Appendix A – Archaeological and Cultural Heritage Screening Checklists

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7

Criteria for Evaluating Archaeological Potential

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area may contain archaeological resources i.e., have archaeological potential
- it includes all areas that may be impacted by project activities, including – but not limited to:
  - the main project area
  - temporary storage
  - staging and working areas
  - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Archaeological assessment

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a licensed consultant archaeologist (see page 4 for definitions) to undertake an archaeological assessment.

The assessment will help you:

- identify, evaluate and protect archaeological resources on your property or project area
- reduce potential delays and risks to your project

Note: By law, archaeological assessments **must** be done by a licensed consultant archaeologist. Only a licensed archaeologist can assess – or alter – an archaeological site.

What to do if you:

- **find an archaeological resource**

  If you find something you think may be of archaeological value during project work, you must – by law – stop all activities immediately and contact a licensed consultant archaeologist

  The archaeologist will carry out the fieldwork in compliance with the *Ontario Heritage Act* [s.48(1)].

- **unearth a burial site**

  If you find a burial site containing human remains, you must immediately notify the appropriate authorities (i.e., police, coroner's office, and/or Registrar of Cemeteries) and comply with the *Funeral, Burial and Cremation Services Act*.

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages when completing this form.

Project or Property Name

Lucan Wastewater Treatment Facility

Project or Property Location (upper and lower or single tier municipality)

6242 Fallon Drive, Lucan, Township of Lucan Biddulph, County of Middlesex

Proponent Name

Township of Lucan Biddulph

Proponent Contact Information

Jeff Little, Manager of Public Works, jlittle@lucanbiddulph.on.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

	Yes	No
2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?	☐	☑

If Yes, do **not** complete the rest of the checklist. You are expected to follow the recommendations in the archaeological assessment report(s).

The proponent, property owner and/or approval authority will:

- summarize the previous assessment
- add this checklist to the project file, with the appropriate documents that demonstrate an archaeological assessment was undertaken e.g., MTCS letter stating acceptance of archaeological assessment report

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., environmental assessment document
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Are there known archaeological sites on or within 300 metres of the property (or the project area)?	☐	☑
4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property (or project area)?	☐	☑
5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or project area)?	☐	☑
6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?	☐	☑
7. Has the property (or project area) been recognized for its cultural heritage value?	☐	☑

If Yes to any of the above questions (3 to 7), do **not** complete the checklist. Instead, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment of your property or project area.

If No, continue to question 8.

	Yes	No
8. Has the entire property (or project area) been subjected to recent, extensive and intensive disturbance?	☐	☑

If Yes to the preceding question, do **not** complete the checklist. Instead, please keep and maintain a summary of documentation that provides evidence of the recent disturbance.

	Yes	No
9. Are there present or past water sources within 300 metres of the property (or project area)?	☑	☐

If Yes, an archaeological assessment is required.

If No, continue to question 10.

	Yes	No
10. Is there evidence of two or more of the following on the property (or project area)?	☐	☐

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

If Yes, an archaeological assessment is required.

If No, there is low potential for archaeological resources at the property (or project area).

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g., under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
    - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

In this context, the following definitions apply:

- **consultant archaeologist** means, as defined in Ontario regulation as an archaeologist who enters into an agreement with a client to carry out or supervise archaeological fieldwork on behalf of the client, produce reports for or on behalf of the client and provide technical advice to the client. In Ontario, these people also are required to hold a valid professional archaeological licence issued by the Ministry of Tourism, Culture and Sport.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may be already in place for identifying archaeological potential, including:

- one prepared and adopted by the municipality e.g., archaeological management plan
- an environmental assessment process e.g., screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s. B.2.]

2. Has an archaeological assessment been prepared for the property (or project area) and been accepted by MTCS?

Respond 'yes' to this question, if all of the following are true:

- an archaeological assessment report has been prepared and is in compliance with MTCS requirements
    - a letter has been sent by MTCS to the licensed archaeologist confirming that MTCS has added the report to the Ontario Public Register of Archaeological Reports (Register)
- the report states that there are no concerns regarding impacts to archaeological sites

Otherwise, if an assessment has been completed and deemed compliant by the MTCS, and the ministry recommends further archaeological assessment work, this work will need to be completed.

For more information about archaeological assessments, contact:

- approval authority
- proponent
- consultant archaeologist
- Ministry of Tourism, Culture and Sport at archaeology@ontario.ca

3. Are there known archaeological sites on or within 300 metres of the property (or project area)?

MTCS maintains a database of archaeological sites reported to the ministry.

For more information, contact MTCS Archaeological Data Coordinator at archaeology@ontario.ca.

4. Is there Aboriginal or local knowledge of archaeological sites on or within 300 metres of the property?

Check with:

- Aboriginal communities in your area
- local municipal staff

They may have information about archaeological sites that are not included in MTCS' database.

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

5. Is there Aboriginal knowledge or historically documented evidence of past Aboriginal use on or within 300 metres of the property (or property area)?

Check with:

- Aboriginal communities in your area
- local municipal staff

Other sources of local knowledge may include:

- property owner
- local heritage organizations and historical societies
- local museums
- municipal heritage committee
- published local histories

6. Is there a known burial site or cemetery on the property or adjacent to the property (or project area)?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulation Unit, Ontario Ministry of Consumer Services – for database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, 'adjacent' means 'contiguous', or as otherwise defined in a municipal official plan.

7. Has the property (or project area) been recognized for its cultural heritage value?

There is a strong chance there may be archaeological resources on your property (or immediate area) if it has been listed, designated or otherwise identified as being of cultural heritage value by:

- your municipality
- Ontario government
- Canadian government

This includes a property that is:

- designated under *Ontario Heritage Act* (the OHA), including:
  - individual designation (Part IV)
  - part of a heritage conservation district (Part V)
  - an archaeological site (Part VI)
- subject to:
  - an agreement, covenant or easement entered into under the OHA (Parts II or IV)
  - a notice of intention to designate (Part IV)
  - a heritage conservation district study area by-law (Part V) of the OHA
- listed on:
  - a municipal register or inventory of heritage properties
  - Ontario government's list of provincial heritage properties
  - Federal government's list of federal heritage buildings
- part of a:
  - National Historic Site
  - UNESCO World Heritage Site
- designated under:
  - *Heritage Railway Station Protection Act*
  - *Heritage Lighthouse Protection Act*
- subject of a municipal, provincial or federal commemorative or interpretive plaque.

To determine if your property or project area is covered by any of the above, see:

- Part A of the MTCS Criteria for Evaluating Potential for Built Heritage and Cultural Heritage Landscapes

Part VI – Archaeological Sites

Includes five sites designated by the Minister under Regulation 875 of the Revised Regulation of Ontario, 1990 (Archaeological Sites) and 3 marine archaeological sites prescribed under Ontario Regulation 11/06.

For more information, check Regulation 875 and Ontario Regulation 11/06.

8. Has the entire property (or project area) been subjected to recent extensive and intensive ground disturbance?

Recent: after-1960

Extensive: over all or most of the area

Intensive: thorough or complete disturbance

Examples of ground disturbance include:

- quarrying
- major landscaping – involving grading below topsoil
- building footprints and associated construction area
    - where the building has deep foundations or a basement
- infrastructure development such as:
    - sewer lines
    - gas lines
    - underground hydro lines
    - roads
    - any associated trenches, ditches, interchanges. **Note**: this applies only to the excavated part of the right-of-way; the remainder of the right-of-way or corridor may not have been impacted.

A ground disturbance does **not** include:

- agricultural cultivation
- gardening
- landscaping

Site visits

You can typically get this information from a site visit. In that case, please document your visit in the process (e.g., report) with:

- photographs
- maps
- detailed descriptions

If a disturbance isn't clear from a site visit or other research, you need to hire a licensed consultant archaeologist to undertake an archaeological assessment.

9. Are there present or past water bodies within 300 metres of the property (or project area)?

Water bodies are associated with past human occupations and use of the land. About 80-90% of archaeological sites are found within 300 metres of water bodies.

Present

- Water bodies:
    - primary - lakes, rivers, streams, creeks
    - secondary - springs, marshes, swamps and intermittent streams and creeks
- accessible or inaccessible shoreline, for example:
    - high bluffs
    - swamps
    - marsh fields by the edge of a lake
    - sandbars stretching into marsh

Water bodies not included:

- man-made water bodies, for example:
  - temporary channels for surface drainage
  - rock chutes and spillways
  - temporarily ponded areas that are normally farmed
  - dugout ponds
- artificial bodies of water intended for storage, treatment or recirculation of:
  - runoff from farm animal yards
  - manure storage facilities
  - sites and outdoor confinement areas

Past

Features indicating past water bodies:

- raised sand or gravel beach ridges – can indicate glacial lake shorelines
- clear dip in the land – can indicate an old river or stream
- shorelines of drained lakes or marshes
- cobble beaches

You can get information about water bodies through:

- a site visit
- aerial photographs
- 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

10. Is there evidence of two or more of the following on the property (or project area)?

- elevated topography
- pockets of well-drained sandy soil
- distinctive land formations
- resource extraction areas
- early historic settlement
- early historic transportation routes

- **Elevated topography**

  Higher ground and elevated positions - surrounded by low or level topography - often indicate past settlement and land use.

  Features such as eskers, drumlins, sizeable knolls, plateaus next to lowlands, or other such features are a strong indication of archaeological potential.

  Find out if your property or project area has elevated topography, through:

  - site inspection
  - aerial photographs
  - topographical maps

- **Pockets of well-drained sandy soil, especially within areas of heavy soil or rocky ground**

  Sandy, well-drained soil - in areas characterized by heavy soil or rocky ground - may indicate archaeological potential

  Find out if your property or project area has sandy soil through:

  - site inspection
  - soil survey reports

- **Distinctive land formations**

  Distinctive land formations include – but are not limited to:

  - waterfalls
  - rock outcrops
  - rock faces
  - caverns
  - mounds, etc.

  They were often important to past inhabitants as special or sacred places. The following sites may be present – or close to – these formations:

  - burials
  - structures
  - offerings
  - rock paintings or carvings

  Find out if your property or project areas has a distinctive land formation through:

  - a site visit
  - aerial photographs
  - 1:10,000 scale Ontario Base Maps - or equally detailed and scaled maps.

- **Resource extraction areas**

  The following resources were collected in these extraction areas:

  - food or medicinal plants e.g., migratory routes, spawning areas, prairie
  - scarce raw materials e.g., quartz, copper, ochre or outcrops of chert
  - resources associated with early historic industry e.g., fur trade, logging, prospecting, mining

  Aboriginal communities may hold traditional knowledge about their past use or resources in the area.

- **Early historic settlement**

  Early Euro-Canadian settlement include – but are not limited to:

  - early military or pioneer settlement e.g., pioneer homesteads, isolated cabins, farmstead complexes
  - early wharf or dock complexes
  - pioneers churches and early cemeteries

  For more information, see below – under the early historic transportation routes.

- **Early historic transportation routes** - such as trails, passes, roads, railways, portage routes, canals.

  For more information, see:

  - historical maps and/or historical atlases
    - for information on early settlement patterns such as trails (including Aboriginal trails), monuments, structures, fences, mills, historic roads, rail corridors, canals, etc.
    - Archives of Ontario holds a large collection of historical maps and historical atlases
    - digital versions of historic atlases are available on the Canadian County Atlas Digital Project
  - commemorative markers or plaques such as local, provincial or federal agencies
  - municipal heritage committee or other local heritage organizations
    - for information on early historic settlements or landscape features (e.g., fences, mill races, etc.)
    - for information on commemorative markers or plaques

Ontario

Ministry of Tourism, Culture and Sport

Programs & Services Branch
401 Bay Street, Suite 1700
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Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes

A Checklist for the Non-Specialist

The **purpose of the checklist** is to determine:

- if a property(ies) or project area:
    - is a recognized heritage property
    - may be of cultural heritage value
- it includes all areas that may be impacted by project activities, including – but not limited to:
    - the main project area
    - temporary storage
    - staging and working areas
    - temporary roads and detours

Processes covered under this checklist, such as:

- *Planning Act*
- *Environmental Assessment Act*
- *Aggregates Resources Act*
- *Ontario Heritage Act* – Standards and Guidelines for Conservation of Provincial Heritage Properties

Cultural Heritage Evaluation Report (CHER)

If you are not sure how to answer one or more of the questions on the checklist, you may want to hire a qualified person(s) (see page 5 for definitions) to undertake a cultural heritage evaluation report (CHER).

The CHER will help you:

- identify, evaluate and protect cultural heritage resources on your property or project area
- reduce potential delays and risks to a project

Other checklists

Please use a separate checklist for your project, if:

- you are seeking a Renewable Energy Approval under Ontario Regulation 359/09 – separate checklist
- your Parent Class EA document has an approved screening criteria (as referenced in Question 1)

Please refer to the Instructions pages for more detailed information and when completing this form.

Project or Property Name

Lucan Wastewater Treatment Facility

Project or Property Location (upper and lower or single tier municipality)

6242 Fallon Drive, Lucan, Township of Lucan Biddulph, County of Middlesex

Proponent Name

Township of Lucan Biddulph

Proponent Contact Information

Jeff Little, Manager of Public Works, jlittle@lucanbiddulph.on.ca

Screening Questions

	Yes	No
1. Is there a pre-approved screening checklist, methodology or process in place?	☐	☑

If Yes, please follow the pre-approved screening checklist, methodology or process.

If No, continue to Question 2.

Part A: Screening for known (or recognized) Cultural Heritage Value

	Yes	No
2. Has the property (or project area) been evaluated before and found **not** to be of cultural heritage value?	☐	☑

If Yes, do **not** complete the rest of the checklist.

The proponent, property owner and/or approval authority will:

- summarize the previous evaluation and
- add this checklist to the project file, with the appropriate documents that demonstrate a cultural heritage evaluation was undertaken

The summary and appropriate documentation may be:

- submitted as part of a report requirement
- maintained by the property owner, proponent or approval authority

If No, continue to Question 3.

	Yes	No
3. Is the property (or project area):		
a. identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value?	☐	☑
b. a National Historic Site (or part of)?	☐	☑
c. designated under the *Heritage Railway Stations Protection Act*?	☐	☑
d. designated under the *Heritage Lighthouse Protection Act*?	☐	☑
e. identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office (FHBRO)?	☐	☑
f. located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?	☐	☑

If Yes to any of the above questions, you need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report, if a Statement of Cultural Heritage Value has not previously been prepared or the statement needs to be updated

If a Statement of Cultural Heritage Value has been prepared previously and if alterations or development are proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No, continue to Question 4.

Part B: Screening for Potential Cultural Heritage Value

	Yes	No
4. Does the property (or project area) contain a parcel of land that:		
a. is the subject of a municipal, provincial or federal commemorative or interpretive plaque?	☐	☑
b. has or is adjacent to a known burial site and/or cemetery?	☐	☑
c. is in a Canadian Heritage River watershed?	☐	☑
d. contains buildings or structures that are 40 or more years old?	☐	☐

Part C: Other Considerations

	Yes	No
5. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area):		
a. is considered a landmark in the local community or contains any structures or sites that are important in defining the character of the area?	☐	☑
b. has a special association with a community, person or historical event?	☐	☑
c. contains or is part of a cultural heritage landscape?	☐	☑

If Yes to one or more of the above questions (Part B and C), there is potential for cultural heritage resources on the property or within the project area.

You need to hire a qualified person(s) to undertake:

- a Cultural Heritage Evaluation Report (CHER)

If the property is determined to be of cultural heritage value and alterations or development is proposed, you need to hire a qualified person(s) to undertake:

- a Heritage Impact Assessment (HIA) – the report will assess and avoid, eliminate or mitigate impacts

If No to all of the above questions, there is low potential for built heritage or cultural heritage landscape on the property.

The proponent, property owner and/or approval authority will:

- summarize the conclusion
- add this checklist with the appropriate documentation to the project file

The summary and appropriate documentation may be:

- submitted as part of a report requirement e.g. under the *Environmental Assessment Act, Planning Act* processes
- maintained by the property owner, proponent or approval authority

Instructions

Please have the following available, when requesting information related to the screening questions below:

- a clear map showing the location and boundary of the property or project area
    - large scale and small scale showing nearby township names for context purposes
- the municipal addresses of all properties within the project area
- the lot(s), concession(s), and parcel number(s) of all properties within a project area

For more information, see the Ministry of Tourism, Culture and Sport's Ontario Heritage Toolkit or Standards and Guidelines for Conservation of Provincial Heritage Properties.

In this context, the following definitions apply:

- **qualified person(s)** means individuals – professional engineers, architects, archaeologists, etc. – having relevant, recent experience in the conservation of cultural heritage resources.
- **proponent** means a person, agency, group or organization that carries out or proposes to carry out an undertaking or is the owner or person having charge, management or control of an undertaking.

1. Is there a pre-approved screening checklist, methodology or process in place?

An existing checklist, methodology or process may already be in place for identifying potential cultural heritage resources, including:

- one endorsed by a municipality
- an environmental assessment process e.g. screening checklist for municipal bridges
- one that is approved by the Ministry of Tourism, Culture and Sport (MTCS) under the Ontario government's Standards & Guidelines for Conservation of Provincial Heritage Properties [s.B.2.]

Part A: Screening for known (or recognized) Cultural Heritage Value

2. Has the property (or project area) been evaluated before and found not to be of cultural heritage value?

Respond 'yes' to this question, if all of the following are true:

A property can be considered not to be of cultural heritage value if:

- a Cultural Heritage Evaluation Report (CHER) - or equivalent - has been prepared for the property with the advice of a qualified person and it has been determined not to be of cultural heritage value and/or
- the municipal heritage committee has evaluated the property for its cultural heritage value or interest and determined that the property is not of cultural heritage value or interest

A property may need to be re-evaluated, if:

- there is evidence that its heritage attributes may have changed
- new information is available
- the existing Statement of Cultural Heritage Value does not provide the information necessary to manage the property
- the evaluation took place after 2005 and did not use the criteria in Regulations 9/06 and 10/06

Note: Ontario government ministries and public bodies [prescribed under Regulation 157/10] may continue to use their existing evaluation processes, until the evaluation process required under section B.2 of the Standards & Guidelines for Conservation of Provincial Heritage Properties has been developed and approved by MTCS.

To determine if your property or project area has been evaluated, contact:

- the approval authority
- the proponent
- the Ministry of Tourism, Culture and Sport

3a. Is the property (or project area) identified, designated or otherwise protected under the *Ontario Heritage Act* as being of cultural heritage value e.g.:

i. designated under the *Ontario Heritage Act*

- individual designation (Part IV)
- part of a heritage conservation district (Part V)

Individual Designation – Part IV

A property that is designated:

- by a municipal by-law as being of cultural heritage value or interest [s.29 of the *Ontario Heritage Act*]
- by order of the Minister of Tourism, Culture and Sport as being of cultural heritage value or interest of provincial significance [s.34.5]. **Note**: To date, no properties have been designated by the Minister.

Heritage Conservation District – Part V

A property or project area that is located within an area designated by a municipal by-law as a heritage conservation district [s. 41 of the *Ontario Heritage Act*].

For more information on Parts IV and V, contact:

- municipal clerk
- Ontario Heritage Trust
- local land registry office (for a title search)

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ii. subject of an agreement, covenant or easement entered into under Parts II or IV of the *Ontario Heritage Act*

An agreement, covenant or easement is usually between the owner of a property and a conservation body or level of government. It is usually registered on title.

The primary purpose of the agreement is to:

- preserve, conserve, and maintain a cultural heritage resource
- prevent its destruction, demolition or loss

For more information, contact:

- Ontario Heritage Trust - for an agreement, covenant or easement [clause 10 (1) (c) of the *Ontario Heritage Act*]
- municipal clerk – for a property that is the subject of an easement or a covenant [s.37 of the *Ontario Heritage Act*]
- local land registry office (for a title search)

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iii. listed on a register of heritage properties maintained by the municipality

Municipal registers are the official lists - or record - of cultural heritage properties identified as being important to the community.

Registers include:

- all properties that are designated under the *Ontario Heritage Act* (Part IV or V)
- properties that have not been formally designated, but have been identified as having cultural heritage value or interest to the community

For more information, contact:

- municipal clerk
- municipal heritage planning staff
- municipal heritage committee

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iv. subject to a notice of:

- intention to designate (under Part IV of the *Ontario Heritage Act*)
- a Heritage Conservation District study area bylaw (under Part V of the *Ontario Heritage Act*)

A property that is subject to a **notice of intention to designate** as a property of cultural heritage value or interest and the notice is in accordance with:

- section 29 of the *Ontario Heritage Act*
- section 34.6 of the *Ontario Heritage Act.* **Note**: To date, the only applicable property is Meldrum Bay Inn, Manitoulin Island. [s.34.6]

An area designated by a municipal by-law made under section 40.1 of the *Ontario Heritage Act* as a **heritage conservation district study area**.

For more information, contact:

- municipal clerk – for a property that is the subject of notice of intention [s. 29 and s. 40.1]
- Ontario Heritage Trust

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v. included in the Ministry of Tourism, Culture and Sport's list of provincial heritage properties

Provincial heritage properties are properties the Government of Ontario owns or controls that have cultural heritage value or interest.

The Ministry of Tourism, Culture and Sport (MTCS) maintains a list of all provincial heritage properties based on information provided by ministries and prescribed public bodies. As they are identified, MTCS adds properties to the list of provincial heritage properties.

For more information, contact the MTCS Registrar at registrar@ontario.ca.

3b. Is the property (or project area) a National Historic Site (or part of)?

National Historic Sites are properties or districts of national historic significance that are designated by the Federal Minister of the Environment, under the *Canada National Parks Act*, based on the advice of the Historic Sites and Monuments Board of Canada.

For more information, see the National Historic Sites website.

3c. Is the property (or project area) designated under the *Heritage Railway Stations Protection Act*?

The *Heritage Railway Stations Protection Act* protects heritage railway stations that are owned by a railway company under federal jurisdiction. Designated railway stations that pass from federal ownership may continue to have cultural heritage value.

For more information, see the Directory of Designated Heritage Railway Stations.

3d. Is the property (or project area) designated under the *Heritage Lighthouse Protection Act*?

The *Heritage Lighthouse Protection Act* helps preserve historically significant Canadian lighthouses. The Act sets up a public nomination process and includes heritage building conservation standards for lighthouses which are officially designated.

For more information, see the Heritage Lighthouses of Canada website.

3e. Is the property (or project area) identified as a Federal Heritage Building by the Federal Heritage Buildings Review Office?

The role of the Federal Heritage Buildings Review Office (FHBRO) is to help the federal government protect the heritage buildings it owns. The policy applies to all federal government departments that administer real property, but not to federal Crown Corporations.

For more information, contact the Federal Heritage Buildings Review Office.

See a directory of all federal heritage designations.

3f. Is the property (or project area) located within a United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Site?

A UNESCO World Heritage Site is a place listed by UNESCO as having outstanding universal value to humanity under the Convention Concerning the Protection of the World Cultural and Natural Heritage. In order to retain the status of a World Heritage Site, each site must maintain its character defining features.

Currently, the Rideau Canal is the only World Heritage Site in Ontario.

For more information, see Parks Canada – World Heritage Site website.

Part B: Screening for potential Cultural Heritage Value

4a. Does the property (or project area) contain a parcel of land that has a municipal, provincial or federal commemorative or interpretive plaque?

Heritage resources are often recognized with formal plaques or markers.

Plaques are prepared by:

- municipalities
- provincial ministries or agencies
- federal ministries or agencies
- local non-government or non-profit organizations

For more information, contact:

- municipal heritage committees or local heritage organizations – for information on the location of plaques in their community
- Ontario Historical Society's Heritage directory – for a list of historical societies and heritage organizations
- Ontario Heritage Trust – for a list of plaques commemorating Ontario's history
- Historic Sites and Monuments Board of Canada – for a list of plaques commemorating Canada's history

4b. Does the property (or project area) contain a parcel of land that has or is adjacent to a known burial site and/or cemetery?

For more information on known cemeteries and/or burial sites, see:

- Cemeteries Regulations, Ontario Ministry of Consumer Services – for a database of registered cemeteries
- Ontario Genealogical Society (OGS) – to locate records of Ontario cemeteries, both currently and no longer in existence; cairns, family plots and burial registers
- Canadian County Atlas Digital Project – to locate early cemeteries

In this context, adjacent means contiguous or as otherwise defined in a municipal official plan.

4c. Does the property (or project area) contain a parcel of land that is in a Canadian Heritage River watershed?

The Canadian Heritage River System is a national river conservation program that promotes, protects and enhances the best examples of Canada's river heritage.

Canadian Heritage Rivers must have, and maintain, outstanding natural, cultural and/or recreational values, and a high level of public support.

For more information, contact the Canadian Heritage River System.

If you have questions regarding the boundaries of a watershed, please contact:

- your conservation authority
- municipal staff

4d. Does the property (or project area) contain a parcel of land that contains buildings or structures that are 40 or more years old?

A 40 year 'rule of thumb' is typically used to indicate the potential of a site to be of cultural heritage value. The approximate age of buildings and/or structures may be estimated based on:

- history of the development of the area
- fire insurance maps
- architectural style
- building methods

Property owners may have information on the age of any buildings or structures on their property. The municipality, local land registry office or library may also have background information on the property.

Note: 40+ year old buildings or structure do not necessarily hold cultural heritage value or interest; their age simply indicates a higher potential.

A building or structure can include:

- residential structure
- farm building or outbuilding
- industrial, commercial, or institutional building
- remnant or ruin
- engineering work such as a bridge, canal, dams, etc.

For more information on researching the age of buildings or properties, see the Ontario Heritage Tool Kit Guide Heritage Property Evaluation.

Part C: Other Considerations

5a. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) is considered a landmark in the local community or contains any structures or sites that are important to defining the character of the area?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has potential landmarks or defining structures and sites, for instance:

- buildings or landscape features accessible to the public or readily noticeable and widely known
- complexes of buildings
- monuments
- ruins

5b. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) has a special association with a community, person or historical event?

Local or Aboriginal knowledge may reveal that the project location is situated on a parcel of land that has a special association with a community, person or event of historic interest, for instance:

- Aboriginal sacred site
- traditional-use area
- battlefield
- birthplace of an individual of importance to the community

5c. Is there local or Aboriginal knowledge or accessible documentation suggesting that the property (or project area) contains or is part of a cultural heritage landscape?

Landscapes (which may include a combination of archaeological resources, built heritage resources and landscape elements) may be of cultural heritage value or interest to a community.

For example, an Aboriginal trail, historic road or rail corridor may have been established as a key transportation or trade route and may have been important to the early settlement of an area. Parks, designed gardens or unique landforms such as waterfalls, rock faces, caverns, or mounds are areas that may have connections to a particular event, group or belief.

For more information on Questions 5.a., 5.b. and 5.c., contact:

- Elders in Aboriginal Communities or community researchers who may have information on potential cultural heritage resources. Please note that Aboriginal traditional knowledge may be considered sensitive.
- municipal heritage committees or local heritage organizations
- Ontario Historical Society's "Heritage Directory" - for a list of historical societies and heritage organizations in the province

An internet search may find helpful resources, including:

- historical maps
- historical walking tours
- municipal heritage management plans
- cultural heritage landscape studies
- municipal cultural plans

Information specific to trails may be obtained through Ontario Trails.

Stage 1-2 Archaeological Assessment
Municipal Class Environmental Assessment
Proposed Expansion - Lucan Wastewater Treatment Plant
6242 Fallon Drive
Part of Lot 25, Concession 4
Geographic Township of Lucan Biddulph
Middlesex County, Ontario

Original Report

Submitted to:
Ministry of Heritage, Sport, Tourism and Culture Industries

Prepared for:
B. M. Ross & Associates Ltd.
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Prepared by:
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Licensee:	Sherri Pearce, M.A., P316
PIF No:	P316-0481-2021
Project No:	2021-308
Dated:	May 24, 2022

EXECUTIVE SUMMARY

A Stage 1 and 2 archaeological assessment was conducted as part of a Municipal Class Environmental Assessment (MCEA) for the proposed expansion to the Lucan Wastewater Treatment Plant (WWTP), located in the Geographic Township of Lucan Biddulph, Ontario. The subject property is roughly 2.01 hectares (5.0 acres) in size and is located within part of Lot 25, Concession 4, in the former Geographic Township of Biddulph, Middlesex County, Ontario. The subject property contains the existing wastewater treatment plant, paved access road and grassed areas. In 2021 TMHC was contracted by B. M. Ross and Associates Limited (B. M. Ross) to carry out the assessment, which was conducted in accordance with the provisions of the *Environmental Assessment Act* and *Provincial Policy Statement* (2020), while also in keeping with the *Ontario Heritage Act* and *Standards and Guidelines for Consultant Archaeologists* (2011). The purpose of the assessment was to determine whether there were archaeological resources present within the subject property.

The Stage 1 background study included a review of current land use, historic and modern maps, past settlement history for the area and a consideration of topographic and physiographic features, soils and drainage. It also involved a review of previously registered archaeological resources within 1 km of the subject property and previous archaeological assessments within 50 m. The background study indicated that the property had potential for the recovery of archaeological resources due to the proximity (i.e., within 300 m) of features that signal archaeological potential, namely:

- mapped 19th-century thoroughfares (Fallon Drive); and
- a water source (Heenan Drain).

The subject property consists of non-ploughable lands; these were subject to Stage 2 assessment via standard test pit survey at a 5 m transect interval (43.8%; 0.88 ha), in keeping with provincial standards. Portions of the subject property consist of built features that were previously disturbed, including existing buildings and infrastructure (29.9%; 0.60 ha), as well as steeply sloped graded and landscaped areas (26.3%, 0.53 ha); these were deemed of low archaeological potential and were photo-documented.

All work met provincial standards and no archaeological material was documented during the assessment. As such, the subject property should be considered free of archaeological concern and no further archaeological assessment is recommended.

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PROJECT PERSONNEL

Project Manager	Sherri Pearce, M.A. (P316)
Project Administrator	Kellie Theaker, CHRP
Health and Safety Coordinator	Amanda DiLoreto-Bendek, M.A. (R317)
Fieldwork Coordination	Johnathan Freeman, M.A. (P274)
	David Gostick, B.A.
Field Director	Matthew Severn, B.A. (R1093)
Field Technicians	Sherri Pearce, M.A. (P316)
	Arwen Johns, M.A. (R1330)
	Sarah Eaton, M.A.
	Daniel Amacker, B.A.
	Rachelle Carter, B.A.
	Sean Graziano, B.A.
	Dave Murphy, B.A.
GIS Mapping	John Moody, Ph.D.
	Krissy Nickle, B.Sc.
Report Writer	Sherri Pearce, M.A. (P316)
Senior Review	Matthew Beaudoin, Ph.D. (P324)

ACKNOWLEDGEMENTS

Lisa Courtney	B.M. Ross and Associates Limited
Jeff Little	Manager of Public Works,
	Lucan-Biddulph Township
Renee Hornick	Regional Hub Manager,
	Ontario Clean Water Agency
Dave Sharp	Senior Operations Manager,
	Ontario Clean Water Agency

TERRITORIAL ACKNOWLEDGEMENT

The subject property is located within the Huron Tract Purchase (Treaty No. 29) of 1827, on the traditional lands and territory of the Anishinaabek (Ah-nish-in-a-bek) people of the Aamjiwnaang (Am-JIN-nun) First Nation and the Walpole Island First Nation who represent the Three Fires Confederacy of Ojibwa (Ow-jib-wei), Odawa (Ow-daa-wuh), and Potawatomi (Pow-tuh-waa-tuh-mee) Nations. These Indigenous groups are the stewards of the lands, waters and resources of their territories, including archaeological resources and cultural heritage values. These lands also continue to be home to diverse Indigenous peoples (e.g., First Nations, Métis and Inuit) whom we recognize as contemporary stewards of the land and vital contributors of our society.

ABOUT TMHC

Established in 2003 with a head office in London, Ontario, TMHC Inc. (TMHC) provides a broad range of archaeological assessment, heritage planning and interpretation, cemetery, and community consultation services throughout the Province of Ontario. We specialize in providing heritage solutions that suit the past and present for a range of clients and intended audiences, while meeting the demands of the regulatory environment. Over the past two decades, TMHC has grown to become one of the largest privately-owned heritage consulting firms in Ontario and is today the largest predominately woman-owned CRM business in Canada.

Since 2004, TMHC has held retainers with Infrastructure Ontario, Hydro One, the Ministry of Transportation, Metrolinx, the City of Hamilton, and Niagara Parks Commission. In 2013, TMHC earned the Ontario Archaeological Society's award for Excellence in Cultural Resource Management. Our seasoned expertise and practical approach have allowed us to manage a wide variety of large, complex, and highly sensitive projects to successful completion. Through this work, we have gained corporate experience in helping our clients work through difficult issues to achieve resolution.

TMHC is skilled at meeting established deadlines and budgets, maintaining a healthy and safe work environment, and carrying out quality heritage activities to ensure that all projects are completed diligently and safely. Additionally, we have developed long-standing relationships of trust with Indigenous and descendent communities across Ontario and a good understanding of community interests and concerns in heritage matters, which assists in successful project completion.

TMHC is a Living Wage certified employer with the Ontario Living Wage Network and a member of the Canadian Federation for Independent Business.

KEY STAFF BIOS

Matthew Beaudoin, PhD, Principal, Manager – Archaeological Assessments

Matthew Beaudoin received a PhD in Anthropology from Western University in 2013 and became a Principal at TMHC in 2019. During his archaeological career, Matthew has conducted extensive field research and artifact analysis on Indigenous and Settler sites from Labrador and Ontario. In addition, Matthew has also conducted ethnographic projects in Labrador. Since joining TMHC in 2008, Matthew has been involved with several notable projects, such as the Imperial Oil's Waterdown to Finch Project, the Camp Ipperwash Project, and the Scugog Island Natural Gas Pipeline Project.

Matthew is an active member of the Canadian Archaeological Association, the Ontario Archaeological Association, the Ontario Historical Society, the World Archaeology Congress, the Council for Northeastern Historical Archaeology, the Society for American Archaeology, and the Society for Historical Archaeology.

Sherri Pearce, M.A., Project Manager

Sherri Pearce received a B.A. (Hon.) in Anthropology specializing in archaeology and First Nations studies from the University of Western Ontario in 2006 and she went on to complete a M.A. in Anthropology at the same institution in 2008. Since receiving her Professional Licence in 2009 Sherri has supervised over 500 archaeological assessments.

Ms. Pearce is an active member of the Ontario Archaeological Society and the Council for Northeast Historical Archaeology.

STATEMENT OF QUALIFICATIONS AND LIMITATIONS

The attached Report (the "Report") has been prepared by TMHC Inc. (TMHC) for the benefit of the Client (the "Client") in accordance with the agreement between TMHC and the Client, including the scope of work detailed therein (the "Agreement").

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- is subject to the scope, schedule, and other constraints and limitations in the Agreement and the qualifications contained in the Report (the "Limitations");
- represents TMHC's professional judgment in light of the Limitation and industry standards for the preparation of similar reports;
- may be based on information provided to TMHC which has not been independently verified;
- has not been updated since the date of issuance of the Report and its accuracy is limited to the time period and circumstances in which it was collected, processed, made or issued;
- must be read as a whole and sections thereof should not be read out of such context; and
- was prepared for the specific purposes described in the Report and the Agreement.

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This Statement of Qualifications and Limitations is attached to and forms part of the Report and any use of the Report is subject to the terms hereof.

QUALITY INFORMATION

Licensee: _____

Sherri Pearce, M.A. (P316)

Project Manager

Report reviewed by: _____

Matthew Beaudoin, Ph.D. (P324)

Principal/Manager of Archaeological Assessments

1 PROJECT CONTEXT

1.1 Development Context

1.1.1 Introduction

A Stage 1 and 2 archaeological assessment was conducted as part of a Municipal Class Environmental Assessment (MCEA) for the proposed expansion to the Lucan Wastewater Treatment Plant (WWTP), located in the Geographic Township of Lucan Biddulph, Ontario. The subject property is roughly 2.01 hectares (5.0 acres) in size and is located within part of Lot 25, Concession 4, in the former Geographic Township of Biddulph, Middlesex County, Ontario. The subject property contains the existing wastewater treatment plant, paved access road and grassed areas. In 2021 TMHC was contracted by B. M. Ross and Associates Limited (B. M. Ross) to carry out the assessment, which was conducted in accordance with the provisions of the *Environmental Assessment Act* and *Provincial Policy Statement* (2020), while also in keeping with the *Ontario Heritage Act* and *Standards and Guidelines for Consultant Archaeologists* (2011). The purpose of the assessment was to determine whether there were archaeological resources present within the subject property.

All archaeological assessment activities were performed under the professional archaeological license of Sherri Pearce, M.A. (P316) and in accordance with the *Standards and Guidelines for Consultant Archaeologists* (MTC 2011, "Standards and Guidelines"). Permission to enter the property and carry out all required archaeological activities, including collecting artifacts when found, was given by Lisa Courtney of B. M. Ross.

1.1.2 Purpose and Legislative Context

The *Ontario Heritage Act* (R.S.O. 1990) makes provisions for the protection and conservation of heritage resources in the Province of Ontario. Heritage concerns are recognized as a matter of provincial interest in Section 2.6.2 of the *Provincial Policy Statement* (PPS 2020) which states:

> *development* and *site alteration* shall not be permitted on lands containing *archaeological resources* or *areas of archaeological potential* unless *significant archaeological resources* have been *conserved*.

In the PPS, the term conserved means:

> the identification, protection, management and use of *built heritage resources, cultural heritage landscapes* and *archaeological resources* in a manner that ensures their cultural heritage value or interest is retained. This may be achieved by the implementation of recommendations set out in a conservation plan, archaeological assessment and/or heritage impact assessment that has been approved, accepted or adopted by the relevant planning authority and/or decision-maker. Mitigative measures and/or alternative development approaches can be included in these plans and assessments.

The *Environmental Assessment Act* also provides for the protection and conservation of the "environment," widely defined to cover "cultural heritage" resources. Section 5(3)(c) of the *Act* stipulates that heritage resources to be affected by a proposed undertaking be identified during the environmental screening process. Within the context of an Environmental Assessment, the purpose of a Stage 1 background study is to determine if the project has potential to negatively impact archaeological resources and assist in the evaluation of options where necessary. A Stage 2 field assessment is undertaken to establish if archaeological sites are present within the proposed areas of impact. If archaeological resources are found, these may be further evaluated through Stage 3 assessment. Any sites deemed to be of further cultural heritage value or interest (CHVI) require mitigation through Stage 4 avoidance and protection or excavation.

2 STAGE 1 BACKGROUND REVIEW

2.1 Research Methods and Sources

A Stage 1 overview and background study was conducted to gather information about known and potential cultural heritage resources within the subject property. According to the *Standards and Guidelines*, a Stage 1 background study must include a review of:

- an up-to-date listing of sites from the Ministry of Heritage, Sport, Tourism and Culture Industries' (MHSTCI) PastPortal for 1 km around the property;
- reports of previous archaeological fieldwork within a radius of 50 m around the property;
- topographic maps at 1:10,000 (recent and historical) or the most detailed scale available;
- historical settlement maps (e.g., historical atlas, survey);
- archaeological management plans or other archaeological potential mapping when available; and,
- commemorative plaques or monuments on or near the property.

For this project, the following activities were carried out to satisfy or exceed the above requirements:

- a database search was completed through MHSTCI's PastPortal system that compiled a list of registered archaeological sites within 1 km of the subject property (completed October 20, 2021)
- a review of known prior archaeological reports for the property and adjacent lands;
- Ontario Base Mapping (1:10,000) was reviewed through ArcGIS and mapping layers under the Open Government Licence – Canada and the Open Government Licence- Ontario;
- detailed mapping provided by the client was also reviewed; and,
- a series of historic maps and photographs was reviewed related to the post-1800 land settlement.

Additional sources of information were also consulted, including modern aerial photographs, local history accounts, soils data provided by the Ontario Ministry of Agriculture, Food and Rural Affairs (OMAFRA), physiographic data provided by the Ontario Ministry of Northern Development and Mines, and detailed topographic data provided by Land Information Ontario.

When compiled, background information was used to create a summary of the characteristics of the subject property, in an effort to evaluate its archaeological potential. The Province of Ontario (MTC 2011; Section 1.3.1) has defined the criteria that identify archaeological potential as:

- previously identified archaeological sites;
- water sources;
    - primary water sources (e.g., lakes, rivers, streams, creeks);
    - secondary water sources (e.g., intermittent streams and creeks, springs, marshes, swamps);
    - features indicating past water sources (e.g., glacial lake shorelines, relic river or stream channels, shorelines of drained lakes or marshes, cobble beaches);
    - accessible or inaccessible shorelines (e.g., high bluffs, sandbars stretching into a marsh);
- elevated topography (e.g., eskers, drumlins, large knolls, plateau);
- pockets of well-drained sandy soils;
- distinctive land formations that might have been special or spiritual places (e.g., waterfalls, rock outcrops, caverns, mounds, promontories and their bases);

- resource areas, including:
    - food or medicinal plants (e.g., migratory routes, spawning areas, prairies);
    - scarce raw materials (e.g., quartz, copper, ochre, or chert outcrops);
    - early Settler industry (e.g., fur trade, logging, prospecting, mining);
- areas of early 19th-century settlement, including:
    - early military locations;
    - pioneer settlement (e.g., homesteads, isolated cabins, farmstead complexes);
    - wharf or dock complexes;
    - pioneer churches;
    - early cemeteries;
- early transportation routes (e.g., trails, passes, roads, railways, portage routes);
- a property listed on a municipal register, designated under the *Ontario Heritage Act*, or that is a federal, provincial, or municipal historic landmark or site; and,
- a property that local histories or informants have identified with possible archaeological sites, historical event, activities, or occupations.

In Southern Ontario (south of the Canadian Shield), any lands within 300 m of any of the features listed above are considered to have potential for the discovery of archaeological resources.

Typically, a Stage 1 assessment will determine potential for Indigenous and 19th-century period sites independently. This is due to the fact that lifeways varied considerably during these eras, so the criteria used to evaluate potential for each type of site also varies.

It should be noted that some factors can also negate the potential for discovery of intact archaeological deposits. The *Standards and Guidelines* (MTC 2011; Section 1.3.2) indicates that archaeological potential can be removed in instances where land has been subject to extensive and deep land alterations that have severely damaged the integrity of any archaeological resources. Major disturbances indicating removal of archaeological potential include, but are not limited to:

- quarrying;
- major landscaping involving grading below topsoil;
- building footprints; and,
- sewage and infrastructure development.

Some activities (agricultural cultivation, surface landscaping, installation of gravel trails, etc.) may result in minor alterations to the surface topsoil but do not necessarily affect or remove archaeological potential. It is not uncommon for archaeological sites, including structural foundations, subsurface features and burials, to be found intact beneath major surface features like roadways and parking lots. Archaeological potential is, therefore, not removed in cases where there is a chance of deeply buried deposits, as in a developed or urban context or floodplain where modern features or alluvial soils can effectively cap and preserve archaeological resources.

2.2 Project Context: Archaeological Context

2.2.1 Subject Property: Overview and Physical Setting

The subject property is located at 6242 Fallon Drive, in the Township of Lucan Biddulph, Middlesex County, Ontario (Maps 1-2). It lies just north of the Town of Lucan, situated between Coursey Line and Saintsbury Line, in an area largely characterized as agricultural. It is bound by agricultural fields to the north, east and west and by Fallon Drive to the south. The subject property is roughly 2.01 ha (5.0 ac) in size and contains the existing Lucan WWTP and associated access road, and is grassed with trees.

The subject property falls within the Stratford Till Plain physiographic region, a broad clay plain encompassing some 1,370 square miles and extending northward from London to Blyth and Listowel (Chapman and Putnam 1966:210; Map 3). The plain is essentially ground moraine interrupted by several terminal moraines. The till in the region is relatively uniform brown calcareous silty clay (Chapman and Putnam 1966:210). East and west of Lucan, the till plain is cut by two till moraines: Seaforth and Lucan. The spillway associated with the Little Ausable River lies between the Seaforth moraine and the till plain surrounding the community.

The soil within the subject property is Huron silt loam, a silty clay soil that is moderately well drained (Hagerty and Kingston 1992; Map 4).

The property lies within the Ausable River drainage system and the Little Ausable River is just over 1 km to the west (Map 5). The general area is characterized by a number of drains, some of which may be channelized tributaries of the Little Ausable River. The Heenan Drain lies roughly 65 m north of the subject property and the drainage map depicts a tributary of that drain bisecting the property (Map 5); although, no such watercourse is visible in any current aerial photos of the property.

2.2.2 Summary of Registered or Known Archaeological Sites

According to PastPortal (accessed October 20, 2021) there is one registered archaeological site within 1 km of the subject property. AhHi-4, the Walnut Grove site, is a mid to late 19th-century cabin site consisting of domestic artifacts. The site was discovered during a Stage 2 assessment for a proposed subdivision and has been fully mitigated (Archaeologix 2007 a & b). The site is just over 650 m south of the subject property.

Table 1: Registered Archaeological Sites within 1 km of the Subject Property

Borden Number	Site Name	Time Period	Affinity	Site Type	Status
AhHi-4		Post-Contact	Euro-Canadian	House	

2.2.3 Summary of Past Archaeological Investigations within 50 m

During the course of this study, no records were found for any archaeological investigations within 50 m of the subject property. However, it should be noted that the MHSTCI currently does not provide an inventory of archaeological assessments to assist in this determination.

2.2.4 Dates of Archaeological Fieldwork

The Stage 2 fieldwork was conducted on May 13, 2022, in sunny and warm weather conditions under the direction of Matthew Severn, BA (R1093).

2.3 Project Context: Historical Context

2.3.1 Indigenous Settlement in the Ausable River Drainage, Middlesex County

Our archaeological knowledge of Indigenous settlement in Middlesex County is very limited, largely due to a lack of cultural resource management and research based archaeological assessments. However, using existing data and regional syntheses, it is possible to propose a generalized model of Indigenous settlement in the Middlesex County area. The general themes, time periods and cultural traditions of Indigenous settlement, based on archaeological evidence, are provided below and in Table 2.

Table 2: Chronology of Indigenous Settlement in Middlesex County

Period	Time Range	Diagnostic Features	Archaeological Complexes
Early Paleo	9000-8400 BCE	fluted projectile points	Gainey, Barnes, Crowfield
Late Paleo	8400-8000 BCE	non-fluted and lanceolate points	Holcombe, Hi-Lo, Lanceolate
Early Archaic	8000-6000 BCE	serrated, notched, bifurcate base points	Nettling, Bifurcate Base Horizon
Middle Archaic	6000-2500 BCE	stemmed, side & corner notched points	Brewerton, Otter Creek, Stanly/Neville
Late Archaic	2000-1800 BCE	narrow points	Lamoka
Late Archaic	1800-1500 BCE	broad points	Genesee, Adder Orchard, Perkiomen
Late Archaic	1500-1100 BCE	small points	Crawford Knoll
Terminal Archaic	1100-950 BCE	first true cemeteries	Hind
Early Woodland	950-400 BCE	expanding stemmed points, Vinette pottery	Meadowood
Middle Woodland	400 BCE-500 CE	dentate, pseudo-scallop pottery	Saugeen/Couture
Transitional Woodland	500-900 CE	first corn, cord-wrapped stick pottery	Princess Point/ Riviere au Vase
Late Woodland	900-1300 CE	first villages, corn horticulture, longhouses	Glen Meyer/Younge
Late Woodland	1300-1400 CE	large villages and houses	Uren, Middleport/Springwell
Late Woodland	1400-1650 CE	tribal emergence, territoriality	Attawandaron/Wolf
Contact Period - Indigenous	1700 CE-present	treaties, mixture of Indigenous & European items	Ojibwa, Oneida, Delaware
Contact Period - Settler	1796 CE-present	industrial goods, homesteads	pioneer life, municipal settlement

2.3.1.1 Paleo Period

The first human populations to inhabit the Middlesex County region arrived between 12,000 and 10,000 years ago, coincident with the end of the last period of glaciation. Climate and environmental conditions were significantly different then they are today; local environs would not have been welcoming to anything but short-term settlement. Termed Paleoindians by archaeologists, Ontario's Indigenous peoples would have crossed the landscape in small groups (i.e., bands or family units) searching for food, particularly migratory game species. In this area, caribou may have provided the staple of the Paleo period diet, supplemented by wild plants, small game, birds and fish.

Given the low density of populations on the landscape at this time and their mobile nature, Paleo period sites are small and ephemeral. They are sometimes identified by the presence of fluted projectile points manufactured on a highly distinctive whitish-grey chert named "Fossil Hill" (after the formation) or "Collingwood." This material was acquired from sources near the edge of the escarpment on Blue Mountain. Sites or find spots are frequently located adjacent to the strandlines of large glacial lakes. This settlement pattern has been attributed to the strategic placement of camps in high, dry areas and at logistical points for the interception of migrating caribou herds.

2.3.1.2 Archaic Period

Settlement and subsistence patterns changed significantly during the Archaic period as both the landscape and ecosystem adjusted to the retreat of the glaciers. Building on earlier patterns, early Archaic period populations continued the mobile lifestyle of their predecessors. Through time and with the development of more resource rich local environments, these groups gradually reduced the size of the territories they exploited on a regular basis. A seasonal pattern of warm season riverine or lakeshore settlements and interior cold weather occupations has been documented in the archaeological record.

Since the large cold weather mammal species that formed the basis of the Paleo period subsistence pattern became extinct or moved northward with the onset of warmer climate conditions, Archaic period populations had a more varied diet, exploiting a range of plant, bird, mammal and fish species. Reliance on specific food resources like fish, deer and nuts becomes more pronounced through time and the presence of more hospitable environments and resource abundance led to the expansion of band and family sizes. In the archaeological record, this is evident in the presence of larger sites and aggregation camps, where several families or bands would come together in times of plenty. The change to more preferable environmental circumstances led to a rise in population density. As a result, Archaic sites are more plentiful than those from the earlier period. Artifacts typical of these occupations include a variety of stemmed and notched projectile points, chipped stone scrapers, ground stone tools (e.g., celts, adzes) and ornaments (e.g., bannerstones, gorgets), bifaces or tool blanks, animal bone (where and when preserved) and waste flakes, a by-product of the tool making process.

2.3.1.3 Early, Middle and Transitional Woodland Periods

Significant changes in cultural and environmental patterns are witnessed in the Woodland period (c. 950 BCE-900 CE). By this time, the coniferous forests of earlier times were replaced by stands of mixed and deciduous species. Occupations became increasingly more substantial in this period, culminating in major semi-permanent villages by 1,000 years ago. Archaeologically, the most significant changes by Woodland times are the appearance of artifacts manufactured from modeled clay and the construction of house structures. The

Woodland period is often defined by the occurrence of pottery, storage facilities and residential areas similar to those that define the incipient agricultural or Neolithic period in Europe.

Early and Middle Woodland period peoples are also known for a well-developed burial complex and ground stone tool industry. Unique Early Woodland period ground stone items include pop-eyed birdstones and gorgets. In addition, there is evidence of the development of widespread trading with groups throughout the northeast. The recovery of marine shells from the Lake Superior area indicates that exchanges of exotic materials and finished items from distant places were commonplace.

2.3.1.4 Late Woodland Period

During the Late Woodland Period, much of Southwestern Ontario was occupied by two groups: Iroquoians and what are thought by archaeologists to be Algonquin speaking populations (the term "Western Basin Tradition" has been used to describe this cultural complex). Beginning circa A.D. 1000, the archaeological record in Southern Ontario documents the emergence of more substantial, semi-permanent settlements and the adoption of corn horticulture. These developments are most often associated with Iroquoian-speaking populations, the ancestors of the Huron (Wendat) and Petun (Tionontati), the Attawandaron (Neutral) nations, who were known to have resided in the province upon the arrival of the first European explorers and missionaries. Iroquoian villages incorporated a number of longhouses, multi-family dwellings that contained several families related through the female line. Pre-contact Iroquoian sites may be identified by a predominance of well-made pottery decorated with various simple and geometric motifs, triangular projectile points, clay pipes, and ground stone artifacts. Sites post-dating European contact are recognized through the appearance of various items of European manufacture. The latter include materials acquired by trade (e.g., glass beads, copper/brass kettles, iron axes, knives, other metal implements) in addition to the personal items of European visitors and Jesuit missionaries (e.g., finger rings, stoneware, rosaries, glassware).

Archaeologists have also documented the *in-situ* development of Late Woodland archaeological traditions from Middle Woodland precedents that are believed to have an Algonquin cultural origin, quite distinct from Iroquoian populations who lived to the east. The archaeological record of these groups has been labeled the "Western Basin Tradition." During the Late Woodland period complex settlements are characteristic of these people and, at their peak, are characterized by fortified villages containing large, likely extended family, structures. Some of the villages are surrounded by earthworks. There is evidence for the cultivation of corn and beans by roughly A.D. 900. The pottery traditions of these people varied significantly from those of their Iroquoian neighbors. Early vessels, called Wayne ware, are small, thin-walled pots covered with vertical cord marking and tool impressions. Vessels become more elaborate through time, incorporating multiple bands of tool impressions, castellated rims and incised decoration. Late pottery is characteristically bag-shaped and often incorporates dentate stamping as well as appliqué strips and strap handles, similar to some Mississippian tradition pottery. As was not the case with much Iroquoian pottery, clay fabrics were mixed with shell temper.

