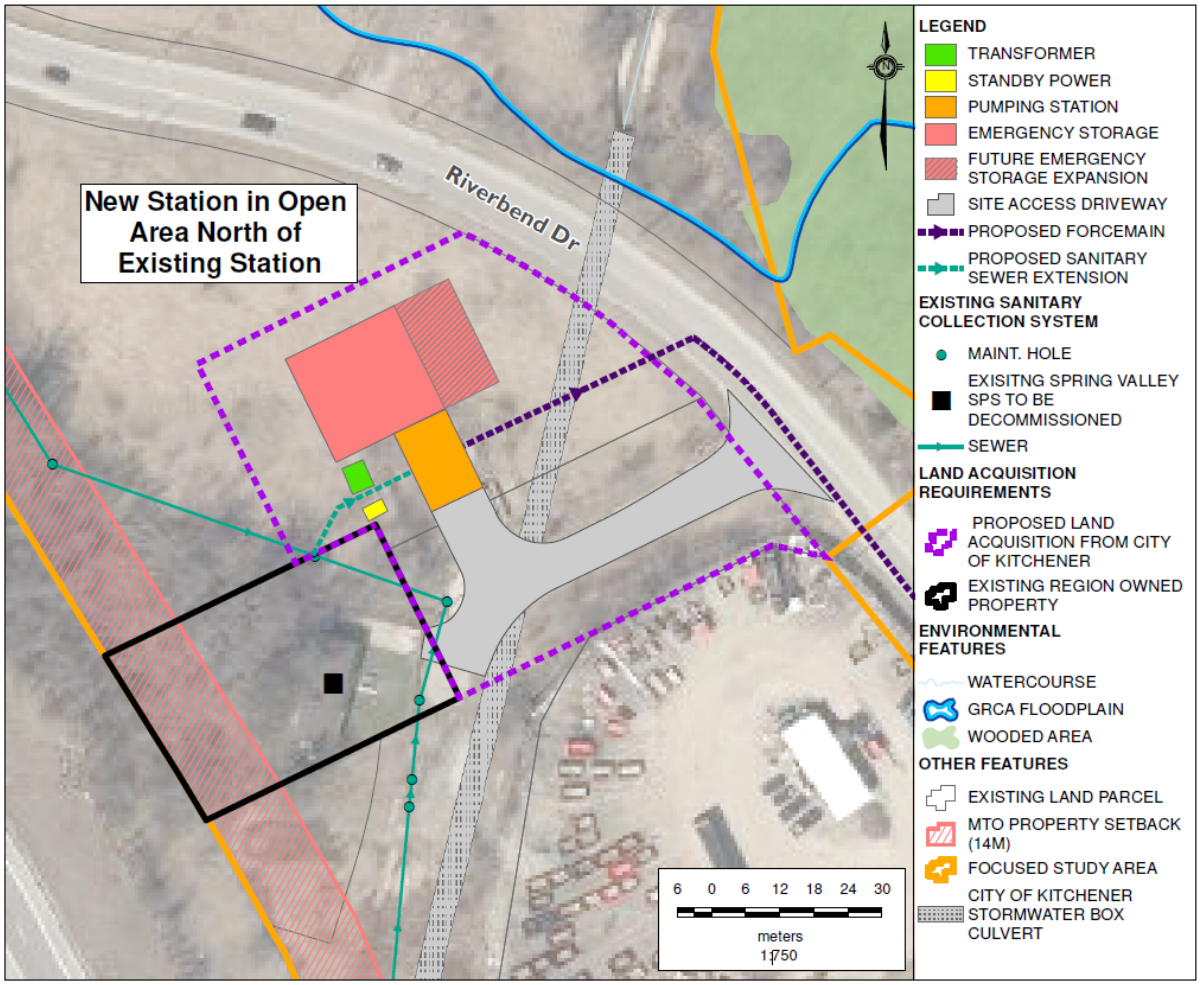


Figure ES-1: Spring Valley SPS Class EA – Preferred Alternative

The benefits of Alternative 2B include the ability to operate the existing station during construction, the proximity of the proposed new station site to the existing station and sewer network, and the best overall score considering environmental, social, technical, and financial factors.

Table of Contents

Executive Summary ..... **ii**
Introduction ii
Municipal Class Environmental Assessment ii
Problem/Opportunity Statement iii
Public Consultation iii
Project Study Area iv
Design Criteria iv
Evaluation Methodology v
Identification of Alternative Solutions vii
Evaluation of Alternative Solutions viii
Preferred Solution viii
1 Introduction **1**
1.1 Class EA Objectives 2
1.2 Project File Report Objectives 2
1.3 Report Outline 3
1.4 Technical Memoranda 4
2 Municipal Class Environmental Assessment Process **6**
2.1 Problem/Opportunity Statement 9
2.2 Information on Part II Order Requests 9
3 Public and Agency Consultation Process **11**
3.1 Guiding Principles of Public Engagement 11
3.2 Objectives of Public Consultation and Communication Program 12
3.3 Public Consultation and Communication Strategies 13
3.4 Public Consultation Centre Formats 14
3.5 Summary of Public Issues, Comments and Concerns 15
3.6 Agency Consultation 15
3.6.1 Ministry of the Environment, Conservation and Parks 16

3.6.2 Grand River Conservation Authority 16
3.6.3 Ontario Ministry of Transportation 17
3.7 First Nations, Metis and Inuit Communities 18
4 Existing Conditions 20
4.1 Sanitary Collection System 20
4.2 Spring Valley SPS 22
4.2.1 SPS Inlet 24
4.2.2 Wet Well 24
4.2.3 Pumps, Valves, and Piping 24
4.2.4 Process Controls 25
4.2.5 Electrical System 26
4.2.6 HVAC 27
4.2.7 Standby Power 27
4.3 Spring Valley SPS Forcemain 28
5 Background Review 30
5.1 Review of Previous Studies 30
5.2 Relevant Policies, Legislation, Regulations and Permitting 32
5.3 Design Standards 34
6 Project Study Area 36
6.1 Environmental Features 37
6.1.1 Background Information Review 38
6.1.2 Environmental Field Investigation Findings 39
6.2 Stage 1 and 2 Archaeological Assessments 42
6.3 Built Heritage Resources and Cultural Heritage Landscapes 45
7 Design Criteria 48
7.1 Peak Design Flow 48
7.1.1 Station Supervisory Control and Data Acquisition (SCADA) Data 48
7.1.2 Influent Flow Data 48
7.1.3 Peak Flow Projections from 2018 WWTMP 50

7.1.4 Impact of Climate Change on Future Peak Flows 52
7.1.5 Future Station Capacity Recommendation 55
7.2 Type of Pumping Station 55
7.3 Separation Distance 56
7.4 Pumping and Forcemain Requirements 56
7.4.1 Total Dynamic Head of Pumps 58
7.4.2 Odour Control at Forcemain Outlet 61
7.5 Wet Well Capacity, Layout and Access 61
7.6 Emergency Storage and High Level Overflow 62
7.7 Equipment Redundancy 63
7.8 Standby Power Requirements 63
7.9 Electrical Requirements 64
7.10 HVAC Requirements 64
7.11 Automation, Instrumentation, and Control 65
7.12 Odour Control Systems 65
7.13 Emergency Trucking and Bypass Pumping 66
8 Evaluation Methodology 67
8.1 Evaluation Categories 67
8.2 Evaluation Criteria 68
8.3 Qualitative Rating 71
9 Identification of Alternative Solutions 73
9.1 Preliminary Screening of Alternatives 73
9.2 Alternative 1 – Upgrade Existing Station with Offsite Emergency Storage 74
9.3 Alternative 2 – Construct a New Station Offsite 77
9.3.1 Alternative 2A – New Station in Walter Bean Trail Parking Lot 79
9.3.2 Alternative 2B – New Station in Open Area North of Existing Station 81
9.3.3 Alternative 2C – New Station on Industrial Land South of Existing Station 83
10 Evaluation of Alternative Solutions 86
10.1 Common Mitigation Measures 86

10.2 Detailed Evaluation Matrix 87
10.3 Sensitivity Analysis 102
11 Preferred Solution 103
11.1 Overview 103
11.2 Implementation Schedule 105
11.3 Permits and Approvals 105
11.4 Anticipated Potential Impacts and Mitigation Measures 107
11.4.1 Disturbance to Natural Environmental Features 107
11.4.2 Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes 108
11.4.3 Climate Change 109
11.4.4 Noise and Vibration 109
11.4.5 Dust/Mud 110
11.4.6 Source Water Protection 110
12 References 112

List of Tables

Table 1: List of Acronyms xvi
Table 2: Summary of Previous Studies 30
Table 3: Potential Permit/Approval Requirements 33
Table 4: Environmental Field Investigations for the Spring Valley SPS Class EA 40
Table 5: Monitored Spring Valley SPS Influent Flow Summary 49
Table 6: Spring Valley SPS Future Capacity Design Basis 55
Table 7: Environmental – Detailed Evaluation Criteria 68
Table 8: Social – Detailed Evaluation Criteria 69
Table 9: Technical – Detailed Evaluation Criteria 70
Table 10: Financial – Detailed Evaluation Criteria 71
Table 11: Scoring Legend 71
Table 12: Evaluation of Alternative Solutions 88

Table 13: Phase 1 Implementation Schedule 105
Table 14: Required Permit and Approvals 106

List of Figures

Figure 1: Location of Spring Valley SPS 1
Figure 2: Municipal Class EA Process for the Spring Valley SPS Study 8
Figure 3: Sanitary Catchment Area 21
Figure 4: Spring Valley SPS and Surrounding Area - Land Ownership Map 22
Figure 5: Spring Valley SPS Main Floor Plan (Associated Engineering, 1994) 23
Figure 6: Spring Valley SPS Below-Grade Section (Proctor & Redfern Consulting Engineers, 1961) 24
Figure 7: Wet Well Level Pump Control – Information from OCWA (email March 26, 2019) 26
Figure 8: Electrical Classification of Existing Spring Valley SPS 27
Figure 9: Existing Forcemain 29
Figure 10: Spring Valley SPS Class EA Study Area and Focused Study Area 37
Figure 11: Environmental Investigations - Existing Conditions 41
Figure 12: Results of Archaeological Investigations in the Study Area 44
Figure 13: Cultural Heritage Landscapes within the Study Area 46
Figure 14: Spring Valley SPS Projected Wastewater Flows (CIMA+ 2018) 51
Figure 15: 15-Minute Average Peak Flows of Hydraulic Modelling Results Incorporating Climate Change Worst-Case Scenarios 54
Figure 16: Existing and Proposed Forcemains 57
Figure 17: Existing and Potential Station System Curves 60
Figure 18: Alternative 1 - Upgrade Existing Station with Offsite Emergency Storage 75
Figure 19: New Station Alternative Solutions 78
Figure 20: Alternative 2A - New Station in Walter Bean Trail Parking Lot 79
Figure 21: Alternative 2B: New Station in Open Area North of Existing Station 82
Figure 22: Alternative 2C: New Station on Industrial Land South of Existing Station 84
Figure 23: Spring Valley SPS Class EA – Preferred Alternative 103

List of Appendices

Appendix A: Technical Memoranda

Appendix A.1: TM1

Appendix A.2: TM2

Appendix A.3: TM3

Appendix A.4: TM4

Appendix B: Public Consultation Documentation

Appendix B.1: Public Notices

Appendix B.2: Public Consultation Centre Materials

Appendix B.3: Public Correspondence

Appendix B.4: Agency Consultation

Appendix B.5: First Nations, Metis and Inuit Communities Consultation

Appendix C: Scoped Environmental Impact Report (LGL Limited)

Appendix D: Stage 1 and 2 Archaeological Assessment (ARA)

Appendix E: Cultural Heritage Report (ARA)

Table 1: List of Acronyms

Description	Acronym/Abbreviation
Air Changes Per Hour	ACH
Average Day Flow	ADF
Class Environmental Assessment	Class EA
CIMA Canada Inc.	CIMA+
Cultural Heritage Landscape	CHL
Environmental Activity and Sector Registry	EASR
Environmental Assessment Act	EA Act
Environmental Compliance Approval	ECA
Grand River Conservation Authority	GRCA
Greenhouse Gas	GHG
Heating, Ventilation, and Air Conditioning	HVAC
Hydrogen Sulphide	H_2S
Industrial, Commercial, and Institutional	ICI
Inflow and Infiltration	I&I
Interdisciplinary Centre on Climate Change	IC3
Migratory Birds Convention Act	MBCA
Ministry of Environment, Conservation and Parks	MECP
Ministry of Natural Resources and Forestry	MNRF
Ministry of Tourism, Culture and Sport	MTCS
Ministry of Transportation	MTO
Motor Control Centre	MCC
Multi-Criteria Analysis	MCA
Municipal Engineers Association	MEA
National Fire Protection Association	NFPA
Ontario Clean Water Agency	OCWA
Ontario Electrical Safety Code	OESC

Description	Acronym/Abbreviation
Peak Dry Weather Flow	PDWF
Peak Wet Weather Flow	PWWF
Public Consultation Centre	PCC
R.V. Anderson Associates Limited	RVA
Regional Municipality of Waterloo	Region
Sewage Pumping Station	SPS
Species at Risk	SAR
Supervisory Control and Data Acquisition	SCADA
Technical Memorandum	TM
Technical Standards and Safety Authority	TSSA
Wastewater Treatment Master Plan Update	WWTMP
Wastewater Treatment Plant	WWTP

1 Introduction

The Spring Valley Sewage Pumping Station (SPS) is located at 365 Riverbend Drive (Figure 1) in the City of Kitchener and pumps wastewater from the north-eastern side of Kitchener to the Kitchener Wastewater Treatment Plant (WWTP) service area for treatment. The dry/wet well station, constructed in 1961 and upgraded in 1993 and 2012, has a firm capacity of 245 L/s with three pumps (two duty, one standby). Spring Valley SPS is owned by the Regional Municipality of Waterloo (Region) and operated by the Ontario Clean Water Agency (OCWA).

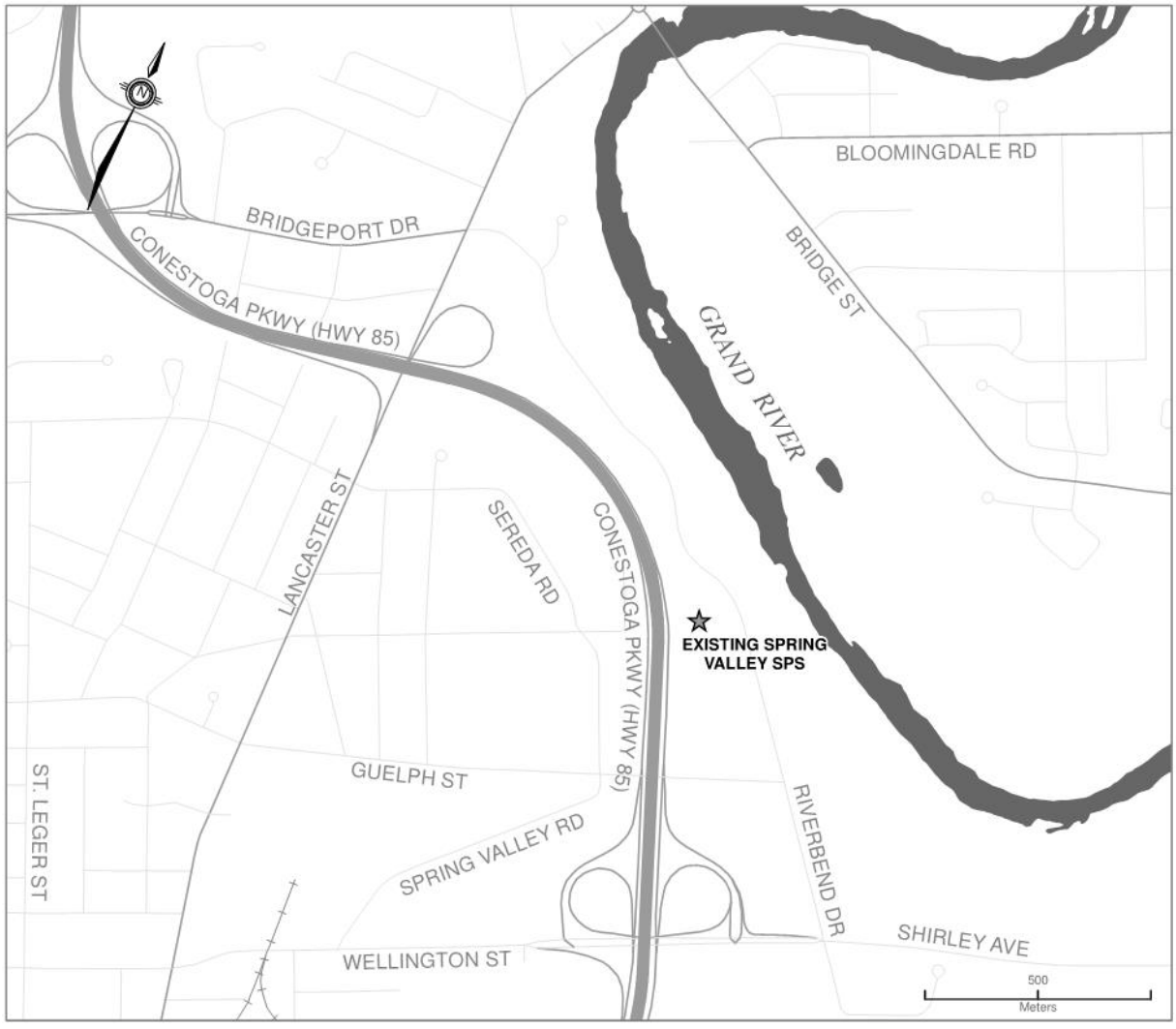


Figure 1: Location of Spring Valley SPS

CIMA Canada Inc (CIMA+) was retained by the Region to complete a Schedule B Class Environmental Assessment (Class EA) study to identify the preferred long-term solution

to adequately meet the existing and future requirements of the Spring Valley SPS. This Project File Report outlines and summarizes the planning and decision-making process undertaken to arrive at the preferred solution for the Spring Valley SPS.

1.1 Class EA Objectives

The main objective of the Spring Valley SPS Class EA is to identify the preferred long-term solution to adequately meet the existing and future requirements of the Spring Valley SPS.

Other Class EA objectives include the following:

- Determine the requirements to accommodate future capacity needs, operational needs and meet current industry standards,
- Determine the preferred approach to accommodate future needs, whether it be station upgrades, expansion, or full replacement, and
- Define future site requirements for the station, including the location of a new facility if this is feasible and identified as the preferred alternative.

1.2 Project File Report Objectives

This Project File Report describes the planning and decision-making process followed during the Class EA Study for the Spring Valley SPS. The Project File Report describes the following:

- Problem or opportunity being addressed,
- Current conditions of existing sanitary collection system, station, and forcemain for Spring Valley SPS,
- Evaluation methodology and evaluation criteria used to assess the different alternative solutions,
- Alternative solutions considered in the study,
- Anticipated potential impacts,
- Proposed mitigation measures associated with the alternatives, and
- Rationale for the selection of the preferred sewage pumping station solution and implementation plans.

The Class EA process also gives members of the public, interest groups and review agencies a chance to review the Project File Report during a 30-day calendar review period. The 30-day review period gives individuals an opportunity to raise outstanding concerns regarding the project with the Region. Unsolved concerns that deal with Indigenous or treaty rights may request that the Minister of the Environment takes action as discussed in Section 2.2.

1.3 Report Outline

The report is divided into 11 subsections plus appendices and references, structured as follows:

Section 1: Introduction – Provides an overview of the Spring Valley SPS, objectives of the Spring Valley SPS Class EA study and objectives of this Project File Report.

Section 2: Municipal Class Environmental Assessment Process – Provides a summary description of the framework and activities completed to meet the Municipal Class EA process requirements and the phases related specifically to the Spring Valley SPS Class EA study. The problem/opportunity statement for this Class EA is also provided in this section.

Section 3: Public and Agency Consultation Process – Outlines the Public Consultation and Communication programs set in place as well as the format of the Public Engagement Meetings. This section also provides a summary of public issues, comments and concerns received throughout the Class EA study, how they have been addressed, and any agency consultation that was conducted.

Section 4: Existing Conditions – Describes the current conditions of the existing Spring Valley SPS sanitary catchment area, station, site, and forcemain.

Section 5: Background Review – Provides a summary of the previous studies and upgrade projects at the Spring Valley SPS. This section also details relevant policies, legislation, regulations, permitting, and design standards that were used in the Spring Valley Class EA study.

Section 6: Project Study Area –Outlines the study area location and major existing natural heritage features. The socio-cultural environment of the area is also discussed including the site settings and land uses, cultural and heritage resources, and archaeological conditions.

Section 7: Design Criteria – Provides a detailed description of the design criteria developed for this Class EA study, including the peak design flow and the recommended future station capacity. This section also discusses design objectives including wet well size, storage volumes, equipment redundancy, standby power requirements, electrical upgrades, heating, ventilation, and air conditioning (HVAC) requirements, automation, odour control, and mitigation of operational risks.

Section 8: Evaluation Methodology – Details the evaluation framework applied to the alternative solutions considered in the Class EA study.

Section 9: Identification of Alternative Solutions – Provides a general description of the alternative solutions considered in the study and the results of the preliminary assessment of such alternatives.

Section 10: Evaluation of Alternative Solutions – Summarizes the results of the detailed comparative evaluation carried out for the feasible alternatives described in Section 9, identifies the preliminary preferred alternative, and details the results of a sensitivity analysis conducted to confirm the preferred alternative.

Section 11: Preferred Solution – Summarizes the preferred solution for the Spring Valley SPS Class EA, implementation schedule, permits and approvals, and impacts and mitigation measures.

1.4 Technical Memoranda

Four technical memoranda (TMs) were developed during the Spring Valley SPS Class EA. The following describes the purpose and content of each TM, which are provided in Appendix A.

- **TM 1 – Background Review.** TM 1 summarized available background information, developed the study area boundary, and identified constraints and opportunities for the Spring Valley SPS Class EA study. The Problem/Opportunity statement was also defined in TM 1 for use throughout the Class EA.
- **TM 2 – Design Parameters.** TM 2 reviewed flow projections developed through the 2018 Wastewater Treatment Master Plan Update (WWTMP) to confirm the recommended Spring Valley SPS capacity recommendation to meet future needs. Several factors affecting the future capacity for the station were assessed including peaking factors, future uncertainty due to climate change, and the addition of future developable industrial lands. TM 2 also discussed design objectives including wet well size, storage volumes, equipment redundancy, standby power requirements, electrical upgrades, HVAC requirements, automation, odour control, and mitigation of operational risks.
- **TM 3 – Evaluation Criteria.** TM 3 developed an evaluation methodology and criteria that were used to assess alternative solutions for the Spring Valley SPS Class EA study. The scoring method and weightings were also described for each criterion.
- **TM 4 – Development and Evaluation of Alternatives.** TM 4 developed alternative solutions to meet the future needs of the Spring Valley SPS, completed a detailed evaluation of the alternative solutions based on evaluation criteria developed in TM 3, identified the preliminary preferred alternative

solution, and performed a sensitivity analysis reviewing the evaluation category weightings.

2 Municipal Class Environmental Assessment Process

The Ontario Municipal Engineers Association (MEA) Municipal Class EA document (2000 as amended in 2007, 2011 and 2015), as approved under the Environmental Assessment Act (EA Act) R.S.O 1990, Chapter E.18, applies to municipal infrastructure projects including roads, water and wastewater projects. Since projects undertaken by municipalities can vary in their environmental impacts, such projects are classified in terms of schedules. Projects are generally classified under Schedule A, A+, B, or C. The Spring Valley SPS Class EA was deemed a Schedule B project as it aims to construct a new pumping station or increase pumping station capacity by adding or replacing equipment and appurtenances.

The Municipal Class EA enables the planning of municipal infrastructure to be undertaken in accordance with an approved procedure designed to protect the environment. The Class EA approach to dealing with municipal infrastructure projects provides a decision-making framework that enables the requirements of the EA Act to be met in an effective manner. It provides:

- A reasonable mechanism for proponents to fulfill their responsibilities to the public for the provision of municipal services in an efficient, timely, economic and environmentally responsible manner;
- A consistent, streamlined and easily understood process for planning and implementing infrastructure projects; and,
- The flexibility to tailor the planning process to a specific project taking into account the environmental setting, local public interests and unique project requirements.

The main elements of the Schedule B Class EA planning process are incorporated in the following two phases:

- Phase 1: Identify the problem (deficiency) or opportunity.
- Phase 2: Identify alternative solutions to address the problem or opportunity by taking into consideration the existing environment, and establish the preferred solution taking into account public and review agency input.

The Class EA process outlines opportunities for public engagement, specifically at Public Consultation Centres (PCCs), which are held at key stages in the project. The requirements for a Schedule B Class EA only include one PCC. However, the project team conducted two PCCs to encourage additional stakeholder input. The first PCC was a ‘Learning Session’, focussed on introducing the project, providing background,

and presenting the problem/opportunity statement. The second PCC was held to present the decision-making process and obtain feedback on the preliminary preferred alternative. An overview of the public and agency consultation process is provided in Section 3.

Figure 2 illustrates the applicable Phases of the Class EA Process as it applies to the Spring Valley SPS Schedule B Class EA.

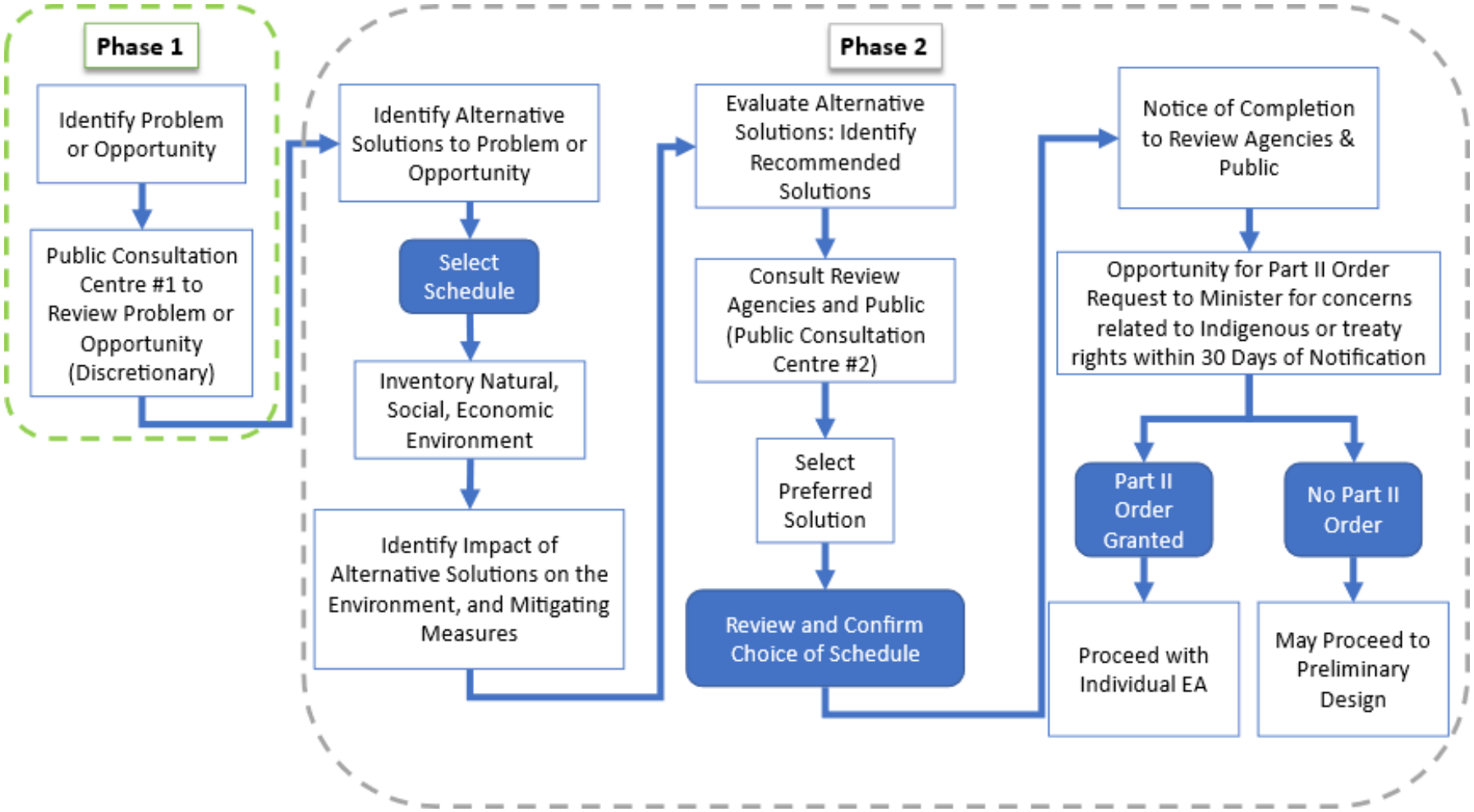


Figure 2: Municipal Class EA Process for the Spring Valley SPS Study

2.1 Problem/Opportunity Statement

The Spring Valley SPS requires upgrades to ensure the continued reliable operation of the station for the future. The Region initiated a Class EA for the Spring Valley SPS to identify the long-term recommendations to:

- Meet future servicing requirements;
- Increase the flexibility and reliability of the station; and
- Meet current industry standards and best practices.

