# TOWNSHIP OF LUCAN BIDDULPH

# CLASS ENVIRONMENTAL ASSESSMENT FOR EXPANSION OF THE LUCAN WASTEWATER TREATMENT FACILITY

# ENVIRONMENTAL STUDY REPORT

BMROSS
engineering better communities

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October 14, 2022

B. M. ROSS AND ASSOCIATES LIMITED
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File No. 21023

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**LIST OF ACRONYMS**

AADF – Annual Average Daily Flow
ABCA – Ausable Bayfield Conservation Authority
AECA – Amended Environmental Compliance Approval
ANSI – Areas of Natural and Scientific Interest
ATRIS – Aboriginal and Treaty Rights Information System
BI – Biotic Index
BMROSS – B.M. Ross and Associates Limited
BOD – Biochemical Oxygen Demand
CHER – Cultural Heritage Evaluation Report
COTTFN – Chippewas of the Thames First Nation
CWA – *Clean Water Act*
DFO – Department of Fisheries and Oceans
DO – Dissolved Oxygen
E. coli – *Escherichia coli*
ECA – Environmental Compliance Approval
ERU – Equivalent Residential Unit
ESA – *Endangered Species Act*
ESR – Environmental Study Report
GHG – Green House Gases
HIA – Heritage Impact Assessment
HVA – Highly Vulnerable Aquifers
IFAS – Integrated Fixed Film Activated Sludge
LHPWSS – Lake Huron Primary Water Supply System
MCEA – Municipal Class Environmental Assessment
MECP – Ministry of Environment Conservation and Parks
MTCS – Ministry of Tourism and Culture and Sport
MNRF – Ministry of Natural Resources and Forestry
NHIC – Natural Heritage Information Centre
O & M – Operational and Maintenance
OCWA – Ontario Clean Water Agency
PIC – Public Information Centre
PPS – Provincial Policy Statement
SARA – *Species At Risk Act*
SGRA – Significant Groundwater Recharge Areas
SPP – Source Protection Plan
SPS – Sewage Pumping Station
SVS – Significant Valley System
TKN – Total Kjeldahl Nitrogen
TMHC – Timmins Martelle Heritage Consultants
TP – Total Phosphorus
TSF – True Sewage Flow
WAS – Waste Activated Sludge
WWTP – Wastewater Treatment Plant

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## ENVIRONMENTAL STUDY REPORT

## EXECUTIVE SUMMARY

## 1.0 INTRODUCTION

### 1.1 General

The Township of Lucan Biddulph initiated a Municipal Class Environmental Assessment (MCEA) process in March 2021 to identify the best strategy for expanding the Wastewater Treatment Plant (WWTP) servicing the community of Lucan. The community of Lucan has experienced significant growth in recent years and is anticipating continued residential growth at similar, or greater, rates over the next 20-25 years as lands designated for growth proceed to development.

Annual average sewage flows to the wastewater treatment facility are expected to be approaching 75% of the plant's rated capacity by the end of 2022, and with current development commitments, will be at 92%. Based on current growth projections flows could exceed the facility's rated hydraulic capacity as early as 2030 and the plant's actual treatment limitations sooner.

The study process followed the procedures set out In the MCEA document, dated October 2000, as amended in 2007, 2011 and 2015. B. M. Ross and Associates Limited (BMROSS) was engaged to conduct the MCEA process on behalf of the Township. The purpose of this report is to document the Schedule C MCEA process followed for this project. The report includes the following major components:

- An overview of the general project area.
- A summary of treatment capacity needs.
- A review of specialized investigations completed in support of the MCEA.
- A description of the alternative solutions considered for resolving the defined problems.
- A synopsis of the decision-making process conducted to select a preferred alternative solution and preferred design option.
- A detailed description of the preferred alternative.

# 2.0 BACKGROUND

## 2.1 Project Study Area

The community of Lucan is located centrally within the Township of Lucan Biddulph, along Highway 4, south of Exeter. The project study area includes the Lucan Wastewater Treatment Plant (WWTP) site and Heenan Drain. In Lucan the collection system generally drains south to north, with a larger Sewage Pumping Station (SPS) located in the north part of the community on Campanale Way north of Walnut Street. That SPS, known as the Chestnut SPS, pumps directly to the WWTP located north of Fallon Drive. One smaller secondary SPS, the Joseph St. SPS is located near the south limit of Lucan.

The WWTP with a rated capacity of 1,700 $m^3$/day discharges treated effluent to the Heenan Drain, which then drains to the Little Ausable River. The Lucan WWTP is located on Fallon Drive outside of the urban settlement area. The wastewater system for Lucan also includes lagoons, located north of the urban limit of Lucan and south of the WWTP site.

## 2.2 Capacity Evaluation

As noted previously, the Lucan WWTP was evaluated as part of a previous Class EA process (Stantec, 2011) and subsequently re-rated from 1,100 $m^3$/day to 1,700 $m^3$/day. No physical changes were made to the principal bio-reactor components (aeration and settling).

### 2.2.1 Existing Wastewater Flows

The following is a summary of recent historical wastewater flow information.

**Table ES-2.1 – Lucan – Historical Wastewater Flows[1.]**

| Year | AADF[2] ($m^3$/day) | Max. Single Day to WWTP ($m^3$) |
|---|---|---|
| 2019 | 1,112 | 2,871 |
| 2020 | 1,018 | 5,641 |
| 2021 | 1,094 | 3,033 |

Notes:
1. Rounded Values
2. AADF = Annual Average Daily Flow

### 2.2.2 Unit Sewage Flows

Wastewater flows were examined for the period 2019 to 2021. During that interval, the number of customers increased steadily, so the total flows have been assessed on a per customer basis.

**Table ES-2.2 – Annual Average Flows per Customer**

| Year | Estimated No. of Customers [1] | Annual Average Flow ($m^3$/day) | Average Flow per Customer ($m^3$/day·cust) |
|---|---|---|---|
| 2019 | 1,263 | 1,112 | 0.880 |
| 2020 | 1,305 | 1,018 | 0.781 |
| 2021 | 1,410 | 1,094 | 0.776 |
| **3-year Average** | **-** | **-** | **0.812** |

Note: 1. Estimated average annual value considering customer data and building permits.

The values in Table 2.1 indicate considerable variability in the total and per customer flow values. For this reason, we propose to use the greater unit value for capacity forecast purposes (i.e. 0.90 $m^3$/day·customer).

For flow forecasting purposes we propose to consider a customer as equivalent to an ERU (Equivalent Residential Unit) which is in turn equivalent to a detached residence. To account for non-residential growth the "per customer flow" has been increased by approximately 10%, resulting in a "design" unit flow of **1.0 $m^3$/ERU·day** for forecasting purposes. Also, for forecasting purposes the expected flow at the beginning of 2022 is assumed to be **1,270 $m^3$/day** based on a per customer flow of 0.9 $m^3$/day and 1,410 customers. Given that recent existing flows have been in the order of 1,100 $m^3$/day, this starting value might seem conservative. In our opinion the general flow variability and the difficulty of establishing an accurate unit flow because new units come on-line at different times through the year, justifies a conservative approach to estimating the 2022 flow.

### 2.2.3 Total Reserve

Typically, the reserve capacity of a WWTP is assessed by deducting the average flow from the previous three to five years from the ECA rated capacity. AADFs at Lucan have been increasing every year, consistent with observed development and are also variable depending on annual precipitation. For that reason, we have chosen to use estimated 2022 year end value (1,270 $m^3$/day ), as the existing flow for reserve calculation purposes.

The Lucan WWTP is rated for an AADF of 1,700 $m^3$/day. The Total Reserve Capacity at the end of 2020 was as follows:

Rated Capacity = 1,700 $m^3$/day
Existing AADF = 1,270
Total Reserve = **430 $m^3$/day**

### 2.2.4 Uncommitted Reserve

The Uncommitted Reserve Capacity is calculated by deducting from the Total Reserve Capacity, the anticipated flow from development commitments. This approach has been extended to proposed developments as well.

Table 2.4 identifies the number of committed ERUs as 286, therefore:

Uncommitted Reserve = Total Reserve – Commitments
= 430 $m^3$/day – (286 x 1.0 $m^3$/day)
= **144 $m^3$/day**
= **144 ERUs**

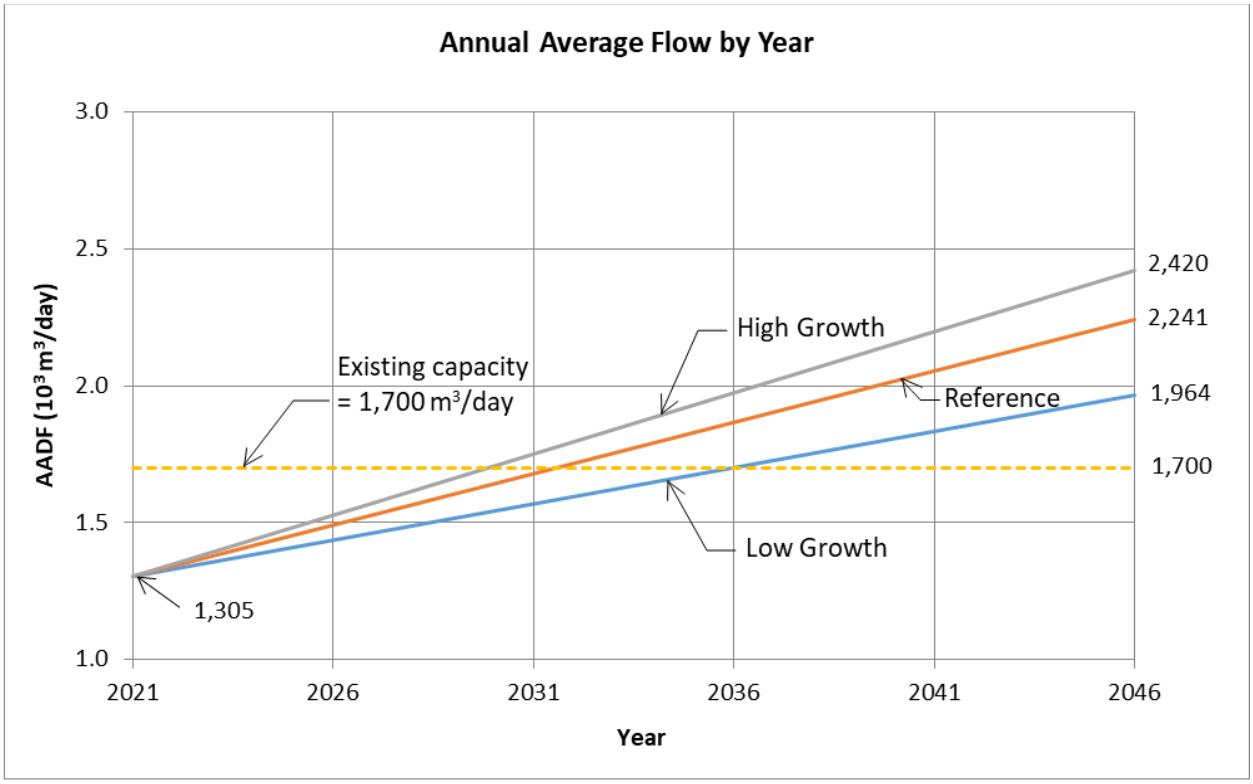
Currently the Township is considering development proposals, within the existing urban boundary, for 92 ERUs, which would equate to approximately 64% of the capacity available to commit.

At current rates, the Township could run out of the ability to approve additional development within 2 to 3 years.

### 2.2.5 Required Treatment Capacity by Year

Figure ES-2.1 shows the expected annual average sewage flows from 2021 to 2046. The figure indicates that, at the highest growth rate, the existing treatment capacity will be adequate until approximately 2025. It is important to note that at recent rates of development, expansion could be required even earlier.

**Figure ES-2.1 – Annual Average Day Sewage Flow by Year**



# 3.0 MCEA PROCESS

## 3.1 Identification of Problem/Opportunity

The first phase of the MCEA process includes the definition of the problem or opportunities that need addressed. Based upon the review of operating data and discussions with the Township, the following key problem has been identified with regards to the WWTP:

**Over the past few years, new growth and development in the community of Lucan has been accelerating at a significantly faster pace than the historic norm. The Lucan wastewater treatment facility is approaching its rated capacity and additional capacity is needed to accommodate future growth**

## 3.2 Identification of Alternative Solutions

The second phase of the MCEA process involves the identification and evaluation of alternative solutions for addressing the defined problem. The evaluation of alternatives is undertaken by examining the technical, cultural, economic, social and environmental considerations associated with implementing any alternative. Mitigation measures that could lessen any environmental impact are also defined. A preferred solution or solutions is then selected.

For the defined capacity problem there are a number of considerations related to providing increased treatment capacity for growth. These include:

- The existing facilities are in good condition and provide very good treatment.
- There are advantages to retaining the existing lagoons for raw sewage flow equalization.
- There is considerable uncertainty regarding both the rate and scale of future growth. Staging the increase in capacity should be considered as a means of reducing the economic risk of over-building.

The following alternatives have been identified and considered as part of this study:

**(1) Reduce wastewater quantities from the existing community.** This option involves the reduction of wastewater flows to the existing facility to lessen the burden on existing treatment systems and thus provide capacity for growth.

**(2) Limit community growth**. This alternative would require the Township to take steps to restrict new development activities in the study area. The adoption of such policies would ensure that the current wastewater treatment capacity is not exceeded.

**(3) Expand the existing wastewater treatment plant.** This option would involve the construction of additional wastewater treatment facilities at the existing plant.

**(4) Construct a new municipal wastewater treatment facility.** This option would involve the construction of a new wastewater treatment facility to replace the existing facility. The implementation of this option could require the selection of a suitable site, the construction of all necessary waste treatment and disposal facilities, and the potential installation or modification of pumping equipment or forcemains to convey the wastewater to the new site or facility.

**(5) Re-rate the existing facility**. This option would involve an evaluation of the current hydraulic rating of the treatment facility to determine if, based upon the current operational parameters and treatment levels, the facility could be re-rated to treat greater volumes of wastewater.

**(6) Do Nothing.** This option proposes that no improvements or changes be made to address capacity deficiencies at the WWTP. During the MCEA planning and design process, the "Do Nothing" alternative may be implemented at any time prior to the commencement of construction. A decision to "Do Nothing" would typically be made when the costs of all other alternatives, financial or environmental, significantly outweigh the benefits.

### 3.3 Identification of a Preferred Solution

Based on the results of the impact assessment presented above and engineering evaluations of the study alternatives; Alternative 3: Expansion of the existing WWTP was selected as the preferred alternative. This type of project is classified as a Schedule 'C' activity under the terms of the MEA Class EA document.

A number of relative advantages were identified with the preferred alternative that justified its selection as the preferred approach to increasing capacity. In particular, the preferred alternative provides the following advantages:

- Expansion of the existing treatment facility provides the most cost effective and efficient method to provide additional wastewater treatment capacity for the community, based on the historic performance of the existing facility.
- Expanding the existing facilities, rather than replacing them, represents a lower impact from a greenhouse gas perspective as it relates to construction.
- It utilizes existing infrastructure, thus reducing the capital cost of capacity expansion.
- It minimizes potential impacts to the natural and cultural environments by limiting activities to the existing WWTP site.
- It allows for continued growth and development within the community, consistent with the Township's Official Plan.
- It allows the Township to meet all existing planning commitments for already approved development and allow continued growth.
- Is in conformance with Infrastructure guidelines contained within the Provincial Policy Statements (PPS 2020) including re-use of existing facilities.

## 3.4 Review of Alternative Design Concepts

The preferred solution is to increase wastewater treatment capacity by expanding the existing WWTP. The facility will continue to receive and treat wastewater and discharge treated effluent to the Heenan Drain on a continuous basis.

During Phase 3 of the EA, different approaches to expanding the facility were evaluated and a preferred solution was identified. The review of alternative design concepts included investigating the possibility of:

- Expanding in stages to align capacity with growth expectations.
- Decommissioning the Granton WWTP and having the Granton wastewater pumped to Lucan for treatment.
- Changing the treatment technology.

## 3.5 Preferred Design Concept

The preferred concept for the expansion is to retain the existing extended aeration process and expand in two stages. Stage 1 would increase the rated capacity from 1,700 $m^3$/day to 2,475 $m^3$/day. Stage 2 would provide a further increase to 2,700 $m^3$/day. The physical changes for Stage 1 would be:

- Increasing the capacity of the Chestnut SPS to 10,000 $m^3$/day (120 L/s) by means of pump replacement and paralleling the existing forcemain.
- Construction of a new Headworks (screening and degritting) to a peak flow of 10,000 $m^3$/day.
- Expansion of the secondary section by the addition of one aeration tank and one clarifier with dimensions equal to existing.
- Addition of a 3$^{rd}$ effluent filter to increase peak filtration capacity to 10,000 $m^3$/day.
- Upgrades to the existing UV disinfection process to increase capacity to 10,000 $m^3$/day.
- Conversion and expansion of the existing aerobic digester and sludge holding tank to be a digester only. This includes potentially 1,100 $m^3$ of digester expansion.
- Modification of the existing lagoons to provide a separate digested sludge storage area.
- Construction of a forcemain to connect the digester to the sludge lagoon.
- Various pumping, piping, and control modifications to integrate the new and existing facilities

The principal physical changes for Stage 2 will be expansion of the secondary section by the addition of a fourth aeration tank and clarifier. Alternatively, the possibility of bioreactor modification exists and will be examined considering the performance of Stage 1. Process options include integrating fixed film technologies which would achieve the capacity increase without additional tankage.

The expansion of the Lucan WWTP creates the opportunity to decommission the Granton WWTP and pump Granton's wastewater to Lucan for treatment. The consolidation of the treatment facilities at a single location results in the opportunity to reduce overall system operational and maintenance (O & M) costs. There would be additional capital costs related to constructing a forcemain from Granton to Lucan; a distance of approximately 10.5 km.

An economic analysis established that the probable payback period for the increased capital costs would be in the order of 20 to 25 years.

For the following reasons, the decision was made to retain the Granton WWTP:

- The payback period is relatively long.
- Growth, and thus treatment capacity, needs for the community of Lucan are increasing at a significant rate and it is possible that the expanded capacity at the Lucan WWTP will be required for Lucan.
- Effluent quality performance objectives for Granton are mostly being met with the exception of TSS. However, the TSS compliance requirements at Granton are generally achieved.
- Should growth at Lucan be less than expected or O&M costs at Granton increase there is still the opportunity to re-visit the decision.

### 3.5.1 Capital Costs

The probable capital costs of expansion fall into two categories; costs related to capacity increase to accommodate growth, and costs related to rehabilitation of the existing works. The latter cost includes the costs to address existing capacity deficiencies.

Probable costs, based on construction in 2023 are as follows:

- Allocation to growth = $12,582,641
- Allocation to rehabilitation = $ 3,862,916

Total Probable Cost = $16,445,557

## 4.0 CONSULTATION

### 4.1 General

During Phases 1 to 5 of the MCEA process, consultation was undertaken to obtain input from the general public, project stakeholders, review agencies and indigenous communities that might have an interest in the project. The key components of the consultation program are as follows:

- Initial Public Notice: March 17, 2021
- Information circulated to review agencies: March 17, 2021
- Virtual Public Information Meeting: August 24, 2021
- Public Open House: September 8, 2022

## 4.2 Consultation Summary

Consultation undertaken during Phases 1 and 2 of the process resulted in relatively few comments or concerns regarding the potential expansion of the WWTP. There were no questions or comments from the public received at, or following the Public Information Meeting held on August 24, 2021. A second Public Information Meeting was held on September 8, 2022 with 8 members of the public attending. The following questions and comments were received during the open house:

- Concerns regarding the potential for odour.
- Cost of the WWTP expansion.
- Timing of the construction of the WWTP expansion.
- Questions regarding adjacent property access during construction.
- Impacts of the WWTP expansion on water quality in the Heenan Drain.

There were no concerns or issues identified by the aboriginal communities consulted.

# 5.0 IMPACT MITIGATION

## 5.1 General

The preferred alternative is to expand the Lucan WWTP capacity by retaining the existing extended aeration process and constructing a third treatment train. The capacity of other process components will be expanded to correspond. Expansion is planned to increase in stages, with Stage 1 being from 1,700 $m^3$/day to 2,475 $m^3$/day and Stage 2 from 2,475 $m^3$/day to 2,700 $m^3$/day.

All construction will take place at the sites of existing facilities and within the existing facility footprints.

Considering the various criteria identified in Section 3 of this report and additional comments received during the public consultation program; a number of specific environmental elements were identified, which could be adversely affected by implementation of the preferred alternative. The impact of construction of the proposed WWTP expansion on the identified environmental elements is summarized below. Specific mitigation measures for the identified impacts are also presented in more detail. These impacts are directly attributable to construction related activities, which are generally short-term in nature and of limited duration. Impacts of a greater magnitude and duration (water quality impacts to the receiving watercourse) are also discussed.

## 5.2 Aquatic Habitat

Expansion of the existing treatment facility has the potential to result in negative impacts to the receiving stream. Currently the facility discharges to the Heenan Drain, which extends for several hundred metres, before merging with the Little Ausable River.

As discussed within Section 2.2 of this report, investigations have been undertaken of the Heenan Drain, in the vicinity of the outfall, in order to gain a general understanding of the

current aquatic habitat present in that area. The assessment confirmed that the aquatic habitat of the Drain is somewhat affected by existing discharges associated with the wastewater treatment facility.

For purposes of the expansion revised EQC limiting additional impacts were established in consultation with the MECP. Further, the amended ECA for the expanded facility will incorporate requirements for additional in-stream monitoring to assess longer term effects.

### 5.3 Terrestrial Habitat

The existing Lucan WWTP is located in an agricultural area adjacent to the Heenan Drain. Construction activities associated with the proposed expansion will take place within the existing footprint of the WWTP and should pose no risk to terrestrial habitat. This also applies to proposed work at the existing lagoons and the Chestnut SPS.

There are also no natural features within the limits of the sites that will be negatively impacted by construction. A series of protective measures will be incorporated into construction plans to ensure mitigation of any possible impacts. As well, all lands disturbed by the construction process will be fully restored.

### 5.4 Disruption Caused by Construction

As noted previously, construction required for the expansion of the existing WWTP and related facilities (e.g. lagoon) will be fully contained within the existing facility sites. As a result, only minor noise and dust disturbances are anticipated during the construction phase. Standard construction mitigation measures will be implemented to minimize other construction-related impacts (e.g. increased traffic adjacent to the facilities during construction). There are no residences located in close proximity to the WWTP or lagoon sites.

### 5.5 Financial Impacts to Residents

This Section describes the principles proposed to be used for cost allocation. The principles and their application are described as follows:

- The costs of expansion required to accommodate growth will be paid by new development.
- The costs related to rehabilitation and to address existing capacity deficiencies, and also operation will be paid through the sewage service rate.
- A reserve fund has been established to pay for capital costs associated with the project. On-going development contributes to these reserves.
- A reserve fund is in place to contribute to the costs of rehabilitation.
- New development proposed for lands that are, or can be, serviced following completion of this project will be subject to development charges.

- New development within the existing serviced area will also be subject to development charges.
- Potential borrowing for capital will take into account financial impacts when establishing debt repayment periods.
- Grant programs and other Federal/Provincial Infrastructure funding programs will be aggressively pursued by municipal staff to help offset capital costs associated with the project.

The Township believes the above noted measures will provide some financial mitigation to residents.

### 5.6 Health and Safety and the Environment

The planned works involve construction work that has the potential to adversely impact upon the health and safety of the workers, the general public, and existing environmental features. Construction activities associated with the implementation of the preferred alternative will therefore be carried out in accordance with industry standards for health and safety. To this end, a series of measures will be prescribed in contract documentation to minimize the risks posed by construction.

The remedial measures set out in the contract documentation include those defined by the Ontario Provincial Standard Specifications and any special provisions deemed appropriate given the proposed construction technique. In general, the provisions will stipulate that the Contractor shall conduct operations in a manner which reduces the risk of detrimental effects to the environment.

## 6.0 PROJECT SCHEDULE

No specific date has been established for the completion of the expansion. Final design, approvals, tendering and construction will require 18 to 24 months to complete**.**

## 7.0 PROJECT SUMMARY

This report documents the Municipal Class Environmental Assessment process conducted to identify the best means to address the need for increased wastewater treatment capacity for the community of Lucan. The MCEA process was initiated in March 2021.