2.3.2 Treaty History

The subject property is encompassed by the Huron Tract Purchase (Treaty No. 29). Indigenous peoples have used the lands that are now known as Middlesex County for thousands of years. Prior to the displacement caused by early European settlement, this area was actively used for hunting and camping by a number of Anishinaabe peoples. The area which became Lucan Biddulph Township was part of the Huron Tract, approximately 2.76 million acres of land subject to Provisional Treaty No. 27 ½ between the local Chippewa

nations and the British Crown signed on April 26, 1825 (Surtees 1984). An earlier 1819 agreement was never realized and for six years the territory remained in limbo. The provisional treaty was finally reached as a result of John Galt's intention to form the Canada Company, which required one million acres of land to sell to prospective settlers (Surtees 1894).

The Chippewa nations transferred most of the Huron Tract to the Crown but maintained their territories in four reserve lands along the St. Clair River and on the shores of Lake Huron near Kettle Point and the Ausable River (River aux Sable). These reserves would become the Aamjiwnaang First Nation and the Chippewas of Kettle and Stony Point First Nation. The agreement was formalized in 1827 through Treaty No. 29 (Canadian Legal Information Institute 2000; Duern 2017).

2.3.3 Nineteenth-Century and Municipal Settlement

Historically the subject property falls within part of Lot 25, Concession 4, in the Geographic Township of Biddulph (now Lucan Biddulph), Middlesex County, Ontario. A brief discussion of 19th-century settlement and land use in the township is provided below in an effort to identify features signaling archaeological potential.

Biddulph Township was originally part of the Huron Tract, a vast parcel extending from Waterloo County to Lake Huron, whose colonization fell in the hands of the Canada Company. The township earned its name from Robert Biddulph, a member of the Canada Company's Provisional committee that was formed in 1824 (Lee 2004:228). One of the first roads opened up in the tract, the London to Goderich Road (Highway 4), attracted much of the earliest settlement in the township. Its survey was initiated in 1829 by the Canada Company, who also instructed that lots along the road be laid out for settlers. By 1832 the survey was completed (Lewis 1964:15, 56).

At the time of the commencement of the survey, a group of some 460 freed and fugitive enslaved people from Cincinnati sought refuge in Biddulph Township and formed what would come to be known as the Wilberforce Settlement, which is discussed in more detail below. Both freed and fugitive enslaved people helped build the London to Goderich Road and for their services, received lots between the Ausable River and Elginfield (Township of Biddulph 1998:125).

By 1840 the Wilberforce Settlement had dwindled but the population of the township grew with the addition of new immigrants, mostly of Irish descent. Among these were the Hodgins and Courcey (also spelled Coursey) families (H.R. Page 1878:12). English and Scottish settlers also helped populate the township (Lewis 1964:21). By 1859, and with the arrival of the Grand Trunk Railway, the community of Lucan was formally established around this initial settlement. By 1860, it had two steam grist mills, a flour mill, a saw mill and a foundry that manufactured farm machinery (Township of Biddulph 1998:125). According to census records, by 1871 the township had a population of 4,198 people (Brock 1972:210) but by a decade later, this was to diminish by nearly 500 (Township of Biddulph 1998:135). Just less than one third of the township population lived in Lucan (Township of Biddulph 1998:135).

2.3.3.1 The Wilberforce Settlement

Significant to the history of Lucan's development is the Wilberforce settlement. The Wilberforce settlement lies just over 1 km southwest of the subject property. In October 1829, a group of six free African American families established the Wilberforce Settlement on the Ausable River. Their emigration to the area was a reaction to the anti-Black mob violence they had experienced in Cincinnati, Ohio. In moving to Ontario, the families sought self-determination and lives free of oppression. The group's leader was James C. Brown, a

former enslaved man and successful mason in Cincinnati (Baily 1973; Taylor 2002).

Before the families moved north, Brown chose two men, Israel Lewis and Thomas Cresap, to travel to York (Toronto) and meet with Lieutenant-Governor Sir John Colborne. At this meeting, Colborne welcomed Lewis and Cresap, and told them: "Tell the Republicans on your side of the line that we Royalists do not know men by their colour. Should you come to us you will be entitled to all the privileges of the rest of His Majesty's subjects" (Drew 1856:244-245; Wilson 1872:365). With their legal status assured by the lieutenant-governor, the settlement's agents signed a contract for 1,619 hectares in Biddulph Township, just north of London. The British government had acquired the land through the Huron Tract Purchase, Treaty 29 with Anishinaabe peoples, but then had sold it to the privately-owned Canada Company (Chippewas of the Thames First Nation 2016; Ontario 2020; also see Lee 2004).

An initial problem faced by the Cincinnati emigrants was not racism but a lack of funds. Acknowledging their financial deficit, the group petitioned the Ohio legislature for a grant, hoping that the state's politicians would support the departure of so many African Americans from Cincinnati. The legislators refused to help, so Quaker Meetings in Ohio and Indiana stepped in and purchased 324 hectares for the group's settlement. The tract was about one-third the size the agents had originally sought (Pease and Pease 1963:47–48).

The Wilberforce settlement was a collection of widely spaced homesteads rather than a nucleated town. One or two lots were occupied in what would become Lucan, but most of the settlers were located along today's Highway 4, with the greatest concentration near the conjunction of the highway and the Ausable River, just north and west of the current subject property. The settlers had built a sawmill in this area, and the Butler Family Cemetery is nearby. At its largest, the Wilberforce community probably numbered no more than 200 people.

When a traveler visited the community not long after its creation, he found thirty-two families living in "tolerably comfortable houses" of logs, "some of them hewed." A few dwellings had shingled roofs. A tailor, a shoemaker, and a blacksmith all lived in the settlement, and a grist mill was under construction (Lundy 1832:154). The year before, another visitor was less sanguine, stating that the settlers' houses were "wretched, badly built and very small" (Priddis 1917:21).

The colony's success attracted the attention of abolitionists, like Benjamin Lundy and John Brown, who argued that the Wilberforce settlement demonstrated that Black adults and children could succeed if they were left alone. Many of the original settlers, including James C. Brown, found life in the area difficult, and so most of them left the settlement during its first decade, either going to other Black communities in southwestern Ontario or to the United States.

A list of heads of households for the township compiled in 1842 provides limited albeit helpful information about the pattern of land usage in Biddulph Township. The plots listed range in size from three hectares to 48.5 hectares. Most landowners (79.5%) held 40 hectares. The next largest percentage of landholders (9.0%) held 20 hectares (Biddulph 2019).

Among the list are 11 Wilberforce residents whose names appear in newspaper accounts published in 1833, 1836, and 1839. Among the recognizable residents, seven held 20 hectares and one each held 14, 10, and 6 hectares. The smallest plot was only three hectares. This information implies that Black families owned the smallest plots in the area. They included 53 individuals, totaling less than 14% of the population listed (Biddulph 2019). Plot maps for 1862 and 1877 show the names of only four recognizable Wilberforce individuals: William Bell, Joseph Taylor, Daniel Turner, and Peter Butler. Their names also appear on the 1842 list. The 1851

Census for Biddulph Township (1851) indicates that seven families remained as of that date. The listed heads of household are Saul Peters, William Bell, Daniel Turner, Philip Harris, Joseph Taylor, Adam Harris, Peter Butler, and Ephriam Taylor. These families accounted for 36 individuals.

Irish immigrants began to settle in the region in the 1840s, establishing two towns on either side of Wilberforce: "Ireland" (now Clandeboye, but originally known as "Flanagan's Corners") to the west, and Lucan (originally Marystown but renamed in honor of an Irish landlord) to the southwest (Goodspeed and Goodspeed 1889:458; Lewis 1967:17). These Irish families, many refugees from the Great Famine in Ireland, purchased land from original Wilberforce settlers and even occupied many of their houses. Irish immigrants eventually completely replaced the Black residents, leaving only a few still in place in the last half of the 19th century.

2.3.4 Review of Historic Maps

The subject property falls within part of Lot 25, Concession 4, in the Geographic Township of Biddulph, Middlesex County, Ontario. The 1862 Tremaine map for Middlesex County does not depict any structures within the subject property (Map 6); however, it does list a J. Hodgins as occupant. Fallon Drive is depicted as open at this time. The Little Ausable River is depicted on the 1862 map, as is what is now the Heenan Drain and Benn and Whitfield Drains; these roughly correspond to their present-day course. The Heenan Drain lies just north of the subject property. The 1878 Historic Atlas Map of Middlesex County depicts a Jno. Hodgins on Lot 25 (Map 7). A structure and orchard are depicted on the 1878 map fronting on Saintsbury line; they are just over 600 m east of the existing WWTP property. Fallon Drive is still depicted as open. The 1878 map does not depict the Heenan Drain, but instead only the larger watercourses: Little Ausable River; and the Benn Drain.

2.3.5 Review of Heritage Properties

There are no listed or designated heritage properties withing the vicinity of the subject property.

2.4 Analysis and Conclusions

As noted in Section 2.1, the Province of Ontario has identified numerous factors that signal the potential of a property to contain archaeological resources. Based on the archaeological and historical context reviewed above, the subject property is in proximity (i.e., within 300 m) to features that signal archaeological potential, namely:

- mapped 19th-century thoroughfares (Fallon Drive); and
- a water source (Heenan Drain).

2.5 Recommendations

Given that the subject property demonstrated potential for the discovery of archaeological resources, a Stage 2 archaeological assessment was recommended. In keeping with provincial standards, the areas within the subject property that consist of grassed areas are recommended for assessment by a test pit survey at a 5 m transect interval to achieve the provincial standard. As the subject property is considered to have archaeological potential pending Stage 2 field inspection, a separate map detailing zones of archaeological potential is not provided herein (MTC 2011; Section 7.7.4, Standard 1 and Section 7.7.6, Standards 1 and 2).

3 STAGE 2 ARCHAEOLOGICAL ASSESSMENT

3.1 Field Methods

All fieldwork was undertaken in good weather and lighting conditions. No conditions were encountered that would hinder the identification or recovery of artifacts. The property boundaries were determined in the field based on proponent mapping, landscape features, fencing, and GPS co-ordinates.

The subject property is comprised of non-ploughable lands (manicured grass) and contains the existing Lucan WWTP and paved access road. As such, the subject property was subject to a standard test pit assessment, employing a 5 m transect interval (43.8%; 0.88 ha; Images 1 and 2). Test pits measuring at least 30 cm (shovel-width) were excavated through the first 5 cm of subsoil with all fill screened through 6 mm hardware cloth. Once screening was finished, the stratigraphy in the test pits was examined and then the pits were backfilled as best as possible, tamped down by foot and shovel and re-capped with sod. Test pitting extended up to 1 m from all standing features, including trees and built infrastructure, when present. It was anticipated that when cultural material was found, the test pit survey would be intensified (reduced to 2.5 m) to determine the size of the site. If not enough archaeological materials were recovered from the intensification test pits, a 1 m^2 test unit would be excavated atop of one of the positive test pits to gather additional information.

Typical test pits contained roughly 25 to 30 cm of brown silty loam soil over orange-light brown silty clay subsoil (Image 3). The property had previously been subject to grading and landscaping when the existing treatment plant was constructed in the 1990s (Map 8) and disturbed test pits were noted adjacent the landscaped areas throughout the property. Despite the identification of disturbed test pits this did not affect our survey interval. Typical disturbed test pits contained roughly 40 to 50 cm of brown clay mottled with grey clay and orange-light brown silty clay subsoil with rock and gravel intrusions (Image 4).

As per Section 2.1, Standard 2 of the *Standards and Guidelines* (MTC 2011:28-29), certain physical features and deep land alterations are considered as having low archaeological potential and are thus exempt from the standard test pit survey. Approximately 29.9% (0.60 ha) of the subject property was disturbed, consisting of existing structures, aerations tanks, storage tanks, paved parking areas and access road, and other built infrastructure, including an Enbridge station fronting on Fallon Drive (Images 5-7 and 10). As mentioned above, the property witnessed extensive grading and landscaping when the existing plant was built and this resulted in the creation of artificial steep slope throughout the subject property (26.3%; 0.53 ha; Map 8; Images 1 and 8-10). Image 1 provides a good overview showing the slope and how the existing plant is raised compared to the surrounding landscape.

Map 9 illustrates the Stage 2 field conditions and assessment methods; the location and orientation of all photographs appearing in this report are also shown on this map. Map 10 presents the Stage 2 results on the proponent mapping. An unaltered proponent map is provided as Map 11.

3.2 Record of Finds

No archaeological materials or sites were identified during the Stage 2 archaeological assessment of the subject property. Table 3 provides an inventory of the documentary records generated during this project.

All files are currently being stored at the TMHC corporate office located at 1108 Dundas Street, Unit 105, London, ON, N5W 3A7.

Table 3: Documentary Records

Date	Field Notes	Field Maps	Digital Images
May 13, 2022	Digital and hard copies	Digital and hard copies	38 Images

3.3 Analysis and Conclusions

A Stage 2 field assessment was carried out in keeping with the MHSTCI's *Standards and Guidelines* (MTC 2011). The test pit survey did not result in the documentation of archaeological resources. As such, the subject property should be considered free of archaeological concern.

3.4 Recommendations

All work met provincial standards and no archaeological material was documented during the assessment. As such, the subject property should be considered free of archaeological concern and no further archaeological assessment is recommended.

Our recommendations are subject to the conditions laid out in Section 5.0 of this report and to the MHSTCI's review and acceptance of this report into the provincial registry.

4 SUMMARY

A Stage 1 and 2 archaeological assessment was conducted as part of a Municipal Class Environmental Assessment (MCEA) for the proposed expansion to the Lucan Wastewater Treatment Plant (WWTP), located in the Geographic Township of Lucan Biddulph, Ontario. The subject property is roughly 2.01 hectares (5.0 acres) in size and is located within part of Lot 25, Concession 4, in the former Geographic Township of Biddulph, Middlesex County, Ontario. The Stage 1 assessment revealed that the subject property had potential for the discovery of archaeological resources and a Stage 2 survey was recommended and carried out. The Stage 2 assessment (test pit assessment at a 5 m interval) did not result in the documentation of archaeological resources. As such, the subject property should be considered free of archaeological concern and no further archaeological assessment is recommended.

5 ADVICE ON COMPLIANCE WITH LEGISLATION

This report is submitted to the MHSTCI as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the MHSTCI, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

It is an offence under Sections 48 and 69 of the Ontario Heritage Act for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the Ontario Heritage Act.

Should previously undocumented (i.e., unknown or deeply buried) archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48(1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48(1) of the *Ontario Heritage Act.*

The *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 requires that any person discovering human remains must notify the police or coroner and Crystal Forrest, A/Registrar of Burial Sites, Ontario Ministry of Government and Consumer Services. Her telephone number is 416-212-7499 and e-mail address is Crystal.Forrest@ontario.ca.

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7 IMAGES

Image 1: 5 m Interval Test Pit Survey

Looking North

Image 2: 5 m Interval Test Pit Survey

Looking Northwest

Image 3: Typical Test Pit

Image 4: Typical Disturbed Test Pit

Image 5: Enbridge Infrastructure Fronting on Fallon Drive

Looking North

Image 6: Administration Building & Paved Area

Looking North

Image 7: Filter Building, Clarifiers & Paved Area

Looking Northeast

Image 8: Typical Landscaped/Graded Area

Looking South

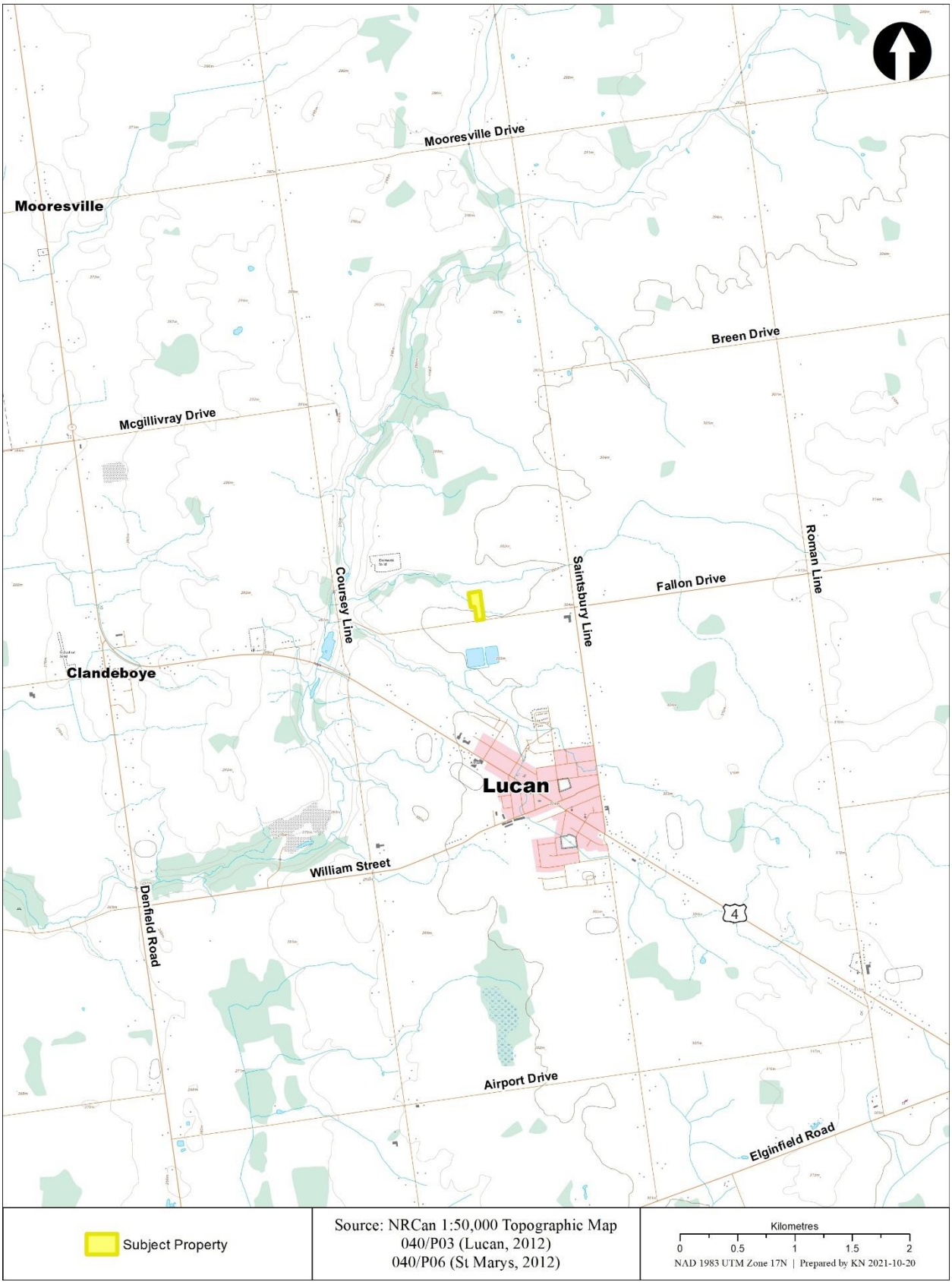
Image 9: Typical Landscaped/Graded Area

Looking West

Image 10: Drain Disturbance & Graded Area

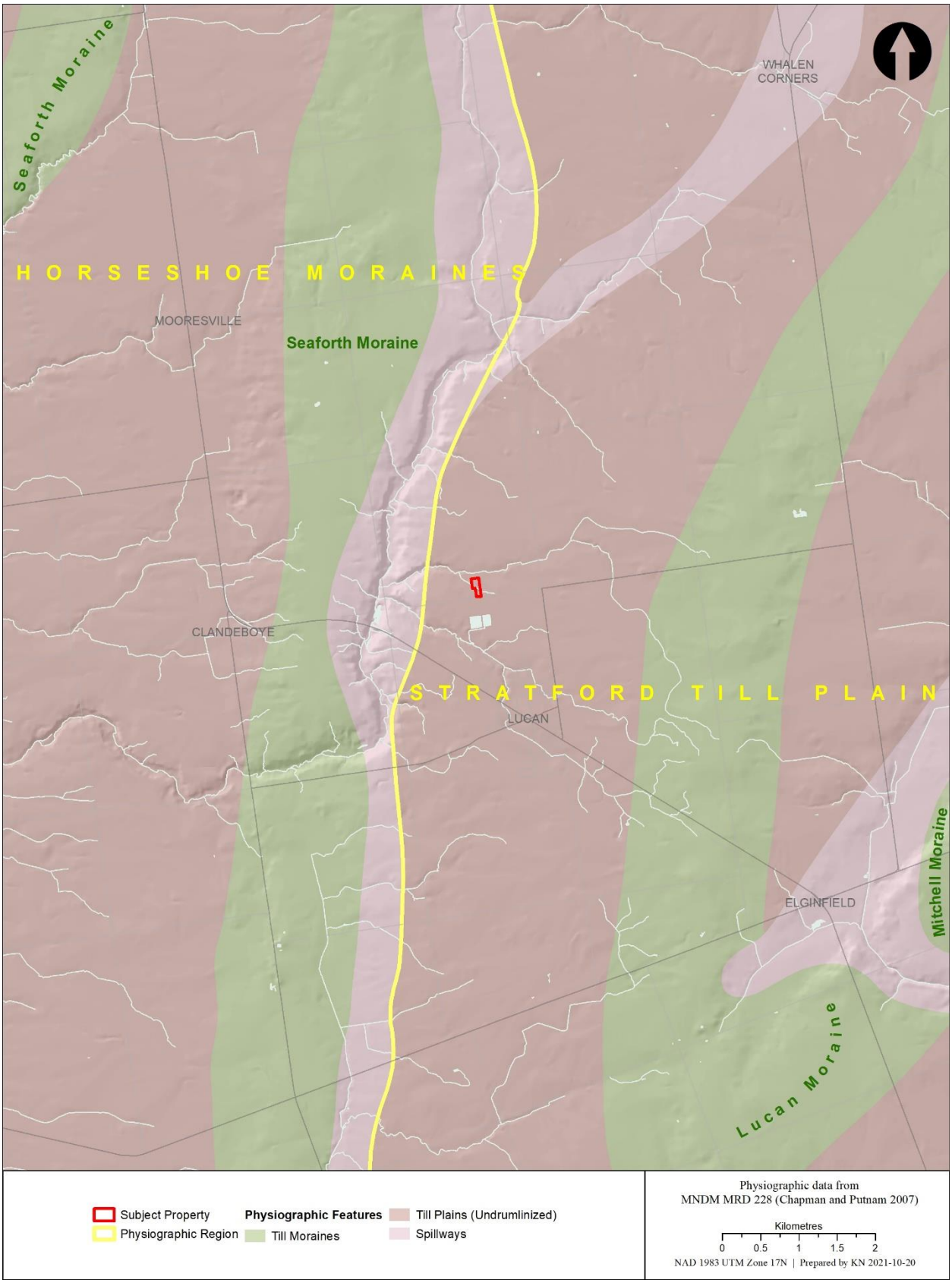
Looking East

8 MAPS

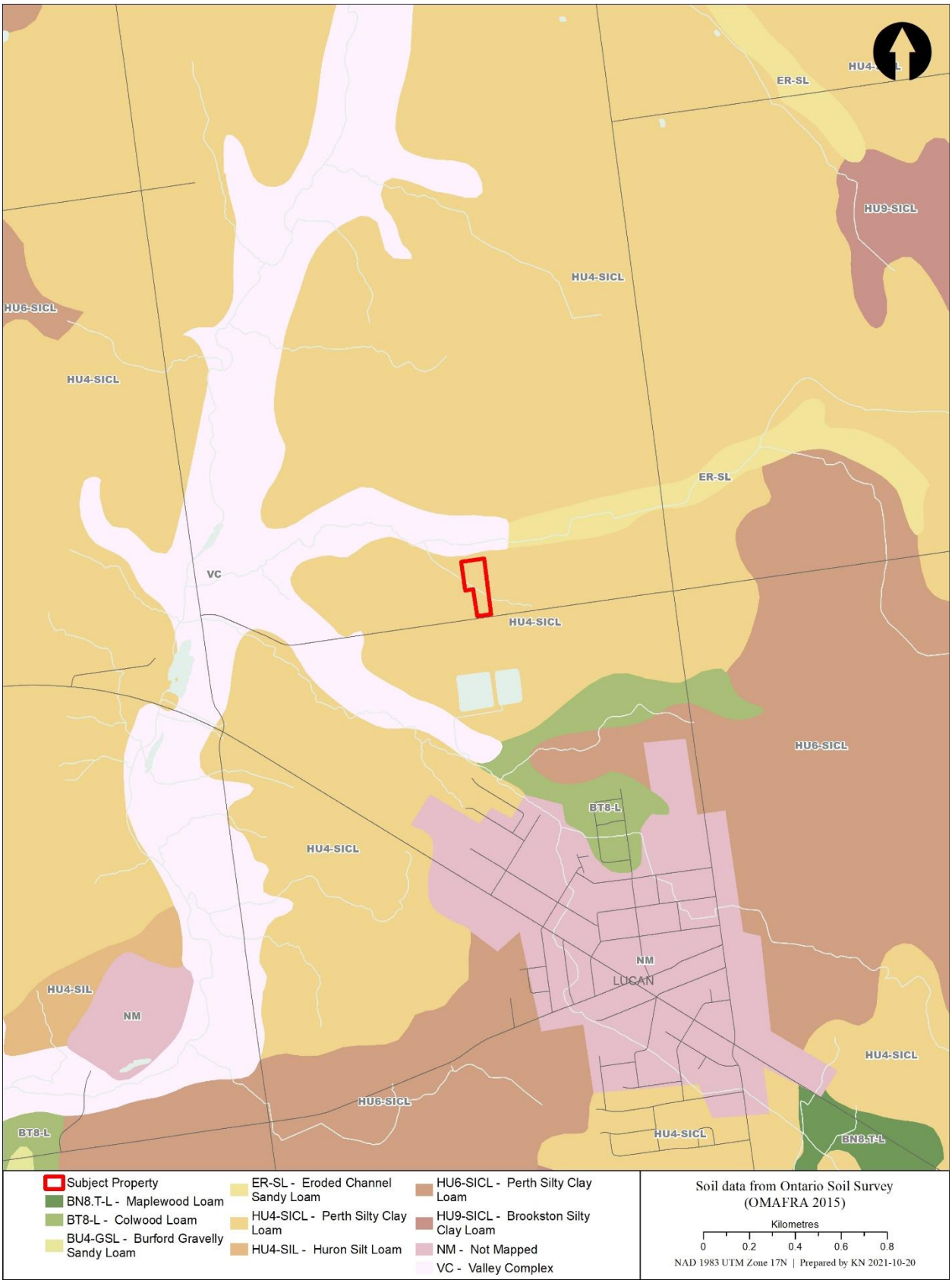


Map 1: Location of the Subject Property in the Township of Lucan Biddulph, ON

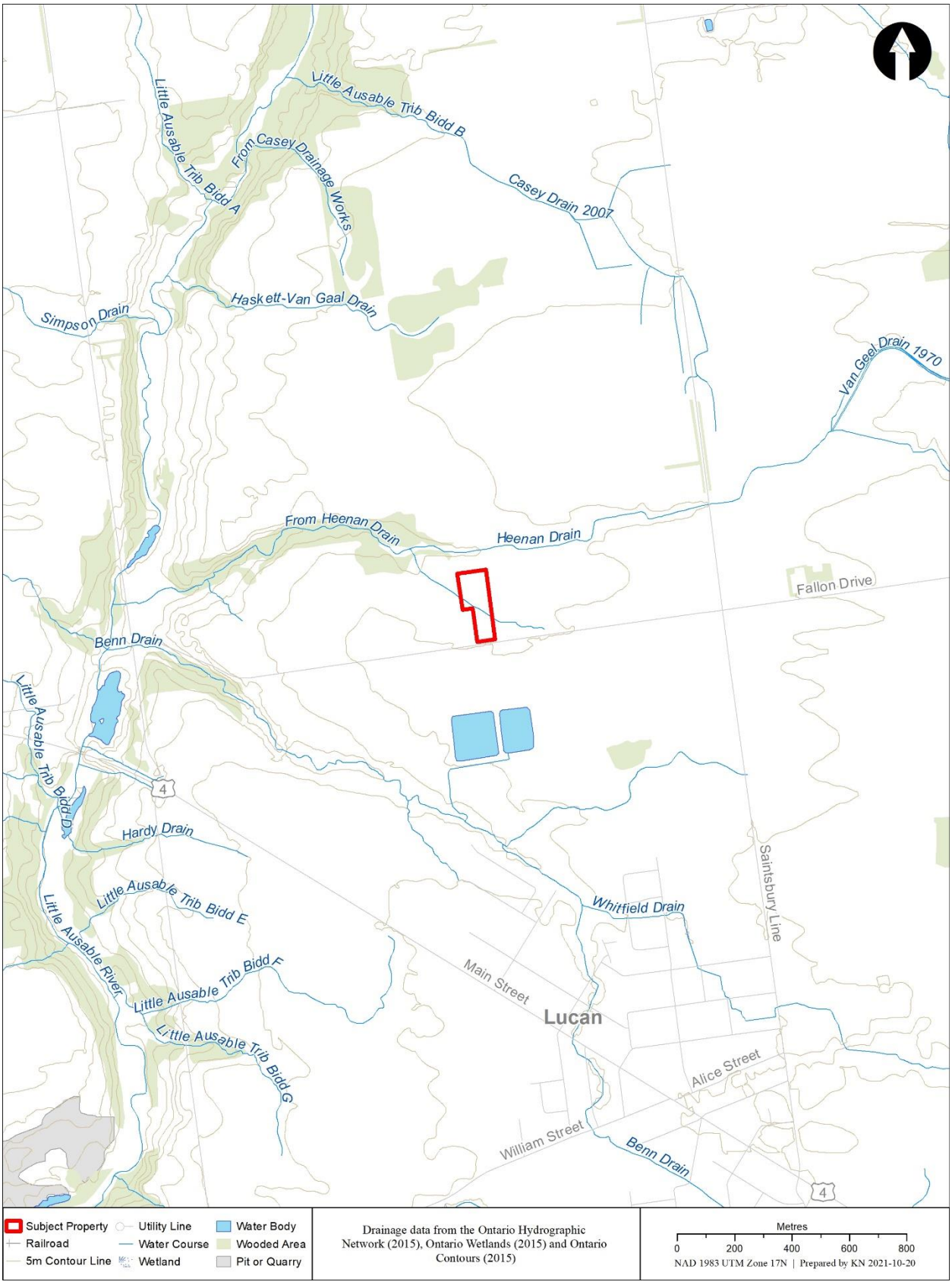
Map 2: Aerial Photograph Showing the Location of the Subject Property



Map 3: Physiography Within the Vicinity of the Subject Property



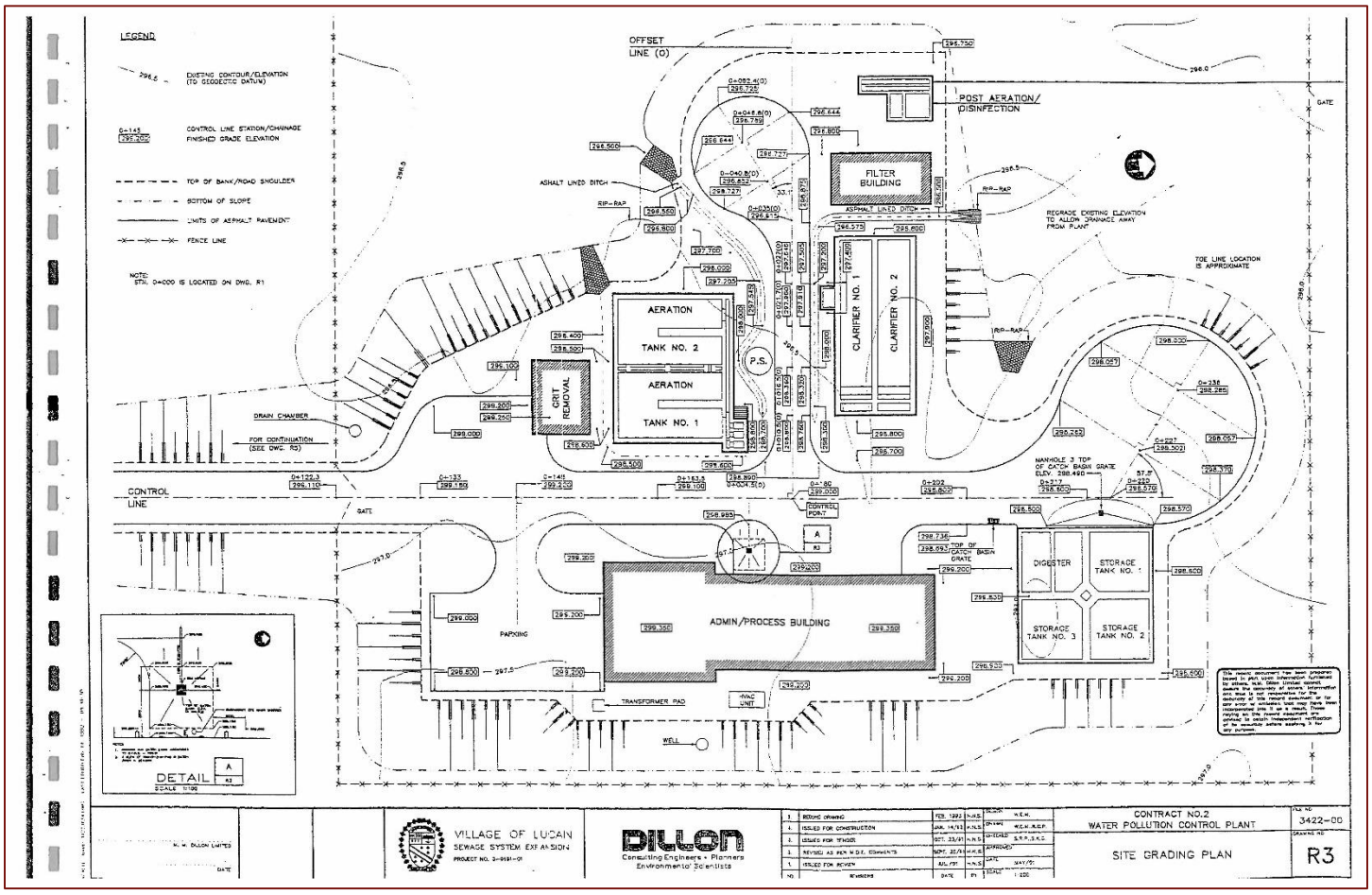
Map 4: Soils Within the Vicinity of the Subject Property



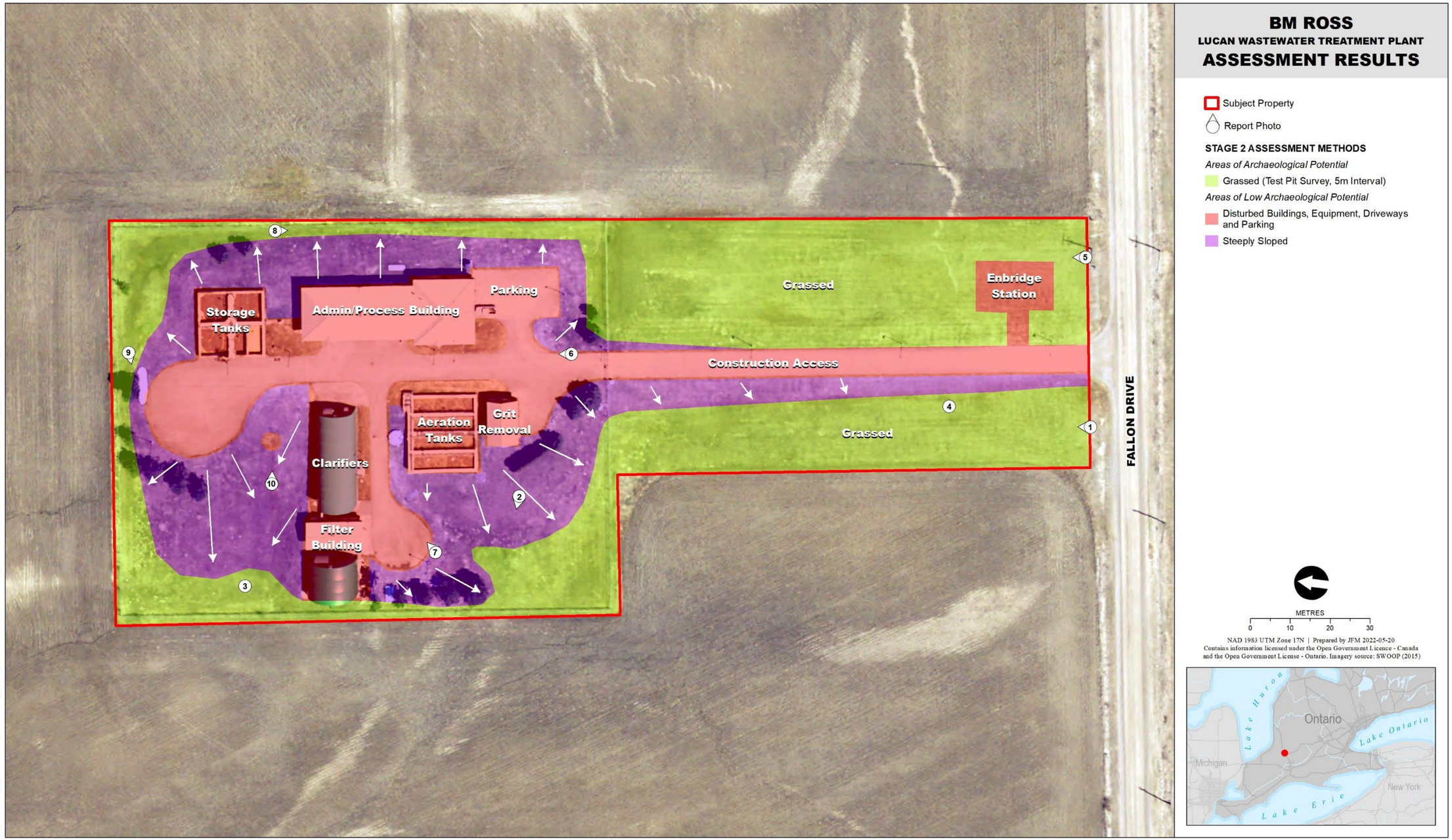
Map 5: Drainage Within the Vicinity of the Subject Property

Map 6: Location of the Subject Property Shown on the 1862 Tremaine Map

Map 7: Location of the Subject Property on an 1878 Map of Middlesex County



Map 8: Site Grading Plan – Existing Conditions



BM ROSS
LUCAN WASTEWATER TREATMENT PLANT
ASSESSMENT RESULTS

Subject Property
Report Photo

STAGE 2 ASSESSMENT METHODS

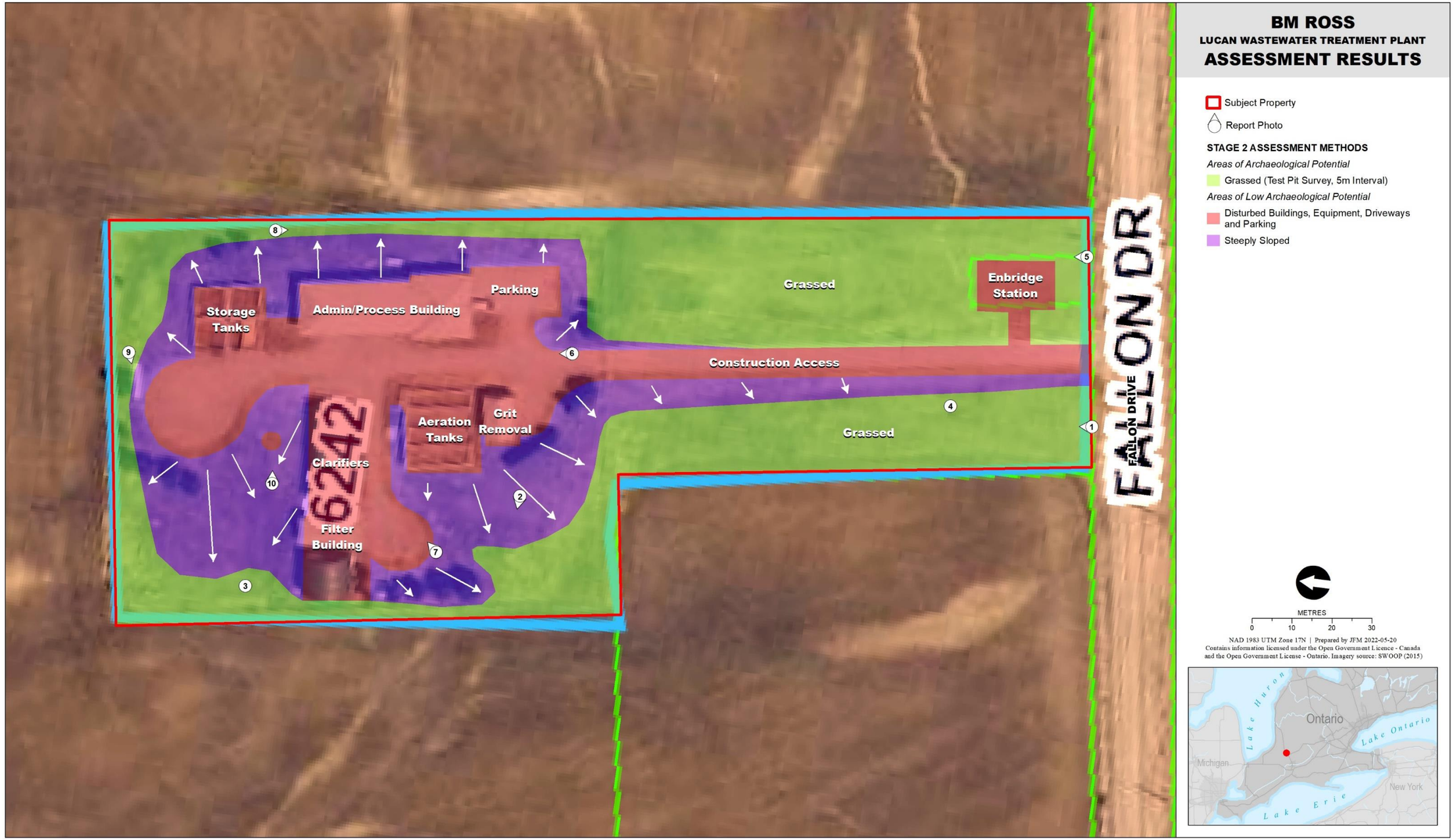
Areas of Archaeological Potential
Grassed (Test Pit Survey, 5m Interval)

Areas of Low Archaeological Potential
Disturbed Buildings, Equipment, Driveways and Parking
Steeply Sloped

METRES
0 10 20 30

NAD 1983 UTM Zone 17N | Prepared by JFM 2022-05-20
Contains information licensed under the Open Government Licence - Canada and the Open Government License - Ontario. Imagery source: SWOOP (2015)

Map 9: Stage 2 Field Conditions and Assessment Methods



Map 10: Stage 2 Field Conditions and Assessment Methods Shown on Proponent Mapping

Map 11: Proponent Mapping

Appendix B – Heenan Drain Study

Water Quality and Aquatic Community Monitoring in Heenan Drain: Summary of 2019 Results

Report to: Kelly Vader, BM Ross
Jeff Little, Lucan Biddulph

Prepared by: Shevaun Verhoog
Contributors: Kari Jean and Mari Veliz
Ausable Bayfield Conservation Authority

Revised July 7, 2020

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Introduction

In light of the recent residential development in Lucan, expansion of the Lucan Wastewater Treatment Plant (WWTP) is expected. In an attempt to evaluate the potential expansion of the WWTP on water quality in the receiving waters, there are some ecological considerations. A Before, After, Control, Impact (BACI) study of water quality and biological indicators was recommended. The monitoring and assessment of water quality, fisheries communities and benthic invertebrate communities before and after the WWTP expansion (and upstream and downstream of the outfall of the WWTP) will help to determine impacts to the health of the aquatic community overtime.

The collection of data will provide stream health information (i.e., impacts on water quality and aquatic life) that could arise as a result of the expanded WWTP (*e.g.,* elevated sediment or nutrient concentrations) in Heenan Drain. Ongoing data collection will help to assess changes to the Heenan Drain system. Throughout 2019, water quality sampling was conducted monthly at two sites, upstream and downstream of the outfall, to provide information before the expansion. Fisheries and benthic invertebrate sampling were conducted at three sites in 2019 to provide knowledge of aquatic conditions in advance of expansion (Figure 1).

Report Objective

The intent of the 2019 work was to collect water quality and aquatic community data previous to the expansion of Lucan's Wastewater Treatment Plant taking place. This preliminary report will include an assessment of water quality and benthic and fisheries community data from 2019 at three locations along Heenan Drain.

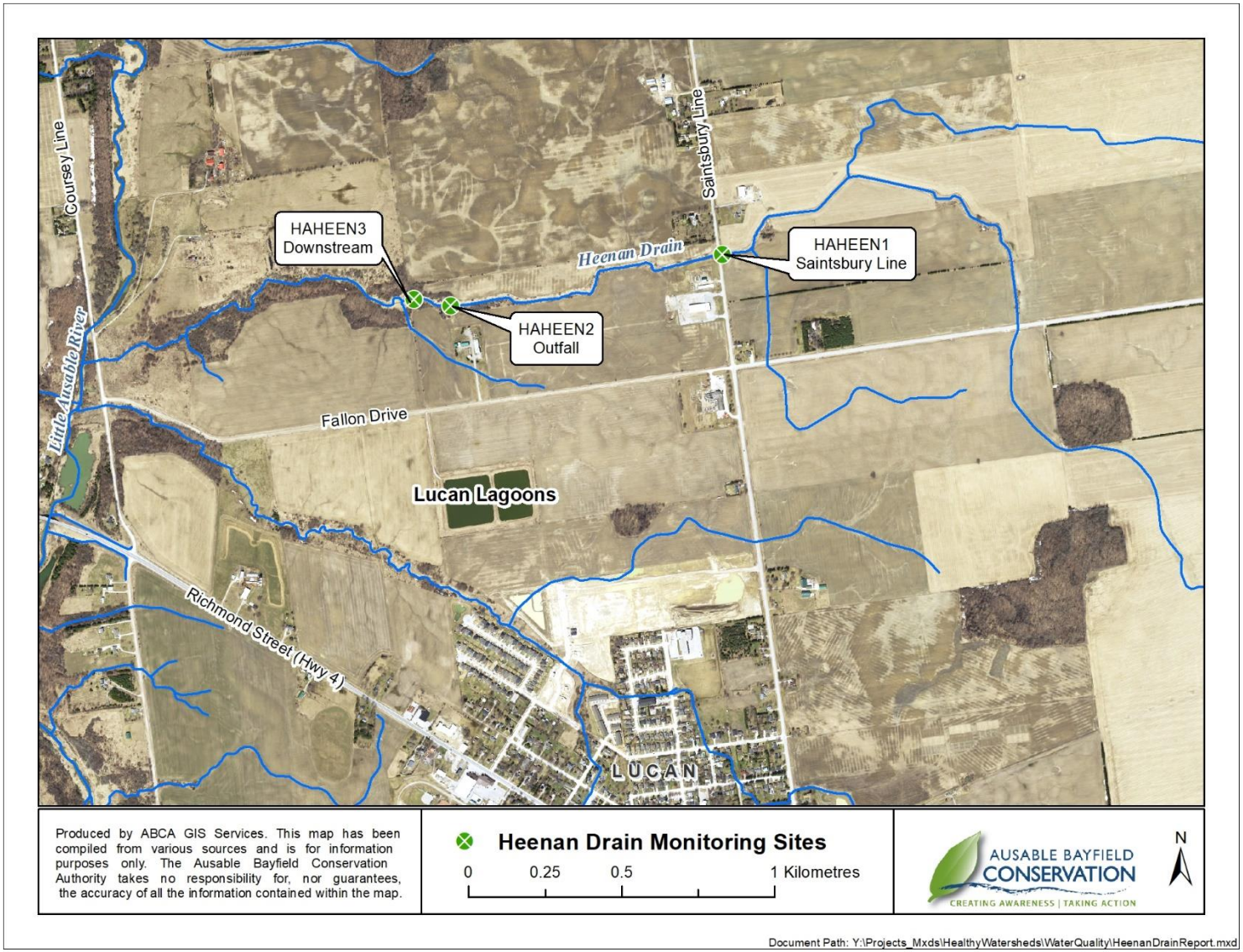

Figure 1: Monitoring locations on the Heenan Drain in the vicinity of the Lucan Wastewater Treatment Plant.

Methods

Fish species and benthic invertebrate community data were collected at three site locations on the Heenan Drain in 2019 . Water quality was collected from two of these three sample sites (Figure 1, Table 1). The sampling methodology described in this report will be repeated in all years of sampling. Data will be collected at the same locations and with the same methods to compare monitoring results of the aquatic community over time.

Site 1 was chosen to act as a control site, and represents an area upstream of the wastewater treatment plant outfall to access the area not directly influenced. Site 2 was chosen within the zone of the wastewater treatment plant outfall influence. Site 3 was chosen downstream of the wastewater facility outfall to determine downstream impacts (Figure 1, Table 1).

Table 1: Site locations and a summary of data types collected at the Heenan Drain in the vicinity of the Lucan Wastewater Treatment Plant

Site	Location Details	Type of Sampling Conducted
Site 1 HAHEEN1	Upstream of outfall: upstream of Saintsbury Line	Surface water quality, water levels, water flow, bio monitoring (fish, benthic invertebrates, fresh water mussels)
Site 2 HAHEEN2	Directly downstream of the outfall: within vicinity of the Lucan Wastewater Treatment Plant	Bio monitoring (fish, benthic invertebrates, fresh water mussels)
Site 3 HAHEEN3	Downstream of the outfall	Surface water quality, water levels, water flow, bio monitoring (fish, benthic invertebrates, fresh water mussels)

Water Quality

Water quality samples were taken monthly from two of the three monitoring site locations, Site 1 and Site 3 (Figure 1, Table 1). Additionally, level loggers were installed and flow rates (m/s) were collected using a flow meter at both sites to provide a better understanding of potential impacts on the Heenan Drain. Physical water conditions were taken with a field YSI Water Quality Meter. Water samples were obtained via a surface grab sample and then shipped to an accredited lab for analysis.

For the purposes of this project, the following indicators were included within the sample analysis: 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 Community

To determine the fish community in the Heenan Drain, three sites were selected near the wastewater treatment plant. Sampling of fish was conducted with a Halltech HT 2000 Battery Backpack Electrofisher. The electrofishing crew consisted of one netter and one electrofishing backpack unit operator. Fish were sampled from the three locations in the fall of 2019 (Figure 1). Electrofishing is a non-destructive sampling methodology that sends an electric current through the aquatic environment, momentarily paralyzing nearby fish. Seine nets placed at the upstream and downstream end of the sites reduced fish movement into or out of the sampling area. Three passes were made at each station. The shocker was active for approximately 400 seconds of shocking time per pass at each of the sites. Fish were processed after each pass. Throughout processing, (*i.e.,* identifying fishes to species and enumerating), fish were kept in the shade in a large container with continuous water flowing through.

Benthic Invertebrate Community

Benthic samples were collected in the fall at each of the three site locations using a D-Net (mesh size 250µm) and a three-minute kick method in which substrate on the stream bed is disturbed and kicked into the net. Benthic invertebrates are small animals, 200 to 500µm, that live in the stream sediments. These animals include insects, crustaceans, mollusks and worms. The variety and numbers of the animals can indicate the aquatic environmental quality. Areas were chosen within each of the sites to include riffle, run and pool habitats so that the samples would incorporate species that live in each of these environments. Benthic invertebrate's habitat features such as instream cover, water clarity, substrate, general channel morphology and riparian features were noted previous to the sampling. Benthic invertebrate samples were preserved in a 10% formaldehyde solution (formalin) and then transferred to a 70% alcohol solution (ethanol).

The benthic community samples were sent to a taxonomic expert for identification and sorting. The benthic samples were sub-sampled. At least 200 animals were identified to the lowest taxonomic level possible (*i.e.,* Family, Genus or species). Benthic communities were identified and a modified Hilsenhoff Family Biotic Index (BI) was used to tell us more about the aquatic habitat quality (Table 2)

Table 2: Modified Hilsenhoff Biotic Index with environmental quality letter grades from Mandaville.

Biotic Index	Water Quality	Degree of Organic Pollution	Letter Grade
0.00-4.50	Excellent – Very Good	No apparent to slight organic pollution	A
4.51-5.50	Good	Some organic pollution	B
5.51-6.50	Fair	Fairly significant organic pollution	C
6.51-7.50	Fairly Poor	Significant organic pollution	D
7.51-10.00	Poor - Very Poor	Very significant to severe organic pollution	F

Biotic indices generally work by assigning a "tolerance value" to individual species based on their ability to survive a variety of environmental stressors. Organisms are identified and assigned a tolerance value. A score from a given site is summarized from the abundance data and the tolerance values for each organism; the resultant score is compared to an index (Table 2). The overall score is thus used as an indicator of environmental quality (*e.g.,* poor to excellent) (Neary, *et al.* 2009).