2.2 Information on Part II Order Requests

Under the Class EA planning process, there is an opportunity for the Minister or delegate to review the status of a project. Members of the public, stakeholders and review agencies may request the Minister or delegate to ask a proponent to comply with Part II of the Environmental Assessment Act (which addresses individual EAs), before proceeding with construction of a proposed project. This is known as a Part II Order.

Interested persons may provide written comments to the project team. All comments and concerns should be sent directly to the Proponent.

In addition, a request may be made to the Minister of the Environment, Conservation and Parks (MECP) for an order requiring a higher level of study (i.e. requiring an individual/comprehensive EA approval before being able to proceed), or that conditions be imposed (e.g. require further studies), only on the grounds that the requested order may prevent, mitigate or remedy adverse impacts on constitutionally protected Indigenous and treaty rights. Requests on other grounds will not be considered. Requests should include the requester contact information and full name for the ministry.

Requests should specify what kind of order is being requested (request for additional conditions or a request for an individual/comprehensive environmental assessment), how an order may prevent, mitigate or remedy those potential adverse impacts, and any information in support of the statements in the request. This will ensure that the ministry is able to efficiently begin reviewing the request. The requests should also be sent to the Proponent by mail or email.

The request should be sent in writing or by email to:

Minister of the Environment, Conservation and Parks

Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3

minister.mecp@ontario.ca
and,
Director, Environmental Assessment Branch
Ministry of Environment, Conservation and Parks
135 St. Clair Ave. W, 1st Floor
Toronto ON, M4V 1P5
EABDirector@ontario.ca

3 Public and Agency Consultation Process

Public consultation is an important part of the Class EA study process. Successful public consultation programs play an important part of building and maintaining community trust, improving project decision-making and notifying the community early.

An overview of the consultation performed during this project is described in in the following section. All activities completed as part of the Spring Valley SPS Class EA communication and consultation program are summarized in detail in Appendix B of this Project File Report. The communication and consultation section includes:

- Description of all engagement and communication and consultation strategies;
- Description of all stakeholder groups, as well as their needs and concerns;
- Final Stakeholder Contact List;
- Copies of all communication and consultation material disseminated to each stakeholder group;
- Summary of feedback received through the Spring Valley SPS Class EA by members of the public; and
- Summary of Steering Committee Meetings and feedback received from committee members.

3.1 Guiding Principles of Public Engagement

Regional employees and contracted consultants are responsible for ensuring public engagement is conducted in accordance with the Regional values of service, integrity, respect, innovation and collaboration.

The Region has guiding principles for public engagement activities. These principles are:

Accountability

- The Region is responsible for its actions, decisions and policies and may be required to explain them and be answerable for resulting consequences.
- Public engagement processes will demonstrate a commitment to being time-sensitive, cost-effective and demonstrate that results are consistent with expectations.
- Where applicable, the Region of Waterloo will follow decision-making protocols and jurisdictions at the municipal, regional, provincial and federal level.

Transparency

- The Region is open, clear and visible to the citizens it serves when conducting business in order to build trust and confidence in government.
- Public engagement processes will demonstrate openness, honesty and clarity of purpose when engaging the public and ensure the same applies when communicating results.

Respect

- Public engagement processes will value and respect citizens.

Inclusivity

- Public engagement processes will include ways to involve members of the community who are most impacted by a particular issue or decision.
- Public engagement processes will identify, prevent and remove barriers to participation, recognizing that certain groups have unique needs and challenges that impact their ability to fully participate in decision-making processes.

Responsiveness

- Public engagement processes will be proactive in addressing public concerns and flexible in responding to changing needs and conditions.

These principles of engagement are a core part of the consultation conducted for this Class EA Study. More information on the Region's Guidelines for Public Engagement can be found on the Region's website.

3.2 Objectives of Public Consultation and Communication Program

The project team believe that the quality of decisions are improved by seeking out and acting on input from the public and stakeholders. The public consultation and communication program was designed to achieve the following:

- Inform the public and stakeholders about the project and provide accurate information in a timely fashion,
- Facilitate and communicate the opportunity for public input,
- Promote a public consultation strategy that includes the participation of stakeholders,
- Tailor the consultation and communication program to the specific needs of the interested members of the public and stakeholders, and

- Involve stakeholders by identifying appropriate mitigation measures and to provide assurance that the measures will be implemented.

3.3 Public Consultation and Communication Strategies

A major component of the Municipal Class EA process is to inform governmental agencies, affected landowners, the local community and the general public of key project activities and to solicit comments and feedback from these groups on the results of major activities, before any final decisions are made.

The MEA Class EA document outlines mandatory and discretionary consultation contact points with the public and agencies. In order to communicate the project progress and goals and to solicit proper feedback and insight throughout the process, CIMA+ undertook the following communication and consultation activities:

- **Project Contact List:** A master project contact list was created at the onset of the project to include representatives from government and regulatory agencies, Indigenous groups, utilities, landowners, developers, and a number of technical review agencies and organizations that may have an interest in this project. Interested members of the public were added to the mailing list upon request and all individuals on the list were kept informed about project updates and upcoming meetings through direct mail.
- **Notice of Study Commencement and Public Consultation Centre No. 1:** A “Notice of Study Commencement and Public Consultation Centre 1” was published on two separate publications in the following local newspaper.
    - The Record on May 23 and May 30, 2019

  Copies of the notice were also mailed out to all individuals and groups on the Project Contact List. A copy of the Notice of Study Commencement and PCC 1 is provided in Appendix B.1.
- **Public Consultation Centre No. 1:** The first public meeting for this Class EA study was held on June 6, 2019 from 5:00 to 7:00 pm at the Breithaupt Community Centre, Room 109. The meeting allowed all members of the public and stakeholders that may have an interest in the project to learn more about the need for the project, the Class EA process, preliminary environmental and archaeological findings in the study area and to provide feedback on the information presented. The meeting was held near the study area in anticipation that residents within the study area would attend. This meeting had three (3) attendees in total. There were no comments received during the meeting.

- **Notice of Public Consultation Centre No. 2:** A Notice of PCC No.2 informing the public of the meeting, held online due to the COVID-19 pandemic, was issued in the following local newspaper:
    - The Record on Friday, January 22 and Saturday, January 23, 2021

  A copy of the PCC No. 2 Notice was sent to all individuals and groups on the Project Contact List in advance of the public meeting. A copy of the "Notice of PCC No. 2" is provided in Appendix B.1.

- **Public Consultation Centre No. 2:** The second public meeting for this Class EA study was held in an online format with a recorded video presentation that described the project display boards. The virtual PCC materials, including the presentation recording, presentation boards, and video transcript, were posted for 30 days (January 27 to February 26, 2021) on the Region's website at: https://www.regionofwaterloo.ca/CurrentWaterProjects/. The purpose of the second PCC was to present the alternative solutions considered, the criteria used to evaluate the alternative solutions, the results of the detailed evaluation process and introduce the preliminary preferred solution to the public for feedback. There were 84 views of PCC No.2 online. One comment was received during the PCC 2 review period that agreed with the preliminary preferred alternative.
- **Notice of Study Completion**: A "Notice of Study Completion" notifying the public and agencies that the Project File Report has been placed on the public record for review will be issued. The Notice advises the public about where to find the Project File Report, as well as their ability to place a Part II Order, as discussed in Section 2.2. The Notice of Study Completion will be advertised in the Record.

  The notice will also be posted on the Region's website https://www.regionofwaterloo.ca/CurrentWaterProjects/ and sent to all individuals and groups on the project contact list. A copy of the Notice of Study Completion is included in Appendix B.1.

3.4 Public Consultation Centre Formats

PCC 1 was held as an open forum where attendees were encouraged to review information displayed on poster boards and have one-on-one conversations with staff from the Region and its consultant team, CIMA+. Before leaving the PCC, attendees were encouraged to fill out a Comment Sheet answering questions pertaining to the content of the presentation, as well as providing the opportunity to submit their own comments or questions.

The public meeting materials available included:

- Display panels: Including information about the project using both text and visuals
- Comments Sheets: Attendees were encouraged to fill out these sheets as an opportunity to provide comments, make suggestions or ask questions about the project and/or the Class EA Study process

PCC 2 was held in an online format due to the COVID-19 pandemic. The public and stakeholders were invited to view a recorded video presentation that described the project display boards. The virtual PCC materials, including the presentation recording, notice, presentation boards, video transcript, and a comment sheet were posted on the Region's website. Contact information was provided for both the Region's and the consultant's project managers if stakeholders wanted to further discuss any content presented.

All meeting and presentation materials for both PCCs were posted on the Region's website at https://www.regionofwaterloo.ca/CurrentWaterProjects/. Copies of the display panels and other material available at the meetings are included in Appendix B.2.

3.5 Summary of Public Issues, Comments and Concerns

No comments sheets were completed and submitted during or after PCC 1 and PCC 2. One comment was received during the PCC 2 review period that agreed with the preliminary preferred alternative.

3.6 Agency Consultation

An important component of the Class EA process is proper consultation with government review agencies and the public. The Region ensured that the public and relevant review agencies were informed about this study and encouraged to contribute during the study. This section outlines the agency consultation component of the study.

A list of agencies was prepared at the start of the project that included all relevant contacts at the federal, provincial, and local levels of government as well as local associations and utilities. Each party on the list of stakeholders was contacted to provide information or comments. The opportunity for these agencies to participate in the project was provided through the distribution of all study notices, direct letter mailings, and through direct invitations to participate in the two formal PCCs. The complete list of all agencies contacted and correspondence with these agencies is included in Appendix B.4 of this report.

3.6.1 Ministry of the Environment, Conservation and Parks

Consultation with the MECP was undertaken as part of the Spring Valley SPS Class EA Study. Email correspondence was received from the MECP on June 10, 2019 in response to the Notice of Project Commencement and PCC 1, with the following major comments:

- Noted that the Spring Valley SPS is within wellhead protection areas with a number of wells in close proximity to the pumping station. Accordingly, it is expected that while contemplating potential improvements, the impact to these wells and the wellhead protection areas will be considered.
- Delegated the procedural aspects of rights-based consultation of Indigenous communities to the proponent, listed the communities who have been identified as potentially affected by the proposed project, identified sources of information related to Indigenous consultation and the Ontario Environmental Assessment Act, and attached a document “A Proponent’s Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities” for further information.
- Provided instruction for when the proponent must contact the Director of Environmental Assessment and Permissions Branch.
- Delegated the requirements regarding a Part II Order Request Form and the conditions in which a project can proceed or not.
- Noted that a draft copy of the Notice of Completion to be sent to the MECP upon completion of the EA Study.

3.6.2 Grand River Conservation Authority

Consultation with the Grand River Conservation Authority (GRCA) was carried out from the early stages of the project. The GRCA was included in direct mailings of the project notices and invitations to the public meetings. In addition, a pre-consultation meeting was conducted to review the scope and obtain feedback on the natural heritage investigation to be completed as part of the Class EA study. The list of proposed natural heritage investigations, as presented in Table 4, was reviewed and approved by the GRCA prior to the commencement of field investigations.

The GRCA was also a key Steering Committee member that participated in both Steering Committee meetings to review the PCC 1 and PCC 2 materials.

Considering the relevancy of aquatic and terrestrial resources within the study area given its proximity to the Grand River and the regulated floodplain, a number of comments were received from GRCA, which included:

- "Ecological and Environmental Features Survey of Properties" should be performed in mid to late summer by a qualified biologist to provide an accurate biotechnical survey of the area. At minimum, a vegetation map with botanical inventories should be performed in the study area.
- 30m delineation of wetlands should be applied to mapping
- Ecological Land Classification mapping should be reviewed to screen for species at risk in the study area.
- Details on species at risk should be obtained from the MECP and Fisheries and Oceans Canada.

The natural heritage investigation completed in support of this Class EA and the respective report incorporated and addressed the above noted comments. All correspondence exchanged with GRCA throughout the course of the Class EA is included in Appendix B.4 for further reference.

3.6.3 Ontario Ministry of Transportation

The Ontario Ministry of Transportation (MTO) is a key stakeholder for the Spring Valley Class EA due to the proposed relocation of the station's forcemain as part of the ongoing new Highway 7 Interchange project, and the proximity of the of study area to Highway 85. The following comments were received from the MTO regarding the preliminary alternative solution layouts:

- The existing Spring Valley SPS property is located adjacent to Highway 85 (Class Freeway), within MTO's Permit Control Area (PCA), and as such, MTO Permits are required before any demolition, grading, construction or alteration to the site commences.
- Permit requirements

  An MTO Building & Land Use Permit is required for any development within the PCA. As a condition of MTO permits, the following shall be addressed.

  - The Proponent shall submit a detailed Site Plan, Grading Plan and Drainage Plan for MTO review and approval. Plans shall clearly identify all structures/works (existing and proposed) and all setbacks to MTO's property limit.
  - MTO requires all buildings, structures and features integral to the site to be located a minimum of 14 metres from the highway property limit.
  - Storm Water Management - As a condition of MTO permits, to ensure that stormwater runoff from this property does not adversely affect our highway drainage system or highway corridor, the MTO may require the owner to submit a Storm Water Management Report (SWMR) report along with the

above-noted grading/drainage plans for the proposed development for review and approval.

- The existing highway drainage outlet along the southeast limit of 365 Riverbend Drive shall be maintained.
- MTO Stormwater Management Requirements for Land Development Proposals can be obtained from the following website: http://www.mto.gov.on.ca/english/engineering/drainage/stormwater/index.html

The layouts of the alternative solutions were revised to address the above noted comments. All correspondence exchanged with MTO throughout the course of the Class EA is included in Appendix B.4 for further reference.

3.7 First Nations, Metis and Inuit Communities

Consultation with Indigenous communities is an important part of the decision ma ing process for projects that may impact their traditional territory and the resources upon which their cultures and livelihoods depend. Based on the project study area, the following First Nations and Indigenous Communities were included in the project mailing list and have been consulted during this Class EA study to determine their interest and desired level of communication:

- Six Nations of the Grand River Territory
- Haudenosaunee Confederacy Chiefs Council
- Mississaugas of the Credit First Nation (MCFN)

Public notices and invitations to the project PCCs were distributed via mail on May 15, 2019 and January 22, 2021 to each of the groups noted above. The first direct form of contact was meant to confirm the communities' project awareness regarding the project notice, project information, and method of contact, if additional information or consultation related to the project was required. The communities were contacted again on July 12 and July 23, 2019 through means of a phone call following PCC1 to inform the communities of the public meeting and the method of contact if the need for a hard copy of the presentation or one-on-one consultation arose. Voice messages were left for the groups and contacts that were not reachable.

Following issue of PCC 2 notice and online materials, communities were contacted on March 2, 2021 by telephone. Communities were asked over the phone or via voice

message, if the contact was not reachable, if they had any questions or concerns regarding the PCC 2 materials or the preliminary preferred alternative.

On March 10, 2021, an email was received from the Six Nations of the Grand River requesting a meeting regarding the project. A meeting with Six Nations of the Grand River, Region, and CIMA+ representatives was held on March 29, 2021 to provide an overview of the Spring Valley SPS Class EA study, review environmental and archeological field investigations performed in the project study area, and discuss the preliminary preferred alternative solution. The minutes from the meeting are provided in Appendix B.5. Following the meeting, a copy of the Stage 1 and 2 archaeological studies report was provided to the Six Nations of the Grand River for review.

The complete list of First Nations and Indigenous Communities contacted during this Class EA study is included in Appendix B.5 of this report. A record of the Indigenous Groups Communication and Consultation log is also included in Appendix B.5.

4 Existing Conditions

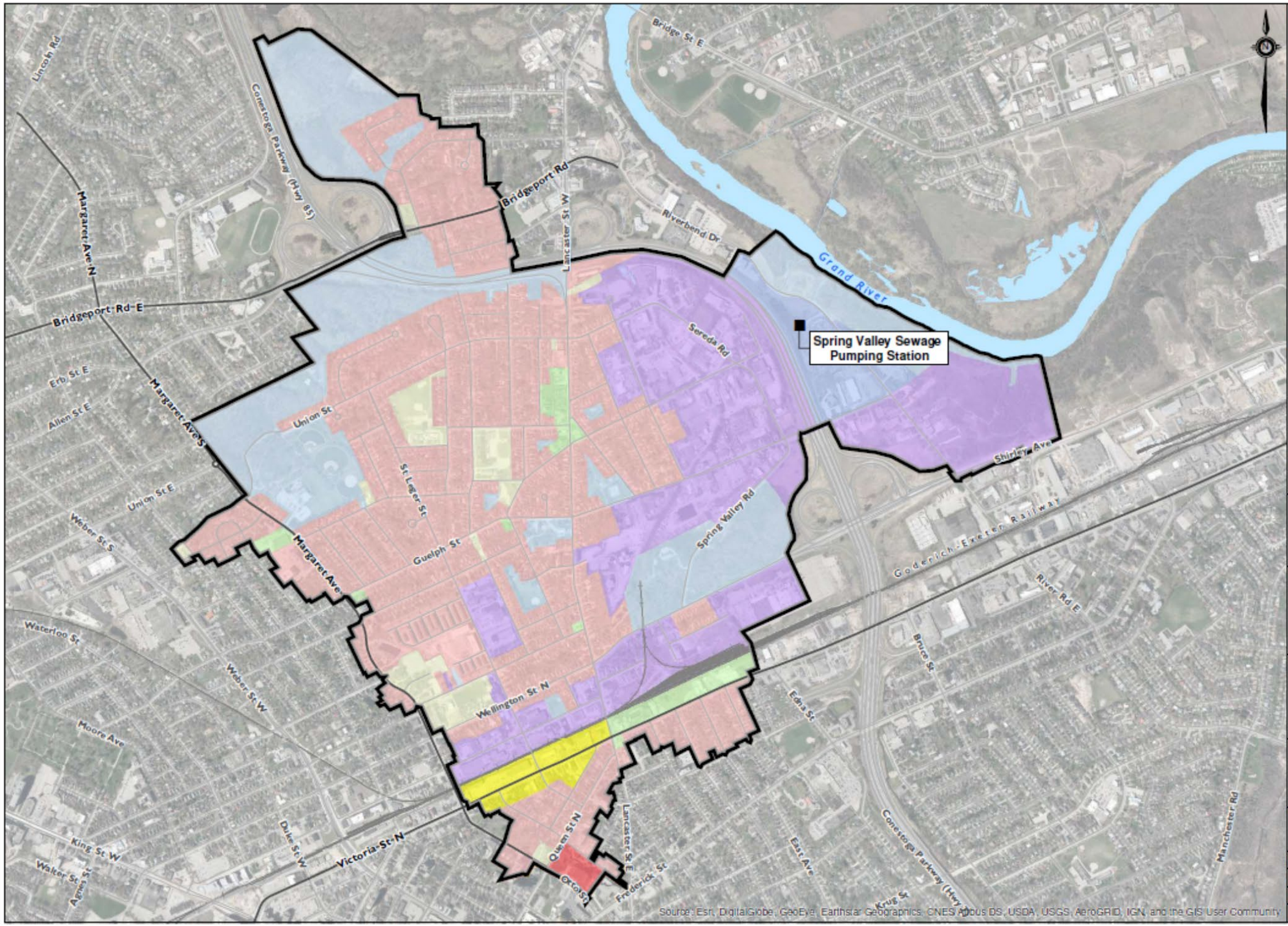
4.1 Sanitary Collection System

The Spring Valley SPS was commissioned in 1961 to service an area in the City of Kitchener generally extending south to Victoria Street North (Highway 7), east to the Grand River, north to Bridgeport Road East, and west to Margaret Avenue. Currently, the total service area is approximately 400 hectares of residential, business parks, industrial, and open spaces. A map of the sanitary service area is provided in Figure 3.

The Spring Valley SPS sanitary collection system is owned by the City of Kitchener. The sanitary sewers range in size between 225 mm at the perimeter of the service area to 750 mm for the incoming sewer to the SPS. Sewage flows into the wet well of the SPS through a 450 mm sewer via the inlet chamber.

The sanitary collection system was originally designed as a combined sanitary and storm system with an overflow bypass to the Grand River. The 1200 mm diameter overflow pipe and bypass chamber are situated about 50 m from the Spring Valley SPS. However, the storm sewers were disconnected from the sanitary sewers under a separation program implemented in the 1980's and the overflow pipe was capped as part of the 1993 SPS upgrades.

The Spring Valley SPS and forcemain are owned by the Region. The forcemain discharges to the City of Kitchener owned gravity collection system where it is conveyed to the Region owned Kitchener WWTP.


Spring Valley Sewage Pumping Station
Bridge St E
Lincoln Rd
Conestoga Parkway (Hwy 85)
Bridgeport Rd
Lancaster St W
Riverbend Dr
Grand River
Margaret Ave N
Bridgeport Rd E
Sereda Rd
Erb St E
Allen St E
Union St
Margaret Ave S
St Leger St
Union St E
Weber St S
Guelph St
Spring Valley Rd
Shirley Ave
Goderich-Exeter Railway
River Rd E
Waterloo St
Weber St W
Wellington St N
Bruce St
Edna St
Moore Ave
Duke St W
Victoria St N
Queen St N
Lancaster St E
Frederick St
King St W
Walter St
Agnes St
East Ave
Krug St
Manchester Rd
Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
LEGEND
SANITARY PUMPING STATION
SANITARY DRAINAGE CATCHMENT AREA
ZONING
BUSINESS PARK
COMMERCIAL
COMMERCIAL RESIDENTIAL
DOWNTOWN
EXISTING USE
INSTITUTIONAL
INDUSTRIAL
MIXED USE
PARK, OPEN SPACE & HAZARD LANDS
RESIDENTIAL
OTHER FEATURES
RAILWAY
BOUNDING ROADS
WATERCOURSE
WATERBODY
DATA SOURCE:
CONTAINS INFORMATION LICENSED UNDER THE OPEN GOVERNMENT LICENCE - THE CORPORATION OF THE CITY OF KITCHENER.
CONTAINS INFORMATION PROVIDED BY THE REGIONAL MUNICIPALITY OF WATERLOO UNDER LICENCE.
CIMA+
CLIENT
Region of Waterloo
PROJECT NAME:
SPRING VALLEY SPS CLASS EA
SHEET TITLE:
FIGURE 3: SANITARY CATCHMENT AREA
SCALE:
1:12,000
PROJECT No.:
CLIENT FILE No.:
DESIGNER:
DRAWING No.:
3
APPROVER:
DATE:
SHEET No.:

4.2 Spring Valley SPS

The Spring Valley SPS is situated on Riverbend Drive in an Industrial Park at the northern end of Kitchener (Figure 4). It was built adjacent to the junction of Spring Valley Road and Arnold Street, on a plot owned by the City of Kitchener. Ownership of the land was transferred to the Region when it was formed in 1973. Construction of the Conestoga Parkway (Highway 85) has changed the frontage of the pumping station. Spring Valley Road and Arnold Street are now cut off by the Highway and access to the station can only be made by Riverbend Drive.

Figure 4: Spring Valley SPS and Surrounding Area - Land Ownership Map

The site backs onto the Conestoga Parkway right-of-way with a growth of dense woods on the highway embankment. The east and southern side of the station is an open field flanked by a scrap yard. A short asphalt road leads from Riverbend Drive to the station.

The site slopes gently east towards a storm culvert running parallel to the station where all surface runoff is picked up and discharged into the Grand River.

The site has an area of approximately 1,700 m^2. The area immediately surrounding the pumping station and wet well is grassed and fenced while the remaining property is unfenced.

The surrounding plots, including the driveway to the site, are owned by the City of Kitchener. The Lancaster Business Park and Walter Bean Trail, owned by the City of Kitchener, extend to the north of the Spring Valley SPS site, across Riverbend Drive, to the banks of the Grand River. The MTO owns the Conestoga Parkway easement west of the station. A private industrial business owns a property to the south.

The existing layout of the Spring Valley SPS is presented in Figure 5 and Figure 6. The station contains three rooms: Dry Well (basement), Pump Room, and Generator Room. The SPS inlet and wet wells (Figure 6) are located below-grade in front (east) of the building. The following sections describe important elements of the existing SPS.

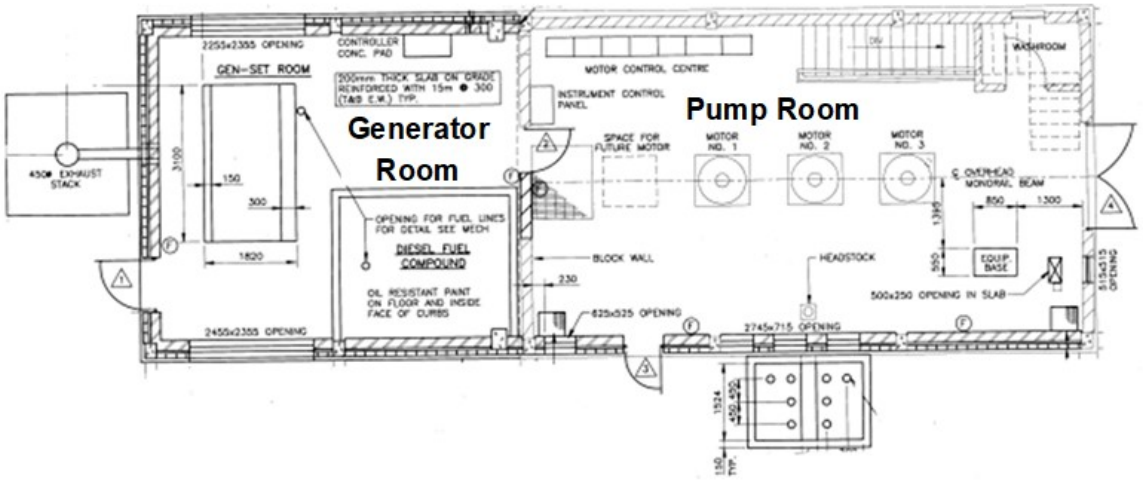


Figure 5: Spring Valley SPS Main Floor Plan (Associated Engineering, 1994)

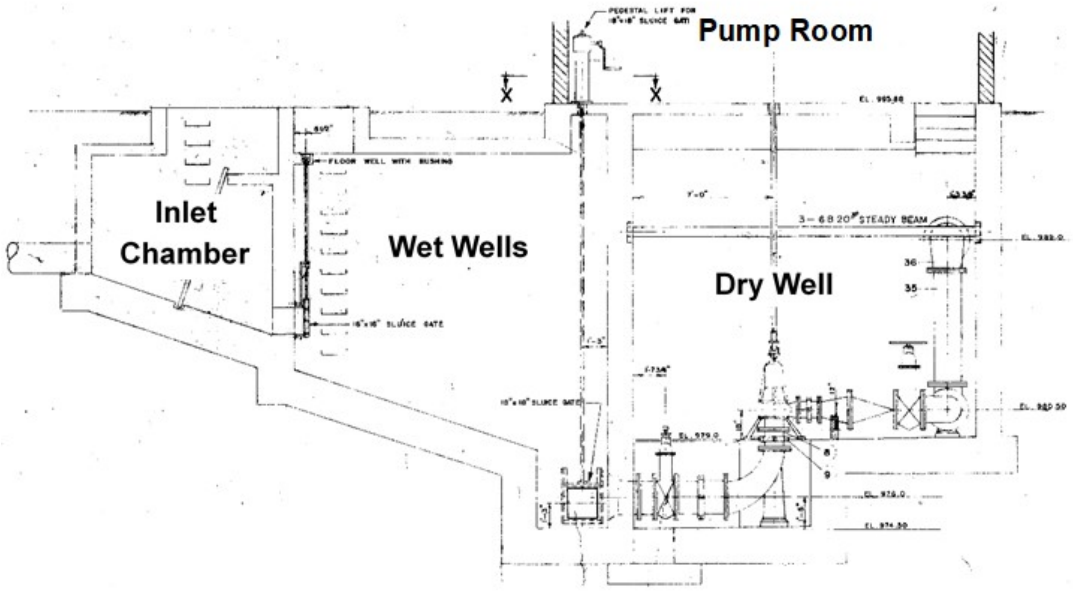


Figure 6: Spring Valley SPS Below-Grade Section (Proctor & Redfern Consulting Engineers, 1961)

4.2.1 SPS Inlet

Wastewater from the collection system flows through 450 mm diameter and 750 mm diameter inlet gravity sewers to a SPS inlet chamber (approximately 9 m^3). The SPS inlet was designed with a manually-cleaned bar screen to prevent large debris from damaging the station's pumps. However, the bar screen has been removed to mitigate blockages and the risk of sewer backup or overflow.