A range of alternatives was identified to address the capacity deficiency. These included:

1. Reducing wastewater quantities from the existing community,
2. Limiting community growth,
3. Expanding the existing WWTP,

4. Construction a new wastewater treatment facility,
5. Re-rating the existing facility, and
6. Doing nothing.

Following a comprehensive review of the alternatives, in which the potential impacts associated with each of the alternatives was examined in relation to various components of the environment, Alternative 3, expansion of the existing facility, was selected as the preferred alternative.

Phase 3 of the MCEA process was then implemented and involved the review of detailed design alternatives associated with the preferred alternative. This phase of the process included additional consultation with agencies, aboriginal communities, and project stakeholders, as well as a second public information meeting to inform members of the general public about the preferred solution and the MCEA process.

A general description of the proposed project as developed through Phase 3 of the MCEA process is as follows:

- Construction of a staged expansion of the WWTP with Stage 1 increasing the capacity from 1,700 to 2,475 $m^3$/day and Stage 2 from 2,475 to 2,700 $m^3$/day.
- A new headworks, complete with screening and de-gritting.
- Stage 1 will include a 3$^{rd}$ bioreactor and clarifier and expansion of filtration and ultraviolet disinfection capacities.
- Stage 2 will include construction of a 4$^{th}$ bioreactor and clarifier, or alternatively conversion of the existing extended aeration process to a process incorporating activated sludge and fixed film treatment technologies. The final decision on process type will be made as part of the Stage 2 design.
- Conversion of the existing biosolids digester and storage facility to a digester only.
- Modification of existing lagoon Cell 2 to allow storage of digested biosolids. This includes improving site access.
- Increasing the capacity of the existing Chestnut SPS by replacing the existing pumps and related equipment and paralleling the existing forcemain from the SPS to the WWTP.

The proposed activity is a Schedule “C” undertaking under the terms of the Municipal Class Environmental Assessment process.

A series of mitigation measures was identified to minimize potential impacts associated with implementation of the preferred alternative. Where required, these will be incorporated into the further planning and implementation of this project.

The Township of Lucan Biddulph intends to proceed with the implementation of this project upon completion of the MCEA investigation and following receipt of all necessary approvals.

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# MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT FOR THE EXPANSION OF THE LUCAN WASTEWATER TREATMENT FACILITY

# ENVIRONMENTAL STUDY REPORT

## 1.0 INTRODUCTION

### 1.1 Introduction

The Township of Lucan Biddulph initiated a Municipal Class Environmental Assessment (MCEA) in March 2021 to identify the best strategy for expanding the Wastewater Treatment Plant (WWTP) servicing the community of Lucan. The study process followed the procedures set out in the Municipal Class Environmental Assessment (Municipal Engineers Association, 2000) document, dated June 2000, as amended in 2007, 2011 & 2015. B.M. Ross and Associates Limited (BMROSS) was engaged to conduct the Class EA investigation on behalf of the Township.

The purpose of this report is to document the planning and design process followed during Phases 1 to 4 of the MCEA investigation. The report includes a summary of the defined problems regarding sanitary sewage treatment in Lucan, as well as a description of the alternative solutions considered to resolve the identified problems. The decision-making process leading to the selection of a preferred alternative is documented.

### 1.2 Environmental Assessment (MCEA) Process

Municipalities must adhere to the *Environmental Assessment Act* of Ontario when completing road, sewer or waterworks activities. The Act allows the use of the Municipal Class Environmental Assessment for most municipal projects. An MCEA is an approved planning document which describes the process that proponents must follow in order to meet the requirements of the EA Act. The MCEA approach allows for the evaluation of alternatives to a project, and alternative methods of carrying out a project, and identifies potential environmental impacts. The process involves mandatory requirements for public input. MCEA studies are a method of dealing with projects which have the following important characteristics in common:

- They are recurring.
- They are usually similar in nature.

- They are usually limited in scale.
- They have a predictable range of environmental effects.
- They are responsive to mitigating measures.

If the MCEA planning process is followed, a proponent does not have to apply for formal approval under the EA Act. The development of this study has followed the procedures set out in the MCEA. Figure 1.1 presents a graphical outline of the procedures.

The MCEA planning process is divided into the following phases:

- Phase 1 – Problem identification.
- Phase 2 – Evaluation of alternative solutions to the defined problems and selection of a preferred solution.
- Phase 3 – Identification and evaluation of alternative design concepts and selection of a preferred design concept.
- Phase 4 – Preparation and submission of an Environmental Study Report (ESR) for public and government agency review.
- Phase 5 – Implementation of the preferred alternative and monitoring of any impacts.

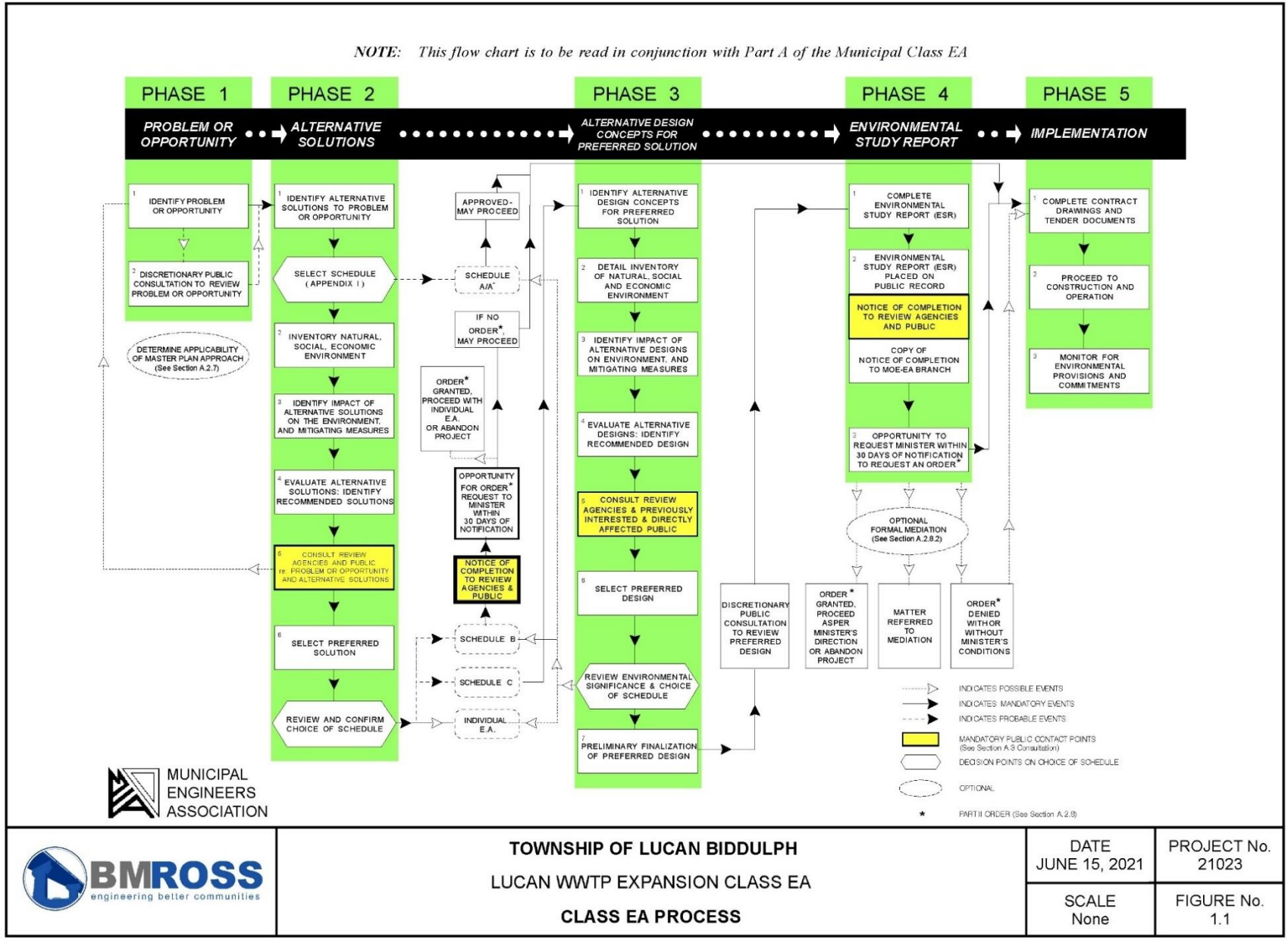
## 1.3 Classification of Project Schedules

Projects are classified to different project schedules according to the potential complexity and the degree of environmental impacts that could be associated with the project. There are four schedules:

- Schedule A - Projects that are approved with no need to follow the MCEA process.
- Schedule A+ - Projects that are pre-approved but require some form of public notification.
- Schedule B – Projects that are approved following the completion of a screening process that incorporates Phase 1 and 2 of the MCEA process, as a minimum.
- Schedule C – Projects that are approved subject, to following the full MCEA process.

The MCEA process is self-regulatory, and municipalities are expected to identify the appropriate level of environmental assessment based upon the project they are considering.

## Figure 1.1 – Municipal Class EA Process



## 1.4 Environmental Study Report

The Environmental Study Report (ESR) is prepared at the conclusion of the MCEA process and provides documentation of the decision making that was carried out. The report documents the planning and design phases of the process which will terminate with the construction of a project. It includes a discussion of the purpose of the project, including background information, outlines existing natural and social characteristics of the project area, details the planning alternatives considered, and identifies any environmental impacts and mitigation measures associated with the implementation of the project.

The ESR, when completed, will be submitted to the Township for final approval and put into the public record. The report will be made available at various locations for perusal by all interested parties. A Notice of Completion outlining details of the project and locations where the ESR can be reviewed will be advertised in the local newspapers and posted on the Township website.

If no written objections are received by the proponents within 30 days of the publication of the Notice of Completion of the ESR, subject to the receipt of all other approvals, the Township can proceed with construction of the project.

## 1.5 Mechanism to Request a Higher Level of Environmental Assessment

Under the terms of the MCEA, the requirement to prepare an individual environmental assessment for approval is waived. However, if it is found that a project going through the MCEA process has associated with it significant environmental impacts, a person/party may convey their concerns to the Township of Lucan Biddulph, who will consider the identified concerns. A request may be made to the Ministry of the Environment, Conservation and Parks 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 aboriginal and treaty rights. Requests on other grounds will not be considered.

## 1.6 Study Organization

The Township of Lucan Biddulph is considered the project proponent under the terms of the Class EA. B. M. Ross and Associates Limited (BMROSS) was engaged by the proponent to carry out the MCEA study process on its behalf.

# 2.0 BACKGROUND

## 2.1 Study Area Description

### 2.1.1 Township of Lucan Biddulph

The Township of Lucan Biddulph is located in the County of Middlesex. In 1999, the Village of Lucan and Township of Biddulph amalgamated to form the Township of Lucan Biddulph. The Township has a population of just over 5,680 residents, with over half the population residing in the community. Lucan is the largest settlement area within the Township. Smaller settlement areas within the Township include Granton and Clandeboye. The Township is bordered by the Municipality of Middlesex Centre to the south, the Municipality of North Middlesex to the west and the Municipality of South Huron to the north. The latter is in the County of Huron. The landscape throughout the Township is predominately rural in nature.

### 2.1.2 Community of Lucan

The community of Lucan represents the largest urban settlement in the Township. It is located approximately 20 kilometers north of London along Provincial Highway 4 in the west-central portion of the Township. Given the close proximity to London and availability of residential homes, Lucan has evolved into primarily a bedroom community. The community supports a downtown core along Richmond Street/Main Street (Highway 4) and a number of commercial, industrial and institutional uses. Figure 2.1 illustrates the location of the Township of Lucan Biddulph and the community of Lucan. Municipal services within the community include wastewater, water, and stormwater servicing.

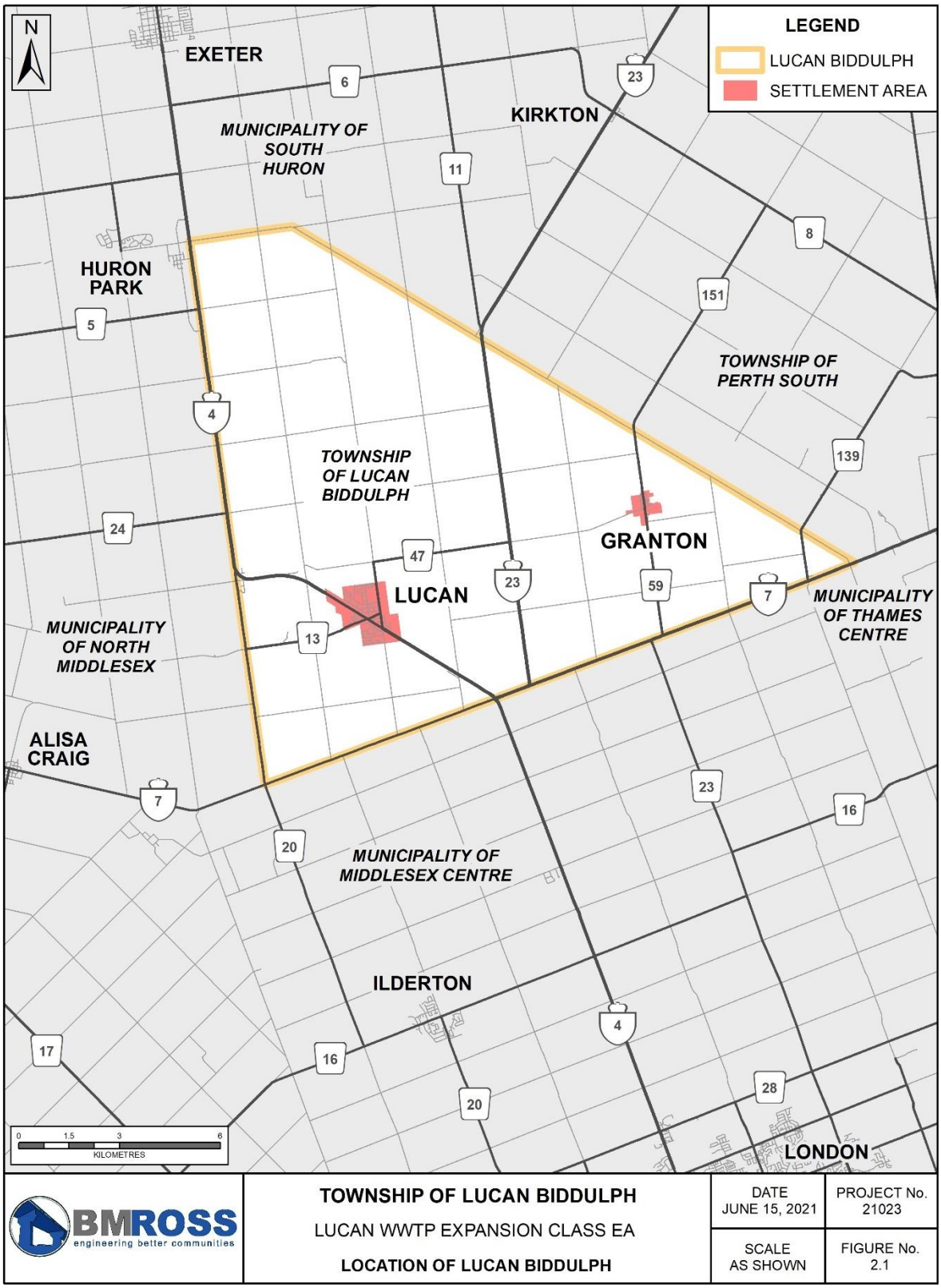
### 2.1.3 Project Study Area Description

The project study area includes the Lucan Wastewater Treatment Plant (WWTP) site and Heenan Drain. In Lucan the collection system generally drains south to north with a larger Sewage Pumping Station (SPS) located in the north part of the community on Campanale Way north of Walnut Street. That SPS, known as the Chestnut SPS, pumps directly to the Wastewater Treatment Plant (WWTP) located north of Fallon Drive. One smaller secondary SPS, the Joseph St. SPS is located near the south limit of Lucan.

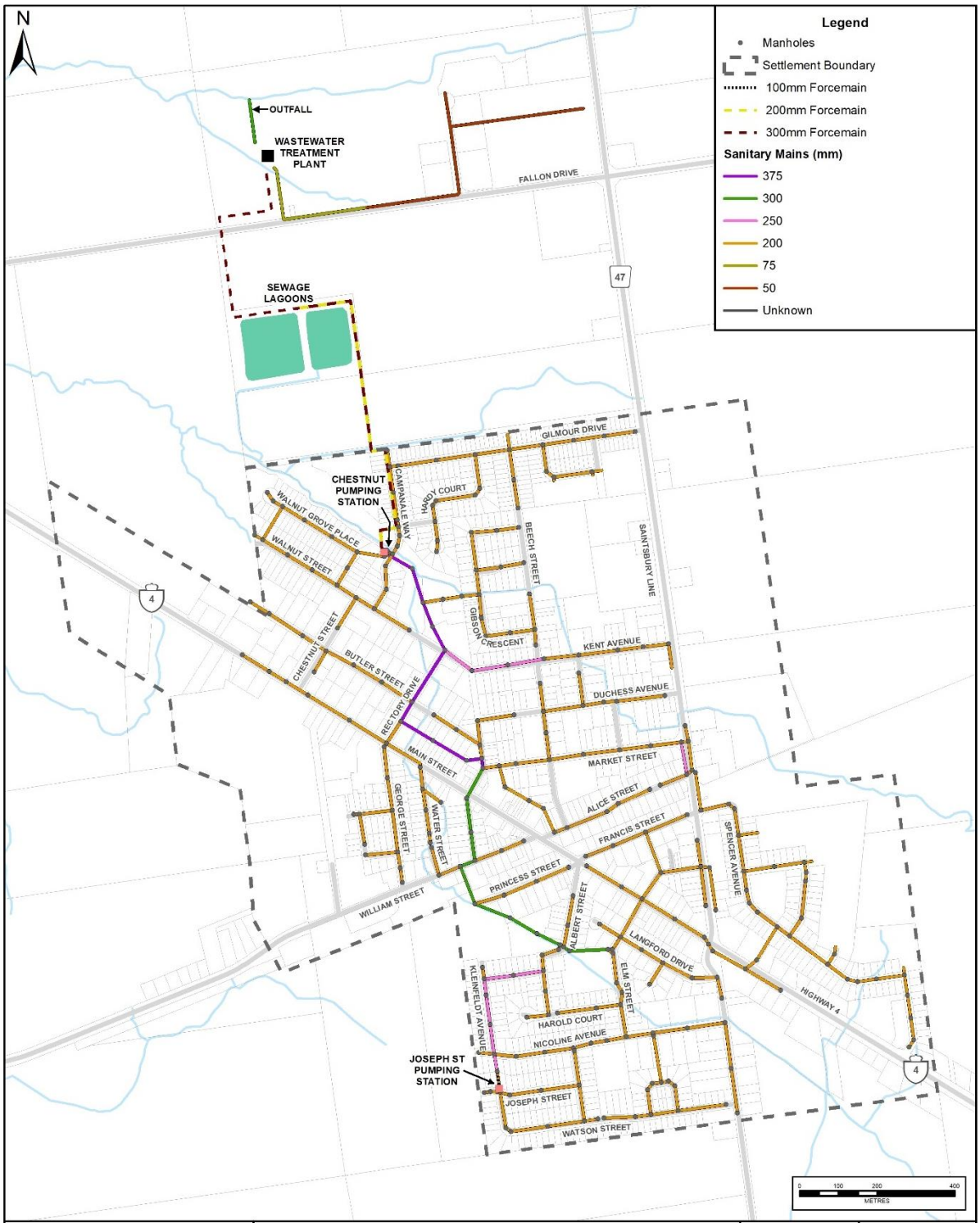
The WWTP, with a rated capacity of 1,700 $m^3$/day, discharges treated effluent to the Heenan Drain which then drains to the Little Ausable River. The wastewater system for Lucan also includes lagoons, located north of the urban limit of Lucan and south of the WWTP site. The lagoons are only utilized during high flow events to prevent bypasses and overflows. In Lucan there are approximately 20 km of gravity sewer and 1,300 (2020) customers. Further details regarding the WWTP are provided in Section 2.6 (Existing Sewage Facilities).

Figure 2.2 illustrates the general limits of the project study area including the current service area for the Lucan WWTP.

## Figure 2.1 – General Location Plan – Township of Lucan Biddulph and the Community of Lucan



## Figure 2.2 – Project Study Area



## 2.2 Natural Heritage Features

### 2.2.1 General Physiography

Lucan is located within the physiographic region known as the Stratford Till Plain. This region is a large clay plain that stretches from London, north towards Blyth and Listowel. Another branch extends towards Arthur and Grand Valley. This till plain is characterized by closely spaced moraines and having a knoll and sag relief (Chapman & Putnam, 1984). The till in this area is relatively uniform, consisting primarily of silty clays. Given the clay composition of the till, artificial drainage is generally required to support agriculture. Soils in the Lucan area are characterized as being silt loam or silty clay loam with poor drainage.

### 2.2.2 Little Ausable River

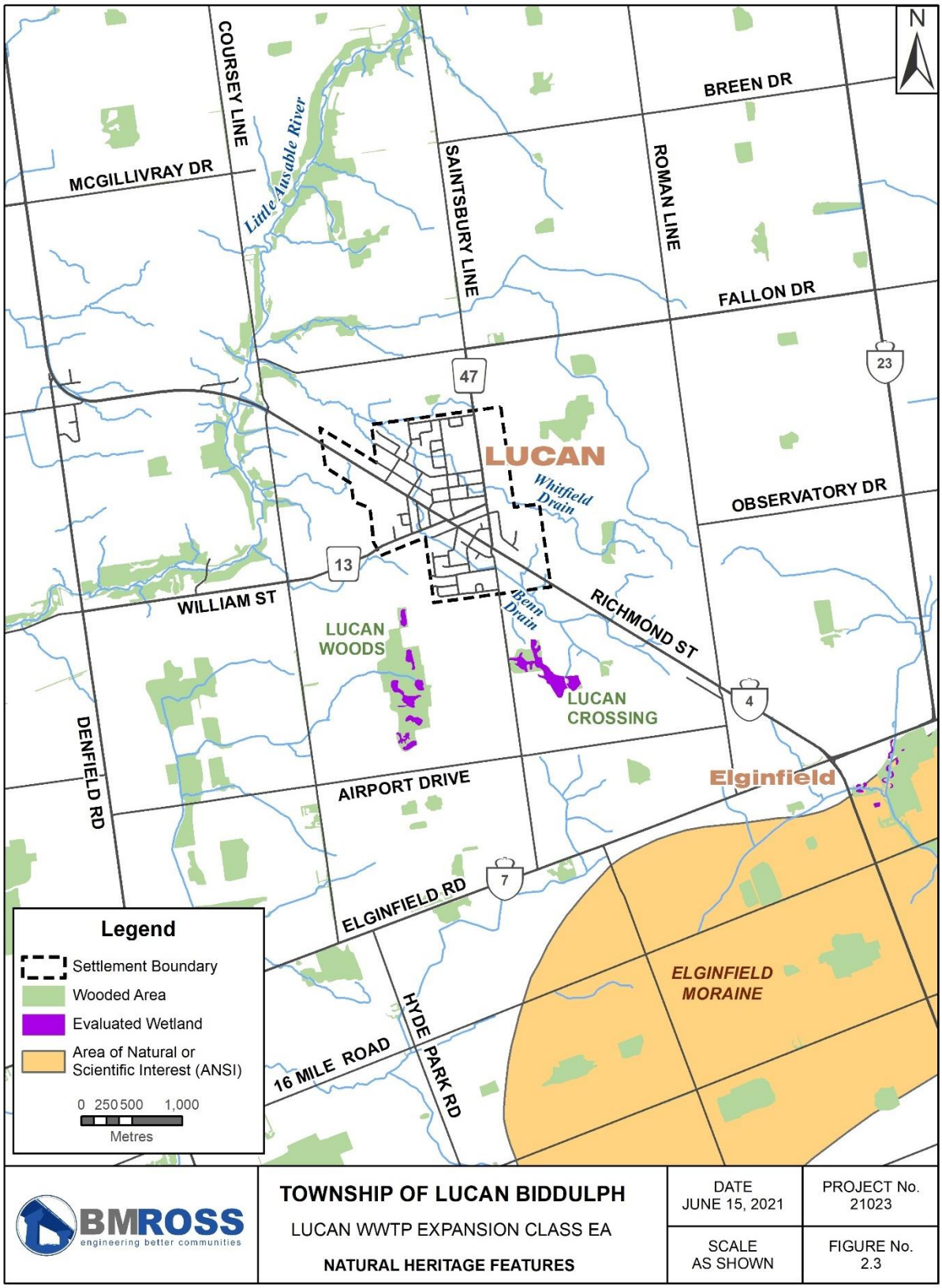
The Little Ausable River is located approximately 1.3 km west of the WWTP flowing south and eventually making a significant meander to flow west to connect to the Ausable River. A Significant Valley System (SVS) associated with the Little Ausable was identified by the Middlesex Natural Heritage Study (2014). An SVS designation recognizes the importance of valleys for linkages and corridors for wildlife movement, habitat opportunities and a large-scale connectivity of natural areas (Upper Thames River Conservation Authority, 2014). The SVS lands coincide with the hazard lands associated with the municipal drains and the Little Ausable River. The Little Ausable River is regulated by the Ausable Bayfield Conservation Authority under O. Reg 147/06 (Regulation of development, interference with wetlands and alteration to shorelines and watercourses). Based on the background information compiled, there are records of Rainbow and Wavy-rayed Lampmussel. The two species at risk mussels and their associated habitats exist within the Little Ausable River, west of Lucan near its convergence with the Ausable River.