Tolerance values were assigned to the invertebrates in each site's sub-sample and a BI value has calculated using the following formula:

$$BI = (\Sigma x_i t_i)/n$$

Where BI is the value of the index, which is the sum of the abundance (x_i) times the tolerance value (t_i) for all species observed then divided by the total abundance (n).

Fresh Water Mussel Investigation

The study area was investigated for freshwater mussels using a timed search methodology. This method is undertaken by a field crew searching for live mussels visually and by excavating small, undefined areas of the substrate for a determined sampling effort time period. Any live mussels found are identified to the species level and the length of the mussel shell is measured.

Results and Discussion

Water Quality

Water quality samples were collected from Site 1 and Site 3 monthly from July to November 2019. See Appendix 1 for all water quality data by site, and available indicator standards for evaluation. BOD*; E. coli*; total phosphorus; nitrate and un-ionized ammonia were examined at the two site locations from July to November 2019.

Wastewater from sewage treatment plants often contains organic materials that are decomposed by microorganisms, which use oxygen in the process. The amount of oxygen consumed by these organisms in breaking down the waste is known as the biochemical oxygen demand or BOD. BOD directly affects the amount of dissolved oxygen in rivers and streams. The greater the BOD, the more rapidly oxygen is depleted in the stream. This means less oxygen is available to higher forms of aquatic life. The consequences of high BOD are the same as those for low dissolved oxygen: aquatic organisms become stressed, suffocate, and die.

Biochemical oxygen demand concentrations were similar at both sites during the study period (Figure 2). It is difficult to assign a standard value for any measure of oxygen demand; however, 2 to 4 mg/L seems reasonable in an agricultural watershed (pers comm. Scott Abernethy, Ontario Ministry of the Environment)

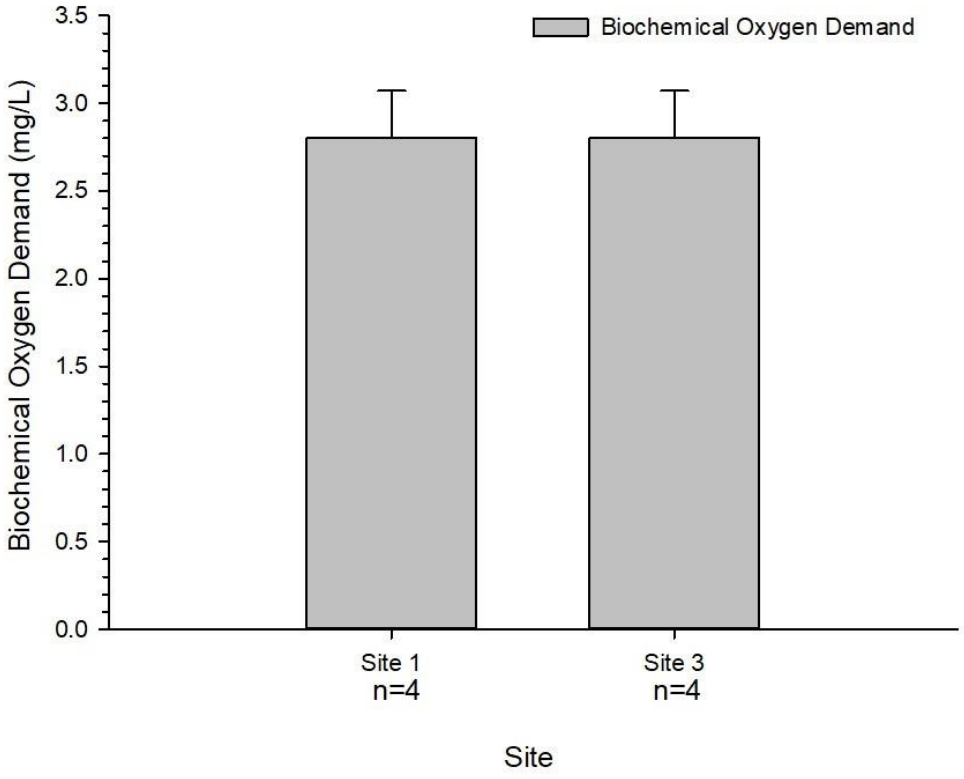

Figure 2: Average biochemical oxygen demand concentrations at two sites on the Heenan drain near the Lucan Wastewater Treatment Plant from July to November 2019. n= number of samples

Escherichia coli (*E. coli*), is among the more harmful bacteria to human health, and is found in animal and human waste. The Ontario Guideline for recreation standards *for E. coli* is less than or equal to 200 colony forming units (cfu)/100mL. These standard concentrations were exceeded at both sample sites during this study period (Figure 3). Typically, where concentrations exceed 500cfu/100mL there is an immediate source of fecal contamination.

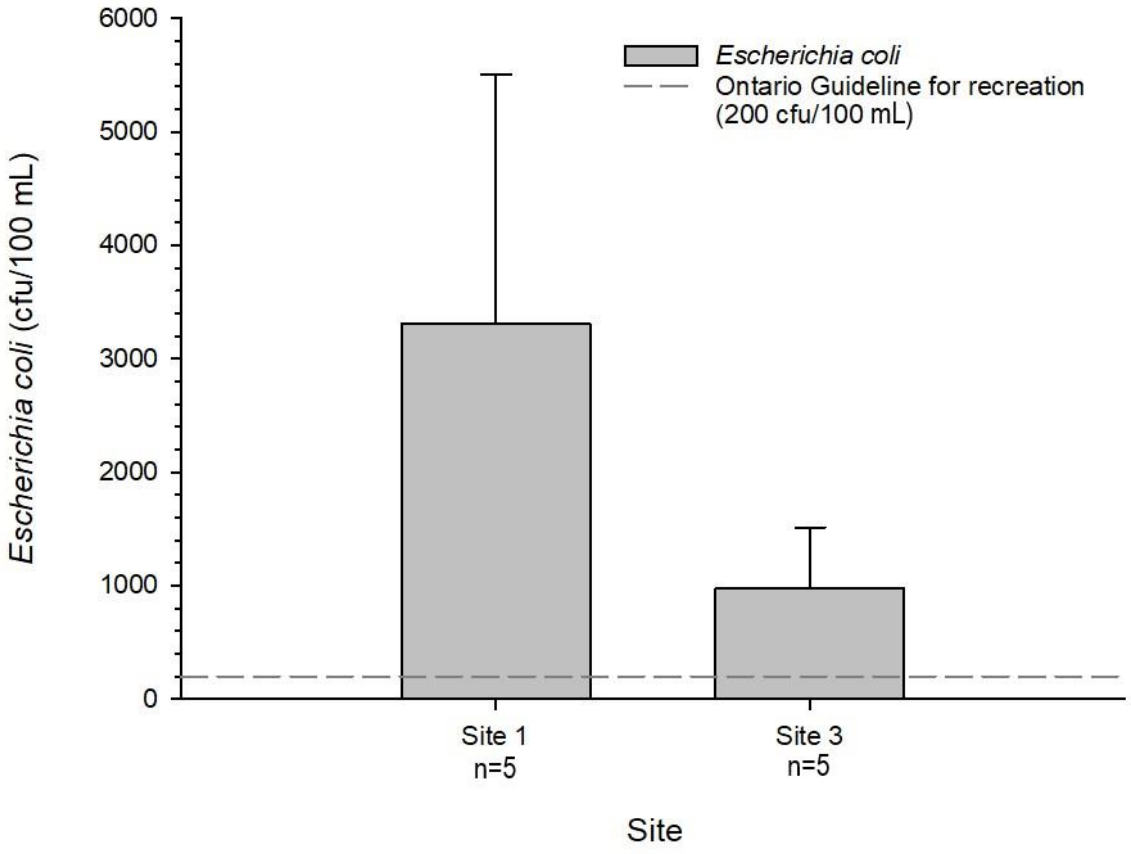

Figure 3: Average *Escherichia coli* concentrations at two sites on the Heenan Drain near the Lucan Wastewater Treatment Plant from July to November 2019. n= number of samples

Total phosphorus includes dissolved phosphorus and forms bound to organic and inorganic material in water. In many aquatic systems phosphorus is the nutrient limiting primary production (i.e., plant growth). When phosphorus is added the first response may be increased productivity, and although this may be an aesthetic concern, increased productivity is beneficial to aquatic life. However, beyond a certain point detrimental effects become apparent due to eutrophication from nutrient over-enrichment.

The Ministry of the Environment objective for concentration of total phosphorous in running water is 0.03 mg/L to avoid excessive algae and plant growth. Typical sources of phosphorous include sewage, industrial wastes, and runoff from urban and agricultural land. Total phosphorus concentrations exceeded the Provincial Water Quality Objective at both sites during the study periods (Figure 4.)

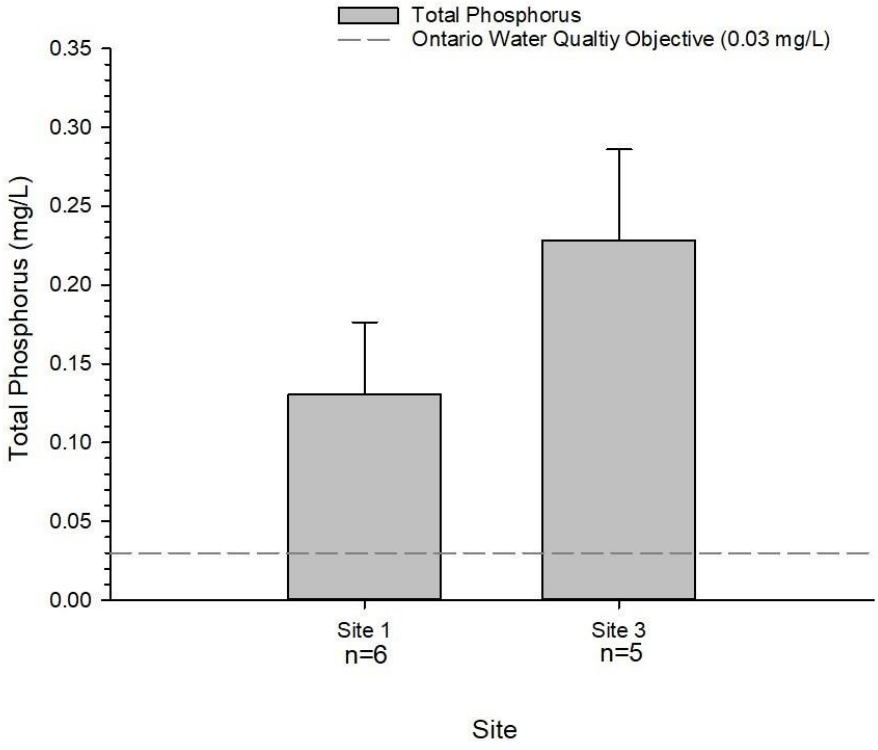

Figure 4: Average total phosphorus concentrations at two sites on the Heenan Drain near the Lucan Wastewater Treatment Plant from July to November 2019. n= number of samples

Nitrate is the primary source of nitrogen for aquatic plants. Nitrogen is essential to plant life, however excessive amounts of nitrate concentrations contribute to eutrophication, algae blooms, and changes in the aquatic community.

The Canadian Council of the Ministers of the Environment (2002) suggested that nitrate concentrations above 0.9 mg/L are generally associated with eutrophic conditions (*i.e.*, algae and macrophyte blooms, shortened food chains and changes in the aquatic community). Concentrations of 3.0 mg/L could have toxic effects on aquatic life. Nitrate concentrations were exceeded at both sites during the study period (Figure 5). Concentration of nitrate was considerably greater at Site 3 compared to Site 1 during this time period.

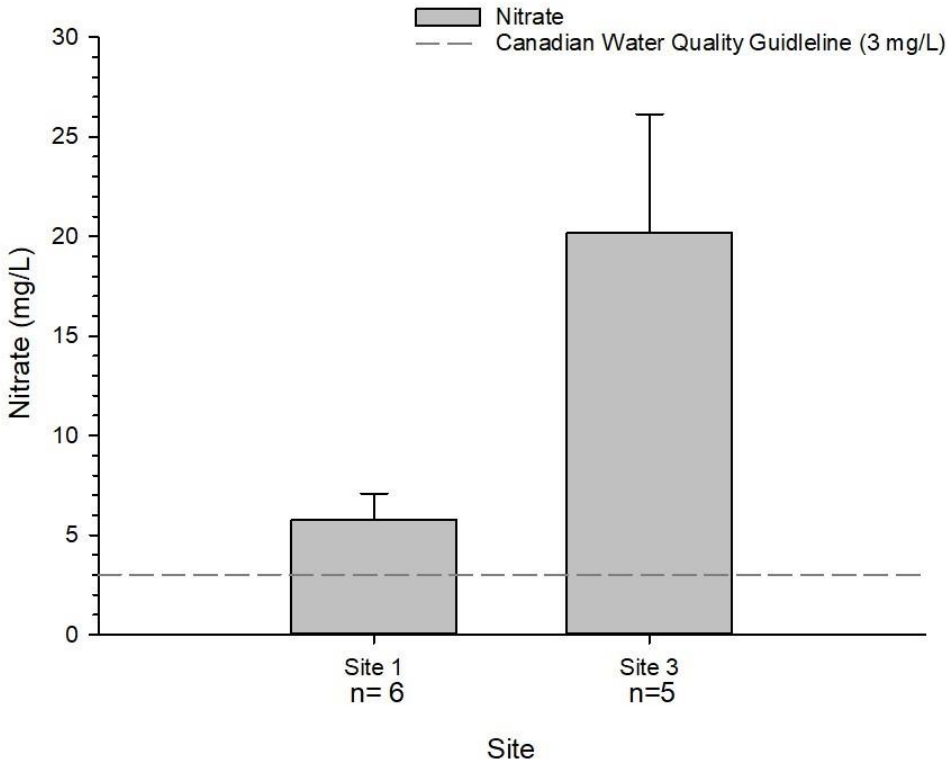

Figure 5: Average nitrate concentrations at two sites on the Heenan Drain near the Lucan Wastewater Treatment Plant from July to November 2019. n= number of samples

Nitrogen in ammonia is a nutrient responsible for stimulating plant and algal growth in the aquatic environment. Excessive amounts can result in eutrophication, causing excessive growth of algae. Eutrophication reduces available dissolved oxygen and can have toxic effects on aquatic organisms, harm spawning grounds or alter habitat. Un-ionized ammonia concentrations exceeded the Canadian Guideline to protect aquatic life (0.019mg/L) at Site 3 during the study period (Figure 6).

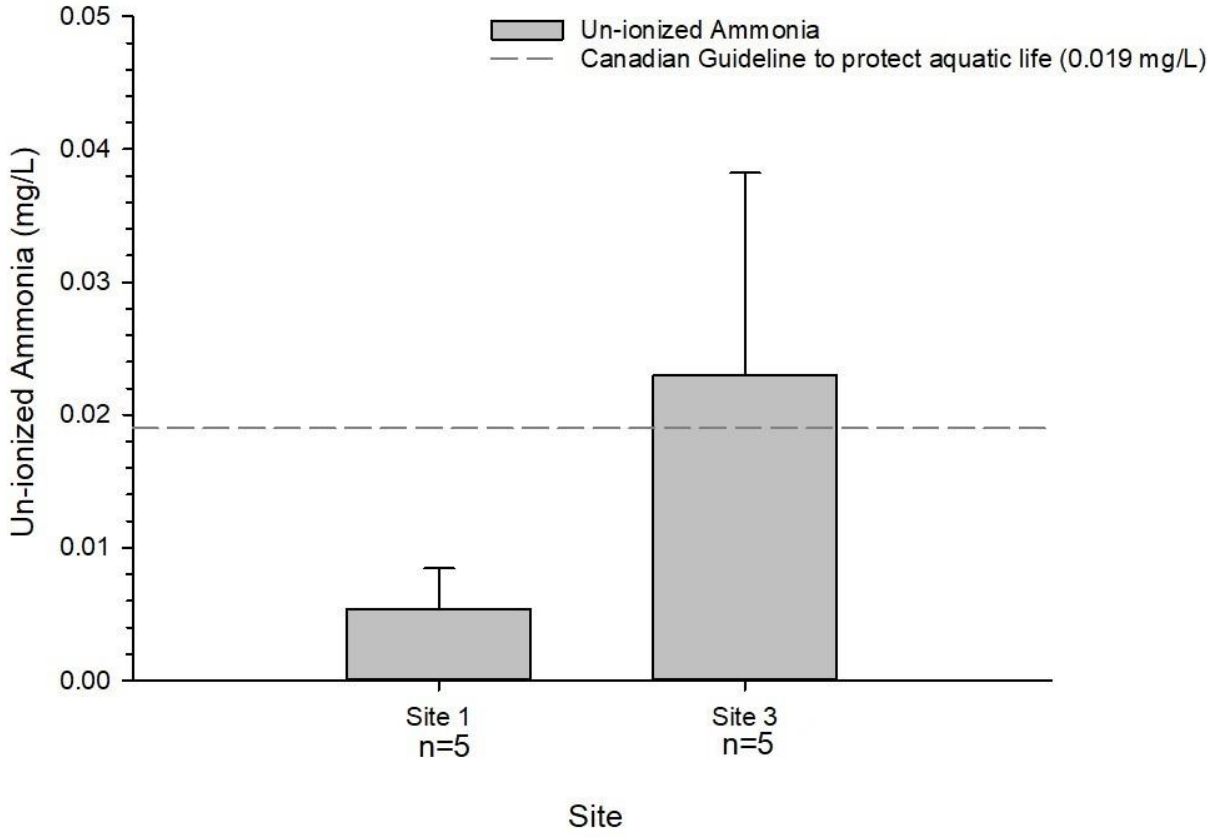

Figure 6: Average un-ionized ammonia concentrations at two sites on the Heenan Drain near the Lucan Wastewater Treatment Plant from July to November 2019. n= number of samples

Concentrations were converted to loads with available flow data to give a better indication of the relative difference between the two sites. Loads are the product of stream flow (volume per time) and concentration (mass per volume). By converting to loads, the nutrient concentration at two sites can be more easily compared, particularly if the sites differ in the amount of water discharge. Total Loads (kg) for total phosphorus (TP), phosphate (PO4-P), and nitrate (NO3-N) were higher downstream, at HAHEEN3 (Table 3). Daily contributions of nutrients for the Lucan Water Pollution Control Plant are found in Appendix 3. A more comprehensive dataset of concentration and flow measurements (at higher volumes of water, throughout the year) would result in a better understanding of nutrient loading in the Heenan Drain.

Table 3: Total Loads (kg) of total phosphorus (TP), phosphate (PO4-P), and nitrate (NO3-N) at two sites on the Heenan Drain.

Site	Months	Load Total (kg)		
		TP	**PO4-P**	**NO3-N**
Site 1 HAHEEN1	July- Nov 2019	93.66	46.23	10011.23
Site 3 HAHEEN3	July- Nov 2019	187.85	89.55	19681.93

Benthic Invertebrate Community

A summary of species diversity (H') and BI values (with associated water quality definitions and letter grades) for the benthic invertebrate community at the three sampling locations can be found in Table 4. Benthic invertebrate species diversity describes environmental quality in that typically, high diversity is found at high quality sites and low diversity is found in degraded environments. Biotic Index (BI) scores were used as an indicator of environmental quality at the benthic monitoring sites. BI values, water quality assessment and associated letter grades are found in Table 4.

Table 4: Summary of Species Diversity (H') and Biotic Index (BI) Values for the benthic invertebrate community at three site locations in the Heenan Drain near the Lucan Water Treatment Plant in 2019.

Site	Sampling Year	Species Diversity (H')	Biotic Index (BI) Value	Water Quality Index	Grade by Year
Site 1 HAHEEN1	2019	1.08	6.715	Fairly Poor	D
Site 2 HAHEEN2	2019	0.84	6.081	Fair	C
Site 3 HAHEEN3	2019	1.84	6.384	Fair	C

Site 2 and 3 (directly at the outfall and downstream of the outfall) indicate Fair water quality, with fairly significant organic pollution. Sampling at Site 1 (upstream of the outfall) indicate Fairly Poor water quality, with significant organic pollution. Sites 2 and 3 received a letter grade of C while Site 1 received a D, based on the 2019 sampling. These results indicate that Site 1, upstream of the outfall, has more degraded water quality than conditions downstream.

Benthic invertebrates are used as bio-indicators of stream water quality for numerous reasons, including that they are: present in various aquatic conditions, species rich, sedentary, relatively long lived, and they provide evidence of conditions over long periods of time (Rosenberg et al.

1998). The benthic community is often used as an indicator of the condition of an aquatic system as the different species respond differently to factors in their environment (Mandaville 2002). The use of benthic invertebrates as bio-indicators provides some information but may not provide a complete story. Biotic Index scores which dictate the environmental quality classification (very poor to excellent) may indicate environmental degradation but does not provide information about the reasons for the degradation. The benthic invertebrate community can be influenced by multiple factors, such as natural variation over time, changes in land use, short term extreme events (*e.g.*, floods, droughts) or pollution events.

Fisheries Community

Overall, the fish sampled in Heenan Drain yielded six species of fish (refer to Appendix 2 for detailed types and numbers captured at each site). The site with the highest abundance of fishes (266) was at Site 3, Downstream of the outfall. The lowest abundance of fishes was found at Site 1, Saintsbury Line (Table 5).

Species richness is the number of different species found within a sample. The greatest richness (six different species) was found at both Site 1 and Site 2. The lowest species richness (4 different species) was found at Site 3 (Table 5).

Table 5: Summary of the Fish Community in Heenan Drain at three sampling locations in 2019..

Site	Sampling Date	Fish Abundance	Species Richness	Shocking time (secs)
Site 1 HAHEEN1	September 12, 2019	148	6	675
Site 2 HAHEEN2	October 1, 2019	207	6	989
Site 3 HAHEEN3	October 9, 2019	266	4	936

Overall, the fish communities at each of the three sites were made up of very few species types. Four of the six species (blacknose dace, creek chub, central stoneroller and northern redbelly dace) sampled belong to the Cyprinidae family (*i.e.,* minnows). These species dominated the fish community at all three sites (Appendix 2).

Freshwater Mussels

No freshwater mussels were observed within study area on the Heenan Drain. The drain outlets to the Little Ausable River not far from the study area. The Little Ausable is known to support freshwater mussel populations, including Species at Risk varieties.

Conclusion and Recommendations

The water quality results at the study sites for the five month period in 2019 indicate that aside for unionized ammonia, nutrient concentrations (total phosphorus and nitrate) are exceeding set objectives and guidelines both upstream and downstream of the WWTP outfall. Concentrations of unionized ammonia exceed the guideline for the protection of aquatic life downstream of the WWTP outfall.

Concentrations and calculated loads (kgs) of the nutrients were higher downstream of the outfall at Site 3 than at Site1. BOD concentrations were similar at both the upstream and downstream sites. Further analyses to compare BOD loads might help to clarify the oxygen conditions at the outfall. Interestingly, *E.coli* concentrations seem to be lower at the site below the existing WWTP outfall.

Benthic community data indicated that Site 2 and Site 3, at and downstream of the outfall, resulted in Fair water quality, while Site 1, upstream, indicated Fairly Poor water quality. These scores indicate that the stream condition sampled at Site 1, upstream of Lucan's Wastewater Treatment Plant, was more degraded than Sites 2 and 3. Analysis of benthic invertebrate samples yielded a considerable amount of bioplastics in Site 3. Microplastics may have traveled downstream from the WWTP outfall.

Overall, the fisheries community at all three sites yielded low species richness and were dominated by the Cyprinidae (minnow) family.

The monitoring and assessment of water quality, fish communities and benthic invertebrate communities before and after the expansion of the Lucan Wastewater Treatment Plant is important to determine impacts to the health of the aquatic community over time. Ongoing monitoring of these sites will provide a more comprehensive understanding of the conditions on Heenan Drain. Now that initial baseline data has been collected, it is strongly recommended that future monitoring of water quality, quantity, fish community, mussel community and benthic invertebrate community continue in the same manner as they have been conducted within this past year to ensure consistency.

Recognizing that Site 1, upstream of the existing WWTP also shows signs of degraded conditions, suggest that efforts to improve and protect Heenan Drain, a tributary of the Little Ausable, could be expanded from the monitoring and assessment of the outfall to a more comprehensive watershed planning exercise.

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Health Canada. April, 2012. *Guidelines for Canadian Recreational Water Quality, Third Edition*. Minister of Health.

Neary, James, Mari Veliz and Angela Baitz. January 2009. *Benthic Monitoring Program Summary Report (2000-2007)*. Ausable Bayfield Conservation Authority.

United States Environmental Protection Agency. 2015. *Dissolved Oxygen and Biochemical Oxygen Demand*.

Appendix 1
Water Quality Report
Heenan Drain- Lucan Wastewater Treatment Plant- July to November 2019
Site 1: Saintsbury Road

Date	Temperature	pH	BOD* (mg/L)	DO* (mg/L)	E. coli (cfu/100 mL)	TSS* (mg/L)
3-Jul-19	-	-	-	-	-	< 2
15-Jul-19	23.6	8.73	-	17.84	18	8.1
19-Aug-19	19.6	8.24	< 3	6.63	5100	17.5
12-Sept-19	16.5	7.76	< 3	7.74	11200	7.1
9-Oct-19	12.5	8.06	< 3	9.47	130	94
14-Nov-19	7.3	8.0	< 2	13.05	110	< 2

*BOD—biochemical oxygen demand; DO—dissolved oxygen; TSS—Total Suspended Sediment

Date	Un-ionized Ammonia (mg/L)	Total Ammonia (mg/L)	Nitrate (mg/L)	Nitrate and Nitrite (mg/L)	Nitrite (mg/L)	SRP* (mg/L)	TP* (mg/L)	TKN* (mg/L)
3-Jul-19	-	0.11	9.4	9.579	0.179	0.0034	0.0189	0.35
15-Jul-19	0.006	0.021	2.06	2.219	0.159	< 0.003	0.0733	0.76
19-Aug-19	0.002	0.022	4.22	4.23	0.01	0.163	0.265	0.94
12-Sept-19	0.001	0.024	5.69	5.701	0.011	0.189	0.268	1.83
9-Oct-19	0.001	0.022	3.1	3.1	< 0.05	0.0296	0.13	1.09
14-Nov-19	0.017	0.92	10	10	< 0.01	0.0253	0.0261	1.12

*SRP—Soluble Reactive Phosphorus; TP—Total Phosphorus; TKN—Total Kjeldahl Nitrogen

Data Evaluation against available Standards

Indicator	Standard	Source	Evaluation
TP*	0.03 m/L	Ontario Provincial Water Quality Objective - to prevent excessive algae and aquatic plant growth	- objective exceeded in all months except July 3rd
Un-ionized Ammonia	0.019 mg/L	Canadian Water Quality Guideline - for protection of aquatic life	- guideline not exceeded
Nitrate	3 mg/L	draft Canadian Water Quality Guideline - for protection of aquatic life	- guideline exceeded in all months except July 15th
TSS*	80 mg/L	European Inland Fisheries Advisory Committee - for maintaining good fisheries	- standard exceeded in October
E. coli	200 cfu/100mL	Ontario Ministry of Health and Long-term Care Guideline - for recreation	- guideline exceed in August and September

*TP—Total Phosphorus; TSS—Total Suspended Sediment

Water Quality Report
Heenan Drain- Lucan Wastewater Treatment Plant- July to November 2019
Site 3: Downstream

Date	Temperature	pH	BOD* (mg/L)	DO* (mg/L)	E. coli (cfu/100 mL)	TSS* (mg/L)
15-Jul-19	21.2	9.53	-	10.38	250	6.9
19-Aug-19	20.6	8.06	3.2	7.32	1400	5.8
12-Sept-19	18.4	7.99	< 3	8.28	2900	5.4
9-Oct-19	17.6	8.51	< 3	9.29	290	14.9
14-Nov-19	7.0	7.12	< 2	13.58	36	< 2

*BOD—biochemical oxygen demand; DO—dissolved oxygen; TSS—Total Suspended Sediment

Date	Un-ionized Ammonia (mg/L)	Total Ammonia (mg/L)	Nitrate (mg/L)	Nitrate and Nitrite (mg/L)	Nitrite (mg/L)	SRP* (mg/L)	TP* (mg/L)	TKN* (mg/L)
15-Jul-19	0.079	0.11	37.7	37.84	0.14	0.122	0.183	< 0.15
19-Aug-19	0.032	0.587	9.44	10.171	0.731	0.178	0.326	1.7
12-Sept-19	0.001	0.025	12.3	12.315	0.015	0.148	0.234	1.27
9-Oct-19	0.002	0.019	31.4	31.411	0.011	0.103	0.362	1.02
14-Nov-19	0.001	0.387	9.96	9.96	< 0.01	0.035	0.0378	0.76

*SRP—Soluble Reactive Phosphorus; TP—Total Phosphorus; TKN—Total Kjeldahl Nitrogen

Data Evaluation against available Standards

Indicator	Standard	Source	Evaluation
TP*	0.03 mg/L	Ontario Provincial Water Quality Objective - to prevent excessive algae and aquatic plant growth	- objective exceeded in all months
Un-ionized Ammonia	0.019 mg/L	Canadian Water Quality Guideline - for protection of aquatic life	- guideline exceeded in July and August
Nitrate	3 mg/L	draft Canadian Water Quality Guideline - for protection of aquatic life	- Guideline exceeded in all months
TSS*	80 mg/L	European Inland Fisheries Advisory Committee - for maintaining good fisheries	- standard not exceeded
E. coli	200 cfu/100 mL	Ontario Ministry of Health and Long-term Care Guideline - for recreation	- guideline exceeded in all months except November

*TP—Total Phosphorus; TSS—Total Suspended Sediment

Appendix 2: Total number of each fish species found in Heenan Drain at the three sampling locations.

Fish Species	Site 1	Site 2	Site 3
Blacknose Dace	24	166	176
Creek Chub	80	32	53
Northern Redbelly Dace	14	3	20
Central Stoneroller	15	4	17
White Sucker	8	1	0
Brook Stickleback	7	1	0

Appendix 3: Loadings data

Lucan WWTP Effluent Report Data						Lucan WWTP Loads (Calculated)			
Date	Total (m^3/d)	TP (mg/L)	TAN (mg/L)	TSS (mg/L)	NO3-N (mg/L)	TP (kg/d)	TAN (kg/d)	TSS (kg/d)	NO3-N (kg/d)
02-Jul-19	702	0.16	<0.1	< 2	27.5	0.11	0.07	1.4	19.3
09-Jul-19	1148	0.28	0.2	4	30.8	0.32	0.23	4.6	35.4
16-Jul-19	679	0.19	0.2	3	36.3	0.13	0.14	2.0	24.6
23-Jul-19	732	0.24	0.2	7	26.1	0.18	0.15	5.1	19.1
30-Jul-19	731	0.19	0.2	7	21.7	0.14	0.15	5.1	15.9
06-Aug-19	914	0.20	0.2	4	33.1	0.18	0.18	3.7	30.3
13-Aug-19	1178	0.28	0.2	5	26.7	0.33	0.24	5.9	31.5
20-Aug-19	868	0.32	0.7	5	19.2	0.28	0.61	4.3	16.7
27-Aug-19	766	0.16	0.2	2	32.2	0.12	0.15	1.5	24.7
04-Sep-19	1420	0.20	0.1	2	33.0	0.28	0.14	2.8	46.9
10-Sep-19	852	0.21	0.1	2	36.0	0.18	0.09	1.7	30.7
17-Sep-19	1297	0.28	0.2	3	25.8	0.36	0.26	3.9	33.5
24-Sep-19	832	0.22	<0.1	3	25.4	0.18	0.08	2.5	21.1
01-Oct-19	1294	0.16	0.1	3	34.0	0.21	0.13	3.9	44.0
08-Oct-19	760	0.18	<0.1	2	26.9	0.14	0.08	1.5	20.4
15-Oct-19	646	0.16	<0.1	3	26.2	0.10	0.06	1.9	16.9
23-Oct-19	1281	0.09	0.1	2	18.6	0.12	0.13	2.6	23.8
29-Oct-19	1112	0.24	0.2	7	18.4	0.27	0.22	7.8	20.5
05-Nov-19	1451	0.18	<0.1	3	15.1	0.26	0.15	4.4	21.9
12-Nov-19	1139	0.16	0.1	<2	17.9	0.18	0.11	2.3	20.4
19-Nov-19	1267	0.19	0.1	4	21.4	0.24	0.13	5.1	27.1
26-Nov-19	905	0.16	<0.1	3	20.0	0.14	0.09	2.7	18.1
03-Dec-19	1059	0.19	<0.1	4	18.7	0.20	0.11	4.2	19.8
10-Dec-19	1403	0.23	<0.1	6	21.3	0.32	0.14	8.4	29.9
17-Dec-19	827	0.19	0.1	5	23.9	0.16	0.08	4.1	19.8
23-Dec-19	755	0.15	0.1	7	17.2	0.11	0.08	5.3	13.0
30-Dec-19	1028	0.26	0.1	3	32.6	0.27	0.10	3.1	33.5

"HAHEEN3" Sampling Data						HAHEEN3 Calculated Loads			
Date	Total (m^3/d)	TP (mg/L)	TAN (mg/L)	TSS (mg/L)	NO3-N (mg/L)	TP (kg/d)	TAN (kg/d)	TSS (kg/d)	NO3-N (kg/d)
15-Jul-19	2874	0.183	0.11	6.9	37.7	0.53	0.32	19.8	108.4
19-Aug-19	5871	0.326	0.587	5.8	9.44	1.91	3.45	34.1	55.4
12-Sep-19	5185	0.234	0.025	5.4	12.3	1.21	0.13	28.0	63.8
09-Oct-19	4241	0.362	0.019	14.9	31.4	1.54	0.08	63.2	133.2
14-Nov-19	11298	0.0378	0.387	<2	9.96	0.43	4.37	22.6	112.5

Appendix C – Capacity Assessment (BlueSky)

Final Report
Capacity Assessment of the Lucan WWTP

July 26, 2021

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1. Introduction

1.1 Background

The Lucan Wastewater Treatment Plant (WWTP) is a tertiary treatment facility that is owned by the Township of Lucan Biddulph, operated by the Ontario Clean Water Agency (OCWA) which services the community of Lucan, Ontario. The Lucan WWTP was re-rated from an average day flow (ADF) capacity of 1,100 m^3/d to 1,700 m^3/d around 2012, however since that time the facility has experienced operational performance issues that may impact available treatment capacity. In addition, B. M. Ross and Associates Limited (BM Ross) is currently completing a Class Environmental Assessment (Class EA) study to determine the most cost effective and environmentally sustainable option to increase wastewater servicing for the community of Lucan. Therefore, an accurate understanding of the current capacity of the Lucan WWTP, along with identification of any capacity limiting processes, is needed in order to develop options to upgrade and expand the facility.

BM Ross has retained Blue Sky Energy Engineering & Consulting Inc. (Blue Sky EEC) to undertake an historical review and desktop capacity assessment of the Lucan WWTP with the goal of determining the available treatment capacity in terms of both flow and equivalent organic loadings that can be serviced.

1.2 Objectives

The specific objectives of this investigation are to:

- Review the existing operation and performance of the Lucan WWTP and each of its individual unit processes;
- Develop a design basis for determining the service capacity of the Lucan WWTP;
- Conduct a desktop capacity assessment of individual unit processes using typical design guidelines and standards; and
- Identify the flow and organic loading capacities that can be serviced by the Lucan WWTP.

2. Description of the Lucan WWTP

2.1 Existing Treatment Process

The Lucan WWTP is a tertiary treatment facility with a rated capacity of 1,700 m^3/d, that operates under Environmental Compliance Approval (ECA) No. 7008-B7CJWY, dated February 11, 2019. Wastewater is pumped to the Lucan WWTP from the Chestnut Street Sewage Pumping Station (SPS). A two-celled facultative sewage lagoon, located at 6207 Fallon Drive, is available for storage of raw wastewater during high flow events. The ECA for the WWTP, which includes approval for the SPS and storage lagoon, is included in Appendix A.

The liquid treatment train consists of preliminary treatment (screening and grit removal), secondary treatment (bioreactors and secondary clarifiers), tertiary treatment (rotating disk filtration), disinfection (via UV irradiation), with effluent discharge to the Heenan Drain, ultimately discharging into Little Ausable River. Waste activated sludge (WAS) is directed to a two-stage aerobic digestion system. A summary of the design of the major unit processes is provided in Table 2.1.

Wastewater is conveyed to the Lucan WWTP via one force main from the Chestnut Street SPS. A separate force main from the SPS is available to divert flow to the lagoon. The WWTP influent force main discharges into the inlet channel, where the wastewater then flows by gravity through the Lucan WWTP's liquid treatment train.

The raw wastewater undergoes screening and is then directed to the vortex grit system for grit removal. A manually operated bypass around the vortex separator is available, however there is no means available to bypass the screen system.

The screened and degritted wastewater then flows to the two bioreactors that operate in parallel. Return activated sludge (RAS) is returned to the head of each bioreactor via a splitter box. Internal recycle flows (filter backwash, digester supernatant) are discharged to an onsite SPS which discharges to the RAS splitter box, upstream of the bioreactors. The mixed liquor from the bioreactors then flows to two rectangular secondary clarifiers, where the biomass settles via gravity and clarified effluent is discharged to the filter inlet channel. Alum is dosed at the bioreactor effluent (upstream of the secondary clarifiers), as well as to the secondary effluent in the secondary clarifier effluent channel (upstream of the tertiary filters).

Two rotating disk filters provide tertiary filtration of the secondary effluent. Filter backwash is produced during backwash and is directed to the onsite SPS prior to being pumped to the RAS splitter box.

Table 2.1 – Unit Process Summary – Lucan WWTP

Unit Process	Design Values
Raw Sewage Pumping	
Chestnut Street SPS	
Wet Well Dimensions	7.6 m x 3.0 m x 8.3 m
Volume	189 m^3
Number of Pumps	5 (one jockey pump, two duty, two stand-by)
Flows to WWTP	
Force Main Diameter	200 mm
Pump Capacity (each)	One pump at 15 L/s (1,296 m^3/d) Two pumps at 41 L/s (3,542 m^3/d) equipped with VFDs
Firm Pump Capacity (existing configuration)	41 L/s (3,542 m^3/d)
Flows to Lagoon	
Force Main Diameter	300 mm
Pump Capacity (each)	Two pumps at 168 L/s (14,515 m^3/d)
Firm Pump Capacity (existing configuration)	168 L/s (14,515 m^3/d)
Storage Lagoon	
Storage Lagoon Approximate Volume (total)	37,000 m^3
Screening	
Type and Number	1 mechanical, 20 mm openings
Peak Capacity	3,600 m^3/d
Grit Removal	
Type and Number	1 vortex grit separator
Peak Capacity	3,600 m^3/d
Aeration Tanks	
Type	Rectangular, complete mix
Number	2
Dimensions (each)	16 m x 8 m x 5 m SWD
Liquid Volume (each)	550 m^3
Liquid Volume (total)	1,100 m^3
Diffuser Type	Fine Bubble Aeration
Oxygenation	
Number of Blowers	3 (for bioreactors and sludge digestion / storage)
Capacity (each)	2,844 m^3/h
Secondary Clarifiers	
Type	Rectangular
Number	2
Dimensions (each)	4 m x 21.5 m x 4.3 m SWD
Surface Area (each)	86 m^2
Surface Area (total)	172 m^2
Return / Waste Activated Sludge Pumping	
Number	3 (2 duty, 1 standby), each equipped with VFDs
Capacity (each)	15.2 L/s (1,313 m^3/d)
Firm Capacity	30.4 L/s (2,626 m^3/d)

Table 2.1 – Unit Process Summary – Lucan WWTP

Unit Process	Design Values
Tertiary Filters	
Type and Number	2 rotating disk filters
Surface Area (each)	5.8 m^2
Surface Area (total)	11.6 m^2
Design Hydraulic Loading Rate	3.0 $L/m^2/s$ (average), 10 $L/m^2/s$ (peak)
Peak Design Flow	5,000 m^3/d
Post-aeration Tank	
Number	1
Dimensions	3.0 m x 3.0 m x 3 m SWD
Volume (total)	27 m^3
Disinfection	
Type and Number	2-bank open channel UV systems (1 duty, 1 standby)
Peak Capacity (per bank)	5,000 m^3/d
Sludge Handling	
Aerobic Digesters	
Number	2 tanks (1 primary stage, 1 secondary stage)
Dimensions (each)	3.5 m x 7.5 m x 4.4 m SWD
Volume (each)	123 m^3
Volume (total)	246 m^3
Sludge Holding Tanks	
Number	3
Volume (total)	744 m^3
Notes: Information taken from ECA No. 7008-B7CJWY, dated February 11, 2019.	

Tertiary effluent is then directed to a post-aeration tank to increase the dissolved oxygen (DO) concentration in the effluent. Disinfection is provided by an ultra-violet (UV) disinfection system. The final effluent is then directed to a gravity outfall discharging to Heenan Drain. A Parshall flume on the outfall records effluent flows from the WWTP.

Waste activated sludge (WAS) from the secondary treatment process is discharged to a two-stage aerobic digestion process. Digested biosolids can be stored on-site in three digested sludge storage tanks. Supernatant can be withdrawn from all sludge digestion / storage tanks, and the supernatant is discharged to the onsite SPS. The contents of the digested sludge storage tanks are periodically pumped to haulage trucks and disposed of offsite. When sludge disposal via land application is not feasible, sludge is periodically hauled to the lagoon for storage.

Finally, the emergency storage lagoon located at 6207 Fallon Drive can provide emergency storage of raw wastewater during peak flow events. The lagoon has a total storage volume of 37,000 m^3, and the lagoon contents can be returned to the head of the WWTP via Chestnut Street SPS.

2.2 Existing Treatment Requirements

The Lucan WWTP operates under Environmental Compliance Approval (ECA) No. 7008-B7CJWY dated February 11, 2019, and has a rated ADF capacity of 1,700 m^3/d. Table 2.2 presents the ECA effluent requirements for the Lucan WWTP.

The objectives and concentration limits for all parameters, with the exception of *E. coli* and pH, are based on monthly averages. Compliance with *E. coli* is based on monthly geometric mean, while pH is based on any single sample. The ECA specifies that monthly average daily effluent loading "means the value obtained by multiplying the monthly average effluent concentration of a contaminant by the monthly daily effluent flow over the same calendar month."

Table 2.2 – Current Effluent Objectives and Limits (ECA No. 7008-B7CJWY)

Parameter	Objective (1)	Limit	
		Concentration (2)	Loading (3)
$cBOD_5$	5 mg/L	10 mg/L	17 kg/d
TSS	5 mg/L	10 mg/L	17 kg/d
TP	0.2 mg/L	0.32 mg/L	0.55 kg/d
TAN May 1 to Oct 31 Nov 1 to Apr 30	 1.0 mg/L 2.0 mg/L	 1.3 mg/L 2.6 mg/L	 2.3 kg/d 4.4 kg/d
E. Coli	80 CFU/100 mL	100 CFU/100 mL	n/a
pH	6.5 – 8.0	6.0 – 8.5	n/a

Notes:

$cBOD_5$ – 5-day carbonaceous biochemical oxygen demand

TSS – total suspended solids

TP – total phosphors

TAN – total ammonia nitrogen

1. Objectives based on monthly average effluent concentration with the exception of E. coli (monthly geometric mean density) and pH (single sample results).
2. Objectives based on monthly average effluent concentration with the exception of E. coli (monthly geometric mean density) and pH (single sample results).
3. Monthly average daily effluent loadings.

3. Historical WWTP Performance

3.1 Historical Wastewater Flows

3.1.1 Assessment of Flowmeter Data

A continuity analysis was conducted to compare the recorded influent and effluent flows from the WWTP over the period January 2017 to December 2020. The monthly average flows recorded by the WWTP influent and WWTP effluent flow meters were compared visually, as presented in Figure 3.1. Flows to the lagoon were excluded from this analysis, since they do not impact WWTP effluent flows.

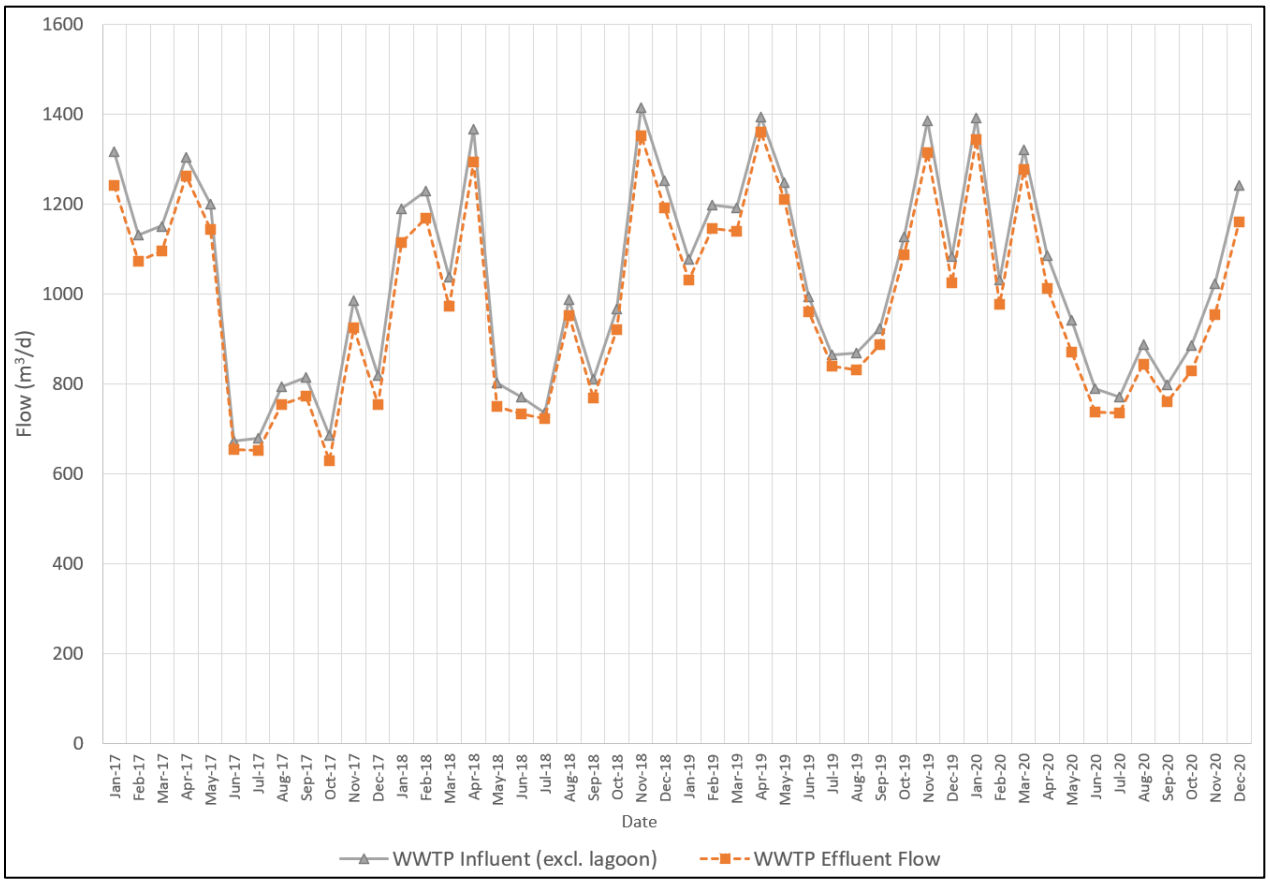

Figure 3.1 – Comparison of Recorded Monthly Average WWTP Influent and Effluent Flows (Jan 2017 – Dec 2020)

In general, the two flow meters showed good agreement, with the WWP effluent meter reading approximately 5% less than the WWTP influent flow. For the purposes of evaluating historical average raw wastewater flows, the WWTP influent flow data were used since this provides a more conservative value than the WRRF effluent flow meter.

3.1.2 Peak Flow Analysis

Typically, peak flows can be assessed using daily and/or monthly maximum day flows recorded at either a WWTP's influent or effluent flow meter. However, in the case of the Lucan WWTP, an off-site storage lagoon is available to equalize influent flows during wet weather events. These flows are diverted at the Chestnut St. SPS upstream of the WWTP influent flow meter. Therefore, an evaluation of the peak flows within the collection system would require analyzing the combined WWTP influent and lagoon influent flows on a daily basis.

Daily flow data were available for the period January to December 2020. The maximum daily flow (MDF) over this period was recorded on January 11, 2020 at 5,641 m^3/d. On this day, 3,781 m^3 of wastewater was diverted to the lagoon while 1,860 m^3/d was conveyed to the WWTP. MDFs over the period 2017 to 2019 were provided by BMRoss and were based on operating data provided by the Ontario Clean Water Agency (OCWA). These ranged from 3,451 m^3/d to 6,952 m^3/d.

Conversely, the MDF conveyed to the WWTP only appears to have reached flows approaching 3,000 m^3/d over the review period. Therefore, without the equalization provided by the storage lagoon, actual peak flows to the Lucan WWTP would have been significantly higher.

3.1.3 Summary of Historical Raw Wastewater Flows

Table 3.1 presents a summary of the historical recorded raw wastewater flows at the Lucan WWTP over the review period January 2017 to December 2020.

Table 3.1 – Historical Raw Wastewater Flows (Jan 2017 – December 2020)

Year	Average Daily Flow (m^3/d) (1)	Maximum Daily Flow (m^3/d) (2)	Estimated Service Population (3)	Estimated Per Capita Flow (L/cap/d)
2017	962	4,299	2,696	357
2018	1,047	6,952	2,851	367
2019	1,113	3,451	3,006	370
2020	1,014	5,641	3,162	321
Overall	**1,034**	**6,952**	-	**357**

Notes:

1. Reported average daily flow based on the WWTP influent flow meter, unless otherwise noted.
2. MDF for 2020 based on the sum of daily WWTP influent and lagoon influent flows (see Section 3.1.2). MDF for 2017 to 2019 provided by BM Ross based on operating data from OCWA.
3. Service populations as provided by BM Ross.

Over the review period, the ADF was 1,034 m^3/d, or approximately 61% of the rated ADF capacity of the WWTP. The estimated annual average per capita flows ranged from 321 L/cap/d to 367 L/cap/d, and are within the mid-range of typical design values of 225 to 450 L/cap/d, exclusive of extraneous flows (MOE, 2008). As noted above, limited maximum day flow (MDF) data were available for 2020, and this peak flow within the collection system was determined to be 6,952 m^3/d.

3.2 Historical Influent Quality

A summary of the historical influent concentrations and loadings, as determined from the 24-hour composite samples collected at the influent chamber, are shown in Table 3.2. Due to the location of raw wastewater sampling point, the reported wastewater quality data excludes contributions from filter backwash and sludge digester / storage supernatant (those streams are added to the RAS splitter box upstream of the bioreactors). The average concentrations and loadings of biochemical oxygen demand (BOD_5), total suspended solids (TSS), total Kjeldahl nitrogen (TKN), and total phosphorus (TP) are based on the samples collected over the historical review period from January 2017 to December 2020. Typical raw domestic wastewater concentrations are also presented in Table 3.2 for comparison purposes.

Table 3.2 –Raw Wastewater Quality (Jan 2017 – Dec 2020)

Year	BOD_5 (mg/L)	TSS (mg/L)	TKN (mg/L)	TP (mg/L)
2017	126	58	31.0	3.2
2018	121	65	30.4	3.1
2019	127	77	32.6	3.0
2020	148	87	34.1	3.2
Overall	**130**	**72**	**32.0**	**3.1**
Typical [1]				
High Strength	400	389	69	11.0
Medium Strength	200	195	35	5.6
Low Strength	133	130	23	3.7

Notes:

1. The “low”, “med”, and “high” refer to low, medium, and high strength domestic wastewaters. Low strength wastewaters based on approximate flowrate of 570 L/capita/d, medium strength on 380 L/capita/d, and high strength on 190 L/capita/d. From Metcalf & Eddy (2003).

The raw wastewater can be characterized as low strength with respect to BOD_5, TKN and TP, and very low strength with respect to TSS.

Table 3.3 presents the historical per capita loadings based on the raw wastewater flow and quality data over the period January 2017 to December 2020. Typical design per capita loadings are also presented.

Table 3.3 – Historical Per Capita Raw Wastewater Loadings (Jan 2017 – Dec 2020)

	BOD5 (g/cap/d)	TSS (g/cap/d)	TKN (g/cap/d)	TP (g/cap/d)
Historical Values	41	22	10.0	1.0
Typical Design Values	75 [1]	90 [1]	13.3 [2]	2.1 [2]

Notes:

1. MOE (2008).
2. Metcalf & Eddy (2003).

Historical per capita loadings are less than typical design values for all parameters. This is consistent with the low strength of the wastewater and the low to average per capita flows.

The recorded influent concentration data were analyzed visually. Figures 3.2 to 3.5 present the monthly average influent concentrations for BOD_5, TSS, TKN, and TP, respectively. The influent BOD_5, TSS, TKN and TP values tend to vary significantly from month-to-month, however the recorded annual averages have been fairly consistent over the review period with the exception of TSS, which shows a modest a year-over-year increase.