Two 400 mm x 400 mm sluice gates connect the SPS inlet to each of the pumping station wet wells.

4.2.2 Wet Well

The Spring Valley SPS contains two below-grade wet well cells: Wet Well Cell No. 1 has an operating volume of 86 m^3, and Wet Well Cell No. 2 has an operating volume of 115 m^3. There is a sluice gate between the wet well cells that is normally open to hydraulically connect the cells. The gate connecting the wet well cells can be closed to isolate either cell for cleaning.

4.2.3 Pumps, Valves, and Piping

Wastewater is pumped from the wet well by three vertical, dry pit, non-clog pumps, each rated at 195 L/s at 34.8 m total head. The three pumps installed in 1993 were Hayward Tyler 8 x 10 TIV model with 444.5 mm diameter impellers and operating at 1175 rpm

(R.V. Anderson Associates Ltd., 2015a). The pumps were replaced at the end of 2018 with three KSB MG model pumps with the same capacity and total head.

One pump, WWP 1, draws from Wet Well Cell No. 1, and two pumps, WWP 2 and WWP 3, draw from Wet Well Cell No. 2. Suction piping for a second pump to draw from Wet Well Cell No. 1 was installed when the station was constructed in 1961 but is not in use. Each pump is equipped with discharge hydraulically damped swing check valves and isolating gate valves on the discharge and suction piping. The pumps discharge into a common 400 mm diameter header which, in turn, discharges to a 500 mm diameter forcemain. There is no valve on the common discharge header or in the yard to isolate the station from the forcemain.

4.2.4 Process Controls

The level in each wet well cell is monitored by a Milltronics Multiranger Ultrasonic Level Sensing system. A Telesafe Remote Terminal Unit (RTU) controls pump operation to correspond to the rate of inflow as monitored by changes in wet well level. Either of the two wet well level sensors may be selected to control the pumps through the RTU. Selection is made by the duty selector on the Pumping Station Alarm and Monitoring Panel. In the case of a failure of the selected wet well level sensor, the other wet well level sensor will automatically assume control. Should both sensors fail, the station is equipped with a manual hard wired Flygt float level control circuit.

Wastewater enters the SPS at varying rates from the collection system. To meet the incoming flow rate one pump either operates on its own or in parallel with a second pump. A third pump is available for standby. Figure 7 illustrates the pump control set points for the lead, lag, and standby pumps provided in email communication from OCWA on March 26, 2019.

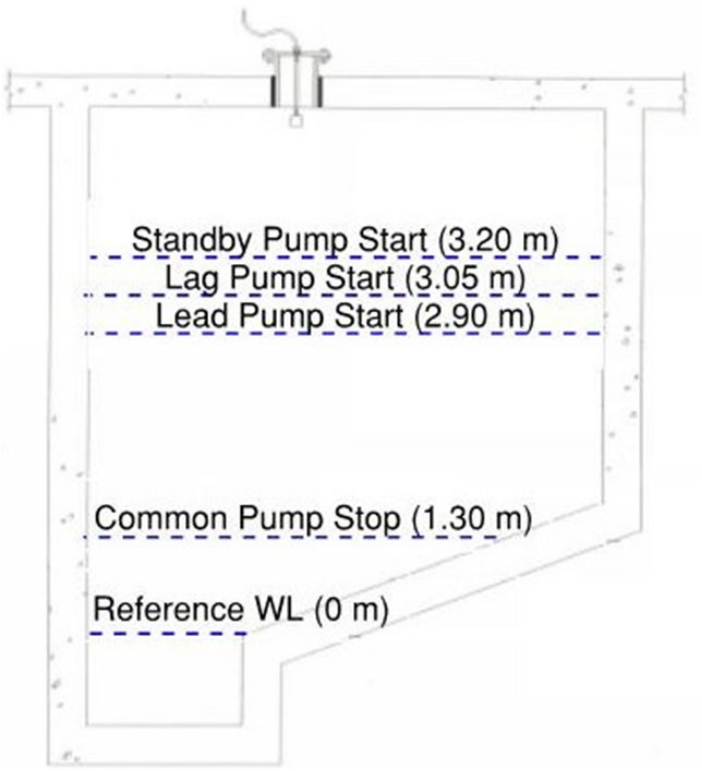


Figure 7: Wet Well Level Pump Control – Information from OCWA (email March 26, 2019)

The pump control system has been designed such that no more than two pumps can run at one time. Under normal flow conditions one pump will cycle on and off. If the inflow exceeds the pump's capacity, a second pump will start and run in parallel with the first pump. As the wet well level falls each pump is shut down in the reverse sequence. Pump status and alarm points are monitored and transmitted to the Kitchener WWTP.

4.2.5 Electrical System

In 2012, the station hydro service owned by Kitchener-Wilmot Hydro was upgraded, including the installation of new transformers. Power is available at the site from three transformers (167kVa, 13.8kV/600-347V, 60 Hz). Power is supplied by a 600V distribution transformer that is housed in a separate structure on the north side of the SPS. Power to the station is provided through a primary service breaker in the Motor Control Centre (MCC) to the reduced voltage autotransformer starters and local and remote-control systems. The breaker acts as the main disconnect for electrical systems within the building.

The electrical equipment located in the Generator Room, Dry Well, and Pump Room are in a Class 1, Division 2 classified area according to Ontario Electrical Safety Code (OESC) which refers to National Fire Protection Association (NFPA) 820, as shown in

Figure 8. The existing MCC and other process and building electrical equipment are not rated for operation in a Class 1, Division 2 environment. To meet OESC (and NFPA 820) requirements all electrical assets in the Spring Valley SPS would need to be replaced and/or relocated to a designated non-classified area.

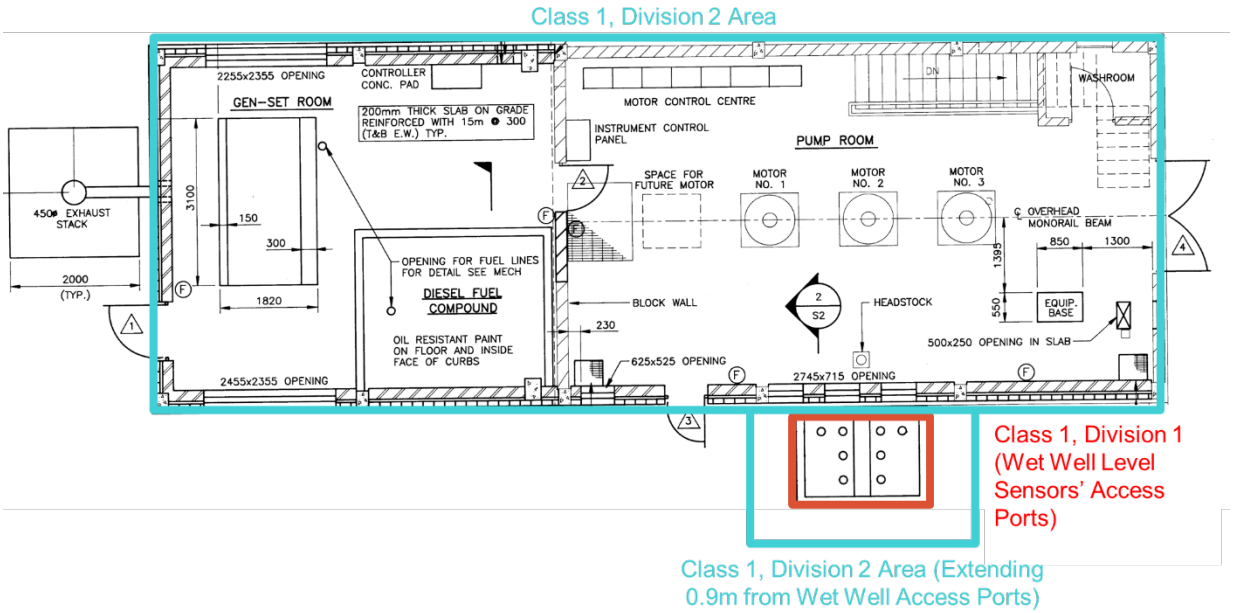


Figure 8: Electrical Classification of Existing Spring Valley SPS

4.2.6 HVAC

Heating is provided by individually controlled electrical unit heaters. Four unit heaters provide a total of 30 kW of heating to the building. Additional heating is provided by duct heaters mounted on the discharge side of supply fans.

Individual ventilation systems are provided for the diesel generator, Pump Room, Dry Well and the washroom on the main floor. A dehumidifier controls condensation in the Dry Well.

4.2.7 Standby Power

The 1993 upgrades installed a 300 kW, 600V, standby diesel generator to allow the station to operate during power outages. The diesel generator starts automatically on hydro power failure and provides sufficient power to maintain operation of two of the three pumps. Two diesel fuel storage tanks (SVP-TK1-00 and SVP-TK2-00), each with a capacity of 1135 L, and an exhaust stack are provided for the generator.

4.3 Spring Valley SPS Forcemain

The existing forcemain, upgraded in 1970 as part of the Highway 7/8 construction, is a 500 mm diameter concrete pressure pipe (CPP), approximately 1950 m in length, and gains approximately 30 m in elevation over its total length. The profile generally follows a constant upgrade with some abrupt changes in elevation.

The forcemain extends south from the SPS Dry Well, under the Generator Room section of the SPS, crossing Highway 85 twice, before discharging to a sanitary manhole, located on the east side of Highway 85, approximately 60 m south of the intersection of Becker Street and Bournemouth Avenue. From there, wastewater flows by gravity to the Kitchener WWTP. A map of the existing forcemain route is shown in Figure 9.

Access to the forcemain for maintenance and cleaning is limited given its current route under the SPS's Generator Room and Highway 85. In addition, the forcemain is not configured with air release or combination air valves (R.V. Anderson Associates Ltd., 2016).

In 2016, approximately 118 m of new 500 mm concrete pressure pipe forcemain was replaced under and on either side of Victoria Street North as a result of the MTO Victoria Street Bridge Reconstruction Project. During the forcemain replacement project, a new valve chamber with two flanged plug valves and a swab access point were installed on the forcemain, north of Victoria Street North (MMM Group, 2016).

The existing Spring Valley SPS forcemain was determined to have a rated working pressure of 100 m (142 psi) during an evaluation of the station in 1991 (Associated Engineering, 1991).

LEGEND

SANITARY COLLECTION SYSTEM

- MANHOLE
- PUMPING STATION
- FORCEMAIN
- SANITARY DRAINAGE CATCHMENT AREA

OTHER FEATURES

- RAILWAYS
- WATERCOURSE
- WATERBODY

CIMA+

CLIENT: Region of Waterloo

PROJECT NAME:
SPRING VALLEY SPS CLASS EA

SHEET TITLE:
FIGURE 9: EXISTING FORCE MAIN

SCALE: 60 30 0 60 120 180 metres 1:7,500

PROJECT No: [illegible]		CLIENT FILE No: --
DRAFTER: S. ELLIOTT	DESIGNER: --	DRAWING No: 9
APPROVER: K. FRENSCH	APPROVER: --	
DATE: 06/09/18		SHEET No: 1 of 1

5 Background Review

5.1 Review of Previous Studies

Table 2 provides an overview of the key items from each of the Spring Valley SPS background studies and how they apply to the current Class EA. A detailed review of the previous studies for the Spring Valley SPS is provided in TM 1 in Appendix A.

Table 2: Summary of Previous Studies

Project	Status of Implementation and Applicability to Class EA Approach
Upgrades Evaluation (Associated Engineering, 1991) and Design Brief (Associated Engineering, 1992)	Spring Valley SPS upgrades that were determined to have immediate need were implemented in 1993 including replacement of the incoming sewer, pumps, check valves, wet well level instrumentation, MCC, process and building electrical, and HVAC. The SPS building was extended to add an indoor standby power generator. These upgrades are now 26 years old and many of the assets are approaching their end of service life.
Flood Mitigation and Stormwater Management Plan (CH2M Hill, 2015)	The Region, City of Kitchener, and OCWA agreed to implement short-term stormwater management options at the Spring Valley SPS site as they better coincided with SPS upgrade efforts. Medium- and long-term stormwater mitigation measures will be reviewed and recommended as part of this Class EA.
Preliminary Design Report (R.V. Anderson Associates Ltd., 2015a)	This preliminary design upgrade was initiated to help the Spring Valley SPS meet current Regional and industry standards, comply with relevant codes and address ongoing concerns, as identified in the Region's asset management program. The recommendations of the preliminary design were put on hold pending the outcomes of the 2018 WWTMP Update and MTO forcemain realignment. This report provides a summary of key considerations for retrofitting the existing station, which is an alternative solution for this Class EA.

Project	Status of Implementation and Applicability to Class EA Approach
Condition Assessment of Spring Valley Pumping Station (PS) Forcemain Feasibility Study (R.V. Anderson Associates Ltd., 2015b)	This study recommended methods for cleaning and inspecting the existing Spring Valley SPS forcemain. The action items from this report were placed on hold pending the finalization of the forcemain realignment route through the new Highway 7 MTO project. A new theoretical system curve was calculated based on the new forcemain route as part of this Class EA.
Generation System Assessment (CIMA Canada Inc., 2016)	The Region is currently pursuing short-term upgrades as described in this assessment report for the generator system to comply with Technical Standards and Safety Authority (TSSA) requirements. A long-term solution for providing standby power to the station was evaluated in this Class EA.
Bridgeport SPS Flow Diversion (R.V. Anderson Associates Ltd., 2016)	This study was initiated to assess the feasibility of redirecting flows from Bridgeport SPS to Spring Valley SPS; however, it is no longer the preferred option and was not considered in this Class EA.
Wastewater Treatment Master Plan Update (CIMA Canada Inc., 2018a)	The WWTMP identified a future firm capacity requirement for the Spring Valley SPS of 265 L/s to meet population and flow projections to the year 2051. This Class EA utilized the projected flows from the WWTMP and incorporated further detail by performing a modelling exercise to determine the required future station firm capacity based on the potential anticipated impacts of climate change.
Spring Valley SPS Condition Assessment (CIMA Canada Inc., 2018b)	The condition assessment report identified that the majority of process, mechanical, and electrical assets were approaching the end of their useful life or did not meet current OESC or TSSA code. It also identified a lack of station redundancy which makes asset replacement difficult. The Region pursued short-term (within the next 5-7 years) asset repairs and replacements identified in the condition assessment

Project	Status of Implementation and Applicability to Class EA Approach
	report. This Class EA addressed the approach for long term asset replacement.
New Highway 7 Sewer, Forcemain, and Watermain Relocation – Preliminary Design Report (WSP Canada, 2018)	This preliminary design report detailed the preferred routing of the proposed Spring Valley SPS forcemain to be routed out of the right-of-way of the new Highway 7 MTO Project. The proposed forcemain route will increase the length and change the elevations of the Spring Valley SPS forcemain; however, it was the preferred option because the routing eliminates the existing Highway 85 crossings and adds several access ports for cleaning and maintenance. The Spring Valley SPS Class EA considered options for upgrading the existing SPS or constructing a new SPS in the proximity of the proposed forcemain routing. The Class EA also considered the impacts of a new station location on the ongoing Highway 7 project.

5.2 Relevant Policies, Legislation, Regulations and Permitting

In addition to the EA Act, there are several policies, legislation, regulations, and permitting that were reviewed as part of the Class EA study. CIMA+ has identified and reviewed the following documents in the preliminary stages of the project:

- Environmental Protection Act, R.S.O. 1990, c. E.19,
- Planning Act, R.S.O. 1990, c. P.13,
- Ontario Water Resources Act, R.S.O. 1990, c. O.40,
- Species at Risk Act, S.C. 2002, c. 29,
- Clean Water Act, S.O. 2006, c. 22,
- Endangered Species Act, S.O. 2007, c. 6,
- Conservation Authorities Act (1990),
- Growth Plan for the Greater Golden Horseshoe (2017),
- Environmental Protection Act (1990),
- Ontario Heritage Act (1990),
- Migratory Birds Convention Act (1994),
- Electrical Safety Code (O.Reg. 164/99) under the Electricity Act, 1998,

- Ontario Flood Forecasting & Warning Program, GRCA,
- Ontario Occupational Health and Safety Act (OHSA) and applicable regulations, and
- Spring Valley Sewage Pumping Station – Certificate of Approval (1992) Issued by the Ministry of the Environment to the Regional Municipality of Waterloo.

Below are permits and approvals that may be required during the detailed design and construction phases of the project.

Table 3: Potential Permit/Approval Requirements

Agency	Description of Permit/Approval
Fisheries and Oceans Canada	The impact of the project should be assessed through a Fisheries Act self-screening. A project review or authorization may apply if impacts to fish and aquatic habitat cannot be avoided or mitigated during design and construction.
Ontario Ministry of Environment, Conservation and Parks	Revised Environmental Compliance Approvals (ECAs), for sewage works and potentially air, will be required for Spring Valley SPS if the station capacity is increased. A new standby power generator is expected to be less than 700 kW and therefore will be an Environmental Activity and Sector Registry (EASR) eligible activity. Standby power generators of 700 kW or greater are required to have an ECA air. A Permit to Take Water may be required during construction activities if dewatering activities are required in excess of 400m^3/day. An EASR may be required during construction if dewatering over 50 m^3/day but less than 400 m^3/day is required. Depending on the preferred stormwater management option, an ECA may be required for the construction and operation of the stormwater management system. Relocation permits, for wildlife or fish, may be required if removals are needed during construction. Permit or other authorization may be required to conduct an activity that could impact an endangered or threatened plant or animal or its habitat.

Agency	Description of Permit/Approval
Ministry of Tourism, Culture and Sport	Archaeological and Cultural Heritage assessments, including fieldwork and reporting, are required to comply with the Ministry's 2011 Standards and Guidelines for Consultant Archaeologists. Additional surveys may be required contingent on the Ministry's review of the Project File Report.
Grand River Conservation Authority	Permits (O.Reg 150/06) are required to traverse all areas regulated by the GRCA and to comply with the Regulation of Development, Interference with Wetlands and Alterations to Shoreline and Watercourses. Construction staging plans will be required to consider impacts to the regulatory floodplain.
City of Kitchener	A building permit will be required for alterations to the existing Spring Valley SPS structure or construction of a new facility. Should any trees require removal, removal will comply with applicable municipal by-laws as well as with the federal Migratory Birds Convention Act (1994), respecting the applicable April 1 – August 31 nesting period for this zone.
Electrical Safety Authority	All electrical installations, repairs, replacements or alterations in Ontario need to be done in compliance with the Ontario Electrical Safety Code, and all necessary Notifications ("permits") must be taken out. This creates a permanent record of the work and triggers a review process by the Electrical Safety Authority.

5.3 Design Standards

The following design standards were used as a basis for developing the Spring Valley SPS Class EA study design parameters:

- City of Kitchener Design Standards and Procedures Manual Wastewater Pumping Facilities (2013) (herein referred to as City of Kitchener Design Standards);
- MECP Design Guidelines for Sewage Works (2008) (herein referred to as MECP Design Guidelines);

- Region of Waterloo and Area Municipalities Design Guidelines and Supplemental Specifications for Municipal Services (2017); and
- The Regional Municipality of Waterloo Water and Wastewater Standards & Guidelines (2009, updated in 2010, 2014, 2015, 2016, 2017, and 2019) (herein referred to as Region's Water and Wastewater Standards and Guidelines).

The City of Kitchener Design Standards were reviewed because the Region does not currently have guidelines for design and construction of sewage pumping stations.

Where applicable, additional design parameters were also used from the Spring Valley SPS Class EA project team's and CIMA+'s experience to guide the evaluation of alternative solutions with study-specific requirements.

6 Project Study Area

The development of the study area for this project accounted for the possibility of upgrading the existing station or constructing a new station to accommodate future flows and forcemain alignment. Ground elevations and proximity to the existing station and sanitary sewer network were reviewed.

A reasonable increase in ground elevation from the existing station was determined to be within 10 m for feasibility of construction (depth of the wet well). Higher elevations would result in a significantly deeper and more costly pumping station construction. Ideally, the location of the station would also limit sewer or forcemain crossings of Highway 85 to allow for access for cleaning and inspection.

CIMA+ investigated the possibility of including a portion of the west side of Highway 85 in the study area. However, elevations on the west side of Highway 85 are approximately 10 m higher than on the existing Spring Valley SPS (east) side. In addition, to relocate the SPS to the west side of the highway, new trenchless sanitary sewer and forcemain crossings would be required to connect the station to the existing sewer network and the preliminary forcemain alignment along Riverbend Drive. For these reasons, the west side of the highway was excluded from the study area.

The study area is bound by the west bank of the Grand River to the northeast, Guelph Street to the south, the Conestoga Parkway (Highway 85) to the west, and the sanitary catchment area boundary to the north, as shown in Figure 10.

Through a preliminary review of available background information, the project team identified an unevaluated wetland, woodland, steep-sloped land, and watercourses within the study area. Consequently, a smaller, more focused study area was developed for the siting of design alternatives to avoid sensitive natural features to the extent feasible. This focused study area is shown in Figure 10.

It is the focused study area where field investigations were conducted to assess natural, archaeological and cultural heritage impacts as they relate to design alternatives as part of the Class EA. The focused study area includes private and public property in the area of the existing Spring Valley SPS extending from Highway 85 to the banks of the Grand River.

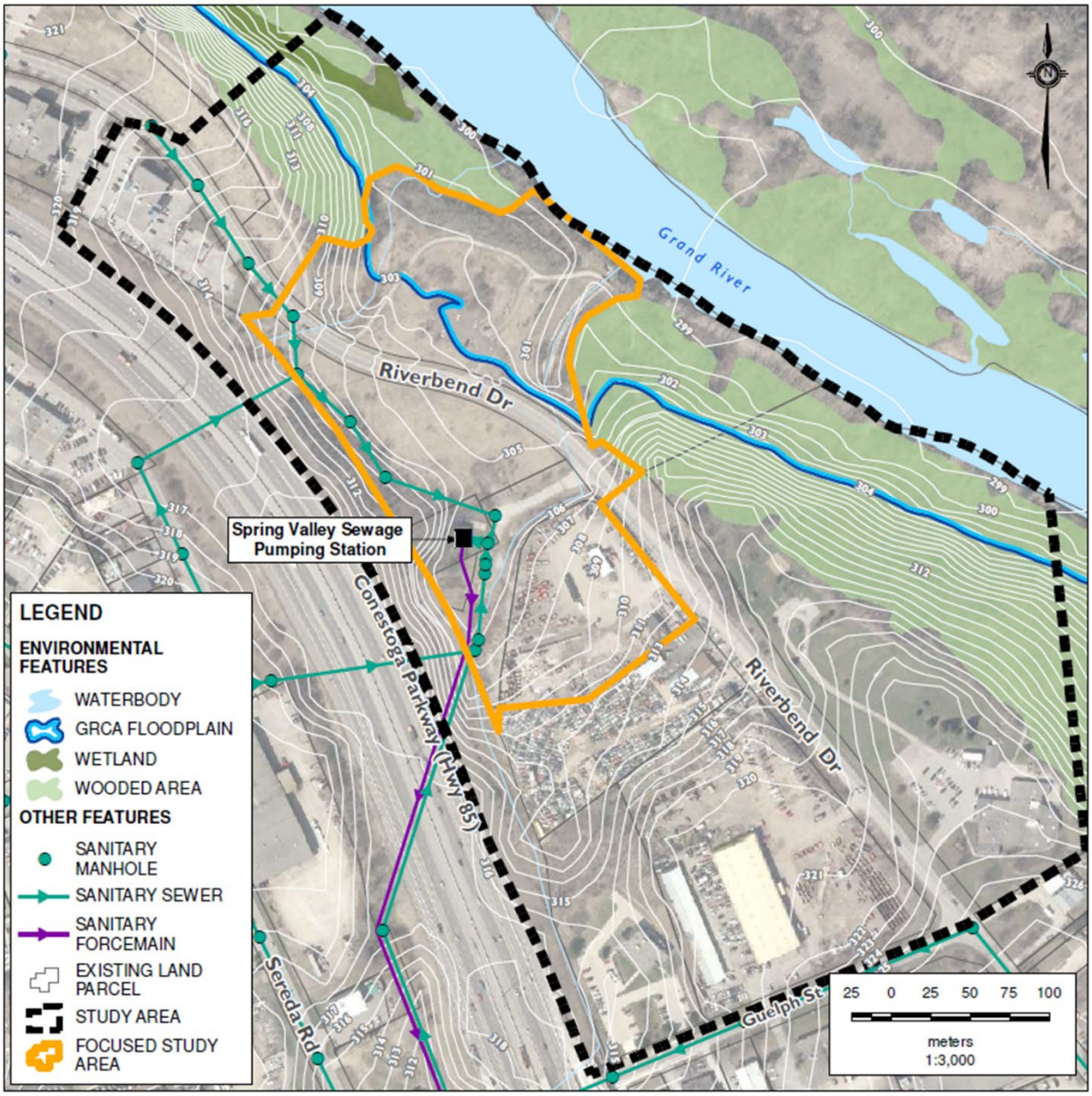


Figure 10: Spring Valley SPS Class EA Study Area and Focused Study Area

6.1 Environmental Features

As part of the Spring Valley SPS Class EA, environmental investigations in the overall and focused study areas were completed to review the opportunities and constraints of the proposed alternative solutions.

The scope of the project's environmental investigations was three-part:

- **Background Information Review** – to provide a high-level understanding of the location, extent, and significance of natural features through a desktop review of available data.
- **Field Investigations** – to confirm the extent of sensitive natural heritage features in order to evaluate potential impacts of the alternative design solutions using the evaluation criteria developed by the project team.
- **Scoped Environmental Impact Study** – to provide input to the natural environment component of the Class EA evaluation completed by the project team. The Scoped Environmental Impact Study is available in Appendix C.

The background review and environmental field investigations' findings will be further discussed in the following sections.

6.1.1 Background Information Review

The Spring Valley SPS is located within the Grand River watershed; specifically, within the Central Grand River Subwatershed. There are records of Species at Risk (SAR) within the study area such as Bald Eagles (*Haliaeetus leucocephalus)*, Barn Swallows (*Hirundo rustica)*, Rainbow Mussels (*Villsa iris*), Wavy-rayed Lampmussel (*Lampsilis fasciola*), and Snapping Turtles (*Chelydra serpentine)*. With the study area bordering the Grand River, it provides the potential for other species of amphibians, reptiles, fish and snakes to be present, as well as their habitats.

Work within or adjacent to a watercourse triggers a self-assessment review under the *Fisheries Act*. The *Fisheries Act* is administered by Fisheries and Oceans Canada and is intended to manage threats to the sustainability and ongoing productivity of Canada's fisheries. Section 35 of the Act prohibits the carrying on of a work, undertaking or activity that results in serious harm to fish that are part of or support a commercial recreational or Indigenous fishery. Serious harm to fish is defined as the death of fish or the permanent alteration to, or destruction of, fish habitat.

The Region of Waterloo Official Plan (2015) designates portions of the study area near the Grand River as Significant Valley and Core Environmental Feature (Map 4). The Core Environmental Feature within the study area include Significant Woodland.

The Kitchener Official Plan (2014), designates the study area as a Slope Erosion Hazard (Map 7) and a Natural Heritage Feature (Map 6).