The project study area is within the Little Ausable River watershed which encompasses a total area of 159 km² and includes the Municipalities of Lucan Biddulph, Northern Middlesex, Perth South and South Huron. The watershed supports a warm water fishery within the main channel and baitfish in its tributaries. The watershed supports habitat for fish species at risk including the Black Redhorse.

### 2.2.3 Areas of Natural and Scientific Interest (ANSI)

The Ministry of Natural Resources and Forestry (MNRF) maintains an inventory of Areas of Natural and Scientific Interest (ANSIs) in Ontario. These life science or earth science features are recognized for their importance related to natural heritage, scientific study, or education. To identify ANSIs within the vicinity of Lucan, the MNRF Make a Map: Natural Heritage Areas application was consulted (Ministry of Natural Resources and Forestry, 2017). There are no ANSIs located within the project area. A map showing ANSI and natural features within the vicinity of Lucan is included in Figure 2.3.

## Figure 2.3 – Natural Heritage Features



### 2.2.4 Species at Risk

### (a) General

Two categories of species at risk were researched in conjunction with this project. The first are species protected through Federal Legislation; Canada's *Species At Risk Act* (SARA). The second category represents species identified as rare, threatened or endangered by the Province of Ontario under the *Endangered Species Act* (ESA). These species are tracked by the MNRF and are documented on the Ontario Natural Heritage Information Centre (NHIC) web site. To protect the exact location of an identified species, both sites utilize range maps for identification purposes, which provide a large buffer around the actual species location. It is therefore difficult to determine whether a species is actually located within the project study area, or has been identified due to the presence of suitable adjacent habitat. A summary of species at risk potentially present in the project study area is presented in Table 2.1

**Table 2.1 – Species at Risk Potentially Within Vicinity of the Study Area**

| Type of Species | Common Name | Scientific Name | Federal SARA Schedule 1 Status | Provincial ESA Status |
|---|---|---|---|---|
| Bird | Acadian Flycatcher | *Empidonax virescens* | Endangered | Endangered |
| Bird | Barn Swallow | *Hirundo rustica* | - | Threatened |
| Bird | Bobolink | *Dolichonyx oryzivorus* | - | Threatened |
| Bird | Cerulean Warbler | *Setophaga cerulea* | Special Concern | Threatened |
| Bird | Chimney Swift | *Chaetura pelagica* | Threatened | Threatened |
| Bird | Eastern Meadowlark | *Sturnella magna* | - | Threatened |
| Bird | Least Bittern | *Ixobrychus exilis* | Threatened | Threatened |
| Bird | Prothonotary Warbler | *Protonotaria citrea* | Endangered | Endangered |
| Bird | Yellow-breasted Chat | *Icteria virens* | Special Concern | Endangered |
| Insect | Monarch | *Danaus plexippus* | Special Concern | Special Concern |
| Insect | Rusty-patched Bumble Bee | *Bombus affinis* | Endangered | Endangered |
| Mammal | American Badger, jacksoni subspecies | *Taxidea taxus jacksoni* | Endangered | Endangered |
| Mammal | Eastern Small-footed Myotis | *Myotis leibii* | - | Endangered |
| Mammal | Little Brown Bat | *Myotis lucifugus* | Endangered | Endangered |

| Type of Species | Common Name | Scientific Name | Federal SARA Schedule 1 Status | Provincial ESA Status |
|---|---|---|---|---|
| Mammal | Northern Myotis | *Myotis septentrionalis* | Endangered | Endangered |
| Mammal | Tri-colored Bat | *Perimyotis Subflavus* | Endangered | Endangered |
| Plant and Lichen | American Chestnut | *Casanea dentata* | Endangered | Endangered |
| Plant and Lichen | American Ginseng | *Panax quinquefolius* | Endangered | Endangered |
| Plant and Lichen | Butternut | *Juglans cinerea* | Endangered | Endangered |
| Plant and Lichen | Dense Blazing Star | *Liatris spicata* | Threatened | Threatened |
| Plant and Lichen | Eastern Flowering Dogwood | *Cornus florida* | Endangered | Endangered |
| Plant and Lichen | Heart-leaved Plantain | *Plantago cordata* | Endangered | Endangered |
| Reptile and Amphibian | Eastern Ribbonsnake | *Thamniphis sauritus* | Special Concern | Special Concern |
| Reptile and Amphibian | Queensnake | *Regina septemvittata* | Endangered | Endangered |
| Reptile and Amphibian | Blanding`s Turtle | *Emydoidea blandingii* | Endangered | Threatened |
| Reptile and Amphibian | Spiny Softshell | *Apalone spinifera* | Endangered | Endangered |
| Reptile and Amphibian | Spotted Turtle | *Clemmys guttata* | Endangered | Endangered |
| Reptile and Amphibian | Snapping Turtle | *Chelydra serpentina* | Special Concern | Special Concern |

## (d) Discussion

The Heart-leaved Plantain is located within the project study area, based on the NHIC and is potentially present along the Heenan Drain as it is a semi aquatic plant and can be found along shallow, slow-moving streams. The Heart-leaved Plantain is sensitive to water quality and quantity changes caused by agriculture and development.

Two (2) species have been identified as occurring within the study area based on historical observation records provided through the MNRF Natural Heritage Information Centre (NHIC) database (Ministry of Natural Resources and Forestry, 2017):

- Heart-leaved Plantain (*Plantago cordata*), an endangered species both provincially and federally has been known to occur in the general area. This species is found within stream channels and emergent zones between open water and upland vegetation along stable, low-gradient streams and their adjacent floodplains. The

species has been recognized as being extirpated for the area by the MNRF (Ontario Ministry of Natural Resources, 2017). Based on the habitat needs of the species, the preferred habitat would be within the Little Ausable River and adjacent floodplain area.

- Snapping Turtle (*Chelydra serpentina*), has special concern status within Ontario. This species of turtle is often found in shallow water, but nests in gravely or sandy areas.

It is anticipated that the proposed expansion to the existing facility will be accommodated within the fenced limits of the existing site, therefore posing few risks to the identified sensitive species. The existing site is fenced, with no trees and a manicured lawn, which offers limited habitat opportunity for the above noted species. Changes to water quality could impact the sensitive species and impacts to water quality in the Heenan Drain. The Heenan Water Quality and Aquatic Community Monitoring Study, which looked at benthic and aquatic species is discussed later Section 2.4.

### 2.2.5 Aquatic Species at Risk

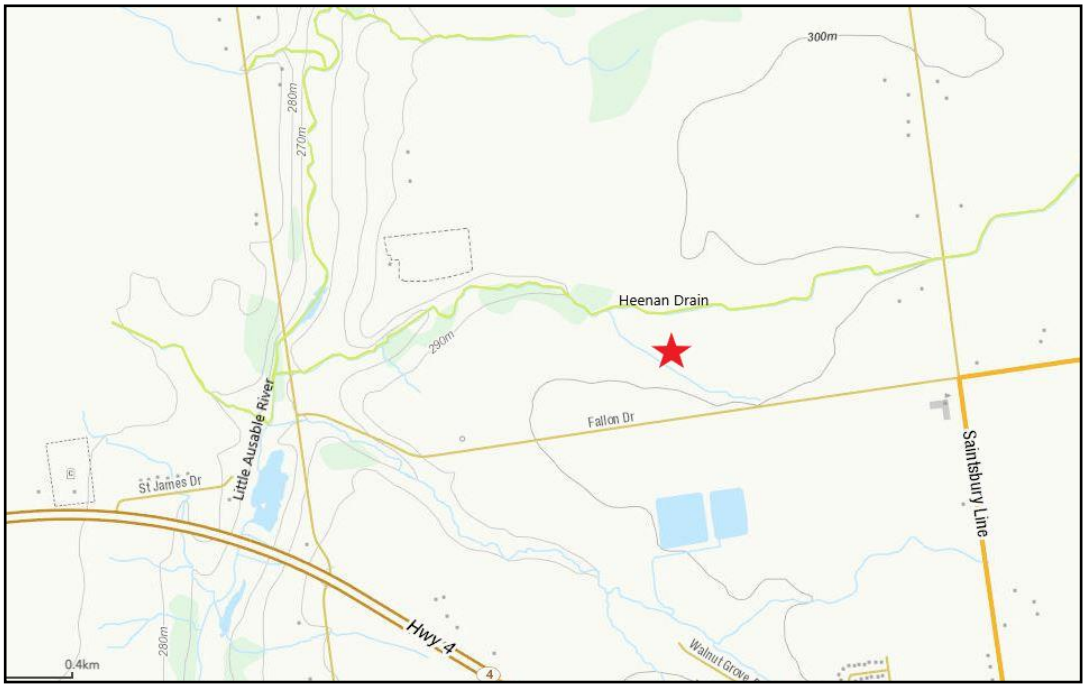
Aquatic Species at Risk are aquatic-based species that either live in, or rely on, an aquatic habitat for a significant portion of their life cycles. Federal and Provincial authorities have developed screening maps to aid in the identification of these rare, threatened, or endangered species. The image below indicates the potential presence of fish and mussel species at risk within the Little Ausable River and Heenan Drain, the outlet for the WWTP.

Based upon the mapping, one freshwater fish species (see Figure 2.4), the Northern Sunfish, is potentially present within the Little Ausable River and Heenan Drain adjacent to the project study area. The green coloured section seen on mapping below indicates the potential presence of the noted species within the watercourses. The red star indicates the location of the WWTP. Input will be sought from the Ausable Bayfield Conservation Authority, the MNRF, and the Federal Department of Fisheries and Oceans (DFO) as part of the approval process to identify any potential impacts to these species from the proposed wastewater treatment facility expansion.

### 2.2.6 Breeding Bird Habitat

The Atlas of Breeding Birds of Ontario (2001-2005) was used to identify the bird species with confirmed, probable, and possible breeding habitat in proximity to the project study area. The project study area lies within the 100 $km^2$ area identified by the Atlas as Square 17MH68, in Region 4: London (Bird Studies Canada, 2009). Within that square, a total of 79 species were observed. A total of 54 species of breeding birds were confirmed to have habitat within the area. In addition to the confirmed species, 21 species are considered to have probable and 4 species, possible breeding habitat in the area. The Eastern Meadowlark (*Sturnella magna*), Barn Swallow (*Hirundo rustica*) and Bank Swallow (*Riparia riparia)*, threatened species in Ontario, are identified as confirmed within the atlas square.

**Figure 2.4 – Aquatic Species at Risk Screening Maps**




Bobolink (*Dolichonyx oryzivorus*), a threatened species in Ontario, is identified as being probable within the atlas square. The Eastern Wood-pewee (*Contopus virens*) and Wood Thrush (*Hylocichla mustelina*), both species of special concern, are identified as probable and confirmed, respectively, within the atlas square.

The survey area includes key habitat for identified species, such as forest (in all stages of growth), riverine areas, agricultural areas, wetlands and shoreline areas.

### 2.2.7 Climate Change

As part of the Class EA process, potential impacts associated with climate change need to be evaluated. Some of the phenomena associated with climate change that may be considered during impact evaluations include:

- Changes in the frequency, intensity and duration of precipitation, wind and heat events;
- Changes in soil moisture;
- Changes in sea/lake levels;
- Shifts in plant growth and growing seasons; and
- Changes in the geographic extent of species ranges and habitat.

There are two approaches that must be utilized to address climate change in project planning. These are as follows:

- Reducing a project's impact on climate change (climate change mitigation). Mitigation of climate change impacts may include:
    - Reducing greenhouse gas emissions related to the project.
    - Alternative methods of completing the project that would reduce any adverse contributions to climate change.
- Increasing the project's and local ecosystem's resilience to climate change (climate change adaptation). Considerations related to climate adaptation include:
    - How vulnerable is the project to climate-related severe events?
    - Are there alternative methods of carrying out the project that would reduce the negative impacts of climate change on the project?

Through the evaluation of alternatives, as part of the second phase of the MCEA, consideration of each of these approaches should be completed and included in the final determination of the preferred approach to completing a project.

## 2.3 Source Water Protection

The intent of the *Clean Water Act* (CWA), 2006 is to "protect existing and future drinking water" sources in Ontario. Under the Act, source protection areas and regions were established, giving Conservation Authorities the duties and powers of a drinking water source protection authority. These duties focus on the development, implementation, monitoring and enforcement of information and policies related to source water protection.

Lucan is located within the Ausable Bayfield Source Protection Area. The Source Protection Plan (SPP) in this region came into effect in 2015 (amended 2019). The SPP outlines policies developed to protect municipal drinking water sources from threats and the Approved Assessment Report summarizes the watershed characteristics and drinking water threats.

The community of Lucan is serviced by the Lake Huron Primary Water Supply System (LHPWSS) which is a surface water intake system, drawing raw water from Lake Huron. It supplies treated drinking water to the Lucan Biddulph Water Distribution System via the Lucan Booster Station located on Denfield Road (Country Road 20). The LHPWSS intake is located north of Grand Bend, approximately 2.5 kilometers offshore and at a depth of 9 meters. Approximately 350,000 people and most of the Ausable Bayfield Source Protection Area rely on the LHPWSS for drinking water (Ausable Bayfield Maitland Valley Source Protection Region, 2014). Water quality from water sourced by the LHPWSS is considered excellent as the pipe is located far offshore and deep within the lake. The intake protection zones for the LHPWSS are not located within the study area.

There are no municipal wells or Wellhead Protection Areas within the project study area. Additionally, there are no Significant Groundwater Recharge Areas (SGRA) or Highly

Vulnerable Aquifers (HVA) within the project study area. Given the absence of vulnerable areas, there are no applicable Source Water Protection policies for the project study area.

## 2.4 Air Quality, Dust and Noise

The current WWTP, including lagoons are located outside of the urban settlement of Lucan and away from sensitive receptors. The lagoons are located approximately 230 m from the nearest residence and the WWTP is an additional 500 m beyond that. Given the distance between the WWTP, lagoons and sensitive receptors there have not been historical concerns or issues regarding air quality or noise related to operation of the WWTP. There is currently a 150 m zoning buffer in place around the WWTP and lagoons to prevent residential and other sensitive land uses being developed in the vicinity of the sites.

## 2.5 Contaminated Sites

The MNRF database of waste disposal sites was consulted to determine if there are any such sites within the vicinity of the project area. There were no sites identified within 5 km of the study area based on information in that database.

The Township of Lucan Biddulph Official Plan Schedule D identifies former landfill sites within Lucan Biddulph. There is a former landfill site at Concession 3 Lot 24, approximately 720 m northwest of the WWTP. Activity at the WWTP is not expected to be impacted by this former landfill site.

There are no active landfill sites within the vicinity of the WWTP.

## 2.6 Cultural Heritage Environment

An assessment of potential impacts to archaeological resources, built heritage resources and cultural heritage landscapes must be undertaken in conjunction with the MCEA process. To aid in the determination of potential for cultural heritage landscapes and archaeological and built heritage resources, the Ministry of Tourism, Culture and Sport (MTCS) provides screening checklists. The checklists were completed and are included in Appendix A.

### 2.6.1 Archaeological Resources

The HTCS Criteria for Evaluating Archaeological Potential was completed for this project and is included in Appendix A. Based on the checklist, a Stage 1-2 Archaeological Assessment was recommended. Timmins Martelle Heritage Consultants (TMHC) has been contracted to undertake the archaeological study for the undisturbed areas within the fenced area of the WWTP. This work was completed in May 2022 and no archaeological sites or resources were identified. A copy of the report is included in Appendix A.

### 2.6.2 Built Heritage and Cultural Heritage Resources

The project study area does not contain known or potential cultural heritage value based on the MTCS Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes (see Appendix A). Therefore, the potential for built heritage or cultural heritage landscapes on the property is considered low and a Cultural Heritage Evaluation Report (CHER) and Heritage Impact Assessment (HIA) do not need to be undertaken.

## 2.7 Planning Policies

### 2.7.1 Provincial Policy Statement

The Provincial Policy Statement (2020) (PPS) was issued under Section 3 of *Planning Act* and provides policy direction on matters of provincial interest. Land use planning decisions must be consistent with the policy statements and the PPS is the overarching framework for other planning policies. In general, the PPS promotes development within serviced urban areas to meet current and future needs. The Policy supports development patterns to optimize land use, infrastructure and public service facilities as well as protect the Province's resources, including water and the environment (Ministry of Munical Affairs and Housing, 2020).

A number of the policies contained within the PPS have relevance to the expansion of the Lucan WWTP. These include:

Section 1.1 Managing and Directing Land Use to Achieve Efficient and Resilient Development and Land Use Patterns:

In this section of the PPS, policies promote efficient development and land use patterns to support long-term financial well-being of municipalities and the Province. This includes ensuring the necessary infrastructure and public service facilities are in place to meet current and the forecasted need. The PPS also states that municipalities shall have land uses sufficient to meet the 25-year projected need. Settlement areas, such as the community of Lucan, are the areas identified in the PPS where growth will be directed. These areas should have infrastructure that is appropriate and efficient, avoiding the need for unjustified or uneconomical expansions. It also encourages local phasing policies, supported by the timely provision of infrastructure to meet the current and future needs.

Section 1.6 of the PPS contains the policies related to infrastructure and public service facilities. The PPS promotes efficient provision of these services, coordinates planning of infrastructure with land use, and growth management planning efforts. The intent of this is to ensure infrastructure is financially viable over its life cycle and able to meet current and projected demands. The PPS promotes the optimization of existing infrastructure and adaptive re-use where feasible. Specific to wastewater services, the PPS states that planning for infrastructure will ensure systems are provided in a manner that can be sustained by; the water resource relied upon, are prepared for impacts of a changing

climate, financially viable and feasible, protect human health, safety, and the natural environment. In the PPS, municipal sewage services are the preferred form of servicing within settlement areas.

### 2.7.2 Official Plan Policies

There are two official plans that contain applicable planning policies for the Township of Lucan Biddulph: the County of Middlesex Official Plan (2006) and Township of Lucan Biddulph Official Plan (2015). It should be noted that both documents are currently being updated; however, the processes have not been completed or approved to date. The policies noted in this ESR reflect the current policies in place.

In compliance with the PPS, the Middlesex Official Plan focuses and directs growth to designated settlement areas (Middlesex County, 2006). The majority of this growth is directed to urban areas which have, or have the ability to, provide full municipal services. The Middlesex Official Plan promotes efficient and environmentally responsible development supported by appropriate sewage services. New development is encouraged where there are full municipal services available. The County also promotes improvement of existing municipal infrastructure systems where technically and financially feasible. It encourages municipalities to monitor treatment capacity and operational effectiveness, and to promote technological and system improvements that may reduce volumes and/or improve the quality of effluent.

The Township of Lucan Biddulph Official Plan provides local planning policies related to land use and development. Similar to the PPS and Middlesex County Official Plan, the Lucan Biddulph Official Plan directs future residential development to the existing settlement areas of Lucan and Granton, where full municipal infrastructure is in place. The Official Plan recognizes Lucan as the largest settlement area within the Township, serving as the administrative and commercial centre (Township of Lucan Biddulph, 2015). It anticipates most, if not all, growth in the Township will occur within Lucan. Goals for Lucan as identified in the Official Plan, include directing growth to this area and ensuring the community has adequate infrastructure in place to accommodate future growth. Within Lucan, Official Plan policies directs that all new development will be connected to the municipal sanitary sewage system.

The Township is currently updating their Official Plan with the objectives of ensuring conformance with the PPS, and potentially expanding the urban settlement area of Lucan. For the purposes of this MCEA, the potential expansion of the urban area as it relates to increased need for treatment (growth) was incorporated into the growth forecasting (see Section 2.6).

## 2.8 Heenan Drain Water Quality and Aquatic Community Monitoring

### 2.8.1 General

The Lucan WWTP discharges treated wastewater continuously into the Heenan Drain.

The Heenan Drain is a tributary of the Little Ausable River, located within the Little Ausable River watershed. The distance from the outlet in the Heenan Drain to the Little Ausable River is 1.37 km. Aquatic resource information from MNRF indicates the river and Heenan Drain have a coldwater thermal regime. MNRF data notes the Heenan Drain is habitat to various minnow species including Blacknose Dace, Bluntnose Minnow, Central Stoneroller, Common Shiner, Creek Chub, Fathead Minnow, Longnose Dace and Northern Redbelly Dace. The system also supports Smallmouth Bass, Rock Bass, Iowa Darter, Johnny Darter, Least Darter, Northern Hog Sucker, Brook Stickleback and the Northern Pike, which is a top predator species.

### 2.8.2 Water Quality and Aquatic Community Monitoring

The Ausable Bayfield Conservation Authority (ABCA) conducted water quality and aquatic community monitoring in 2019 to determine baseline stream health information for the Heenan Drain. A copy of the report is included as Appendix B.

### 2.8.3 Methods

Monitoring took place in 2019 with water quality sampling and fisheries and benthic invertebrate sampling. The water quality sampling occurred monthly from July to November at two sites, upstream and downstream of the WWTP outfall. Water samples were collected through a surface grab sample and analyzed at an accredited lab. Physical water conditions, water level and flow rates were also collected. The following indicators were collected: temperature, pH, dissolved oxygen (DO), biochemical oxygen demand (BOD), *Escherichia coli* (E. coli), total phosphorus, dissolved reactive phosphorus, total ammonia, nitrate, nitrite, total kjeldahl nitrogen (TKN), total suspended solids and a calculation of un-ionized ammonia.

Fisheries and benthic invertebrate sampling were conducted at three sites, upstream, downstream and at the WWTP outfall. Fisheries sampling was conducted using a backpack electrofisher. Fish were identified and released shortly after being collected. Benthic samples were collected in the fall using a D-Net and a three-minute kick sweep method. The benthic community samples were identified and sorted by a taxonomic expert and were analyzed using the Hilsenhoff Family Biotic Index (BI), indicating the aquatic habitat quality.

A search for freshwater mussels was conducted using a time-search survey method.

### 2.8.4 Results

Water quality indicators were compared for the sites upstream and downstream of the WWTP outlet. Biochemical oxygen demand (BOD) was similar between sites. E. Coli

concentrations were higher upstream of the outfall, and at both sites exceeded the concentration acceptable under the Ontario guideline for recreation. Total phosphorus concentrations were higher downstream of the outfall, and at both sites the concentration exceeded the Ontario Water Quality Objective. Nitrate concentrations were higher downstream of the outfall, and at both sites the concentrations were above the Canadian Water Quality Guideline. Un-ionized ammonia concentrations were higher downstream of the outfall and exceeded the Canadian guideline downstream of the outfall.

Six fish species were collected from the Heenan Drain with the highest abundance downstream of the outfall, and the highest species richness at the WWTP outfall and upstream of the outfall. Species that were collected included Blacknose Dace, Creek Chub, Northern Redbelly Dace, Central Stoneroller, White Sucker and Brook Stickleback.

The benthic sampling identified 200 benthic invertebrates to the lowest taxonomic level possible (i.e. family, genus or species). The benthic communities were identified and indexed to be used as an indicator of environmental quality ranging from poor to excellent. Generally, where benthic communities are more diverse, the sites are considered higher quality, while low species diversity is often found in degraded environments. The benthic communities sampled at the outlet and downstream indicate fair water quality with fairly significant organic pollution. Upstream of the outfall, the benthic communities suggest fairly poor water quality with significant organic pollution. These results indicate that the site upstream of the outfall has more degraded water quality than downstream of the outfall.

No freshwater mussels were found within the study area.

### 2.8.5 Conclusions

Several water quality indicators including total phosphorus, nitrate and unionized ammonia are exceeding provincial or federal standards upstream and downstream of the existing outfall. E. coli and BOD concentrations are higher upstream of the WWTP; therefore, land uses upstream of the outfall are likely contributing to the degraded conditions in the channel. With some parameters showing improvement downstream of the outfall, it is thought that the existing WWTP is properly managing biological contamination. Given that conditions upstream of the WWTP indicate signs of degradation, efforts to improve and protect the Heenan Drain should be considered.