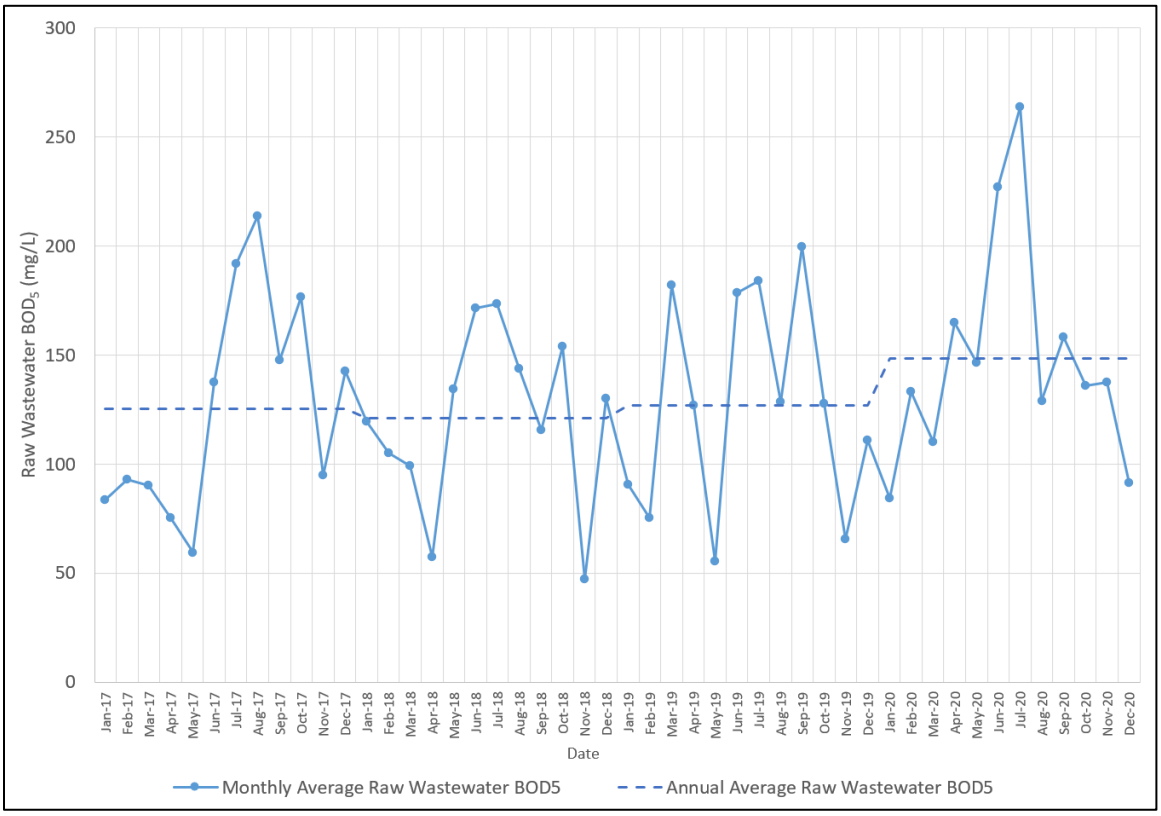

Figure 3.2 – Raw Influent Monthly Average BOD_5 (Jan 2017 – Dec 2020)

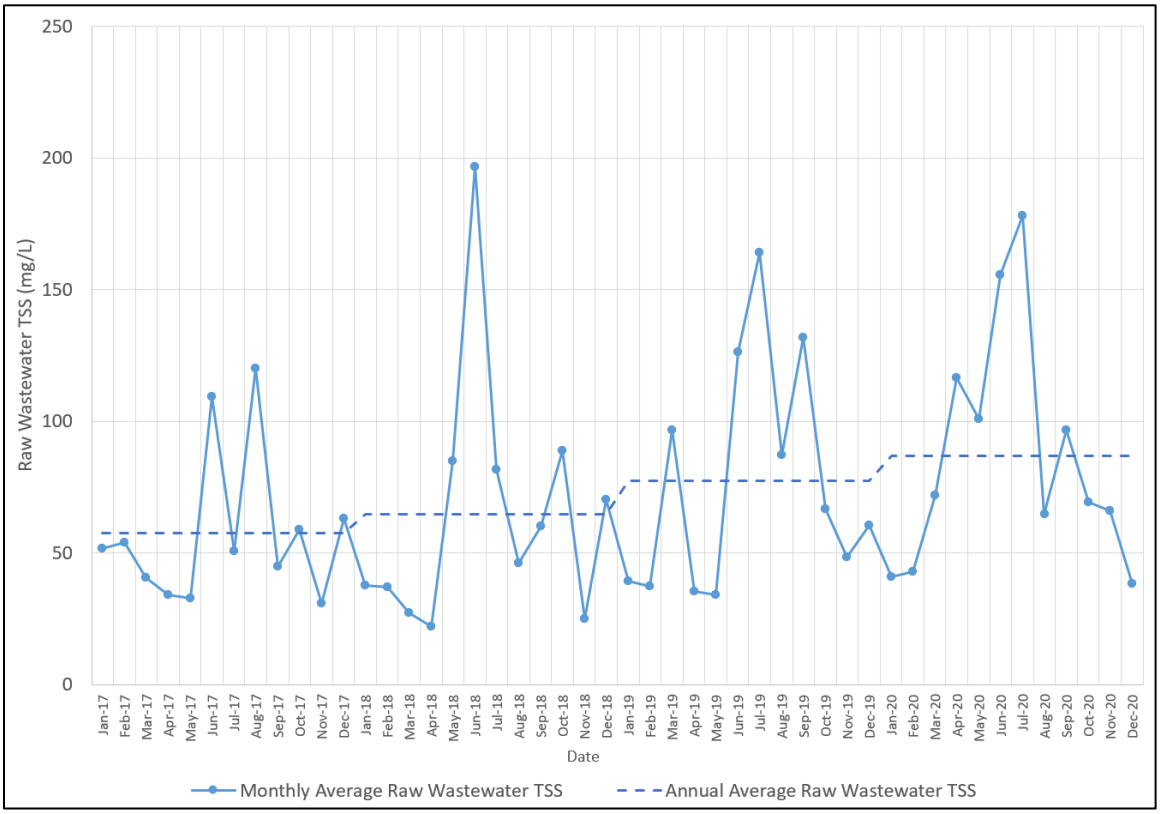

Figure 3.3 – Raw Influent Monthly Average TSS (Jan 2017 – Dec 2020)

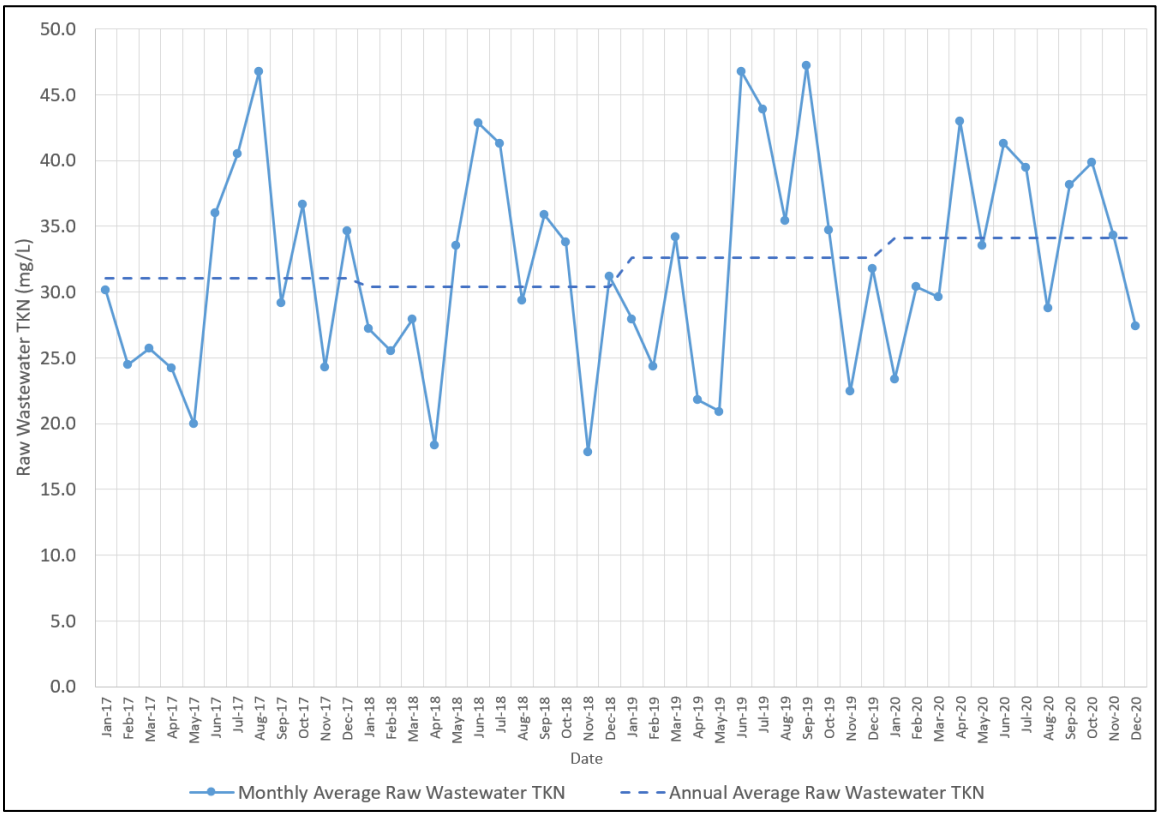

Figure 3.4 – Raw Influent Monthly Average TKN (Jan 2017 – Dec 2020)

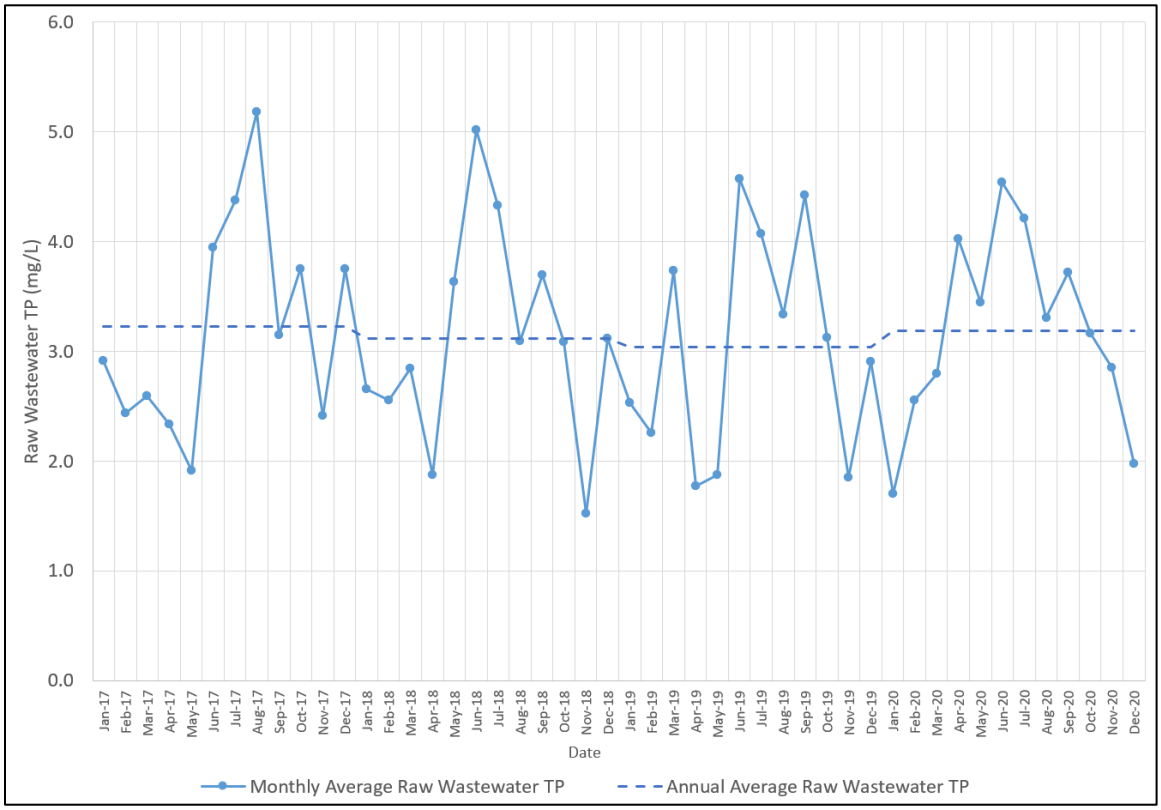

Figure 3.5 – Raw Influent Monthly Average TP (Jan 2017 – Dec 2020)

3.3 Historical Final Effluent Quality

Table 3.4 presents the final effluent quality from the Lucan WWTP, with maximum monthly values shown in parentheses, over the review period. Monthly average effluent concentrations for $cBOD_5$, TSS, TAN and TP are presented in Figures 3.6 to 3.9, respectively.

Table 3.4 – Final Effluent Quality (Jan 2017 – Dec 2020)

Year	$cBOD_5$ (mg/L)	TSS (mg/L)	TAN (mg/L)	TP (mg/L)
2017	2.4 (3.0)	2.6 (4.8)	0.11 (0.13)	0.20 (0.28)
2018	2.2 (3.3)	3.5 (4.3)	0.10 (0.12)	0.21 (0.29)
2019	2.4 (3.0)	3.8 (5.0)	0.21 (0.90)	0.19 (0.24)
2020	2.3 (3.1)	4.9 (8.0)	0.19 (0.75)	0.18 (0.24)
Overall	**2.3** **(3.3)**	**3.7** **(8.0)**	**0.15** **(0.90)**	**0.20** **(0.29)**

Notes:
Values in parentheses represent maximum month values.

The Lucan WWTP has been able to consistently meet its effluent compliance limits. In addition, the $cBOD_5$ and TAN objectives were consistently met. Conversely, the TP objective is often exceeded, and effluent TSS concentrations have been increasing over the review period ultimately resulting in monthly average concentrations exceeding the objective in 6 months of 2020. A site visit was conducted by Blue Sky staff in October 2020 to try to identify factors that may be affecting elevated effluent TP concentrations, and to proposed mitigation measures that could be implemented to improve performance. These are summarized in a memorandum included in Appendix B.

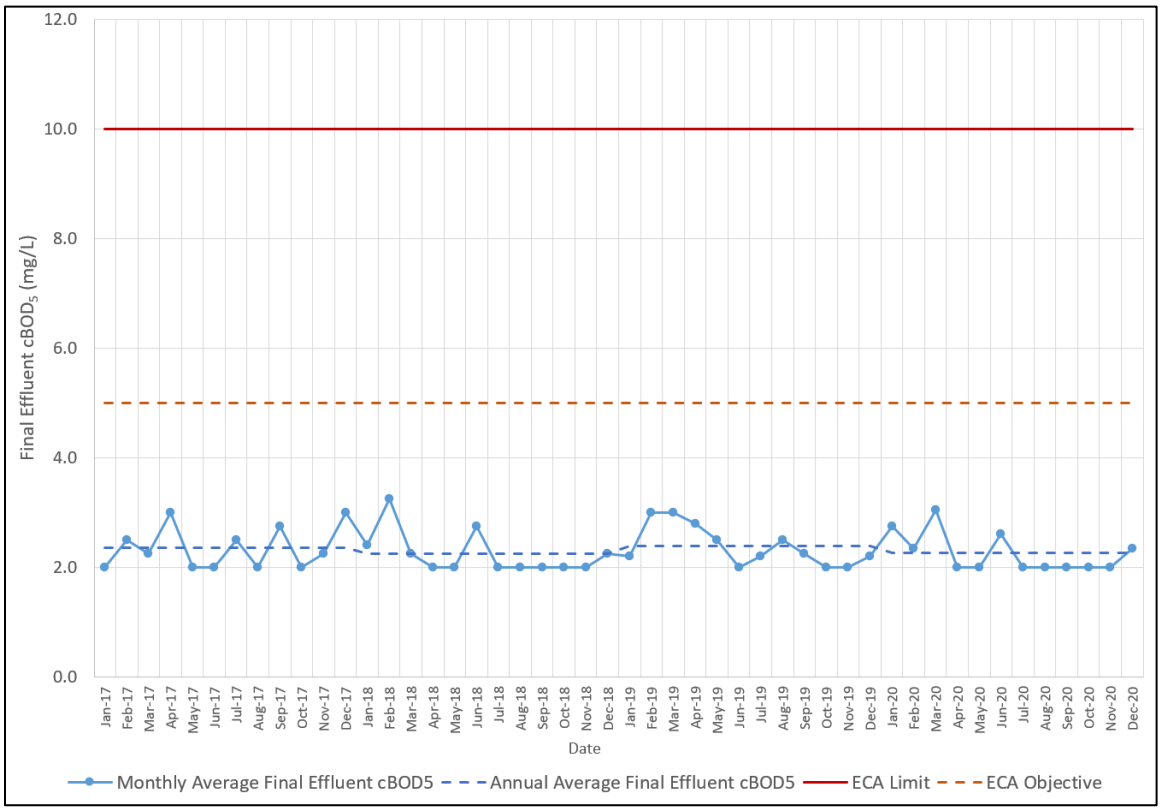

Figure 3.6 – Final Effluent Monthly Average $cBOD_5$ (Jan 2017 – Dec 2020)

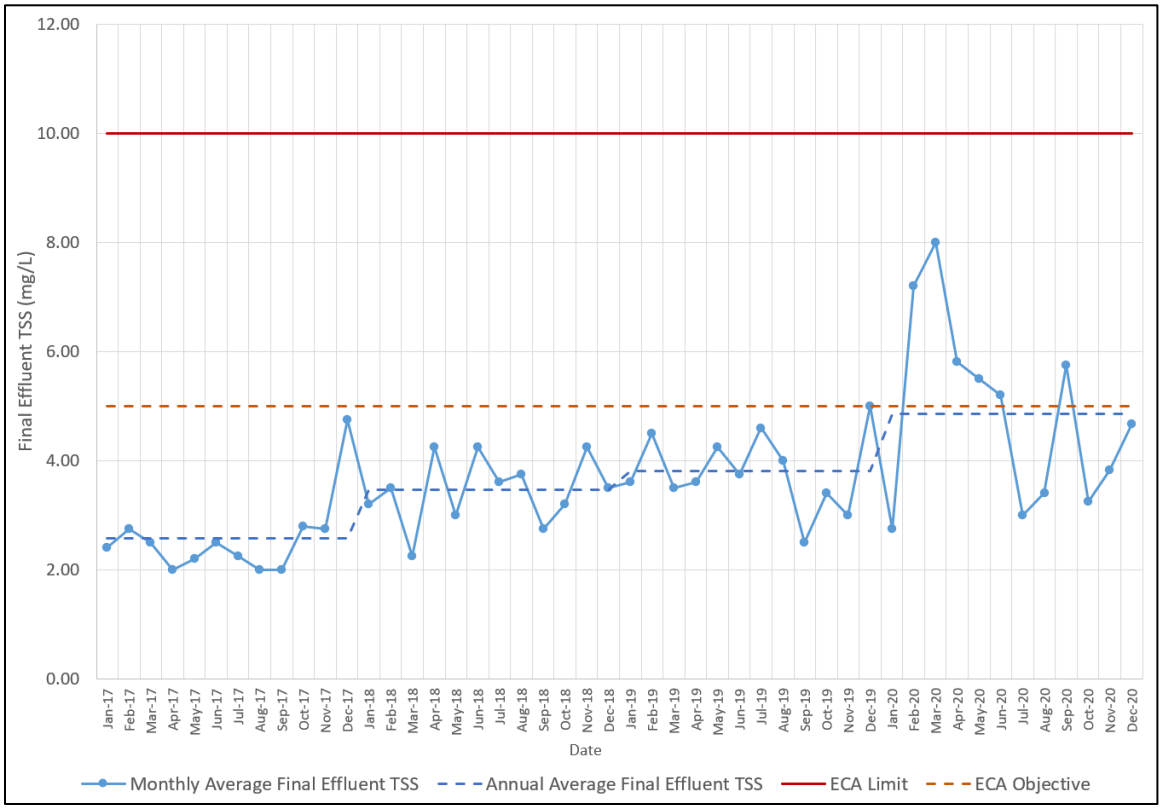

Figure 3.7 – Final Effluent Monthly Average TSS (Jan 2017 – Dec 2020)

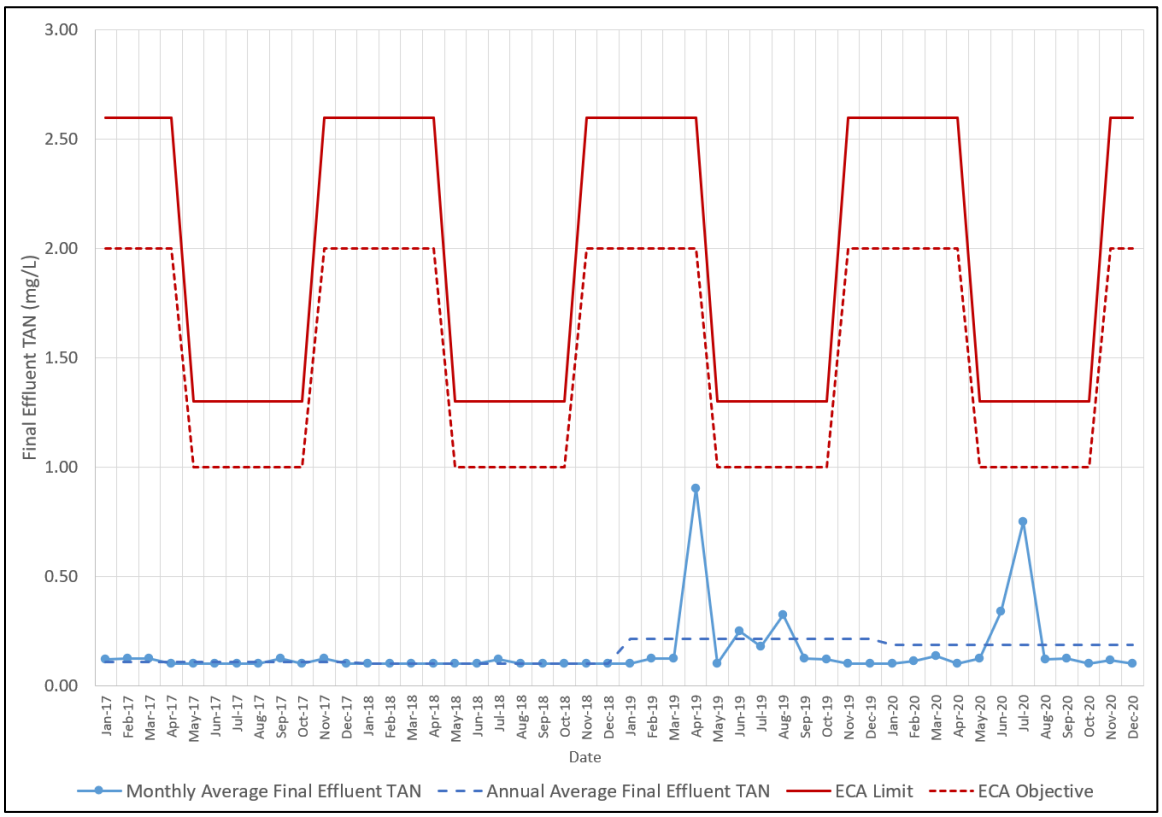

Figure 3.8 – Final Effluent Monthly Average TAN (Jan 2017 – Dec 2020)

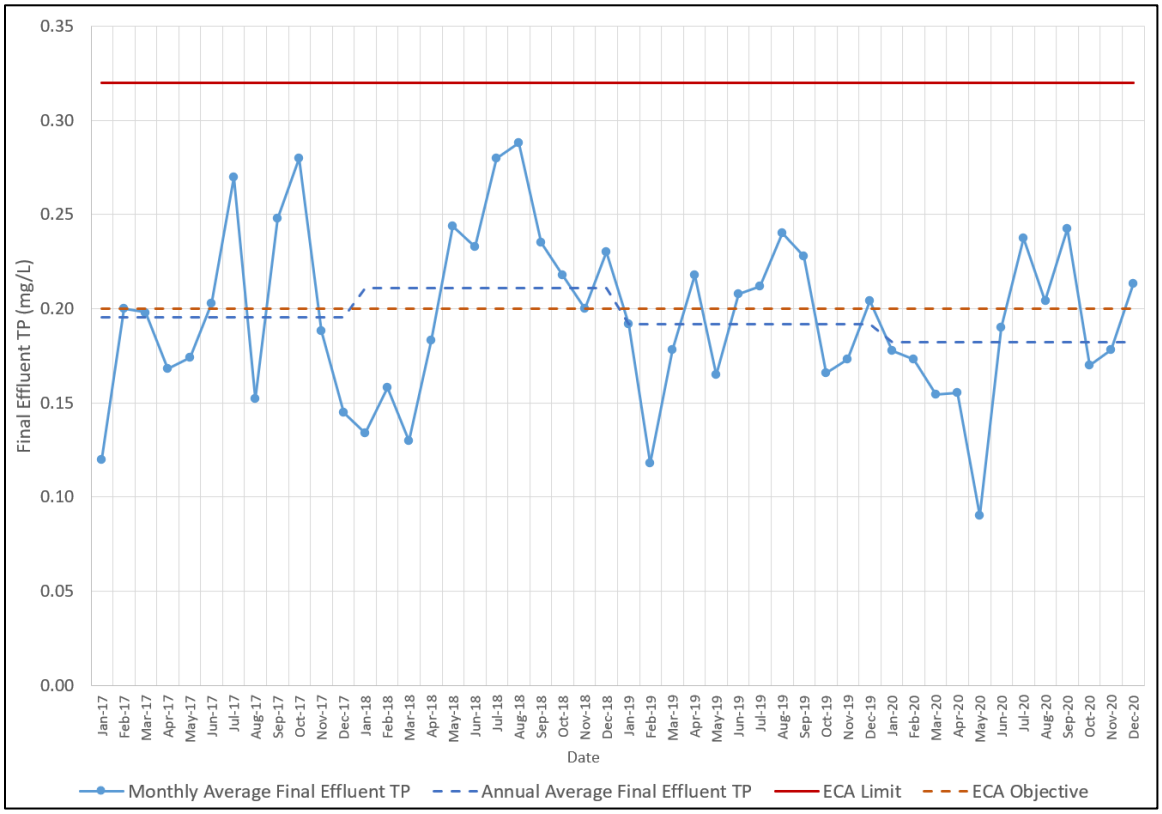

Figure 3.9 – Final Effluent Monthly Average TP (Jan 2017 – Dec 2020)

4. Flow and Loading Projections

The purpose of this assessment was to determine the capacity of the Lucan WWTP in terms of flow and organic loading. The following sub-sections outline the methodology used to develop average and peak raw wastewater flow and loading projections for the facility when it is operating at its ECA rated capacity of 1,700 m^3/d. In addition, projected increases in internal recycle stream flows and associated loadings are also defined.

To develop projected flows and loadings, a per capita wastewater flow of 368 L/cap/d was assumed for all new growth as per the design value defined by BM Ross for design and planning purposes. Peak flow estimates were developed for the total influent flows conveyed to the Chestnut St. SPS (e.g. un-equalized raw wastewater flows).

Finally, it is understood that wastewater currently treated at the Granton WWTP may be diverted to the Lucan WWTP in the future. A review of recent annual reports for the Granton WWTP suggests that the wastewater characteristics are consistent with those at the Lucan WWTP. Furthermore, the Granton WWTP has a low rated capacity (230 m^3/d) and currently treats an ADF of approximately 120 m^3/d, or less than 10% of the rated capacity of the Lucan WWTP. Therefore, the addition of these wastewaters will not significantly impact the flow and loading projections. However, consideration should be given to the potential for septicity due to the long force main required. Odour control and/or addition of an oxidizer (e.g. peroxide) to limit H_2S formation could be considered. Impacts on peak flows to the Lucan WWTP will also need to be considered, and will depend on the design of a new SPS to convey flows from Granton.

4.1 Raw Wastewater Flow Projections

4.1.1 Average Day Flow

As noted above, the ADF being used for the purposes of developing projected raw wastewater flows and loadings is the ECA rated capacity of 1,700 m^3/d.

4.1.2 Maximum Day Flow

The projected MDF value was calculated based on the historical (base) MDF, plus an MDF allowance for new growth. To calculate the MDF allowance for new growth, an MDF peaking factor for the new growth flows was determined by applying a typical historical dry weather flow (DWF) factor to the non-I/I portion of the per capita flow rate, and applying a design 2.5 peaking factor for I/I flows (MOE, 2008). Based on an analysis conducted by BM Ross, the existing average extraneous influent flow was estimated to be approximately 136 L/cap/d.

Based on experience at other similar Ontario facilities, the DWF peaking factor was estimated to be 1.5. By applying the DWF peaking factor of 1.5 to the dry weather flow portion of the growth per capita flow (232 L/cap/d), and the I/I flow peak factor to the I/I portion of the per capita flow

(136 L/cap/d), the overall MDF peaking factor for new growth was determined to be 1.87. The projected MDF is presented in Table 4.1.

Table 4.1 – Projected Maximum Day Flow

Parameter	Raw Wastewater Flows		
	Average Day	MDF Factor	Maximum Day
Existing Service Area	1,034 m^3/d	6.72	6,952 m^3/d
Growth	666 m^3/d	1.87	1,245 m^3/d
Overall Projected Value	**1,700 m^3/d**	**4.82**	**8,197 m^3/d**

4.1.3 Peak Instantaneous Flow

The projected peak instantaneous flow (PIF) was calculated based on the an estimated base PIF, plus a PIF allowance for new growth. PIF data for raw wastewater influent flows to the SPS were not available; therefore, base PIF was estimated to be 10% higher than the base MDF. To calculate the peak flow allowance for new growth, the Harmon peaking factor was applied to the non-I/I portion of the per capita flow value, and a 2.5 peaking factor was applied to per capita I/I flows (MOE, 2008).

By applying a Harmon peaking factor of 3.24 to the dry weather flow portion of the per capita flow (232 L/cap/d), and the I/I flow 2.5 peak factor to the I/I portion of the per capita flow (136 L/cap/d), the overall peaking factor for new growth was determined to be 2.97.

The projected PIF value is presented in Table 4.2.

Table 4.2 – Projected Peak Instantaneous Flow

Parameter	Raw Wastewater Flows		
	Average Day	PIF Factor	Peak Instantaneous
Existing Service Area	1,034 m^3/d	7.39	7,647 m^3/d
Growth	666 m^3/d	2.97	1,977 m^3/d
Overall Projected Value	**1,700 m^3/d**	**5.66**	**9,624 m^3/d**

4.2 Raw Wastewater Loading Projections

Raw wastewater loading projections were based on the current base raw wastewater loadings, plus an allowance for new growth. The estimated historical per capita values for all influent parameters were lower than typical design values. Therefore, to develop conservative estimates of future loadings, typical design per capita loading values were used to project the future loadings due to growth.

Table 4.3 presents a summary of the loading projections for the facility when it is operating at its rated ADF capacity of 1,700 m^3/d.

Table 4.3 – Projected Raw Wastewater Loadings

Parameter	Raw Wastewater Loadings		
	Current Base	New Growth (1)	Overall Projected
BOD_5	135 kg/d	136 kg/d	271 kg/d
TSS	74 kg/d	42 kg/d	116 kg/d
TKN	33.1 kg/d	19.0 kg/d	52.1 kg/d
TP	3.3 kg/d	1.9 kg/d	5.2 kg/d

Notes:

1. Growth loadings historical per capita loadings as presented in Table 3.4, and an estimated population growth of 1,809 persons (based on a per capita flow for new growth of 368 L/cap/d).

4.3 Internal Recycle Streams

There are two sources of internal recycle streams, namely: filter backwash and digester / sludge storage supernatant. No data were available regarding historic flows or quality of these internal recycle streams. Therefore, typical design values and data from other Ontario facilities.

Future filter backwash flow rates were estimated to be 10% of the ADF (170 m^3/d of backwash), while supernatant flow rates were estimated to be approximately 50% of the future projected WAS flows (18 m^3/d of supernatant). Typical aerobic digester supernatant concentrations (WEF, 2005) and estimated historical filter backwash characteristics were used to represent the quality of these internal recycle streams. The projected flows and concentrations associated with internal recycle streams are presented in Table 4.4.

Table 4.4 – Projected Internal Recycle Stream Flows and Characteristics

Stream	Projected Flow	Projected Characteristics			
		BOD_5	TSS	TKN	TP
Aerobic digester supernatant	18 m^3/d	250 mg/L	1,500 mg/L	10 mg/L	100 mg/L
Filter backwash	170 m^3/d	2 mg/L	50 mg/L	0.2 mg/L	5 mg/L
Overall Projected Internal Recycle Streams	**187 m^3/d**	**29 mg/L**	**190 mg/L**	**1.3 mg/L**	**13.9 mg/L**

4.4 Summary of Projected Wastewater Flows and Characteristics

Table 4.5 presents a summary of the projected flows and characteristics for both raw wastewater and the liquid treatment train influent (raw wastewater plus internal recycle streams) for the facility is operating at is rated ADF capacity of 1,700 m^3/d.

Table 4.5 – Projected Flows and Loadings to the Lucan WWTP Operating the Rated ADF Capacity of 1,700 m^3/d

Parameter	Raw Wastewater	Liquid Treatment Train Influent
Flows		
ADF	1,700 m^3/d	1,887 m^3/d
MDF	8,197 m^3/d	8,384 m^3/d
MDF Factor (normalized to raw wastewater ADF)	4.82	4.93
PIF	9,624 m^3/d	9,811 m^3/d
PIF Factor (normalized to raw wastewater ADF)	5.66	5.77
Concentrations		
BOD_5	159 mg/L	146 mg/L
TSS	68 mg/L	80 mg/L
TKN	30.7 mg/L	27.8 mg/L
TP	3.0 mg/L	4.1 mg/L

5. Unit Process Review and Desktop Capacity Assessment

5.1 Approach and Assumptions

The capacity estimate of each major unit process was developed based on a review of the current performance and typical design guideline values. The unit process review incorporated historical plant performance and available operational data over the period Jan 2017 to Dec 2020.

The process capacity assessment was performed using traditional desktop analytical methods, historical plant operational data, plant design criteria, and approved ECA capacities, as well as typical design guidelines. Assumptions made when determining estimated WWTP capacity include:

- All tanks and treatment equipment will be online;
- Effluent is required to meet the existing ECA treatment requirements;
- Future alum dosages will be consistent with historical values;
- The projected flows and quality data as defined Table 4.5;
- A future operating mixed liquor suspended solids (MLSS concentration) of 4,000 mg/L; and
- A projected WAS yield of 1.1 kg/kg (see Section 5.2.2 for rationale).

The following sub-sections present the existing configuration, historical performance, and capacity assessment of individual unit processes.

5.2 Unit Process Review

The following sub-sections present the existing configuration, historical performance, and capacity assessment of individual unit processes.

5.2.1 Screening and Grit Removal

It is understood that the current headworks (screening, grit removal) will be replaced as part of any future upgrades to the Lucan WWTP. As such, these unit processes were excluded from the capacity assessment.

5.2.2 Bioreactors

Configuration and Historical Performance

The Lucan WWTP is equipped with two bioreactors, each with dimensions of 16 m x 8 m x 5 m SWD. Each bioreactor has a volume of 550 m^3, providing an overall bioreactor volume of 1,100 m^3. Both bioreactors are operated in aerobic mode. Select historical operating parameters are presented in Table 5.1.

In order to develop an estimated solids retention time (SRT), it was necessary to estimate the historical solids yield. An evaluation of available waste activated sludge (WAS) resulted in an estimated yield of 1.1 kg WAS SS/kg BOD_5, which is on the high end of the typical range of 0.8 to 1.2 kg WAS SS/kg BOD_5. Therefore, for the purposes of assessing historical operating conditions and projecting available capacity, the yield was set to 1.1 kg WAS SS/kg BOD_5.

Table 5.1 – Historical Bioreactor Operating Conditions

Parameter	Historical Value	Typical Design Value
ADF (Liquid Train Influent)	1,148 m^3/d (1)	-
Total Operating Volume	1,100 m^3	-
HRT - total	23 h	> 15 h
F/M_v	0.06 kg/kg/d	0.05 – 0.15 kg/kg/d
OLR - total	0.14 kg/m3/d	0.17 – 0.24 kg/m3/d
MLSS	3,434 mg/L (2)	3,000 – 5,000 mg/L
MLVSS	2,343 mg/L (2)	-
Estimated Yield	1.1 kg TSS/kg BOD_5	0.8 – 1.2 kg TSS/kg BOD_5
Estimated SRT - Aerobic	23.0 d	> 15 d
Average Effluent TAN	0.15 mg/L	-
Maximum Month Effluent TAN	0.90 mg/L	-

Notes:
1. Based on the historic raw wastewater ADF plus an allowance for internal recycle streams.
2. Based on operating data over the period 2019-2020.

The online bioreactor has operated at hydraulic loading and food-to-microorganism ratio within typical design guidelines, and slightly below the typical value for OLR. The estimated operating aerobic SRT of 23.0 d is above the minimum recommended design value of 15 d for consistent year-round nitrification. Effluent TAN concentrations have also consistently met effluent objectives and limits (see Section 3.3).

The bioreactors have been prone to the development of thick layers of foam, which have caused performance issues in the downstream secondary clarifiers. This is reviewed and discussed in more detail in a memorandum included as Appendix B. Based on a high-level review of the bioreactors, it is likely that the physical configuration of the bioreactors, which “traps” any foam or scum that accumulates on the surface of the tank, is contributing to the foaming issue in the bioreactors. Any upgrades should consider modifications such as using an overflow weir rather than a submerged port to allow the surface layer of the mixed liquor to flow from one pass of the bioreactor to the other and to exit the bioreactor.

Capacity Assessment

While there are currently no nitrate-nitrogen objectives or limits for the Lucan WWTP, it is understood that MECP may require some denitrification in the future. Therefore, capacities were

developed based on three future design options, namely: status quo (not designed for denitrification), providing a pre-anoxic zone in each bioreactor (limited denitrification), and converting the bioreactors to the Modified-Ludzack-Ettinger (MLE) process (enhanced denitrification).

For the Status Quo option, the entire bioreactor volume would operate in aerobic mode. For the Pre-Anoxic Zone option, 10% of the tank volume would be partitioned off to create an anoxic zone at the head of each bioreactor. For the MLE option, 25% of the tank volume would be partitioned off to create an anoxic zone at the head of each bioreactor, and new dedicated mixed liquor recycle system would be provided to recycle mixed liquor from the end of the tank to the head of the anoxic zone.

For all three options, the capacity of the bioreactors was based on a future operating MLSS concentration of 4,000 mg/L which is greater than the historical average of 3,434 mg/L, but is in within the typical operating range for an extended aeration facility of 3,000 to 5,000 mg/L (MOE, 2008). It was also assumed that the facility would be required to meet effluent TAN limits consistent with the current seasonal objectives and limits, operating at a minimum aerobic SRT of 15 d (12 d for the MLE option).

Finally, estimates of average effluent nitrate-nitrogen (NO_3-N) concentrations were developed for all three options. These estimates were based on the design influent characteristics as presented in Table 4.5, and in particular the projected influent TKN and BOD_5 concentrations. Should the influent TKN concentrations be higher than projected and/or should the TKN:BOD_5 ratio increase, this would increase the anticipated average effluent NO_3-N concentrations.

The results of the bioreactor capacity assessment are presented in Table 5.2.

Table 5.2 – Estimated Bioreactor Capacity for Alternative Operating Modes

Capacity	Status Quo	Pre Anoxic Zone	MLE
Organic Loading Capacity	267 kg BOD_5/d	240 kg BOD_5/d	235 kg BOD_5/d
Equivalent Liquid Treatment Train Influent ADF Capacity (1)	1,829 m^3/d	1,644 m^3/d	1,610 m^3/d
Anticipated Average Effluent NO_3-N	20 – 25 mg/L	10 – 15 mg/L	5 – 10 mg/L

Notes:

1. ADF capacity based on all influent to bioreactors, which includes internal recycle streams (filter backwash and digester supernatant).

5.2.3 Oxygenation

Configuration and Historical Performance

The existing oxygenation system consists of three blowers (2 duty, 1 standby), each with capacities of 2,844 m^3/h. The blowers provide aeration to both the bioreactors and the aerobic digesters

and sludge storage tanks. Therefore, it was assumed that the firm capacity dedicated to bioreactor aeration is the capacity of one blower, or 2,844 m^3/hr. The bioreactors are equipped with a fine-bubble aeration system.

Capacity Assessment

The capacity of the oxygenation system was assessed based on the firm capacity dedicated to the bioreactors and an assumed field oxygen transfer efficiency (FOTE) of 12% based on the bioreactor SWD of 5.0 m (MOE, 2008). Liquid treatment train influent BOD_5 and TKN concentrations were used, and a peak day TKN loading factor of 1.5 was assumed (based on the estimated dry weather MDF factor).

The estimated ADF capacity of the oxygenation system is 5,569 m^3/d (in terms of liquid treatment train influent flows). This is equivalent to an average liquid treatment train influent BOD_5 loading capacity of 813 kg/d.

5.2.4 Return Activated Sludge Pumping

Configuration and Historical Performance

The existing return activated sludge (RAS) pumping system consists of three pumps (2 duty, 1 standby), each rated for 15.2 L/s (1,313 m^3/d), providing a firm pumping capacity of 2,626 m^3/d.

Capacity Assessment

Typical RAS return rates for an extended aeration facility range between 50% to 200% of the average influent flow rate. For the purposes of this capacity assessment, the capacity of the RAS system was based on providing a minimum of 150% of the average influent flows. Therefore, the estimated ADF capacity of the RAS pumping system is 1,751 m^3/d (in terms of liquid treatment train influent).

5.2.5 Secondary Clarifiers

Configuration and Historical Performance

The Lucan WWTP is equipped with two rectangular clarifiers, each with dimensions of 4 m x 21.5 m x 4.3 m SWD. Each clarifier provides a surface area of 86 m^2, with a total clarification surface area of 172 m^2.

Table 5.3 presents the historical estimated operating parameters for the secondary clarifier based on recorded WWTP effluent flows and the historical average operating MLSS concentration and RAS:ADF ratio.

Table 5.3 – Estimated Historical Secondary Clarifier Operating Conditions

Parameter	Historical Value	Typical Design Value
Historical Liquid Treatment Train MDF (1)	3,142 m^3/d	-
Estimated SOR (peak day) (2)	18.3 $m^3/m^2/d$	< 37 $m^3/m^2/d$
SLR (maximum day) (3)	83.1 $kg/m^2/d$	< 170 $kg/m^2/d$

Notes:

SOR – Surface overflow rate

SLR – Solids loading rate

1. Maximum day effluent flow (3,028 m^3/d) plus an allowance for internal recycle streams (114 m^3/d).
2. Clarifier SOR is typically assessed based on PHF; however, no PHF data were available. Given the available flow equalization to divert raw wastewater to the storage lagoon during wet weather events, it was assumed that the PHF would not be significantly higher than the recorded MDF through the WWTP.
3. Peak day SLR estimated based on historical average RAS flow of 1,018 m^3/d, and the historical operating MLSS concentration of 3,434 mg/L.

As shown in Table 5.3, the secondary clarifiers appear to have operated at SOR and SLR values below typical design guideline values. Baffles have been installed to prevent foam from the bioreactors entering the secondary clarifiers. As noted in Section 5.2.2, physical modifications to the bioreactors may reduce the potential for foam accumulation, which would eliminate the need for these baffles.

Finally, it is believed that the configuration of the secondary clarifiers has contributed to rising sludge which occasionally impacts secondary effluent quality. This is discussed in more detail in the memorandum in Appendix B. It is recommended that methods to address the accumulation of sludge on the sloped wall at the effluent end of the clarifiers be investigated as part of any future upgrades.

Capacity Assessment

The PHF capacity of the secondary clarifiers was estimated based on the typical design guideline peak hour SOR of 37 $m^3/m^2/d$. Assuming both clarifiers are in operation, the PIF capacity of the clarifiers is estimated to be 6,880 m^3/d (in terms of liquid treatment train influent flows).

The MDF capacity of the secondary clarifiers was estimated based on the typical design guideline maximum day SLR of 170 $kg/m^2/d$, the bioreactors operating at a MLSS concentration of 4,000 mg/L and RAS pumping system operating 150% of the influent ADF. Assuming both clarifiers are in operation, the MDF capacity of the clarifiers is estimated to be 5,209 m^3/d (in terms of liquid treatment train influent flows).

5.2.6 Tertiary Filters

Configuration and Historical Performance

The tertiary treatment system consists of two rotating disk filters, each with a surface area of 5.8 m^2 providing a total surface area of 11.6 m^2. According to the ECA, the design filtration rates are 3.0 $L/m^2/d$ (average) and 10 $L/m^2/d$ (peak), corresponding to a peak design flow capacity of 5,000 m^3/d at N-1 conditions.

The current operating strategy for the filtration system involves typically running both filters. The system has the capability to operate in automatic backwash mode and has in the past, however as of late 2020 the filters were being operated in continuous backwash mode. It is unclear when that operational change was made.

The filters have consistently produced effluent with TSS and TP concentrations below the ECA limits, although the objectives are occasionally exceeded (see Section 3.3). In addition, final effluent TSS concentrations have been increasing year-over-year. Finally, operations staff have noted that the poor secondary effluent quality results in frequent clogging of the canister pre-filter.

Capacity Assessment

For the purposes of developing the capacity of the filters, the original N-1 design capacity of 5,000 m^3/d (peak flow) was taken to be the PIF capacity of the existing filtration system (in terms of liquid treatment train influent). Because the WWTP typically operates with both filters online, this provides additional capacity to keep filtration rates lower than the peak design values even during peak flow events unless one disk filter unit is offline.

5.2.7 UV Disinfection

Configuration and Historical Performance

The existing disinfection system consists of two UV disinfection units (1 duty, 1 standby) located in a single channel. Each UV disinfection unit sized for a peak flow of 5,000 m^3/d. No data were available regarding design UV transmittance (UVT), however these systems are typically designed for a UVT of 65%.

Capacity Assessment

For the purposes of this study, the PIF capacity of the UV disinfection system is taken to be the firm peak flow capacity of 5,000 m^3/d (in terms of raw wastewater flows).

The Township could consider monitoring of the tertiary effluent UVT to estimate actual UVT values, particularly during high flow conditions. This information could then be used by the equipment supplier to update the design peak flow capacity of the UV disinfection system.

5.2.8 Sludge Digestion and Storage

Configuration and Historical Performance

The existing sludge handling facilities consist of:

- A two-stage aerobic digester, with 123 m^3 of volume in each of the two stages, providing a total digester volume of 246 m^3; and
- Three sludge storage tanks providing a total 744 m^3 of storage volume.

On average over the period 2017 to 2019, 1,212 m^3 of biosolids were hauled from the storage tanks per year. No data were available regarding biosolids quality, although based on a mass balance assessment it is estimated that the hauled biosolids had a concentration of 3.0 to 3.5%. Because of storage limitations, and wet conditions early in the land application season, it was necessary to use the storage lagoon for emergency biosolids storage. During each of 2017, 2018 and 2019, biosolids were hauled in May and discharged to the storage lagoon (approximately 400 m^3) and again in September for land application (approximately 800 m^3).

Capacity Assessment

The capacity of the sludge digestion system was based on a yield of 1.1 kg/kg, a total system SRT of 45 d (15 d in the bioreactors and 30 in the digester), a maximum month sludge generation rate of 1.5 times the average (based on typical maximum month factors at other similar facilities), thickening to 2.0% in the digester and providing an additional 25% volume to allow for supernating (MOE, 2008). Using these assumptions, the capacity of the two-stage digester is estimated to be equivalent to an average liquid treatment influent BOD_5 loading of 79 kg/d or an ADF capacity of 541 m^3/d (in terms of liquid treatment train influent flows).

The capacity of the storage tank was based on achieving a conservative thickened sludge concentration of 2.75%, 50% VSS destruction in the digesters, and providing a minimum of 280 days of storage to avoid the need to haul biosolids to the lagoon. Using these assumptions, the capacity of the sludge storage tanks is estimated to be equivalent to a liquid treatment influent BOD_5 loading of 100 kg/d or and ADF capacity of 685 m^3/d (in terms of liquid treatment train influent flows).

5.3 Hydraulic Evaluation

A hydraulic analysis of the overall existing WWTP was not completed as part of this desktop capacity evaluation, as it is outside the scope of this study.

The Lucan WWTP has the capability to divert raw wastewater flows to the off-site storage lagoon during peak flow events. This flexibility will allow the WWTP to control the magnitude of peak flows conveyed to its unit processes.

5.4 Capacity Assessment Summary

The previous sub-sections outline the capacities of the individual WWTP unit processes either in terms of ADF, MDF or PIF. It was also noted if these capacities were in terms of raw wastewater flows (for unit processes that are not subject to the hydraulic and organic loadings from the internal recycle streams), or liquid treatment train influent flows (for those unit processes that are subject to hydraulic and organic loadings from the internal recycle streams). For unit processes designed to accommodate organic loadings, the capacity was also expressed in terms of average BOD_5 loading.

In order to provide a common basis for the interpretation of the results of the desktop capacity assessment, the estimated unit process capacities have all been adjusted, as needed, to reflect an equivalent raw wastewater ADF capacity (i.e. not including internal recycle stream flows) to allow direct comparison of the estimated capacity to the ECA rated ADF capacity of 1,700 m^3/d. For example, for a unit process with a MDF capacity in terms of liquid treatment train influent, the reported MDF capacity is divided by a peaking factor equivalent to the design liquid treatment train MDF: design raw wastewater ADF (as defined in Table 4.5) to calculate the equivalent raw wastewater ADF capacity.

In addition, the equivalent raw wastewater ADF capacities were developed for two operating scenarios, namely:

- Scenario 1 – Without Equalization: All influent flows to the Chestnut St. SPS are directed to the Lucan WWTP, and no flows are diverted to the existing, on-site diversion lagoon; and
- Scenario 2 – With Equalization: Peak influent flows in excess of 5,000 m^3/d (the design peak flow capacity of the Lucan WWTP) are diverted to the existing, off-site storage lagoon.

These results are summarized in Table 5.4 and graphically in Figure 5.1.

Table 5.4 – Lucan WWTP Unit Process Capacity Summary

Unit Process	Estimated Unit Process Capacity (m^3/d) [1]			Estimated Avg Organic Loading Capacity (kg BOD_5/d)	Equivalent Raw Wastewater ADF Capacity (m3/d) [2]	
	ADF	MDF	PIF		Scenario 1 Without Equalization	Scenario 2 With Equalization [3]
Bioreactors – Status Quo	1,829	n/a	n/a	267	***1,648***	***1,648***
Bioreactors – Pre-Anoxic	1,644	n/a	n/a	240	***1,481***	***1,481***
Bioreactors – MLE	1,640	n/a	n/a	235	***1,477***	***1,477***
Oxygenation	5,569	n/a	n/a	830	5,017	5,017
RAS	1,751	n/a	n/a	n/a	***1,577***	***1,577***
Secondary Clarifiers – SOR	n/a	n/a	6,880	n/a	***1,192***	2,256
Secondary Clarifiers – SLR	n/a	5,209	n/a	n/a	***1,057***	1,708
Tertiary Filters	n/a	n/a	5,000	n/a	***867***	***1,639***
Disinfection	n/a	n/a	5,000	n/a	***883***	1,700
Sludge Digestion	541	n/a	n/a	79	***487***	***487***
Sludge Storage	685	n/a	n/a	100	***617***	***617***

Notes:

n/a – Not applicable. Unit process design is not based on that flow basis.

Equivalent raw wastewater ADF capacities in bold italics are those which are less than the current ECA rated ADF capacity of 1,700 m^3/d.

1. Details for all unit process capacity estimates can be found in Section 5.2.
2. Equivalent Raw Wastewater ADF Capacity values can be directly compared to the existing ECA rated ADF capacity. These values were calculated by dividing the estimated unit process capacity (from columns 2 to 4) by the appropriate peaking factors, based on the ratio of liquid treatment train influent to raw wastewater flow.
3. Peaking factors used for Scenario 2 were based on diverting all influent flows to the Chestnut St SPS in excess of 5,000 m^3/d to the off-site storage lagoon.