The study area also has the following land designations by the GRCA and Ministry of Natural Resources and Forestry:

- Regulated Waterbody – Grand River
- Wooded Area

- Wetlands
- Wellhead Protection Areas WHPA-B, WHPA-D and WHPA-C - moderate GUDI Vulnerability (groundwater wells which are known to have interactions with surface water)
- Slope Erosion Area – Steep and Oversteep designations
- Slope Valley Area – Steep and Oversteep designations
- GRCA Floodplain

During the initial site visits and review of Region GIS contour data it appeared that the existing GRCA floodplain mapping did not match the reported GRCA floodplain elevations in the area. At a GRCA coordination meeting on March 21, 2019 the limitations of the existing GRCA floodplain mapping were discussed. For this project it was agreed that a more detailed topographic survey of the Spring Valley SPS site and surrounding area was required to identify existing ground elevations. CIMA+ completed a survey in the focused study area to confirm the location of the GRCA regulated floodplain. Preliminary survey results for the revised floodplain boundary are shown in Figure 10. These survey results have been shared with the GRCA.

6.1.2 Environmental Field Investigation Findings

The project team conducted field studies to confirm the extent of sensitive natural heritage features in order to evaluate potential impacts of the alternative design solutions using the evaluation criteria developed by the project team. Ecological field investigations in the focused study area included the studies summarized in Table 4. Figure 11 illustrates the findings of environmental investigations within the focused study area.

During the field investigations, Grand River tributaries, labelled Tributary 1, 1A, and 1B on Figure 11, were verified on the north end of the focused study area.

Two key species were found as part of the field investigations. An osprey, which is protected under the *Fish and Wildlife Conventions Act*, was observed outside the boundary of the focused study area on the east Highway 85 easement. One small Butternut was found on the north side of Riverbend Drive. Butternut is listed as “Endangered” under both the federal *Species at Risk Act* and the provincial *Endangered Species Act*.

Table 4: Environmental Field Investigations for the Spring Valley SPS Class EA

Investigation	Timing/Description	Protocol
Vegetation communities Vascular plants	Minimum 2 visits (May/June and August)	Ecological Land Classification for Southern Ontario (2008)
Breeding birds	2 visits, early morning between May 28 - July 5	Bird Studies Canada
Bat habitat assessment Raptor habitat screening	Screening of trees under leaf-off condition	Ministry of Natural Resources and Forestry (MNRF) SAR Bat Survey Protocol (2015) to locate bat habitat. Pedestrian survey of site to screen for presence of large stick nests.
Bat acoustic survey (where potential impacts to forested ELC communities are identified)	10-day acoustic survey in June	MNRF SAR Bat Survey Protocol (2015)
Aquatic habitat (limited to areas of potential impact)	Aquatic features observed under spring and summer flow conditions.	Data collection included wetted width and depth, substrate composition, conditions of instream cover (to include presence of undercut banks and notes on erosion and bank stability), water temperature and summary of available fish data.
Incidental wildlife and general ecology	During all field visits	Pedestrian survey collected data through visual and auditory observations as well as indirect incidental observations (i.e. tracks, scat, and scents).

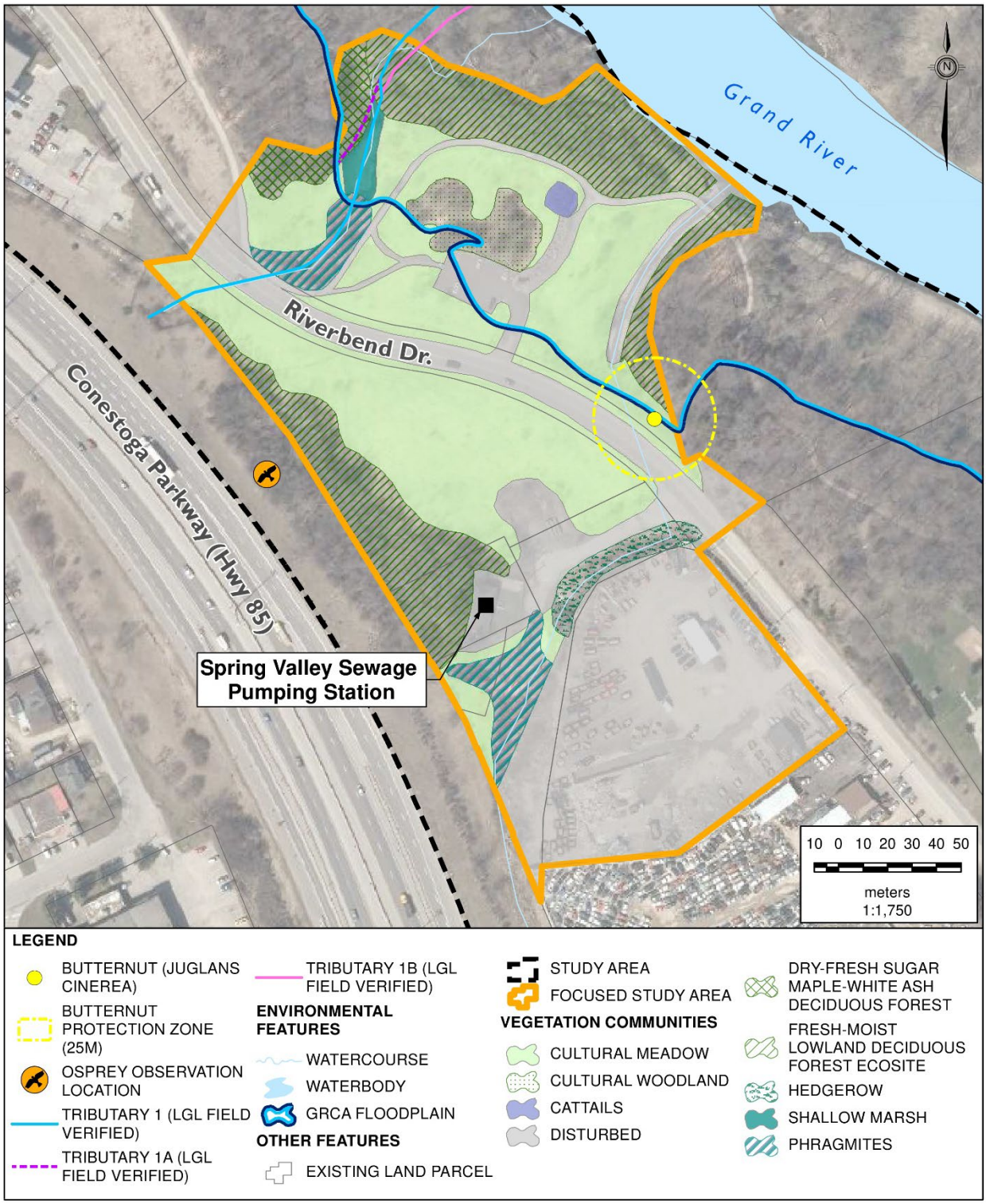


Figure 11: Environmental Investigations - Existing Conditions

6.2 Stage 1 and 2 Archaeological Assessments

The Stage 1 Archaeological Assessment consisted of comprehensive background research into the study area. This was accomplished through an examination of the archaeology, history, geography and current land conditions in the vicinity of the project area. This stage also generated an inventory of known archaeological sites within 1 km and previous archaeological fieldwork results within 50 m of the study area, which are used to assist in predicting zones of archaeological potential. Sources utilized during a background study include archival sources (e.g., historical publications and records), current academic and archaeological publications (e.g., archaeological studies, reports and management plans), modern topographic maps, recent satellite imagery, historical maps/atlases and the Ministry of Tourism, Culture and Sport's (MTCS) Ontario Archaeological Sites Database.

A property inspection (site visit) was conducted, to gain first-hand knowledge of geography, topography and current land conditions. This inspection documented features of archaeological potential and mapped areas of no archaeological potential (i.e., lands disturbed by deep soil moving alterations, permanently wet, steeply sloped, etc.).

The Stage 1 assessment determined that the study area comprised a mixture of areas of archaeological potential, areas of no archaeological potential and previously assessed lands of no further concern. A Stage 2 Archaeological Assessment was recommended for the identified areas of archaeological potential. The Stage 2 assessment was conducted only for the focused study area in order to document any archaeological resources that may be present within the areas of impact associated with the design alternatives.

For the Stage 2 assessment, small regular test pits were hand-excavated at prescribed intervals across the areas of archaeological potential within the focused study area. The resultant pits were then examined for stratigraphy, cultural features and/or evidence of fill, and the soils were screened for archaeological materials. The focused study area was found to consist of mostly disturbed soils due to the long history of industrial and urban development over time.

The Stage 2 assessment did not result in the identification of any archaeological materials, as shown in Figure 12. Based on the findings of the Stage 2 assessment, it is recommended that no further assessment be required within the focused study area.

Although the archaeological assessments of the focused study area have been completed and no further work is required as part of this project, the Stage 2 survey of the remainder of the study area was not completed. The areas of archaeological

potential, outside the focused study area but within the study area, were not subjected to a Stage 2 assessment. It is recommended that the identified areas of archaeological potential be subject to a Stage 2 property assessment in accordance with Section 2.1 of the 2011 Standards and Guidelines for Consultant Archaeologists in advance of any ground alterations or development associated with a future project in these areas.

A report outlining the results of the Stage 1 and Stage 2 Archaeological Assessments is included in Appendix D. The report was also submitted to the MTCS for approval, review, and entry into the Ontario Public Register of Archaeological Reports.

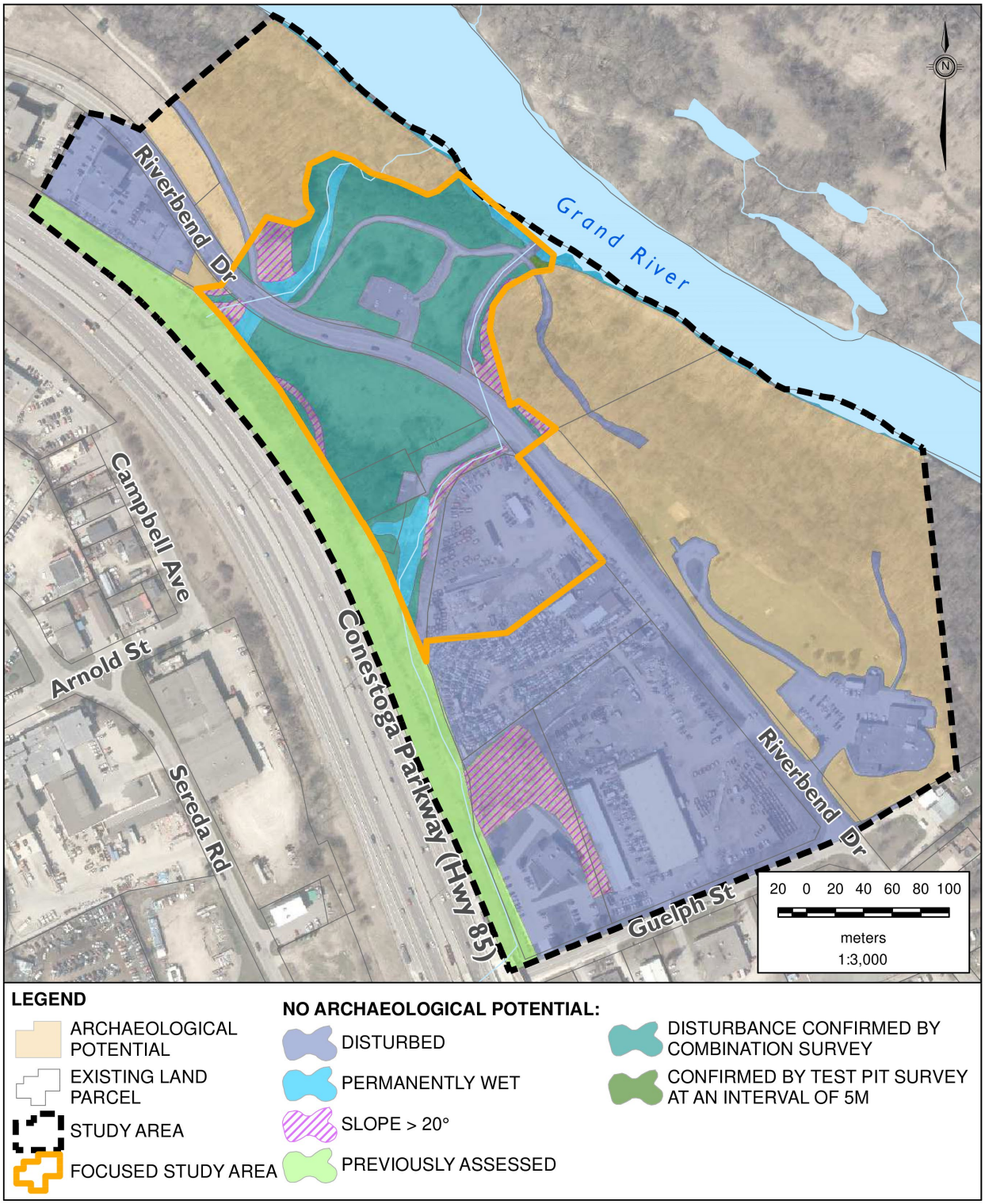


Figure 12: Results of Archaeological Investigations in the Study Area

6.3 Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Resources - Existing Conditions report was completed as a part of the Spring Valley SPS Class EA to evaluate structures and landscapes located within the study area with the potential to be impacted by the proposed upgrade, expansion or replacement of the SPS. The report is included in Appendix E.

The approach for the Cultural Heritage Resources - Existing Conditions report included specific tasks required through the Class EA process, including:

- Background research concerning the project context and historical context of the study area;
- Consultation with the City of Kitchener and Region of Waterloo planners responsible for heritage matters;
- Identification of any designated or recognized properties within the limits of the study area;
- On-site inspection and creation of an inventory of all properties with potential Built Heritage Resources and Cultural Heritage Landscapes within, adjacent and in proximity to the project location;
- A description of the location and nature of potential cultural heritage resources;
- Evaluation of each potential cultural heritage resource against the criteria set out in *Ontario Regulation 9/06* for determining cultural heritage value or interest;
- Evaluation of potential project impacts; and
- Provision of suggested strategies for the future conservation of the identified cultural heritage resources.

A windshield survey of the study area was conducted, and all potential cultural heritage resources noted were evaluated against the criteria of *Ontario Regulation 9/06*. Of the properties evaluated, two cultural heritage landscapes (CHL) were identified in the study area as shown in Figure 13: The Grand River Corridor – City of Kitchener Identified Cultural Heritage Landscape L-GRC-1 (CHL 1) and the Walter Bean Trail – City of Kitchener Identified Cultural Heritage Landscape L-TRL-17 (CHL 2).

Figure 13: Cultural Heritage Landscapes within the Study Area

Preliminary potential impacts to the properties within the study area were evaluated to determine possible project impacts. The following conservation/mitigation strategies

were suggested based on the results of the Cultural Heritage Resources - Existing Conditions report:

- During the planning and design phases, infrastructure should avoid cultural heritage resources where possible and any construction staging areas should be located on lands well away from the identified CHLs;
- Both identified CHLs are related through views and associations, therefore, the siting of infrastructure and construction staging areas should not interrupt this relationship by locating between the two CHLs;
- Consideration should be given to the nature of construction activities (i.e., soil removal, vibrations, etc.) to minimize any direct impact to the adjacent Grand River and Walter Bean Trail CHLs; and
- Consideration should be given to the location of future construction and the type of construction techniques and machinery used so as not to impede the existing alignment of the Walter Bean Trail CHL.

Should the selected preferred alternative have the potential to impact the identified CHLs, a Heritage Impact Assessment report should be undertaken to confirm the anticipated impacts outlined in the report, evaluate any additional impact of the proposed design, as well as outline avoidance/mitigation measures to minimize the impact. Suggested mitigation measures may include additional landscaping to minimize visual impacts along with suggested design approaches.

7 Design Criteria

7.1 Peak Design Flow

An important objective of the Spring Valley SPS Class EA was to review flow projections developed through the 2018 WWTMP to confirm the recommended station capacity to meet future needs. The following sections detail the flow monitoring, analysis, and modelling that was performed during this and previous studies to inform the future station capacity recommendation (Section 7.1.5).

This Class EA considered flow projections to 2051, consistent with the approach taken in the WWTMP. This time horizon was chosen to ensure future flows can be accommodated without oversizing equipment.

7.1.1 Station Supervisory Control and Data Acquisition (SCADA) Data

The existing Spring Valley SPS does not have an inlet or discharge flow meter. The Region and OCWA provided the following data from the SCADA records at the station:

- Daily Pump Runtimes (hours) for the period of July 2016 – January 2019,
- Wet Wells Levels (m) in 15-minute intervals from July 2016 – January 2019, and
- Pump Starts in 15-minute increments from July 2016 – December 2018.

A SCADA upgrade was completed at the station in July 2016 making this level and pump data more readily accessible.

During the TM 1 review workshop, the project team discussed the challenges and limitations of using the available data to estimate the influent flow rates to the station. It was agreed that a temporary flow monitor would be installed in the inlet sewer to the station to collect data throughout the Class EA study and inform future design stages.

7.1.2 Influent Flow Data

In 2015 and 2016, flow data was collected from the Spring Valley SPS's inlet sewer to assess the possibility of diverting flows from Bridgeport SPS to Spring Valley SPS (R.V. Anderson Associates Ltd., 2016). The collected data compared actual dry and wet weather flows against the existing station firm capacity and future design flows.

One sewer flow monitor was installed in the Spring Valley SPS's 750 mm common inlet sewer, immediately upstream of the SPS inlet chamber. The data collected consisted of depth, velocity and flow readings at 5-minute intervals between April 29, 2015 and June 24, 2016.

As noted in Section 7.1.1, the Class EA project team agreed to re-install the influent sewer flow monitor on May 22, 2019 to collect additional station influent flow data to inform future design stages. The monitor collected flow data in 5-minute intervals for 12 months (May 2019 to May 2020) to supplement the flow monitoring data collected during the 2015-2016 R.V. Anderson and Associates (RVA) study.

Table 5 summarizes the monitored average day flow (ADF), peak dry weather flow (PDWF), and peak wet weather flow (PWWF) for both flow monitoring programs.

Table 5: Monitored Spring Valley SPS Influent Flow Summary

Parameter	2015-2016 Flow Monitoring (R.V. Anderson Associates Ltd., 2016) (L/s)	2019-2020 Flow Monitoring (L/s)
Existing SPS Firm Capacity	245	245
ADF Rate	46 (1)	43 (2)
PDWF Rate	83 (3)	84 (4)
PWWF Rate	259 (5)	131 (6)
90th Percentile	61	54

Table Notes:

(1) Based on 5-minute average flow data collected between April 29, 2015 and June 24, 2016.

(2) Based on 5-minute average flow data collected between May 22, 2019 and May 22, 2020.

(3) Monitored on July 25, 2015.

(4) Monitored on March 16, 2020.

(5) Monitored on July 14, 2015 with 25.8 mm total 24-hour rainfall accumulation.

(6) Monitored on May 25, 2019 with 23.2 mm total 24-hour rainfall accumulation.

The station's ADF and PDWF have remained relatively consistent between the two flow monitoring programs as shown in Table 5. However, the observed 5-minute 2015 PWWF of 259 L/s is significantly higher than the 2019 PWWF of 131 L/s. In general, the influent flow to Spring Valley SPS as a result of wet weather events has decreased slightly since the 2015-2016 flow monitoring study as indicated by the lower 90th percentile of flow rates calculated for the 2019/2020 study.

The difference in monitored PWWF between flow monitoring programs may be caused by several factors:

- Upgrades to the Spring Valley SPS catchment system to limit extraneous flows, such as inflow and infiltration (I&I), into the sanitary sewer network,
- Higher precipitation volume/intensity storm in 2015 as compared to 2019, or
- Preceding conditions in terms of soil moisture content, etc. before a storm event.

Both flow monitoring programs were reviewed to recommend the capacity requirements for infrastructure and equipment of the upgraded or new Spring Valley SPS.

7.1.3 Peak Flow Projections from 2018 WWTMP

The 2018 WWTMP Update determined the current (2016) PWWF (207 L/s) based on the historical 15-minute average influent flow to the station using flow data collected during the 2015-2016 influent flow monitoring study. Fifteen-minute averages were used to represent the peak flows that the pumps experience given the buffering/storage capacity of the wet well.

Flow projections to the SPS were based on peak wet weather flows. The historic average per capita flow rate (0.3659 m^3/cap/d), comprised of wastewater from residential, industrial, commercial, and institutional (ICI), and I&I, was developed using the pumping station's actual observed average influent flow (46 L/s) and the 2016 Population (10,772). A moderate population growth trend was used to estimate the 2051 Spring Valley SPS service population at 14,540.

The peak wet weather flow was calculated using the following formula from the 2018 WWTMP (CIMA Canada Inc., 2018):

> *Peak Wet Weather Flow = Base Year Peak Wet Weather Flow (incl. Extraneous Flow) + Historic Average Per Capita Flow x Increase in Population x Peaking Factor*

The following assumptions were made for generating the SPS peak flow projections:

- The observed historical PWWF was used as the baseline for existing peak flow conditions. The existing PWWF was determined based on the historical 15-minute average influent flow to the station. This value includes extraneous flow.
- Estimated future flow increase to the SPS is based on the increase in population times an average per capita flow rate derived from the station historic flow monitoring data. The average per capita rate includes flow rates from existing residential developments, existing ICI developments, and I&I; however, the population used to calculate the average is based only on residential population (i.e. rather than using both residential and equivalent employment populations).

By using this number to project future flow and loadings, it is assumed that the ICI to residential ratio remains similar to the current ratio in the service area. It also assumes the base I&I flows for future development will remain similar to existing conditions.

- The peak factor was determined using Harmon formula as follows:
    - Peak Factor (M) = 1 + 14 / (4+P^0.5); Where P = population in thousands

Figure 14 shows the WWTMP projected peak flows to the Spring Valley SPS to 2051, based on population, an average per capita flow of 0.3659 m^3/cap/d, and a Harmon peaking factor of 2.8. This population increase corresponds to a small exceedance (252 L/s) from the existing rated capacity (245 L/s).

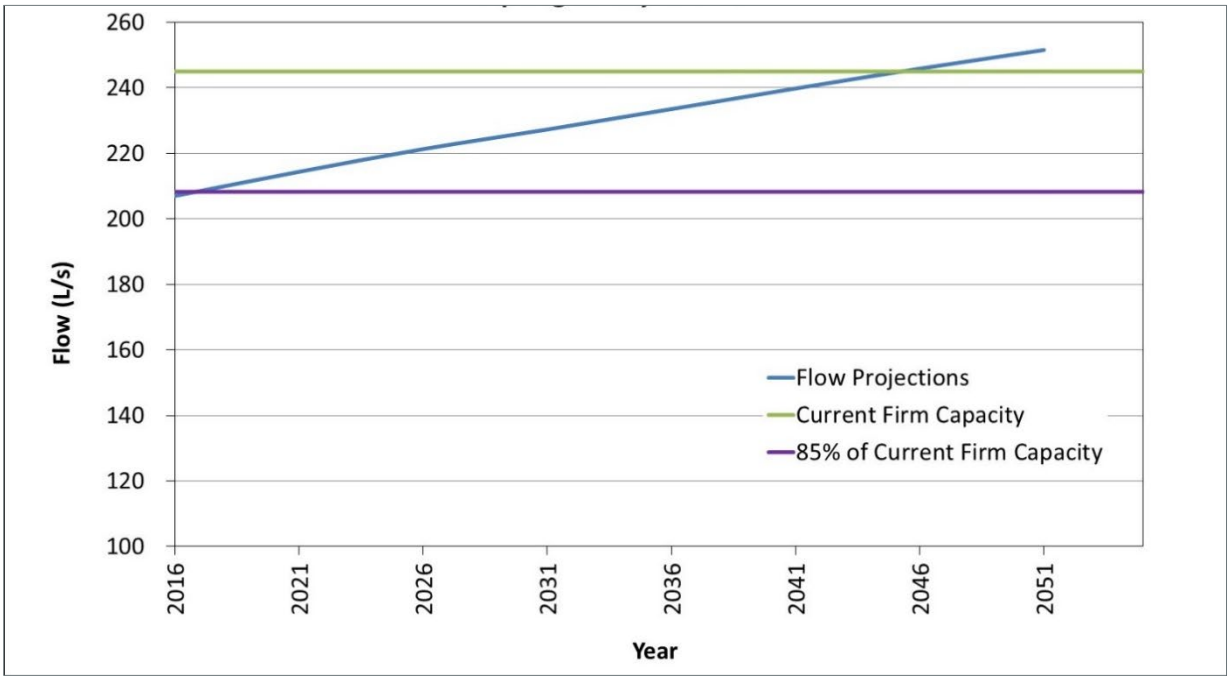


Figure 14: Spring Valley SPS Projected Wastewater Flows (CIMA+ 2018)

The 2018 WWTMP recommended expanding the pump station's capacity to 265 L/s, which included a 5% safety factor over the 2051 projected flow. Pump testing at the station was recommended closer to the upgrade timeline to refine overall system curves (and C-Factor for the forcemain) and for the proper pump selection to meet the targeted firm capacity.

Population projections outlined in the 2018 WWTMP were not anticipated to change during this Class EA study. However, flow projections were reviewed to confirm the recommended station capacity to meet future needs based on anticipated impacts of climate change (Section 7.1.4).

7.1.4 Impact of Climate Change on Future Peak Flows

The approach in the 2018 WWTMP was to use current peaking factors and ratios between contributing areas of wastewater generation to project future flows, and then to conduct sensitivity analyses on these assumptions. Since the Spring Valley SPS Class EA has a more focused study area and scope of work, it is prudent to further evaluate the impacts of climate change and resulting uncertainty on the predicted peak flow projections.

Municipalities and utilities are calling for climate change adaptation for existing and new infrastructure, as well as an analysis of peaking factors used to predict future flows. In the past, data collected on historic weather events was assumed to be indicative of the future weather impacts – in other words there was no trend with respect to time in the number, frequency, or magnitude of extreme events. However, with the impacts of climate change, it is now accepted that extreme weather events are changing in both frequency and intensity.

Precipitation, temperature and wind are all important climate change variables which may impact water and wastewater infrastructure. However, since the focus of this EA is on a pumping station which must convey and/or use emergency storage for attenuation of peak flows; precipitation is the most important climate change parameter.

In 2015, the University of Waterloo's Interdisciplinary Centre on Climate Change (IC3) published a report on localized climate projections for Waterloo Region (IC3, University of Waterloo, 2015). The report found that Waterloo Region is expected to become slightly wetter over the rest of the century with total annual precipitation increasing by approximately 5-12%, depending on the time period and scenario, compared to the baseline period of 1981 – 2010. The report considered three climate change mitigation scenarios and generally defined them as follows:

- **Business as usual** – regular economic growth continues without regard to reducing greenhouse gas (GHG) emissions.
- **Aggressive Mitigation** – optimistic scenario that relies on global emissions increasing slowly and reaching a peak around 2050, before drastically declining towards the end of the century.
- **Net-Zero Carbon** – strong and immediate global commitment to drastically reduce GHG emissions, with emissions peaking in approximately 2020 and declining substantially thereafter until net-zero emission levels are reached by the end of the century.

For the purposes of this Class EA study, a modelling exercise with precipitation amounts generated from each of the above future climate change scenarios was

undertaken to review the future impact of climate change. The City of Kitchener provided their hydraulic collection system model to the Region and CIMA+ for the purposes of this study to assess the impacts of climate change on future flows to the Spring Valley SPS. The hydraulic model and modelling methodology are discussed in TM 2 in Appendix A.

Figure 15 shows the results of modelling the current (2016) and future (2031, 2041, and 2051) dry- and wet-weather peak flows to the Spring Valley SPS. The future wet-weather peak flows were modelled with and without the worst case climate change predictions.

The dry weather flows shown in Figure 15 are derived from average dry-weather flows projected in the WWTMP and therefore closely match the flows found in that study. The hydraulic model showed that Spring Valley SPS receives dry weather inflows that range between 29 L/s and 64 L/s. This compares well with current measured pumping station inflows.

The increase in wet-weather peak flows between 2016 and 2031 in Figure 15 is due to the addition of 42 hectares of industrial sub-catchment area, as anticipated by the City of Kitchener sanitary catchment area model. At the peak flow rate, the addition of the new industrial sub-catchment area adds between 30 - 57 L/s of I&I flows to the modelled Spring Valley SPS influent flow based on the estimated additional sanitary collection system required.