## 2.9 Population Growth and Development

### 2.9.1 Information Sources

Population information for Lucan is available from the 2021 Census of Population from Statistics Canada. The 2021 Census identifies Lucan as a ‘population centre’ and as such, has population and dwellings counts available for the community (Statistcs Canada, 2022). Census data was used as the source of background population information for the purposes of this study.

Municipal staff provided information on approved and proposed developments within and adjacent to the urban settlement area. In addition to the proposed developments, recent population and housing projections completed by Watson and Associates for Middlesex County (Watson & Associates Economists Ltd, 2020) and the lower tier municipalities have been approved by County Council. These 25-year forecasts were developed in conjunction with the 5-year review of the Middlesex County Official Plan and provide a range of forecasts (low, reference and high growth) that municipalities can use in their own planning policies.

### 2.9.2 Existing Population

The most recent population count for the Township of Lucan Biddulph is the 2021 Census. In 2021, the population of Lucan Biddulph was 5,680 residents, an increase of 980 persons from the 2016 count (Statistics Canada, 2022). The increase in population between 2021 and 2016 equates to a population increase of 20.9%.

Much of the growth in the Township occurred within the community of Lucan, which increased in population from 2,541 persons in 2016 to 3,089 persons in 2021. This amounts to a 21.6% increase between 2016 and 2021. Table 2.2 summarizes the census population data for both Lucan and Lucan Biddulph.

To estimate the 2021 population of Lucan, the number of new residents was calculated based on the building permits issued for Lucan from 2017 to 2020. The number of new residential builds between 2017 and 2020 is summarized in Table 2.3, including the average number of persons per unit type, based on Census data.

**Table 2.2 – Census Population Counts, 1981-2021**

| Year | Lucan | Lucan Biddulph |
|---|---|---|
| 1981 | 1,616 | 3,876 |
| 1986 | 1,728 | 3,973 |
| 1991 | 1,847 | 4,041 |
| 1996 | 1,958 | 4,085 |
| 2001 | 2,010 | 4,201 |
| 2006 | 1,997 | 4,187 |
| 2011 | 2,014 | 4,338 |
| 2016 | 2,541 | 4,700 |
| 2021 | 3,089 | 5,680 |
| **5-year population change** | **548** | **980** |
| **10-year population change** | **1,075** | **1,342** |
| **5-year Population Change (%)** | **21.57** | **20.85** |
| **10-year population change (%)** | **53.38** | **30.94** |

**Table 2.3 – Number of New Residential Units in Lucan (2017-2020)**

| Year | Single Detached Units | Apartments | Multi |
|---|---|---|---|
| 2017 | 69 | 23 | 0 |
| 2018 | 67 | 0 | 0 |
| 2019 | 81 | 0 | 0 |
| 2020 | 22 | 0 | 47 |
| Density (persons per unit) | 2.72 | 1.5 | 1.94 |

### 2.9.3 Growth Expressed as Equivalent Units

To assess capacity needs for the major wastewater facilities, the expected growth in households has been expressed in Equivalent Residential Units (ERUs). A single detached residence is considered to be one ERU. Multi-family and apartment units are made equivalent using the current population density values for each type. Results are as follows:

- Single detached = 2.72 PPU = 1.00 ERU
- Multi-family = 1.94 PPU = 0.75 ERU
- Apartments = 1.50 PPU = 0.60 ERU

### 2.9.4 Current Development Proposals

### (a) Approved Developments

There are a number of approved residential developments within the settlement area of Lucan. These developments include apartment, townhouse, single family units, and a 8.5 ha of future development. The approved developments, as of December 31, 2021, are shown in Figure 2.5. There is a total of 385 units approved, in addition to the 8.5 ha of future development associated with the Olde Clover development. The number of approved units by type and development are summarized in Table 2.4.

**Table 2.4 – Number and Type of Approved Units, By Development**

| Development | Number of Approved Units | ERUs |
|---|---|---|
| Ridge Crossing (multi-family) | 49 | 37 |
| Lucan Woods (apartments) | 23 | 14 |
| Brock (Apartments) | 57 | 34 |
| Olde Clover (single detached) | 76 | 76 |
| Ausable Fields (single detached) | 12 | 12 |
| Ausable Fields (multi-family) | 78 | 59 |
| 280 Main Street (apartments) | 90 | 54 |
| **Total Approved Units** | **385** | **286** |

### (b) Proposed Developments

There are a number of proposed residential developments both within and outside of the urban settlement area. Within the current settlement area, the proposed developments include 98 residential units (townhouses and single family units) and 2.89 ha of commercial development. Additional residential units are currently proposed outside of the current urban boundary. The proposed developments within the urban boundary are shown in Figure 2.5. The number of proposed units, by unit type and development are summarized in Table 2.5.

**Table 2.5 – Proposed Units, by Type and Development**

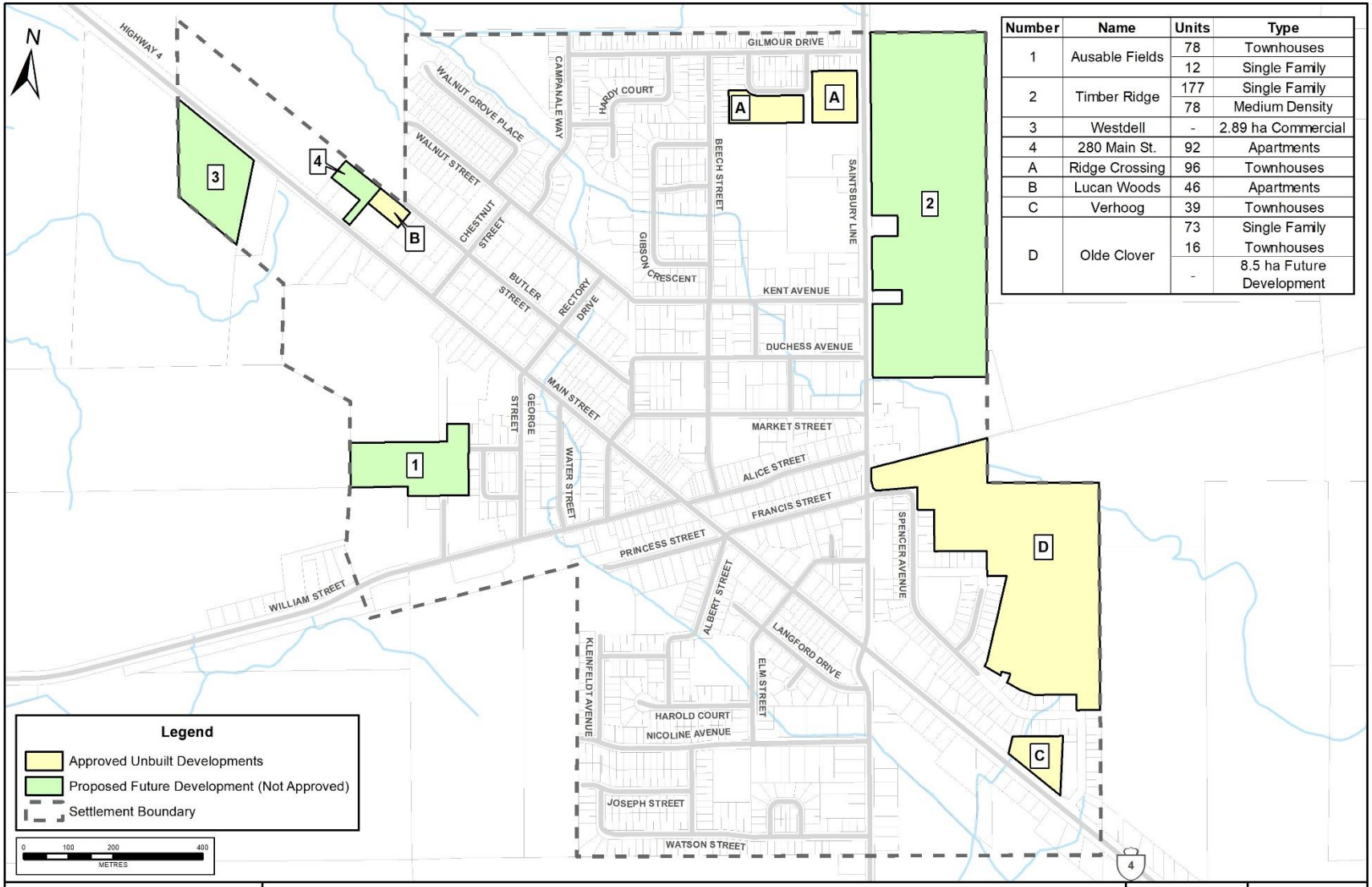
| Development | Number of Proposed Units | ERUs |
|---|---|---|
| Landea Developments (single detached) | 27 | 27 |
| Landea Developments (multi-family) | 24 | 18 |
| Timber Ridge (single detached) | 47 | 47 |
| **Total Proposed Units** | **98** | **92** |

### 2.9.5 Population and Growth Forecasts

Currently, the County of Middlesex is in the process of updating their Official Plan. This update includes new population and dwelling forecasts for the lower-tier municipalities to use for future land use planning purposes. The forecasts, developed by Watson and Associates were approved by County Council in January 2021 and include low, reference, and high growth scenarios (Watson and Associates Economist Ltd, 2020). The 25-year scenarios reflect recent development trends within the County and expected demographic and socioeconomic trends. The forecasts anticipate the majority of future housing across the County will be single detached homes (low density), but the proportion of medium and high density units built will increase in the future. Additionally, it is anticipated that the average household density (Person per Unit, PPU) will continue to decline over the next 25 years across the County.

The forecasts developed for Lucan Biddulph are summarized in Table 2.6.

## Figure 2.5 – Lucan Development Areas




| Number | Name | Units | Type |
|---|---|---|---|
| 1 | Ausable Fields | 78 | Townhouses |
| | | 12 | Single Family |
| 2 | Timber Ridge | 177 | Single Family |
| | | 78 | Medium Density |
| 3 | Westdell | - | 2.89 ha Commercial |
| 4 | 280 Main St. | 92 | Apartments |
| A | Ridge Crossing | 96 | Townhouses |
| B | Lucan Woods | 46 | Apartments |
| C | Verhoog | 39 | Townhouses |
| D | Olde Clover | 73 | Single Family |
| | | 16 | Townhouses |
| | | - | 8.5 ha Future Development |

BMROSS engineering better communities

**TOWNSHIP OF LUCAN BIDDULPH**

LUCAN WWTP EXPANSION CLASS EA

**LUCAN DEVELOPMENT AREAS**

DATE JUNE 15, 2021 | PROJECT No. 21023

SCALE AS SHOWN | FIGURE No. 2.5

**Table 2.6 – Population and Household Forecast Growth Scenarios for Lucan Biddulph.**

| Year | Low Scenario Population | Low Scenario Households | Reference Scenario Population | Reference Scenario Households | High Scenario Population | High Scenario Households |
|---|---|---|---|---|---|---|
| 2021 | 5,200 | 1,970 | 5,300 | 2,010 | 5,390 | 2,040 |
| 2026 | 5,300 | 2,080 | 5,700 | 2,230 | 5,860 | 2,300 |
| 2031 | 5,500 | 2,210 | 6,200 | 2,470 | 6,420 | 2,570 |
| 2036 | 5,800 | 2,380 | 6,600 | 2,690 | 7,080 | 2,850 |
| 2041 | 6,200 | 2,560 | 7,100 | 2,910 | 7,660 | 3,110 |
| 2046 | 6,800 | 2,780 | 7,800 | 3,160 | 8,410 | 3,410 |
| Change (2021-2046) | 1,600 | 810 | 2,500 | 1,150 | 3,710 | 1,370 |

Across all the forecasts the population of Lucan Biddulph, as a proportion of the total population of Middlesex County, is expected to remain at 7%. For these scenarios it is assumed that the majority of the predicted growth will occur within Lucan.

Under the low growth scenario Lucan Biddulph will add 810 new homes beyond the 2020 number of total households. This is equivalent to 7% of the growth within Middlesex County, and a 1.5% annual average growth rate. The reference scenario forecasts an additional 1,160 homes between 2021 and 2046, or an annual growth rate of 1.9%. The high growth scenario predicts an annual growth rate of 2.2%, with 1,370 new homes constructed during the forecast period (Watson and Associates Economist Ltd, 2020).

For all the County forecasts, it is anticipated that there will be a shift towards an increased proportion of medium and high-density housing types (e.g. townhouses and apartments).

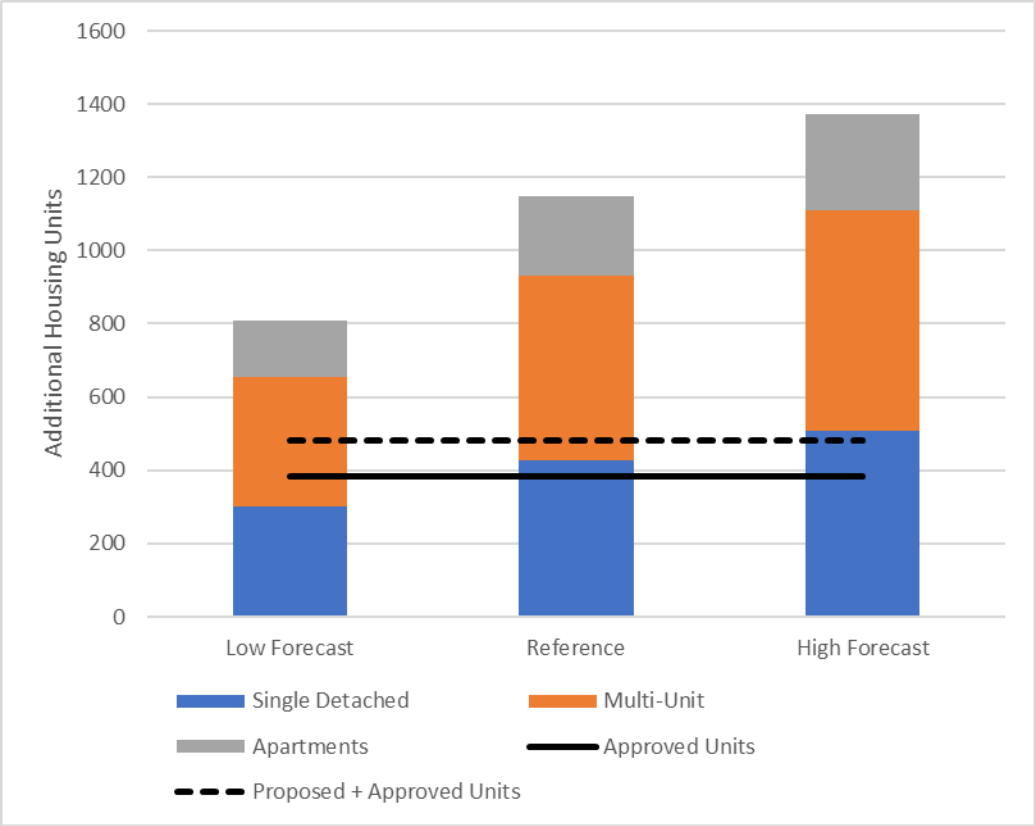
Currently, for Lucan Biddulph the density split for approved and proposed properties is as follows:

- Single Detached - 37%
- Multi- family - 44%
- Apartments - 19%

### 2.9.6 Comparison to Current Commitments and Proposals

In order to compare the County's forecasted growth against current commitments and proposed developments, the number of single detached, multi-unit, and apartments for each forecast scenario was estimated. The proportion of single detached, multi-unit and apartment units is based on the ratio of units currently proposed for development in Lucan. The number of new housing units by type for each forecasting scenario is summarized in Figure 2.6.

**Figure 2.6 – Forecasted Units for Growth Scenarios and Approved and Proposed Development Units**




Using the County growth forecast as summarized in Table 2.6 and the current density split, the total growth in ERUs for the period 2021 to 2046 has been calculated to be:

- Low Growth Scenario = 659 ERUs
- Reference Growth Scenario = 936 ERUs
- High Growth Scenario = 1,115 ERUs

These values have been used in the evaluation of capacity requirements for the wastewater treatment facilities.

## 2.10 Existing Sewage Facilities

### 2.10.1 Collection System

As of 2018 approximately 50% of the sanitary sewer system had been constructed between 1963 and 1975, and the remainder since 1991. Therefore, the oldest sewers are approximately 60 years old. As of January 2021 the system consisted of approximately:

- 19.7 km of gravity sewer
- 2.8 km of forcemain
- 1,300 customers in Lucan

There is a small secondary sewage pumping station (SPS) in the southwest corner of the community (the Joseph St. SPS) and a main SPS at Campanale Way in the north. The latter is referred to as the Chestnut SPS. It discharges directly to the WWTP. The industrial area north of Fallon Drive has a low pressure sewage system which also discharges directly to the WWTP.

### 2.10.2 Treatment Facilities

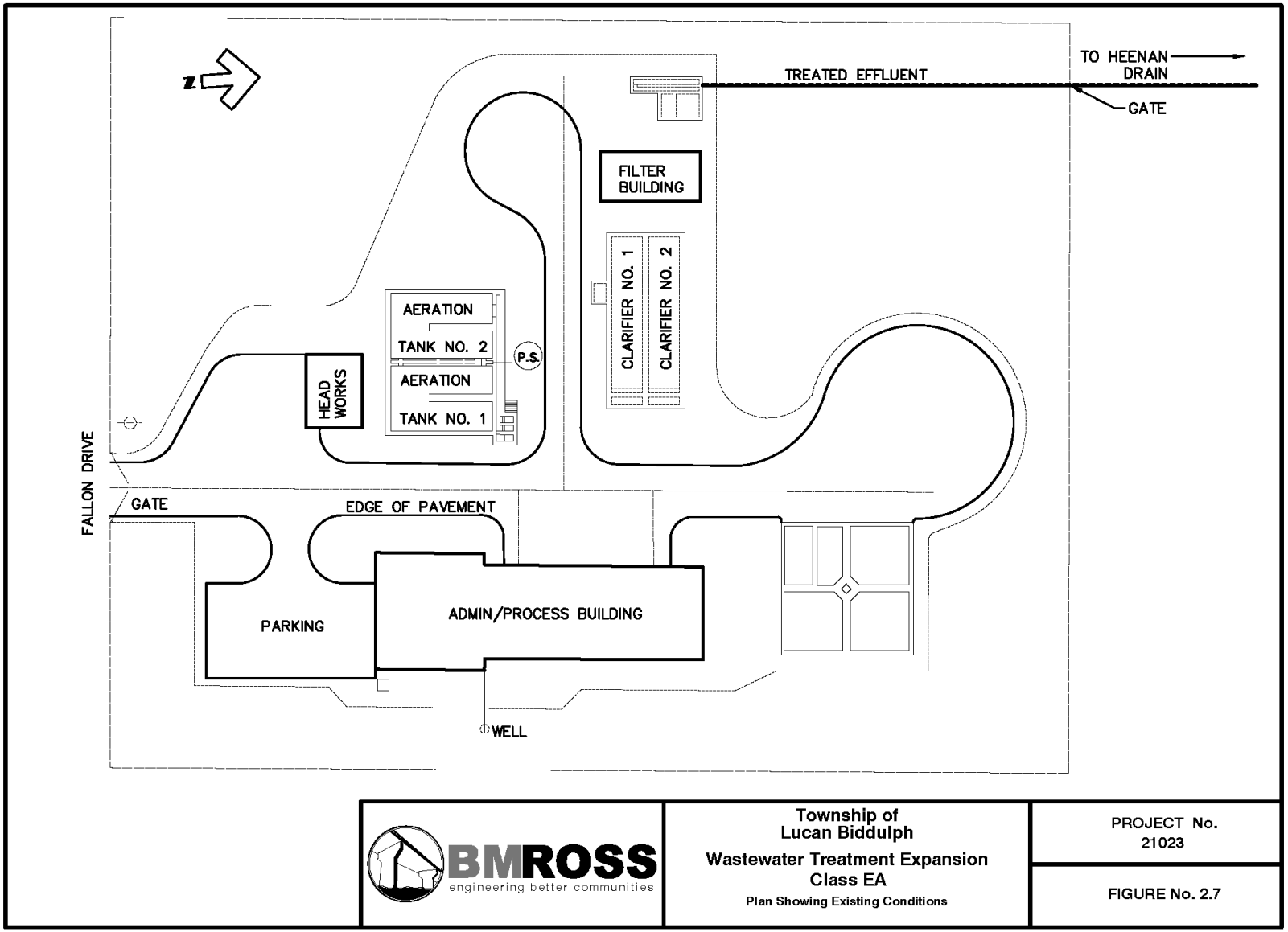
#### (a) Description

The existing WWTP is located at 6242 Fallon Drive. The plant was originally constructed in 1991 and partially upgraded in 2011. Plant operations are regulated by Amended Environmental Compliance Approval (AECA) No. 7008-B7CJWY dated February 11, 2019. The facility is operated by the Ontario Clean Water Agency (OCWA). Figure 2.7 illustrates the existing site arrangement.

The plant provides tertiary level treatment. A summary of the plant description from the AECA is as follows:

- The AECA includes a description of the Chestnut SPS and forcemains to both the WWTP and the existing lagoons.
- The lagoons consist of two facultative cells with a total area of approximately 4 ha and a volume of 37,000 $m^3$.
- The Headworks of the plant are rated at 3,600 $m^3$/day and include screening and de-gritting equipment.
- Secondary treatment is provided by two aeration basins and two secondary clarifiers with associated pumping facilities for sludge recirculation and wasting.
- Two rotary disc filters provide tertiary treatment.
- Final disinfection of the effluent is provided by a UV system.
- Discharge of treated effluent occurs continuously to the Heenan Drain.
- Waste activated sludge (WAS) is treated in a two stage aerobic digester with 744 $m^3$ of integrated storage.

## Figure 2.7 – Existing Site Arrangement



### (b) Operating Constraints

The WWTP is approved to treat 1,700 $m^3$/day as an annual average daily flow (AADF) and 3,600 $m^3$/day as a daily peak flow. The peak flow limit is linked to the capacity of the Headworks. Previous studies (Stantec, 2011) have established that the balance of the plant processes downstream of the Headworks have a capacity up to 5,000 $m^3$/day. Peak flow to the plant is regulated by the capacity of the pumps at the Chestnut SPS. Excess flows are diverted to the lagoons.

### (c) Effluent Criteria

The existing ECA for the Lucan WWTP provides both treatment objectives and limits. The final effluent objective criteria are set out in Schedule B of the ECA and are as follows (Table 2.7):

**Table 2.7 – Current Effluent Objective Criteria for Lucan WWTP**

| Final Effluent Parameter | Averaging Calculator | Objective |
|---|---|---|
| CBOD5 | Monthly Average Effluent Concentration | 5 mg/L |
| Total Suspended Solids | Monthly Average Effluent Concentration | 5 mg/L |
| Total Phosphorus | Monthly Average Effluent Concentration | 0.2 mg/L |
| Total Ammonia Nitrogen | Monthly Average Effluent Concentration | 1.0 mg/L (May 1-October 30) 2.0 mg/L (November 1-April 30) |
| Dissolved Oxygen | Monthly Average Effluent Concentration | Greater than 5 |
| *E. coli* | Geometric Mean Density | *80 CFU/100 ml for any calendar month |
| pH | Single Sample Result | 6.5 - 8.5 inclusive |

The final effluent compliance criteria (Table 2.8) are set out in Schedule C of the ECA. Both concentration and loading criteria are stipulated and are as follows:

**Table 2.8 – Current Final Effluent Compliance Criteria for Lucan WWTP**

| Final Effluent Parameter | Averaging Calculator | Limit |
|---|---|---|
| CBOD5 | Monthly Average Effluent Concentration | 10 mg/L |
| Total Suspended Solids | Monthly Average Effluent Concentration | 10 mg/L |
| Total Phosphorus | Monthly Average Effluent Concentration | 0.32 mg/L |
| Total Ammonia Nitrogen | Monthly Average Effluent Concentration | 1.3 mg/L (May 1-October 30) 2.6 mg/L (November 1-April 30) |
| *E. coli* | Geometric Mean Density | 100 CFU per 100 mL |
| pH | Single Sample Result | between 6.0 - 8.5 inclusive |
| $CBOD_5$ | Monthly Average Effluent Concentration | 17 kg/d |
| Total Suspended Solids | Monthly Average Effluent Concentration | 17 kg/d |
| Total Phosphorus | Monthly Average Effluent Concentration | .55 kg/d |
| Total Ammonia Nitrogen | Monthly Average Daily Effluent Loading | 2.3 kg/d (May 1-October 30) 4.4 kg/d (November 1-April 30) |

Objectives and Limits are judged based on the monthly average of weekly samples.