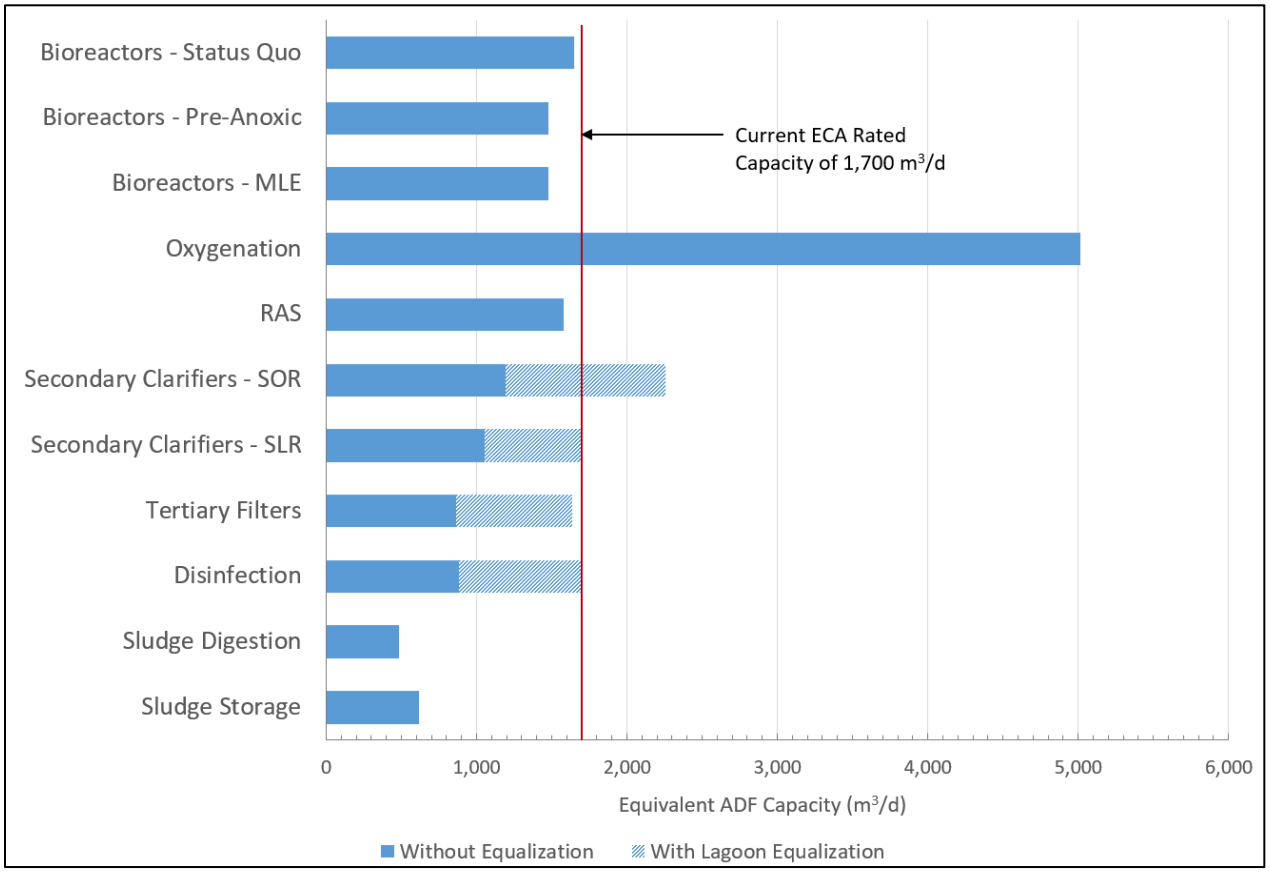

Figure 5.1 – Lucan WWTP Capacity Assessment Summary

The following conclusions can be drawn from Table 5.4 and Figure 5.1:

- Liquid treatment train capacity:
    - Without equalization, the equivalent raw wastewater ADF capacity is limited by tertiary filtration and disinfection at approximately 870 m^3/d. The secondary clarifiers have slightly more capacity at approximately 1,050 m^3/d.
    - Utilizing the storage lagoon for influent equalization addresses the hydraulic capacity limitations of the tertiary filters and disinfection system. The capacity is then limited by the bioreactors, with an equivalent raw wastewater ADF capacity of 1,648 m^3/d when the bioreactors are operated in aerobic mode (Status Quo), reducing to 1,481 m^3/d and 1,477 m^3/d for limited denitrification (Pre-Anoxic) and enhanced denitrification (MLE), respectively.
    - Continued use of the storage lagoon to limit influent peak flows to the Lucan WWTP maximizes available treatment capacity.
- Solids treatment train capacity:
    - The equivalent raw wastewater ADF capacity of the aerobic sludge digestion system of 487 m^3/d is significantly less than the ECA rated capacity. Despite this, the Lucan

WWTP has likely historically produced stabilized biosolids given additional retention time provided in the sludge storage tanks.

- The capacity of the sludge storage system of 617 m^3/d is also significantly less than the ECA rated capacity. Historic operating data suggest that the storage system has historically been unable to provide sufficient storage over the non-land application season, resulting in the need to haul biosolids to the storage lagoon for long-term storage. This capacity assessment was based on a conservative estimate of thickened biosolids concentration (2.75%). If operations staff are able to thicken the sludge to concentrations in excess of 3.5%, this could increase the capacity to more than 760 m^3/d, however this is still significantly less that the ECA rated capacity.

6. Summary and Conclusions

6.1 Historical Review and Flow and Loading Projections

Based on a review of the historical recorded raw wastewater and final effluent flows and quality, the following conclusions can be made:

- In general, the WWTP influent and effluent flow meters show good agreement, with the effluent meter reading approximately 5% less on average. Therefore, the influent flow data were used to represent raw wastewater flows to the WWTP since this provides a more conservative value.
- Internal recycle stream flows and loadings are not monitored. Estimates were developed based on the configuration of the Lucan WWTP and experience at other similar facilities.
- The annual estimated per capita flows are in the mid-range of the typical design values of 225 to 450 L/cap·d, exclusive of extraneous flows (MOE, 2008).
- Historic maximum day flow within the collection system was estimated to be 6,952 m^3/d; however, peak flows to the Lucan WWTP have been limited to approximately 3,000 m^3/d through the use of the storage lagoon for offsite equalization.
- The raw wastewater can be characterized as low strength with respect to BOD_5, TKN and TP, and very low strength with respect to TSS.
- The Lucan WWTP has been able to consistently meet its effluent compliance limits for all parameters. In addition, the $cBOD_5$ and TAN objectives were consistently met. Conversely, the TP objective is often exceeded, and effluent TSS concentrations have been increasing over the review period ultimately resulting in monthly average concentrations exceeding the objective in 6 months of 2020.

Table 6.1 presents the projected flows and loadings to the Lucan WWTP when it is operating at its rated ADF capacity of 1,700 m^3/d. Projections were developed on both raw wastewater and liquid treatment train bases, the latter including projected contributions from internal recycle streams.

Table 6.1 – Projected Flows and Loadings to the Lucan WWTP Operating at the Rated ADF Capacity of 1,700 m^3/d

Parameter	Raw Wastewater	Liquid Treatment Train Influent
Flows		
ADF	1,700 m^3/d	1,887 m^3/d
MDF	8,197 m^3/d	8,384 m^3/d
MDF Factor (normalized to raw wastewater ADF)	4.82	4.93
PIF	9,624 m^3/d	9,811 m^3/d
PIF Factor (normalized to raw wastewater ADF)	5.66	5.77
Concentrations		
BOD_5	159 mg/L	146 mg/L
TSS	68 mg/L	80 mg/L
TKN	30.7 mg/L	27.8 mg/L
TP	3.0 mg/L	4.1 mg/L

6.2 Capacity Assessment

A detailed unit process-by-unit process capacity assessment was conducted based on desk-top analytical methods. Key conclusions of the overall capacity assessment are presented below. Details can be found in Section 5.

The overall capacity assessment of the Lucan WWTP was developed in terms of equivalent raw wastewater ADF and average organic loadings for two operating scenarios as follows:

- Scenario 1 – Without Equalization: All influent flows to the Chestnut St SPS are directed to the Lucan WWTP, and no flows are diverted to the existing, on-site diversion lagoon; and
- Scenario 2 – With Equalization: Peak influent flows in excess of 5,000 m^3/d (the design peak flow capacity of the Lucan WWTP) are diverted to the existing, off-site storage lagoon.

Bioreactor capacities were developed based on three future design options, namely: status quo (not designed for denitrification, average effluent NO_3-N of 20 to 25 mg/L), providing a pre-anoxic zone in each bioreactor (limited denitrification, average effluent NO_3-N of 10 to 15 mg/L), and converting the bioreactors to the Modified-Ludzack-Ettinger (MLE) process (enhanced denitrification, average effluent NO_3-N of <5 to 10 mg/L).The results of this assessment are presented in tabular form in Table 6.2 and graphically in Figure 6.1.

Table 6.2 – Lucan WWTP Unit Process Capacity Summary

Unit Process	Estimated Unit Process Capacity (m^3/d) [1]			Estimated Avg Organic Loading Capacity (kg BOD_5/d)	Equivalent Raw Wastewater ADF Capacity (m3/d) [2]	
	ADF	MDF	PIF		Scenario 1 Without Equalization	Scenario 2 With Equalization [3]
Bioreactors – Status Quo	1,829	n/a	n/a	267	***1,648***	***1,648***
Bioreactors – Pre-Anoxic	1,644	n/a	n/a	240	***1,481***	***1,481***
Bioreactors – MLE	1,640	n/a	n/a	235	***1,477***	***1,477***
Oxygenation	5,569	n/a	n/a	830	5,017	5,017
RAS	1,751	n/a	n/a	n/a	***1,577***	***1,577***
Secondary Clarifiers – SOR	n/a	n/a	6,880	n/a	***1,192***	2,256
Secondary Clarifiers – SLR	n/a	5,209	n/a	n/a	***1,057***	1,708
Tertiary Filters	n/a	n/a	5,000	n/a	***867***	***1,639***
Disinfection	n/a	n/a	5,000	n/a	***883***	1,700
Sludge Digestion	541	n/a	n/a	79	***487***	***487***
Sludge Storage	685	n/a	n/a	100	***617***	***617***

Notes:

n/a – Not applicable. Unit process design is not based on that flow basis.

Equivalent raw wastewater ADF capacities in bold italics are those which are less than the current ECA rated ADF capacity of 1,700 m^3/d.

4. Details for all unit process capacity estimates can be found in Section 5.2.
5. Equivalent Raw Wastewater ADF Capacity values can be directly compared to the existing ECA rated ADF capacity. These values were calculated by dividing the estimated unit process capacity (from columns 2 to 4) by the appropriate peaking factors, based on the ratio of liquid treatment train influent to raw wastewater flow.
6. Peaking factors used for Scenario 2 were based on diverting all influent flows to the Chestnut St SPS in excess of 5,000 m^3/d to the off-site storage lagoon.

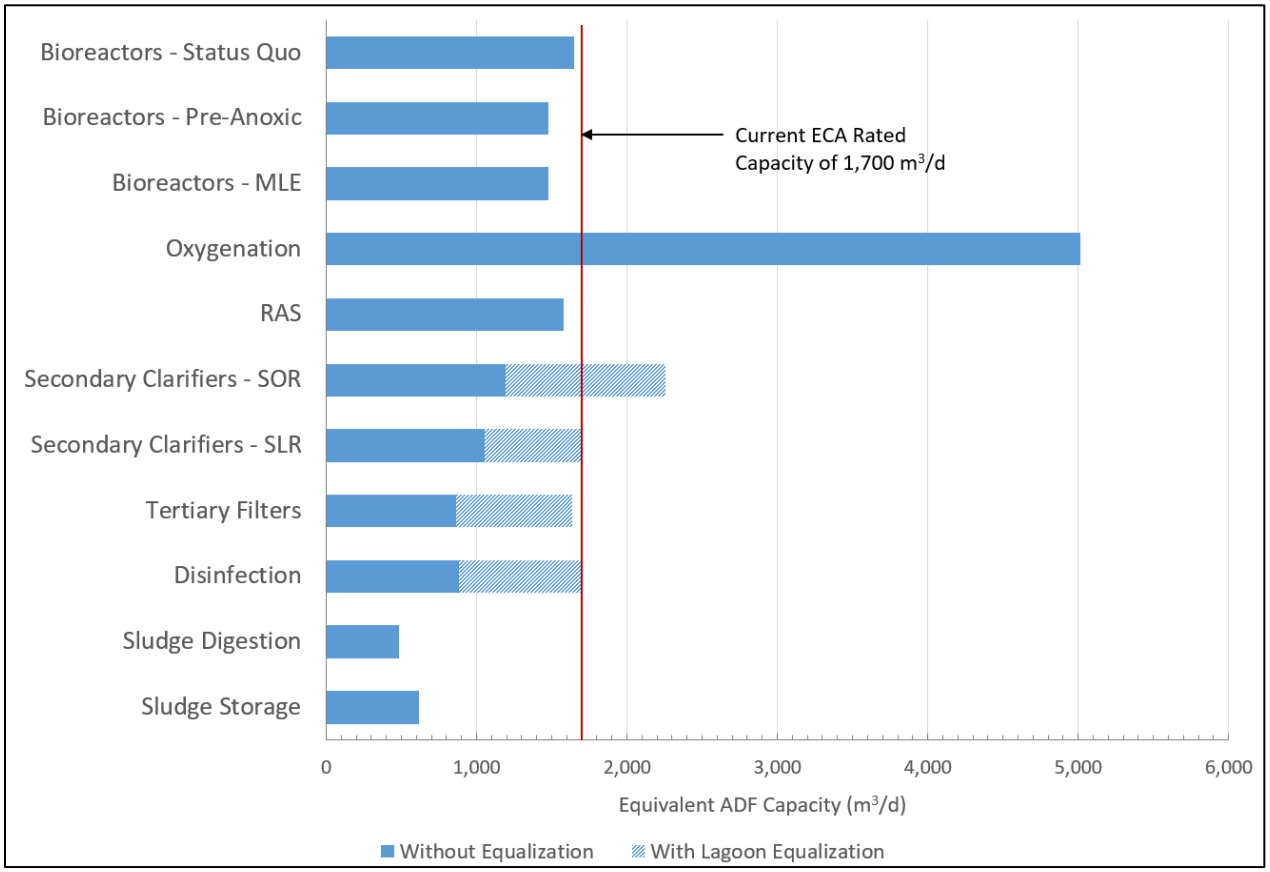

Figure 6.1 – Lucan WWTP Capacity Assessment Summary

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Appendix A

ECA No. 7008-B7CJWY

AMENDED ENVIRONMENTAL COMPLIANCE APPROVAL
NUMBER 7008-B7CJWY
Issue Date: February 11, 2019

The Corporation of the Township of Lucan Biddulph
270 Main Street, Lucan Biddulph,
Ontario, N0M 2J0

Site Location: Lucan WPCP
6242 Fallon Drive, Lot 25, Concession 4
Township of Lucan Biddulph, County of Middlesex.

You have applied under section 20.2 of Part II.1 of the Environmental Protection Act , R.S.O. 1990, c. E. 19 (Environmental Protection Act) for approval of:

alteration to the Chestnut Street Sewage Pumping Station, usage and operation of existing municipal sewage works, for the treatment of sanitary sewage and disposal of effluent to Little Ausable River via Lucan Sewage Treatment Plant, and Final Effluent disposal facilities as follows:

Classification of Collection System: Nominally Separate Sewer System

Classification of Sewage Treatment Plant: Tertiary

Classification of Sewage Treatment Plant (Prior to Completion of Construction of All Proposed Works): Tertiary

Classification of Sewage Treatment Plant (Upon Completion of Construction of All Proposed Works): Tertiary

Design Capacity of Sewage Treatment Plant:

Design Capacity with All Treatment Trains in Operation	Prior to Completion of Construction of All Proposed Works	Upon Completion of Construction of All Proposed Works
Rated Capacity	1,700 m3/d	1,700 m3/d

Proposed Works:

Sanitary Sewage Pumping Stations:

Chestnut Street Pumping Station and Valve Chamber:

- replacement of two (2) existing 20 hp pumps in wet well #1 with two (2) new

submersible sewage pumps, capable of passing through 75 mm diameter solids, self cleaning, semi-open channel impeller, together rated at 41 L/sec at 23 m TDH, complete with 15 hp motors and variable frequency drives (VFDs);

- addition of one (1) 200 mm diameter motorized plug valve for forcemain drainage;
- addition of one (1) 200 mm diameter knife gate valve on the forcemain drain line to allow for maintenance of the plug valve;

Existing Works:

Sanitary Sewage Pumping Station:

Chestnut Street Sewage Pumping Station:

a 7.6 m X 3.0 m X 8.3 m high, rectangular wet well, reinforced concrete, two chamber sewage pumping station, with a minimum volume 40 cu.m., equipped with five (5) submersible pumps, rated as follows:

- One (I) submersible pump rated at 15 L/s (Jockey Pump);

- Two (2) submersible pumps, one (I) as stand-by, each rated at 168 L/s;

- Two (2) submersible pumps, one (I) as stand-by, each rated at 41.7 L/s, to be removed and taken out of service and replaced with new pumps as proposed;

one (1) 300 mm diameter by-pass forcemain, approximately 900 m long, within an easements from Chestnut Street Sewage Pumping Station to the Sewage Lagoon, as described below;

one (1) 500 mm diameter, 10 m long emergency overflow gravity sewer at the sewage pump station, that discharges to the Benn Drain;

one (1) 200 mm diameter forcemain, approximately 1600 m long, located within an easement, from Chestnut Street Sewage Pumping Station to the Lucan WWTP (extended aeration plant);

Sewage Lagoon:

Located at 6207 Fallon Drive, a two (2) cells facultative sewage lagoon, each on separate areas of two (2) ha., with an approximate total storage volume of 37,000 cu.m. for storage of raw sewage at the high emergency overflow events in the pump station.

Lucan WWTP:

Influent Sewer

- one (1) 200 mm diameter forcemain inlet to the Preliminary Treatment System;

Preliminary Treatment System

- Screening
    - One (1) mechanically raked bar screen, 20 mm clear opening between bars, sized for the peak design flow of 3,600 cu.m. per day;
- Grit Removal
    - A vortex type grit chamber sized for the peak flow of 3,600 cubic metres per day and designed for 95 per cent capture of 150 micron or larger grit particles.
    - A grit classifier to separate and dewater concentrated grit slurry (under-flow) for vortex grit chamber for a maximum flow rate of 1.5 L/sec.

Influent Flow Measurement and Sampling Point

- Two (2) flow measurement devices in a chamber near Chestnut Street Pump Station: one (1) measuring sewage flow into the treatment plant and one (1) measuring sewage flow into the Lagoon.
- One (1) automatic composite sampler at the treatment plant Headworks Building;

Primary Treatment System: None

Secondary Treatment System:

- Biological Treatment
    - Two (2) 16 m x 8 m x 5 m SWD completely mixed aeration tanks with, each having a volume of 550 cubic meters to provide a hydraulic retention time of 24 hours at the average design flow, complete with fine bubble diffused aeration system with a minimum oxygen transfer capacity of 530 kg/d and a minimum firm capacity of 472 L/sec (standard conditions).
    - Three (3) air blowers, 75hp each, rated at 2,844 cu.m./h; equipped with Variable Frequency Drives (VFDs) and also designed to provide air flow to the digesters under normal conditions.
- Secondary Sedimentation
    - Two (2) secondary clarifiers rectangular type each 4 m X 21.5 m X 4.3m SWD; each having an approximate surface area of 80 square metres and a

volume of 315 cubic metres, equipped with sludge and scum removing mechanism and outlet weir with an overflow rate of 2.2 L/m.sec;

- a complete effluent spraying system, including an effluent pump, piping with spray nozzles to spray the effluent from the Rotating Disc Filters in the aeration tank and clarifier as when required;
- Three (3) centrifugal RAS/WAS pumps, one (1) as stand-by, each with VFDs, rated at 15.2 L/sec;
- 100 mm diameter, branch-off line with automated valve from the return activated sludge line for waste activated sludge, discharging to the primary clarifier distribution chamber for co-thickening in the primary clarifiers;

Post-Secondary Treatment System:

- Filtration System / Rotating Disc Filter:
  - Two (2) rotating disk filters with a total area per filter of 5.8 square metres, pore size of 5-25 micron, average loading rate of 3.0 L/m^2/s and peak loading rate of 10 L/m^2/s, supplied in stand-alone stainless steel tanks and capable of handling a flow rate up to 5,000 cubic metres per day;

Supplementary Treatment System:

- Phosphorus Removal: one (1) 27,000 L capacity phosphorus removal chemical storage tank and three (3) positive displacement metering pumps (one stand-by) each rated at 0 - 8.3 L/h;
- Alkalinity Addition: one (1) 27,000 L capacity alkalinity addition chemical storage tank and two (2) metering pumps (one stand-by) each rated at 0 - 8.3 L/h;
- Dissolved Oxygen Adjustment: one (1) post aeration basin 3.0 m X 3.0m wide X 3 m SWD, having a storage volume of 27.0 cu.m. to check and adjust the dissolved oxygen level (DO) in the final effluent;

Disinfection System:

- One (1) UV treatment channel 10.19 m long by 3.81 m wide by 1.73 m deep, covered with a prefabricated building structure, consisting of a weir to maintain water level in the channel and complete with two (2) UV lamp banks operating in series, on duty/stand-by mode. Each UV bank is equipped with a total of 40 lamps (8 lamps per modules and 5 modules per bank); the UV disinfection system (Trojan model UV3000B) is capable of handling a peak flow rate of up to 5,000 cubic metres per day by each bank.

Final Effluent Flow Measurement and Sampling Point:

- One (1) effluent Autosampler (automatic composite sampler), and Parshall Flume flow measurement device, located downstream and at outlet of the UV disinfection channel;

Sludge Management System , complete with a two stage aerobic digester as follows:

- Primary (Stage 1) Digesters: one (1) holding tank with one (1) compartment, measuring 3.5 m X 7.5 m X 4.4 m SWD, providing a total effective holding capacity of approximately 123 cu.m. and equipped with Coarse bubble aeration system, having a sludge retention capacity of 123 cubic metres in Stage I;
- Secondary (Stage 2) Digester: one (1) holding tank with one (1) compartment, measuring 3.5 m X 7.5 m X 4.4 m SWD, providing a total effective holding capacity of approximately 123 cu.m. and equipped with Coarse Bubble Aeration system;
- Two (2) 5 hp capacity centrifugal non-clog activated sludge pumps;
- One (1) rotary positive displacement blower capable of supplying 790 L/s air at 56 kPa, as stand-by; and
- one (1) common chamber (1 m x 1 m x 3.6 m D) for collection of all supernatant from the sludge management system and to discharge by gravity into the plant drain line for treatment;
- Biosolids Storage and Disposal: a digested sludge storage tank having a storage capacity of approximately 744 cubic metres;

Final Effluent Disposal Facilities:

effluent sewer from the UV/filter building to the outfall chamber: an outlet sewer 300 mm diameter, 118 m long to Heenan Drain, ultimately discharging into Little Ausable River;

including all other mechanical system, electrical system, instrumentation and control system, stand-by power system, piping, pumps, valves and appurtenances essential for the proper, safe and reliable operation of the Works in accordance with this Approval, in the context of process performance and general principles of wastewater engineering only;

all in accordance with the submitted supporting documents listed in **Schedule A.**

For the purpose of this environmental compliance approval, the following definitions apply:

1. "Annual Average Daily Influent Flow" means the cumulative total sewage flow of Influent to the Sewage Treatment Plant during a calendar year divided by the number of days during which sewage was flowing to the Sewage Treatment Plant that year;

2. "Approval" means this environmental compliance approval and any schedules attached to it, and the application;

3. "BOD5" (also known as TBOD5) means five day biochemical oxygen demand measured in an unfiltered sample and includes carbonaceous and nitrogenous oxygen demands;

4. "Bypass" means diversion of sewage around one or more treatment processes, excluding Preliminary Treatment System, within the Sewage Treatment Plant with the diverted sewage flows being returned to the Sewage Treatment Plant treatment train upstream of the Final Effluent sampling point(s) and discharged via the approved effluent disposal facilities;

5. "CBOD5" means five day carbonaceous (nitrification inhibited) biochemical oxygen demand measured in an unfiltered sample;

6. "Director" means a person appointed by the Minister pursuant to section 5 of the EPA for the purposes of Part II.1 of the EPA;

7. "District Manager" means the District Manager of the appropriate local district office of the Ministry where the Works is geographically located;

8. "E. Coli" refers to the thermally tolerant forms of Escherichia that can survive at 44.5 degrees Celsius;

9. "EPA" means the Environmental Protection Act, R.S.O. 1990, c.E.19, as amended;

10. "Equivalent Equipment" means alternate piece(s) of equipment that meets the design requirements and performance specifications of the piece(s) of equipment to be substituted;

11. "Event" means an action or occurrence, at a given location within the Works that causes a Bypass or Overflow. An Event ends when there is no recurrence of Bypass or Overflow in the 12-hour period following the last Bypass or Overflow. Overflows and Bypasses are separate Events even when they occur concurrently;

12. “Existing Works” means those portions of the Works included in the Approval that have been constructed previously;

13. "Final Effluent" means effluent that is discharged to the environment through the approved effluent disposal facilities, including all Bypasses, that are required to meet the compliance limits stipulated in the Approval for the Sewage Treatment Plant at the Final Effluent sampling point(s);

14. "Influent" means flows to the Sewage Treatment Plant from the collection system;

15. "Limited Operational Flexibility" (LOF) means the conditions that the Owner shall follow in order to undertake any modification that is pre-authorized as part of this Approval;

16. "Ministry" means the ministry of the government of Ontario responsible for the EPA and OWRA and includes all officials, employees or other persons acting on its behalf;

17. "Monthly Average Effluent Concentration" is the mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month, calculated and reported as per the methodology specified in Schedule F;

18. "Monthly Average Daily Effluent Flow" means the cumulative total Final Effluent discharged during a calendar month divided by the number of days during which Final Effluent was discharged that month;

19. "Monthly Average Daily Effluent Loading" means the value obtained by multiplying the Monthly Average Effluent Concentration of a contaminant by the Monthly Average Daily Effluent Flow over the same calendar month;

20. "Monthly Geometric Mean Density" is the mean of all Single Sample Results of E.Coli measurement in the samples taken during a calendar month, calculated and reported as per the methodology specified in Schedule F;

21. "Normal Operating Condition" means the condition when all unit process(es), excluding Preliminary Treatment System, in a treatment train is operating within its design capacity;

22. "Operating Agency" means the Owner or the entity that is authorized by the Owner for the management, operation, maintenance, or alteration of the Works in accordance with this Approval;

23. "Overflow" means a discharge to the environment from the Works at designed location(s) other than the approved effluent disposal facilities or via the effluent disposal facilities downstream of the Final Effluent sampling point;

24. "Owner" means The Corporation of the Township of Lucan Biddulph and its successors and assignees;

25. "OWRA" means the Ontario Water Resources Act, R.S.O. 1990, c. O.40, as amended;

26. “Preliminary Treatment System” means all facilities in the Sewage Treatment Plant associated with screening and grit removal;

27. "Professional Engineer” means a person entitled to practice as a Professional Engineer in the Province of Ontario under a licence issued under the Professional Engineers Act;

28. "Proposed Works" means those portions of the Works included in the Approval that are under construction or to be constructed;

29. "Rated Capacity" means the Annual Average Daily Influent Flow for which the Sewage Treatment Plant is designed to handle;

30. “Sewage Treatment Plant" means all the facilities related to sewage treatment within the sewage treatment plant site excluding the Final Effluent disposal facilities;

31. “Single Sample Result" means the test result of a parameter in the effluent discharged on any day, as measured by a probe, analyzer or in a composite or grab sample, as required;

32. "Works" means the approved sewage works, and includes Proposed Works, Existing Works and modifications made under Limited Operational Flexibility.

You are hereby notified that this environmental compliance approval is issued to you subject to the terms and conditions outlined below:

TERMS AND CONDITIONS

1. **GENERAL PROVISIONS**

2. The Owner shall ensure that any person authorized to carry out work on or operate any aspect of the Works is notified of this Approval and the terms and conditions herein and shall take all reasonable measures to ensure any such person complies with the same.

3. The Owner shall design, construct, operate and maintain the Works in accordance

with the conditions of this Approval.

4. Where there is a conflict between a provision of any document referred to in this Approval and the conditions of this Approval, the conditions in this Approval shall take precedence.

5. **CHANGE OF OWNER AND OPERATING AGENCY**

6. The Owner shall, within thirty (30) calendar days of issuance of this Approval, prepare/update and submit to the District Manager the Municipal and Local Services Board Wastewater System Profile Information Form, as amended (Schedule G) under any of the following situations:

a. the form has not been previously submitted for the Works;
b. this Approval is issued for extension, re-rating or process treatment upgrade of the Works;
c. when a notification is provided to the District Manager in compliance with requirements of change of Owner or Operating Agency under this condition.

7. The Owner shall notify the District Manager and the Director, in writing, of any of the following changes within thirty (30) days of the change occurring:

a. change of address of Owner;
b. change of Owner, including address of new owner;
c. change of partners where the Owner is or at any time becomes a partnership, and a copy of the most recent declaration filed under the Business Names Act, R.S.O. 1990, c. B.17, as amended, shall be included in the notification;
d. change of name of the corporation where the Owner is or at any time becomes a corporation, and a copy of the most current information filed under the Corporations Information Act, R.S.O. 1990, c. C.39, as amended, shall be included in the notification.

8. The Owner shall notify the District Manager, in writing, of any of the following changes within thirty (30) days of the change occurring:

a. change of address of Operating Agency;
b. change of Operating Agency, including address of new Operating Agency.

9. In the event of any change in ownership of the Works, the Owner shall notify the succeeding owner in writing, of the existence of this Approval, and forward a copy of the notice to the District Manager.

10. The Owner shall ensure that all communications made pursuant to this condition refer to the environmental compliance approval number.

11. **CONSTRUCTION OF PROPOSED WORKS / RECORD DRAWINGS**

12. All Proposed Works in this Approval shall be constructed and installed and must commence operation within five (5) years of issuance of this Approval, after which time the Approval ceases to apply in respect of any portions of the Works not in operation. In the event that the construction, installation and/or operation of any portion of the Proposed Works is anticipated to be delayed beyond the time period stipulated, the Owner shall submit to the Director an application to amend the Approval to extend this time period, at least six (6) months prior to the end of the period. The amendment application shall include the reason(s) for the delay and whether there is any design change(s).

13. Within thirty (30) days of commencement of construction, the Owner shall prepare and submit to the District Manager a schedule for the completion of construction and commissioning operation of the Proposed Works. The Owner shall notify the District Manager within thirty (30) days of the commissioning operation of any Proposed Works. Upon completion of construction of the Proposed Works, the Owner shall prepare and submit a statement to the District Manager, certified by a Professional Engineer, that the Proposed Works is constructed in accordance with this Approval.

14. Within one (1) year of completion of construction of the Proposed Works, a set of record drawings of the Works shall be prepared or updated. These drawings shall be kept up to date through revisions undertaken from time to time and a copy shall be readily accessible for reference at the Works.

15. **BYPASSES**

16. Any Bypass is prohibited, except:

a. an emergency Bypass when a structural, mechanical or electrical failure causes a temporary reduction in the capacity of a treatment process or when an unforeseen flow condition exceeds the design capacity of a treatment process that is likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset, if a portion of the flow is not bypassed;
b. a planned Bypass that is a direct and unavoidable result of a planned repair and maintenance procedure or other circumstance(s), the Owner having notified the District Manager in writing at least fifteen (15) days prior to the occurrence of Bypass, including an estimated quantity and duration of the Bypass, an

assessment of the impact on the quality of the Final Effluent and the mitigation measures if necessary, and the District Manager has given written consent of the Bypass;

c. a designed Bypass to the Lagoon under the following flow conditions: Bypass before the primary treatment system when flow rate to this system exceeds 3,600 m3/h;

17. Notwithstanding the exceptions given in Paragraph 1, the Operating Agency shall undertake everything practicable to maximize the flow through the downstream treatment process(es) prior to bypassing.

18. At the beginning of a Bypass Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

a. the type of the Bypass as indicated in Paragraph 1 and the reason(s) for the Bypass;

b. the date and time of the beginning of the Bypass;

c. the treatment process(es) gone through prior to the Bypass and the treatment process(es) bypassed;

d. the effort(s) done to maximize the flow through the downstream treatment process(es) and the reason(s) why the Bypass was not avoided.

19. Upon confirmation of the end of a Bypass Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

a. the date and time of the end of the Bypass;

b. the estimated or measured volume of Bypass.

20. For any Bypass Event, the Owner shall collect daily sample(s) of the Final Effluent, inclusive of the Event and analyze for all effluent parameters outlined in Compliance Limits condition, except for E. Coli, toxicity to Rainbow Trout and Daphnia magna, total residual chlorine / bisulphite residual, dissolved oxygen, pH, temperature and unionized ammonia, following the same protocol specified in the Monitoring and Recording condition as for the regular samples. The sample(s) shall be in addition to the regular Final Effluent samples required under the monitoring and recording condition, except when the Event occurs on a scheduled monitoring day.

21. The Owner shall submit a summary report of the Bypass Event(s) to the District Manager on a quarterly basis, no later than each of the following dates for each

calendar year: February 15, May 15, August 15, and November 15. The summary reports shall contain, at a minimum, the types of information set out in Paragraphs (3), (4) and (5) and either a statement of compliance or a summary of the non-compliance notifications submitted as required under Paragraph 1 of Condition 11. If there is no Bypass Event during a quarter, a statement of no occurrence of Bypass is deemed sufficient.

22. The Owner shall develop a notification procedure in consultation with the District Manager and SAC and notify the public and downstream water users that may be adversely impacted by any Bypass Event.

23. **OVERFLOWS**

24. Any Overflow is prohibited, except:

a. an emergency Overflow in an emergency situation when a structural, mechanical or electrical failure causes a temporary reduction in the capacity of the Works or when an unforeseen flow condition exceeds the design capacity of the Works that is likely to result in personal injury, loss of life, health hazard, basement flooding, severe property damage, equipment damage or treatment process upset, if a portion of the flow is not overflowed;
b. a planned Overflow that is a direct and unavoidable result of a planned repair and maintenance procedure or other circumstance(s), the Owner having notified the District Manager in writing at least fifteen (15) days prior to the occurrence of Overflow, including an estimated quantity and duration of the Overflow, an assessment of the impact on the environment and the mitigation measures if necessary, and the District Manager has given written consent of the Overflow;

25. Notwithstanding the exceptions given in Paragraph 1, the Operating Agency shall undertake everything practicable to maximize the flow through the downstream treatment process(es) and Bypass(es) prior to overflowing.

26. At the beginning of an Overflow Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

a. the type of the Overflow as indicated in Paragraph 1 and the reason(s) for the Overflow;
b. the date and time of the beginning of the Overflow;
c. the point of the Overflow from the Works, the treatment process(es) gone through prior to the Overflow, the disinfection status of the Overflow and whether the

Overflow is discharged through the effluent disposal facilities or an alternate location;

d. the effort(s) done to maximize the flow through the downstream treatment process(es) and Bypass(es) and the reason(s) why the Overflow was not avoided.

27. Upon confirmation of the end of an Overflow Event, the Owner shall immediately notify the Spills Action Centre (SAC) and the local Medical Officer of Health. This notice shall include, at a minimum, the following information:

a. the date and time of the end of the Overflow;

b. the estimated or measured volume of the Overflow.

28. For any Overflow Event

a. in the Sewage Treatment Plant, the Owner shall collect grab sample(s) of the Overflow, one near the beginning of the Event and one every eight (8) hours for the duration of the Event, and have them analyzed at least for CBOD5, total suspended solids, total phosphorus, except that raw sewage and primary treated effluent Overflow shall be analyzed for BOD5, total suspended solids, total phosphorus and total Kjeldahl nitrogen only.

29. The Owner shall submit a summary report of the Overflow Event(s) to the District Manager on a quarterly basis, no later than each of the following dates for each calendar year: February 15, May 15, August 15, and November 15. The summary report shall contain, at a minimum, the types of information set out in Paragraphs (3), (4) and (5). If there is no Overflow Event during a quarter, a statement of no occurrence of Overflow is deemed sufficient.

30. The Owner shall develop a notification procedure in consultation with the District Manager and SAC and notify the public and downstream water users that may be adversely impacted by any Overflow Event.

31. **DESIGN OBJECTIVES**

32. The Owner shall design and undertake everything practicable to operate the Sewage Treatment Plant in accordance with the following objectives:

a. Final Effluent parameters design objectives listed in the table(s) included in **Schedule B.**

b. Final Effluent is essentially free of floating and settleable solids and does not contain oil or any other substance in amounts sufficient to create a visible film or sheen or foam or discolouration on the receiving waters.

c. Annual Average Daily Influent Flow is within the Rated Capacity of the Sewage Treatment Plant.

33. **COMPLIANCE LIMITS**

1. The Owner shall operate and maintain the Sewage Treatment Plant such that compliance limits for the Final Effluent parameters listed in the table(s) included in **Schedule C** are met.

34.

OPERATION AND MAINTENANCE

1. The Owner shall ensure that, at all times, the Works and the related equipment and appurtenances used to achieve compliance with this Approval are properly operated and maintained. Proper operation and maintenance shall include effective performance, adequate funding, adequate staffing and training, including training in all procedures and other requirements of this Approval and the OWRA and regulations, adequate laboratory facilities, process controls and alarms and the use of process chemicals and other substances used in the Works.

2. The Owner shall update and maintain the operations manual for the Works within six (6) months of completion of construction of the Proposed Works, that includes, but not necessarily limited to, the following information:

a. operating procedures for the Works under Normal Operating Conditions;

b. inspection programs, including frequency of inspection, for the Works and the methods or tests employed to detect when maintenance is necessary;

c. repair and maintenance programs, including the frequency of repair and maintenance for the Works;

d. procedures for the inspection and calibration of monitoring equipment;

e. operating procedures for the Works to handle situations outside Normal Operating Conditions and emergency situations such as a structural, mechanical or electrical failure, or an unforeseen flow condition, including procedures to minimize Bypasses and Overflows;

f. a spill prevention and contingency plan, consisting of procedures and contingency plans, including notification to the District Manager, to reduce the risk of spills of pollutants and prevent, eliminate or ameliorate any adverse effects that result or may result from spills of pollutants;

g. procedures for receiving, responding and recording public complaints, including

recording any follow-up actions taken.

3. The Owner shall maintain the operations manual up-to-date and make the manual readily accessible for reference at the Works.

4. The Owner shall ensure that the Operating Agency fulfils the requirements under O. Reg. 129/04, as amended for the Works, including the classification of facilities, licensing of operators and operating standards.

35. **MONITORING AND RECORDING**

36. The Owner shall, upon commencement of operation of the Works, carry out a scheduled monitoring program of collecting samples at the required sampling points, at the frequency specified or higher, by means of the specified sample type and analyzed for each parameter listed in the tables under the monitoring program included in Schedule D and record all results, as follows:

a. all samples and measurements are to be taken at a time and in a location characteristic of the quality and quantity of the sewage stream over the time period being monitored.
b. a schedule of the day of the week/month for the scheduled sampling shall be created. The sampling schedule shall be revised and updated every year through rotation of the day of the week/month for the scheduled sampling program, except when the actual scheduled monitoring frequency is three (3) or more times per week.
c. definitions and preparation requirements for each sample type are included in document referenced in Paragraph 3.b.
d. definitions for frequency:
    i. Weekly means once every week;
    ii. Monthly means once every month;

37. In addition to the scheduled monitoring program required in Paragraph 1, the Owner shall collect daily sample(s) of the Final Effluent, on any day when there is any situation outside Normal Operating Conditions, by means of the specified sample type and analyzed for each parameter listed in the tables under the monitoring program included in Schedule D, except for E. Coli, toxicity to Rainbow Trout and Daphnia magna, total residual chlorine / bisulphite residual, dissolved oxygen, pH, temperature and unionized ammonia.

38. The methods and protocols for sampling, analysis and recording shall conform, in order of precedence, to the methods and protocols specified in the following documents

and all analysis shall be conducted by a laboratory accredited to the ISO/IEC:17025 standard or as directed by the District Manager and as follows:

a. the Ministry's Procedure F-10-1, “Procedures for Sampling and Analysis Requirements for Municipal and Private Sewage Treatment Works (Liquid Waste Streams Only), as amended;
b. the Ministry's publication "Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater Version 2.0" (January 2016), PIBS 2724e02, as amended;
c. the publication "Standard Methods for the Examination of Water and Wastewater", as amended.

39. The Owner shall monitor and record the flow rate and daily quantity using flow measuring devices or other methods of measurement as approved below calibrated to an accuracy within plus or minus 15 per cent (+/- 15%) of the actual flowrate of the following:

40. The Owner shall retain for a minimum of five (5) years from the date of their creation, all records and information related to or resulting from the monitoring activities required by this Approval.

41.

LIMITED OPERATIONAL FLEXIBILITY

1. The Owner may make pre-authorized modifications to the sewage pumping stations and Sewage Treatment Plant in Works in accordance with the document “Limited Operational Flexibility - Protocol for Pre-Authorized Modifications to Municipal Sewage Works” (Schedule E), as amended, subject to the following:

a. the modifications will not involve the addition of any new treatment process or the removal of an existing treatment process, including chemical systems, from the liquid or solids treatment trains as originally designed and approved.
b. the scope and technical aspects of the modifications are in line with those delineated in Schedule E and conform with the Ministry’s publication “Design Guidelines for Sewage Works 2008”, as amended, Ministry’s regulations, policies, guidelines, and industry engineering standards;
c. the modifications shall not negatively impact on the performance of any process or equipment in the Works or result in deterioration in the Final Effluent quality;
d. where the pre-authorized modification requires notification, a "Notice of

Modifications to Sewage Works" (Schedule E), as amended shall be completed with declarations from a Professional Engineer and the Owner and retained on-site prior to the scheduled implementation date. All supporting information including technical memorandum, engineering plans and specifications, as applicable and appropriate to support the declarations that the modifications conform with LOF shall remain on-site for future inspection.

2. The following modifications are not pre-authorized under Limited Operational Flexibility:

a. Modifications that involve addition or extension of process structures, tankages or channels;

b. Modifications that involve relocation of the Final Effluent outfall or any other discharge location or that may require reassessment of the impact to the receiver or environment;

c. Modifications that involve addition of or change in technology of a treatment process or that may involve reassessment of the treatment train process design;

d. Modifications that require changes to be made to the emergency response, spill prevention and contingency plan; or

e. Modifications that are required pursuant to an order issued by the Ministry.

42. **REPORTING**

1. The Owner shall report to the District Manager orally as soon as possible any non-compliance with the compliance limits, and in writing within seven (7) days of non-compliance.

2. The Owner shall, within fifteen (15) days of occurrence of a spill within the meaning of Part X of the EPA, submit a full written report of the occurrence to the District Manager describing the cause and discovery of the spill, clean-up and recovery measures taken, preventative measures to be taken and schedule of implementation, in addition to fulfilling the requirements under the EPA and O. Reg. 675/98 "Classification and Exemption of Spills and Reporting of Discharges".

3. The Owner shall, upon request, make all manuals, plans, records, data, procedures and supporting documentation available to Ministry staff.

4. The Owner shall prepare performance reports on a calendar year basis and submit to the District Manager by March 31 of the calendar year following the period being reported upon. The reports shall contain, but shall not be limited to, the following information pertaining to the reporting period:

a. a summary and interpretation of all Influent, monitoring data, and a review of the historical trend of the sewage characteristics and flow rates;

b. a summary and interpretation of all Final Effluent monitoring data, including concentration, flow rates, loading and a comparison to the design objectives and compliance limits in this Approval, including an overview of the success and adequacy of the Works;

c. a summary of any deviation from the monitoring schedule and reasons for the current reporting year and a schedule for the next reporting year;

d. a summary of all operating issues encountered and corrective actions taken;

e. a summary of all normal and emergency repairs and maintenance activities carried out on any major structure, equipment, apparatus or mechanism forming part of the Works;

f. a summary of any effluent quality assurance or control measures undertaken;

g. a summary of the calibration and maintenance carried out on all monitoring equipment to ensure that the accuracy is within the tolerance of that equipment as required in this Approval or recommended by the manufacturer;

h. a summary of efforts made to achieve the design objectives in this Approval, including an assessment of the issues and recommendations for pro-active actions if any are required under the following situations:
    i. when any of the design objectives is not achieved more than 50% of the time in a year, or there is an increasing trend in deterioration of Final Effluent quality;
    ii. when the Annual Average Daily Influent Flow reaches 80% of the Rated Capacity;

i. a tabulation of the volume of sludge generated, an outline of anticipated volumes to be generated in the next reporting period and a summary of the locations to where the sludge was disposed;

j. a summary of any complaints received and any steps taken to address the complaints;

k. a summary of all Bypasses, Overflows, other situations outside Normal Operating Conditions and spills within the meaning of Part X of EPA and abnormal discharge events;

l. a summary of all Notice of Modifications to Sewage Works completed under Paragraph 1.d. of Condition 10, including a report on status of implementation of all modification.

m. a summary of efforts made to achieve conformance with Procedure F-5-1 including but not limited to projects undertaken and completed in the sanitary

sewer system that result in overall Bypass/Overflow elimination including expenditures and proposed projects to eliminate Bypass/Overflows with estimated budget forecast for the year following that for which the report is submitted.

The reasons for the imposition of these terms and conditions are as follows:

1. Condition # 1 regarding general provisions is imposed to ensure that the Works are constructed and operated in the manner in which they were described and upon which approval was granted.

2. Condition # 2 regarding change of Owner and Operating Agency is included to ensure that the Ministry records are kept accurate and current with respect to ownership and Operating Agency of the Works and to ensure that subsequent owners of the Works are made aware of the Approval and continue to operate the Works in compliance with it.

3. Condition # 3 regarding construction of Proposed Works/record drawings is included to ensure that the Works are constructed in a timely manner so that standards applicable at the time of Approval of the Works are still applicable at the time of construction to ensure the ongoing protection of the environment, and also ensure that the Works are constructed in accordance with the Approval and that record drawings of the Works "as constructed" are updated and maintained for future references.

4. Condition # 4 regarding Bypasses is included to indicate that Bypass is prohibited, except in circumstances where the failure to Bypass could result in greater damage to the environment than the Bypass itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Bypass Events.

5. Condition # 5 regarding Overflows is included to indicate that Overflow of untreated or partially treated sewage to the receiver is prohibited, except in circumstances where the failure to Overflow could result in greater damage to the environment than the Overflow itself. The notification and documentation requirements allow the Ministry to take action in an informed manner and will ensure the Owner is aware of the extent and frequency of Overflow Events.

6. Condition # 6 regarding design objectives is imposed to establish non-enforceable design objectives to be used as a mechanism to trigger corrective action proactively and voluntarily before environmental impairment occurs.

7. Condition # 7 regarding compliance limits is imposed to ensure that the Final Effluent discharged from the Works to the environment meets the Ministry's effluent quality

requirements.

8. Condition # 8 regarding operation and maintenance is included to require that the Works be properly operated, maintained, funded, staffed and equipped such that the environment is protected and deterioration, loss, injury or damage to any person or property is prevented. As well, the inclusion of a comprehensive operations manual governing all significant areas of operation, maintenance and repair is prepared, implemented and kept up-to-date by the Owner. Such a manual is an integral part of the operation of the Works. Its compilation and use should assist the Owner in staff training, in proper plant operation and in identifying and planning for contingencies during possible abnormal conditions. The manual will also act as a benchmark for Ministry staff when reviewing the Owner's operation of the Works.

9. Condition # 9 regarding monitoring and recording is included to enable the Owner to evaluate and demonstrate the performance of the Works, on a continual basis, so that the Works are properly operated and maintained at a level which is consistent with the design objectives and compliance limits.

10. Condition # 10 regarding Limited Operational Flexibility is included to ensure that the Works are constructed, maintained and operated in accordance with the Approval, and that any pre-approved modification will not negatively impact on the performance of the Works.

11. Condition # 11 regarding reporting is included to provide a performance record for future references, to ensure that the Ministry is made aware of problems as they arise, and to provide a compliance record for this Approval.

12.

13.

Schedule A:

List of supporting documents:

1. Environmental Compliance Approval Application prepared and submitted by Gregory Simon, P.Eng. of Stantec Consulting Ltd. on behalf of The Corporation of the Township of Lucan Biddulph , dated April 6, 2018, including Design Brief dated March 09, 2018 and drawings.
2.
3.
4.

Schedule B

Final Effluent Design Objectives

Final Effluent Parameter	Averaging Calculator	Concentration Objective (milligrams per litre unless otherwise indicated)
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 results	6.5 to 8.5

* If the MPN method is utilized for E.coli analysis, the limit shall be 80 MPN/100 mL.

Schedule C: Final Effluent Compliance:

Concentration Limits

Final Effluent Parameter	Averaging Calculator	Concentration Limit (maximum unless otherwise indicated)
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

* If the MPN method is utilized for E.Coli analysis, the limit shall be 100 MPN/100 mL

Loading Limits

Final Effluent Parameter	Averaging Calculator	Limit (maximum unless otherwise indicated)
CBOD5	Monthly Average Daily Effluent Loading	17 kg/d
Total Suspended Solids	Monthly Average Daily Effluent Loading	17 kg/d
Total Phosphorus	Monthly Average Daily Effluent Loading	0.55 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)

Schedule D

Monitoring Program

Influent Sampling Point: Raw Sewage Pumping Station or at the Inlet of Aeration Tank

Parameters	Sample Type	Minimum Frequency
BOD5	Composite	Weekly
Total Suspended Solids	Composite	Weekly
Total Phosphorus	Composite	Weekly
Total Kjeldahl Nitrogen	Composite	Weekly

Final Effluent Sampling Point: Outlet of UV Disinfection Unit

Parameters	Sample Type	Minimum Frequency
CBOD5	24 hour composite	Weekly
Total Suspended Solids	24 hour composite	Weekly
Total Phosphorus	24 hour composite	Weekly
Total Ammonia Nitrogen	24 hour composite	Weekly
Total Kjeldahl Nitrogen	24 hour composite	Weekly
Nitrite Nitrogen	24 hour composite	Weekly
Nitrate Nitrogen	24 hour composite	Weekly

Alkalinity	24 hour composite	Weekly
E.Coli	Grab	Weekly
Dissolved Oxygen	Grab	Weekly
pH*	Grab/probe	Weekly
Temperature*	Grab/probe	Weekly

*pH and temperature of the Final Effluent shall be determined in the field at the time of sampling for Total Ammonia Nitrogen.

Schedule E

Limited Operational Flexibility

Protocol for Pre-Authorized Modifications to Municipal Sewage Works

1. **General**

2. Pre-authorized modifications are permitted only where Limited Operational Flexibility has already been granted in the Approval and only permitted to be made at the pumping stations and sewage treatment plant in the Works, subject to the conditions of the Approval.

3. Where there is a conflict between the types and scope of pre-authorized modifications listed in this document, and the Approval where Limited Operational Flexibility has been granted, the Approval shall take precedence.

4. The Owner shall consult the District Manager on any proposed modifications that may fall within the scope and intention of the Limited Operational Flexibility but is not listed explicitly or included as an example in this document.

5. The Owner shall ensure that any pre-authorized modifications will not:

f. adversely affect the hydraulic profile of the Sewage Treatment Plant or the performance of any upstream or downstream processes, both in terms of hydraulics and treatment performance;

g. result in new Overflow or Bypass locations, or any potential increase in frequency or quantity of Overflow(s) or Bypass(es).

h. result in a reduction in the required Peak Flow Rate of the treatment process or equipment as originally designed.

9. **Modifications that do not require pre-authorization:**

10. Sewage works that are exempt from Ministry approval requirements;

11. Modifications to the electrical system, instrumentation and control system.

12. **Pre-authorized modifications that do not require preparation of "Notice of Modification to Sewage Works"**

13. Normal or emergency maintenance activities, such as repairs, renovations, refurbishments and replacements with Equivalent Equipment, or other improvements to an existing approved piece of equipment of a treatment process do not require pre-authorization. Examples of these activities are:

a. Repairing a piece of equipment and putting it back into operation, including replacement of minor components such as belts, gear boxes, seals, bearings;

b. Repairing a piece of equipment by replacing a major component of the equipment such as motor, with the same make and model or another with the same or very close power rating but the capacity of the pump or blower will still be essentially the same as originally designed and approved;

c. Replacing the entire piece of equipment with Equivalent Equipment.

14. Improvements to equipment efficiency or treatment process control do not require pre-authorization. Examples of these activities are:

a. Adding variable frequency drive to pumps;

b. Adding on-line analyzer, dissolved oxygen probe, Oxygen reduction probe (ORP probe), flow measurement or other process control device.

15. **Pre-Authorized Modifications that require preparation of "Notice of Modification to Sewage Works"**

16. **Pumping Stations**

q. Replacement, realignment of existing sewers including manholes, valves, gates, weirs and associated appurtenances provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved.

r. Extension or partition of wetwell to increase retention time for emergency response and improve station maintenance and pump operation;

s. Replacement or installation of inlet screens to the wetwell;

t. Replacement or installation of flow meters, construction of station bypass;

u. Replacement, reconfiguration or addition of pumps and modifications to pump suctions and discharge pipings including valve, gates, motors, variable frequency drives and associated appurtenances to maintain firm pumping capacity or modulate the pump rate provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head or an increase in the peak pumping rate of the pumping station as originally designed;

v. Replacement, realignment of existing forcemain(s) valves, gates, and associated appurtenances provided that the modifications will not reduce the flow capacity or increase the total dynamic head and transient in the forcemain.