The modelled wet-weather flows with climate change for 2041 and 2051 incorporate the worst-case climate change scenarios for future 2-, 10-, and 25-year storm events.

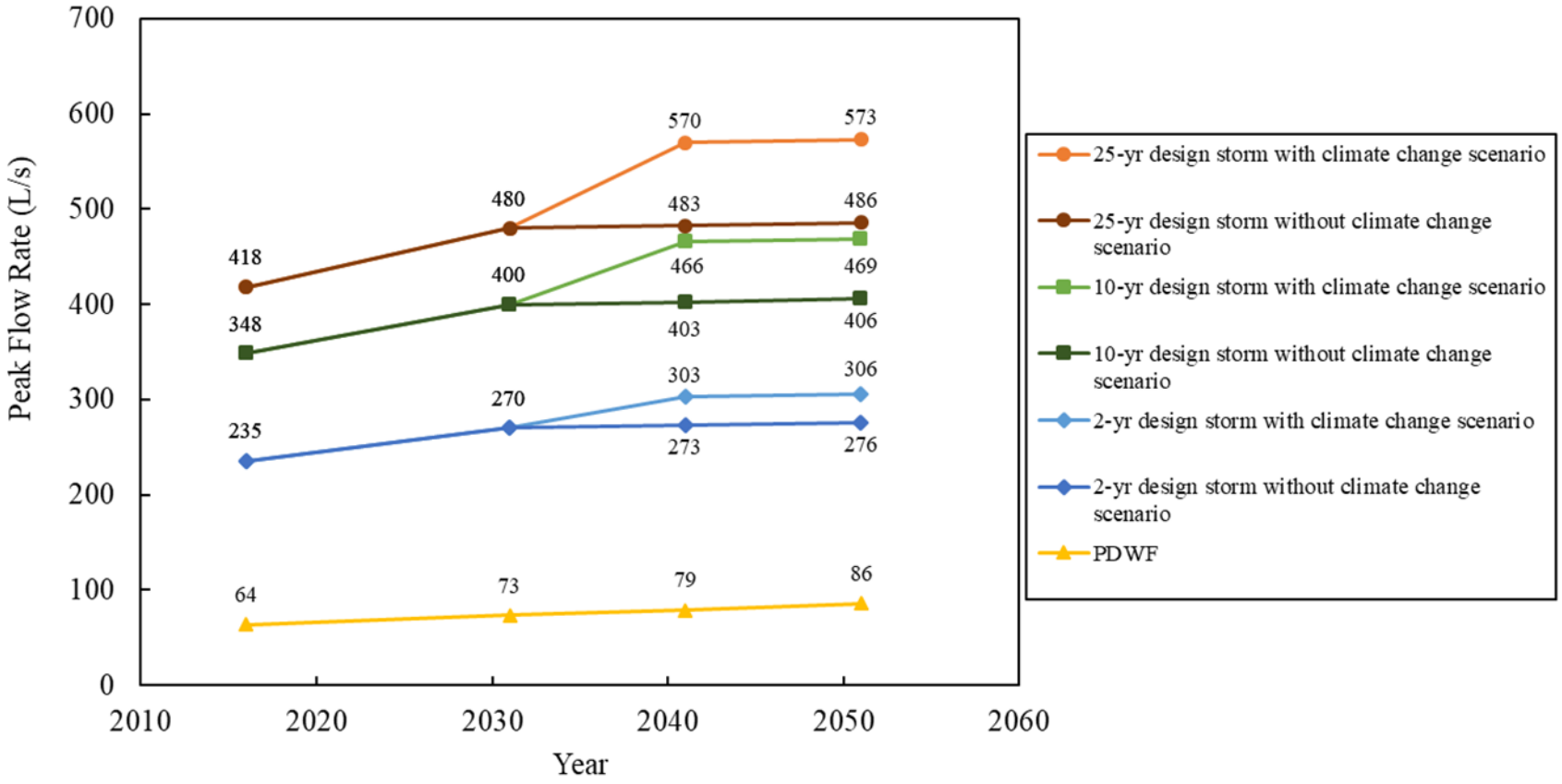


Figure 15: 15-Minute Average Peak Flows of Hydraulic Modelling Results Incorporating Climate Change Worst-Case Scenarios

7.1.5 Future Station Capacity Recommendation

It is recommended that the design of the future upgraded or new Spring Valley SPS incorporate sufficient footprint for infrastructure with a long asset life (concrete, building, etc.) to accommodate the 2051 10-year design storm with climate change scenario (approximately 470 L/s). Sizing the Spring Valley SPS to meet the current and future 10-year design storms is recommended to be consistent with industry standards and best practices for sewage pumping station design. The pumping capacity of the station can be upgraded in stages, with the first installation able to accommodate the current (2016) 10-year storm event (approximately 350 L/s) while including adequate space for future expansion. The recommendations for the Spring Valley SPS future capacity design basis are summarized in Table 6.

Table 6: Spring Valley SPS Future Capacity Design Basis

Design Horizon	Firm Capacity (L/s)	Applicable Assets
Current Upgrades (based on 2016 10-year storm event)	350	Pumps, process equipment, standby power, instrumentation
Ultimate Station Buildout (based on 2051 10-year design storm with climate change scenario)	470	Property requirements, SPS building, wet and dry wells, forcemain, electrical service line, HVAC

The recommendation to increase the Spring Valley SPS ultimate capacity to 470 L/s instead of the WWTMP recommended station capacity of 265 L/s will impact the width requirement of a potential new station wet well and the footprint requirements for emergency storage. In general, capital cost impacts associated with upsizing the wet well will be minimal as it will not require additional concrete pours and is estimated to only increase the wet well size by 1m. Emergency storage can be installed in phases to meet the future storage requirements.

7.2 Type of Pumping Station

There are two types of sewage pumping stations which could be considered for the Spring Valley SPS: wet/dry well, or submersible. In a submersible station the pumps are directly submersed in the liquid and piping is located in the wet well area. In a wet/dry well configuration the sewage is contained in the wet well and the process equipment (i.e. pumps, piping) is located in the adjacent dry well.

The City of Kitchener Design Standards states that wet/dry well type sewage pumping stations are the most desirable. A recently constructed pump station in the Region of Waterloo was the 84 L/s (ultimate capacity) Swan Street Sewage Pump Station in Ayr, which was configured as a wet/dry well station. The existing Spring Valley SPS and the majority of pump stations with capacities greater than 100 L/s in the Region are of the wet/dry well configuration.

For the Spring Valley SPS, a wet/dry well station is preferred over a submersible station for accessibility of pumps for maintenance.

7.3 Separation Distance

The upgraded or new Spring Valley SPS should comply with the MECP Design Guidelines' recommendations for separation distance between sewage works and sensitive land use. Sensitive land uses can include residential development, hospitals, hotels, hostels, caravan parks, schools, nursing homes, childcare facilities, shopping centres, playgrounds and some public buildings.

The MECP Design Guidelines state that SPS buildings and tanks with rated capacity greater than 25,000 m^3/d (289 L/s) are recommended to be at least 150 m away from sensitive land use. Each feasible option developed through this Class EA should provide sufficient surrounding footprint to meet the minimum separation distance.

7.4 Pumping and Forcemain Requirements

The MTO is currently undertaking the design of the New Highway 7 interchange. Utility conflicts were identified for the New Highway 7 interchange design, including the Spring Valley SPS forcemain. As a result, the majority of the Spring Valley SPS forcemain will be realigned (both vertically and horizontally). A preliminary realignment has been identified, as shown in Figure 16, with the final alignment to be confirmed during detailed design by others.

Spring Valley Sewage Pumping Station

Riverbend Dr

Union St

Lancaster St W

Sereda Rd

Conestoga Parkway (Hwy 85)

Grand River

Shirley Ave

Guelph St

Spring Valley Rd

Goderich-Exeter Railway

Connection to Existing Forcemain

River Rd E

St Leger St

Bruce St

Conestoga Parkway (Hwy 7)

Connection to Existing Forcemain

Wellington St N

Edna St

Connection to Existing Forcemain

Victoria St N

Queen St N

Lancaster St E

Frederick St

East Ave

Krug St

Discharge Manhole

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

LEGEND

SANITARY COLLECTION SYSTEM

- MANHOLE
- PUMPING STATION
- EXISTING FORCEMAIN
- PRELIMINARY PROPOSED FORCEMAIN
- SANITARY DRAINAGE CATCHMENT AREA

OTHER FEATURES

- RAILWAYS
- WATERCOURSE
- WATERBODY

CIMA+

CLIENT

Region of Waterloo

PROJECT NAME:

SPRING VALLEY SPS CLASS EA

SHEET TITLE:

FIGURE 16: EXISTING AND PROPOSED FORCE MAIN

SCALE:

1:7,000

PROJECT No. TS001-GA		CLIENT FILE No. --
DRAFTER S. ELLIOTT	DESIGNER --	DRAWING No. 16
APPROVER K. FRENCH	APPROVER --	
DATE: 09/2019		SHEET No. 1 of 1

7.4.1 Total Dynamic Head of Pumps

To determine the total dynamic head requirement for the pumps, it is important to review the existing and proposed system curves. This section will review the potential headloss that the new Spring Valley SPS pumps would need to overcome.

It may be required for the upgraded or new Spring Valley SPS to operate on the existing forcemain while the design and construction of the new forcemain is ongoing. Therefore, previous analysis of the best-fit system curve for the existing forcemain is included in the total dynamic head range requirement for the new pumps.

The MECP Design Guidelines state that SPS designs should be based on system-head calculations and curves for three conditions using appropriate Hazen-Williams factor "C" as follows:

a. Low sewage level in the wet well, C = 120;
b. Median sewage level over the normal operating range in the wet well, C = 130; and
c. Overflow sewage level in the wet well, C = 140.

System-head curve (b) should be used to select the pump and motor since this will reflect the normal operating condition. The extreme operating ranges will be given by the intersections of curves (a) and (c) with the selected pump curve. The pump motor should be able to operate satisfactorily over this full range (i.e. between conditions (a) and (c)).

Several system curves have been graphed in Figure 17 to compare:

- The best-fit system curve developed for the existing forcemain, C = 72 (RVA 2014), which includes an extrapolated portion for flows above 295 L/s,
- The proposed system curve based on the preliminary new forcemain alignment and the existing SPS site at each wet well level and corresponding Hazen-Williams factor "C", and
- The proposed system curve based on the preliminary new forcemain alignment and a new SPS site (100 m away and 4 m lower than existing) at each wet well level and corresponding Hazen-Williams factor "C".

Despite the existing forcemain's low Hazen-Williams factor "C" that was determined through the 2014 RVA study, the future forcemain will be designed to meet the MECP Design Guidelines, with a higher Hazen-Williams factor "C" range (120-140), because implementing swabbing capabilities in the proposed forcemain is anticipated to limit future build up.

The resulting system curves have a range of total dynamic head requirements between 50-65 m at the recommended 10-year Spring Valley SPS firm pumping capacity (350 L/s) and 67-89 m at the ultimate 2051 design capacity (470 L/s).

It should be noted that system curves presented at this Class EA study stage are high-level and have been developed using several assumptions. The forcemain length was estimated based on the preliminary routing provided. Minor losses along the length of the existing and proposed forcemains have been estimated as 10% of pipe friction losses. During the preliminary and detailed design stages, a detailed analysis of the proposed system curve should be performed.

CIMA+ performed a preliminary analysis of the capacity of the sanitary sewer to which the Spring Valley SPS forcemain discharges. Based on available as-built drawings, the sanitary sewer is 500 mm in diameter, whereas GIS data specifies that the sanitary sewer is 750 mm in diameter. For this capacity analysis, CIMA+ assumed that the diameter of the sanitary sewer is 500 mm as a worst case scenario. The analysis indicated that the sanitary sewer immediately downstream of the forcemain outlet manhole has sufficient capacity to accommodate the ultimate forcemain flows (i.e. up to 470 L/s). It is recommended that the City of Kitchener perform further analysis of the downstream sanitary catchment system to determine if the entire system can accommodate the increased Spring Valley forcemain flowrate.

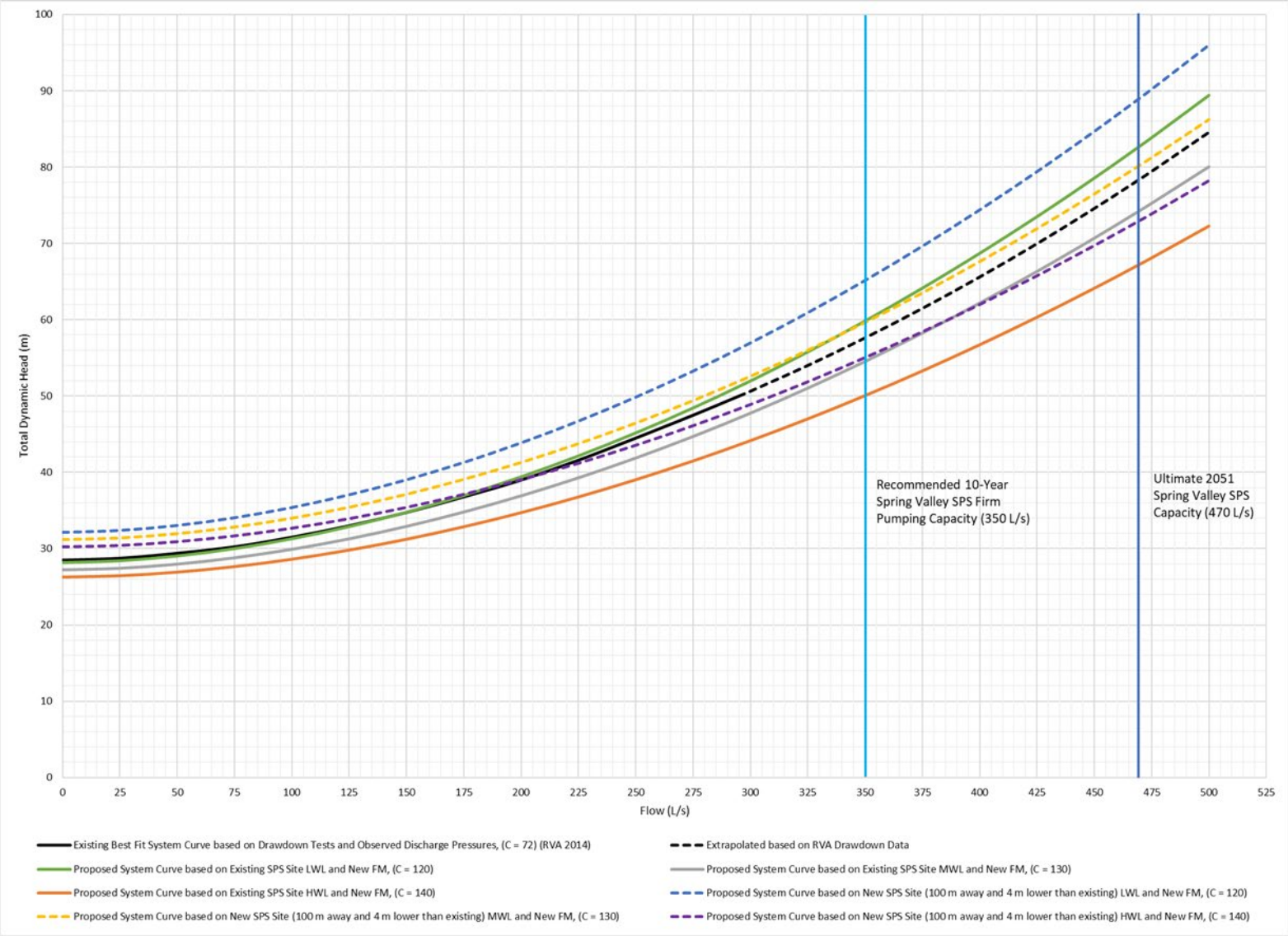


Figure 17: Existing and Potential Station System Curves

7.4.2 Odour Control at Forcemain Outlet

The City of Kitchener has received at least one comment regarding a hydrogen sulphide (H_2S) smell from a gravity sewer fed manhole just downstream of the Spring Valley SPS forcemain discharge point. H_2S is an odorous compound that forms when sewage is retained in anaerobic conditions. The length of the Spring Valley SPS forcemain (approximately 2 km) presents an increased risk for H_2S generation due to a long retention time of raw sewage in anaerobic conditions, especially during warm summer months.

There are several possibilities that the Region can consider in future design phases to mitigate odour issues at the forcemain outlet. The approaches for odour control include both liquid and air phase treatment; however, air phase treatments, including granular activated carbon, biofiltration, and air scrubbing, would be difficult to implement at the outlet of the Spring Valley SPS forcemain. The feasible liquid phase treatment options include:

- Chemical addition in the SPS wet well to mitigate odours prior to flow entering the forcemain,
- Wet well aeration to maintain high dissolved oxygen levels in raw sewage and minimize anaerobic conditions, or
- Aeration at the forcemain discharge location using a flow vortex to oxidize H_2S to prevent odours.

These options should be considered during future design phases to evaluate the preferred strategy to mitigate odours at the Spring Valley SPS forcemain outlet.

7.5 Wet Well Capacity, Layout and Access

The City of Kitchener Design Standards and MECP Design Guidelines state that wet wells should not provide retention times in excess of 30 minutes, based on design average daily flow, to prevent septic conditions leading to odour issues.

Sizing a wet well is influenced by:

- The volume required for pump cycling,
- Dimensional requirements to avoid turbulence and air entrainment problems,
- Vertical separation between pump control points,
- Inlet sewer elevation,
- Capacity required between alarm levels, and
- Basement flooding or overflow elevations.

The following formula from the City of Kitchener Design Standards can be used to calculate the required volume of wet well between start and stop elevations for pump(s) and speed(s):

V =T x q/4

Where:

V = Required capacity in L including storage of influent line

T = Minimum time of one pumping cycle between successive starts, or speed increases of the control range in minutes (T = 15 min is desirable)

q = Pump capacity in L/min, for one pump, or the incremental pumping capacity for an additional pump, or pump speed.

Layout of the wet well is discussed in both the MECP Design Guidelines and City of Kitchener Design Standards. For stations with firm capacities greater than 100 L/s, it is recommended that wet wells be divided into at least two sections to permit cleaning each wet well periodically to limit accumulation of grit. A minimum 1:1 slope for the wet well floor to hopper is also stipulated to prevent grit accumulation.

Safe access to the wet well for cleaning and equipment maintenance will be a requirement for the upgraded/new Spring Valley SPS. The access stairs or ladder to the wet well should be from outside with a hatch opening greater than or equal to 750 by 900 mm or 900 mm in diameter.

7.6 Emergency Storage and High Level Overflow

The City of Kitchener Design Standards state that the emergency response time in the event of an overflow is a minimum of one (1) hour. As a result, one (1) hour of peak flow storage is to be provided at a pump station, not including the storage capacity of the inlet pipe. It is expected that OCWA would have a similar emergency response time after receiving a high-level alarm from the station. A recent pumping station construction in the Region of Waterloo, Swan Street SPS in Ayr, was designed with approximately one hour of emergency storage at peak flow conditions.

During the Spring Valley SPS Class EA phase, ensuring that each proposed solution provides sufficient footprint to install emergency storage is recommended based on the City of Kitchener Design Standards and best management practices from other municipalities. The capacity of emergency storage can be increased in stages depending on the design time horizon, taking into account the predicted PWWF as a result of climate change, as discussed in Section 7.1.

In addition to the emergency storage, a high level overflow will be installed at the station and is anticipated to only be used as a last resort in uncontrollable emergency conditions.

7.7 Equipment Redundancy

One of the key objectives of the Spring Valley SPS Class EA study is to provide reliability and redundancy at the station to ensure protection of public health, the environment, and the Region's assets. Standby or redundant capabilities need to be provided for satisfactory operation of the SPS during power failures, flooding, peak loads, equipment failure and maintenance shutdowns.

The MECP Design Guidelines state that redundancy of SPSs must be such that the firm capacity of the station (i.e. the capacity with the largest pump out of service) is capable of handling the design peak instantaneous flow. The designer should also ensure that the sewage flow to any treatment process unit out-of-service can be routed to remaining units in service with minimum impact on their performance.

The City of Kitchener Design Standards stipulate the requirement for at least three pumps for stations handling total flows greater than 52 L/s. At a minimum, three pumps (two duty, one standby) should be designed to meet the firm capacity. It is always preferable to have a standby pump available for service.

7.8 Standby Power Requirements

A standby power generator will be required for the upgraded/new Spring Valley SPS to allow for continued station operation during potential power failures. This will protect public health by preventing backup of sewage and potential discharge to the environment, streets, and other public and private property. The generator should have the capacity and reliability, especially during cold weather conditions, to start up and maintain the pumping capacity of the SPS. The generating unit should also be adequately sized for lighting, ventilation and other auxiliary equipment necessary for safety and proper operation of the pumping station.

Provision needs to be made for both automatic and manual start-up and load transfer. An automatic transfer switch to the generator should be provided.

The MECP Design Guidelines specify detailed generator requirements for location, sizing, and minimum runtimes, that should be reviewed in the preliminary and detailed design stages.

7.9 Electrical Requirements

Electrical systems and components (e.g. motors, lights, cables, conduits, switch boxes, control circuits) in raw sewage wet wells, or in enclosed or partially enclosed spaces where hazardous concentrations of flammable gases or vapours may be present, should comply with the Electrical Safety Code (O. Reg. 164/99) under the Electricity Act, 1998 for Class I, Division 1, Group D locations.

The electrical requirements of the upgraded/new Spring Valley SPS will be greater than the existing loads. A new electrical service line will be required to upgrade the existing station or construct a new station. The complete electrical requirements will be realized during the preliminary and detailed design stages with the selection of process, mechanical, and electrical equipment and logging of a comprehensive load list.

In the preliminary and detailed design stages, consideration should be given to the efficiency of the pumps, motors and drives to reduce energy requirements and cost. It is recommended that evaluation of such energy efficient units include both capital and operation and maintenance costs to allow for full life-cycle costs to be calculated. Life-cycle costs will provide an accurate evaluation of the benefits for such equipment.

7.10 HVAC Requirements

Ventilation, and heating equipment should be provided in the upgraded/new SPS to meet building and other codes specific to sewage pumping stations such as NFPA 820. Dehumidification should also be considered to protect equipment from excess moisture and pre-mature corrosion.

If the dry well remains below the ground surface, mechanical ventilation is needed. If screens or mechanical equipment requiring maintenance or inspection are located in the wet well, permanently installed ventilation is needed. Natural or mechanically assisted ventilation can be considered for the wet well.

There should be no interconnection between the wet well and dry well ventilation systems. In addition, under no circumstances should wet well vents open into a building or connect to the building ventilation system.

Based on NFPA 820 requirements, ventilation can be intermittent (wet/dry wells = 30 air changes per hour (ACH)), based on manual switches or automatic indicators (gas or motion detector), or continuous (wet well = 12 ACH, dry well = 6 ACH) for both the wet and dry wells, although the ventilation systems must be separated.

7.11 Automation, Instrumentation, and Control

The Spring Valley SPS will have intermittent operator oversight, similar to its current operation. The upgraded/new station must be designed with instrumentation and control philosophies necessary to meet the Region's Water and Wastewater Standards and Guidelines.

The future station will include instrumentation for measuring wastewater flows and levels in the wet well. The MECP Design Guidelines recommend flow metering devices that indicate, totalize, and record flow measurements. It is recommended that the new/upgraded Spring Valley SPS have flow meters for both the influent and effluent flows. Pressure gauges on the pumps' discharge headers are also recommended to monitor discharge pressure from each pump.

Pump starts/stops are typically controlled by the level in the wet well. The maximum number of pump starts per hour should be discussed with the pump manufacturer during equipment selection in future design stages.

The MECP Design Guidelines stipulate the preferred type, number, and location of level control sensing devices in the wet wells. Provision should be made in the station's control philosophy to automatically alternate the level sensors and the pumps in use to:

- Optimize energy usage (i.e. running pumps with lower energy use more often or during peak energy periods);
- Maintain similar runtimes between redundant equipment as an asset management strategy; and
- Mitigate overflow/backup of wastewater in the event of equipment failure.

7.12 Odour Control Systems

Wastewater contains numerous potentially odorous substances, but the predominant groups are the reduced sulphur compounds. Of these, H_2S is perhaps the most common and easily identified.

The MECP Design Guidelines reference several standards which discuss odour generation, particularly as related to sulphides. In the preliminary and detailed design phases, the designer should refer to the U.S. EPA Design Manual, Odour and Corrosion Control in Sanitary Sewage Systems and Treatment Plants (EPA/625/185/018) and the ASCE Manual of Practice No. 69 Sulfide in Wastewater Collection and Treatment Systems when assessing the potential for odour generation at the upgraded/new station.

The Spring Valley SPS site has not received odour complaints in the past; potentially because the wet well has minimal storage capacity and therefore less potential to develop odours. There are also very few residents nearby the existing station. There may be potential for odour generation and complaints in the future if a larger wet well is provided. The Class EA alternative solutions provide provisional space to implement odour control facilities if the need arises in conceptual, preliminary, or detailed design.

7.13 Emergency Trucking and Bypass Pumping

The requirement for emergency trucking and bypass pumping at the Spring Valley SPS was considered during the 2015 Preliminary Design (R.V. Anderson Associates Ltd., 2015) consistent with the recommendations of the MECP Design Guidelines and City of Kitchener Design Standards. The proposed layout of the common discharge header included operational and maintenance flexibility with a bypass pipe and connection for emergency pumping or swabbing pig launcher.

These elements, in addition to emergency storage and standby power, will be required for the future upgraded/new Spring Valley SPS. A portable pump connection to the forcemain with rapid connection capabilities (cam-lock) and valving should be provided outside the dry well and wet well. The station must also be able to accommodate trucking for emergency pumping.

8 Evaluation Methodology

The evaluation methodology is essential in guiding the decision-making process. A well-structured comprehensive evaluation methodology provides the foundation for a decision-making process that is sound, defensible, traceable and consistent with the project objectives.

The following decision-making methodology was used for the Spring Valley SPS Class EA:

- Development of evaluation categories and criteria to assess a list of alternative solutions for the Spring Valley SPS,
- Development of alternative solutions for the Spring Valley SPS,
- Detailed evaluation of the alternative solutions using a multi-criteria analysis (MCA) decision-making process, and
- Identification of the preliminary preferred alternative solution based on the results of the decision-making process.

The decision-making model for the Spring Valley SPS Class EA study was centred on an MCA. The MCA provides a structured approach to determine overall benefits among alternative options, where the options accomplish several objectives. This evaluation methodology requires specification of desirable objectives and identification of corresponding indicators, which are then used to measure/assess the ability of each alternative option to meet a specific objective.

The MCA approach includes the following major components:

- **Evaluation Categories**: Primary evaluation categories group the evaluation criteria.
- **Evaluation Criteria**: A set of evaluation criteria is developed to reflect aspects of importance for a specific project. Alternative options are assessed and compared relative to the others against the evaluation criteria.
- **Qualitative Rating**: Each alternative option is assigned a rating that reflects its ability to meet each evaluation criterion relative to the performance of the other alternative options.

8.1 Evaluation Categories

The feasible alternative solutions were subjected to a detailed comparative evaluation using an evaluation matrix that enables a systematic and rational comparison of the alternatives and focuses on a set of criteria for four main categories:

- Environmental,

- Social,
- Technical, and
- Financial.

Each evaluation category has equal weighting (25% each).

8.2 Evaluation Criteria

Each of the primary evaluation categories was further subdivided into specific evaluation criteria. The detailed evaluation criteria represent specific aspects of the categories to be evaluated. Table 7 through Table 10 show the detailed evaluation criteria that have been developed for this project. Individual evaluation criteria within each category are equally weighted.

Table 7: Environmental – Detailed Evaluation Criteria

Criteria	Rationale and Measures
Protects environmental features	Protect sensitive natural features and regulated areas. Minimize the potential impact from construction and operation to existing terrestrial habitats/features, vegetation, wetlands, woodlots, and steep slopes. Allow for scheduling and roll-out of construction activities in a way and at a time of year that would limit the negative impacts on the vegetation of the site and surrounding area.
Protects wildlife and species at risk	Minimize impacts to wildlife (including species at risk) or identified habitat locations for these species. Protect fisheries and aquatic health. Allow for scheduling and roll-out of construction activities in a way and at a time of year that would limit the negative impacts on wildlife and species at risk.
Protects groundwater, streams and rivers	Protect groundwater and meets Clean Water Act requirements. Minimize impacts on the GRCA regulated floodplain.
Minimizes climate change impacts	Minimize GHG emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g. changes to site and vicinity plant cover).