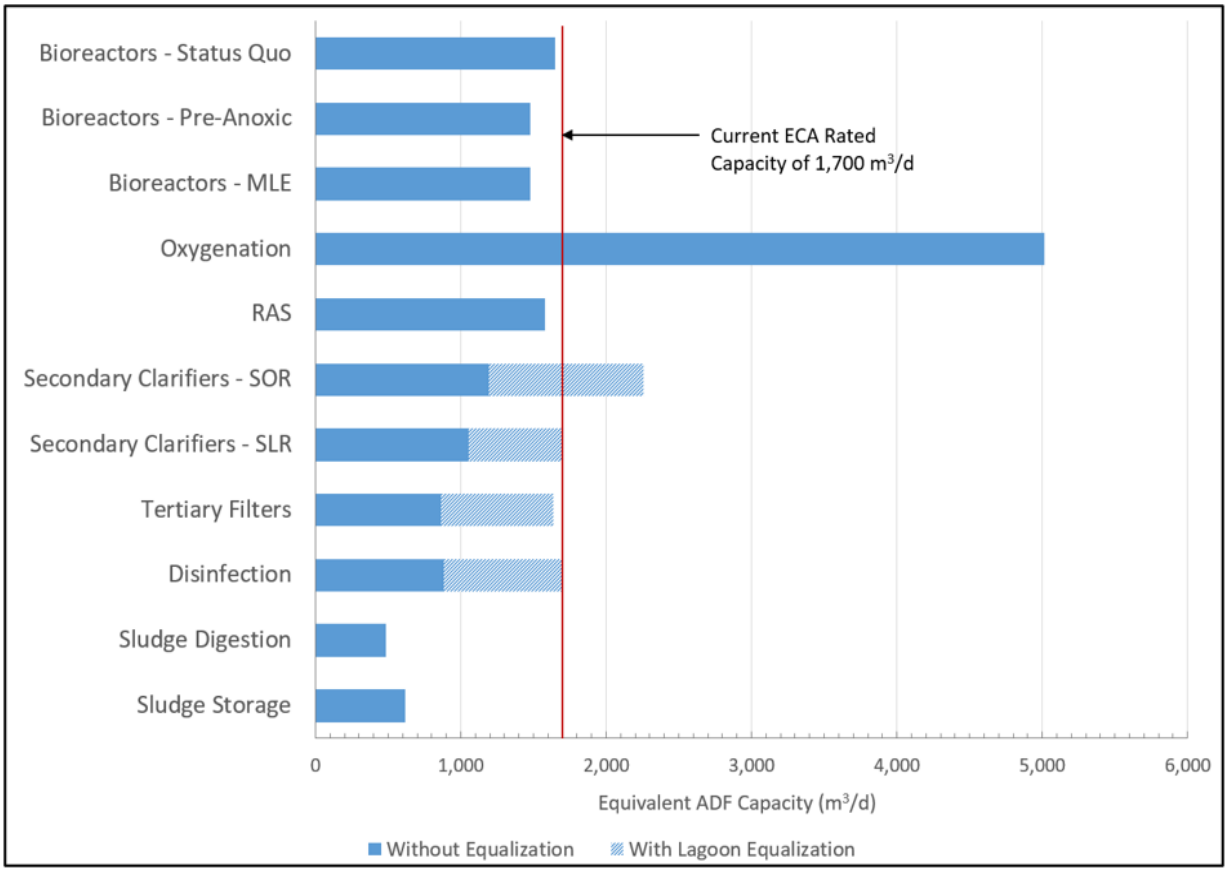
## 2.11 Capacity Evaluation

As noted previously, the Lucan WWTP was evaluated as part of a previous Class EA process (Stantec, 2011) and subsequently re-rated from 1,100 $m^3$/day to 1,700 $m^3$/day. No physical changes were made to the principal bio-reactor components (aeration and settling).

Because of the expected need to physically expand the facilities, Blue Sky Energy Engineering and Consulting Inc. (Blue Sky) was retained to undertake a detailed evaluation of the capacity of each of the units in the process treatment train. Since the previous re-rating, a significant amount of process operating data has been accumulated and actual flows are much closer to the plant capacity than in 2011.

Blue Sky's opinion of the unit process capacities is presented in Figure 2.8. The complete assessment report is included in Appendix C.

**Figure 2.8 – Capacity Assessment Summary**




For purposes of considering expansion the limiting capacity of the treatment process is the bioreactors, at **1,650 m³/day**.

## 2.12 Wastewater Flows

### 2.12.1 Existing Wastewater Flows

The following is a summary of recent historical wastewater flow information.

**Table 2.9 – Lucan – Historical Wastewater Flows[1.]**

| Year | AADF[2] (m³/day) | Max. Single Day to WWTP (m³) |
|---|---|---|
| 2019 | 1,112 | 2,871 |
| 2020 | 1,018 | 5,641 |
| 2021 | 1,094 | 3,033 |

Notes:
1. Rounded Values
2. AADF = Annual Average Daily Flow

### 2.12.2 Unit Sewage Flows

Wastewater flows were examined for the period 2019 to 2021. During that interval, the number of customers increased steadily, so the total flows have been assessed on a per customer basis.

**Table 2.10 – Annual Average Flows per Customer**

| Year | Estimated No. of Customers [1] | Annual Average Flow ($m^3$/day) | Average Flow per Customer ($m^3$/day·cust) |
|---|---|---|---|
| 2019 | 1,263 | 1,112 | 0.880 |
| 2020 | 1,305 | 1,018 | 0.781 |
| 2021 | 1,410 | 1,094 | 0.776 |
| **3-year Average** | **-** | **-** | **0.812** |

Note: 1. Estimated average annual value considering customer data and building permits.

The values in Table 2.9 indicate considerable variability in the total and per customer flow values. For this reason, we propose to use the greater unit value for capacity forecast purposes (i.e. 0.90 $m^3$/day·customer).

For flow forecasting purposes we propose to consider a customer as equivalent to an ERU, which is in turn is equivalent to a detached residence. To account for non-residential growth the “per customer flow” has been increased by approximately 10%, resulting in a “design” unit flow of **1.0 $m^3$/ERU·day** for forecasting purposes. Also, for forecasting purposes the expected flow at the beginning of 2022 is assumed to be **1,270 $m^3$/day** based on a per customer flow of 0.9 $m^3$/day and 1,410 customers. Given that recent existing flows have been in the order of 1,100 $m^3$/day, this starting value might seem conservative. In our opinion the general flow variability and the difficulty of establishing an accurate unit flow, because new units come on-line at different times through the year, justifies a conservative approach to estimating the 2022 flow.

### 2.12.3 Review of Extraneous Flows

Extraneous flows are defined as, flows in excess of what would be considered true sewage flow (TSF). Extraneous flows are typically divided into two categories; groundwater infiltration, which typically includes discharges from building footing drains, and inflow which is the direct connection of surface flows to a sanitary sewer (e.g. roof leaders). Combined, the flow is referred to as Infiltration-Inflow (I-I).

TSF is estimated as 95% of the potable water supplied. Data for the water supply to Lucan indicates that 95% of the annual average water supply in 2020 was approximately 806 $m^3$/day. With reference to the sewage values in Table 2.9, the average extraneous flows in 2020 were approximately 245 $m^3$/day, or 23% of the total flow to the WWTP. In our opinion this is lower than typically observed values in similar communities.

## 2.13 Reserve Treatment Capacity

### 2.13.1 Total Reserve

Typically, the Reserve Capacity of a WWTP is assessed by deducting the average flow from the previous three to five years from the ECA rated capacity. AADFs at Lucan have been increasing every year, consistent with observed development and are also variable depending on annual precipitation. For that reason, we have chosen to use estimated 2022 year end value (1,270 $m^3$/day), from Section 2.8.2, as the existing flow for reserve calculation purposes.

The Lucan WWTP is rated for an AADF of 1,700 $m^3$/day. The Total Reserve Capacity at the end of 2020 was as follows:

Rated Capacity = 1,700 $m^3$/day
Existing AADF = 1,270
Total Reserve = **430 $m^3$/day**

### 2.13.2 Uncommitted Reserve

The Uncommitted Reserve Capacity is calculated by deducting from the Total Reserve Capacity, the anticipated flow from development commitments. This approach has been extended to proposed developments as well.

Table 2.4 identifies the number of committed ERUs as 286, therefore:

Uncommitted Reserve = Total Reserve – Commitments
= 430 $m^3$/day – (286 x 1.0 $m^3$/day)
= **144 $m^3$/day**
= **144 ERUs**

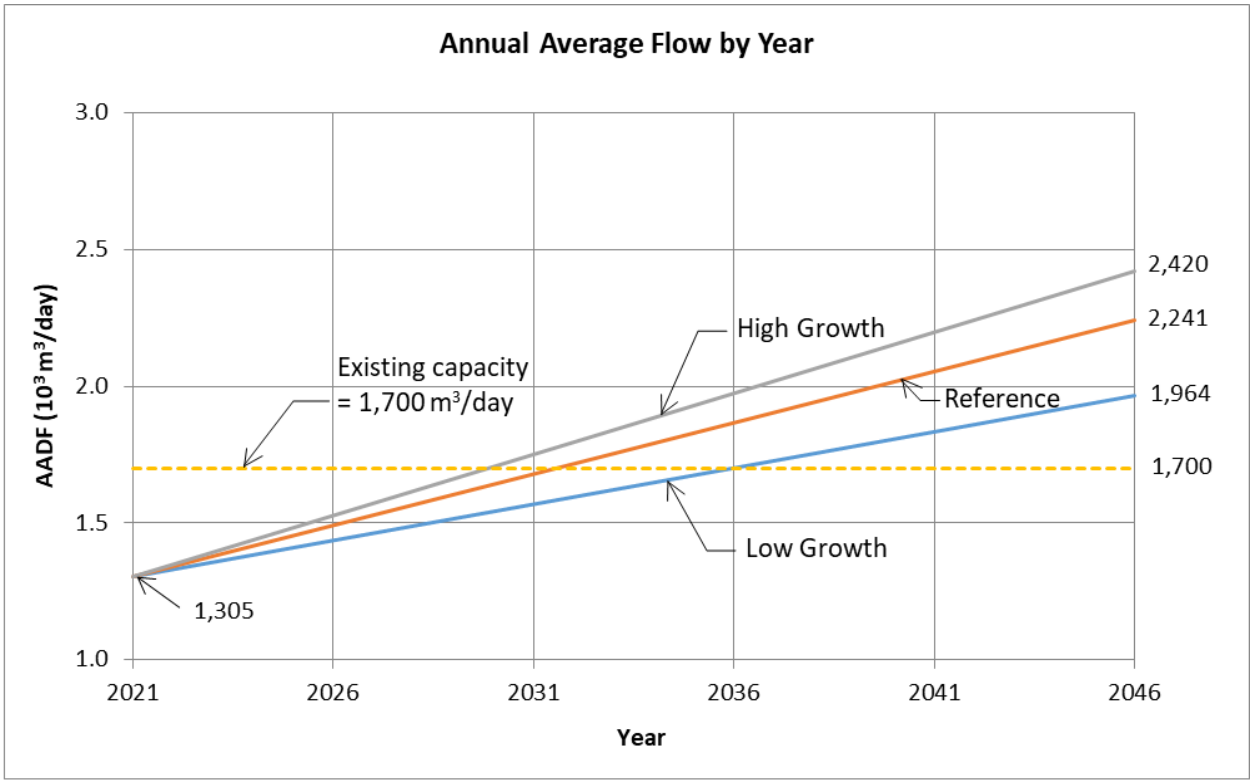
Currently the Township is considering development proposals within the existing urban boundary for 92 ERUs, which would equate to approximately 64% of the capacity available to commit.

At current rates, the Township could run out of the ability to approve additional development within 2 to 3 years.

### 2.13.3 Required Treatment Capacity by Year

With reference to the growth projections presented in Section 2.9, Figure 2.9 shows the expected annual average sewage flows from 2021 to 2046. The figure indicates that, at the highest growth rate, the existing treatment capacity will be adequate until approximately 2025. It is important to note that at recent rates of development, expansion could be required even earlier.

**Figure 2.9 – Annual Average Day Sewage Flow by Year**




### 2.13.4 Other Issues

Additional issues that have been identified are:

- The existing WWTP Headworks, which includes screening and de-gritting equipment is a peak flow constraint for the entire WWTP. Also, the equipment has reached its useful life.
- Existing biosolids treatment and storage facilities are substantially undersized, even for the current plant rating. The current operating approach is to transfer excess biosolids from the holding facilities to the existing lagoons when land application is not feasible. This is at best an interim solution.

### 2.13.5 Reserve Pumping Capacity – Chestnut Street

#### (a) General

The Chestnut SPS has five sewage pumps. Three of the pumps are arranged to discharge wastewater to the WWTP. There is one 3.75 kW pump operating at approximately 13.75 L/s. This pump is the first duty pump and is referred to as a “Jockey pump”. The remaining two pumps are 15 kW and operating at approximately 40 L/s. The capacity of each of the larger pumps is approximately equal to the peak inflow capacity of the WWTP.

The remaining two pumps operate during peak flow periods and discharge wastewater directly to the lagoons. These pumps are 56.25 kW and are estimated to discharge 134 L/s. Based on a review of the operating records, when flows exceed the capacity of

the Jockey pump, one of the 15 kW pumps starts as the second duty and flow continues to go to the WWTP. All inflow in excess of the capacity of the 15 kW pump goes directly to the lagoons. The system has been put in place for peak flow management to protect the WWTP.

With the current arrangement, under low flow conditions, the contents of the lagoon are allowed to flow backwards from the lagoon to the Chestnut SPS through the existing forcemain and are then sent to the WWTP. The backflow arrangement is manually initiated.

The firm capacity (largest pump out of service) for each arrangement is:

- To WWTP – 3,600 /$m^3$/day.
- To lagoon – 11,575 $m^3$/day

A review of the 2019 operating data established that approximately 2% of the total annual flow was directed to the lagoon. This is well within the capability of the lagoon system; however, as flows increase with growth this value will also increase.

### (b) Proposed Upgrades

It is currently proposed to replace the two 15 kW pumps with smaller 11.25 kW pumps, each rated at approximately 37 L/s at 18 m TDH. With parallel operation the two pumps would discharge approximately 42 L/s to the WWTP. The 56.25 kW units would only be initiated if flows exceed the capacity of the two new units operating in parallel. The result is that the lagoon pumps would become $4^{th}$ and $5^{th}$ duty, and overall more wastewater would be delivered to the WWTP and less to the lagoon.

In addition to the pump size changes, the backflow from the lagoon to the SPS would be automated by the installation of an electrically actuated plug valve and modifications to the controls.

### (c) Potential Issues

Currently approved and proposed development within the urban boundaries of Lucan will add an additional 378 ERUs to the Chestnut SPS drainage area. Potential additional peak flows from this development will be in the order of 15 to 20 L/s. It will be important to consider the increased peak in any plans to change the pumps as well as WWTP peak flow capacity.

In our opinion there is limited value in modifying the SPS until WWTP peak capacity is increased.

## 2.14 Lucan WWTP Treatment Performance

Performance requirements are established by the Plant's ECA and are summarized in Section 2.6. Annual performance reports were reviewed for the period 2018 to 2021. This Section compares actual annual performance against the criteria.

**Table 2.11 – Summary of Existing Effluent Criteria**

| Criteria | $CBOD_5$ | TSS | TP | TAN | *E. coli* |
|---|---|---|---|---|---|
| **Objective (mg/L)** | 5.0 | 5.0 | 0.20 | 1.0 (May-Oct.)<br>2.0 (Nov.-Apr.) | <80 cfu/100 ml |
| **Limits (mg/L) as a Monthly Average** | 10.0 | 10.0 | 0.32 | 1.3 (May-Oct.)<br>2.6 (Nov.-Apr.) | <100cfu/100mL |

**Table 2.12 – Summary of Existing Effluent Concentrations**

| Year | $CBOD_5$ Average | $CBOD_5$ Max | TSS Average | TSS Max | TP Average | TP Max | TAN Average | TAN Max | *E. coli* Average | *E. coli* Max |
|---|---|---|---|---|---|---|---|---|---|---|
| 2018 | 2.2 | 3.3 | 3.5 | 4.3 | 0.21 | 0.29 | 0.10 | 0.12 | 3 | 6 |
| 2019 | 2.4 | 3.0 | 3.8 | 5.0 | 0.19 | 0.24 | 0.21 | 0.90 | 5 | 24 |
| 2020 | 2.3 | 3.0 | 4.9 | 8.0 | 0.17 | 0.25 | 0.19 | 0.75 | 23 | 86 |
| 2021 | 2.3 | 3.3 | 5.3 | 7.6 | 0.18 | 0.26 | 0.20 | 0.95 | 17 | 32 |

Note: 1. *E. coli* is cfu/100 mL
2. *E. coli* is calculated as a geometric mean. Values shown are the average of the monthly means.
3. Average values are the annual average based on 12 monthly values.
4. Maximum values are highest monthly average for the year.

Effluent concentration objectives and limits have consistently been met. The ECA also presents loading limits (i.e. kg/day) based on the allowable concentration times 1,700 $m^3$/day. Because existing flows are considerably less than that value, loading limits are also being met.

In 2019 BMROSS conducted a detailed review of plant performance specifically regarding TSS and TP. It was determined that, when considering weekly sample values, TP concentrations were trending upward. The Township undertook a more detailed assessment (Blue Sky Energy Engineering & Consulting Inc, 2020) and is currently implementing operational changes to resolve this issue.

# 3.0 CLASS EA STUDY FRAMEWORK

## 3.1 Study Initiation

The community of Lucan has experienced significant growth in recent years and is anticipating continued residential growth at similar, or greater rates, over the next 20-25 years as lands designated for growth proceed to development.

Annual average sewage flows to the wastewater treatment facility are expected to be approaching 75% of the plant's rated capacity by the end of 2022 and with current development commitments will be at 92%. Based on current growth projections flows could exceed the facility's rated hydraulic capacity as early as 2030 and the plant's actual treatment limitations sooner.

To address the issue of capacity the Township has initiated this MCEA.

## 3.2 Phase 1 – Problem Definition

The first phase of the MCEA process is to define the problems or opportunities which need to be addressed. Based upon a review of operating data and discussions with the Township, the following key problem has been identified with regards to the existing wastewater treatment works:

> **Over the past few years new growth and development in the community of Lucan has been accelerating at a significantly faster pace than the historic norm. The Lucan wastewater treatment facility is approaching its rated capacity and additional capacity is needed to accommodate future growth.**

In order to resolve the above issue, the Township has identified and investigated a range of alternatives. Among these are projects that may require expansion of the existing treatment facility or the establishment of a new wastewater treatment system. From an MCEA perspective, these types of projects are considered Schedule 'C' activities. Schedule 'C' projects require the proponent to evaluate alternative design concepts for the preferred alternative and to prepare an Environmental Study Report documenting study investigations (i.e., Phases 1 to 4 of the MCEA process). One purpose of the study process is to identify any potential environmental impacts associated with the construction of proposed facilities and plan for appropriate mitigation.

Given the need for capacity expansion at Lucan, the Township has chosen to also investigate the possibility of decommissioning the existing Township owned WWTP serving the community of Granton and have that wastewater transferred to Lucan for treatment and disposal.

## 3.3 Phase 2 – Identification of Alternative Solutions

The second phase of the MCEA process involves the identification and evaluation of alternative solutions for addressing the defined problem. The evaluation of alternatives

is undertaken by examining the technical, cultural, economic, social, and environmental considerations associated with implementing any alternative. Mitigation measures that could lessen any environmental impact are also defined. A preferred solution or solutions is then selected.

For the defined capacity problem there are a number of considerations related to providing increased treatment capacity for growth. These include:

- The existing facilities are in good condition and provide very good treatment.
- There are advantages to retaining the existing lagoons for raw sewage flow equalization.
- There is considerable uncertainty regarding both the rate and scale of future growth. Staging the increase in capacity should be considered as a means of reducing the economic risk of over-building.

The following alternatives have been identified and considered as part of this study:

**(1)** **Reduce wastewater quantities from the existing community.** This option involves the reduction of wastewater flows to the existing facility to lessen the burden on existing treatment systems and thus provide capacity for growth.

**(2)** **Limit community growth**. This alternative would require the Township to take steps to restrict new development activities in the study area. The adoption of such policies would ensure that the current wastewater treatment capacity is not exceeded.

**(3)** **Expand the existing wastewater treatment plant.** This option would involve the construction of additional wastewater treatment facilities at the existing plant.

**(4)** **Construct a new municipal wastewater treatment facility.** This option would involve the construction of a new wastewater treatment facility to replace the existing facility. The implementation of this option could require the selection of a suitable site, the construction of all necessary waste treatment and disposal facilities, and the potential installation or modification of pumping equipment or forcemains to convey the wastewater to the new site or facility.

**(5)** **Re-rate the existing facility**. This option would involve an evaluation of the current hydraulic rating of the treatment facility to determine if, based upon the current operational parameters and treatment levels, the facility could be re-rated to treat greater volumes of wastewater.

**(6)** **Do Nothing.** This option proposes that no improvements or changes be made to address capacity deficiencies at the WWTP. During the MCEA planning and design process, the “Do Nothing” alternative may be implemented at any time prior to the commencement of construction. A decision to “Do Nothing” would typically be made when the costs of all other alternatives, financial or environmental, significantly outweigh the benefits.

# 4.0 EVALUATION OF ALTERNATIVES

## 4.1 Technical Evaluation of Alternatives

### 4.1.1 General

The next component of the investigation involved the evaluation of the identified alternatives. The purpose of the evaluation was to examine the potential environmental impacts associated with each option and to consider potential mitigation methods for any identified impacts. The evaluation generally involved the following activities:

- A preliminary technical review of each alternative.
- Consultation with the general public and review agencies.
- Selection of a preferred alternative.

A preliminary engineering analysis was conducted to determine the requirements for implementing each of the identified alternatives. A discussion of these findings is included below for each of the project alternatives previously identified in Section 3.3.

### 4.1.2 Alternative 1: Reduce wastewater quantities from the existing community.

Existing wastewater flows are approximately 80% of the rated capacity of the WWTP. The facility is rated on the basis of annual average daily flow. In theory, decreasing the average inflow will result in a corresponding increase in capacity that can be used to service additional development.

Section 2.11.3 included an analysis of existing sewage flows and concluded that, based on 2020, approximately 23% of the existing annual flows could be considered as extraneous. If 100% of the extraneous flows were somehow eliminated, approximately 245 $m^3$/day of capacity would be created. Adding this to the current total reserve capacity (see Section 2.8) would result in an available capacity of approximately 640 $m^3$/day.

Sections 2.11.2 of this report identified that unit flows are 1.0 $m^3$/day per ERU and projected growth to 2046 is somewhere between 659 and 1,115 ERUs. Therefore, the minimum projected future additional flows (i.e. 659 $m^3$/day) exceed the capacity that would be created by eliminating 100% of the infiltration and inflow. Realistically, in our experience, with an aggressive system inspection and rehabilitation program an extraneous flow reduction of 25% to 30% might be achievable, not 100%.

In conclusion, reducing existing flows to create capacity for growth is not a viable solution to the capacity problem and thus Alternative 1 will not be considered further.

Regardless, sewer inspection and rehabilitation/replacement efforts are valuable in that they prevent extraneous flows from increasing. Such programs should continue.

### 4.1.3 Alternative 2: Limit Community Growth

The implementation of this strategy would require the Township to amend its Official Plan and local Zoning By-law to restrict new development in the community of Lucan (i.e., limit infilling opportunities and housing expansions). A policy change of this nature

would ensure that new development activities would not create sewage flows that exceed existing treatment capacity.

This approach would not resolve the fact that existing, plus approved development, is predicted to produce wastewater flows equal to approximately 93% of treatment capacity and that there are already active development proposals within the approved urban boundary that will cause the flows to exceed approved capacity.

Restricting growth is not consistent with a number of planning policies, including the Provincial Policy Statement (PPS), as well as County and Township Official Plans. The PPS directs growth to settlement areas where full water and wastewater services are provided. For settlement areas, the PPS also states that sufficient land be available to meet future growth needs projected over the next 25 years. Relating specifically to residential growth, the PPS identifies the need to maintain at all times lands with servicing capacity sufficient to provide at least a 3-year supply of residential units. Upper and lower tier municipalities, under the PPS, may choose to maintain a 5-year supply of lands with servicing capacity.