23. **Sewage Treatment Plant**

24. Sewers and appurtenances: Replacement, realignment of existing sewers (including pipes and channels) or construction of new sewers, including manholes, valves, gates, weirs and associated appurtenances within the a sewage treatment plant, provided that the modifications will not add new influent source(s) or result in an increase in flow from existing sources as originally approved and that the modifications will remove hydraulic bottlenecks or improve the conveyance of sewage into and through the Works.

25. Flow Distribution Chambers/Splitters: Replacement or modification of existing flow distribution chamber/splitters or construction of new flow distribution chamber/splitters, including replacements or installation of sluice gates, weirs, valves for distribution of flows to the downstream process trains, provided that the modifications will not result in a change in flow distribution ratio to the downstream process trains as originally designed.

26. Imported Sewage Receiving Facility

1. Replacement, relocation or installation of loading bays, connect/disconnect hook-up systems and unloading/transferring systems;
2. Replacement, relocation or installation of screens, grit removal units and compactors;
3. Replacement, relocation or installation of pumps, such as dosing pumps and transfer pumps, valves, piping and appurtenances;
4. Replacement, relocation or installation of storage tanks/chambers and spill containment systems;

5. Replacement, relocation or installation of flow measurement and sampling equipment;
6. Changes to the source(s) or quantity from each source, provided that changes will not result in an increase in the total quantity and waste loading of each type of Imported Sewage already approved for co-treatment.

27. Preliminary Treatment System

a. Replacement of existing screens and grit removal units with equipment of the same or higher process performance technology, including where necessary replacement or upgrading of existing screenings dewatering washing compactors, hydrocyclones, grit classifiers, grit pumps, air blowers conveyor system, disposal bins and other ancillary equipment to the screening and grit removal processes.
b. Replacement or installation of channel aeration systems, including air blowers, air supply main, air headers, air laterals, air distribution grids and diffusers.Primary Treatment System
c. Replacement of existing sludge removal mechanism, including sludge chamber;
d. Replacement or installation of scum removal mechanism, including scum chamber;
e. Replacement or installation of primary sludge pumps, scum pumps, provided that:the modifications will not result in a reduction in the firm pumping capacity or discharge head that the primary sludge pump(s) and scum pump(s) are originally designed to handle.

28. Secondary Treatment System

1. Biological Treatment
    a. Conversion of complete mix aeration tank to plug-flow multi-pass aeration tank, including modifications to internal structural configuration;
    b. Addition of inlet gates in multi-pass aeration tank for step-feed operation mode;
    c. Partitioning of an anoxic/flip zone in the inlet of the aeration tank, including installation of submersible mixer(s);
    d. Replacement of aeration system including air blowers, air supply main, air headers, air laterals, air distribution grids and diffusers, provided that the modifications will not result in a reduction in the firm capacity or discharge pressure that the blowers are originally designed to supply or in the net oxygen transferred to the wastewater required for biological treatment as originally required.

2. Secondary Sedimentation
    a. Replacement of sludge removal mechanism, including sludge chamber;
    b. Replacement or installation of scum removal mechanism, including scum chamber;
    c. Replacement or installation of return activated sludge pump(s), waste activated sludge pump(s), scum pump(s), provided that the modifications will not result in a reduction in the firm pumping capacity or discharge head that the activated sludge pump(s) and scum pump(s) are originally designed to handle.

29. Post-Secondary Treatment System: Replacement of filtration system with equipment of the same filtration technology, including feed pumps, backwash pumps, filter reject pumps, filtrate extract pumps, holding tanks associated with the pumping system, provided that the modifications will not result in a reduction in the capacity of the filtration system as originally designed.

30. Disinfection System

1. UV Irradiation: Replacement of UV irradiation system, provided that the modifications will not result in a reduction in the design capacity of the disinfection system or the radiation level as originally designed.

31. Supplementary Treatment Systems

1. Chemical systems
    a. Replacement, relocation or installation of chemical storage tanks for existing chemical systems only, provided that the tanks are sited with effective spill containment;
    b. Replacement or installation of chemical dosing pumps provided that the modifications will not result in a reduction in the firm capacity that the dosing pumps are originally designed to handle.
    c. Relocation and addition of chemical dosing point(s) including chemical feed pipes and valves and controls, to improve phosphorus removal efficiency;
    d. Use of an alternate chemical provided that it is a non-proprietary product and is a commonly used alternative to the chemical approved in the Works, provided that the chemical storage tanks, chemical dosing pumps, feed pipes and controls are also upgraded, as necessary..

32. Sludge Management System

1. Sludge Holding and Thickening: Replacement or installation of sludge holding tanks, sludge handling pumps, such as transfer pumps, feed pumps, recirculation pumps, provided that modifications will not result in reduction in the solids storage or handling capacities;
2. Sludge Digestion
    a. Replacement or installation of digesters, sludge handling pumps, such as transfer pumps, feed pumps, recirculation pumps, provided that modifications will not result in reduction in the solids storage or handling capacities;
    b. replacement of sludge digester covers.
3. Sludge Dewatering and Disposal: Replacement of sludge dewatering equipment, sludge handling pumps, such as transfer pumps, feed pumps, cake pumps, loading pumps, provided that modifications will not result in reduction in solids storage or handling capacities.
4. Processed Organic Waste: Changes to the source(s) or quantity from each source, provided that changes will not result in an increase in the total quantity already approved for co-processing.

33. **Stand-by Power System**

1. Replacement or installation of stand-by power system, including feed from alternate power grid, emergency power generator, fuel supply and storage systems, provided that the existing stand-by power generation capacity is not reduced.

34. **Pilot Study**

1. Small side-stream pilot study for existing or new technologies, alternative treatment process or chemical, provided:
    i. all effluent from the pilot system is hauled off-site for proper disposal or returned back to the sewage treatment plant for at a point no further than immediately downstream of the location from where the side-stream is drawn;
    ii. no proprietary treatment process or propriety chemical is involved in the pilot study;
    iii. the effluent from the pilot system returned to the sewage treatment plant does not significantly alter the composition/concentration of or add any new contaminant/inhibiting substances to the sewage to be treated in the downstream process;
    iv. the pilot study will not have any negative impacts on the operation of the sewage treatment plant or cause a deterioration of effluent quality;

v. the pilot study does not exceed a maximum of two years and a notification of completion shall be submitted to the District Manager within one month of completion of the pilot project.

35. **Lagoons**

1. installing baffles in lagoon provided that the operating capacity of the lagoon system is not reduced;
2. raise top elevation of lagoon berms to increase free-board;
3. replace or install interconnecting pipes and chambers between cells, provided that the process design operating sequence is not changed;
4. replace or install mechanical aerators, or replace mechanical aerators with diffused aeration system provided that the mixing and aeration capacity are not reduced;
5. removal of accumulated sludge and disposal to an approved location off-site.

36. **Final Effluent Disposal Facilities**

37. Replacement or realignment of the Final Effluent channel, sewer or forcemain, including manholes, valves and appurtenances from the end of the treatment train to the discharge outfall section, provided that the sewer conveys only effluent discharged from the Sewage Treatment Plant and that the replacement or re-aligned sewer has similar dimensions and performance criteria and is in the same or approximately the same location and that the hydraulic capacity will not be reduced.

Schedule F

Methodology for Calculating and Reporting

Monthly Average Effluent Concentration, Annual Average Effluent Concentration and Monthly Geometric Mean Density

1. Monthly Average Effluent Concentration

Step 1: Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month and proceed as follows depending on the result of the calculation:

a. If the arithmetic mean does not exceed the compliance limit for the

contaminant, then report and use this arithmetic mean as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval;

b. If the arithmetic mean exceeds the compliance limit for the contaminant and there was no Bypass Event during the calendar month, then report and use this arithmetic mean as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval;

c. If the arithmetic mean exceeds the compliance limit for the contaminant and there was Bypass Event(s) during the calendar month, then proceed to Step 2;

d. If the arithmetic mean does not exceed the compliance limit for the contaminant and there was Bypass Event(s) during the calendar month, the Owner may still elect to proceed to Step 2 calculation of the flow-weighted arithmetic mean.

Step 2: Calculate the flow-weighted arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar month and proceed depending on the result of the calculation:

a. Group No Bypass Days (**NBPD**) data and Bypass Days (**BPD**) data during a calendar month separately;

b. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all NBPD during a calendar month and record it as **Monthly Average NBPD Effluent Concentration**;

c. Obtain the "**Total Monthly NBPD Flow**" which is the total amount of Final Effluent discharged on all NBPD during the calendar month;

d. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all BPD during a calendar month and record it as **Monthly Average BPD Effluent Concentration**;

e. Obtain the "**Total Monthly BPD Flow**" which is the total amount of Final Effluent discharged on all BPD during the calendar month;

f. Calculate the flow-weighted arithmetic mean using the following formula:

[(Monthly Average NBPD Effluent Concentration × Total Monthly NBPD Flow) + (Monthly Average BPD Effluent Concentration × Total Monthly BPD Flow)] ÷ (Total Monthly NBPD Flow + Total Monthly BPD Flow)

It should be noted that in this method, if there are no Bypass Event for the month, the calculated result would be the same as the non-flow-weighted arithmetic mean method;

g. Report and use the lesser of the flow-weighted arithmetic mean obtained in Step 2 and the arithmetic mean obtained in Step 1 as the Monthly Average Effluent Concentration for this parameter where applicable in this Approval.

2. Annual Average Effluent Concentration

Step 1: Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year and proceed as follows depending on the result of the calculation:

a. If the arithmetic mean does not exceed the compliance limit for the contaminant, then report and use this arithmetic mean as the Annual Average Effluent Concentration for this parameter where applicable in this Approval;

b. If the arithmetic mean exceeds the compliance limit for the contaminant and there was no Bypass Event during the calendar year, then report and use this arithmetic mean as the Annual Average Effluent Concentration for this parameter where applicable in this Approval;

c. If the arithmetic mean exceeds the compliance limit for the contaminant and there was Bypass Event(s) during the calendar year, then proceed to Step 2;

d. If the arithmetic mean does not exceed the compliance limit for the contaminant and there was Bypass Event(s) during the calendar year, the

Owner may still elect to proceed to Step 2 calculation of the flow-weighted arithmetic mean.

Step 2: Calculate the flow-weighted arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured during a calendar year and proceed depending on the result of the calculation:

a. Group No Bypass Days (**NBPD**) data and Bypass Days (**BPD**) data during a calendar year separately;

b. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all NBPD during a calendar year and record it as **Annual Average NBPD Effluent Concentration**;

c. Obtain the "**Total Annual NBPD Flow**" which is the total amount of Final Effluent discharged on all NBPD during the calendar year;

d. Calculate the arithmetic mean of all Single Sample Results of the concentration of a contaminant in the Final Effluent sampled or measured on all BPD during a calendar year and record it as **Annual Average BPD Effluent Concentration**;

e. Obtain the "**Total Annual BPD Flow**" which is the total amount of Final Effluent discharged on all BPD during the calendar year;

f. Calculate the flow-weighted arithmetic mean using the following formula:

[(Annual Average NBPD Effluent Concentration × Total Annual NBPD Flow) + (Annual Average BPD Effluent Concentration × Total Annual BPD Flow)] ÷ (Total Annual NBPD Flow + Total Annual BPD Flow)

It should be noted that in this method, if there are no Bypass Event for the calendar year, the calculated result would be the same as the non-flow-weighted arithmetic mean method;

g. Report and use the lesser of the flow-weighted arithmetic mean obtained

in Step 2 and the arithmetic mean obtained in Step 1 as the Annual Average Effluent Concentration for this parameter where applicable in this Approval.

3. Monthly Geometric Mean Density: Geometric mean is defined as the n^{th} root of the product of n numbers. In the context of calculating Monthly Geometric Mean Density for E.coli, the following formula shall be used:

$\sqrt[n]{x_1 x_2 x_3 \cdots x_n}$, in which, " n " is the number of samples collected during the calendar month; and " x " is the value of each Single Sample Result.

For example, four weekly grab samples were collected and tested for E.Coli during the calendar month. The E.Coli densities in the Final Effluent were found below:

Sample Number	E.Coli Densities* (CFU / MPN or organisms /100 mL)
1	10
2	100
3	300
4	50

The Geometric Mean Density for these data: $\sqrt[4]{10 \times 100 \times 300 \times 50} = 62$

*If a particular result is zero (0), then a value of one (1) will be substituted into the calculation of the Monthly Geometric Mean Density. If the MPN method is utilized for E.coli analysis, the limit shall be 100 MPN/100 mL

Schedule G

Municipal and Local Services Board Wastewater System

Profile Information Form

(For reference only, images of the form are attached on the next four pages. A digital copy can be obtained from the District Manger.)

Ontario

Ministry of the Environment, Conservation and Parks

Municipal and Local Services Board Wastewater System Profile Information Form

The information in this form is necessary to administer the Ministry's approvals, compliance and enforcement programs with respect to wastewater treatment and collection systems owned by municipalities and local services boards. These programs are authorized under the *Ontario Water Resources Act*, the *Environmental Protection Act*, the *Nutrient Management Act* and their respective regulations.

Email the completed form to: waterforms@ontario.ca
For any questions call 1-866-793-2588.

[A] SYSTEM PROFILE INFORMATION

Wastewater System Number *(if assigned)*

☐ New Profile
☐ Update Existing Profile

Name of System

Name of Municipality or Local Services Board

Level of Treatment (select one*)
☐ Primary
☐ Secondary
☐ Tertiary
☐ Secondary Equivalent
☐ Other (specify):
*See Terms and Concepts on page 4

Population Served	Population (Design)	Type of System
		☐ Treatment & Collection System ☐ Collection System Only

Design Rated Capacity (m^3/day)	Peak Flow Rate (m^3/day)	Current Environmental Compliance Approval (ECA) Number	Current ECA Issue Date (yyyy/mm/dd):

The treatment plant receives sewage from: (Check all that applies.* If you have checked more than one option below, indicate the approximate %)

☐ Sanitary Sewer ☐ Combined Sewer
☐ Nominally Separated Sewer ☐ Partially Separated Sewer *See Terms and Concepts on page 4

[B] OWNER INFORMATION

Legal Name of Municipality or Local Services Board

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

☐ Dr ☐ Miss ☐ Mr ☐ Mrs ☐ Ms	Owner Contact First Name	Owner Contact Last Name	Owner Contact Job Title

Tel. No.	Fax Number	Email address
( ) - ext.	( ) -	

[C] OPERATING AUTHORITY ☐ Check if same as owner

Legal Name of Operator

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

☐ Dr ☐ Miss ☐ Mr ☐ Mrs ☐ Ms	Operator Contact First Name	Operator Contact Last Name	Operator Contact Job Title

Tel. No.	Fax Number	Email address
( ) - ext.	( ) -	

[D] 24/7 CONTACT

☐ Dr ☐ Miss ☒ Mr ☐ Mrs ☐ Ms	First Name	Last Name	Job Title

Tel. No.	Fax Number	Email address
( ) - ext.	( ) -	

[E] SYSTEM CIVIC LOCATION ADDRESS (I.E. ADDRESS OF TREATMENT PLANT)

Unit No	Street No.	Street Name.	Street Type (St, Rd, etc)	Street Direction (N,S,E,W)

PO Box	City/Town	Postal Code

If the Wastewater System has no street address

Geographical Township	Lot	Concession

Geographical Referencing (if known, enter the Geographical Reference Information for this Wastewater System)

Map Datum	Geo-Referencing Method	Accuracy Estimate	Location Reference	
Latitude	**Longitude**	**Zone**	**Easting**	**Northing**

[F] TREATMENT PROCESS

Preliminary	Primary	Secondary	Secondary Equivalent	Post-Secondary	Additional Treatment
☐ Screening	☐ Settling/sedimentation/ clarification	☐ Conventional Activated Sludge (CAS)	☐ Aerated Lagoon	☐ Filtration	☐ Phosphorous Removal ☐ Biological ☐ Chemical
☐ Shredding/ grinding	☐ Scum Removal	☐ Extended Aeration	☐ Facultative Lagoon	☐ Clarification	If chemical is used, specify:
☐ Grit Removal	☐ Polymer Addition	☐ Membrane Bioreactor (MBR)	☐ Anaerobic Lagoon	☐ Intermittent Sand Filter (after lagoons)	☐ Nitrification
☐ Other(specify):	☐ Other(specify):	☐ Sequencing Batch Reactor (SBR)	☐ Aerobic Lagoon	☐ Polishing Wetlands	☐ Denitrification
		☐ Rotating Biological Contactor (RBC)	☐ Other(specify):	☐ Polishing Lagoons	☐ Other(specify):
		☐ Trickling Filter (TF)		☐ Other(specify):	
		☐ Biological Aerated Filter (BAF)			
		☐ Other(specify):			

[G] DISINFECTION

Method of Disinfection	Disinfection Period
☐ Chlorination If you chlorinate, do you practice de-chlorination? ☐ Yes ☐ No	☐ Continuous ☐ Seasonal
☐ Ultraviolet Irradiation	☐ Continuous ☐ Seasonal
☐ Other (specify):	☐ Continuous ☐ Seasonal

[H] SLUDGE

Sludge Stabilization Process	Method of Sludge Disposal/Utilization
☐ Aerobic Digestion	☐ Agricultural
☐ Anaerobic Digestion	☐ Landfill
☐ Drying & Pelletization	☐ Incineration
☐ Lime Treatment	☐ Other (specify):
☐ Composting	
☐ Other (specify):	

Available Sludge Storage Capacity (m^3):

[I] EFFLUENT

Effluent Disposal Method	Effluent Discharge Frequency
☐ Surface Water Receiving Water Body Name:	☐ Continuous ☐ Seasonal
☐ Subsurface	☐ Continuous ☐ Seasonal
☐ Other (specify):	☐ Continuous ☐ Seasonal

Is the effluent discharged in a vulnerable area identified in the local source protection assessment report approved under the Clean Water Act, 2006?
☐ Yes ☐ No

[J] INFLUENT

Does the plant receive sewage from another municipality or local services board either through an interconnected collection system or hauled sewage?
☐ Yes ☐ No
(if yes, name(s) of other municipality or local services board):

Plant receives:
☐ Leachate (approximate annual volume in m^3):
☐ Septage (approximate annual volume in m^3):
☐ Industrial input (approximate annual volume in m^3):
or (approximate volume in %):

Terms and Concepts

The following Terms and Concepts are provided to assist you when completing Wastewater System Profile Information Form.

In order to determine the level of treatment that applies to the wastewater system, the effluent quality objectives that the wastewater treatment plant was designed to meet must be considered. The process based approach often used in the past has led to confusion and is open to interpretation due to recent developments and practices in the wastewater treatment industry. For example, a plant with a high rate filter (often referred to as a tertiary filter) after its secondary treatment was considered a tertiary treatment in the past since the filter was designed and operated to produce a tertiary quality effluent. However, secondary plants are now being constructed with these filters as a safeguard against any potential secondary clarifier performance degradation and not for the purpose of ensuring tertiary treatment performance. Also, new technologies have evolved that can produce tertiary quality effluent without having these high rate filters (e.g., membrane bioreactors). Lagoons were considered in the past as being capable of providing only secondary equivalent treatment. However, with add-on treatment after the lagoons (e.g. intermittent sand filters), many lagoon treatment systems are capable of producing secondary or tertiary quality effluent.

During the establishment of sewage works, site-specific effluent limits (including averaging periods) are provided by the Ministry's Regional Technical Support Section, considering the assimilative capacity of the receivers and the minimum treatment requirements provided in Procedure F-5-1. The designer of the sewage works then selects objective values that are acceptable to the Ministry and are less (i.e. more stringent) than the effluent limits , in order to provide an adequate safety factor based on the designer's confidence/experience with the technology chosen and other site-specific conditions. The sewage works are then designed (and operated) to meet these design objectives in a reliable and consistent manner. Therefore, the values that are to be used in the determination of the level of treatment that applies to the sewage works must be based on the design objectives, and not the effluent limits.

Two common parameters used in almost all sewage works designs and performance evaluations are $CBOD_5$ (carbonaceous biochemical oxygen demand) (BOD_5 – biochemical oxygen demand - for primary sewage works) and total suspended solids (TSS). Therefore, it is logical that the **objective values** of these two parameters are used to determine the level of treatment at the sewage works.

Level of Treatment:

Primary:
Wastewater treatment plants that have only settling/sedimentation (with or without chemical addition) and providing 30% and 50% or better reduction of BOD_5 and TSS respectively are considered primary plants (MOE Procedures F-5-1 and F-5-5).

Secondary:
Wastewater treatment plants that have biological processes (e.g. activated sludge process and its variations, fixed film processes) or physical-chemical processes producing an effluent quality of $CBOD_5$ and TSS of 15 mg/L or better are considered secondary plants (MOE Design Guidelines for Sewage Works, 2008).

Secondary Equivalent:
Wastewater treatment plants producing an effluent quality of $CBOD_5$ of 25 mg/L and TSS of 30 mg/L or better are considered as secondary equivalent plants.

Note: Wastewater treatment plants that provide only primary settling of solids and the addition of chemicals to improve the removal of TSS (and phosphorus) are not considered as secondary treatment plants or secondary equivalent plants (MOE Design Guidelines for Sewage Works, 2008).

Tertiary:
Wastewater treatment plants that have biological processes (e.g. activated sludge process and its variations, fixed film processes) and/or physical-chemical processes producing an effluent quality of $CBOD_5$ and TSS of 5 mg/L or better are considered tertiary plants.

Note: Biological processes such as nitrification, denitrification and enhanced biological phosphorus removal can be part of either a secondary or tertiary treatment plant. They may be described as secondary treatment plant with nitrification, secondary treatment plant with enhanced biological phosphorus removal, tertiary treatment plant with nitrification etc.

Sewer System Type:

Sanitary Sewers:
Pipes that convey sanitary sewage flows made up of wastewater discharges from residential, commercial, institutional and industrial establishments plus extraneous flow components from such sources as groundwater and surface run off.

Combined Sewers:
Pipes that convey both sanitary sewage and stormwater runoff through a single-pipe system.

Partially Separated Sewers:
Exist when either a portion of the combined sewer area was retrofitted to separate (sanitary and storm) sewers and/or a service area with combined sewers has had a new development area with separate sewers added to the service area; whatever the case may be, the final flows will be combined sewage.

Nominally Separated Sewers:
These sewers are constructed as separate sewers, but the sanitary sewers accept stormwater from roof and foundation drains (i.e., these are separated sewers in name only).

Upon issuance of the environmental compliance approval, I hereby revoke Approval No(s). 3742-8ZJPHF issued on November 5, 2012.

In accordance with Section 139 of the Environmental Protection Act, you may by written

Notice served upon me and the Environmental Review Tribunal within 15 days after receipt of this Notice, require a hearing by the Tribunal. Section 142 of the Environmental Protection Act provides that the Notice requiring the hearing shall state:

a. The portions of the environmental compliance approval or each term or condition in the environmental compliance approval in respect of which the hearing is required, and;
b. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

Pursuant to subsection 139(3) of the Environmental Protection Act, a hearing may not be required with respect to any terms and conditions in this environmental compliance approval, if the terms and conditions are substantially the same as those contained in an approval that is amended or revoked by this environmental compliance approval.

The Notice should also include:

1. The name of the appellant;
2. The address of the appellant;
3. The environmental compliance approval number;
4. The date of the environmental compliance approval;
5. The name of the Director, and;
6. The municipality or municipalities within which the project is to be engaged in.

And the Notice should be signed and dated by the appellant.

This Notice must be served upon:

The Secretary*
Environmental Review Tribunal
655 Bay Street, Suite 1500
Toronto, Ontario
M5G 1E5

AND

The Director appointed for the purposes of Part II.1 of the Environmental Protection Act
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor
Toronto, Ontario
M4V 1P5

*** Further information on the Environmental Review Tribunal's requirements for an appeal can be obtained directly from the Tribunal at: Tel: (416) 212-6349, Fax: (416) 326-5370 or** www.ert.gov.on.ca

The above noted activity is approved under s.20.3 of Part II.1 of the Environmental Protection Act.

DATED AT TORONTO this 11th day of February, 2019

Fariha Pannu, P.Eng.
Director

appointed for the purposes of Part II.1 of the *Environmental Protection Act*

MN/
c: District Manager, DWECD, MECP London - District
Gregory Simon, P.Eng., Stantec Consulting Ltd.

Appendix B

Memorandum Dated October 13, 2020

Lucan WWTP – Notes from Site Visit to Review Current Operation and Configuration and Identify Potential Mitigation Measures

Memorandum

To:	Steve Burns, P.Eng., B.M. Ross
From:	Melody Johnson, M.A.Sc., P.Eng.
Date:	October 13, 2020
Subject	Lucan WWTP – Notes from Site Visit to Review Current Operation and Configuration and Identify Potential Mitigation Measures

1. Introduction

The Lucan WWTP is a tertiary treatment facility providing servicing to the community of Lucan. The facility's catchment area services mainly residential customers. As flows to the Lucan WWTP have increased, the effluent total phosphorus (TP) concentration has also increased. A statistical analysis of operating data was conducted to determine what parameters, if any, could be correlated to the increase in effluent TP concentrations. The main factors affecting effluent TP were found to be the remaining soluble P (mainly orthophosphate) and particulate P (as a fraction of TSS). Furthermore, it was determined that although effluent alkalinity varies seasonally and can sometimes dip below 50 mg/L, there was no observed impact on either effluent TP or nitrification performance. Details of the analysis can be found in Attachment 1.

As a follow-up to this analysis, a site visit was held on September 22, 2020 to tour the facility and obtain information regarding current operational practices and concerns. Discussions during the tour focused on process performance and operational factors that may affect secondary and/or final effluent total suspended solids (TSS) and TP concentrations. The purpose of this memorandum is to document the key findings during the tour, and potential mitigation measures that could be implemented.

2. Bioreactor Configuration and Operation

- A considerable amount of foam was observed in the two aeration tanks. There was more foam in the first pass (Figure 1a) than the second pass (Figure 1b).
- Operations staff noted that foam has been an ongoing operational issue at the WWTP. The foaming tends to be worse at higher operating mixed liquor suspended solids (MLSS) concentrations. MLSS concentration was approximately 3,500 mg/L during the site visit.
- The current aeration system is capable of maintaining dissolved oxygen (DO) concentrations > 1.5 mg/L, with concentrations typically higher.

- The effluent water system is currently being used to provide spray water to try to keep the foam under control (Figure 2). This has helped somewhat, but the foaming issues persist.
- There is no microscope available at the WWTP site. Operations staff are, therefore, not able to conduct routine visual assessments of mixed liquor characteristics / types of organisms present.
- The bioreactor configuration allows operation in step-feed mode, however operations staff note that this has not been used. There were no issues identified with flow splitting (either RAS or influent wastewater) between the bioreactors.
- The alum addition point provides good mixing. Operators adjust the alum dosage manually, with dosages reported to be within the range of 80 to 90 mg/L. It was also noted that at higher dosages, pin floc can become a problem, impacting secondary effluent quality.
- The foam appears to be consistent with that seen in WWTPs operating with long sludge retention times (SRT). This is also consistent with the observations of operations staff that foaming is worse at higher MLSS (and by extension, higher SRT).
- In addition to the potential for higher operating SRT, there are other factors that may be contributing to the foaming issues at the Lucan WWTP:
    - Physical configuration of the bioreactors. Due to the location of the interconnection between the first and second passes, it is not possible for foam/scum to move from the first pass to the second.
    - Continued “re-seeding” of the bioreactors with foam-causing microorganism. Because the foam becomes “stuck” in the first pass, it would likely remain in the bioreactor even after the addressing the cause of the original foaming (for example, long SRT). The filamentous organisms causing the foaming would, therefore, be constantly present in the bioreactor.

3. Secondary Clarifier Configuration and Operation

- The foam from the bioreactors is conveyed to the secondary clarifiers. Operations staff have installed a temporary baffle system to prevent the foam from entering the secondary clarifier (Figure 3).
- Operations staff indicated that, since the temporary baffles were installed earlier this summer, there has been a significant reduction in the amount of scum that collects on the surface of the clarifiers and an overall improvement in secondary effluent quality in terms of TSS.
- The scum removal system is manual. Because the WWTP is not manned on the weekends,

there tends to be significant accumulation of foam on the surface of the clarifiers by Monday mornings. During the week, operations staff manually remove scum approximately twice per day.

- The scum removal system in Clarifier No. 2 is not as efficient as that in Clarifier No. 1. Inefficient scum removal results in large volumes of water being conveyed to the scum storage tank, and an inability to effectively remove scum from Clarifier No. 2.
- Rising sludge was observed between the last two effluent troughs in each clarifier (Figure 4). Operations staff noted that this was common issue in both clarifiers, and that the rising sludge impacts the quality of the secondary effluent and performance of the downstream filters.
- The sludge blanket in the clarifier in the vicinity of the effluent troughs was low (<6”), and it was determined that this was not likely contributing to the rising sludge. However, a large accumulation of sludge was observed on the concrete baffles installed at the effluent end of each clarifier (Figure 5). This appears to be the source of the rising sludge.

4. Filter Configuration and Operation

- During the site visit, only one of the two disc filters was in operation.
- The system has the capability to operate in automatic backwash mode using differential pressure, however the current operating strategy is to run with backwash operating at all times. Operations staff did not know when this change was made, but it was likely at least several years ago.
- The canister filter, used as a pre-filter for the backwash feed water, had a significant accumulation of sludge (Figure 6). Operations staff note that the filter is cleaned when the pressure decreases on the backwash line, typically every other day.
- The UV channel is cleaned typically twice per week to removed the solids and foam that accumulate there. A sample of the tertiary effluent, collected in the UV channel, was inspected visually. It was observed to be very turbid, suggesting that the filters are not effectively removing smaller suspended solids fractions.

5. Other Observations

- A chemical feed line, labelled NaOCl, is installed to provide a dosing point to the effluent water system. There is currently no metering pump or NaOCl storage tank present. The space could accommodate a drum or carboy for chemical storage purposes. The NaOCl feed system is included in the original drawings for the facility.

- The scum from the secondary clarifiers is stored separately from the waste activated sludge. Operations staff have added chlorine to the supernatant from the scum and sludge storage tanks prior to its discharge into the bioreactors, however this approach is not currently used.
- The NaOH and alum storage tanks are located in the same chemical storage room. It was observed that a hand-written label had been added to the NaOH feed line to the RAS header that says "NaOCl". It was also noted that there is liquid present in the NaOH storage tank. Operations staff did not know what chemical is currently in the NaOH storage tank, as this system has not been used since OCWA took over operation of the plant.

6. Recommended Mitigation Measures

- Begin chlorinating the effluent water, and continue the utilizing the spray system in the bioreactors to try to control the foam. Because the NaOCl feed system was indicated on the original drawings for the facility, it would have been included in the original Certificate of Approval submission to MOE. Therefore, this operating change should be either pre-approved or require only a Limited Operational Flexibility change application. MECPs' district office should be contacted to confirm what, if any, approval is required.
- Resume chlorinating the scum / sludge tank supernatant prior to its discharge into the bioreactors.
- Obtain an optical microscope for the on-site laboratory and begin regular visual assessment of mixed liquor characteristics (e.g. 3 times per week). Assess both mixed liquor and foam separately, with a particular emphasis on the types of organisms observed and their relative abundance.
- Begin monitoring operating SRT. When calculating SRT, it is recommended that 7-day average MLSS, WAS SS and WAS flow rates be used in the calculations (to smooth out the variations in daily values).
- Adjust wasting rates to target an SRT of approximately 15 to 20 d in the winter, and 10 to 15 d in the summer. Watch effluent TAN concentrations during any changes to operating SRT, and minimize the day-to-day variation in WAS flow rates (no more than a 10% change from day-to-day). Changes to operating conditions within the bioreactors should be made slowly and progressively over the course of several weeks. If available sludge storage capacity limits the ability to maintain the necessary sludge wasting rates, investigate alternative options to dispose of the sludge (e.g. contractual arrangements with third party sludge disposal service providers, such as Lystek).
- Retain the scum baffles in the secondary clarifiers. If possible, investigate installing more

permanent baffles, particularly before winter.

- Routinely monitor and clean, as necessary, any sludge that accumulates on the concrete baffles in the secondary clarifiers to try to minimize rising sludge and the associated negative impact on secondary effluent quality.
- Return the filters to automatic backwash mode. It is possible that the current approach of operating in continuous backwash mode may be reducing the solids removal efficiency of the filters. As the disc filter fouls, the available opening sizes for particles to pass through decreases. Therefore, it is possible that improved effluent quality could be achieved by allowing the filters to partially foul between intermittent backwash cycles.
- Determine what chemical is currently in the NaOH storage tank, and drain and clean the tank approriately. Remove the "NaOCl" label on the NaOH chemical feed line in the RAS/WAS room.

7. Longer-Term Considerations

During future upgrades, consideration could be given to the following:

- Adjusting the configuration of the exiting bioreactors to allow the surface scum / foam in the first pass to move freely to the second pass.
- Adding an anoxic / aerobic swing zone to the head of the existing bioreactors, as well as any new bioreactors, to provide a means to regenerate alkalinity, reduce effluent TN and potentially improve sludge settleability.
- Providing a means to chlorinate RAS for filamentous organism control.

8. Closure

We trust the above is satisfactory. Should you have any questions or concerns, please do not hesitate to contact Melody Johnson at melody@bskyeng.com or 647-721-7644.

Figure 1 – Foam on the Surface of the Bioreactors in a) Pass 1 and b) Pass 2

Figure 2 – Effluent Water Spray to for Foam Control

Figure 3 – Temporary Scum / Foam Baffle at Inlet to Secondary Clarifier

Figure 4 – Example of Rising Sludge Observed in Secondary Clarifiers

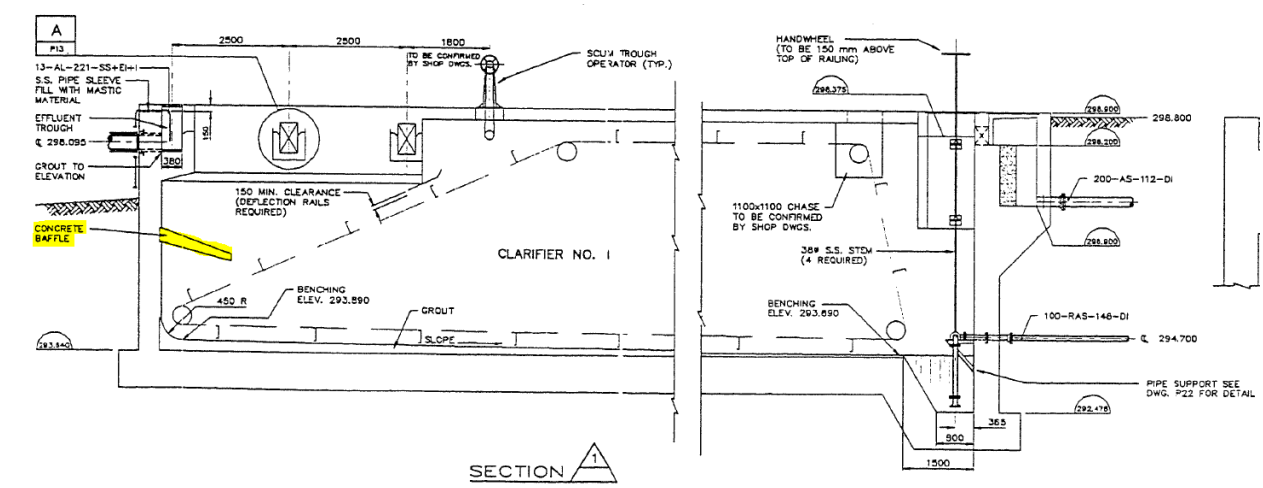

Figure 5 – Section View of Secondary Clarifier Showing Location of Concrete Baffle

Figure 6 – Canister Filter on Disc Filter Backwash Feed Line

Attachment 1

Previously Completed Statistical Analysis of Operating Data

Melody Johnson

From: Melody Johnson
Sent: April 24, 2020 1:53 PM
To: Steve Burns
Cc: Andrea Dwight
Subject: Lucan WWTP - Effluent TP, Alkalinity Addition

Hi Steve,

Further to our conversations earlier this month, we have reviewed the available operating data for the Lucan WWTP. We understand that operators are concerned that low levels of alkalinity in the effluent are negatively impacting effluent TP quality, making it difficult to consistently achieve the effluent TP objective of 0.2 mg/L. Furthermore, we understand that the current treatment system consists of extended aeration, cloth disc filters and UV disinfection.

We have divided our analysis into three main sections. The first reviews the available effluent pH and alkalinity data, and identifies steps that should be considered prior to implementing supplemental alkalinity addition. The second is an analysis of available effluent TP and other operating data in an attempt to identify factors that may have contributed to elevated effluent TP concentrations. Finally, recommendations with respect to the implementation of supplemental alkalinity addition are also provided.

As always, please feel free to contact me if you have any questions / concerns.

Historic Effluent Alkalinity and pH

As a first step, the available effluent alkalinity and pH data over the period 2018 to 2019 were analyzed for a potential correlation. A scatter plot of the available data points are presented in Figure 1 below. The plot suggests a weak positive correlation (i.e. increasing effluent pH at increasing effluent alkalinity), however the Pearson correlation coefficient was fairly low at + 0.38 (a perfect positive correlation would have a coefficient of +1.0). In addition, all effluent pH values were within the limit range of 6.0 to 8.5, however 7 of the 106 datapoints (7%) were below the lower end of the objective range of 6.5 to 8.5.

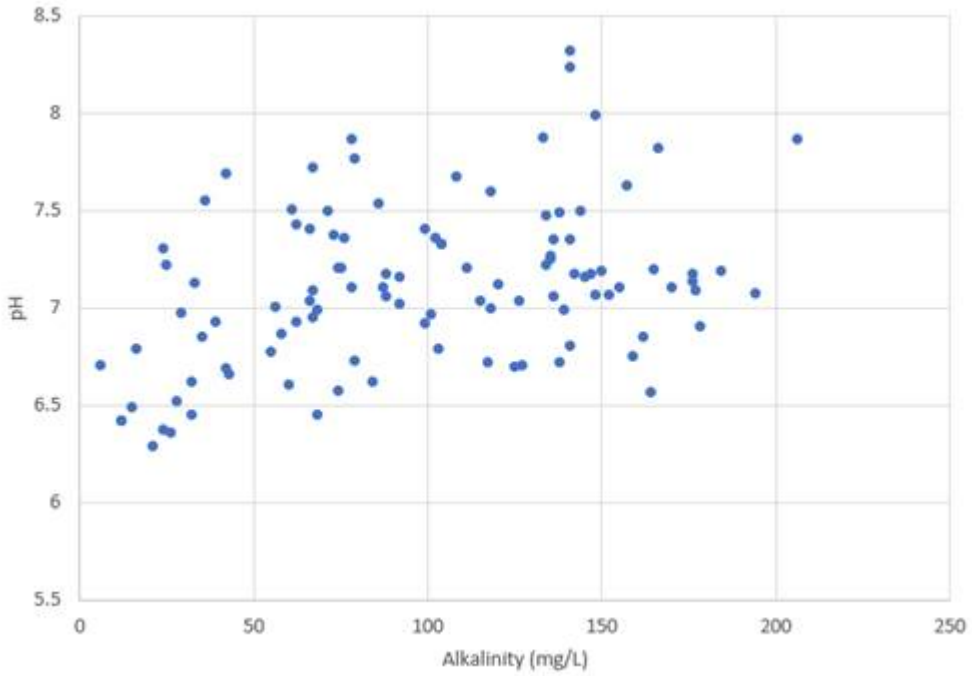

Figure 1 – Scatterplot of Effluent pH vs. Effluent Alkalinity (2018-2019)

Seasonal variations in effluent pH and alkalinity were also evaluated. Using a timeseries plot (Figure 2), a distinct seasonal effluent alkalinity trend was observed, with values highest in the winter and lowest in the summer. Alkalinity is consumed within the WWTP's treatment process via biological nitrification as well as the addition of coagulant for chemical phosphorus removal. Based on available operating data, nitrification performance appears to be consistent over all seasons. As such, it is unlikely that the higher winter alkalinity is due to a reduction in overall nitrification rates (and associated alkalinity consumption). Similarly, it is unlikely that coagulant dosages applied to the liquid treatment train would have varied enough to explain the seasonal variations in effluent alkalinity, however applied coagulant dosage data were not available at the time of this review. It is possible that the influent wastewater itself varies in its characteristics (e.g. alkalinity concentration) on a seasonal basis. This is sometimes seen in communities serviced by drinking water systems with variable raw/treated water quality, or those with major industrial contributors with seasonal variations in production.

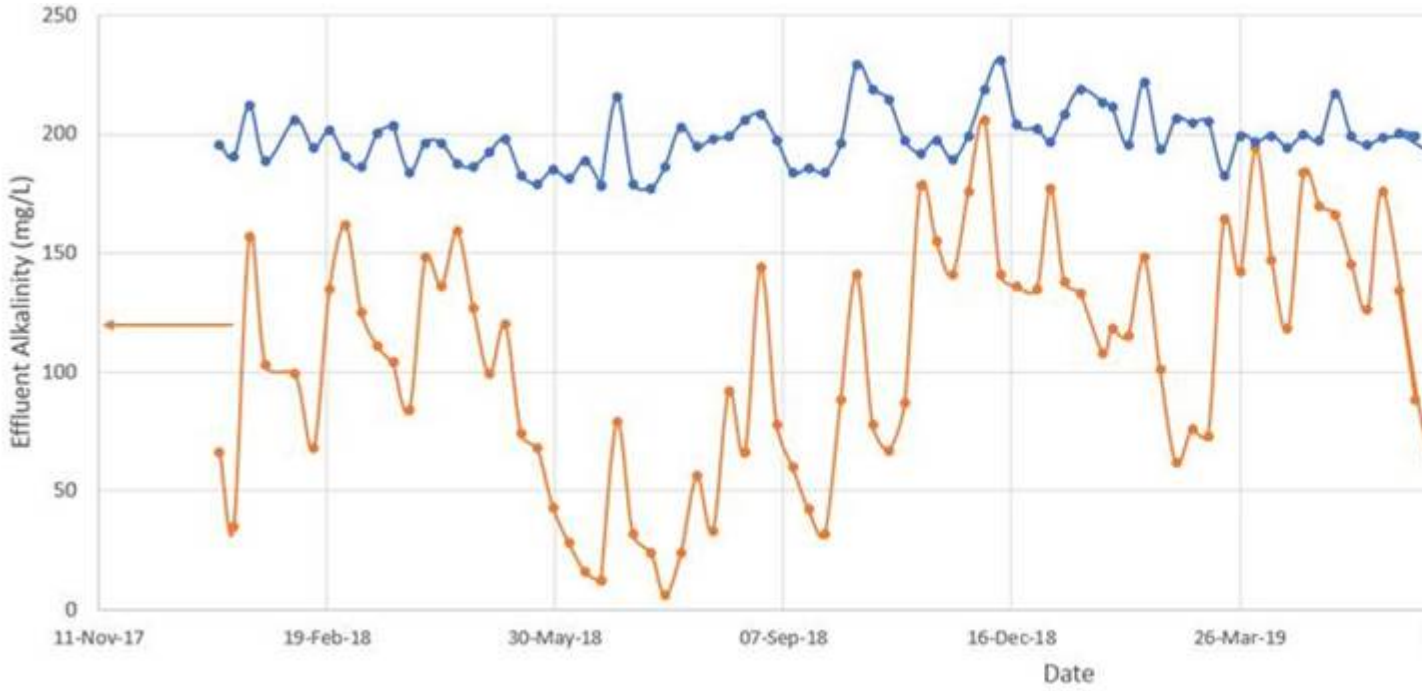

Figure 2 – Effluent pH and Alkalinity vs. Time

Analysis of Effluent TP Data

Factors that may have affected effluent TP concentrations were evaluated using multiple linear regression with step-wise elimination of non-significantly significant factors (95% confidence interval). Using the data provided, it was possible to assess the impact of the following variables on effluent TP concentration: effluent flow (m3/d), effluent pH, effluent alkalinity (mg/L), effluent ortho (mg/L, as recorded in-house), effluent TSS (mg/L, lab reported), effluent TSS (mg/L, in-house). Effluent ortho concentrations were only available over the first 6 months of 2018. A single outlier was identified and removed from the dataset.

Using this approach, it was determined that flow, pH, alkalinity and in-house TSS concentrations were **not** statistically significant.

Effluent ortho and TSS (lab) were found to be statistically significant, yielding the following equation:

Effluent TP (mg/L) = 0.157*Effluent Ortho (mg/L, as recorded) + 0.019*TSS (mg/L, lab) + 0.065

The adjusted R^2 for the above equation was 0.80 signifying that 80% of the variance in effluent TP concentrations could be explained by variations in recorded effluent ortho and TSS (lab) concentrations. Figure 3 presents the actual vs. model predicted effluent TP concentrations. For a perfect relationship, all data points would be located on the diagonal line. From Figure 3, it can be seen that the model provides good agreement with the observed effluent TP concentrations.

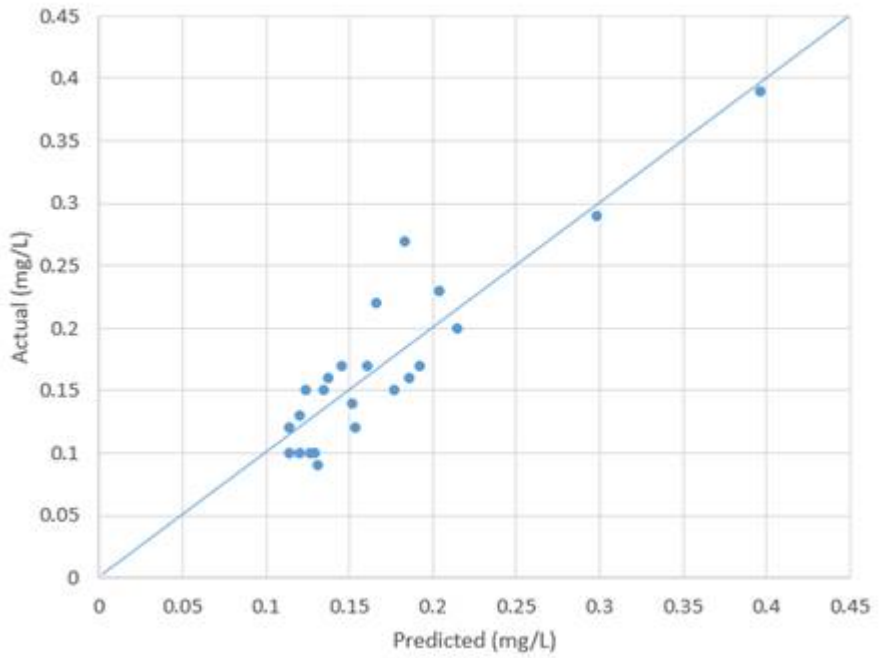

Figure 3 – Actual vs Model Predicted Effluent TP Concentrations

From this analysis, it can be concluded that main factors affecting effluent TP concentrations are the remaining soluble (mostly ortho) and particulate (as a fraction of TSS) fractions of phosphorus in the effluent. These results also suggest that optimizing effluent TP will require: ensuring the disc filters are operating well (optimal particulate removal); and, ensuring effluent soluble phosphorus concentrations are low (optimal coagulant addition).

As noted above, ortho data were only available to mid-2018. It is recommended that operations staff resume monitoring and recording effluent ortho concentrations. This will allow the impact of adjusting coagulant dosage rates to be quantified, facilitating the optimization of effluent soluble P concentrations. If this approach cannot consistently lower effluent ortho concentrations, consideration could be given to implementing dual point addition (i.e. adding alum to both the secondary treatment train (current dosing location) as well as upstream of the filters (secondary dosing location). Care should be taken if alum is added upstream of the filters, as this will impact the quality and quantity of tertiary influent solids, and can affect throughput capacity and backwash requirements.

Recommendations for Supplemental Alkalinity Addition

Based on the results of this analysis, individual effluent samples are occasionally below the objective range for pH. In addition, there is a weak positive correlation between effluent pH and alkalinity. Nitrification performance at the Lucan WWTP appears to be consistent, suggesting the occasionally low (<50 mg/L) effluent alkalinity concentrations have not negatively impacted biological treatment performance. Supplemental alkalinity addition could improve the WWTP's performance in terms of effluent pH, however the required chemical dosage is likely to vary significantly on a seasonal basis.

While variations in alkalinity appear to affect effluent pH, the data available do not indicate that these variations impact effluent TP concentrations. Literature suggests that precipitation of soluble reactive phosphorus is highest at pH values in the range of 5 to 6, with a reduction in precipitation at higher pH (WEF, 2010). Additionally, studies suggest that excess alkalinity can negatively impact chemical phosphorus removal by reacting preferentially with metal salts, reducing the fraction of orthophosphate that is precipitated while generating excess chemical sludge (WEF, 2010). Therefore, if alkalinity addition is implemented, it will be critical to ensure it is not overdosed. A conservative approach should be taken when selecting chemical dosing rates.

Prior to implementing alkalinity addition at full scale, it is recommended that jar testing be performed. As a preliminary step, the following could be considered:

- Conduct jar testing. Each jar test could consist of collecting a sample (several litres) of secondary effluent, which is then divided into equal aliquots (several hundred mL each). The initial pH of the sample should be recorded. Then a known dosage of supplemental alkalinity chemical would be added to each aliquot (with varying dosages applied to each) under well (rapid) mixed conditions. Under gentle mixing, the pH could then be monitored until it stabilizes. If desired, some of these samples could also be submitted to an accredited laboratory for analysis of alkalinity.
- The jar testing should be conducted over several days to obtain results at varying initial secondary effluent pH values.
- The jar testing should also be revisited during each season (Winter, Spring, Summer, Fall) to identify appropriate dosages that accommodate the seasonal variability in effluent quality. Preliminary results of the data analysis suggest that alkalinity addition may not be required over the Winter period (approximately December to March).

Initial monitoring / process control could be based on measured secondary effluent pH. As a starting point, a target clarifier effluent pH of 6.8 to 7.0 could be considered. To ensure alkalinity is not overdosed, initial dosages used at the outset of full scale implementation should not increase the effluent alkalinity by more than 25 to 50 mg/L. For example, if NaOH is used, this would be equivalent to a maximum initial NaOH dosage of 16 to 32 mg/L as NaOH. Jar testing should be completed over a wider range of dosages, however, to better understand the behaviour of the secondary effluent. Further adjustments to the full-scale alkalinity dosage can then be made once the system has stabilized.

References

WEF (2010). Nutrient Removal – WEF Manual of Practice No. 34.

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Appendix D – Correspondence with MECP

From: Geurts, Hugh (MECP)
To: sburns@bmross.net
Cc: Miller, Jim (MECP)
Subject: FW: 17319 - Lucan WWTP Expansion
Date: September 4, 2020 5:19:58 PM
Attachments: ABCA-Lucan WWTP Report 7 July 2020-resubmitted.pdf

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Hello Steve:

Further to our telephone conversation of Monday August 31st and as per the attached report entitled "Water Quality and Aquatic Community Monitoring in Heenan Drain: Summary of 2019 Results. (ABCA – July 2020). I offer the following.

The Region is of the position that an expansion of the Lucan WWTP is feasible given that there are no specific sensitivities within the immediate receiver; the Heenan drain. Furthermore, water quality within the Heenan drain suggest that a Policy two approach may be considered and effluent limits similar to existing limits may suffice pending a finalized review for assimilative narrative (ammonia as always will need further review).

Outstanding is the issue of Nitrates further downstream within the Little Ausable River. The lowest reaches for the Little Ausable is established habitat for Species At Risk and Nitrates has been identified as a concern for molluscs. As Nitrate is difficult to model in summer low flow (as it can be rapidly assimilated within the water column) the Ministry will need some level of downstream nitrate monitoring to occur pre and post expansion that would quantify the potential for impact. To this end, the Municipality will need to understand that the Ministry may invoke more stringent treatment of Nitrate (sometime in the future) should continued increase of effluent flow volume suggest nitrate is significantly increasing within Species at Risk zones.

I trust the above information is consistent with your understanding of our conversation.

If you need any further detail, please let me know.

From: Steve Burns <sburns@bmross.net>
Sent: August 31, 2020 8:48 AM
To: Geurts, Hugh (MECP) <Hugh.Geurts@ontario.ca>
Subject: FW: 17319 - Lucan WWTP Expansion

Hi Hugh:
Would you have time this week to discuss this?

Steve

From: Steve Burns [mailto:sburns@bmross.net]
Sent: August 19, 2020 10:05 AM
To: Hugh Geurts (hugh.geurts@ontario.ca) <hugh.geurts@ontario.ca>
Cc: Kelly Vader (kvader@bmross.net) <kvader@bmross.net>; Andrew Garland (agarland@bmross.net) <agarland@bmross.net>
Subject: 17319 - Lucan WWTP Expansion

Hi Hugh:
The Lucan WWTP provides tertiary level treatment. The plant utilizes an Extended Aeration process with effluent filtration in two treatment trains.

The logical expansion is to add a 3rd train with the same process. This approach would maintain current effluent concentrations but would result in a 50% increase in effluent loadings. Based on the few months of monitoring in 2019 (mostly low stream flow months). The current data indicates that stream loadings downstream of the discharge are approximately 33% from the WWTP and 67% from upstream sources. A 50% increase in plant loads would change this to roughly 50/50.