Criteria	Rationale and Measures
	Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce new energy or material demands. Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts.

Table 8: Social – Detailed Evaluation Criteria

Criteria	
Minimizes impacts to residents related to noise, odour, traffic, and aesthetics.	Minimize noise, odour, and truck traffic affecting the community during pumping station operation. Maintain access to and aesthetics of public spaces (including the Walter Bean Grand River Trail). Minimize negative impacts that may result due to changes to the neighbourhood characteristics (e.g., recreational features, green space, property values).
Minimizes impacts to businesses	Maintain access for businesses during construction and operation. Minimize potential negative effects on short-term and long-term business vitality, and community growth and development.
Manages and minimizes construction impacts	Minimize noise, odour, road closures, and truck traffic affecting the community during construction.
Conserves built heritage resources and/or cultural heritage landscapes	Minimize potential impacts to built heritage resources and cultural heritage landscapes. Minimize the potential impact to Indigenous communities.
Conserves archaeological resources	Minimize potential impacts to archaeological resources and areas of archaeological potential.
Protects health and safety	Minimize the potential risk to public health and safety, particularly on downstream users (including for recreation and tourism). Minimize the potential risk to operator and maintenance staff's health and safety.

Table 9: Technical – Detailed Evaluation Criteria

Criteria	Rationale and Measures
Provides reliable service	Prioritize security, reliability and robustness. Lesser likelihood of process upset or mechanical breakdown.
Meets existing and future needs	Meets the long-term capacity requirements to service the projected population growth in the sanitary catchment area. Provide appropriate site access and egress for operations and maintenance per current standards and best practices. Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure. Minimize increases in operational and/or maintenance complexity of the station.
Aligns with existing and planned infrastructure	Optimize existing infrastructure investment including structures, tanks, and equipment. Align with planned infrastructure projects including recommendations of the Region's 2018 Wastewater Treatment Master Plan Update, the Ministry of Transportation's new Highway 7 Interchange project to install a new Spring Valley SPS forcemain, and City of Kitchener stormwater management projects.
Aligns with existing and future land use	Evaluate need to acquire land for new pumping station or expansion of pumping station and ownership requirements.
Aligns with approval and permitting process	Minimize the complexity and time spent to obtain approvals from various regulatory agencies.
Manages and minimizes construction risks	Minimize complexity of construction and maximize ability to maintain adequate sewage pumping services during construction.
Ability to adapt to climate change	Promote resiliency to extreme weather events. Prioritize climate change adaptation to minimize risk associated with variation in climate parameters (temperature, precipitation, wind gusts, or other) and natural hazards (flooding, high river levels, or other). Prioritize the surrounding area's ability to be resilient and maintain its adaptive capacity to climate change (Grand

Criteria	Rationale and Measures
	River floodplain capacity, local stormwater drainage pathways).

Table 10: Financial – Detailed Evaluation Criteria

Criteria	Rationale and Measures
Provides low lifecycle costs	Minimize capital, operation and maintenance (life cycle) costs over a 50-year period.

8.3 Qualitative Rating

The evaluation methodology consisted of a descriptive or qualitative evaluation of alternative solutions/strategies and identified advantages and disadvantages of each alternative option with respect to the evaluation criteria. In this respect, comparisons and trade-offs were made between alternatives. Trade-offs can involve forfeiting an advantage or accepting a disadvantage to address a higher priority consideration.

Life cycle costs were evaluated using quantitative means. High-level estimates were generated for this criterion and they were evaluated using a relative rating provided for each alternative as it compares to each of the other alternatives.

An evaluation matrix was prepared describing the specific advantages and disadvantages that each alternative option offers for each criterion under consideration. For each option, detailed information was provided with a description of:

- Risk and/or potential impacts for each criterion,
- Approaches to mitigating risks and/or impacts,
- Scoring rationale, based on degree of risk and/or mitigation required, and
- Score, which were assigned as follows:

Table 11: Scoring Legend

Graphic	Rating	Description
	5	Very well aligned with criteria
	4	Well aligned with criteria

Graphic	Rating	Description
	3	Somewhat aligned with criteria
	2	Not well aligned with criteria
	1	Low alignment with criteria

The total score within the category was determined by summing the individual scores assigned to each evaluation criterion. Category scores were then summed to determine the overall score of an alternative solution. The alternative solution that scored the highest was ranked first and selected as the preliminary preferred solution. The alternative solution with the second highest score was ranked second, and so on.

A sensitivity analysis (Section 10.3) was performed by category (Environmental, Social, Technical, and Financial) following the overall evaluation of the alternative solutions with equally weighted categories.

9 Identification of Alternative Solutions

In accordance with Phase 2 of the Municipal Class EA process, alternative solutions were identified to address the existing opportunities and constraints associated with the Spring Valley SPS.

The following general alternative solutions were identified:

- Do nothing;
- Limit community growth;
- Upgrade existing station with offsite emergency storage; and
- Construct a new station offsite, including the following potential siting locations:
    - Walter Bean Trail parking lot,
    - Open area north of existing station, and
    - Industrial land south of existing station.

9.1 Preliminary Screening of Alternatives

A preliminary screening of each alternative solution was performed to ensure that alternatives meet the long-term servicing needs for the Spring Valley SPS.

The “Do Nothing” alternative would mean that no upgrades would be implemented at the Spring Valley SPS. It allows for some development to occur until the wastewater generated in the Spring Valley SPS sanitary catchment area approaches the current rated capacity of the station of 245 L/s. With the limited redundancy and many existing process and electrical assets reaching the end of their service life, there is risk that asset failure will increase in frequency in the future resulting in costly emergency expenditure for replacement. This alternative does not meet the 2018 WWTMP recommendations for wastewater pumping to accommodate population and flow projections to the year 2051. In addition, this alternative does not mitigate the anticipated future risks due to climate change which will cause more frequent and intense storms. For these reasons, the “Do Nothing” alternative was excluded from further evaluation.

The “Limit Community Growth” alternative assumes that ultimate growth in the Spring Valley SPS sanitary catchment area will be limited so that the total sewage generation will not exceed the rated capacity of the existing station of 245 L/s. This alternative involves no changes to the existing station, and no improvements made to address the existing concerns. Limiting community growth does not satisfy the requirements of the 2015 Region Official Plan which calls for achieving a more balanced growth by directing a greater share of new development to the existing built-up area to make better use of land, existing physical infrastructure, community infrastructure and human services. In

addition, similar to the “Do Nothing” alternative, current asset replacement needs in the Spring Valley SPS, managing future flow projections, and mitigating climate change impacts are not addressed with the “Limit Community Growth” alternative solution. For these reasons, the “Limit Community Growth” alternative was excluded from further evaluation.

The following alternative solutions are feasible, meet the recommendations of the WWTMP and were carried forward for further evaluation:

- Alternative 1: upgrade existing station with offsite emergency storage,
- Alternative 2A: new station in Walter Bean Trail parking lot,
- Alternative 2B: new station in open area north of existing station, and
- Alternative 2C: new station on industrial land south of existing station.

The following sections provide descriptions of the feasible alternatives that were subjected to the detailed evaluation process.

9.2 Alternative 1 – Upgrade Existing Station with Offsite Emergency Storage

This alternative involves major upgrades to the existing Spring Valley SPS to meet the project objectives. The existing station is located on a plot owned by the Region that is surrounded by City of Kitchener land and the Highway 85 easement.

The majority of existing infrastructure (station building and wet well) can be reused to upgrade the existing station. However, the requirements for the SPS expansion include adequate space within the site to accommodate the installation of emergency storage. Given that the existing Region-owned property is heavily treed, sloped, and within the MTO property setback of 14 metres, the installation of emergency storage would require acquiring additional property from the City of Kitchener (Figure 18).

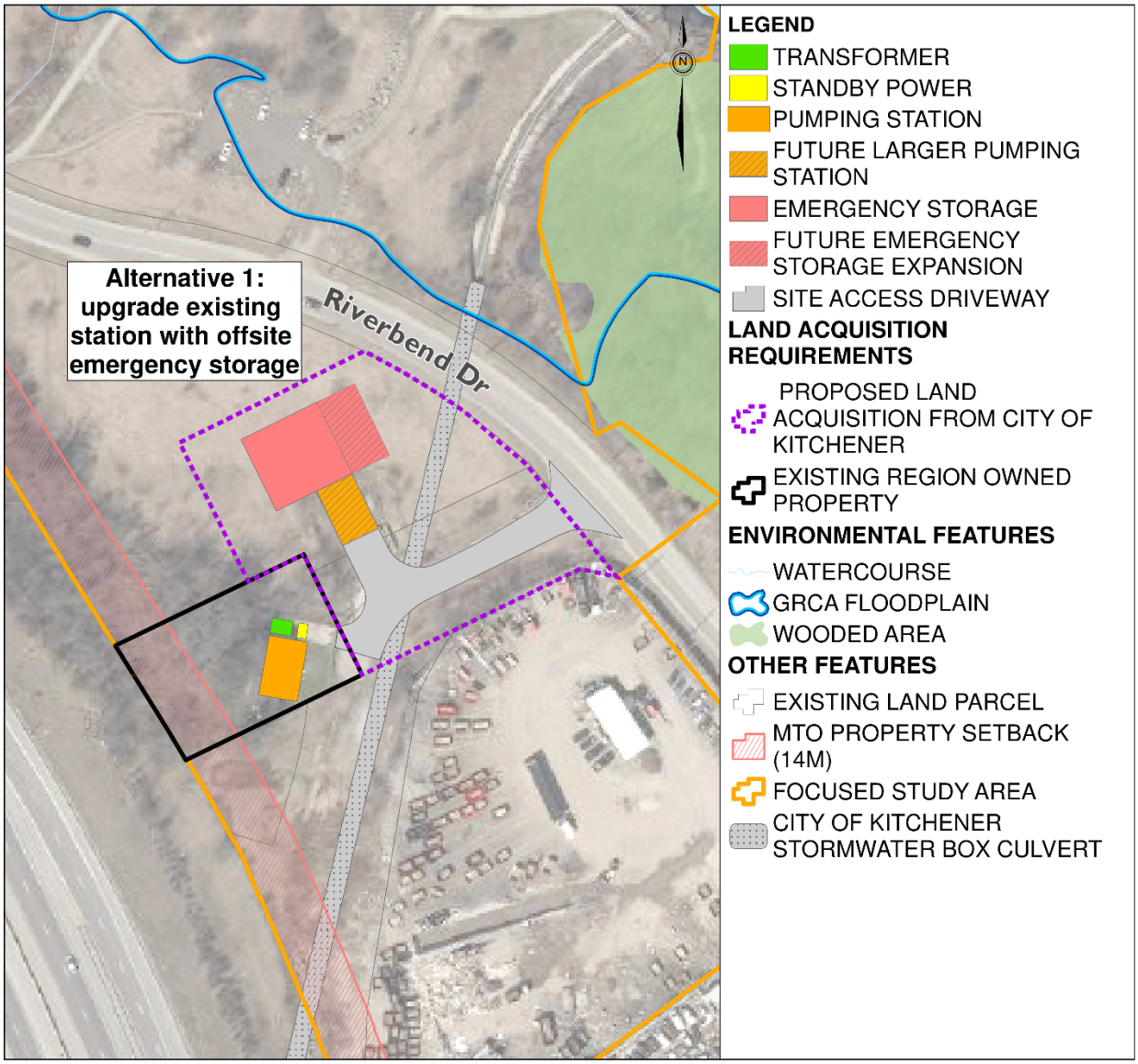


Figure 18: Alternative 1 - Upgrade Existing Station with Offsite Emergency Storage

Upgrading the existing station would involve minimal change to the preliminary design of the forcemain as part of the MTO new Highway 7 Interchange project. It is also anticipated that no sanitary sewer modifications will be required for this option into the existing station but connection to the emergency storage would be provided.

In the area of the existing station there is overland stormwater flow and a 3 m wide storm water culvert owned by the City of Kitchener. The City of Kitchener has indicated that they require a 15 m easement centred on the stormwater culvert which would need to be considered in relation to the proposed location for emergency storage.

There is also stormwater runoff from the steep slopes of Highway 85 which travels overland near the existing station. Stormwater runoff will intensify with climate change and may result in flooding around the existing low lying station.

In 2015, RVA completed the Spring Valley SPS Preliminary Design (pre-design) which outlined a method to implement upgrades at the station to increase operating flexibility and reliability and meet current industry standards and best practices. RVA proposed short (8-12 hours) and long-term shutdowns of the station to complete the major upgrades including replacement of the pumps, electrical components, and process piping. The pre-design for upgrading the existing Spring Valley SPS did not include the addition of emergency storage, increase in station capacity or land acquisition.

One of the challenges associated with this alternative is the limited operational flexibility of the existing station's design to isolate process equipment for asset repair and replacement. There is a significant construction risk associated with replacing existing assets at the station because it has a single discharge header (no redundancy), no station bypass, and no emergency bypass connections. Additional costs for temporary bypass pumping of sewage during the construction phase would be incurred.

If upgrading the existing SPS is selected as the preferred alternative, it is likely that the station building will still require replacement in 30 years due to the age of the existing SPS infrastructure and to accommodate the ultimate station capacity of 470 L/s. The evaluation of upgrading the existing SPS will include the capital cost for constructing a new station in 30 years.

Lands adjacent to the existing SPS building that are required for expansion are primarily comprised of cultural meadow and disturbed lands. Given the low diversity/quality of vegetation, the level of impact associated with this option is considered low. Construction disturbance for this option should avoid intrusion into the nearby deciduous forest and associated wildlife habitat.

The meadow community provides habitat for a number of common and secure species, including a number of birds. Barn Swallow was observed foraging, however; no nests were found on existing structures. Should Barn Swallow or active nests of the species be found to occur, further consultation with MECP will be required to ensure compliance under the *Endangered Species Act*. Built structures also provide nesting opportunities for breeding birds (American Robin actively nesting on SPS in 2019). Construction within timing windows is recommended for any proposed activity at this location to ensure compliance with the Migratory Birds Convention Act (MBCA).

An abundance of milkweed was observed within the footprint of this option. Milkweed is of importance to the monarch butterfly (a species of special concern); several of which were observed on site during field investigations.

Archaeological and cultural heritage investigations concluded that soils around the existing station property are mostly fill material with no identified archaeological resources and no identified cultural heritage resources.

9.3 Alternative 2 – Construct a New Station Offsite

There are several locations within the focused study area upon which a new pumping station can be constructed to replace the existing Spring Valley SPS. In each case, construction of a new SPS would require property acquisition in the vicinity of the existing pumping station due to the limited, wooded, and steep sloped areas within the Region's current SPS property. Each of the proposed new station sites would have easy access from Riverbend Drive for operations and maintenance staff.

Constructing a new station would allow the existing Spring Valley SPS to remain operational while the new station is being constructed and would involve varying degrees of changes to the existing sanitary sewer network to divert flow to the new station.

In the following sections, feasible locations for a new station are described in detail to provide context for their relative advantages and disadvantages that will be evaluated in Section 10. Figure 19 shows the location of each new station alternative and the approximate land area required to accommodate the design criteria.

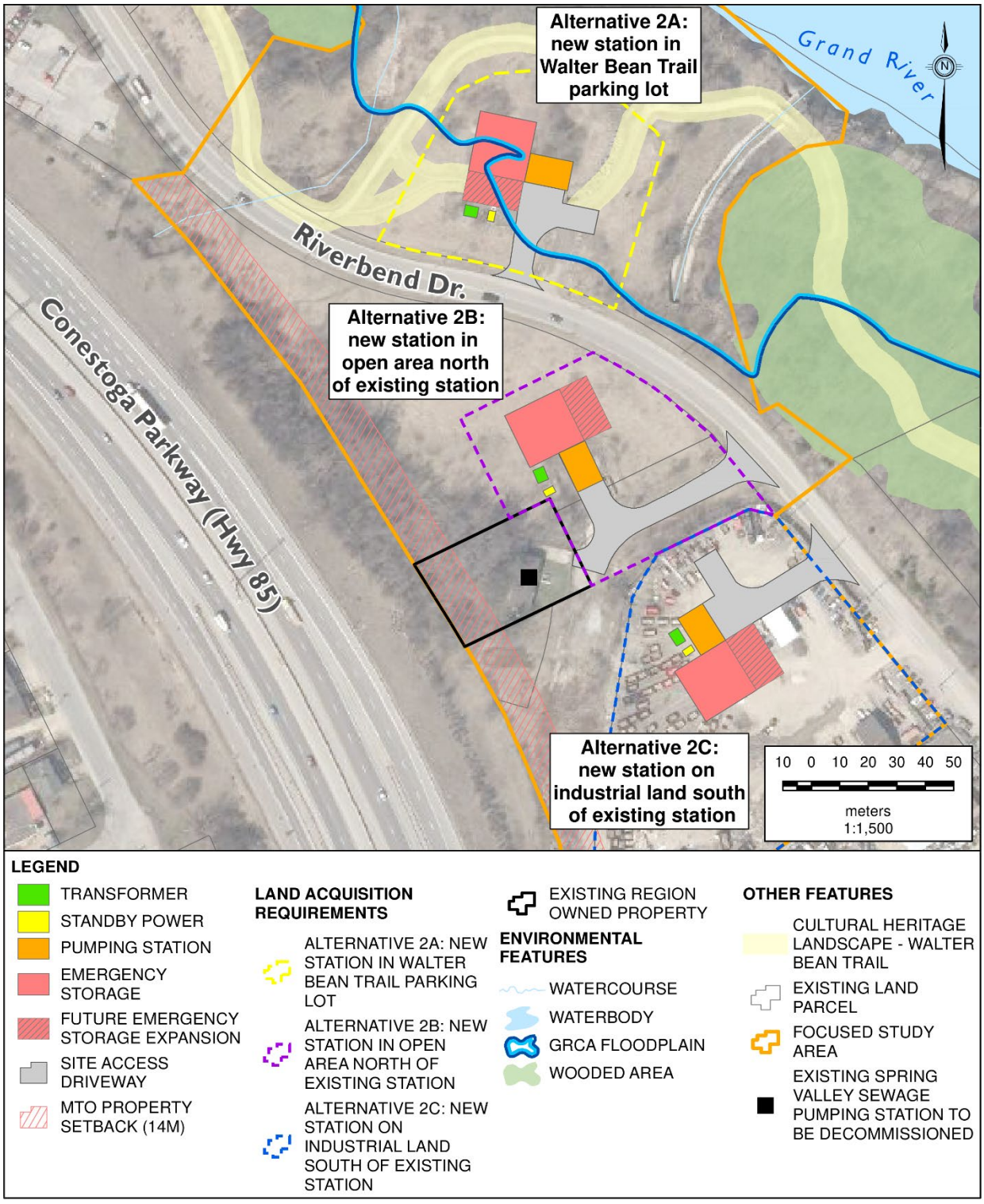


Figure 19: New Station Alternative Solutions

9.3.1 Alternative 2A – New Station in Walter Bean Trail Parking Lot

This option for a new Spring Valley SPS is located on City of Kitchener property to the north-east of Riverbend Drive (Figure 20). This property is currently used as a parking lot and trailhead for the Walter Bean Trail for public recreation along the Grand River. Should this location be the preferred option, land acquisition from the City of Kitchener would be required. As a result, the City of Kitchener would also be required to identify other City lands or acquire land to relocate the trail head.

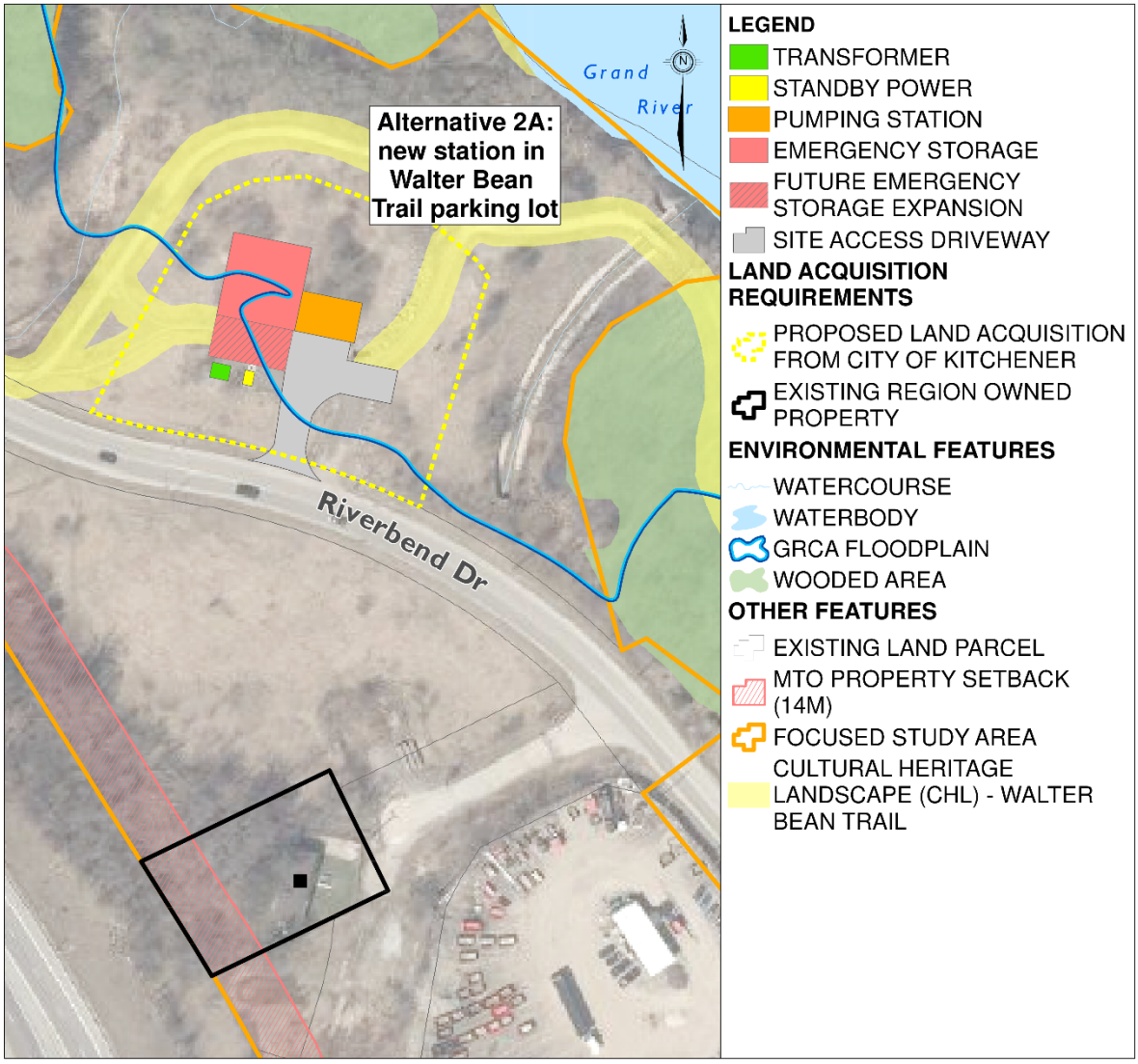


Figure 20: Alternative 2A - New Station in Walter Bean Trail Parking Lot

A station on this property would increase the length of the proposed forcemain as it is further north than the existing station. Approximately 200 metres of new sanitary sewer would also be required to be installed on lands to the north of the existing Spring Valley

SPS and cross under Riverbend Drive to the new pump station. This longer gravity sewer will result in a deeper pumping station.

In comparison with other options under consideration, this option is sited closest to the Walter Bean Trail, Grand River and its tributaries. The MECP recommends siting sewage works 150 m away from sensitive land use. If this option is selected as the preferred alternative, there would be a greater potential for odour complaints in the future. In addition, a new station in this location would be in direct public view next to the Trail, requiring additional landscaping and aesthetic architecture.

The site is located in the GRCA regulated floodplain. Habitat protection for Silver Shiner (1981 record in the Natural Heritage Information Centre) includes the floodplain and riparian areas to watercourses, therefore if this option is identified as the preferred solution, further consultation with MECP and Fisheries and Oceans Canada is required to confirm circumstances of the 1981 record and determine if impact to this species can be avoided.

The floor of the new building would need to be raised above the floodplain elevation. This will result in additional non permeable ground and infill in the vicinity of the station, reducing the storage capacity in the floodplain which would need to be offset by increasing storage capacity elsewhere. This strategy is commonly referred to as “cut and fill” requirements for floodplain storage and would result in a larger impacted area.

The existing trailhead parking lot area would be used for siting the new station, wet well, and emergency storage. The parking lot is used regularly by the public, and a new trail access point and parking lot may be required to reduce negative social impacts. This location is also inclusive of the Walter Bean Trail – City of Kitchener Identified Cultural Heritage Landscape L-TRL-17 and is adjacent to the Grand River Corridor – City of Kitchener Identified Cultural Heritage Landscape L-GRC-1, both of which were identified to possess cultural heritage value or interest through the Cultural Heritage Resources Existing Conditions report. Should any alternatives be recommended that may impact these features, a Heritage Impact Assessment report should be undertaken to confirm the anticipated impacts to the landscapes as a result of the project, evaluate any additional impacts stemming from the proposed design, as well as outline avoidance/mitigation measures to minimize the impact.

Additional notifications, coordination and safety precautions would need to be taken to relocate the Walter Bean Trail parking lot and allow public use of the trail during construction and long-term operation. Care must be taken in siting the new parking lot and trail access to prevent negative social impacts, while maintaining public safety and separation from construction and regular operation activities.

Environmental impacts would be reduced considering the current use/previously disturbed nature of the site. However, the area required for construction includes a meadow community and open grown trees in use by breeding birds (Baltimore Oriole actively nesting in 2019). Construction within timing windows is recommended for any proposed activity at this location to ensure compliance with the MBCA. In addition, the relocation of the Walter Bean Trailhead parking lot may result in the disruption of other naturalized areas on the north side of Riverbend Drive.

9.3.2 Alternative 2B – New Station in Open Area North of Existing Station

This option would involve constructing a new station on City of Kitchener property located north of the existing Spring Valley SPS on the south-west side of Riverbend Drive (Figure 21). Should this location be the preferred option, land acquisition from the City of Kitchener would be required.

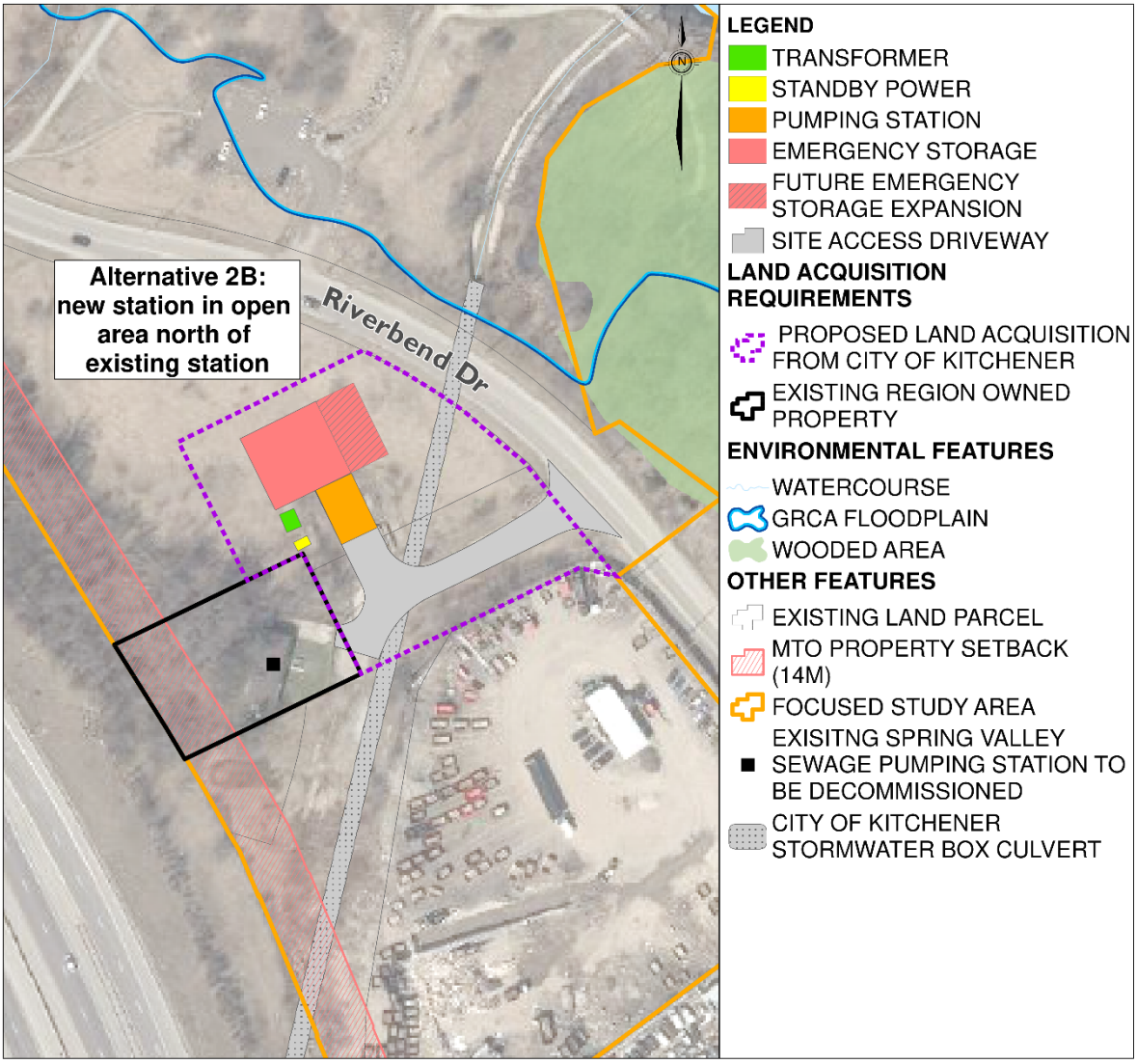


Figure 21: Alternative 2B: New Station in Open Area North of Existing Station

The benefits of this location for a new station include the proximity to the existing station and sanitary sewer piping. Approximately 50 metres of new sanitary sewer would be required from the existing influent maintenance hole to divert flow to a new wet well on this property, however, the station is closer to the northern sanitary network. The elevation of a new station on this property would be between one and two metres higher than the existing, which will require the wet well to be one to two metres deeper than the existing to accommodate gravity flow from the existing sewer network.