Policies within the Middlesex and Lucan Biddulph Official Plans are required to comply with the PPS. Similar to the PPS, these Official Plans plan for and direct growth to serviced urban areas such as Lucan.

Given that provincial and local policies direct and encourage growth within urban settlements such as Lucan, Alternative 2 will not be given further consideration.

### 4.1.4 Alternative 3: Expand the existing WWTP

Expansion of the existing WWTP is physically possible. The plant's primary treatment units (aeration and clarification) have been constructed as modules referred to as "trains". Currently there are two trains and adequate land area within the current plant site to add additional trains.

The WWTP operates as an extended aeration process with phosphorus removal, filtration and disinfection which would be considered "tertiary" level treatment. Performance objectives for $BOD_5$ and TAN are consistently being met. Objectives for TSS and TP are occasionally exceeded and slowly trending upwards. Investigations involving operational changes to improve effluent quality are currently proceeding.

Preliminary discussions (see Appendix D) with the MECP regarding increasing effluent discharge quantities at this location established "…that an expansion of the Lucan WWTP is feasible given that there are no specific sensitivities within the immediate receiver; the Heenan Drain."

Therefore, Alternative 3, WWTP expansion, is considered as potentially viable and will be considered further.

### 4.1.5 Alternative 4: Construct a new WWTP

Construction of a new, larger, WWTP in lieu of expanding the existing facility is an alternative. To implement this alternative, it would be necessary to identify and acquire a new site and construct a facility sufficiently large that it can replace the capacity of the existing WWTP and provide additional capacity for growth.

This alternative has been rejected for the following reasons:

- As discussed for Alternative 3, the existing facilities are capable of expansion in terms of physical space and design.
- The existing plant process technology adequately provides tertiary level wastewater treatment to relatively current effluent quality standards.
- The Heenan Drain has been judged to be an acceptable effluent receiver and there is no apparent value or reason to re-locate and discharge to a different receiver.
- The majority of the existing plant facilities (e.g. tankage, buildings) are approximately 30 years old and have significant useful life remaining.
- Economically, it would cost substantially more to replace the facility rather than expand the existing.

### 4.1.6 Alternative 5: Re-rate the existing facility

The existing WWTP was originally designed and approved to treat an annual average flow of 1,100 $m^3$/day. As part of a previous MCEA (Stantec 2011) the facility was re-rated to treat 1,700 $m^3$/day, the current approved rating. Some plant components including biosolids digestion and storage, and the plant headworks were not expanded and thus have the original rating.

Since the work in 2012 was completed there has been an opportunity to observe the plant's performance at inflows closer to the approved rating. As part of the current MCEA a detailed examination of plant capacity and performance was undertaken (Blue Sky, 2021). The capacity evaluation report is included in Appendix C. A conclusion of the assessment was that the plant's bioreactors would be more appropriately rated at 1,500 $m^3$/day, rather than 1,700 $m^3$/day. None of the major process components are capable of re-rating to a greater value than the existing rating.

In conclusion, it is not feasible to expand the existing facility by means of re-rating to allow a greater inflow. Alternative 5 is therefore not considered further.

### 4.1.7 Alternative 6: Do Nothing

The Do Nothing alternative represents the least expensive alternative available. It does not, however, resolve the problem which is the need to accommodate additional growth and development. The existing WWTP's hydraulic capacity is approaching full commitment and must be addressed. The implementation of this option would not provide opportunity for additional development in the community. Consequently, the 'Do Nothing' option is not considered to be a viable strategy for addressing the identified

problem. However, the opportunity to do nothing always exists should all other alternatives prove to be impractical and will continue to be examined in the following sections.

### 4.1.8 Summary of Technical Review of Alternatives

Six alternatives were identified and given consideration. Four of these; reducing wastewater quantities, limiting community growth, replacing the facility with a new WWTP, and re-rating the existing facility have been determined to not be viable solutions to the problem and have been rejected. It should be noted that flow reduction is not viable as a stand-alone solution but could, and should be, considered a component of any expansion approach.

Two alternative solutions remain for more detailed evaluation. These are:

- Expanding the existing WWTP.
- Doing nothing.

## 4.2 Environmental Considerations

### 4.2.1 General

Section 3.3 of this report listed the alternative solutions that were identified to resolve deficiencies with the Lucan WWTP. As part of the evaluation process, it is necessary to assess what affect each alternative may have on the environment and what measures can be taken to mitigate the identified impacts. The two main purposes of this exercise are to:

- Minimize or avoid adverse environmental effects associated with a project.
- Incorporate environmental factors into the decision-making process.

Under the terms of the EA Act, the environment is divided into five general components:

- Natural environment
- Social environment
- Cultural environment
- Economic environment
- Technical environment

The identified environmental components can be further subdivided into specific sub-components that have the potential to be affected by the implementation of the alternative solutions. Table 4.1 provides an overview of the specific environmental components and sub-components considered relevant to this investigation. These were identified following the initial round of public and agency input, and after a preliminary review of each alternative with respect to technical considerations and the environmental setting of the project area.

**Table 4.1 – Evaluation of Alternatives: Identification of Environmental Components**

| Element | Component | Sub-Component |
|---|---|---|
| Natural | Aquatic | Aquatic Resources |
| Natural | Aquatic | Fisheries |
| Natural | Atmosphere | Air Quality |
| Natural | Atmosphere | Noise |
| Natural | Atmosphere | Climate Change |
| Natural | Surface Water | Water Quality/Quantity |
| Natural | Terrestrial | Wildlife |
| Natural | Terrestrial | Vegetation Communities |
| Natural | Terrestrial | Species at Risk |
| Natural | Geologic | Soils |
| Social | Neighbourhood | Disruption |
| Social | Community | Recreation Activities |
| Social | Community | Policy Goals |
| Cultural | Cultural Heritage | Archaeological Resources |
| Cultural | Cultural Heritage | Built Heritage Resources |
| Cultural | Cultural Heritage | Cultural Heritage Resources |
| Economic | Project Area | Capital and Operating Costs |
| Economic | Community | Wastewater Rates |
| Technical | Infrastructure | Servicing Capacity |
| Technical | Infrastructure | Technologies |
| Technical | Infrastructure | Utilities |

The environmental effects of each study alternative on the specific components are generally determined through an assessment of various impact predictors (i.e. impact criteria). Given the works associated with the alternative solutions, the following key impact criteria were examined during the course of this assessment:

- Magnitude (e.g. scale, intensity, geographic scope, frequency, duration).
- Technical complexity.
- Mitigation potential (e.g. avoidance, compensation, degree of reversibility).
- Public perception.
- Scarcity and uniqueness of affected components.
- Likelihood of compliance with applicable regulations and public policy objectives.

The evaluation process described above provides the proponent with a methodology to predict the potential effects of alternative solutions. The significance of the identified impacts is largely based on the anticipated severity of the following:

- Direct changes occurring at the time of project completion (e.g., habitat disruption).
- Indirect effects following project completion (e.g., increased sedimentation/ erosion).

- Induced changes resulting from a project (e.g., additional activity in sensitive areas).

### 4.2.2 Climate Change Considerations

Climate includes multiple related factors including; temperature, precipitation and wind. Climate varies daily and seasonally. When climate changes on a global or regional scale it is generally referred to as “climate change”.

Although there are predictions of change on a macro scale (e.g. sea level change, loss of glacier ice, loss of permafrost), on a project scale we are more interested in the predicted potential local effects including:

- More frequent periods of high temperatures and more rapid changes in temperature.
- An increased frequency for extreme precipitation and wind events both during the traditional warm weather and cold weather periods.

When evaluating alternative solutions to the defined problem it is necessary to consider both the alternative’s contribution to climate change, and the impact climate change might have on the project. Most factors for both contribution and impact mitigation are assessed at the detailed design stage however some more general considerations would be:

- Reducing the amount of construction activity, including duration, required to put in place the solution.
- Selecting an alternative that has a lower requirement for energy during its operation.
- Ensuring that carbon sinks such as forest and vegetation cover are retained or enhanced.

All three of these considerations are discussed in the following summary.

### 4.2.3 Provincial Policy Statement Considerations

Section 2.5 of this report provides information related to the Provincial Policy Statement’s position regarding public service infrastructure which includes infrastructure, such as wastewater treatment facilities. In general, a preferred solution should incorporate to the extent possible:

- Adaptive re-use of existing infrastructure.
- Provisions to address climate change.
- Conservation practices.
- Planning for growth in a manner that promotes the efficient use and optimization of existing services:

All of the above have been considered with regards to the selection of a preferred alternative.

### 4.2.4 Summary of Environmental Review

Table 4.2 provides a summary of the key considerations for each option with respect to the environmental components described above. To this end, the table identifies those benefits and impacts that were identified as significant during the initial evaluation of the results of the preliminary analysis indicated that Alternative 3, expansion of the existing facility, appeared to have few unmitigable impacts associated with its implementation.

Regarding the recommendations of the PPS, Alternative 3's use of the existing treatment facilities is consistent with the goal of optimization and adaptive re-use of existing infrastructure.

To further examine this preliminary conclusion a more comprehensive environmental effects analysis was completed which examined potential interactions between the identified alternatives and environmental components. The purpose of this analysis was to determine the environmental effects of constructing and operating each identified option on the environmental components and sub-components. The level of effect for each of the environmental interactions was rated as High, Moderate, Low and Minimal/Nil. Potential mitigation measures were also considered as part of this evaluation. Table 4.3 summarizes the outcome of this analysis.

Potential mitigation measures for the identified impacts are also presented.

## Table 4.2 – General Evaluation of Alternatives: Lucan WWTP Expansion

| Study Alternative | Potential Benefits | Potential Impacts | Impact Mitigation |
|---|---|---|---|
| **Alternative 3 - Expand existing WWTP** | - Represents a cost-effective use of existing infrastructure.<br>- Minimal disruption to the natural environment due to construction within the existing WWTP site.<br>- Low impact on social and cultural environments as site is remote from residences and other sensitive land uses.<br>- Use of the existing treatment technologies to treat the wastewater will reduce impact on operations and the technical environment.<br>- Allows continued use of lagoons for peak flow management. | - Would result in some disruptions to existing WWTP operations during construction.<br>- Potential negative impacts on receiving stream from additional effluent loadings.<br>- Construction related impacts may be experienced by adjacent properties.<br>- Will require some re-training of operational staff.<br>- Additional environmental review of treatment strategy and effluent loadings will be required.<br>- The expanded facility will have a greater electrical energy requirement than the existing WWTP. | - Provide advance notice of interruptions of existing works to minimize impacts.<br>- Closely monitor performance of treatment works and water quality in receiving stream.<br>- Minimize construction impacts by implementing standard measures.<br>- Investigate training/technical requirements for plant operators.<br>- Incorporating energy saving considerations into the detailed design. |
| **Alternative 6 - Do Nothing** | - Represents the least expensive option.<br>- Is the option with the least impacts from both a construction and climate change perspective. | - Fails to provide additional treatment capacity to accommodate planned growth and development.<br>- Continued growth and development as proposed in the Official Plan cannot proceed. | - Identified impact of existing problem cannot be mitigated |

**Table 4.3 – Alternative Solutions: Environmental Effects Analysis**

| Environmental Component | Alternative 3 – Expand WWTP | Alternative 6 – Do Nothing |
|---|---|---|
| Natural – Aquatic Resources | Impacts to aquatic habitats may occur as a result of increased loadings and discharges to the Heenan Drain. Impacts are anticipated to be low given the historic performance of the existing Wastewater Treatment Facility, as determined by aquatic assessments undertaken within the Drain.<br><br>Level of impact = Low to Moderate | Given that the current facility is approaching its hydraulic capacity, the do-nothing option could result in significant impacts to the Heenan Drain if the WWTP is overwhelmed, resulting in discharges of poorly treated effluent to the environment.<br><br>Level of impact = Moderate |
| Natural – Fisheries | Impacts to fish may occur as a result of increased loadings and discharges to the Heenan Drain. Impacts are anticipated to be low given high performance of WWTP.<br><br>Level of impact = Low to Moderate | Given that the current facility is approaching its hydraulic capacity, the do-nothing option could result in significant impacts to the Heenan Drain if the WWTP is overwhelmed, resulting in discharges of poorly treated effluent to the environment, impacting fish species.<br><br>Level of impact = Moderate |
| Natural – Air Quality | May be some localized impacts to air quality (dust) during construction. There are no odour concerns with the existing WWTP and it is remote from any sensitive receptors. The expansion is not expected to create odour concerns.<br><br>Level of impact = Low | If the WWTP is overwhelmed there will be air quality and odour concerns within the WWTP.<br><br>Level of impact = Moderate |

| Environmental Component | Alternative 3 – Expand WWTP | Alternative 6 – Do Nothing |
|---|---|---|
| Natural – Noise | Majority of mechanical components are housed within buildings. Increase in noise during construction will be localized and limited in duration. Impacts are mitigated by distance between WWTP and sensitive receptors.<br><br>Level of impact = Low | No impacts anticipated.<br><br>Level of impact = Minimal |
| Natural – Climate Change | Construction will require heavy equipment that will release Green House Gases (GHG) as emissions. Impacts related to construction may be reduced through equipment and materials selection.<br>-A larger WWTP will have additional energy demands.<br><br>Level of impact = Moderate | When the WWTP approaches capacity, increased frequency and intensity of rainfall and storm events could result in the system being overwhelmed and resulting in bypass/overflow events more frequently.<br><br>Level of impact = High |
| Natural – Water Quantity/Quality | Impacts to water quality/quantity may occur as a result of increased loadings and discharges to the Heenan Drain. Impacts are anticipated to be low given the historic performance of the existing Wastewater Treatment Facility, as determined by aquatic assessments undertaken within the Drain.<br><br>Level of impact = Low to Moderate | Heenan Drain currently identified as Policy II receiver. Do-nothing option could result in bypasses to the Drain if the WWTP is overwhelmed, which would impact water quality.<br><br>Level of impact = Moderate |
| Natural – Wildlife | Minimal impacts expected given the expansion will take place within the fenced area of the existing WWTP, where there is limited wildlife and habitat.<br><br>Level of impact = Minimal | No impacts anticipated<br><br>Level of impact = Minimal |

| Environmental Component | Alternative 3 – Expand WWTP | Alternative 6 – Do Nothing |
|---|---|---|
| Natural – Vegetation Communities | Minimal impacts expected given the expansion will take place within the fenced area of the existing WWTP where vegetation is limited to maintained lawn.<br><br>Level of impact = Minimal | No impacts anticipated<br><br>Level of impact = Minimal |
| Natural – Species at Risk | Surveys completed by ABCA did not identify any SAR in the Heenan Drain in the immediate vicinity of the WWTP. | Surveys completed by ABCA did not identify any SAR in the Heenan Drain in the immediate vicinity of the WWTP. |
| Natural – Soils | It is expected soils will be disturbed during the construction. Excess, uncontaminated material will be used onsite as much as possible or transported per O. Reg. 406/19.<br><br>Level of impact = Low | No change from current conditions<br><br>Level of impact = Minimal |
| Social – Disruption | Construction could result in temporary interruptions to wastewater services.<br>The construction itself is not expected to impact any residences or sensitive land uses, as none are located within the vicinity of the WWTP. | When capacity is reached, there may be service interruptions due to bypass/overflow events.<br><br>Level of impact = Low |
| Social – Policy goals | Will allow for growth and development in accordance with Provincial, County, and municipal policies regarding growth and servicing.<br><br>Level of impact = Minimal | Will not allow for growth and development. Will limit future growth which may impact the overall prosperity and social wellbeing of Lucan.<br><br>Level of impact = High |

| Environmental Component | Alternative 3 – Expand WWTP | Alternative 6 – Do Nothing |
|---|---|---|
| Social – Recreation Activities | Potential to use existing sludge lagoon for biosolid storage with this option. Not expected to impact the proposed soccer fields located south of the lagoons given the over 100 m between the storage area and fields.<br><br>Level of impact = Low | No impacts anticipated.<br><br>Level of impact = Minimal |
| Cultural – Archaeological Resources | A Stage 1-2 Archaeological Assessment did not identify any archaeological resources or sites.<br><br>Level of impact = Minimal | No impacts anticipated<br><br>Level of impact = Minimal |
| Cultural – Built Heritage Resources | No impacts anticipated.<br><br>Level of impact = Minimal | No impacts anticipated<br><br>Level of impact = Minimal |
| Cultural – Cultural Heritage Resources | No impacts anticipated.<br><br>Level of impact = Minimal | No impacts anticipated<br><br>Level of impact = Minimal |
| Economic – Capital and Operating Costs | Capital costs estimated at $16.4 million. Capital costs of construction would be offset through development charges for future development and reserve funds and wastewater rates for costs benefiting existing residents. Operating costs will increase but should be offset by wastewater operating fees collected from future development.<br><br>Level of impact = High | No capital construction costs associated with this option. Operating costs of the existing WWTP may increase in the future if the plant operates at, or near capacity due to increased wear and tear on components.<br><br>Level of impact = Moderate |

| Environmental Component | Alternative 3 – Expand WWTP | Alternative 6 – Do Nothing |
|---|---|---|
| Economic – Wastewater Rates | It is expected that the portion of the project benefiting existing users will be funded through reserves/wastewater rates. Reserves may offset impacts to wastewater rates. Future operating costs expected to be funded through rates collected from future development.<br><br>Level of impact = Moderate | Operating costs of the existing WWTP may increase in the future if the plant operates at, or near capacity due to increased wear and tear on components.<br><br>Level of impact = Moderate |
| Technical – Servicing Capacity | Will increase servicing capacity and allow for future development within Lucan.<br><br>Level of impact = Low | Will not increase servicing capacity to allow for future development within Lucan.<br><br>Level of impact = High |
| Technical – Technologies | Will likely incorporate some level of improved process technology. Will also provide resiliency by utilizing existing facilities in conjunction with the proposed mechanical plant.<br><br>Level of impact = Low | Implementation of this option would not address capacity issues with the existing facility and will make the continued operation of the facility very technically demanding.<br><br>Level of impact = High |
| Technical - Utilities | Use of lagoons for peak flow management results in a smaller energy footprint than expanding to accommodate full peak flows.<br><br>Level of impact = Low | No change in impacts anticipated.<br><br>Level of impact = Minimal. |

## 4.3 Identification of a Preferred Solution

Based on the results of the impact assessment presented above and engineering evaluations of the study alternatives; Alternative 3: Expansion of the existing WWTP was selected as the preferred alternative. This type of project is classified as a Schedule 'C' activity under the terms of the MEA Class EA document.

A number of relative advantages were identified with the preferred alternative that justified its selection as the preferred approach to increasing capacity. In particular, the preferred alternative provides the following advantages:

- Expansion of the existing treatment facility provides the most cost effective and efficient method to provide additional wastewater treatment capacity for the community, based on the historic performance of the existing facility.
- Expanding the existing facilities, rather than replacing them, represents a lower impact from a greenhouse gas perspective as it relates to construction.
- It utilizes existing infrastructure, thus reducing the capital cost of capacity expansion.
- It minimizes potential impacts to the natural and cultural environments by limiting activities to the existing WWTP site.
- It allows for continued growth and development within the community, consistent with the Township's Official Plan.
- It allows the Township to meet all existing planning commitments for already approved development and allow continued growth.
- Is in conformance with Infrastructure guidelines contained within the Provincial Policy Statements (PPS 2020) including re-use of existing facilities.

# 5.0 PHASE 3 – REVIEW OF ALTERNATIVE DESIGN CONCEPTS

## 5.1 General

As identified in Section 4.3, the preferred solution is to increase wastewater treatment capacity by expanding the existing WWTP. The facility will continue to receive and treat wastewater and discharge treated effluent to the Heenan Drain on a continuous basis.

During Phase 3 of the EA, different approaches to expanding the facility were evaluated and a preferred solution was identified. The review of alternative design concepts included investigating the possibility of:

- Expanding in stages to align capacity with growth expectations.
- Decommissioning the Granton WWTP and having the Granton wastewater pumped to Lucan for treatment.
- Changing the treatment technology.

## 5.2 Design Wastewater Quantities

### 5.2.1 Design Flow Basis

In Sections 2.12 to 2.13 the following design wastewater flows and volumes were developed:

- Existing Flow = 1,270 $m^3$/d (projected 2022 year end flow)
- Unit Flow for Growth = 1.0 $m^3$/d per equivalent residential unit (ERU)
- No. of ERUs per year = 26 to 45 (County projections)
- Existing Service Commitments = 286 ERUs

The recent rate of development in Lucan exceeds even the County's high growth rate projection. Approved development and active proposals as of January 2022 (378 ERUs) represent more than 34% of the County's 25-year projection. Further, the Township is aware of substantial residential development interest that has not yet reached the "active" proposal stage because of space constraints imposed by the existing urban boundary. For these reasons we recommend that capacity projections be based on the highest rate predicted by the County with any proposed expansion being subjected to a sensitivity analysis based on the highest County rate +25 %.

Additional capacity considerations include the following assumptions:

- Capacity needs will consider a planning period of 25 years (i.e. to 2046), consistent with the County of Middlesex growth projections (see Section 2.9).
- If expansion is staged, Stage 1 should have sufficient capacity so that planning for Stage 2 does not have to be initiated for at least ten years.

- Stage 1 should permit servicing of all existing commitments plus current active development approvals and provide for a reasonable number of future proposals.
- Capacity needs are to be examined both with and without receiving wastewater from Granton.
- Expansion needs will be based on an existing WWTP Capacity of 1,650 $m^3$/day annual average flow (refer to Appendix C), not the current rated capacity of 1,700 $m^3$/day.

### 5.2.2 Design Wastewater Volume

#### (a) Capacity Required for 2046

This section addresses annual Average flows. Wastewater flows in 2046 will include the existing flow plus flows from the expected growth over the 25 year period.

Required Capacity (2046) = Existing + Growth

= 1,270 + (1,115 x 1.0)

= **2,385 $m^3$/day**

The above capacity would accommodate an average of 45 ERUs per year of growth over the 25 year period and is considered to be the minimum capacity required.

#### (b) Peak Flow Capacity

Peak flows in excess of WWTP capacity are currently diverted to the existing lagoons and retained for treatment at a later time. This practice will continue. Expansion of the average day capacity will have a corresponding increase in the peak flow capacity of the various unit processes consistent with MECP design guidelines. The result will be less diversion.

#### (c) Impact of Decommissioning the Granton WWTP

The existing wastewater flows at Granton are in the order of 120 $m^3$/day. The projected growth (i.e. 1,115 ERUs) applies to all of Lucan Biddulph. Therefore, the growth could occur in Granton or Lucan. For design purposes we are assuming it will occur in Lucan.

The required capacity in 2046 if the Granton WWTP is decommissioned would be the existing Lucan and Granton flows plus expected growth (1,270 + 120 + 1115) 2,405 $m^3$/day.

#### (d) Flow Sensitivity Analysis

As noted previously, because of the uncertainties regarding growth rate and also the current rapid pace of growth, a decision was made to check capacity needs if growth exceeded the County high projection by 25% (i.e. from 45 to 56 ERUs per year).

At 56 ERUs per year, the required AADF capacity in 2046 would be 2,670 $m^3$/day.

The following sections of the study are based on expanding the facility to a design AADF of **2,700 $m^3$/day**.

## 5.3 Effluent Quality Criteria

### 5.3.1 General Approach

Any proposal to create or expand a WWTP requires the approval of the Ministry of the Environment Conservation and Parks (MECP) regarding effluent quality and the allowable discharge volumes. For Lucan the controlling parameter is the Total Phosphorus (TP) loading (expressed as kg/day) to the Little Ausable River. Consideration must be given to existing allowable loadings, background river quality and the presence or absence of species at risk.

Species at risk exist within the Little Ausable but not in the immediate vicinity of the WWTP outfall.

The Little Ausable has been defined as a Policy 2 receiver which means that the water quality already does not meet provincial water quality objectives (see Section 2.8), and should not be allowed to deteriorate further. The practical application of this rule is that an increased discharge can occur, but the TP loadings are not allowed to increase.

### 5.3.2 Treatment of Total Phosphorus

The existing effluent objective concentration for TP is 0.2 mg/L. This is considered fairly stringent but some locations in Ontario have been required to achieve lower values. The plant has an effluent concentration limit (i.e. must not exceed) of 0.32 mg/L. This is a more typical value.