Based on the information in the ABCA report (attached) do you see any reason why a 50% expansion using the same process technology would not be acceptable?

Steve

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Engineers and Planners
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Goderich, ON N7A 2T4

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From: Steve Burns
To: Geurts, Hugh (MECP)
Cc: mark.badali1@ontario.ca
Subject: RE: 21023 - Lucan WWTP - Draft Proposal for Effluent TP
Date: Wednesday, August 25, 2021 10:11:32 AM

Hi Hugh:
We need to finalize the effluent quality requirements.
You mentioned that the MECP would be looking for additional stream monitoring for at least Nitrates. We already have downstream monitoring so we assume it means upstream monitoring. I don't think the Township would be in any way opposed to monitoring and reporting but we need to work out the details:

Some questions:

1. We assume the upstream monitoring would take place on the Little Ausable not the Heenan Drain. Correct?
2. Taking into consideration reasonable access, would a location on Saintsbury Line (4km +/- upstream) be sufficient?
3. For the same reason, would sampling from April to November be sufficient?
4. Presumably the monitoring is a trigger for something (e.g. NO_3-N reduction in the effluent). What exactly would be the circumstance that requires action?
5. It is easy to incorporate the sample results into annual reporting. Would you be looking for periodic analysis at 5 or 10 year anniversaries?

Steve

From: Geurts, Hugh (MECP) [mailto:Hugh.Geurts@ontario.ca]
Sent: August 13, 2021 10:24 AM
To: Steve Burns <sburns@bmross.net>
Subject: RE: 21023 - Lucan WWTP - Draft Proposal for Effluent TP

Hello Steven:

I think that approach will work and a 3% annual increase in loading is within the intent of no increases of phosphorus so feel free to formalize and proceed with this approach.

This is a little outside the standardized method that approvals usually works with but I will deal with that when Permissions Branch asks and I will explain to them our rational.

Thanks

Hugh

From: Steve Burns <sburns@bmross.net>
Sent: August 12, 2021 1:30 PM
To: Geurts, Hugh (MECP) <Hugh.Geurts@ontario.ca>
Subject: 21023 - Lucan WWTP - Draft Proposal for Effluent TP

Hugh:
Outlined below is an unofficial proposal for performance criteria for Total Phosphorus. It is "unofficial" because the Township hasn't signed off on it yet and I am aware you are leaving for holidays.
I need to know if it is something you can agree to.
I am at 510-524-2641 x202 today till 3 and then at 519-524-0631 (cell).

TP Concentration

- **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 improvement over current values.
- **An annual 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.

Design Flow (Annual Average)
Based on the County high growth projection the 2046 flow will be 2,420 m3/day.
We are proposing a design flow of **2,700 m3/day** which is about 12% more than the county's high projection (i.e. a safety factor for growth). Current growth in Lucan is exceeding the County projections.
This is more than can be accommodated in 3 trains but less than 4 trains. The outcome for expansion to 4 trains will be that we have a plant with greater capacity than the ECA rating.

TP Load
Current loading limit is 0.55 kg/day on a monthly basis.
We suggest proposing **an annual loading limit** of 2,700 x 0.21 mg/L = 0.567 kg/day (3% more than current).

Let me know if this is something you can support.

Steve

Steve Burns, P. Eng.
B. M. Ross and Associates Limited
Engineers and Planners
62 North Street
Goderich, ON N7A 2T4

Ph: (519) 524-2641
sburns@bmross.net
https://link.edgepilot.com/s/0720fcbe/eNvEtn509EStstX-wm6jCA?u=http://www.bmross.net/

From:	Geurts, Hugh (MECP)
To:	sburns@bmross.net; Badali, Mark (MECP)
Subject:	FW: 21023 - Lucan Biddulph WWTP Expansion EA - Draft EQC letter
Date:	Thursday, August 26, 2021 10:20:35 AM
Attachments:	image001.jpg 21023-2021-08-05-MECP_DRAFT_EQC_Let.pdf ABCA-Lucan WWTP Report 7 July 2020-resubmitted.pdf

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Hello Steve:

Further to you inquiry with respect to finalizing monitoring requirements…

Could you please provide a formal summary of the proposed effluent criteria for the Lucan WWTP expansion incorporating elements of your August 5th letter attached and your approach to phosphorus in your August 12th e-mail below.

As discussed, the region is satisfied with the current limits/objectives for BOD, TSS, E. Coli, and Ammonia. Phosphorus limits can be laid out as per your Aug 12 e-mail. Please present the information in a format that your client would like to see as it would appear in the ECA.

Also, the Ministry will require a proposed long term monitoring of Nitrate in an upstream/downstream configuration (non freezing period only) as the plant flows increase to be able to assess whether the plant is increasing nitrate loads to the lower reaches of the Ausable River. This will form a condition of the ECA .

If you need anything else, let me know

Hugh

Hugh Geurts
Surface Water Evaluator
Southwest Regional Office
Ontario Ministry of the Environment, Conservation and Parks
Ministère de l'Environnement, de la Protection de la nature et des Parcs
733 Exeter Road, London
N6E 1L3
(548) 388-7471

From: Geurts, Hugh (MECP)
To: Steve Burns
Subject: RE: 21023 - Lucan WWTP - Draft Proposal for Effluent TP
Date: Friday, August 13, 2021 10:24:19 AM

Hello Steven:

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Steve

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B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 **www.bmross.net**

File No. 21023

September 2, 2021

Mark Badali
Environmental Resource Planner/EA Coordinator
Ministry of the Environment, Conservation and Parks
Southwest Region
733 Exeter Road
London, ON N6E 1L3

Re: Township of Lucan Biddulph
Lucan WWTP Expansion Class EA
Effluent Quality Criteria

The purpose of this letter is to present, for Ministry review and approval, proposed effluent quality objective and non-compliance values for an expanded Lucan WWTP.

The existing Lucan WWTP has a rated hydraulic capacity of 1,700 m^3/day (AECA No. 7008-B7CJWY dated February 11, 2019). Work completed to date for the Class EA has established that, to accommodate potential growth, an appropriate expanded capacity would be as much as 3,150 m^3/day. Consideration is being given to a staged expansion with a Stage 1 capacity of 2,475 m^3/day.

The current effluent quality requirements, as set out in the AECA, are as follows. Objective values are in the first table. Compliance values are in the second.

Final Effluent Parameter	Averaging Calculator	Objective
$CBOD_5$	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 mg/L

Final Effluent Parameter	Averaging Calculator	Objective
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 are set out in Schedule C of the ECA. Both concentration and loading criteria are stipulated and are as follows:

Final Effluent Parameter	Averaging Calculator	Limit
$CBOD_5$	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

Final Effluent Parameter	Averaging Calculator	Limit
$CBOD_5$	Monthly Average Effluent Concentration	17 kg/d
Total Suspended Solids	Monthly Average Effluent Concentration	17 kg/d
Total Phosphorus	Monthly Average Effluent Concentration	0.55 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)

The above criteria are already at tertiary quality which is consistent with the existing plant process. Annual reporting has established that the existing process is consistently meeting the objective concentrations. The following table provides a summary of performance:

Table 1 -- Summary of Existing Effluent Concentrations

	$CBOD_5$		**TSS**		**TP**		**TAN**		***E. coli***	
Objective (mg/L)	5		5		0.20		1.0 mg/L (May 1-October 30) 2.0 mg/L (November 1-April 30)			
Limit (mg/L) as a Monthly Average	10		10		0.32		1.3 mg/L (May 1-October 30)_ 2.6 mg/L (November 1-April 30)		<100cfu/100mL	
	Average	**Max**	**Average**	**Max**	**Average**	**Max**	**Average**	**Max**	**Average**	**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

Existing objectives for $CBOD_5$, TSS, TAN and E.coli are being met. Effluent TP concentrations are essentially at Objective concentrations but well within compliance values. The TP values are consistent with the existing extended aeration process with filtration technology.

Based on available data from 2019 and 2020, warm weather (May to October) effluent temperatures are less than 20^{o}C 100% of the time. The maximum recorded pH (field measured) was 7.64. Based on these values, un-ionized ammonia concentrations in the effluent would consistently be less than the PWQO of 0.02 mg/L for the existing TAN Objective of 1.0 mg/L. Actual monthly average TAN concentrations for the period ranged from 0.10 to 0.75 mg/L with a median value of 0.125 mg/L. The treatment process has demonstrated the ability to meet the provincial objective for un-ionized ammonia.

Receiving Stream Characteristics

The Lucan WWTP discharges to the Heenan Drain which joins with the Little Ausable River approximately 1.4 km downstream of the WWTP outfall. The Ausable Bayfield Conservation Authority (ABCA) completed a water quality and aquatic community assessment of the Heenan Drain from July to November 2019 (ABCA, July 2020). The conclusions of the study were:

- Nutrients, as characterized by Total Phosphorus and Nitrate, exceeded objective and guideline values both upstream and downstream of the outfall location. Downstream values are greater and indicate the influence of the WWTP discharge.

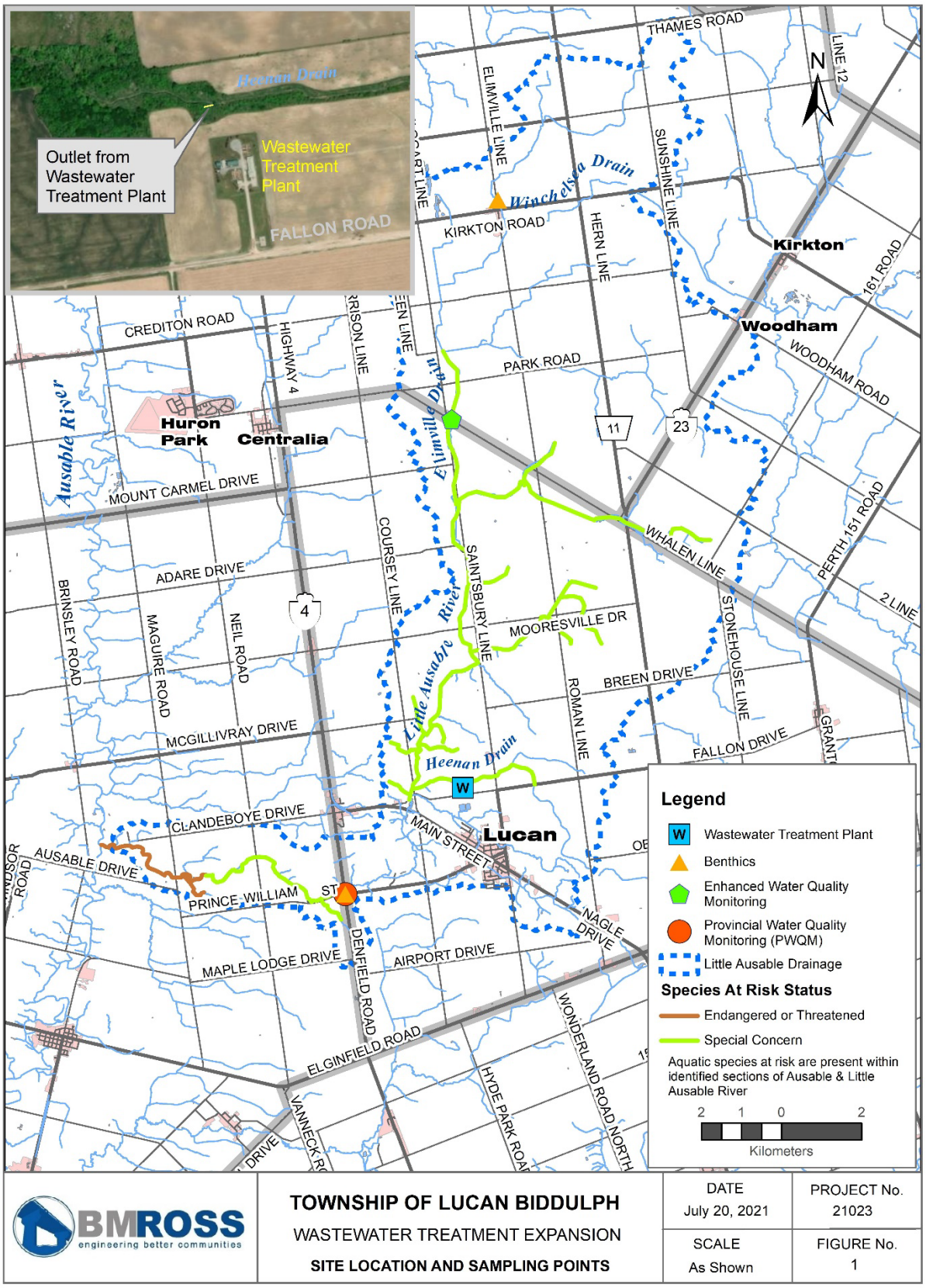
- Average un-ionized Ammonia concentrations downstream of the outfall slightly exceed Canadian guidelines (0.023 mg/L vs 0.019 mg/L guideline). The average was significantly impacted by a single value in July.

- The fish community in the Heenan Drain is principally minnow species with low species richness. Species richness at the outfall location was equivalent to upstream values.

- Examination of the benthic invertebrate community indicated that conditions at the discharge location and downstream could be characterized as “fair” (Modified Hilsenhoff Biotic Index “C”) and better than the upstream location which was “fairly poor” (Modified Hilsenhoff Biotic Index “D”).

- No freshwater mussels were observed within the study area.

Figure 1 summarizes available information concerning Species at Risk and identifies what current mapping shows as the location for endangered or threatened mussel and fish species. Locations are significantly downstream of the WWTP discharge location.



Filename: Z:\21023-LB-Lucan_STP_Expansion\Projects\GIS\21023_LucanWWTP_ABCASampling_July2021.mxd 2021-07-20

BMROSS engineering better communities

TOWNSHIP OF LUCAN BIDDULPH

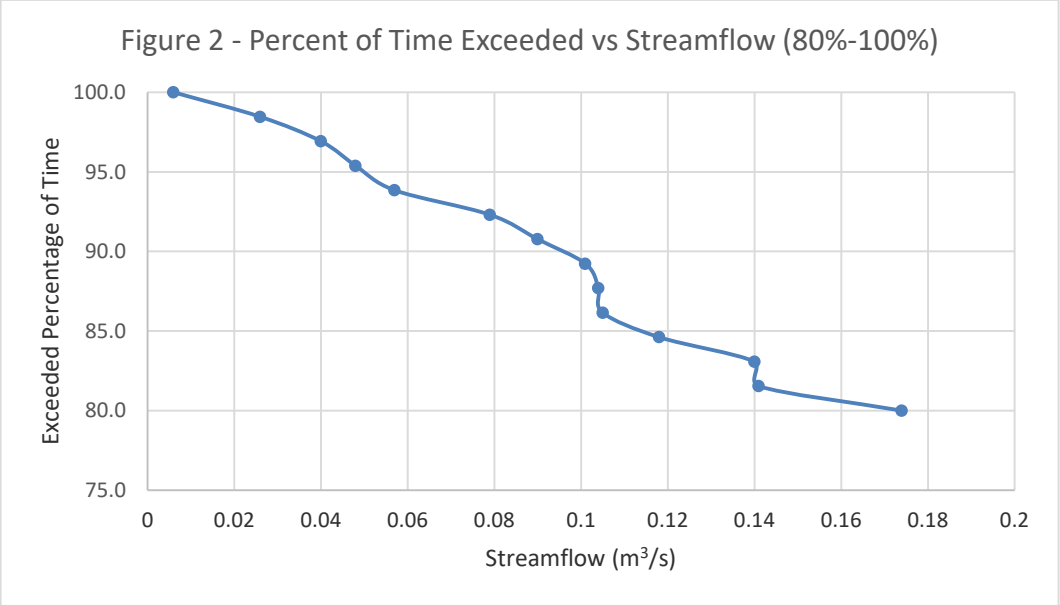
WASTEWATER TREATMENT EXPANSION

SITE LOCATION AND SAMPLING POINTS

DATE	PROJECT No.
July 20, 2021	21023
SCALE	FIGURE No.
As Shown	1

The ABCA operates a water quality and quantity monitoring station (MALIT2) where the Little Ausable River crosses Denfield Road, approximately 4.3 km downstream of the outfall location. The approximate drainage areas at the outfall and MALIT2 locations are 5.8 km^2 and 143.3 km^2 respectively.

No flow data is available for the Heenan Drain. Figure 2 shows the relationship between flow and frequency, based on 66 months of data, for the Little Ausable River at Denfield Road. It is important to note that the stream gauge is used for flood flow monitoring and not specifically calibrated for low flows.



The graph shows that 95% of the time the River flow would exceed approximately 0.05 m^3/sec. On the basis of recorded flows, low River flow at the gauge location is therefore approximately 300% of the current Lucan WWTP discharge. Median River flows are approximately 1.1 m^3/sec. and thus greater than 70 times the existing WWTP discharge. At the outfall location it is probable that during summer conditions the entire flow in the Heenan Drain is from the WWTP discharge.

A previous Assimilative Capacity Study (Stantec, 2011) predicted the following low flow values for the Little Ausable at Lucan:

- 7Q2 = 18.5 L/s
- 7Q5 = 6.9 L/s
- 7Q20 = 3.8 L/s

Based on the above values, developed through pro-rating, 7Q20 low flows would be in the order of 330 times existing plant average discharges.

Table 2 summarizes monthly water quality (2019 and 2020) at the MALIT2 location.

Table 2 – Water Quality at MALIT2

Year	Month	Parameter Result in mg/L except pH				
		TAN	**NO_3-N +NO_2-N**	**Lab pH**	**TP**	**TSS**
2019	Jan.	0.005	9.72	8.35	0.0251	3.7
	Feb.	0.034	7.84	8.17	0.0333	3.6
	March	0.17	3.56	8.16	0.2000	45.3
	April	0.022	6.34	8.37	0.0344	7.8
	May	0.034	7.93	8.35	0.0167	8.5
	June	0.027	7.35	8.35	0.0217	3.2
	July	0.055	1.67	8.31	0.0321	2.5
	Aug.	0.094	9.72	8.26	0.0869	11.5
	Sept.	0.01	3.08	8.4	0.0312	1.7
	Oct.	0.019	3.53	8.38	0.0211	1.8
2020	Jan.	0.034	8.92	8.31	0.0515	24.5
	Feb.	0.04	7.69	8.24	0.0307	6.9
	March	0.02	8.14	8.33	0.0223	4
	May	not listed	5.20	not listed	0.0236	2.3
	June	not listed	16.46	not listed	0.292	43.6
	Aug.	not listed	1.95	not listed	0.0289	3
	Sept.	not listed	1.34	not listed	0.0225	3
	Oct.	0.035	5.06	8.37	0.0371	10.9
	Nov.	0.047	8.41	8.4	0.0800	4.7
	Average	**0.043**	**6.52**	**8.32**	**0.057**	**10.1**
	Median	**0.034**	**6.94**	**8.34**	**0.0317**	**4.4**

Based on the above summary, the Little Ausable River would be considered a Policy 2 stream with respect to Phosphorus. Therefore an expansion of the WWTP should ideally not cause the phosphorus loadings to increase.

The Lucan WWTP is already a tertiary level plant operating to quite stringent standards including those for TP. We recognize the need to keep phosphorus loadings at or very near currently approved values while also acknowledging the limitations of the existing treatment process.

We therefore propose that the WWTP rating be restricted to 2,700 m^3/day as an Annual Average Flow (AADF) and that the following be established for TP objectives and limits:

TP Concentration

- **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 definite improvement over current values.

- **An annual 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.

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

It is also recognized that, at some distance downstream, Species at Risk have been identified that are potentially sensitive to increased nitrate concentrations. In this regard we propose a long-term monitoring and reporting requirement that would determine if the WWTP discharge is increasing downstream nitrate loads to the extent that conditions could potentially be problematic.

Effluent Quality Objectives and Limits

Recognizing the need to have criteria for the expanded facility that are superior to the current criteria, but also achievable given readily available technology, we suggest the following for effluent quality criteria for an expansion from 1,700 m^3/day to 2,700 m^3/day.

The following sections present the above proposals in a format consistent with that found in ECAs. Values that are different than the existing criteria are shown in red text.

Suggested Effluent Objectives for the Lucan WWTP expanded to 2,700 m^3/day.

Final Effluent Parameter	Averaging Calculator	Objective
$CBOD_5$	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 mg/L
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 are set out in Schedule C of the ECA. Both concentration and loading criteria are stipulated and are as follows:

Final Effluent Parameter	Averaging Calculator	Limit
$CBOD_5$	Monthly Average Effluent Concentration	10 mg/L
Total Suspended Solids	Monthly Average Effluent Concentration	10 mg/L
Total Phosphorus	Monthly Average Effluent Concentration	0.25 mg/L
Total Phosphorus	Annual Average Effluent Concentration	0.21 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

Final Effluent Parameter	Averaging Calculator	Limit
$CBOD_5$	Monthly Average Effluent Concentration	27 kg/d
Total Suspended Solids	Monthly Average Effluent Concentration	27 kg/d
Total Phosphorus	Annual Average Effluent Concentration	0.567 kg/d
Total Ammonia Nitrogen	Monthly Average Daily Effluent Loading	3.51 kg/d (May 1-October 30) 7.02 kg/d (November 1-April 30)

Monitoring for Nitrates in the Little Ausable River (Proposed Condition)

The Owner shall establish upstream and downstream water quality monitoring stations at locations where the Little Ausable River crosses Saintsbury Line and Denfield Road. Grab samples will be taken at these locations monthly from April to November and analyzed for nitrate nitrogen. Sample results will be summarized in the annual report prepared for the Lucan WWTP.

At 5 year intervals, beginning with the first set of upstream and downstream samples, the Owner shall prepare a report summarizing the accumulated sample results and provide an opinion regarding whether the discharge from the WWTP has caused an increase in the downstream nitrate loadings and whether any increase might be detrimental to aquatic life. The report shall be submitted to the Ministry simultaneously with that year's annual report for the WWTP.

If you have any questions or require additional information, please feel free to contact me.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____

Stephen D. Burns, P. Eng.

SDB:es
Encl.
c.c. Hugh Geurts, MECP – London
Jeff Little, Township of Lucan Biddulph
Renee Hornick, OCWA

From:	Badali, Mark (MECP)
To:	Steve Burns
Cc:	mpearson@bmross.net; Lisa Courtney (lcourtney@bmross.net); Geurts, Hugh (MECP); Jeff Little; Renee Hornick
Subject:	RE: 21023 - Lucan WWTP Class EA - Effluent Quality Proposal
Date:	Friday, September 17, 2021 3:07:58 PM

Hi Steve,

Thank you for providing this letter. The ministry accepts these proposed effluent criteria.

As discussed in previous correspondence, the ministry will require a proposed long term monitoring of nitrate in an upstream/downstream configuration (non freezing period only), which will form a condition of the Environmental Compliance Approval. Further details of the monitoring program (e.g. locations for downstream nitrate monitoring, for species at risk) can be addressed in the Environmental Study Report (ESR).

Please submit a draft copy of the ESR directly to me in advance of filing the final report, allowing a minimum of 30 days for the ministry's technical reviewers to provide comments, if possible.

Thank you and have a great weekend,

Mark Badali (he/him)
Regional Environmental Planner (REP) – Southwest Region
Project Review Unit | Environmental Assessment Branch
Ontario Ministry of the Environment, Conservation and Parks
Mark.Badali1@ontario.ca | (416) 457-2155

From: Steve Burns <sburns@bmross.net>
Sent: September 3, 2021 9:49 AM
To: Badali, Mark (MECP) <Mark.Badali1@ontario.ca>
Cc: mpearson@bmross.net; Lisa Courtney (lcourtney@bmross.net) <lcourtney@bmross.net>; Geurts, Hugh (MECP) <Hugh.Geurts@ontario.ca>; Jeff Little <jlittle@lucanbiddulph.on.ca>; Renee Hornick <rhornick@ocwa.com>
Subject: 21023 - Lucan WWTP Class EA - Effluent Quality Proposal

Hi Mark:
Attached is a letter proposing effluent quality criteria for an expanded Lucan WWTP.
We believe the proposal is consistent with discussions to date with Ministry staff.
If you have any questions or require additional information please contact me.
Steve

Steve Burns, P. Eng.
B. M. Ross and Associates Limited

Engineers and Planners
62 North Street
Goderich, ON N7A 2T4

Ph: (519) 524-2641
sburns@bmross.net
https://link.edgepilot.com/s/60ee61d1/YYEMbQlFjUySMWAeukNOPA?u=http://www.bmross.net/

Appendix E – Consultation Materials

Township of Lucan Biddulph
Municipal Class Environmental Assessment for the Expansion of the Lucan Wastewater Treatment Plant

NOTICE OF STUDY COMMENCEMENT

The Project: The Township of Lucan Biddulph is initiating a Municipal Class Environmental Assessment (MCEA) to investigate and evaluate options to increase capacity at the Lucan Wastewater Treatment Plant (WWTP). The need for additional capacity at the WWTP is in response to current and anticipated future local growth. The WWTP is located at 6242 Fallon Drive in Lucan, Ontario. The EA will consider alternative solutions to increase the rated capacity of the WWTP in response to known and future servicing needs. This notice is being issued to advise of the start of study investigations.

The Environmental Assessment Process: This project is being investigated following the environmental planning and design process set out for Schedule 'C' activities under the MCEA process. The purpose of the MCEA is to evaluate solutions related municipal infrastructure needs and projects following a logical and defined decision-making process. The process incorporates the evaluation of alternative solutions, potential environmental impacts and identifies how impacts may be mitigated. The EA will also incorporate consultation with the public, government review agencies, stakeholders and affected property owners. Near the completion of the MCEA process, an Environmental Study Report (ESR) will be available for public and agency review. Notices of public meetings and the availability of the ESR will be posted in the future on the Township's website (https://www.lucanbiddulph.on.ca) and in the local papers.

Public Involvement: Public consultation is a key component of this study. At this time, we welcome any initial comments related to this EA. It is anticipated that a public information meeting will be held at a future date to provide information on the project and alternatives being considered and provide an opportunity for residents to provide input and feedback. If you have any questions or comments or wish to be added to the study mailing list, please contact the consulting engineers: **B. M. Ross and Associates, 62 North Street, Goderich ON, N7A 2T4. Telephone (519) 524-2641. Attention: Lisa Courtney, Environmental Planner – lcourtney@bmross.net.** Any comments collected will be maintained on file for use during the project and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

This Notice issued: March 17, 2021

Jeff Little, Manager of Public Works, Township of Lucan Biddulph.

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 www.bmross.net

File No. 21023

March 17, 2021

(see attached list)

RE: Class EA to Expand Lucan Wastewater Treatment Plant
Township of Lucan Biddulph (Lucan)

The Township of Lucan Biddulph has initiated a Class Environmental Assessment (Class EA) process to consider options associated with the expansion of the Lucan Wastewater Treatment Plant located at 6242 Fallon Drive in Lucan, Ontario (as shown on the accompanying key plan). The need for additional capacity at the WWTP is in response to current and anticipated future local growth. The EA will consider alternative solutions to increase the rated capacity of the WWTP.

The planning for this project is following the planning process established for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA) document. Schedule 'C' projects must complete all five phases of the Class EA, which is undertaken in order to identify potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, First Nation and Métis communities, project stakeholders and review agencies.

Your organization has been identified as possibly having an interest in this project and we are soliciting your input. Please forward your response to our office by April 21, 2021. If you have any questions or require further information, please contact the undersigned at lcourtney@bmross.net or by phone at 1-888-524-2641.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Lisa Courtney, M.Sc., MCIP, RPP
Environmental Planner

LJC:hl
Encl.
cc. Jeff Little, Manager of Public Works, Township of Lucan Biddulph

Z:\21023-LB-Lucan_STP_Expansion\WP\Class EA\2021\Agency\21023 - 10Feb21 - Agency Letter.docx

TOWNSHIP OF LUCAN BIDDULPH
CLASS EA TO EXPAND LUCAN SEWAGE TREATMENT PLANT
PROJECT: 21023

REVIEW AGENCY CIRCULATION LIST

REVIEW AGENCY	INVOLVEMENT
Ministry of the Environment, Conservation & Parks Regional EA Coordinator	Mandatory Contact
Ministry of Natural Resources and Forestry - Aylmer	Potential Impact on Natural Features
Ministry of Heritage, Sport, Tourism and Culture Industries	Potential Impact to Cultural Heritage Features
Ministry of Municipal Affairs and Housing	Potential Impacts to Residential Areas
County of Middlesex - Planning - Administration - Economic Development	General Information and implication for long-term development
Ausable Bayfield Conservation Authority 71108 Morrison Line, RR3 Exeter, ON N0M 1S5	Potential Impacts on Natural Features
Ausable Bayfield Maitland Valley Source Protection Authority	Potential Impacts to Source Water Protection
Township of Lucan Biddulph	Proponent

B. M. ROSS AND ASSOCIATES LIMITED
Engineers and Planners
62 North Street, Goderich, ON N7A 2T4
p. (519) 524-2641 www.bmross.net

File No. 21023

March 17, 2021

RE: Class EA to Expand Lucan Wastewater Treatment Plant
Township of Lucan Biddulph (Lucan)

The Township of Lucan Biddulph has initiated a Class Environmental Assessment (Class EA) process to consider options associated with expansion of the Lucan Wastewater Treatment Plant located at 6242 Fallon Drive in Lucan, Ontario (as shown on the accompanying key plan). The need for additional capacity at the WWTP is in response to current and anticipated future local growth. The EA will consider alternative solutions to increase the rated capacity of the WWTP.

The planning for this project is following the planning process established for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA) document. Schedule 'C' projects must complete all five phases of the Class EA, which is undertaken in order to identify potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, First Nation and Métis communities, project stakeholders and review agencies.

Your community has been identified as possibly having an interest in this project. For your convenience, a response form is enclosed. Please forward your response to our office by May 3, 2021. If you have any questions or require further information, please contact the undersigned at 519-524-2641 or by e-mail at lcourtney@bmross.net.

Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Lisa Courtney, MSc., MCIP, RPP
Environmental Planner

LJC:hl
Encl.
cc. Jeff Little, Manager of Public Works, Township of Lucan Biddulph

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TOWNSHIP OF LUCAN BIDDULPH
CLASS EA TO EXPAND LUCAN SEWAGE TREATMENT PLANT
PROJECT: 21023

ABORIGINAL CIRCULATION LIST

Chippewas of the Thames First Nation
320 Chippewa Road
Muncey, ON N0L 1Y0
Email: Fallon Burch at consultation@cottfn.com

Munsee-Delaware Nation
Chief Roger Thomas
289 Jubilee Road, RR 1
Muncey, ON N0L 1Y0
Email: chief@munsee.ca

Oneida Nation of the Thames
2212 Elm Avenue
Southwold, ON N0L 2G0

Delaware Nation
14760 School House Line, RR3
Thamesville, ON N0P 2K0

Bkejwanong Territory (Walpole Island)
Chief Charles Sampson
117 Tahgahoning Road
Wallaceburg, ON N8A 4K9
Email: Dean Jacobs at dean.jacobs@wifn.org

Caldwell First Nation
Chief Mary Duckworth
14 Orange Street
Leamington, ON N8H 1P5
Email: consultation.coordinator@caldwellfirstnation.ca

Chippewas of Kettle and Stony Point First Nation
Chief Jason Henry
6247 Indian Lane RR2
Forest, ON N0N 1J1
Email: Valerie George, Consultation Coordinator at
Valerie.george@kettlepoint.org

Aamjiwnaang First Nation
Chief Chris Plain
Annex Building
978 Tashmoo Avenue
Sarnia, ON N7T 7H5
Mail: Sharilyn Johnston, Environmental Coordinator

Métis Nation of Ontario
Suite 1100 – 66 Slater Street
Ottawa, ON K1P 5H1
consultations@metisnation.org

Métis Nation of Ontario Thames Bluewater Métis Council
Kathleen Anderson, President
Unit 19, 1100 Dearness Dr
London, ON, N6E 1N9
tbwmc.president@gmail.com

Ministry of the Environment, Conservation and Parks

Environmental Assessment Branch

1st Floor
135 St. Clair Avenue W
Toronto ON M4V 1P5
Tel.: 416 314-8001 416 314-8001
Fax.: 416 314-8452 **416 314-8452**

Ministère de l'Environnement, de la Protection de la nature et des Parcs

Direction des évaluations environnementales

Rez-de-chaussée
135, avenue St. Clair Ouest
Toronto ON M4V 1P5
Tél.: 416 314-8001
Téléc.: 416 314-8452

Ontario

April 26, 2021

Jeff Little, Manager of Public Works
Township of Lucan Biddulph

Re: **Expansion of the Lucan Wastewater Treatment Plant**
Township of Lucan Biddulph
Municipal Class EA
Response to Notice of Commencement

Dear Jeff Little,

This letter is in response to the Notice of Commencement for the above noted project. The Ministry of the Environment, Conservation and Parks (MECP) acknowledges that the Township of Lucan Biddulph (proponent) has indicated that the study is following the approved environmental planning process for a Schedule C project under the Municipal Class Environmental Assessment (Class EA).

The **updated (February 2021)** attached "Areas of Interest" document provides guidance regarding the ministry's interests with respect to the Class EA process. Please address all areas of interest in the EA documentation at an appropriate level for the EA study. Proponents who address all the applicable areas of interest can minimize potential delays to the project schedule. **Further information is provided at the end of the Areas of Interest document relating to recent changes to the Environmental Assessment Act through Bill 197, Covid-19 Economic Recovery Act 2020.**

The Crown has a legal duty to consult Aboriginal communities when it has knowledge, real or constructive, of the existence or potential existence of an Aboriginal or treaty right and contemplates conduct that may adversely impact that right. Before authorizing this project, the Crown must ensure that its duty to consult has been fulfilled, where such a duty is triggered. Although the duty to consult with Aboriginal peoples is a duty of the Crown, the Crown may delegate procedural aspects of this duty to project proponents while retaining oversight of the consultation process.

The proposed project may have the potential to affect Aboriginal or treaty rights protected under Section 35 of Canada's *Constitution Act* 1982. Where the Crown's duty to consult is triggered in relation to the proposed project**, the MECP is delegating the procedural aspects of rights-based consultation to the proponent through this letter.** The Crown intends to rely on the delegated consultation process in discharging its duty to consult and maintains the right to participate in the consultation process as it sees fit.

Based on information provided to date and the Crown`s preliminary assessment the proponent is required to consult with the following communities who have been identified as potentially affected by the proposed project:

- Aamjiwnaang First Nation
- Bkejwanong (Walpole Island)
- Chippewas of Kettle and Stony Point
- Chippewas of the Thames First Nation
- Oneida Nation of the Thames

Steps that the proponent may need to take in relation to Aboriginal consultation for the proposed project are outlined in the "Code of Practice for Consultation in Ontario's Environmental Assessment Process". Additional information related to Ontario's Environmental Assessment Act is available online at: www.ontario.ca/environmentalassessments.

Please also refer to the attached document "A Proponent's Introduction to the Delegation of Procedural Aspects of consultation with Aboriginal Communities" for further information, including the MECP's expectations for EA report documentation related to consultation with communities.

The proponent must contact the Director of Environmental Assessment Branch (EABDirector@ontario.ca) under the following circumstances subsequent to initial discussions with the communities identified by MECP:

- Aboriginal or treaty rights impacts are identified to you by the communities
- You have reason to believe that your proposed project may adversely affect an Aboriginal or treaty right
- Consultation with Indigenous communities or other stakeholders has reached an impasse
- A Part II Order request is expected on the basis of impacts to Aboriginal or treaty rights

The MECP will then assess the extent of any Crown duty to consult for the circumstances and will consider whether additional steps should be taken, including what role you will be asked to play should additional steps and activities be required.

A draft copy of the report should be sent directly to me prior to the filing of the final report, allowing a minimum of 45 days for the ministry's technical reviewers to provide comments.

Please also ensure a copy of the final notice is sent to the ministry's Southwest Region EA notification email account (eanotification.swregion@ontario.ca) after the draft report is reviewed and finalized.

Should you or any members of your project team have any questions regarding the material above, please contact me at mark.badali1@ontario.ca.

Yours truly,

Mark Badali
Regional Environmental Assessment Coordinator – Southwest Region

cc Rob Wrigley, Manager, London District Office, MECP
Mark Smith, Water Compliance Supervisor, London District Office, MECP
Lisa Courtney, Environmental Planner, B. M. Ross and Associates

Attach: Areas of Interest
A Proponent's Introduction to the Delegation of Procedural Aspects of Consultation with Aboriginal Communities

AREAS OF INTEREST (v. February 2021)

It is suggested that you check off each section after you have considered / addressed it.

☐ **Planning and Policy**

- Projects located in MECP Central Region are subject to **A Place to Grow: Growth Plan for the Greater Golden Horseshoe (2020).** Parts of the study area may also be subject to the Oak Ridges Moraine Conservation Plan (2017), Niagara Escarpment Plan (2017), Greenbelt Plan (2017) or Lake Simcoe Protection Plan (2014). Applicable plans and the applicable policies should be identified in the report, and the proponent should describe how the proposed project adheres to the relevant policies in these plans.

- The **Provincial Policy Statement (2020)** contains policies that protect Ontario's natural heritage and water resources. Applicable policies should be referenced in the report, and the proponent should describe how the proposed project is consistent with these policies.

- In addition to the provincial planning and policy level, the report should also discuss the planning context at the municipal and federal levels, as appropriate.

☐ **Source Water Protection**

The *Clean Water Act*, 2006 (CWA) aims to protect existing and future sources of drinking water. To achieve this, several types of vulnerable areas have been delineated around surface water intakes and wellheads for every municipal residential drinking water system that is located in a source protection area. These vulnerable areas are known as a Wellhead Protection Areas (WHPAs) and surface water Intake Protection Zones (IPZs). Other vulnerable areas that have been delineated under the CWA include Highly Vulnerable Aquifers (HVAs), Significant Groundwater Recharge Areas (SGRAs), Event-based modelling areas (EBAs), and Issues Contributing Areas (ICAs). Source protection plans have been developed that include policies to address existing and future risks to sources of municipal drinking water within these vulnerable areas.

Projects that are subject to the Environmental Assessment Act that fall under a Class EA, or one of the Regulations, have the potential to impact sources of drinking water if they occur in designated vulnerable areas or in the vicinity of other at-risk drinking water systems (i.e. systems that are not municipal residential systems). MEA Class EA projects may include activities that, if located in a vulnerable area, could be a threat to sources of drinking water (i.e. have the potential to adversely affect the quality or quantity of drinking water sources) and the activity could therefore be subject to policies in a source protection plan. Where an activity poses a risk to drinking water, policies in the local source protection plan may impact how or where that activity is undertaken. Policies may prohibit certain activities, or they may require risk management measures for these activities. Municipal Official Plans, planning decisions, Class EA projects (where the project includes an activity that is a threat to drinking water) and prescribed instruments must conform with policies that address significant risks to drinking water and must have regard for policies that address moderate or low risks.

- In October 2015, the MEA Parent Class EA document was amended to include reference to the Clean Water Act (Section A.2.10.6) and indicates that proponents undertaking a Municipal Class EA project must identify early in their process whether a project is or could potentially be occurring with a vulnerable area. **Given this requirement, please include a section in the report on source water protection.**

    - The proponent should identify the source protection area and should clearly document how the proximity of the project to sources of drinking water (municipal or other) and any delineated vulnerable areas was considered and assessed. Specifically, the report should discuss whether or not the project is located in a vulnerable area and provide applicable details about the area.

- If located in a vulnerable area, proponents should document whether any project activities are prescribed drinking water threats and thus pose a risk to drinking water (this should be consulted on with the appropriate Source Protection Authority). Where an activity poses a risk to drinking water, the proponent must document and discuss in the report how the project adheres to or has regard to applicable policies in the local source protection plan. This section should then be used to inform and be reflected in other sections of the report, such as the identification of net positive/negative effects of alternatives, mitigation measures, evaluation of alternatives etc.

- While most source protection plans focused on including policies for significant drinking water threats in the WHPAs and IPZs it should be noted that even though source protection plan policies may not apply in HVAs, these are areas where aquifers are sensitive and at risk to impacts and within these areas, activities may impact the quality of sources of drinking water for systems other than municipal residential systems.

- In order to determine if this project is occurring within a vulnerable area, proponents can use this mapping tool: http://www.applications.ene.gov.on.ca/swp/en/index.php. Note that various layers (including WHPAs, WHPA-Q1 and WHPA-Q2, IPZs, HVAs, SGRAs, EBAs, ICAs) can be turned on through the "Map Legend" bar on the left. The mapping tool will also provide a link to the appropriate source protection plan in order to identify what policies may be applicable in the vulnerable area.

- For further information on the maps or source protection plan policies which may relate to their project, proponents must contact the appropriate source protection authority. **Please consult with the local source protection authority to discuss potential impacts on drinking water. Please document the results of that consultation within the report and include all communication documents/correspondence.**

More Information
For more information on the *Clean Water Act*, source protection areas and plans, including specific information on the vulnerable areas and drinking water threats, please refer to Conservation Ontario's website where you will also find links to the local source protection plan/assessment report.

A list of the prescribed drinking water threats can be found in section 1.1 of Ontario Regulation 287/07 made under the *Clean Water Act*. In addition to prescribed drinking water threats, some source protection plans may include policies to address additional "local" threat activities, as approved by the MECP.

- **Climate Change**

The document "Considering Climate Change in the Environmental Assessment Process" (Guide) is now a part of the Environmental Assessment program's Guides and Codes of Practice. The Guide sets out the MECP's expectation for considering climate change in the preparation, execution and documentation of environmental assessment studies and processes. The guide provides examples, approaches, resources, and references to assist proponents with consideration of climate change in EA. Proponents should review this Guide in detail.

- **The MECP expects proponents of Class EA projects to:**

    1. Consider during the assessment of alternative solutions and alternative designs, the following:
        a. the project's expected production of greenhouse gas emissions and impacts on carbon sinks (climate change mitigation); and
        b. resilience or vulnerability of the undertaking to changing climatic conditions (climate change adaptation).
    2. Include a discrete section in the report detailing how climate change was considered in the EA.

How climate change is considered can be qualitative or quantitative in nature and should be scaled to the project's level of environmental effect. In all instances, both a project's impacts on climate change (mitigation) and impacts of climate change on a project (adaptation) should be considered.

- The MECP has also prepared another guide to support provincial land use planning direction related to the completion of energy and emission plans. The "Community Emissions Reduction Planning: A Guide for Municipalities" document is designed to educate stakeholders on the municipal opportunities to reduce energy and greenhouse gas emissions, and to provide guidance on methods and techniques to incorporate consideration of energy and greenhouse gas emissions into municipal activities of all types. We encourage you to review the Guide for information.

Air Quality, Dust and Noise

- If there are sensitive receptors in the surrounding area of this project, a quantitative air quality/odour impact assessment will be useful to evaluate alternatives, determine impacts and identify appropriate mitigation measures. The scope of the assessment can be determined based on the potential effects of the proposed alternatives, and typically includes source and receptor characterization and a quantification of local air quality impacts on the sensitive receptors and the environment in the study area. The assessment will compare to all applicable standards or guidelines for all contaminants of concern. **Please contact this office for further consultation on the level of Air Quality Impact Assessment required for this project if not already advised.**

- If a quantitative Air Quality Impact Assessment is not required for the project, the MECP expects that the report contain a qualitative assessment which includes:

    - A discussion of local air quality including existing activities/sources that significantly impact local air quality and how the project may impact existing conditions;
    - A discussion of the nearby sensitive receptors and the project's potential air quality impacts on present and future sensitive receptors;
    - A discussion of local air quality impacts that could arise from this project during both construction and operation; and
    - A discussion of potential mitigation measures.

- As a common practice, "air quality" should be used an evaluation criterion for all road projects.

- Dust and noise control measures should be addressed and included in the construction plans to ensure that nearby residential and other sensitive land uses within the study area are not adversely affected during construction activities.

- The MECP recommends that non-chloride dust-suppressants be applied. For a comprehensive list of fugitive dust prevention and control measures that could be applied, refer to *Cheminfo Services Inc. Best Practices for the Reduction of Air Emissions from Construction and Demolition Activities* report prepared for Environment Canada. March 2005.

- The report should consider the potential impacts of increased noise levels during the operation of the completed project. The proponent should explore all potential measures to mitigate significant noise impacts during the assessment of alternatives.

Ecosystem Protection and Restoration

- Any impacts to ecosystem form and function must be avoided where possible. The report should describe any proposed mitigation measures and how project planning will protect and enhance the local ecosystem.

- Natural heritage and hydrologic features should be identified and described in detail to assess potential impacts and to develop appropriate mitigation measures. The following sensitive environmental features may be located within or adjacent to the study area:
    - Key Natural Heritage Features: Habitat of endangered species and threatened species, fish habitat, wetlands, areas of natural and scientific interest (ANSIs), significant valleylands,

significant woodlands; significant wildlife habitat (including habitat of special concern species); sand barrens, savannahs, and tallgrass prairies; and alvars.
  - Key Hydrologic Features: Permanent streams, intermittent streams, inland lakes and their littoral zones, seepage areas and springs, and wetlands.
  - Other natural heritage features and areas such as: vegetation communities, rare species of flora or fauna, Environmentally Sensitive Areas, Environmentally Sensitive Policy Areas, federal and provincial parks and conservation reserves, Greenland systems etc.

We recommend consulting with the Ministry of Natural Resources and Forestry (MNRF), Fisheries and Oceans Canada (DFO) and your local conservation authority to determine if special measures or additional studies will be necessary to preserve and protect these sensitive features. In addition, you may consider the provisions of the Rouge Park Management Plan if applicable.

Species at Risk

- The Ministry of the Environment, Conservation and Parks has now assumed responsibility of Ontario's Species at Risk program. Information, standards, guidelines, reference materials and technical resources to assist you are found at https://www.ontario.ca/page/species-risk.

- The Client's Guide to Preliminary Screening for Species at Risk (Draft May 2019) has been attached to the covering email for your reference and use. Please review this document for next steps.

- For any questions related to subsequent permit requirements, please contact SAROntario@ontario.ca.

Surface Water

- The report must include enough information to demonstrate that there will be no negative impacts on the natural features or ecological functions of any watercourses within the study area. Measures should be included in the planning and design process to ensure that any impacts to watercourses from construction or operational activities (e.g. spills, erosion, pollution) are mitigated as part of the proposed undertaking.

- Additional stormwater runoff from new pavement can impact receiving watercourses and flood conditions. Quality and quantity control measures to treat stormwater runoff should be considered for all new impervious areas and, where possible, existing surfaces. The ministry's Stormwater Management Planning and Design Manual (2003) should be referenced in the report and utilized when designing stormwater control methods. **A Stormwater Management Plan should be prepared as part of the Class EA process** that includes:

    - Strategies to address potential water quantity and erosion impacts related to stormwater draining into streams or other sensitive environmental features, and to ensure that adequate (enhanced) water quality is maintained
    - Watershed information, drainage conditions, and other relevant background information
    - Future drainage conditions, stormwater management options, information on erosion and sediment control during construction, and other details of the proposed works
    - Information on maintenance and monitoring commitments.

- Ontario Regulation 60/08 under the *Ontario Water Resources Act* (OWRA) applies to the Lake Simcoe Basin, which encompasses Lake Simcoe and the lands from which surface water drains into Lake Simcoe. If the proposed sewage treatment plant is listed in Table 1 of the regulation, the report should describe how the proposed project and its mitigation measures are consistent with the requirements of this regulation and the OWRA.

- Any potential approval requirements for surface water taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, except for certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information. Additionally, an Environmental Compliance Approval under the OWRA is required for municipal stormwater management works.

Groundwater

- The status of, and potential impacts to any well water supplies should be addressed. If the project involves groundwater takings or changes to drainage patterns, the quantity and quality of groundwater may be affected due to drawdown effects or the redirection of existing contamination flows. In addition, project activities may infringe on existing wells such that they must be reconstructed or sealed and abandoned. Appropriate information to define existing groundwater conditions should be included in the report.

- If the potential construction or decommissioning of water wells is identified as an issue, the report should refer to Ontario Regulation 903, Wells, under the OWRA.

- Potential impacts to groundwater-dependent natural features should be addressed. Any changes to groundwater flow or quality from groundwater taking may interfere with the ecological processes of streams, wetlands or other surficial features. In addition, discharging contaminated or high volumes of groundwater to these features may have direct impacts on their function. Any potential effects should be identified, and appropriate mitigation measures should be recommended. The level of detail required will be dependent on the significance of the potential impacts.

- Any potential approval requirements for groundwater taking or discharge should be identified in the report. A Permit to Take Water (PTTW) under the OWRA will be required for any water takings that exceed 50,000 L/day, with the exception of certain water taking activities that have been prescribed by the Water Taking EASR Regulation – *O. Reg. 63/16*. These prescribed water-taking activities require registration in the EASR instead of a PTTW. Please review the Water Taking User Guide for EASR for more information.

- Consultation with the railroad authorities is necessary wherever there is a plan to use construction dewatering in the vicinity of railroad lines or where the zone of influence of the construction dewatering potentially intercepts railroad lines.

Excess Materials Management

- In December 2019, MECP released a new regulation under the Environmental Protection Act, titled "On-Site and Excess Soil Management" (O. Reg. 406/19) to support improved management of excess construction soil. This regulation is a key step to support proper management of excess soils, ensuring valuable resources don't go to waste and to provide clear rules on managing and reusing excess soil. New risk-based standards referenced by this regulation help to facilitate local beneficial reuse which in turn will reduce greenhouse gas emissions from soil transportation, while ensuring strong protection of human health and the environment. The new regulation is being phased in over time, with the first phase in effect on January 1, 2021. For more information, please visit https://www.ontario.ca/page/handling-excess-soil.

- The report should reference that activities involving the management of excess soil should be completed in accordance with O. Reg. 406/19 and the MECP's current guidance document titled "Management of Excess Soil – A Guide for Best Management Practices" (2014).

- All waste generated during construction must be disposed of in accordance with ministry requirements

Contaminated Sites

- Any current or historical waste disposal sites should be identified in the report. The status of these sites should be determined to confirm whether approval pursuant to Section 46 of the EPA may be required for land uses on former disposal sites. We recommend referring to the MECP's D-4 guideline for land use considerations near landfills and dumps.
    - Resources available may include regional/local municipal official plans and data; provincial data on large landfill sites and small landfill sites; Environmental Compliance Approval information for waste disposal sites on Access Environment.

- Other known contaminated sites (local, provincial, federal) in the study area should also be identified in the report (Note – information on federal contaminated sites is found on the Government of Canada's website).

- The location of any underground storage tanks should be investigated in the report. Measures should be identified to ensure the integrity of these tanks and to ensure an appropriate response in the event of a spill. The ministry's Spills Action Centre must be contacted in such an event.

- Since the removal or movement of soils may be required, appropriate tests to determine contaminant levels from previous land uses or dumping should be undertaken. If the soils are contaminated, you must determine how and where they are to be disposed of, consistent with *Part XV.1 of the Environmental Protection Act* (EPA) and Ontario Regulation 153/04, Records of Site Condition, which details the new requirements related to site assessment and clean up. Please contact the appropriate MECP District Office for further consultation if contaminated sites are present.

Servicing, Utilities and Facilities

- The report should identify any above or underground utilities in the study area such as transmission lines, telephone/internet, oil/gas etc. The owners should be consulted to discuss impacts to this infrastructure, including potential spills.

- The report should identify any servicing infrastructure in the study area such as wastewater, water, stormwater that may potentially be impacted by the project.

- Any facility that releases emissions to the atmosphere, discharges contaminants to ground or surface water, provides potable water supplies, or stores, transports or disposes of waste must have an Environmental Compliance Approval (ECA) before it can operate lawfully. Please consult with MECP's Environmental Permissions Branch to determine whether a new or amended ECA will be required for any proposed infrastructure.

- We recommend referring to the ministry's environmental land use planning guides to ensure that any potential land use conflicts are considered when planning for any infrastructure or facilities related to wastewater, pipelines, landfills or industrial uses.

Mitigation and Monitoring

- Contractors must be made aware of all environmental considerations so that all environmental standards and commitments for both construction and operation are met. Mitigation measures should be clearly referenced in the report and regularly monitored during the construction stage of the

project. In addition, we encourage proponents to conduct post-construction monitoring to ensure all mitigation measures have been effective and are functioning properly.

- Design and construction reports and plans should be based on a best management approach that centres on the prevention of impacts, protection of the existing environment, and opportunities for rehabilitation and enhancement of any impacted areas.

- The proponent's construction and post-construction monitoring plans must be documented in the report, as outlined in Section A.2.5 and A.4.1 of the MEA Class EA parent document.

Consultation

- The report must demonstrate how the consultation provisions of the Class EA have been fulfilled, including documentation of all stakeholder consultation efforts undertaken during the planning process. This includes a discussion in the report that identifies concerns that were raised and **describes how they have been addressed by the proponent** throughout the planning process. The report should also include copies of comments submitted on the project by interested stakeholders, and the proponent's responses to these comments (as directed by the Class EA to include full documentation).

- Please include the full stakeholder distribution/consultation list in the documentation.