The location of the new station would also have the benefit of being separated from the existing overland stormwater flow and infrastructure. However, the City of Kitchener has indicated that they require a 15 m easement centred on the stormwater culvert which

would need to be considered in relation to the proposed location for a new station and emergency storage land acquisition requirements for this option.

This alternative offers the benefits of being directly adjacent to the existing property, which is owned by the Region, resulting in a single connected parcel of land for future use.

Lands that are required for this option are primarily comprised of disturbed land and cultural meadow. Given the low diversity/quality of vegetation, the level of impact associated with this option is considered low. Construction disturbance for this option should avoid intrusion into the nearby deciduous forest and associated wildlife habitat.

The meadow community provides habitat for a number of common and secure species, including a number of birds. Barn Swallow was observed foraging, however; no nests were found on existing structures. Should Barn Swallow or active nests of the species be found to occur, further consultation with MECP will be required to ensure compliance under the *Endangered Species Act*. Construction within timing windows is recommended for any proposed activity at this location to ensure compliance with the MBCA.

An abundance of milkweed was observed within the footprint of this option. Milkweed is of importance to the monarch butterfly (a species of special concern); several of which were observed on site during field investigations.

Archaeological and cultural heritage investigations concluded that soils are mostly fill material with no identified archaeological resources and no identified cultural heritage resources. This property is not connected to a walking trail or used for recreational purposes.

9.3.3 Alternative 2C – New Station on Industrial Land South of Existing Station

This option would involve constructing a new station on private property located south of the existing Spring Valley SPS on the west side of Riverbend Drive (Figure 22). Should this location be the preferred option, land acquisition from the private owner would be required.

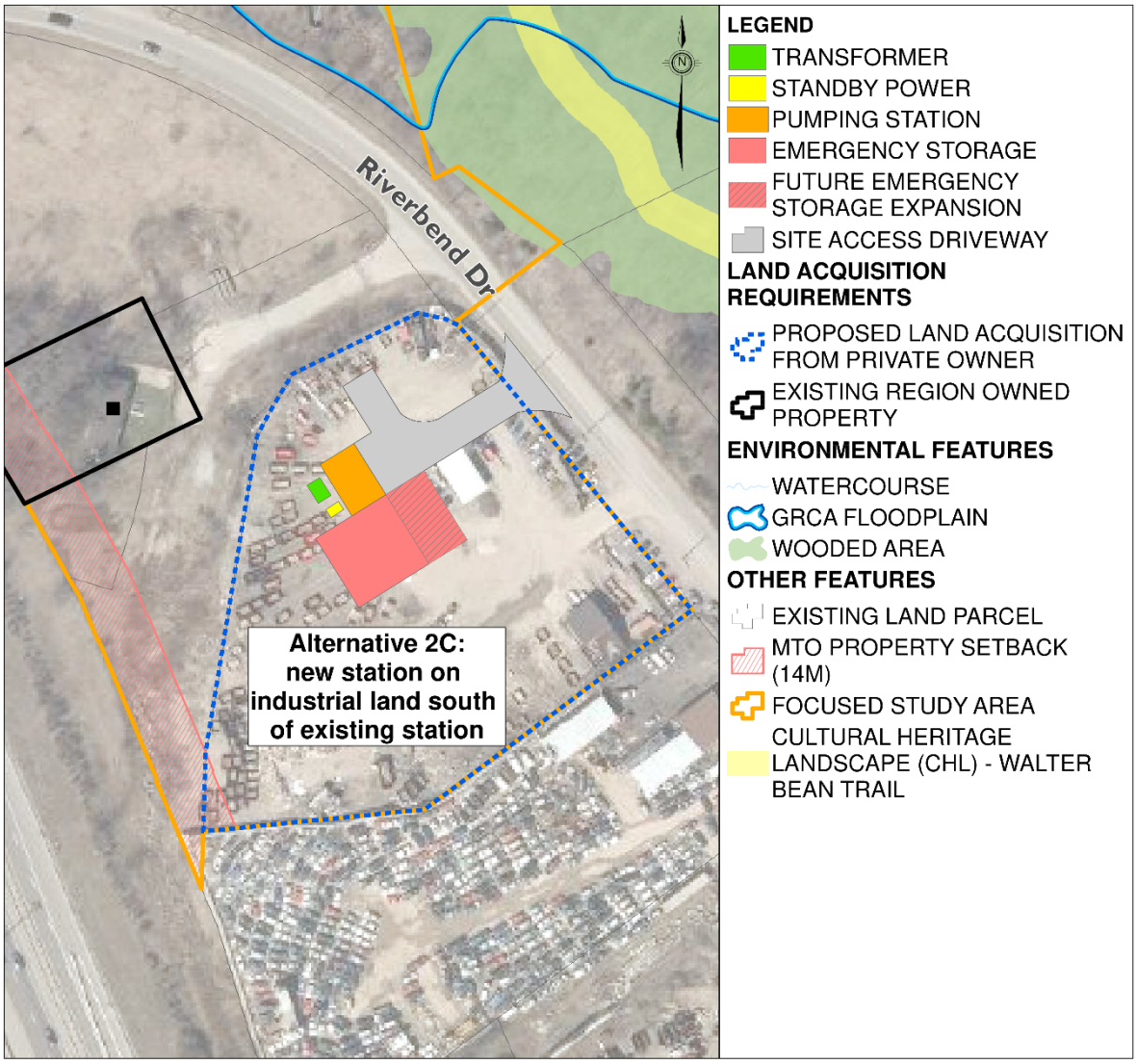


Figure 22: Alternative 2C: New Station on Industrial Land South of Existing Station

A benefit of this location is its proximity to the existing station. A station on this property would decrease the length of the proposed forcemain by approximately 100 metres as it is closer to Riverbend Drive and the proposed forcemain alignment than the existing station. Approximately 50 metres of new sanitary sewer would be required from the existing influent maintenance hole to divert flow to a new wet well on this property. However, the elevation of a new station on this property would be between four and five metres higher than the existing, which will require the total wet well to be four to five metres deeper than the existing to accommodate gravity flow from the existing sewer network.

Given the disturbed nature of the site, little impact to natural heritage is identified. Wildlife habitat is limited on site and generally restricted to existing structures/buildings

where breeding birds may build nests. Construction within timing windows is recommended for any proposed activity at this location to ensure compliance with the MBCA.

No archaeological materials were identified during the Stage 2 assessment of Alternative 2C, and no cultural heritage resources were identified for this alternative.

There would be some additional site preparation considerations and costs associated with disposal of excavated material as this site has historically been used for industrial purposes.

10 Evaluation of Alternative Solutions

10.1 Common Mitigation Measures

There are common mitigation measures that can be implemented for each of the alternative solutions which are summarized below.

- Protects environmental features
    - Replanting in adjacent areas is recommended to mitigate impacts to trees.
    - Reseeding post construction with a native seed mix in adjacent areas and cultural meadow communities to re-establish native ground cover that includes appropriate species.
- Protects wildlife and species at risk
    - Scheduling of construction activities (e.g. vegetation/tree removal) to avoid the most sensitive period for wildlife (in particular, breeding birds) is recommended to mitigate impacts to wildlife and ensure project compliance under the MBCA.
    - Use of best management practices to deter nesting/use of structures throughout the construction period are recommended to mitigate impacts to wildlife.
- Protects groundwater, streams and rivers
    - Each alternative option includes adequate space to accommodate installation of emergency storage to mitigate impacts to surface water quality associated with overflow events as a result of peak sewage flows which exceed the capacity of the pumping station.
    - A hydrogeological study and a Permit to Take Water may be required in the detailed design stage for the preferred option to quantify and mitigate impacts to groundwater during construction.
    - Where a need for dewatering is identified, mitigation and monitoring will be required to ensure protection of water quality and quantity in surface water features to ensure protection of aquatic SAR and fish habitat in the Grand River and its tributaries (including consideration for how groundwater will be treated and where it will be directed during dewatering).
- Minimizes climate change impacts
    - Each option can mitigate impacts to climate change by planting native vegetation as part of landscaping efforts following construction to mitigate

runoff, by promoting infiltration, and to sequester atmospheric carbon in the soil.
    - Energy efficient equipment and good standard operating procedures can be implemented for each option to minimize future energy requirements.
- Manages and minimizes construction impacts
    - Potential impacts during construction due to additional truck traffic and noise can be mitigated with proper construction practices and schedules.
- Ability to adapt to climate change
    - The addition of emergency storage will increase the resiliency of each option to intense storm events.
    - Installation of a standby power system will support the station's ability to maintain service and adapt to climate change impacts.

Table 12 in Section 10.2 will focus on evaluating the differences between alternative solutions.

10.2 Detailed Evaluation Matrix

The detailed evaluation of alternative solutions was carried out in Table 12 according to the evaluation methodology described in TM 3 and summarized in Section 8 above. Each alternative was assessed under each criterion and assigned a score. Potential risks, mitigation measures, and scoring rationale are provided for each alternative under each criterion. The scores were totaled for each option. The alternative that scored the highest is considered to provide the most overall benefit to this project and thus, has been selected as the preliminary preferred solution.

In Section 10.3, the evaluation category weightings were reviewed to determine whether changes in weighting of the evaluation categories would have any impact on the selection of the preliminary preferred alternative.

Table 12: Evaluation of Alternative Solutions

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Environmental Criteria				
Protects environmental features Protect sensitive natural features (Core Features include natural heritage system, provincially significant wetlands, environmentally sensitive policy areas, regional forests, forests greater than 4 ha, and significant valley features). Minimize impacts on the GRCA regulated floodplain. Minimize the potential impact from construction and operation to existing vegetation (including species at risk) and vegetation communities.	 This option would provide adequate footprint for installation of emergency storage and a new station in the future to accommodate the ultimate 470 L/s capacity. The additional infrastructure is not sited within core environmental features or regulated areas. Lands adjacent to the existing SPS building that are required for expansion are primarily comprised of cultural meadow and disturbed areas. Seeding adjacent cultural meadow with a native seed mix (to include Milkweed) would mitigate impacts to vegetation associated with loss of existing cultural meadow. Given the opportunity available to enhance adjacent cultural meadow areas, impacts to vegetation associated with removal of cultural meadow are considered low.	 This option would provide adequate footprint for the construction of a new SPS, wet well, and emergency storage on City of Kitchener land. This is the only option proposed within the GRCA regulated floodplain and core environmental features associated with the Grand River Valley. Flood mitigation measures will be required in the design of new infrastructure on this property. This option encroaches into a small adjacent cultural meadow community with a few open grown trees. Overall extent of impacts to vegetation are reduced given that a portion of the site is previously disturbed (gravel parking lot). However, if the parking lot and access for the Walter Bean Trail needs to be relocated it may disturb more naturalized areas. Given the location of this option (in the floodplain and core environmental features), impacts are assessed as intermediate – high.	 This option would provide adequate footprint for the construction of a new SPS, wet well, and emergency storage on City of Kitchener land. This option is not sited within core environmental features or regulated areas. This site is primarily comprised of cultural meadow and disturbed areas. Seeding adjacent cultural meadow with a native seed mix (to include Milkweed) would mitigate impacts to vegetation associated with loss of existing cultural meadow. Given the opportunity available to enhance adjacent cultural meadow areas, impacts to vegetation associated with removal of cultural meadow are considered low.	 This option would provide adequate footprint for the construction of a new SPS, wet well, and emergency storage within a fully developed property. This option is not sited within core environmental features or regulated areas. Very little vegetation is evident within this property (some open grown trees and shrubs at edges) and the operational footprint does not encroach into any vegetation communities. The impacts to environmental features associated with this option are considered minor.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Protects wildlife and species at risk Minimize impacts to wildlife and wildlife habitat (including species at risk).	 Adequate footprint for the installation of emergency storage for this option is proposed on nearby City of Kitchener property to avoid encroachment into the steep-sloped and wooded area and associated wildlife habitat within the Region's property bordering Highway 85. The cultural meadow represents habitat for breeding birds and monarch butterflies. The existing SPS provides nesting opportunities for breeding birds (American Robin actively nesting on SPS in 2019). As well, disturbed areas north of the existing SPS with piled debris have the potential to be used by wildlife for basking or cover. Given the extent of disturbance and habitat removal, along with the diversity of species observed using the site, impacts to wildlife associated with this option are considered low.	 A portion of the footprint for this option is located within the meadow community adjacent to the parking lot where general wildlife habitat is available. Birds were documented nesting within the community in 2019. Surrounding areas of meadow and forested riparian communities offer higher diversity of habitat. However, if the parking lot and access for the Walter Bean trail needs to be relocated it may impact wildlife and species at risk. Overall, given the small area of cultural meadow affected and the limited diversity of habitat that it represents, impacts to wildlife associated with this option are considered low.	 This option is located within a cultural meadow community and disturbed land. The cultural meadow represents habitat for breeding birds and monarch butterflies. Overall, given the small area of cultural meadow affected and the limited diversity of habitat that it represents, impacts to wildlife associated with this option are considered low.	 Given the disturbed nature of the site, no natural areas representing wildlife habitat were noted. However, built structures and debris on site may be used by wildlife (birds, snakes, small mammals) for nesting, basking or cover from predators. Minor impacts to wildlife and habitat are anticipated for this option given its location, exiting land use, and lack of natural vegetation and associated wildlife habitat.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Protects groundwater, streams and rivers Protect groundwater and respect Clean Water Act requirements. Minimize impacts to aquatic species and their habitat (including species at risk) associated with the Grand River and its tributaries.	 This option is sited well away from the Grand River and its tributaries. However, it is located in the same footprint as a main City of Kitchener stormwater conveyance system which drains to the Grand River. Additional mitigation measures will be required to ensure that runoff from construction and normal station operation does not impact stormwater collection and drainage. Impacts to groundwater and surface water are considered low for this option and primarily associated with sedimentation control, and dewatering during construction.	 Of all the options under consideration, this option is sited closest to the Grand River and its tributaries. The setbacks (minimum 30 m) combined with stringent erosion and sedimentation control measures and best management practices for works near water (based on Fisheries and Oceans Canada guidelines) are anticipated to protect water quality and associated fisheries habitat, including that for SAR mussels. Given the location of this option (in floodplain representing potential Silver Shiner habitat), impacts to aquatic habitat are assessed as intermediate.	 This option is sited well away from the Grand River and its tributaries. However, it is located in close proximity to a City of Kitchener stormwater conveyance system which drains to the Grand River. Additional mitigation measures will be required to ensure that runoff from construction and normal station operation does not impact stormwater collection and drainage. Impacts to groundwater and surface water are considered low for this option and primarily associated with sedimentation control and dewatering activities during construction.	 This option is sited well away from the Grand River and its tributaries. Impacts to groundwater and surface water are considered minor for this option and primarily associated with the potential for dewatering.
Minimizes climate change impacts Minimize GHG emissions and negative impacts on the landscape which may alter the ecosystems' ability to remove carbon dioxide from the atmosphere (e.g. changes to site and vicinity plant cover). Prioritize energy and water conservation and efficiency measures and/or adaptive re-use of buildings or structures to reduce	 This option would provide adequate footprint for the installation of emergency storage on nearby City of Kitchener property to preserve the existing wooded area on the Region's property – thereby maintaining the ecosystem's ability to remove carbon dioxide from the atmosphere.	 The process of constructing a new station will contribute to GHG emissions more so than upgrading the existing station as the construction work will require new materials and several months of use of heavy machinery.	 The process of constructing a new station will contribute to GHG emissions more so than upgrading the existing station as the construction work will require new materials and several months of use of heavy machinery.	 The process of constructing a new station will contribute to GHG emissions more so than upgrading the existing station as the construction work will require new materials and several months of use of heavy machinery.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
new energy or material demands. Evaluate contributions to or investments in natural spaces that offset or mitigate the alternative's climate change impacts.	Upgrading the existing station is the most efficient option for reuse of existing buildings and tanks. Using the existing facilities will reduce new construction energy and material demands. Minimal grass and shrub removal will have a minor impact on this area's ability to remove carbon dioxide from the atmosphere. Overall, this option has low climate change impacts as compared to the other feasible alternative solutions.	A new station can be designed to be energy efficient and provide more flexibility for the design of energy efficient pumps than reusing an existing building. Minimal grass and shrub removal will have a low impact on this area's ability to remove carbon dioxide from the atmosphere. Overall, this option has intermediate climate change impacts as compared to the other feasible alternative solutions.	A new station can be designed to be energy efficient and provide more flexibility for the design of energy efficient pumps than reusing an existing building. Minimal grass and shrub removal will have a low impact on this area's ability to remove carbon dioxide from the atmosphere. Overall, this option has intermediate climate change impacts as compared to the other feasible alternative solutions.	A new station can be designed to be energy efficient and provide more flexibility for the design of energy efficient pumps than reusing an existing building. This site does not currently have plant cover, therefore there is no impact on the area's limited ability to remove carbon dioxide from the atmosphere. Overall, this option has low climate change impacts as compared to the other feasible alternative solutions.
Social Criteria				
Minimizes impacts to residents related to noise, odour, traffic, and aesthetics. Minimize noise, odour, and truck traffic affecting the community during pumping station operation. Maintain access to and aesthetics of public spaces (including the Walter Bean Grand River Trail). Minimize negative impacts that may result due to changes to the neighbourhood characteristics (e.g., recreational features, green space, property values).	 Upgrading the existing station will result in a similar operational routine to existing. Additional nuisance impacts are not expected during normal station operations. The new emergency storage tank will be more visible from Riverbend Drive than only the footprint of the existing station, and any potential aesthetic impact will need to be minimized through a landscaping plan. For this option, larger trucks accessing the station may not have sufficient area to turn around within	 There may be more potential for noise and odour impacts due to the proximity of this site to public use of the nearby Walter Bean Trail. In addition, the relocation of the existing parking lot for the siting of the station may decrease the utility of the Trail for the public. Impacts can be mitigated by relocating the parking lot to an area close to the Trailhead, providing aesthetic appeal in the design of the station, and allowing space for an odour control system at the new station site.	 This site is removed from public spaces, including the Walter Bean Trail. This station may be more visible from Riverbend Drive than the existing station, but impacts could be minimized with a landscaping plan. Additional nuisance impacts are not expected during normal station operations. Impacts to residents related to noise, odour, traffic, and aesthetics are anticipated to be low for this option compared to the other feasible alternative solutions.	 A new station on private property will not decrease the access to or aesthetics of public spaces in the area. Additional nuisance impacts are not expected during normal station operations. Overall, this option is anticipated to have minimal impacts to residents related to noise, odour, traffic, and aesthetics as compared to the other feasible alternative solutions.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
	the site. This will cause trucks to use Riverbend Drive to back into the station, potentially impacting traffic and residents trying to access the nearby trail parking. Overall, this option is anticipated to have low impacts to residents related to noise, odour, traffic, and aesthetics as compared to the other feasible alternative solutions.	Impacts to residents related to noise, odour, traffic, and aesthetics are anticipated to be intermediate for this option compared to the other feasible alternative solutions.		
Minimizes impacts to businesses Maintain access for businesses during construction and operation. Minimize potential negative effects on short-term and long-term business vitality, and community growth and development.	 This option is anticipated to have intermediate impact to businesses during construction bypass pumping and staging operations given the limited laydown areas available on the existing site. There is also more potential that truck traffic will need to wait along the side of the road during construction. Large trucks also would not have sufficient turn around space at this location and would need to back up on Riverbend Drive, potentially impacting access to nearby businesses.	 Minimal impacts to businesses during construction and operation for this option are anticipated.	 Minimal impacts to businesses during construction and operation for this option are anticipated.	 The Region must first purchase this property from the current private landowner to construct a station in this location. The industrial business which operates on this land will be impacted and displaced to accommodate a new SPS construction. The site is also directly adjacent to neighbouring businesses which may be impacted during construction and operation. Overall, this option is anticipated to have intermediate to high impacts to businesses.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Manages and minimizes construction impacts Minimize noise, odour, road closures, and truck traffic affecting the community during construction.	 During construction of this option, the community may be affected by bypass pumping and staging operations that cause noise, odour, road closures, and truck traffic given the limited laydown areas available on the existing site. There is a limited footprint for construction vehicles on this site. Additional construction mitigation measures will be required to avoid construction truck traffic (i.e. cement trucks and soil hauling trucks) waiting on Riverbend Drive. Overall, this option has a low ability to manage and minimize construction impacts.	 Compared to other new station site options, there will be more significant potential impacts during construction at this site due to additional truck traffic and noise in the vicinity of the Walter Bean Trail and parking lot. Parking and access to the Trailhead throughout construction is recommended to further mitigate impacts. Overall, this option has an intermediate ability to manage and minimize construction impacts.	 Impacts will be limited to the open area north of the station and the Spring Valley SPS site during construction. There will be sufficient space within the construction area for multiple trucks to enter the site at a time. Overall, this option has an excellent ability to manage and minimize construction impacts.	 Impacts will be limited to industrial lands and the Spring Valley SPS site during construction. There will be sufficient space within the construction area for multiple trucks to enter the site at a time. Overall, this option has an excellent ability to manage and minimize construction impacts.
Conserves built heritage resources and/or cultural heritage landscapes Minimize potential impacts to built heritage resources and cultural heritage landscapes.	 Following a windshield survey of the study area, no cultural heritage resources were identified that could be impacted by Alternative 1, upgrading the existing station.	 Following a windshield survey of the study area, two cultural heritage resources with the potential to be impacted by Alternative 2A were identified: Grand River Corridor and Walter Bean Trail. The construction of a new station on this site has the potential to have a direct impact on the Walter Bean Trail, including trail	 Following a windshield survey of the study area, no cultural heritage resources were identified that could be impacted by Alternative 2B, construction of a new station.	 Following a windshield survey of the study area, no cultural heritage resources were identified that could be impacted by Alternative 2C, construction of a new station.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
		access, and indirect impacts to the Grand River Corridor. Impact mitigation should be determined through the completion of a Heritage Impact Assessment.		
Conserves archaeological resources Minimize potential impacts to archaeological resources and areas of archaeological potential.	Stage 1 and 2 archaeological investigations were performed within the Alternative 1 area. The Stage 2 assessment did not result in the identification of archaeological materials. Based on the preliminary study results, upgrading the existing station will have no impact to known archaeological resources.	Stage 1 and 2 archaeological investigations were performed within the Alternative 2A area. The Stage 2 assessment did not result in the identification of archaeological materials. Based on the preliminary study results, construction of a station on this site will have no impact to known archaeological resources.	Stage 1 and 2 archaeological investigations were performed within the Alternative 2B area. The Stage 2 assessment did not result in the identification of archaeological materials. Based on the preliminary study results, construction of a station on this site will have no impact to known archaeological resources.	Stage 1 and 2 archaeological investigations were performed within the Alternative 2C area. The Stage 2 assessment did not result in the identification of archaeological materials. Based on the preliminary study results, construction of a station on this site will have no impact to known archaeological resources.
Protects health and safety Minimize the potential risk to public health and safety, particularly on downstream users (including for recreation and tourism). Minimize the potential risk to operator and maintenance staff's health and safety.	Operation of the existing pump station will be more complex during construction activities to upgrade the existing station. There is a greater chance of a sewage bypass event at the station during construction which poses risks to downstream users. While health and safety will be improved as part of this upgrade, there will be constraints associated	This option will minimize risks to public and operators' health and safety. Operators can continue to normally operate the existing pump station while the new pump station is constructed offline. A new pump station provides the most design flexibility and best opportunity for minimize risks to operations staff.	This option will minimize risks to public and operators' health and safety. Operators can continue to normally operate the existing pump station while the new pump station is constructed offline. A new pump station provides the most design flexibility and best opportunity for minimize risks to operations staff.	This option will minimize risks to public and operators' health and safety. Operators can continue to normally operate the existing pump station while the new pump station is constructed offline. A new pump station provides the most design flexibility and best opportunity for minimize risks to operations staff.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
	with reusing the existing infrastructure. Overall, this option has an intermediate ability to meet the requirements to protect health and safety.	Overall, this option has an excellent ability to meet the requirements to protect health and safety.	Overall, this option has an excellent ability to meet the requirements to protect health and safety.	Overall, this option has an excellent ability to meet the requirements to protect health and safety.
Technical Criteria				
Provides reliable service Prioritize security, reliability and robustness. Lesser likelihood of process upset or mechanical breakdown.	This option will provide long-term reliability of the station's operation and assets. Emergency expenditure due to equipment failure would be minimized with the proposed replacement of process and electrical assets. There may be more limitations on providing redundancy within the existing station, compared to building a new pumping station. Therefore, this option has an intermediate ability to provide reliable service.	This option will provide long-term reliability of the station's operation and assets. Emergency expenditure due to equipment failure would be minimized with the proposed new station, which would include new process and electrical assets. The design of new wet well, station building, and emergency storage infrastructure can accommodate ultimate station capacity. Overall, a new station has an excellent ability to provide reliable service.	This option will provide long-term reliability of the station's operation and assets. Emergency expenditure due to equipment failure would be minimized with the proposed new station, which would include new process and electrical assets. The design of new wet well, station building, and emergency storage infrastructure can accommodate ultimate station capacity. Overall, a new station has an excellent ability to provide reliable service.	This option will provide long-term reliability of the station's operation and assets. Emergency expenditure due to equipment failure would be minimized with the proposed new station, which would include new process and electrical assets. The design of new wet well, station building, and emergency storage infrastructure can accommodate ultimate station capacity. Overall, a new station has an excellent ability to provide reliable service.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Meets existing and future needs Meets the long-term capacity requirements to service the projected population growth in the sanitary catchment area. Provide appropriate site access and egress for operations and maintenance per current standards and best practices. Provide operational redundancy to allow for maintenance and cleaning of equipment and infrastructure. Minimize increases in operational and/or maintenance complexity of the station.	 This option will upgrade the existing station to meet existing and future needs of the service area, including increased capacity to 350 L/s in the short-term. There may be more limitations on providing redundancy and bypass flexibility within the existing station, compared to building a new pumping station. In addition, the existing wet well and station building will require a new station to accommodate future station capacity of 470 L/s as anticipated to be required based on climate change modelling. Overall, this option has an intermediate ability to meet existing and future needs.	 This option will provide a new station that meets the existing and future needs of the service area, including increased capacity to 350 L/s in the short-term with ultimate capacity requirements of 470 L/s. Redundancy and bypass flexibility can be incorporated with equipment meeting current industry standards and best practices. Overall, this option has an excellent ability to meet existing and future needs.	 This option will provide a new station that meets the existing and future needs of the service area, including increased capacity to 350 L/s in the short-term with ultimate capacity requirements of 470 L/s. Redundancy and bypass flexibility can be incorporated with equipment meeting current industry standards and best practices. Overall, this option has an excellent ability to meet existing and future needs.	 This option will provide a new station that meets the existing and future needs of the service area, including increased capacity to 350 L/s in the short-term with ultimate capacity requirements of 470 L/s. Redundancy and bypass flexibility can be incorporated with equipment meeting current industry standards and best practices. Overall, this option has an excellent ability to meet existing and future needs.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Aligns with existing and planned infrastructure Optimize existing infrastructure investment including structures, tanks, and equipment. Align with planned infrastructure projects including recommendations of the Region's 2018 Wastewater Treatment Master Plan Update, the MTO new Highway 7 Interchange project to install a new Spring Valley SPS forcemain, and City of Kitchener stormwater management projects.	 Upgrading the existing station best optimizes the use of existing infrastructure, including the station building and wet well. However, the majority of existing equipment requires replacement due to age and condition. This option aligns with planned infrastructure projects. It would involve minimal change to the preliminary design of the forcemain as part of the MTO new Highway 7 Interchange project. Coordination with the City of Kitchener regarding stormwater management uses for this property will be required. Overall, this option aligns well with existing and planned infrastructure.	 This option would require significant new infrastructure, including a new station building, wet well, emergency storage, and new equipment. There would be some modifications required to planned infrastructure projects, including increasing the length of the forcemain as part of the MTO new Highway 7 Interchange project. Overall, this option aligns well with existing and planned infrastructure.	 This option would require significant new infrastructure, including a new station building, wet well, emergency storage, and new equipment. There would be some modifications required to planned infrastructure projects, including increasing the length of the forcemain as part of the MTO new Highway 7 Interchange project. Coordination with the City of Kitchener for an easement for the stormwater infrastructure in close proximity to this property will be required. Overall, this option aligns well with existing and planned infrastructure.	 This option would require significant new infrastructure, including a new station building, wet well, emergency storage, and new equipment. There would be some modifications required to planned infrastructure projects, including decreasing the length of the forcemain as part of the MTO new Highway 7 Interchange project. Overall, this option aligns well with existing and planned infrastructure.
Aligns with existing and future land use Evaluate need to acquire land for new pumping station or expansion of pumping station and ownership requirements.	 Upgrading the existing station will require acquiring adequate footprint from the City of Kitchener for the installation of emergency storage. However, the majority of the Region-owned site can be re-used.	 Constructing a new station on this site will require acquiring land from the City of Kitchener. The City of Kitchener currently uses this land for a trailhead and parking lot for the Walter Bean Trail. Acquiring this land	 Constructing a new station on this site will require acquiring land from the City of Kitchener, however, this is currently open space. This option provides limited flexibility for the City of Kitchener to upgrade stormwater infrastructure in the area	 The Region must acquire property from a private landowner to construct a station in this location. The existing land use of the property is an industrial business. Constructing a SPS on this property does not align with the business owner's and