To maintain the same effluent TP loading (i.e. flow x concentration) as currently permitted while simultaneously allowing for greater the flow, the concentration must decrease. The WWTP generally meets the monthly limit value (i.e. 0.32 mg/L). The plant is currently challenged to meet the existing TP objective value (i.e. 0.2 mg/L) on a monthly average basis; however, it does meet the objective as an annual average. A study has been completed and OCWA is currently making operational changes with the goal of improving TP removal.

We are reluctant to recommend new EQC that we cannot be confident can be met without costly technology changes.

### 5.3.3 New EQC for Phosphorus and Allowable Discharge

Based on the need to maintain loadings while simultaneously retaining the existing, or similar technology, the following criteria have been developed in consultation with the MECP:

- **Design Objective = 0.2 mg/L** (unchanged from current value)
- **A monthly limit value of 0.25 mg/L** which is about 80% of the current value of

0.32 mg/L. This value has proven to be achievable and represents a definite improvement over current values.

- **An <u>annual</u> limit value of 0.21 mg/L**. Currently there is no annual value. A value of 0.21 mg/L annually has been proven to be feasible and as a limit is far less than the current limit value.
- **An annual average daily discharge of 2,700 $m^3$/day**.

Considering the proposed annual concentration limit of 0.21 mg/L and the 2,700 $m^3$/day AADF, the annual loading limit for TP would be **0.567 kg/day;** which is only 3% over the existing loading limit.

Based on the above, allowable discharge exceeds the 2046 expected flow by approximately 12% at the highest forecasted growth rate.

### 5.3.4 Future Considerations for Nitrate

A second parameter of interest is nitrate ($NO_3$). Nitrogen, like phosphorus, is a nutrient and increased loadings promote plant growth and deteriorate stream quality. The MECP has indicated that, at this time, they will not impose EQC for nitrate but will require monitoring and reporting of upstream and downstream conditions. Subject to the results of the monitoring the MECP may impose nitrate criteria in the future.

The existing process can be modified to provide $NO_3$ removal, but the required physical changes would result in some capacity reduction.

## 5.4 Staging Considerations

As discussed previously, the Lucan WWTP is constructed as two treatment trains. Based on a capacity review (Blue Sky, July 2021) each train is considered to have a capacity of 825 $m^3$/day (WWTP Capacity = 1,650 $m^3$/day). The existing treatment process is defined as extended aeration.

One approach to staging would be to retain the existing extended aeration process and construct one additional train as the first stage of expansion. The result would be:

Capacity after Stage 1 = 3 trains x 825 $m^3$/day

= 2,475 $m^3$/day

Therefore Stage 1 would accommodate 27 years of growth at the highest projected rate of 45 ERUs per year. If the Granton plant were decommissioned and existing flows pumped to Lucan, then the life expectancy would decrease by 2.7 (say 3) years to 24 yrs.

If the rate of growth was actually the projected high rate, plus 25% or 56 units per year, the Stage 1 capacity would be adequate for approximately 22 years without Granton and 20 years with Granton.

Therefore, planning for Stage 2 would not be required for more than 10 years, which meets the criteria set out in Section 5.2.1.

Currently there are 286 approved ERUs and 92 actively proposed for a total of 378 ERUs. A facility expanded to 2,475 $m^3$/day after Stage 1 would accommodate the current commitments and proposals and allow the Township to approve 827 additional ERUs additional to current values.

Unless effluent TP concentrations are reduced, the capacity after Stage 2 cannot exceed 2,700 $m^3$/day. That capacity would allow an additional 225 ERUs beyond the Stage 1 value.

A capacity of 2,700 $m^3$/day would accommodate the existing Lucan and Granton flows, and an additional 1,300 ERUs over current values which is greater than the current highest growth projected by the County for the next 20 years. It would also accommodate a growth rate of the high County projection plus 25%, however it would not allow connection of Granton at that rate of increased flow.

## 5.5 Wastewater Treatment Facility Design

### 5.5.1 General

The following sections of the report review the options available for expansion of the plant's treatment processes. As identified in Figure 2.11 each component of the plant process has a different existing physical capacity. Alternative approaches for expansion of each are reviewed here.

### 5.5.2 Effluent Quality Criteria

Based on the loading constraints identified above, the following effluent quality objectives and limits were negotiated with the MECP. (BMROSS, September, 2021) Appendix D includes copies of the correspondence with the Ministry.

## Table 5.1 – Final Effluent Design Objectives

| Final Effluent Parameter | Averaging Calculator | Concentration Objective |
|---|---|---|
| $CBOD_5$ | Monthly Average Effluent Concentration | 5.0 mg/L |
| Total Suspended Solids (TSS) | Monthly Average Effluent Concentration | 5.0 mg/L |
| Total Phosphorus (TP) | Annual Average Effluent Concentration | 0.2 mg/L |
| Total Ammonia Nitrogen (TAN) | Monthly Average Effluent Concentration | 1.0 mg/L (May 1 to Oct. 30)<br>2.0 mg/L (Nov. 1 to April 30) |
| Dissolved Oxygen | Monthly Average Effluent Concentration | Greater than 5.0 mg/L |
| *E. coli* | Monthly Geometric Mean Density | 80 CFU/100 ml for any calendar month |
| pH | Single sample results | 6.5 to 8.5 |

## Table 5.2 – Concentration Limits

| Final Effluent Parameter | Averaging Calculator | Concentration Limit |
|---|---|---|
| $CBOD_5$ | Monthly Average Effluent Concentration | 10.0 mg/L |
| Total Suspended Solids (TSS) | Monthly Average Effluent Concentration | 10.0 mg/L |
| Total Phosphorus (TP) | Monthly Average Effluent Concentration | 0.25 mg/L |
| Total Phosphorus (TP) | Annual Average Effluent Concentration | 0.21 mg/L |
| Total Ammonia Nitrogen (TAN) | Monthly Average Effluent Concentration | 1.3 mg/L (May 1 to Oct. 30)<br>2.6 mg/L (Nov. 1 to April 30) |
| *E. coli* | Monthly Geometric Mean Density | 100 CFU per 100 mL |
| pH | Single Sample Result | Between 6.0 - 8.5 inclusive |

**Table 5.3 – Loading Limits**

| Final Effluent Parameter | Averaging Calculator | Limit (maximum unless otherwise indicated) |
|---|---|---|
| $CBOD_5$ | Monthly Average Daily Effluent | 27.0 kg/day |
| TSS | Monthly Average Daily Effluent | 27.0 kg/day |
| TP | Annual Average Daily Effluent | 0.567 kg/day |
| TAN | Monthly Average Daily Effluent | 3.51 kg/day (May 1 to Oct. 30)<br>7.02 kg/day (Nov. 1 to April 30) |

It is expected that the loading limits will be adjusted to reflect the design flow of each stage if the expansion is staged.

Performance monitoring will be established in an Amended ECA. It is anticipated that weekly effluent samples will be required including annual reporting of results.

### 5.5.3 Treatment Process Selection

#### (a) General

Two treatment approaches for the secondary process were examined.

- Retaining the existing Extended Aeration process.
- Converting the bioreactors to Integrated Fixed Film Activated Sludge (IFAS).

IFAS involves the placement of fixed media within the bioreactor, effectively increasing the capacity without having to increase the actual tankage volume. Two manufacturers of IFAS type equipment were contacted for design and probable cost information.

Upstream of the bioreactors there will be screening and de-gritting. Downstream of the bioreactors there would be clarification, filtration, and UV disinfection. The conceptual design is consistent with MECP Design Guidelines (Ministry of Environment and Climate Change, 2008).

Evaluations considered the following AADF values:

- 2,425 $m^3$/day – Maximum capacity with 3 trains and EA.
- 2,700 $m^3$/day – Maximum capacity with proposed EQC.
- 3,300 $m^3$/day – Potential capacity with 4 trains and EA.

### (b) Comparison of Extended Aeration to IFAS

The two processes were compared based on the following considerations:

- Capital cost (at both Stage 1 and Stage 1 + 2).
- Treatment performance relative to the effluent quality objectives.
- Operational complexity including operator familiarity of the process.
- Life expectancy of components.
- Relative differences for Green House Gas emissions.
- Expandability.

It was determined that the IFAS alternative would be more costly for Stage 1 but might have an economic advantage for Stage 2. For the following reasons it was decided to stay with the extended aeration process for at least Stage 1:

- The lack of an economic advantage.
- The introduction of a newer and different process technology increases operational complexity and thus adds some risk.
- There was no expected effluent quality advantage for IFAS.
- The added process components (i.e. the fixed media) would be expected to have a lesser life expectancy than concrete tankage.
- There was the possibility that an additional aeration tank would be required in any event which would negate any greenhouse gas advantage that IFAS might have and add to the probable cost for IFAS.

Retaining the extended aeration process for Stage 1 does not limit the opportunity to convert the plant to activated sludge/fixed film technology (e.g. IFAS or MBBR) for future stages.

## 5.5.4 Decommissioning of the Granton WWTP

As noted previously, expansion of the Lucan WWTP creates the opportunity to decommission the Granton WWTP and pump Granton's wastewater to Lucan for treatment. The consolidation of the treatment facilities at a single location results in the opportunity to reduce overall system operational and maintenance (O & M) costs. There would be additional capital costs related to constructing a forcemain from Granton to Lucan, a distance of approximately 10.5 km.

An economic analysis established that the probable payback period for the increased capital costs would be in the order of 20 to 25 years.

For the following reasons, the decision was made to retain the Granton WWTP:

- The payback period is relatively long.
- Growth and thus treatment capacity needs for the community of Lucan are increasing at a significant rate and it is possible that the expanded capacity at the Lucan WWTP will be required for Lucan.

- Effluent quality performance objectives for Granton are mostly being met, with the exception of TSS. However, the TSS compliance requirements at Granton are generally achieved.
- Should growth at Lucan be less than expected or O & M costs at Granton increase there is still the opportunity to re-visit the decision.

### 5.5.5 Biosolids Treatment and Storage

Waste activated sludge (WAS) generated in the treatment process is currently treated in a two-stage aerobic digester and stored in sludge holding tankage constructed integrally with the digester. In Section 2.11 it was identified that both the digester and storage facilities are significantly undersized for even current flows. Historically it has been necessary from time to time to transfer digested biosolids to the adjacent lagoons when storage was full and land disposal was not feasible.

A component of the plant expansion will be to increase both the biosolids treatment and storage capacity. The following alternatives were examined:

1. Adding new digestion and storage to operate in parallel with the existing.

2. Converting the existing storage tanks to operate as a digester, thus increasing treatment capacity, and constructing new storage facilities with a minimum of eight months of capacity. This alternative also compared:

    a. Constructing new storage facilities on site.
    b. Modifying the existing lagoons south of Fallon Drive for storage.

Given that the existing tankage functions adequately and is in reasonable condition, the first approach was rejected in favour of the second – conversion with new storage. Conceptual designs were completed for the two storage alternatives.

Constructing facilities on-site would involve modification and expansion of the existing digester-holding tank. The existing holding sections would be modified to function as digesters and an additional tank constructed on the north side of the existing to increase digestion capacity. A separate holding tank, sized to provide a minimum of eight months of digested sludge, would be added west of the existing tankage. The holding tank could be constructed of reinforced concrete or bolted steel. Both aeration and mechanical mixing would be incorporated into the tankage.

Biosolids storage in the existing lagoons south of Fallon Drive would involve construction of a forcemain to allow pumping of treated biosolids from the digester to the lagoon. Currently the east lagoon cell is not used for peak flow diversion and historically it has not been used for excess sludge storage. The storage lagoon would provide a minimum of five years storage for digested sludge. Improvements would be made to the existing access road and north berm to allow periodic biosolids removal. No aeration would be required. Odours would be managed by keeping a minimum of 60 cm of clear

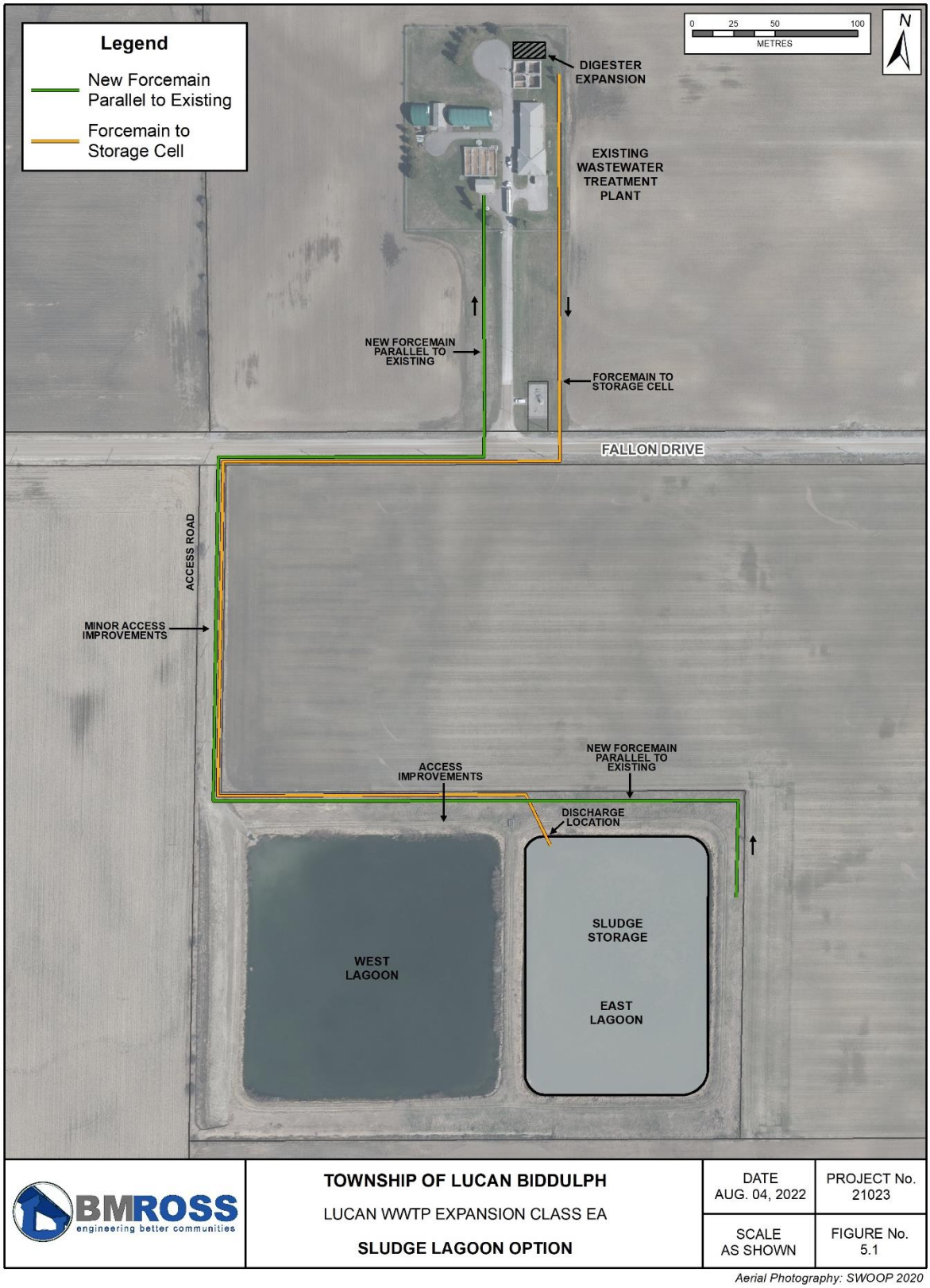
supernatant over the biosolids. As biosolids enter the lagoon from the WWTP the supernatant will overflow to the west cell. No aeration is proposed.

After evaluation of the two alternatives the sludge lagoon alternative was selected as the preferred option. Reasons are as follows:

- The opportunity to have several years of available capacity, versus less than one year, provides much greater operational flexibility.
- Modification of existing facilities (i.e. the existing lagoons) is preferred over adding new facilities that require maintenance and eventual replacement.
- The lagoon approach is preferred from a greenhouse gas perspective because:
    - It does not increase the overall process surface area of site tankage.
    - No aeration and associated energy usage is required.
    - Construction is much less intensive from an energy and materials context.
- The lagoon alternative has a probable cost approximately $3M to $4M less than the on-site storage approach.

Figure 5.1 shows the lagoon storage concept.

## Figure 5.1 – Sludge Lagoon Option



## 5.6 Preferred Design Concept

### 5.6.1 Description

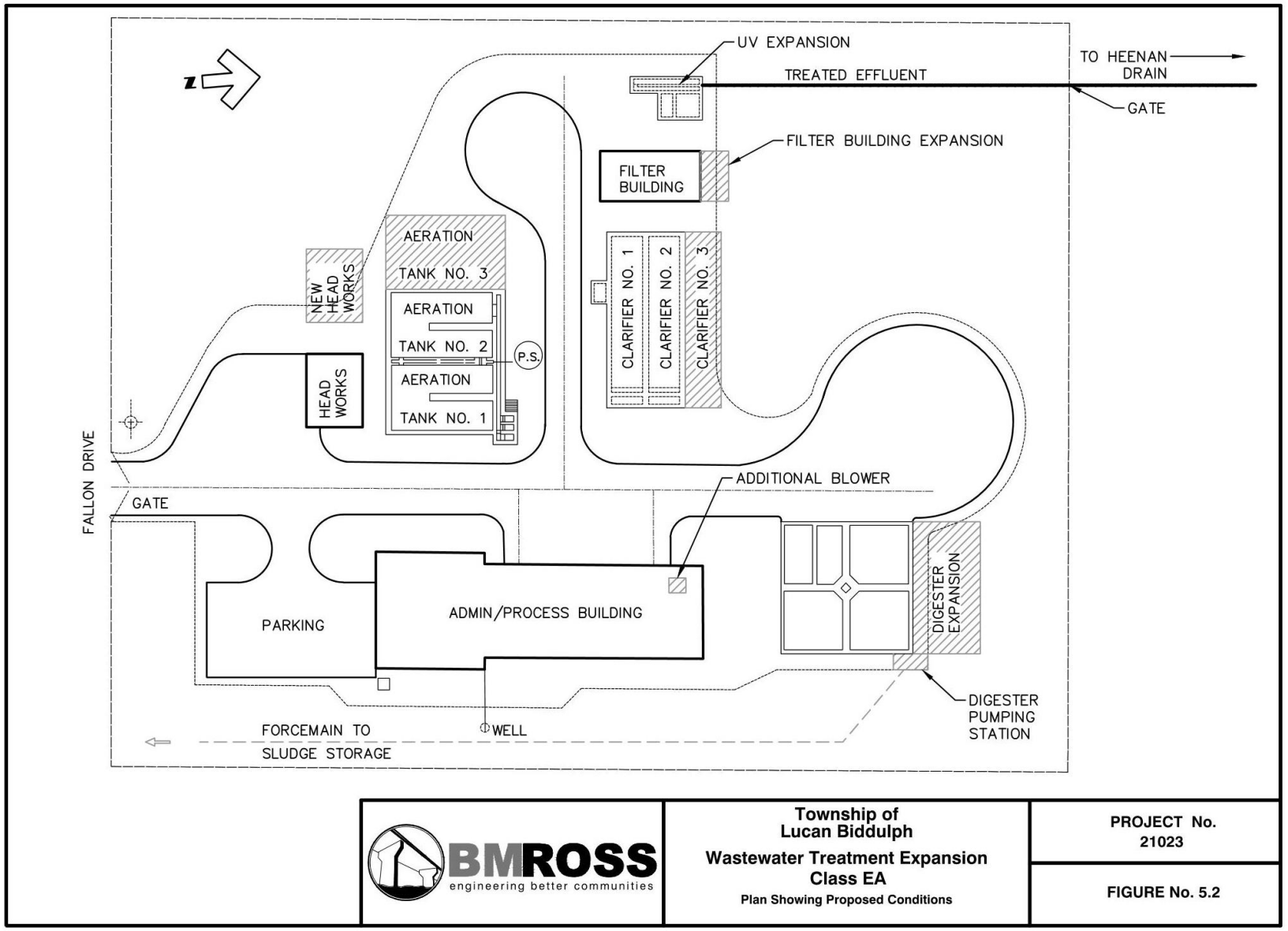
The preferred concept for the expansion is to retain the existing extended aeration process and expand in two stages. Stage 1 would increase the rated capacity from 1,700 $m^3$/day to 2,475 $m^3$/day. Stage 2 would provide a further increase to 2,700 $m^3$/day. The physical changes for Stage 1 would be:

- Increasing the capacity of the Chestnut SPS to 10,000 $m^3$/day (120 L/s) by means of pump replacement and paralleling the existing forcemain.
- Construction of a new Headworks (screening and degritting) to a peak flow of 10,000 $m^3$/day.
- Expansion of the secondary section by the addition of one aeration tank and one clarifier with dimensions equal to existing.
- Addition of a 3rd effluent filter to increase peak filtration capacity to 10,000 $m^3$/day.
- Upgrades to the existing UV disinfection process to increase capacity to 10,000 $m^3$/day.
- Conversion and expansion of the existing aerobic digester and sludge holding tank to be a digester only. This includes potentially 1,100 $m^3$ of digester expansion.
- Modification of the existing lagoons to provide a separate digested sludge storage area.
- Construction of a forcemain to connect the digester to the sludge lagoon.
- Various pumping, piping, and control modifications to integrate the new and existing facilities

The principal physical changes for Stage 2 will be the expansion of the secondary section by the addition of a fourth aeration tank and clarifier. Alternatively, the possibility of bioreactor modification exists and will be examined considering the performance of Stage 2. Process options include integrating fixed film technologies which would achieve the capacity increase without additional tankage.

Figure 5.2 shows the site changes proposed for the WWTP. Figure 5.1 already presented the concept for biosolids.

## Figure 5.2 – Proposed Conditions



### 5.6.2 Capital Costs

The probable capital costs of expansion fall into two categories; costs related to the capacity increase to accommodate growth, and costs related to rehabilitation of the existing works. The latter cost includes the costs to address existing capacity deficiencies. Table 5.4 provides a summary of the probable costs. Values assume construction in 2023.

**Table 5.4 – Summary of Probable Costs**

| Project Component | Total Cost | Allocation to Growth | Allocation to Rehabilitation |
|---|---|---|---|
| Chestnut SPS upgrades including parallel forcemain | $747,656 | $747,656 | $0 |
| Site work including yard piping and power supply | $1,110,913 | $809,931 | $300,981 |
| Headworks replacement | $2,970,000 | $1,604,050 | $1,365,950 |
| Aeration Section including air supply | $996,368 | $996,368 | $0 |
| Clarifier Section | $1,534,500 | $1,534,500 | $0 |
| Filtration Section including building expansion | $1,134,375 | $1,134,375 | $0 |
| Disinfection (UV) section | $522,500 | $522,500 | $0 |
| Digester expansion | $842,159 | $463,188 | $378,971 |
| Sludge storage including forcemain to lagoon | $849,063 | $407,550 | $441,513 |
| Sub-total | $10,707,533 | $8,220,118 | $2,487,415 |
| Provisionals and Miscellaneous | $749,527 | $575,329 | $174,198 |
| General and Overhead | $916,565 | $703,546 | $213,019 |
| Allowance for Engineering | $1,484,835 | $1,139,744 | $345,091 |
| Sub-total | $13,858,460 | $10,638,737 | $3,219,723 |
| Cost Estimate Variance | $2,302,661 | $1,726,299 | $576,362 |
| Net HST at 1.76% | $284,436 | $217,605 | $66,831 |
| **Totals for Project Cost** | **$16,445,557** | **$12,582,641** | **$3,862,916** |

## 5.7 Cost Recovery

### 5.7.1 General

As set out in Table 5.4 the probable capital costs of expansion fall into two categories; costs related to the capacity increase to accommodate growth, and costs related to rehabilitation of the existing works. Rehabilitation of the existing works includes areas that have been identified as capacity deficient or at the end of their useful life. This work benefits the existing user base and a proportionate share of the costs have been allocated to the base to pay for this share of the project. The major portion of the project relates to the expansion of the facility to accommodate new development in Lucan. The tool available to the Township to recover these costs is the Development Charges Act. This allows the Township to recover a portion of the costs from every new build as capacity is allocated.

### 5.7.2 Wastewater Rates

The allocation of project costs to rehabilitation is presented in Table 5.4 is approximately $3.8 million. These costs are assigned to the wastewater system and its users. It is expected this cost will be recovered through the wastewater user rates. At this time there is approximately $2.0 million in the Wastewater Reserve, with about $300,000 a year generated towards the reserve through user charges. However, this reserve is used to pay for capital rehabilitation/repairs to all wastewater projects and has not been put in place solely for the proposed works. No decisions have been made regarding how much of the reserve will be used for the project and how much of the allocation will be required from the annual rates. It is probable that user raters will have to be increased to cover these costs.