Class EA Process

- If this project is a Master Plan: there are several different approaches that can be used to conduct a Master Plan, examples of which are outlined in Appendix 4 of the Class EA. **The Master Plan should clearly indicate the selected approach for conducting the plan**, by identifying whether the levels of assessment, consultation and documentation are sufficient to fulfill the requirements for Schedule B or C projects. Please note that any Schedule B or C projects identified in the plan would be subject to Part II Order Requests under the Environmental Assessment Act, although the plan itself would not be. **Please include a description of the approach being undertaken (use Appendix 4 as a reference).**

- If this project is a Master Plan: Any identified projects should also include information on the MCEA schedule associated with the project.

- The report should provide clear and complete documentation of the planning process in order to allow for transparency in decision-making.

- The Class EA requires the consideration of the effects of each alternative on all aspects of the environment (including planning, natural, social, cultural, economic, technical). The report should include a level of detail (e.g. hydrogeological investigations, terrestrial and aquatic assessments, cultural heritage assessments) such that all potential impacts can be identified, and appropriate mitigation measures can be developed. Any supporting studies conducted during the Class EA process should be referenced and included as part of the report.

- Please include in the report a list of all subsequent permits or approvals that may be required for the implementation of the preferred alternative, including but not limited to, MECP's PTTW, EASR Registrations and ECAs, conservation authority permits, species at risk permits, MTO permits and approvals under the *Impact Assessment Act*, 2019.

- Ministry guidelines and other information related to the issues above are available at http://www.ontario.ca/environment-and-energy/environment-and-energy. We encourage you to review all the available guides and to reference any relevant information in the report.

Amendments to the EAA through the Covid-19 Economic Recovery Act, 2020

Once the EA Report is finalized, the proponent must issue a Notice of Completion providing a minimum 30-day period during which documentation may be reviewed and comment and input can be submitted to the proponent. The Notice of Completion must be sent to the appropriate MECP Regional Office email address (for projects in MECP Southwest Region, the email is eanotification.swregion@ontario.ca).

The public has the ability to request a higher level of assessment on a project if they are concerned about potential adverse impacts to constitutionally protected Aboriginal and treaty rights. In addition, the Minister may issue an order on his or her own initiative within a specified time period. The Director (of the Environmental Assessment Branch) will issue a Notice of Proposed Order to the proponent if the Minister is considering an order for the project within 30 days after the conclusion of the comment period on the Notice of Completion. At this time, the Director may request additional information from the proponent. Once the requested information has been received, the Minister will have 30 days within which to make a decision or impose conditions on your project.

Therefore, the proponent cannot proceed with the project until at least 30 days after the end of the comment period provided for in the Notice of Completion. Further, the proponent may not proceed after this time if:

- a Part II Order request has been submitted to the ministry regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, or
- the Director has issued a Notice of Proposed order regarding the project.

Please ensure that the Notice of Completion advises that outstanding concerns are to be directed to the proponent for a response, and that in the event there are outstanding concerns regarding potential adverse impacts to constitutionally protected Aboriginal and treaty rights, Part II Order requests on those matters should be addressed in writing to:

Minister Jeff Yurek
Ministry of Environment, Conservation and Parks
777 Bay Street, 5th Floor
Toronto ON M7A 2J3
minister.mecp@ontario.ca

and

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

A PROPONENT'S INTRODUCTION TO THE DELEGATION OF PROCEDURAL ASPECTS OF CONSULTATION WITH ABORIGINAL COMMUNITIES

DEFINITIONS

The following definitions are specific to this document and may not apply in other contexts:

Aboriginal communities – the First Nation or Métis communities identified by the Crown for the purpose of consultation.

Consultation – the Crown's legal obligation to consult when the Crown has knowledge of an established or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. This is the type of consultation required pursuant to s. 35 of the *Constitution Act, 1982*. Note that this definition does not include consultation with Aboriginal communities for other reasons, such as regulatory requirements.

Crown – the Ontario Crown, acting through a particular ministry or ministries.

Procedural aspects of consultation – those portions of consultation related to the process of consultation, such as notifying an Aboriginal community about a project, providing information about the potential impacts of a project, responding to concerns raised by an Aboriginal community and proposing changes to the project to avoid negative impacts.

Proponent – the person or entity that wants to undertake a project and requires an Ontario Crown decision or approval for the project.

I. PURPOSE

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that may adversely impact that right. In outlining a framework for the duty to consult, the Supreme Court of Canada has stated that the Crown may delegate procedural aspects of consultation to third parties. This document provides general information about the Ontario Crown's approach to delegation of the procedural aspects of consultation to proponents.

This document is not intended to instruct a proponent about an individual project, and it does not constitute legal advice.

II. WHY IS IT NECESSARY TO CONSULT WITH ABORIGINAL COMMUNITIES?

The objective of the modern law of Aboriginal and treaty rights is the *reconciliation* of Aboriginal peoples and non-Aboriginal peoples and their respective rights, claims and interests. Consultation is an important component of the reconciliation process.

The Crown has a legal duty to consult Aboriginal communities when it has knowledge of an existing or asserted Aboriginal or treaty right and contemplates conduct that might adversely impact that right. For example, the Crown's duty to consult is triggered when it considers issuing a permit, authorization or approval for a project which has the potential to adversely impact an Aboriginal right, such as the right to hunt, fish, or trap in a particular area.

The scope of consultation required in particular circumstances ranges across a spectrum depending on both the nature of the asserted or established right and the seriousness of the potential adverse impacts on that right.

Depending on the particular circumstances, the Crown may also need to take steps to accommodate the potentially impacted Aboriginal or treaty right. For example, the Crown may be required to avoid or minimize the potential adverse impacts of the project.

III. THE CROWN'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

The Crown has the responsibility for ensuring that the duty to consult, and accommodate where appropriate, is met. However, the Crown may delegate the procedural aspects of consultation to a proponent.

There are different ways in which the Crown may delegate the procedural aspects of consultation to a proponent, including through a letter, a memorandum of understanding, legislation, regulation, policy and codes of practice.

If the Crown decides to delegate procedural aspects of consultation, the Crown will generally:

- Ensure that the delegation of procedural aspects of consultation and the responsibilities of the proponent are clearly communicated to the proponent;
- Identify which Aboriginal communities must be consulted;
- Provide contact information for the Aboriginal communities;
- Revise, as necessary, the list of Aboriginal communities to be consulted as new information becomes available and is assessed by the Crown;
- Assess the scope of consultation owed to the Aboriginal communities;
- Maintain appropriate oversight of the actions taken by the proponent in fulfilling the procedural aspects of consultation;
- Assess the adequacy of consultation that is undertaken and any accommodation that may be required;
- Provide a contact within any responsible ministry in case issues arise that require direction from the Crown; and
- Participate in the consultation process as necessary and as determined by the Crown.

IV. THE PROPONENT'S ROLE AND RESPONSIBILITIES IN THE DELEGATED CONSULTATION PROCESS

Where aspects of the consultation process have been delegated to a proponent, the Crown, in meeting its duty to consult, will rely on the proponent's consultation activities and documentation of those activities. The consultation process informs the Crown's decision of whether or not to approve a proposed project or activity.

A proponent's role and responsibilities will vary depending on a variety of factors including the extent of consultation required in the circumstance and the procedural aspects of consultation the Crown has delegated to it. Proponents are often in a better position than the Crown to discuss a project and its potential impacts with Aboriginal communities and to determine ways to avoid or minimize the adverse impacts of a project.

A proponent can raise issues or questions with the Crown at any time during the consultation process. If issues or concerns arise during the consultation that cannot be addressed by the proponent, the proponent should contact the Crown.

a) What might a proponent be required to do in carrying out the procedural aspects of consultation?

Where the Crown delegates procedural aspects of consultation, it is often the proponent's responsibility to provide notice of the proposed project to the identified Aboriginal communities. The notice should indicate that the Crown has delegated the procedural aspects of consultation to the proponent and should include the following information:

- a description of the proposed project or activity;
- mapping;
- proposed timelines;
- details regarding anticipated environmental and other impacts;
- details regarding opportunities to comment; and
- any changes to the proposed project that have been made for seasonal conditions or other factors, where relevant.

Proponents should provide enough information and time to allow Aboriginal communities to provide meaningful feedback regarding the potential impacts of the project. Depending on the nature of consultation required for a project, a proponent also may be required to:

- provide the Crown with copies of any consultation plans prepared and an opportunity to review and comment;
- ensure that any necessary follow-up discussions with Aboriginal communities take place in a timely manner, including to confirm receipt of information, share and update information and to address questions or concerns that may arise;
- as appropriate, discuss with Aboriginal communities potential mitigation measures and/or changes to the project in response to concerns raised by Aboriginal communities;
- use language that is accessible and not overly technical, and translate material into Aboriginal languages where requested or appropriate;
- bear the reasonable costs associated with the consultation process such as, but not limited to, meeting hall rental, meal costs, document translation(s), or to address technical & capacity issues;
- provide the Crown with all the details about potential impacts on established or asserted Aboriginal or treaty rights, how these concerns have been considered and addressed by the proponent and the Aboriginal communities and any steps taken to mitigate the potential impacts;
- provide the Crown with complete and accurate documentation from these meetings and communications; and
- notify the Crown immediately if an Aboriginal community not identified by the Crown approaches the proponent seeking consultation opportunities.

b) What documentation and reporting does the Crown need from the proponent?

Proponents should keep records of all communications with the Aboriginal communities involved in the consultation process and any information provided to these Aboriginal communities.

As the Crown is required to assess the adequacy of consultation, it needs documentation to satisfy itself that the proponent has fulfilled the procedural aspects of consultation delegated to it. The documentation required would typically include:

- the date of meetings, the agendas, any materials distributed, those in attendance and copies of any minutes prepared;
- the description of the proposed project that was shared at the meeting;
- any and all concerns or other feedback provided by the communities;
- any information that was shared by a community in relation to its asserted or established Aboriginal or treaty rights and any potential adverse impacts of the proposed activity, approval or disposition on such rights;
- any proposed project changes or mitigation measures that were discussed, and feedback from Aboriginal communities about the proposed changes and measures;
- any commitments made by the proponent in response to any concerns raised, and feedback from Aboriginal communities on those commitments;
- copies of correspondence to or from Aboriginal communities, and any materials distributed electronically or by mail;
- information regarding any financial assistance provided by the proponent to enable participation by Aboriginal communities in the consultation;
- periodic consultation progress reports or copies of meeting notes if requested by the Crown;
- a summary of how the delegated aspects of consultation were carried out and the results; and
- a summary of issues raised by the Aboriginal communities, how the issues were addressed and any outstanding issues.

In certain circumstances, the Crown may share and discuss the proponent's consultation record with an Aboriginal community to ensure that it is an accurate reflection of the consultation process.

c) Will the Crown require a proponent to provide information about its commercial arrangements with Aboriginal communities?

The Crown may require a proponent to share information about aspects of commercial arrangements between the proponent and Aboriginal communities where the arrangements:

- include elements that are directed at mitigating or otherwise addressing impacts of the project;
- include securing an Aboriginal community's support for the project; or
- may potentially affect the obligations of the Crown to the Aboriginal communities.

The proponent should make every reasonable effort to exempt the Crown from confidentiality provisions in commercial arrangements with Aboriginal communities to the extent necessary to allow this information to be shared with the Crown.

The Crown cannot guarantee that information shared with the Crown will remain confidential. Confidential commercial information should not be provided to the Crown as part of the consultation record if it is not relevant to the duty to consult or otherwise required to be submitted to the Crown as part of the regulatory process.

V. WHAT ARE THE ROLES AND RESPONSIBILITIES OF ABORIGINAL COMMUNITIES' IN THE CONSULTATION PROCESS?

Like the Crown, Aboriginal communities are expected to engage in consultation in good faith. This includes:

- responding to the consultation notice;
- engaging in the proposed consultation process;
- providing relevant documentation;
- clearly articulating the potential impacts of the proposed project on Aboriginal or treaty rights; and
- discussing ways to mitigates any adverse impacts.

Some Aboriginal communities have developed tools, such as consultation protocols, policies or processes that provide guidance on how they would prefer to be consulted. Although not legally binding, proponents are encouraged to respect these community processes where it is reasonable to do so. Please note that there is no obligation for a proponent to pay a fee to an Aboriginal community in order to enter into a consultation process.

To ensure that the Crown is aware of existing community consultation protocols, proponents should contact the relevant Crown ministry when presented with a consultation protocol by an Aboriginal community or anyone purporting to be a representative of an Aboriginal community.

VI. WHAT IF MORE THAN ONE PROVINCIAL CROWN MINISTRY IS INVOLVED IN APPROVING A PROPONENT'S PROJECT?

Depending on the project and the required permits or approvals, one or more ministries may delegate procedural aspects of the Crown's duty to consult to the proponent. The proponent may contact individual ministries for guidance related to the delegation of procedural aspects of consultation for ministry-specific permits/approvals required for the project in question. Proponents are encouraged to seek input from all involved Crown ministries sooner rather than later.

Ministry of Heritage, Sport, Tourism and Culture Industries

Programs and Services Branch
401 Bay Street, Suite 1700
Toronto, ON M7A 0A7
Tel: 613.242.3743

Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture

Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto, ON M7A 0A7
Tél: 613.242.3743

Ontario

April 19th, 2021 EMAIL ONLY

Lisa J. Courtney, MSc., MCIP, RPP
B. M. Ross and Associates Limited
Engineers and Planners
62 North Street
Goderich, ON N7A 2T4
lcourtney@bmross.net

MHSTCI File	**:**	**0013884**
Proponent	**:**	**The Township of Lucan Biddulph**
Subject	**:**	**Notice of Commencement – Schedule C MCEA**
Project	**:**	**Class EA to Expand Lucan Wastewater Treatment Plant**
Location	**:**	**6242 Fallon Drive, The Township of Lucan Biddulph**

Dear Lisa Courtney:

Thank you for providing the Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI) with the Notice of Commencement for the above-referenced project. MHSTCI's interest in this Environmental Assessment (EA) project relates to its mandate of conserving Ontario's cultural heritage.

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources.

Project Summary
The Township of Lucan Biddulph has initiated a Class Environmental Assessment (Class EA) process to consider options associated with the expansion of the Lucan Wastewater Treatment Plant. The planning for this project is following the planning process established for Schedule 'C' activities under the Municipal Class Environmental Assessment (Class EA) document.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Indigenous communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Indigenous communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources
This EA project may impact archaeological resources and should be screened using the MHSTCI *Criteria for Evaluating Archaeological Potential* to determine if an archaeological assessment is needed. MHSTCI archaeological sites data are available at *archaeology@ontario.ca*. If the EA project area exhibits archaeological potential, then an archaeological assessment (AA) should be undertaken by an archaeologist licenced under the *OHA*, who is responsible for submitting the report directly to MHSTCI for review.

Built Heritage Resources and Cultural Heritage Landscapes
The MHSTCI *Criteria for Evaluating Potential for Built Heritage Resources and Cultural Heritage Landscapes* should be completed to help determine whether this EA project may impact cultural heritage resources. If potential or known heritage resources exist, MHSTCI recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, should be completed to assess potential project impacts. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MHSTCI for review and make it available to local organizations or individuals who have expressed interest in review.

Environmental Assessment Reporting
All technical cultural heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MHSTCI whether any technical cultural heritage studies will be completed for this EA project, and provide them to MHSTCI before issuing a Notice of Completion or commencing any work on the site. If screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file.

Thank you for consulting MHSTCI on this project and please continue to do so throughout the EA process. If you have any questions or require clarification, do not hesitate to contact me.

Sincerely,

Joseph Harvey
Heritage Planner
joseph.harvey@Ontario.ca

CHIPPEWAS OF THE THAMES FIRST NATION

April 12, 2021

VIA EMAIL

Lisa Courtney
B. M. Ross and Associates Limited
62 North Street
Goderich, ON N7A 2T4

RE: Class EA to Expand Lucan Wastewater Treatment Plant, Township of Lucan Biddulph

Dear: Lisa,

We have reviewed information concerning the aforementioned project. The proposed project is located within the Chippewas of the Thames First Nation (COTTFN) Big Bear Creek Additions to Reserve (ATR) land selection area, as well as COTTFN's Traditional Territory.

After reviewing the project information, we have identified minimal concerns with the information that you have presented to us at this time. We have no concerns with this project and do not wish to be consulted further. However, I ask that if there are changes to the project that are of a substantive nature that you keep us informed by sending an electronic notification to consultation@cottfn.com.

We look forward to continuing this open line of communication. To implement meaningful consultation, COTTFN has developed its own protocol - a document and a process that will guide positive working relationships. We would be happy to meet with you to review COTTFN's Consultation Protocol.

As per *'Appendix D'* of the Wiindmaagewin attached is invoice 00100. Please do not hesitate to contact me if you need further clarification of this letter.

Sincerely,

Fallon Burch
Consultation Coordinator
Chippewa of the Thames First Nation
consultation@cottfn.com

Notice of Virtual Public Information Centre

Township of Lucan Biddulph

Municipal Class Environmental Assessment for the Expansion of the Lucan Wastewater Treatment Plant

The Project: The Township of Lucan Biddulph has initiated a Municipal Class Environmental Assessment (MCEA) to investigate and evaluate options to increase capacity at the Lucan Wastewater Treatment Plant (WWTP). The WWTP is located north of Lucan, at 6242 Fallon Drive. The EA is considering alternative solutions to increase the rated capacity in response to known and future servicing needs. At this time, the study team would like to present the technical background studies completed to date, the identified problem/opportunity, and review the alternatives being considered.

The Environmental Assessment Process: The project is being investigated following the MCEA process set out for Schedule 'C' activities. The purpose of the MCEA is to evaluate solutions related to municipal infrastructure needs and projects following a logical and defined decision-making process. The process incorporates the evaluation of alternative solutions, potential environmental impacts and identifies how impacts may be mitigated.

Public Involvement: Public consultation is a key component of this study and the first virtual Public Information Centre has been scheduled to update residents and stakeholders on the progress of the MCEA. It is expected a second public information centre will be held at a future date. This meeting will also provide an opportunity to ask questions and receive comments on the project. Details of the meetings are as follows:

DATE: Tuesday August 24, 2021
TIME: 6:30 PM
FORMAT: Virtual Meeting via Zoom

Due to COVID-19 concerns, the meeting will be held virtually using the Zoom platform. Pre-registration is required to participate during the meeting. The meeting link will be provided to those who pre-register ahead of the meeting date. Representatives from BMROSS will give a presentation and then take questions and comments from the public. Please contact Tina Merner at tmerner@lucanbiddulph.on.ca or 519-227-4491 ext. 23 to register for the meeting. If you are unable to access the presentation material on-line, please contact BMROSS and alternative arrangements will be made.

Any comments collected will be maintained on file for use during the project and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

Jeff Little, Manager of Public Works, Township of Lucan Biddulph
This Notice issued August 10, 2021

Township of Lucan Biddulph

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT FOR THE LUCAN WASTEWATER TREATMENT PLANT EXPANSION

Public Information Centre

August 24, 2021

BMROSS
engineering better communities

Agenda

1. Introduction to Project
2. Municipal Class Environmental Assessments
3. Consultation
4. Need for Expansion
5. Review of WWTP plant and capacity
6. Problem Definition
7. Review of Alternatives
8. Next Steps
9. Questions

Introduction

- Lucan has experienced significant growth in the last 10 years and growth is expected to continue.
- Township staff and BMROSS have been monitoring the remaining capacity of the existing Lucan Wastewater Treatment Plant (WWTP) as growth occurs.
- WWTP is approaching its capacity (as identified through reserve capacity monitoring and the Lucan Urban Servicing Master Plan).
  - Currently it is projected there is sufficient capacity until 2029.
- Given this, the Township has initiated a Municipal Class Environmental Assessment to investigate an expansion to the existing WWTP.

Municipal Class EAs

- The Municipal Class Environmental Assessment (MCEA) is the planning and approval process for municipal road, water, wastewater and stormwater projects.
- Municipalities must follow the MCEA process for municipal infrastructure projects to meet the requirements of the Environmental Assessment Act.
- MCEA process allows for the evaluation of feasible alternatives, identifies potential impacts and methods for mitigating impacts.
- MCEA considers the impacts to the natural, socio-economic, cultural and technical environments.

Principles of the MCEA process

- A systematic approach for groups of similar projects
  - Types of projects are classified into schedules and the schedule dictates the level of investigation needed.
- Documentation and transparency of the decision-making process.
- Consideration of alternative solutions to an identified problem or opportunity.
- Identifying and evaluating impacts of the alternative solutions.

Municipal Class EA Process

Schedule B EAs must complete Phase 1 and 2

1	2	3	4	5
Problem or opportunity identification	Evaluation of alternative solutions and selection of preferred solution	Identification and evaluation of alternative design concepts and selection of preferred solution	Preparation and submission of Environmental Study Report (ESR) for public and government agency review	Implementation of the preferred alternative and monitoring of impacts

Schedule C EAs must complete all the phases

Expansion of a wastewater treatment plant beyond the existing rated capacity is a Schedule C MCEA.

Consultation

- Key component of MCEA process.
- Required to consult with:
  - Provincial and federal agencies (depending on project)
  - First Nation and Métis communities
  - Adjacent property owners
  - Stakeholders and the general public
- At least two mandatory points of contact
  - Initial Project Notice
  - Notice of Study Completion
- Depending on the level of interest or impacts associated with a project, one or multiple public meetings may be held.

Consultation (con't)

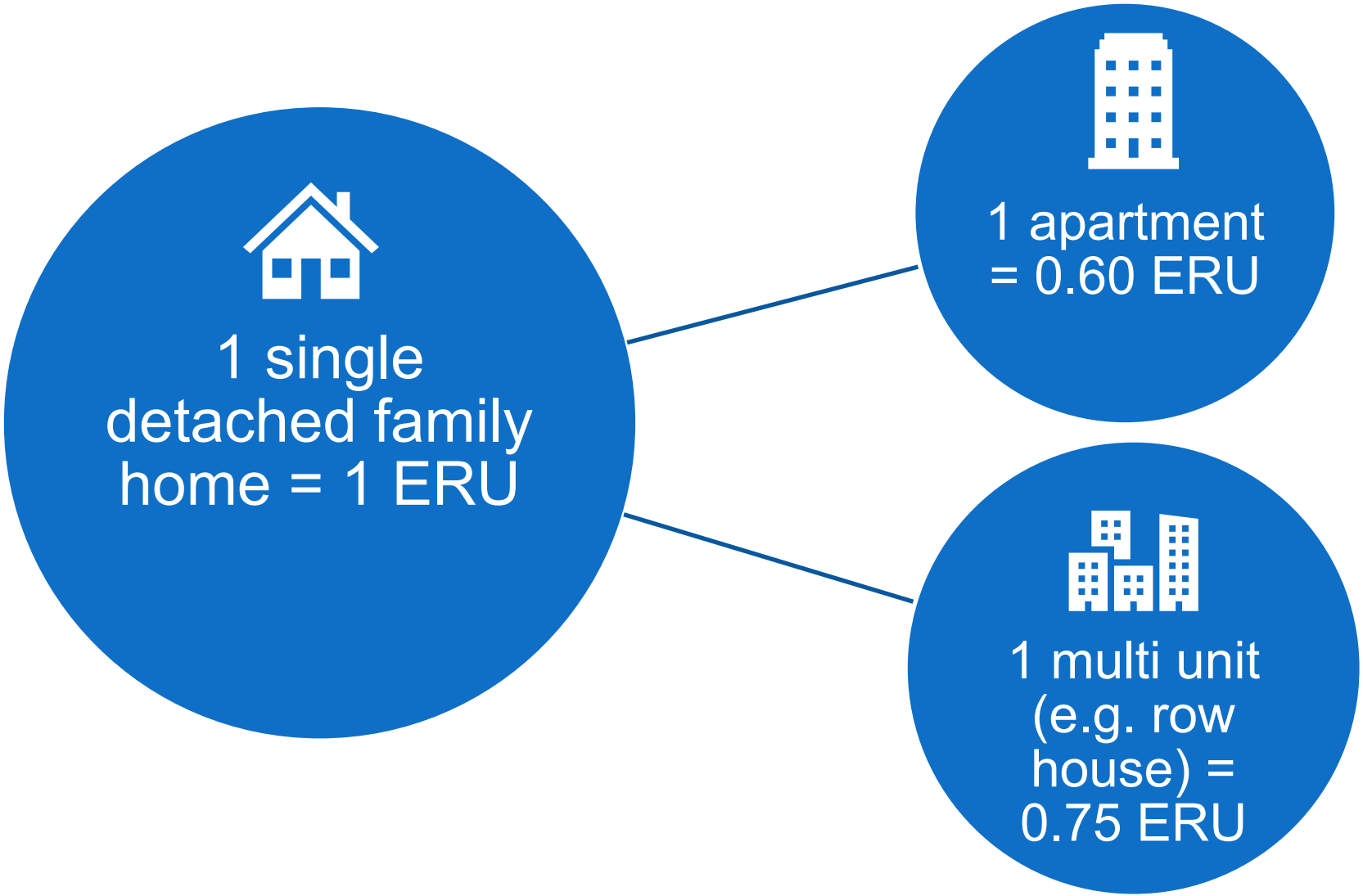
- Notice of Study Commencement in local papers.
- Letters mailed to review agencies, First Nation and Métis communities.
  - Have received initial comments from MECP, MHSTCI, Chippewas of the Thames First Nation.
- Adjacent property owners mailed copy of the Notice

- Additional public meeting will be held at a later date, when the study has progressed further.

Need for Expansion

- Estimated population of Lucan in 2021 is 3,300 persons.
- Currently, there are:
  - 360 approved units (not yet constructed) in Lucan.
  - 345 proposed units (not yet approved) in Lucan.
- Total reserve capacity of the WWTP = Rated Capacity (1,700 m^3/day) – Average Annual Daily Flow (1,305 m^3/day).
  - Total reserve capacity is 395 m^3/day.
  - Uncommitted portion of the reserve capacity is: 127 m^3/day or approximately 127 Equivalent Residential Units (ERU)

Equivalent Residential Units (ERU)



Projected Growth

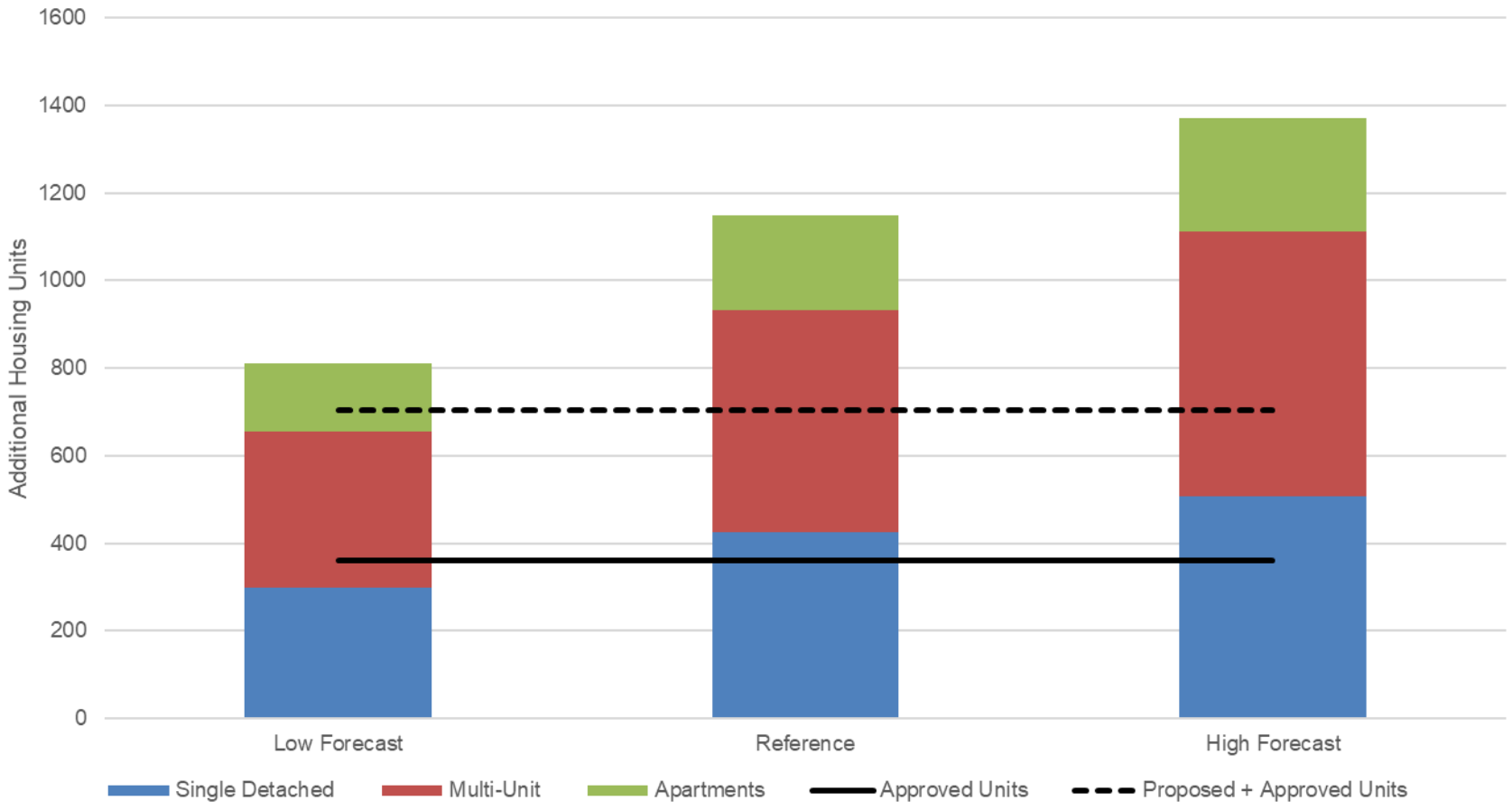
The County of Middlesex has recently projected growth in Lucan Biddulph to 2046 (25 years).

The number of new households (HH) predicted is:

- High growth = 1,370 HH
- Low growth = 810 HH
- Reference prediction = 1,150 HH

Recent growth has been at or exceeding the high projection.

Projected Growth (con't.)



Projected Growth and Wastewater Flows

When the number of forecasted households are converted to ERUs the result is:

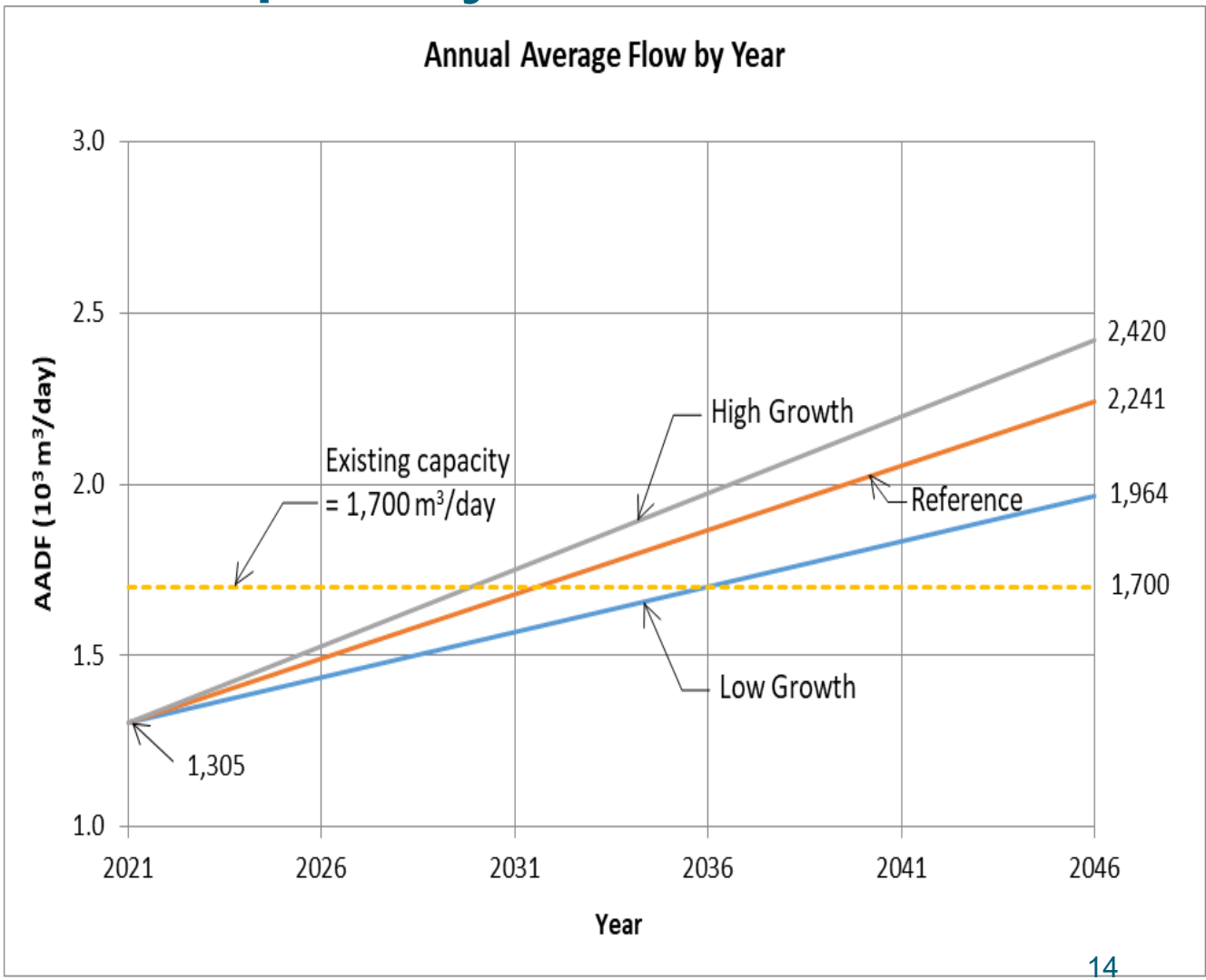
- High growth = 1,115 ERUs
- Low growth = 659 ERUs
- Reference prediction = 936 ERUs

The relationship between ERUs and flow is:

- 1 ERU = 1 m^3/day annual average flow

Rated WWTP Capacity

- Existing capacity may be adequate to 2029, but at recent development rates expansion may be required by 2026
- Headworks is a peak flow constraint and equipment is at end of useful life
- Existing biosolids treatment and storage facilities are undersized



Problem Definition

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.

Alternative Solutions to the Problem

1. Reduce existing quantities.
2. Limit community growth.
3. Expand the existing WWTP.
4. Replace the existing WWTP.
5. Re-rate the existing WWTP.
6. Do Nothing.

Alternative 1- Reduce existing quantities

- Reducing the average (AADF) flow to the plant is equal to creating capacity.
- The total sewage flow is a combination of true sewage (TSF) and extraneous flow (I-I).
- TSF = 95% of the water supplied -- roughly 540 L/day per ERU or 200 L/day per capita (very low)
- I-I in 2020 was 23% of the total flow (also very low)
- Conclusion is flow reduction is not feasible for expansion → REJECTED

Alternative 2- Limit Community Growth

- Existing flows + commitments = 93% of WWTP capacity.
- Limiting is not consistent with PPS, County OP or Township OP, which all encourage growth.
- There is substantial growth pressure that is not expected to decline.
- Conclusion - REJECTED as a solution.

Alternative 3- Expand WWTP

- Site is large enough.
- Physical facilities are capable of expansion (more treatment trains feasible).
- MECP is in agreement with an increased discharge to the Heenan Drain.
- Conclusion – continue to evaluate.

Alternative 4- Replace existing WWTP

- Assumes construction of a new facility at a different location.
- Existing technology is functioning well – don't need to change.
- Heenan Drain is an adequate receiver – no advantage to change location.
- Tankage and buildings are only 30 years old.
- Economically far more costly than expansion
- Conclusion – replacement is not necessary → REJECTED

Alternative 5- Re-rate existing WWTP

- Facility has already been re-rated once – from 1,100 to 1,700 m^3/day.
- Evaluation has established that further re-rating is not feasible.
- Conclusion – re-rating is not feasible → REJECTED

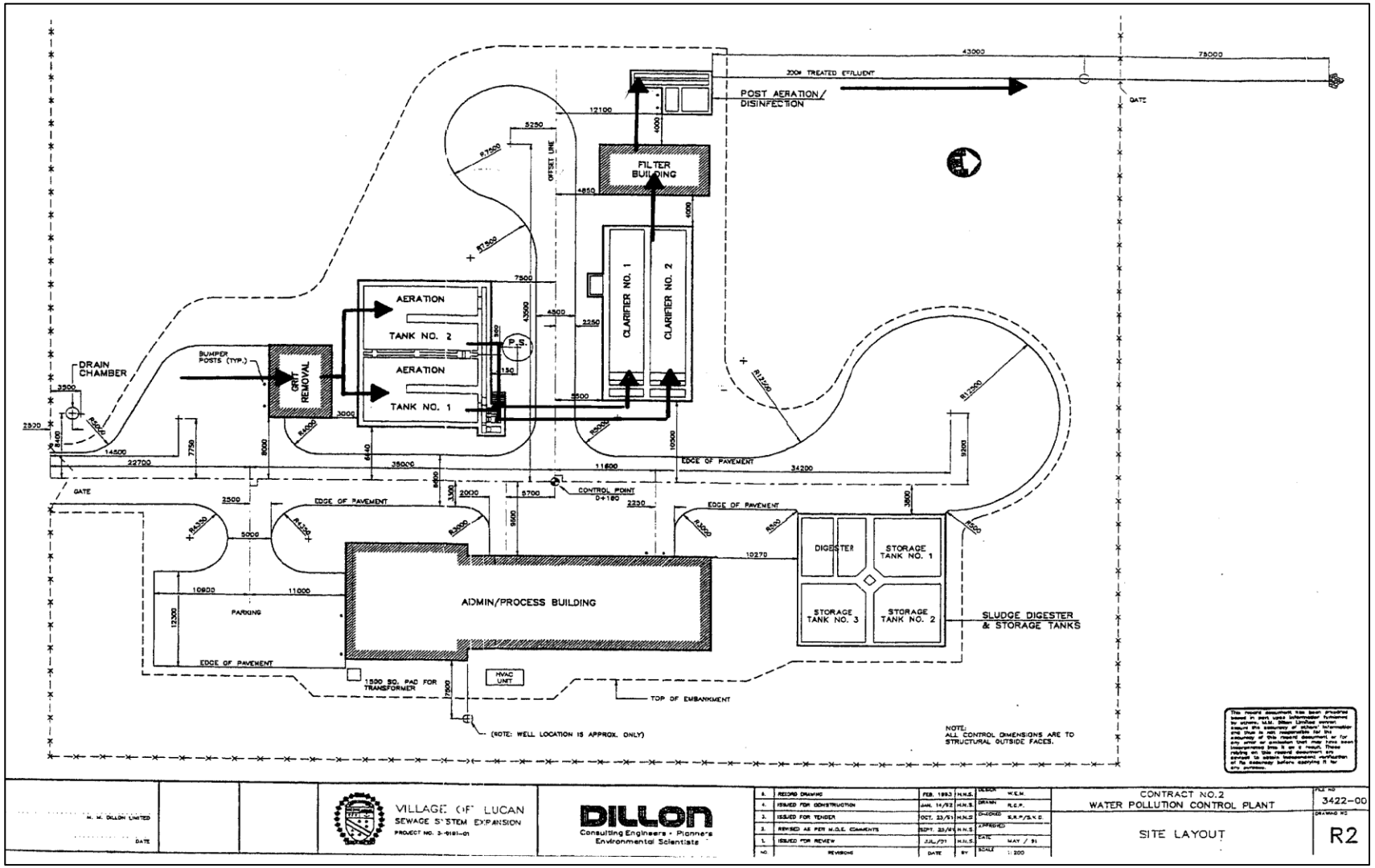
Alternative 6- Do Nothing

- Does not resolve the capacity problem.
- Essentially equal to Alternative 2 – Limiting Growth.
- Will remain an option until the end of the EA process.

Alternative Solutions Review

1. ~~Reduce existing quantities.~~ REJECTED
2. ~~Limit community growth.~~ REJECTED
3. Expand the existing WWTP.
4. ~~Replace the existing WWTP.~~ REJECTED
5. ~~Re-rate the existing WWTP.~~ REJECTED
6. Do Nothing.

Current WWTP



Existing Unit Process Capacities

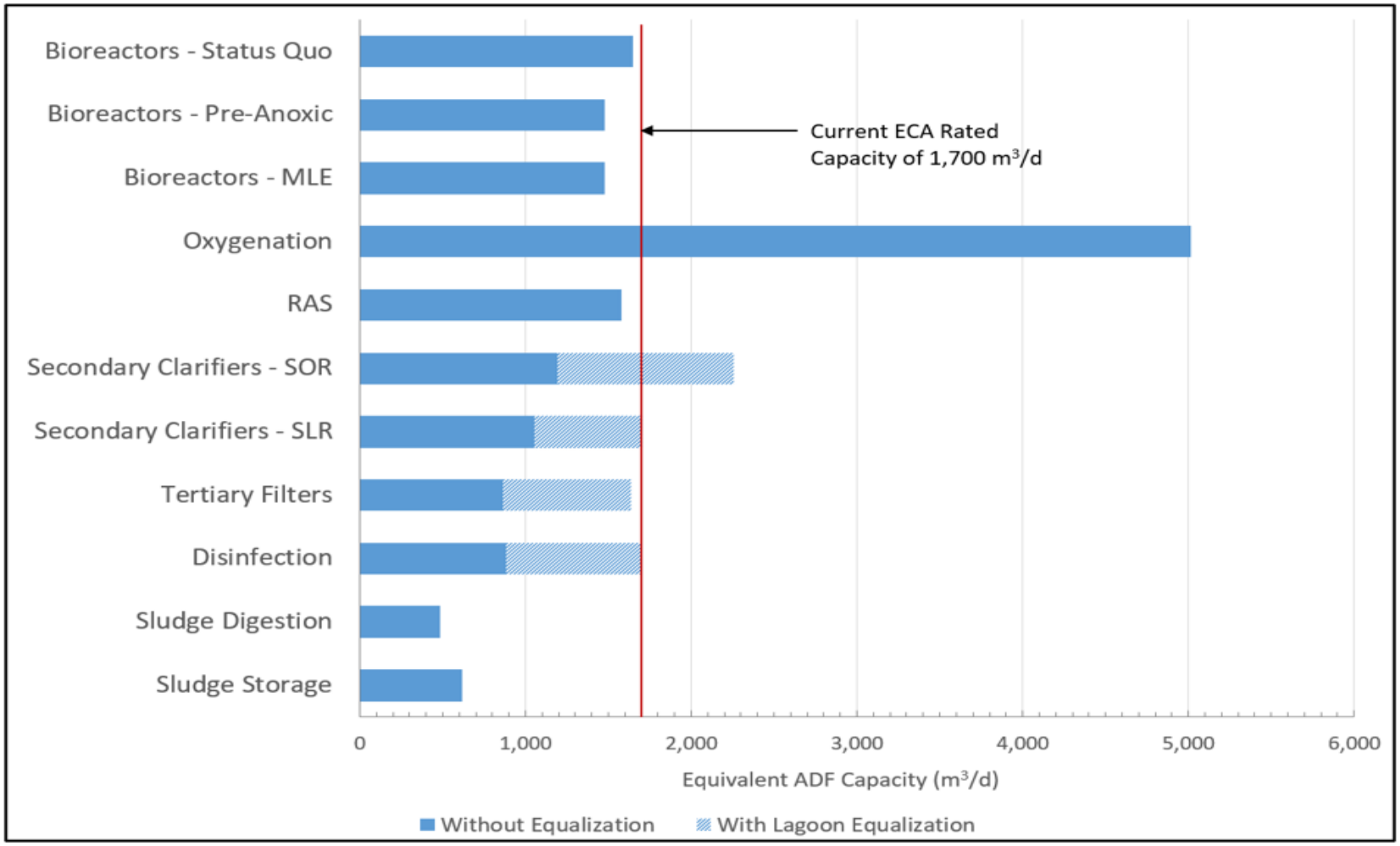


Figure 5.1 – Lucan WWTP Capacity Assessment Summary

Considerations for Expansion

The method and scale of the expansion are governed by the following factors:

1. The need to accommodate growth projections.
2. Uncertainty regarding the growth projections.
3. The ability of the receiving stream to accept additional effluent.
4. The current performance and expandability of the existing facility.
5. Capital and operating costs for an expanded facility.
6. The opportunity to decommission the Granton WWTP and pump Granton wastewater to the Lucan WWTP.

Considerations for Expansion (con't.)

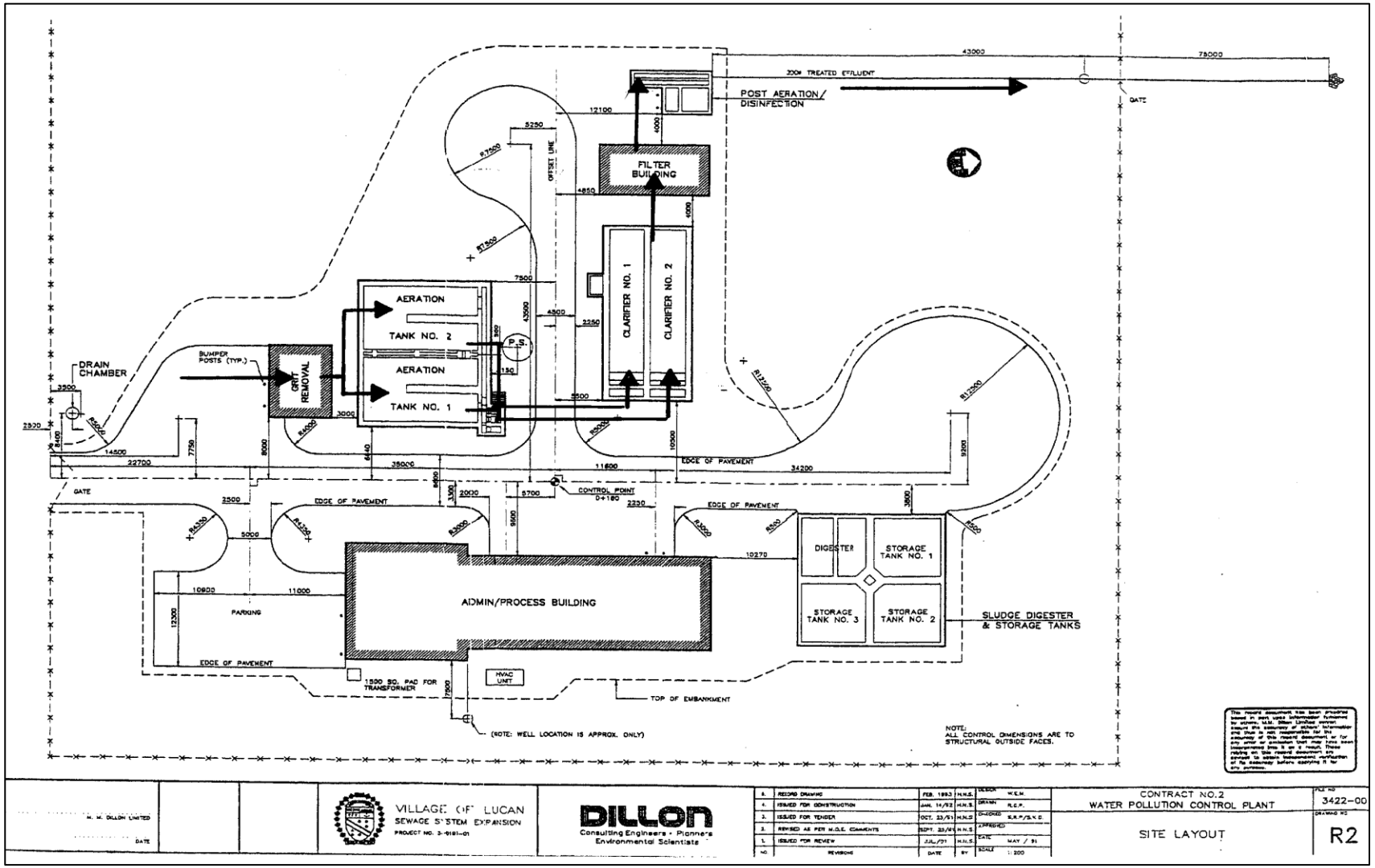
- Growth – Recommend planning for the High Growth Scenario (1,115 ERUs)
- 25 year (2046) estimated flow = **2,420 m^3/day**.
- Discussions with the MECP re Effluent Quality have tentatively established:
  - The present treatment process is satisfactory.
  - Nutrients are a concern.
  - The receiver is considered Policy 2.
  - Phosphorus will be the constraint for capacity.
- The maximum expanded capacity with the current process will be in the order of **2,700 m^3/day**. This is equal to High Growth + 12%.

Considerations for the Expansion (con't)

The Primary components for expansion will be the:

- Increased capacity at the Chestnut SPS.
- Bioreactors
- Final Clarifiers
- Filtration
- UV Disinfection
- Biosolids (Sludge) treatment and storage.

Lucan WWTP


POST AERATION/ DISINFECTION
200ø TREATED EFFLUENT
FILTER BUILDING
CLARIFIER NO. 1
CLARIFIER NO. 2
AERATION TANK NO. 2
AERATION TANK NO. 1
GRIT REMOVAL
DRAIN CHAMBER
BUMPER POSTS (TYP.)
P.S.
EDGE OF PAVEMENT
CONTROL POINT 0+180
ADMIN/PROCESS BUILDING
PARKING
1500 SQ. PAD FOR TRANSFORMER
HVAC UNIT
TOP OF EMBANKMENT
(NOTE: WELL LOCATION IS APPROX. ONLY)
DIGESTER
STORAGE TANK NO. 1
STORAGE TANK NO. 3
STORAGE TANK NO. 2
SLUDGE DIGESTER & STORAGE TANKS
NOTE: ALL CONTROL DIMENSIONS ARE TO STRUCTURAL OUTSIDE FACES.
VILLAGE OF LUCAN
SEWAGE SYSTEM EXPANSION
PROJECT NO. 3-9181-01
DILLON
Consulting Engineers • Planners
Environmental Scientists
CONTRACT NO.2
WATER POLLUTION CONTROL PLANT
SITE LAYOUT
3422-00
R2

Staging Opportunities

- The WWTP is constructed as “trains”.
- The logical approach to expansion is to add more trains.
- Adding one additional train will increase the capacity to between 2,200 and 2,475 m^3/day.
- One train will accommodate the High Growth Scenario until at least 2040 and will accommodate approximately an additional (to 2021) 900 ERUs.

Decommissioning the Granton WWTP

- Being evaluated as an “opportunity”.
- Would result in:
  - 120 m^3/day of wastewater being transferred to Lucan WWTP for treatment.
  - An overall reduction in system operating costs.
- Cost-Benefit analysis established that the payback period would be approximately 22 years.
- It is too early to understand the importance of the 120 m^3/day in the context of future growth.

Current Technical Activities

1. Finalizing the Effluent Quality Criteria with the MECP.
2. Establishing the probable costs of both a one or two train expansion.
3. Preparing the Environmental Study Report (ESR) text related to the technical evaluations.

Next Steps

- Continue technical evaluations to inform evaluation of design alternatives.
- Prepare draft Environmental Study Report
- Future PIC

Questions?

Notice of Public Open House

Township of Lucan Biddulph

Municipal Class Environmental Assessment for the Expansion of the Lucan Wastewater Treatment Plant

The Project: The Township of Lucan Biddulph has initiated a Municipal Class Environmental Assessment (MCEA) to investigate and evaluate options to increase capacity at the Lucan Wastewater Treatment Plant (WWTP). The WWTP is located north of Lucan, at 6242 Fallon Drive. The EA is considering alternative solutions to increase the rated capacity in response to known and future servicing needs. At this time, the study team would like to present technical investigations completed, alternative solutions, alternative design concepts and the preferred solution - expansion of the WWTP at the existing site.

The Environmental Assessment Process: The project is following the MCEA process set out for Schedule 'C' activities. The purpose of the MCEA is to evaluate solutions related to municipal infrastructure needs and projects following a logical and defined decision-making process. The process incorporates the evaluation of alternative solutions, potential environmental impacts and identifies how impacts may be mitigated.

Public Involvement: Public consultation is a key component of this study and an in-person public open house has been scheduled to update residents and stakeholders on the progress of the MCEA. Display boards containing information on the project will be available for viewing and members of the study team will be available to answer questions and receive comments. Details of the public open house are as follows:

DATE: Thursday September 8, 2022
TIME: 6:00 – 8:00 PM
LOCATION: Lucan Biddulph Council Chambers, 270 Main St., Lucan ON

For further information on this project, or to submit comments, please contact the consulting engineers: B.M. Ross and Associates: 62 North Street, Goderich, Ontario, N7A 2T4. Telephone (519) 524-2641. Lisa Courtney, Environmental Planner (e-mail: lcourtney@bmross.net).

Any comments collected will be maintained on file for use during the project and may be included in project documentation. With the exception of personal information, all comments will become part of the public record.

Jeff Little, Manager of Public Works, Township of Lucan Biddulph
This Notice issued August 24, 2022