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
	This option provides limited flexibility for the City of Kitchener to upgrade stormwater infrastructure in the area of the existing pumping station and modify the overland flow path, until the new station is constructed in 30 years. When the new station is constructed in 30 years, construction methods to protect the City's aging stormwater culvert will need to be considered. Overall, this option aligns neither well, nor poorly with existing and future land use.	for a new station will not align with the existing and future land use. This option provides the City of Kitchener with more flexibility in managing stormwater infrastructure in the vicinity of the existing station. Overall, this option aligns poorly with existing and future land use.	of the new pumping station. However, the new station will be located away from the existing overland flow traveling down the steep slope from HWY 85. Overall, this option aligns well with existing and future land use.	landowner's existing or future land use. This option provides the City of Kitchener with more flexibility in managing stormwater infrastructure in the vicinity of the existing station. Overall, this option aligns poorly with existing and future land use.
Aligns with approval and permitting process Minimize the complexity and time spent to obtain approvals from various regulatory agencies.	This option will require an amended Environmental Compliance Approval, and potentially a Permit to Take Water. Overall, this option aligns well with the approval and permitting process.	This option will require an amended Environmental Compliance Approval, and potentially a Permit to Take Water. Given that this site is also within the GRCA regulated floodplain, a GRCA-issued permit will be required for construction. Overall, this option aligns neither well, nor poorly with the approval and permitting process.	This option will require an amended Environmental Compliance Approval, and potentially a Permit to Take Water. Overall, this option aligns well with the approval and permitting process.	This option will require an amended Environmental Compliance Approval, and potentially a Permit to Take Water. Overall, this option aligns well with the approval and permitting process.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Manages and minimizes construction risks Minimize complexity of construction and maximize ability to maintain adequate sewage pumping services during construction.	Upgrading the existing station presents challenges for constructability while maintaining the continuous operation of the station. Short and long-term shutdowns are possible if appropriate contingency plans are in place. The area available for construction laydown is limited for this alternative and may require the temporary use of nearby City of Kitchener land. In addition, tie-ins and temporary pumping during construction will be required during the connection of emergency storage, standby generator, and major process equipment. Major coordination effort with operators, with the potential for overnight work, will be required. Overall, this option has a poor ability to manage and minimize construction risks.	Constructing a new station offline and removed from the existing Spring Valley SPS day-to-day operation minimizes the complexity of construction and maximizes the ability to maintain adequate sewage pumping services during construction. Overall, this option has an excellent ability to manage and minimize construction risks.	Constructing a new station offline and removed from the existing Spring Valley SPS day-to-day operation minimizes the complexity of construction and maximizes the ability to maintain adequate sewage pumping services during construction. Overall, this option has an excellent ability to manage and minimize construction risks.	Constructing a new station offline and removed from the existing Spring Valley SPS day-to-day operation minimizes the complexity of construction and maximizes the ability to maintain adequate sewage pumping services during construction. Overall, this option has an excellent ability to manage and minimize construction risks.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Ability to adapt to climate change Promote resiliency to extreme weather events. Prioritize climate change adaptation to minimize risk associated with variation in climate parameters (temperature, precipitation, wind gusts, or other) and natural hazards (flooding, high river levels, or other). Prioritize the surrounding area's ability to be resilient and maintain its adaptive capacity to climate change (Grand River floodplain capacity, local stormwater drainage pathways).	 The addition of emergency storage will increase the resiliency to intense storm events. Option provides limited flexibility for the City of Kitchener to upgrade local stormwater drainage pathways in the area of the existing pumping station. The existing wet well and station building will require modifications to accommodate future station capacity of 470 L/s as anticipated to be required based on climate change modelling. Overland flow events will increase in intensity and frequency as a result of climate change. Given the proximity to the steep slopes and low elevation, this option is the most susceptible to flooding. Overall, this option has an intermediate ability to adapt to climate change.	 The addition of emergency storage will increase the resiliency to intense storm events. This option's location in the GRCA regulated floodplain necessitates the need for flooding mitigation and buffering in the station's design. Mitigation measures must be undertaken to maintain the overall floodplain storage capacity of the Grand River watershed. Overall, this option has a good ability to adapt to climate change.	 The addition of emergency storage will increase the resiliency to intense storm events. Option provides limited flexibility for the City of Kitchener to upgrade local stormwater drainage pathways in the area of the new pumping station. Overall, this option has a good ability to adapt to climate change.	 The addition of emergency storage will increase the resiliency to intense storm events. Provides the City of Kitchener with more flexibility to upgrade local stormwater drainage pathways in the vicinity of the existing station. Overall, this option has an excellent ability to adapt to climate change.

Criteria	Alternative 1: upgrade existing station with offsite emergency storage Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2A: new station in Walter Bean Trail parking lot Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2B: new station in open area north of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale	Alternative 2C: new station on industrial land south of existing station Score, Potential Risks, Mitigation Measures, and Scoring Rationale
Financial Criteria				
Provides low lifecycle cost Minimize capital, operation and maintenance (life cycle) costs over a 50-year period.	 Present value life-cycle cost, including constructing a new station in 30 years: $24M	 Present value life-cycle cost: $25M	 Present value life-cycle cost: $24M	 Present value life-cycle cost: $34M
Overall Ranking			 Preferred Alternative	

The preliminary preferred alternative based on the detailed evaluation matrix is:

- Alternative 2B – new station in open area north of existing station.

The benefits, implementation schedule, preliminary cost, and anticipated potential impacts and mitigation measures of Alternative 2B are further discussed in Section 11.

10.3 Sensitivity Analysis

A sensitivity analysis was performed by category (Environmental, Social, Technical, and Financial) by increasing the weighting factors of each category to 30 percent, 40 percent, and 50 percent, sequentially. Applying such a weighting to a category increased its relative importance in the overall evaluation and reduced the weighting of all other categories equally. A detailed table containing the results of the sensitivity analysis, including the preferred alternative in each case, is included in the Appendix D of TM 4.

Based on the sensitivity analysis results, Alternative 2B – new station in open area north of existing station remained the preliminary preferred alternative for the majority of adjustments to the category weightings. There was one occurrence in the sensitivity analysis that did not result in Alternative 2B as the sole preliminary preferred alternative when the weighting of the Environmental category was increased to 50 percent, Alternative 2C was the preliminary preferred alternative by a very small margin.

Based on feedback from stakeholders, the project steering committee, and project team members, and considering the results of the sensitivity analysis, the evaluation is considered sufficiently robust and the preliminary preferred alternative has been selected based on sound decision-making principles.

11 Preferred Solution

The following section summarizes:

- The preferred solution for the Spring Valley SPS Class EA,
- Implementation schedule,
- Permits and approvals, and
- Impacts and mitigation measures.

11.1 Overview

The results of the detailed evaluation and sensitivity analysis support the selection of Alternative 2B – new station in open area north of existing station as the preferred solution for the Spring Valley SPS. A simplified site plan of the preferred alternative solution is shown in Figure 23.

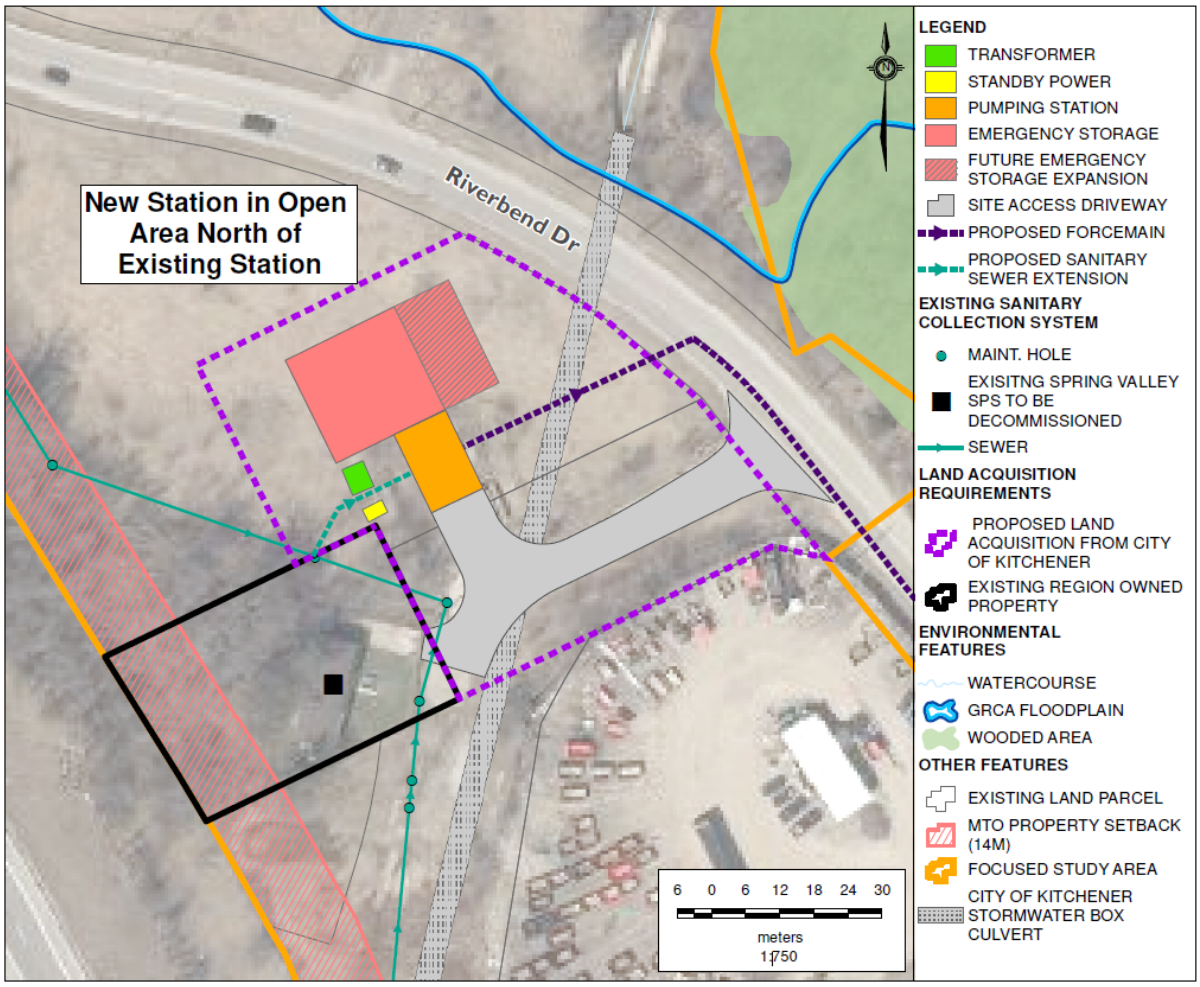


Figure 23: Spring Valley SPS Class EA – Preferred Alternative

The benefits of Alternative 2B include the ability to minimize operational impacts to the existing station during construction, the proximity of the proposed new station site to the existing station and sewer network, and the best overall score considering environmental, social, technical, and financial factors.

Lands that are required for the preferred solution are primarily comprised of disturbed land and cultural meadow. Given the low diversity/quality of vegetation, the level of impact associated with this option is considered low. Construction disturbance for this option should avoid intrusion into the nearby deciduous forest and associated wildlife habitat. Anticipated natural environment disturbance and mitigation measures for the construction of the preferred solution are discussed in Section 11.4.1.

Archaeological and cultural heritage investigations concluded that soils are mostly fill material with no identified archaeological resources and no identified cultural heritage resources. This property is not connected to a walking trail or used for recreational purposes.

The following next steps should be considered to pursue implementation of the preferred solution:

- The preferred solution involves constructing a new station on City of Kitchener property located north of the existing Spring Valley SPS on the south-west side of Riverbend Drive.
- A geotechnical investigation of the new station site is recommended to inform future design stages.
- A connection from the existing sanitary sewer to the new pumping station will be required. A preliminary layout of the new sanitary sewer configuration is shown in Figure 23 and will be further reviewed in conceptual, preliminary, and detailed design.
- The City of Kitchener parcel north of the proposed station will be required for laydown and construction staging to maintain access for operations to the existing station during construction.
- The preferred solution will include decommissioning the existing Spring Valley SPS following construction and commissioning of the new station.
- Coordination with the MTO during conceptual, preliminary, and detailed design will be essential to accurately size the new raw sewage pumps for the future forcemain. Use of the existing forcemain during the design and construction of the new forcemain may be required.

The recommended alternative solution and the rationale for its selection were presented for comments at the second PCC held virtually between January 27 and February 26,

2021. Since no objections or major comments were received in regards to the preliminary preferred solution, subsequent to PCC No. 2, the project team confirmed Alternative 2B - new station in open area north of existing station as the preferred solution for this Class EA study.

11.2 Implementation Schedule

The preferred solution is expected to be implemented in two phases as follows:

- Phase 1: Construction of new Spring Valley SPS and emergency storage to meet 350 L/s capacity.
- Phase 2: Expansion of the Spring Valley SPS and emergency storage to meet 470 L/s capacity.

The design and implementation of Phase 1 will occur in the short-term to meet the immediate needs for the Spring Valley SPS while incorporating long-term objectives for the continued reliable operation of the station. The need for implementing Phase 2 upgrades will be monitored over the planning period to determine when capacity expansion to 470 L/s will be required. The proposed timeline for the completion of Phase 1 of the project is shown in Table 13.

Table 13: Phase 1 Implementation Schedule

Next Steps	Proposed Implementation Timeline
MECP Draft Project File Report Review	Spring 2021
Project File Report – 30 Day Review	Summer 2021
Confirm preferred alternative solution based on comments received during 30-day review period	Fall 2021
Conceptual Design of Phase 1	Fall 2021
Detailed Design of Phase 1	2022
Construction of Phase 1	2023-2024

11.3 Permits and Approvals

Permits and approvals required with the proposed Phase 1 works associated with the preferred solution are shown in Table 14.

Table 14: Required Permit and Approvals

Agency	Permit / Approval Description
Ministry of Environment, Conservation and Parks	• A revised ECA for sewage works will be required due to the recommended capacity increase for Spring Valley SPS. • A new standby power generator is expected to be less than 700 kW and therefore will be an EASR eligible activity. Standby power generators of 700 kW or greater are required to have an ECA air. • A Permit to Take Water may be required during construction activities if dewatering activities are required. An EASR may be required during construction if dewatering over 50 m /day but less than 400 m3/day is required. • Relocation permits, for wildlife, may be required if removals are needed during construction.
City of Kitchener	• Site Plan Approval and a Building permit will be required to construct the new station and decommission the existing Spring Valley SPS structure. • Should any trees require removal, removal will comply with applicable municipal by-laws as well as with the federal Migratory Birds Convention Act (1994), respecting the applicable April 1 – August 31 nesting period for this zone.
Electrical Safety Authority	• All electrical installations, repairs, replacements or alterations in Ontario need to be done in compliance with the Ontario Electrical Safety Code, and all necessary Notifications ("permits") must be taken out. This creates a permanent record of the work and triggers a review process by the Electrical Safety Authority.
Grand River Conservation Authority	• Consultation with the GRCA is recommended to mitigate any impacts to the nearby regulatory floodplain and confirm permit requirements.
Local Utilities	• Utility clearance from local utilities, as required.

11.4 Anticipated Potential Impacts and Mitigation Measures

This section describes the potential impacts anticipated from the construction of the new Spring Valley SPS, as well as the recommended mitigating measures to avoid or minimize such impacts.

Implementation of the preferred solution is not expected to have significant impacts on the existing natural environment; however, as with any construction project, there will be some temporary potential impacts to the public and environment during construction in areas such as noise, dust, vibration and visuals during the construction period. Most of the impacts will be of short-term duration and expected to occur only during construction. Property owners adjacent to the sites where construction activities will take place should be notified in advance and provided with Regional contact information should they encounter any problems during construction.

Public health and safety is a priority to the Region and as such, all design and construction related to the construction of the new Spring Valley SPS will adhere to strict safety guidelines and all applicable codes and standards. All construction work will be carried out in accordance with the Occupational Health and Safety Act (OHSA) and other local regulations.

Specific mitigation measures, as described below, are recommended for implementation to reduce anticipated potential impacts.

11.4.1 Disturbance to Natural Environmental Features

A natural science investigation was conducted by LGL Limited, as part of this Class EA study, to inventory the existing natural heritage conditions within the study area, identify potential environmental impacts associated with the construction of the proposed works, and establish approaches to mitigate these possible impacts. A Terms of Reference was circulated to GRCA and MNRF prior to initiation of the investigation in order to obtain feedback on the proposed effort, survey protocols and field work. The complete Scoped Environmental Impact Report is provided in Appendix C. This section outlines the main issues considered during the assessment including anticipated impacts and proposed mitigating measures.

Approximately 62% of the permanent/operational footprint (new SPS, existing site access driveway, and a portion of the emergency overflow tank) is sited outside of vegetation communities in areas previously disturbed by SPS operations and storage of materials. Approximately 35% of the permanent/operational footprint (new transformer, standby power, and the majority of the emergency overflow tank and area identified for

tank expansion) is located within the cultural meadow community, and the remainder of the permanent footprint (3%) overlaps with an existing hedgerow along the edge of the existing access driveway.

The cultural meadow community on which a portion of the new Spring Valley SPS construction is proposed provides habitat for a number of common and secure species, including a number of birds. Barn Swallow was observed foraging, however; no nests were found on existing structures. Should Barn Swallow or active nests of the species be found to occur, further consultation with MECP will be required to ensure compliance under the *Endangered Species Act*. Construction within timing windows is recommended for any proposed activity at this location to ensure compliance with the MBCA.

Potential direct and indirect impacts to vegetation and associated habitat within and around the construction zones can be avoided by using standard mitigation measures during construction such as:

- Avoid removal of vegetation during the active season for breeding birds (April 15-August 15),
- Ensure all equipment is cleaned prior to transportation to, and use on, the site to avoid spread or introduction of invasive species seeds onto the site,
- Implement standard practices such as sediment and erosion controls, spill prevention etc., during the construction phase of the project,
- Use of best management practices to deter nesting/use of structures throughout the construction period are recommended to mitigate impacts to wildlife, and
- Reseeding post construction with a native seed mix in adjacent areas and cultural meadow communities to improve the diversity of vegetation. It is suggested that the use of milkweed be specifically included in the seed mix proposed to be used in the cultural meadow.

11.4.2 Archaeological Resources, Built Heritage Resources and Cultural Heritage Landscapes

If archaeological resources are impacted during the implementation of the preferred solution, the Ministry of Heritage, Sport, Tourism and Cultural Industries must be notified at archaeology@ontario.ca. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist will carry out an archaeological assessment in accordance with the Ontario Heritage Act and the Standards and Guidelines for Consultant Archaeologists.

If human remains are encountered, all activities must cease immediately and the local police as well as the Registrar, Burials of the Ministry of Government and Consumer

Services (416-326-8800) must be contacted. In situations where human remains are associated with archaeological resources, the Ministry of Heritage, Sport, Tourism and Cultural Industries should also be notified to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

11.4.3 Climate Change

As discussed in this project file report, the addition of emergency storage will increase the resiliency of the new station to intense storm events caused by climate change. Installation of a standby power system will also support the station's ability to maintain service and adapt to climate change impacts.

Implementation of the following climate mitigation measures should be considered to reduce the long-term generation of carbon emissions arising mainly from operation of the new station and to enhance carbon storage due to proposed changes in the landscape:

- Construction equipment should be appropriately maintained to ensure that exhaust emissions meet industry standards,
- Use of energy efficiency features within the station, such as LED lighting fixtures and insulation to reduce the energy needs, and
- Implementation of an adequate landscape plan, comprising planting of new trees and local non-invasive vegetation species within the new site.

11.4.4 Noise and Vibration

Noise and vibration impacts are not expected to be significant since construction activities will be contained on the new Spring Valley SPS site and are considered temporary. There are no nearby residential properties that would be affected by construction; however, public access to the Walter Bean Trail across Riverbend Drive will be in close proximity to the construction site.

The operation of dewatering equipment, an emergency standby generator and generator testing package at the station would result in production of some noise on site. The proposed station can be designed to meet the applicable MECP sound level limits at all identified offsite Points of Reception. During the detailed design stage, noise and vibration mitigation measures should be considered based on the geotechnical investigation information and construction methods.

In order to further reduce the construction related impacts on the surrounding areas, the following mitigation measures are recommended to be implemented:

- Construction of the project to be carried out in accordance with the municipal noise requirements. Construction equipment will be operated according to the applicable City of Kitchener's Local Noise By-law, which imposes limitations and restrictions for operation of construction equipment between certain hours.
- The standby power generator will be installed in a sound attenuating enclosure and designed to meet noise limits defined by the MECP.

11.4.5 Dust/Mud

Construction traffic could create additional dust and mud. There are no anticipated concerns regarding dust and mud during normal station operation. The proposed mitigation measures for the construction period include the following:

- Dust control measures;
- Maintaining public roadways clean and free of mud on a consistent basis, and
- Temporary fencing should be used around the construction areas to minimize dust/mud impacts.

11.4.6 Source Water Protection

In consultation with the MECP, the Spring Valley SPS is within wellhead protection areas with a number of wells in close proximity to the pumping station. To reduce, manage or eliminate threat of the proposed sanitary sewers and pumping station to drinking water sources, the Region will exercise every effort to reduce the potential for release of sewage by applying best available design and construction practices (i.e., proper design to ensure no surcharging and overflow in the inlet sewer at future flows) and obtaining any necessary approvals from the approval agencies.

One mitigation measure proposed for the preferred solution includes adequate space to accommodate installation of emergency storage to mitigate impacts to surface water quality associated with overflow events as a result of peak sewage flows which exceed the capacity of the pumping station. Additional proposed mitigation measures for the construction and operation period include the following:

- A hydrogeological study and a Permit to Take Water may be required in the detailed design stage for the preferred option to quantify and mitigate impacts to groundwater during construction,
- Where a need for dewatering is identified, mitigation and monitoring will be required to ensure protection of water quality and quantity in surface water features to ensure protection of aquatic SAR and fish habitat in the Grand River and its tributaries (including consideration for how groundwater will be treated and where it will be directed during dewatering),

- There are also standard industrial leak detecting and monitoring technologies for sanitary piping that can be considered in future design stages, and
- Designated equipment fueling areas and spill response procedures.

12 References

Associated Engineering. (1991). *Spring Valley Pumping Station Evaluation.* Regional Municipality of Waterloo.

Associated Engineering. (1992). *Spring Valley Wastewater Pumping Station Upgrade - Design Brief.* Regional Municipality of Waterloo.

Associated Engineering. (1994). *Spring Valley Wastewater Pumping Station Upgrade Contract No. 93001 - Record Drawings.* Region of Waterloo.

CH2M Hill. (2015). *Spring Valley Sewage Pumping Station Flood Mitigation and Stormwater Management Plan - Final Report.* Region of Waterloo.

CIMA Canada Inc. (2016). *Generation System Assessment Spring Valley Pumping Station - Condition Assessment Report.* Region of Waterloo.

CIMA Canada Inc. (2018). *2018 Wastewater Treatment Master Plan - Final Project File Report.* Region of Waterloo.

CIMA Canada Inc. (2018a). *2018 Wastewater Treatment Master Plan - Final Project File Report.* Region of Waterloo.

CIMA Canada Inc. (2018b). *Spring Valley SPS Condition Assessment.* Region of Waterloo.

IC3, University of Waterloo. (2015). *Localized Climate Projections for Waterloo Region.* Kitchener, ON: Prepared for City of Cambridge, City of Kitchener, City of Waterloo, and Region of Waterloo.

MMM Group. (2016). *Contract Drawings - Contract No. 2016-3012 - Highway 7/Victoria Street Underpass.* Ontario: Ministry of Transportation.

Proctor & Redfern Consulting Engineers. (1961). *Spring Valley Sewage Pumping Station Stage No. 1A As Constructed Drawings.* City of Kitchener.

R.V. Anderson Associates Ltd. (2015). *Spring Valley Sewage Pumping Station Preliminary Design.* Region of Waterloo.

R.V. Anderson Associates Ltd. (2015a). *Spring Valley Sewage Pumping Station Preliminary Design.* Region of Waterloo.

R.V. Anderson Associates Ltd. (2015b). *Condition Assessment of Spring Valley Pumping Station (PS) Forcemain Feasibility Study - Final Report.* Region of Waterloo.

R.V. Anderson Associates Ltd. (2016). *Bridgeport Sewage Pumping Station Flow Diversion - Technical Memorandum #1 - Final.* Region of Waterloo.

WSP Canada. (2018). *New Highway 7 Sewer, Forcemain, and Watermain Relocation - Preliminary Design Report and Drawings.* Region of Waterloo and City of Kitchener.

A

Appendix A: Technical Memoranda

A.1

Appendix A.1: TM1

A.2

Appendix A.2: TM2

A.3

Appendix A.3: TM3

A.4

Appendix A.4: TM4

B

Appendix B: Public Consultation Documentation

B.1

Appendix B.1: Public Notices

B.2

Appendix B.2: Public Consultation Centre Materials

B.3

Appendix B.3: Public Correspondence

B.4

Appendix B.4: Agency Consultation

B.5

Appendix B.5: First Nations, Metis and Inuit Communities Consultation

C

Appendix C: Scoped Environmental Impact Report (LGL Limited)

D

Appendix D: Stage 1 and 2 Archaeological Assessment (ARA)

E

Appendix E: Cultural Heritage Report (ARA)

Engineering
for **people**