An example of how this part of the cost could be funded and the impact on rates is presented below.

Assumptions:

- $3,800,000 required to fund rehabilitation works.
- $1,000,000 used from immediate reserves.

Therefore $2,800,000 would be required to be financed.

At a 5% borrowing rate, with a 15 year term, an annual payment of $270,000 would be required to repay the loan. This would be financed through the user rates.

It should be noted that this is only an example to illustrate how this part of the project could be financed and repaid. The amount borrowed, the term and the interest rate, will be subject to the final project costs and the borrowing rates that the Township can secure at the time.

### 5.7.3 Development Charges

The need for expansion is the catalyst for this project and the bulk of the project costs will be allocated to future development. This will be collected through the authority of the Development Charges Act, through a Development Charges Bylaw. It is expected that all new development will pay a development charge for these works beginning in January 2023. This charge would be collected until the capacity at the expanded plant is allocated and the project costs are paid out. This will be 20-25 years in the future depending on growth rates of new development.

An example of what is considered and how a development charge is calculated is presented below for illustrative purposes.

Assumptions:

- Debenture begins in 2026 after Phase 1 expansion project is completed.
- Estimated amount to borrow = $12,600,000.
- 20 year term at 5% interest.

Based on this approach the total cost including interest would be approximately $20,000,000 which would require an annual payment in the order of $1,000,000.

With an expected 1,050 ERU’s (single family homes) the estimated development charge for this project would be approximately $19,000 per single family unit. Apartments and higher density units would pay proportionately less.

It should be noted that this is only an example to illustrate how this part of the project could be financed and repaid. The amount borrowed, the term and the interest rate, will be subject to the final project costs and the borrowing rates that the Township can secure at the time.

# 6.0 CONSULTATION

## 6.1 General

Public consultation is an integral component of the MCEA process. Public consultation allows for an exchange of information, which assists the proponent in making informed decisions during the evaluation of alternative solutions. During Phases 1 and 2 of the study process consultation was undertaken to obtain input from the general public, stakeholders and review agencies that might have an interest in the project. Phase 3 of the process provided additional information to identified stakeholders regarding detailed design alternatives associated with the preferred alternative. The components of the public consultation program employed during the MCEA study are summarized in this section of the screening report and documented in Appendix E. Comments received through the consultation program and related correspondence are also discussed below and documented in the appendix.

## 6.2 Initial Public Notice

The Township issued a Notice of Study Commencement on March 17, 2021 to introduce the MCEA and summarize the study being undertaken. The notice was placed in the March 17 and March 24, 2021 editions of the Exeter Lakeshore Times Advance and Middlesex Banner. A copy was also placed on the Township of Lucan Biddulph website.

A copy of the newspaper notice are included in Appendix E of this report.

| | |
|---|---|
| Contents: | Project Description, explanation of MCEA process, contact information |
| Issued: | March 17, 2021 |
| Placed In: | Exeter Lakeshore Times Advance and Middlesex Banner |
| Input Period: | April 17, 2021 |

No responses were received as a result of the Notice.

## 6.3 Review Agency Circulation

### 6.3.1 Project Initiation Phase

Input into the MCEA process was solicited from government review agencies and project stakeholders by way of direct mail correspondence. Agencies that might have an interest in the project were sent an information package detailing the nature of the project and an outline of the environmental assessment process being undertaken. The information was circulated to 8 review agencies on March 17, 2021. Appendix E contains a copy of the information that was circulated to the review organizations and a list of the agencies that were requested to comment on this project. Table 6.1 summarizes the comments received.

**Table 6.1 – Initial Consultation Phase: Agency Responses**

| Review Agency | Comments | Action Taken |
|---|---|---|
| Ministry of Tourism, Culture and Sport (MTCS) – April 19, 2021 (via email) | • The proponent is required to determine a projects potential impact on cultural heritage resources.<br>• Recommended screening using the MTCS criteria checklists.<br>• Technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical cultural heritage studies will be completed for the EA and provide them to MTCS before issuing a Notice of Completion or commencing any work on the site. | - Checklists completed.<br>- MTCS advised of Stage 1-2 Archaeological Assessment. |
| Ministry of the Environment, Conservation and Parks (MECP), April 26, 2021 (via email) | • Provided updated "Areas of Interest" for the Class EA process.<br>• MECP is delegating the procedural aspects of rights-based consultation to the proponent.<br>• A draft copy of the report should be sent directly prior to filing of the final report, allowing a minimum of 45 days for the ministry's technical reviews to provide comments.<br>• Ensure a copy of the final notice is sent the southwest Region EA notification email account after the report is reviewed and finalized. | - Noted. |

### 6.3.2 Pre-Consultation with MECP

Prior to initiation of the formal Class EA process, discussions were held with the Ministry of Environment and Climate Change, now the Ministry of Environment Conservation and Parks (MECP), to establish parameters for related to the discharge of treated effluent to the Heenan Drain. As discussed previously, an investigation of the Drain's existing conditions (ABCA, 2020) was completed, and results reviewed with Ministry staff.

Further, the Township completed a municipal servicing Master Plan (BMROSS, 2022), which included considerations of wastewater treatment capacity, in early 2022. The Ministry was consulted throughout the preparation of the Plan.

## 6.4 Aboriginal Consultation

The Crown has a duty to consult with First Nation and Métis communities if there is a potential to impact of Aboriginal or Treaty rights. This requirement is delegated to project proponents as part of the MCEA process, therefore, the project proponent has a responsibility to conduct adequate and thorough consultation with Aboriginal communities.

### 6.4.1 Background Review

In order to identify Aboriginal communities potentially impacted by this project, the Aboriginal and Treaty Rights Information System (ATRIS) was consulted. A search was conducted for Aboriginal Communities, including their traditional territories within a 50 m radius of the project study area. Utilizing this process, ten Aboriginal and Métis communities were identified as potentially having interest in this project. Correspondence was subsequently forward to each community/organization detailing the proposed project and asked for input. A copy of the letter and information sent to the following communities is included in Appendix E:

- Chippewas of the Thames First Nation (COTTFN)
- Munsee-Delaware Nation
- Oneida Nation of the Thames
- Delaware Nation
- Bkejwanong Territory (Walpole Island)
- Caldwell First Nation
- Chippewas of Kettle and Stony Point First Nation
- Aamjiwnaang First Nation
- Métis Nation of Ontario
- Métis Nation of Ontario Thames Bluewater Métis Council

### 6.4.2 Consultation Record

A response to the initial letter and Notice of Study Commencement was received from Chippewas of the Thames First Nation (see Table 6.2) No other responses were received. A consultation log is included in Appendix E.

**Table 6.2 – Aboriginal Consultation Record**

| First Nation/Metis Community, Date | Comments | Action/Response |
|---|---|---|
| Chippewas of Thames First Nation, April 12, 2021 (via email) | • Project is located within the COTTFN Big Bear Creek Additions to the Reserve land selection area and Traditional Territory<br>• Have identified minimal concerns with the information presented at this time. We have no concerns with this project and do not wish to be consulted further.<br>• If there are any changes that are of a substantive nature, please inform us. | • Noted, no further action required. |

## 6.5 Public Information Centre – August 24, 2021

A Public Information Centre (PIC) was held on Tuesday, August 24 2021 via Zoom to inform the public of the study, MCEA process, and alternatives being considered. The PIC Notice was published in the Exeter Lakeshore Times Advance and Middlesex Banner for two weeks prior to the meeting. The Notice was also placed on the Township's website and mailed to property owners adjacent to the WWTP.

The meeting was held virtually, due to health concerns related to COVID-19, from 6 PM – 9:15 PM. The meeting was also live-streamed and made available on YouTube for viewing. A copy of the presentation given is included in Appendix E.

The general purpose of the meeting was to provide audience members with the following:

- A summary of the MEA Class EA process.
- A summary of the progress completed to date on the project.
- A description of the preferred alternative being considered by the Township to address the deficiencies present at the facility.
- A tentative timeline for completion of the Class EA.

There were approximately 10 members of the public in attendance in addition to members of Lucan-Biddulph Council. No questions were received from the public, but the following questions and comments were submitted by Council:

- Question – Is consideration being given to transferring flows from the Granton WWTP as a result of capacity issues or to improve efficiency?

    - Response – It is being considered for the purposes of efficiency, there is currently sufficient capacity at the Granton WWTP.
- Comment – In the future there may be grants that are geared towards efficiency, which may make transferring flows from Granton WWTP to the Lucan WWTP more attractive.
- Comment – Residents in Granton are not likely to want to pay to connect to another WWTP.
- Question – If a municipality could not afford as expansion to their WWTP, is it possible to get an exemption to growth mandates?
    - Response – The study team has not heard of any municipalities in such a situation.
- Question – Should we be looking at a program to reduce inflow and infiltration?
    - Response – While it is unlikely that inflow and infiltration can be significantly reduced, it is worth monitoring inflow and infiltration to ensure there are not future issues.
- Question – Why is alternative technology not considered as an alternative solution?
    - Response – Generally, the need for alternative technologies is driven by the level of treatment required. If a higher level of treatment is required, then alternative treatment methods would be considered.
- Question – Does the projected flows include a non-residential growth?
    - Response – It is assumed that non-residential growth is proportional to residential growth. The 1 $m^3$/d flow per ERU incorporates non-residential growth.
- Question – Do we have a high level cost estimate and how would the expansion be funded?
    - Response – The expectation is that growth will pay the majority of the costs. It will likely be incorporated into development charges. The MCEA will include a cost analysis and financing options.
- Question – will the design consider energy efficiency?
    - Response – That will be incorporated into the evaluation of alternatives but will be more fully examined during final design.
- Question – If sludge is stored in the lagoons, will there be any odour issues?
    - Response – It would be unlikely there would be any odour issues.
- Question – Is a separate EA required if the lagoons are used for sludge storage?
    - Response – No, will be considered and evaluated as part of this EA.

## 6.6 Public Open House – September 2022

A Public Open House was held on September 8, 2022 from 6 PM to 8 PM at the Township of Lucan Biddulph Municipal Office. Display boards outlining the project background, MCEA process, problem definition, alternative solutions, alternative design concepts and preferred solution were available for viewing. Members of the study team

from BMROSS and Township staff were also available for questions. Eight members of the public attended the Open House. The following questions and comments were received during the open house:

- Concerns regarding the potential for odour.
- Cost of the WWTP expansion.
- Timing of the construction of the WWTP expansion.
- Questions regarding adjacent property access during construction.
- Impacts of the WWTP expansion on water quality in the Heenan Drain.

# 7.0 IDENTIFICATION OF POTENTIAL IMPACTS OF PREFERRED SOLUTION

## 7.1 General

The preferred alternative is to expand the Lucan WWTP capacity by retaining the existing extended aeration process and constructing a third treatment train. The capacity of other process components will be expanded to correspond. Expansion is planned to increase in stages with Stage 1 being from 1,700 $m^3$/day to 2,475 $m^3$/day and Stage 2 from 2,475 $m^3$/day to 2,700 $m^3$/day.

All construction will take place at the sites of the existing facilities and within the existing facility footprints.

Considering the various criteria identified in Section 3 of this report, and additional comments received during the public consultation program, a number of specific environmental elements were identified which could be adversely affected by implementation of the preferred alternative. The impact of construction of the proposed WWTP expansion on the identified environmental elements is summarized below. Specific mitigation measures for the identified impacts are also presented in more detail. These impacts are directly attributable to construction related activities, which are generally short-term in nature and of limited duration. Impacts of a greater magnitude and duration (water quality impacts to the receiving watercourse) are also discussed.

## 7.2 Construction-Related Activities

Below is a list of anticipated construction activities that will be associated with the proposed plant expansion.

- Contractor mobilization to the site.
- Establishment of temporary storage areas.
- Installation of sediment and erosion control measures.
- Modifications to the existing lagoon cell.
- Potential removal of biosolids and placement of fill.
- Temporary stockpiling of material.
- Dewatering, if required.
- Temporary storage of fuels.

- Construction of the treatment facility expansion.
- Construction traffic.
- Site restoration as required.

Given that a majority of the proposed work, as noted above, will be limited to the existing sites, and will not encroach on adjacent areas, there were few impacts identified with the proposed expansion plan.

Based upon the findings of the general impact assessment (Table 3.2), the environmental effects analysis (Table 3.3), and the detailed project review, the project has the potential to impact upon a limited number of specific environmental components. They are as follows:

- Natural environment.
- Community level impacts.
- Technical environment.

The potential impacts to each identified feature are described in detail within this section of the report. Measures designed to minimize the impacts are also presented. The determination of appropriate mitigation measures incorporated an assessment of previous studies and investigations, site specific requirements, and an evaluation of a broad range of alternatives. This assessment was based on consideration of three broad approaches to impact mitigation; avoidance, minimization of adverse effects, and compensation.

## 7.3 Natural Environment

### 7.3.1 Aquatic Habitat

Expansion of the existing treatment facility has the potential to result in negative impacts to the receiving stream. Currently the facility discharges to the Heenan Drain which extends for several hundred metres before merging with the Little Ausable River.

As discussed within Section 2.2 of this report, investigations have been undertaken of the Heenan Drain in the vicinity of the outfall in order to gain a general understanding of the current aquatic habitat present in that area. The assessment confirmed that the aquatic habitat of the Drain is somewhat affected by existing discharges associated with the wastewater treatment facility.

For purposes of the expansion, revised EQC limiting additional impacts were established in consultation with the MECP. Further, the amended ECA for the expanded facility will incorporate requirements for additional in-stream monitoring to assess longer term effects.

### 7.3.2 Terrestrial Habitat

The existing Lucan WWTP is located in an agricultural area adjacent to the Heenan Drain. Construction activities associated with the proposed expansion will take place

within the existing footprint of the WWTP and should pose no risk to terrestrial habitat. This also applies to proposed work at the existing lagoons and the Chestnut SPS.

There are also no natural features within the limits of the sites that will be negatively impacted by construction. A series of protective measures will be incorporated into construction plans to ensure mitigation of any possible impacts. As well, all lands disturbed by the construction process will be fully restored.

## 7.4 Social Environment

### 7.4.1 Disruption Caused by Construction

As noted previously, construction required for the expansion of the existing WWTP and related facilities (e.g. lagoon) will be fully contained within the existing facility sites. As a result, only minor noise and dust disturbances are anticipated during the construction phase. The mitigation measures presented in Table 7.1 of this report will be implemented to minimize other construction-related impacts (e.g. increased traffic adjacent to the facilities during construction). There are no residences located in close proximity to the WWTP or lagoon sites.

**Table 7.1 – Summary of Proposed Mitigation Measures (General Construction Impacts)**

| Construction Activity | Planned Mitigation |
|---|---|
| Refuelling and Maintenance | - Identify suitable locations for designated refuelling and maintenance areas.<br>- Restrict refuelling or maintaining equipment near watercourses. Non-spill equipment is required within 30 m of any watercourse. Fuelled equipment shall be stored overnight not less than 30 m from the edge of water.<br>- Avoid cleaning equipment in watercourses and in locations where debris can gain access to sewers or watercourses.<br>- Prepare to intercept, clean-up, and dispose of any spillage which may occur (whether on land or water). |
| Disposal | - Dispose of all construction debris in approved locations.<br>- Avoid emptying fuel, lubricants or pesticides into sewers or watercourses. |
| Pesticides | - Coordinate the use of pesticides and herbicides with affected landowners and the local pesticide control officer. |
| Work in Sensitive Areas | - Avoid encroachment on sensitive natural areas. Do not disturb habitats of rare or endangered species. |

| Construction Activity | Planned Mitigation |
|---|---|
| Dust Control | - Cover or wet down dry materials and rubbish to prevent blowing dust and debris.<br>- Avoid the use of chemical dust control products adjacent to wetlands and watercourses. |
| Site Clearing | - Protective measures shall be taken to safeguard trees from construction operations.<br>- Equipment or vehicles shall not be parked, repaired, or refuelled near the dripline area of any tree. Construction and earth materials shall also not be stockpiled within the defined dripline areas.<br>- Minimize stripping of topsoil and vegetation. |
| Sedimentation/ Erosion Control | - Erect sediment fencing to control excess sediment loss during construction period.<br>- Protect watercourses, catch basins and pipe ends from sediment intrusion.<br>- Complete restoration works following construction. |
| Noise Control | - Site procedures should be established to minimize noise levels in accordance with local by-laws.<br>- Provide and use devices that will minimize noise levels in the construction area.<br>Night time or Sunday work shall not be permitted, except in emergency situations. |

### 7.4.2 Financial Impacts to Residents

This Section describes the principles proposed to be used for cost allocation. The principles and their application are described as follows:

- The costs of expansion required to accommodate growth will be paid by new development.
- The costs related to rehabilitation and to address existing capacity deficiencies and also operation will be paid through the sewage service rate.
- A reserve fund has been established to pay for capital costs associated with the project. On-going development contributes to these reserves.
- A reserve fund is in place to contribute to the costs of rehabilitation.
- New development proposed for lands that are, or can be, serviced following completion of this project will be subject to development charges.

- New development within the existing serviced area will also be subject to development charges.
- Potential borrowing for capital will take into account financial impacts when establishing debt repayment periods.
- Grant programs and other Federal/Provincial Infrastructure funding programs will be aggressively pursued by municipal staff to help offset capital costs associated with the project.

The Township believes the above noted measures will provide some financial mitigation to residents.

### 7.4.3 Health and Safety and the Environment

The planned works involve construction work that has the potential to adversely impact upon the health and safety of the workers, the general public, and existing environmental features. Construction activities associated with the implementation of the preferred alternative will therefore be carried out in accordance with industry standards for health and safety. To this end, a series of measures will be prescribed in contract documentation to minimize the risks posed by construction.

The remedial measures set out in the contract documentation include those defined by the Ontario Provincial Standard Specifications and any special provisions deemed appropriate given the proposed construction technique. In general, the provisions will stipulate that the Contractor shall conduct operations in a manner which reduces the risk of detrimental effects to the environment.

# 8.0 CONCLUSIONS AND PROJECT IMPLEMENTATION

## 8.1 General Conclusions

Raw sewage flows to Lucan's existing wastewater treatment facility are currently at approximately 75% of the rated capacity of the facility. Already approved growth will increase this to 91%. The following problem definition was developed:

> *Over the past few years new growth and development in the community of Lucan has been accelerating at a significantly faster pace than the historic norm. The Lucan wastewater treatment facility is approaching its rated capacity and additional capacity is needed to accommodate future growth.*

Based upon an assessment of the ability of six different alternative approaches to resolving the defined problem it was established that Alternative 3, which is expansion of the existing treatment facility, represents the preferred strategy for increasing treatment capacity at the existing WWTP. Implementation of this option would result in a 60% increase in treatment capacity. The capacity can be increased in stages to match growth.

A number of relative advantages were identified with expansion that justified its selection as the preferred approach to increasing capacity. In particular, the preferred alternative provides the following advantages:

- Expansion of the existing treatment facility provides the most cost effective and efficient method to provide additional wastewater treatment capacity for the community based on the historic performance of the existing facility.
- Expanding the existing facilities, rather than replacing them, represents a lower impact from a greenhouse gas perspective as it relates to construction.
- It utilizes existing infrastructure, thus reducing the capital cost of capacity expansion.
- It minimizes potential impacts to the natural and cultural environments by limiting activities to the existing WWTP site.
- It allows for continued growth and development within the community consistent with the Township's Official Plan.
- It allows the Township to meet all existing planning commitments for already approved development and allow continued growth.
- Is in conformance with Infrastructure guidelines contained within the Provincial Policy Statements (PPS 2020) including re-use of existing.

## 8.2 MCEA Project Schedule

The recommended WWTP expansion is considered a Schedule "C" project under the terms of the MCEA document. This project is approved, subject to the completion of an Environmental Study Report.

## 8.3 Final Public Consultation

A Notice of Completion will be circulated to adjacent property owners, agencies, First Nation and Métis communities and the public. The Notice will identify the preferred alternative and provide the process for providing comments and submitted a Part II order request to the Minister of Environment, Conservation and Parks. This Notice will be placed in the Exeter Lakeshore Times Advance

## 8.4 MCEA Study Completion

The following activities are required in order to complete the formal MCEA study process:

- Complete the 30-day review period, defined in the Notice of Completion.
- Address any outstanding issues.
- Finalize the Study Report.
- Advise the Township and MECP when the MCEA study process is complete.

## 8.5 Approvals

### 8.5.1 Ontario Water Resources Act

The works associated with the preferred alternative are subject to the “Ontario Water Resources Act”. Consequently, the project cannot proceed without the issuance of an amended Environmental Compliance Approval (ECA) from the MECP for the proposed changes. The ECA will define how the project must be implemented and operated.

### 8.5.2 Environmental Commitments

As an outcome of this Class EA planning process, the Township is committed to carrying out the following measures to mitigate the potential environmental impacts of project implementation:

- Submission of relevant applications to the MECP in conjunction with the proposed works, as well as implementation of all conditions issued in association with the subsequent approvals.

- Implementation of standard mitigation measures during the construction phase of the project, to minimize construction related impacts to the natural and social environments.

- Expansion of the facility within the existing site’s footprint, to minimize impacts to adjacent natural features.

- That proposed financing approaches, described within Section 5.0 of this report, be implemented in conjunction with the project.

- Wastewater treatment performance will be monitored as required by the facility's amended ECA. This will include submission of Annual Performance Reports to the MECP.

- A program of monitoring and reporting on stream quality for potential increases in nitrate concentrations downstream of the WWTP discharge.

- If archaeological resources are impacted by EA project work, notify the Ministry of Tourism, Culture and Sport (MTCS) at archaeology@ontario.ca. All activities impacting archaeological resources must cease immediately, and a licensed archaeologist is required to 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 and coroner must be contacted. In situations where human remains are associated with archaeological resources, MTCS should also be notified (at archaeology@ontario.ca) to ensure that the site is not subject to unlicensed alterations which would be a contravention of the Ontario Heritage Act.

## 8.6 Project Schedule

No specific date has been established for the completion of the expansion. Final design, approvals, tendering and construction will require 18 to 24 months to complete**.**

## 9.0 PROJECT SUMMARY

This report documents the Municipal Class Environmental Assessment process conducted to identify the best means to address the need for increased wastewater treatment capacity for the community of Lucan. The MCEA process was initiated in March 2021.

A range of alternatives was identified to address the capacity deficiency. These included:

1. Reducing wastewater quantities from the existing community,
2. Limiting community growth,
3. Expanding the existing WWTP,
4. Construction a new wastewater treatment facility,
5. Re-rating the existing facility, and
6. Doing nothing.

Following a comprehensive review of the alternatives, in which the potential impacts associated with each of the alternatives was examined in relation to various components of the environment, Alternative 3, expansion of the existing facility, was selected as the preferred alternative.

Phase 3 of the MCEA process was then implemented and involved the review of detailed design alternatives associated with the preferred alternative. This phase of the process included additional consultation with agencies, aboriginal communities, and project stakeholders, as well as a second public information meeting to inform members of the general public about the preferred solution and the MCEA process.

A general description of the proposed project as developed through Phase 3 of the MCEA process is as follows:

- Construction of a staged expansion of the WWTP with Stage 1 increasing the capacity from 1,700 to 2,475 $m^3$/day and Stage 2 from 2,475 to 2,700 $m^3$/day.
- A new headworks complete with screening and de-gritting.
- Stage 1 will include a 3$^{rd}$ bioreactor and clarifier and expansion of filtration and ultraviolet disinfection capacities.
- Stage 2 will include construction of a 4$^{th}$ bioreactor and clarifier, or alternatively conversion of the existing extended aeration process to a process incorporating activated sludge and fixed film treatment technologies. The final decision on process type will be made as part of the Stage 2 design.

- Conversion of the existing biosolids digester and storage facility to a digester only.
- Modification of existing lagoon Cell 2 to allow storage of digested biosolids. This includes improving site access.
- Increasing the capacity of the existing Chestnut SPS by replacing the existing pumps and related equipment and paralleling the existing forcemain from the SPS to the WWTP.

The proposed activity is a Schedule “C” undertaking under the terms of the Municipal Class Environmental Assessment process.

A series of mitigation measures were identified to minimize potential impacts associated with implementation of the preferred alternative. Where required, these will be incorporated into the further planning and implementation of this project.

The Township of Lucan Biddulph intends to proceed with the implementation of this project upon completion of the MCEA investigation and following receipt of all necessary approvals.

All of which is respectfully submitted.


B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Stephen Burns, P. Eng.


Per _____
Lisa Courtney, RPP, MCIP

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