Appendix A

Built Heritage and Archaeological 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

MCEA for Expansion of Century Heights Drinking Water System

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

Township of Ashfield-Colborne-Wawanosh, County of Huron

Proponent Name

Township of Ashfield-Colborne-Wawanosh

Proponent Contact Information

Brett Pollock, Chief Building Official, 519-524-4669 ext. 208,

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.

An archaeological assessment is not required.

If No, continue to question 9.

	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.

	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
Toronto ON M7A 0A7

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

ACW - Expansion of Century Heights Water System

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

Township of Ashfield-Colborne-Wawanosh, Huron County

Proponent Name

Township of Ashfield-Colborne-Wawanosh

Proponent Contact Information

Brett Pollock, Township of ACW

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.

Appendix B

Well 3 Report

EVALUATION OF WELL 3
CENTURY HEIGHTS DRINKING WATER SYSTEM
TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH (COLBORNE)

Prepared For:
Township of Ashfield-Colborne-Wawanosh

Project 2022-14
November 21, 2022

IAN D. WILSON ASSOCIATES LIMITED
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EVALUATION OF WELL 3
CENTURY HEIGHTS DRINKING WATER SYSTEM
TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH (COLBORNE)

1.0 INTRODUCTION

The Century Heights Drinking Water System is a small municipal drinking water system that serves approximately 250 people and 85 residences atop the uplands of the community of Saltford. Century Heights Wells 1 and 2 are located at 81270 Pump House Lane, and were drilled *ca.* 1979 and 2003. To upgrade the water supply for the system, Century Heights Well 3 was drilled at 36604 Maitland Avenue during September 2022. Well 3 is located approximately 450m southeast of Wells 1 and 2. Figure 1 shows the location of Wells 1, 2 and 3.

A small-diameter municipal supply well, known as the Maitland Well, was historically located at the same property as new Well 3, but was abandoned in 2008. The former Maitland Well was historically subjected to a 24-hour pumping test in 1988, which is summarized in the Wilson Associates report "Well Evaluation, Proposed Residential Development, Township of Colborne". Well 2 was subjected to a 48-hour pumping test in 2003, which is summarized in the September 2003 report "Aquifer Test and GUDI Assessment of the Century Heights Production Wells", prepared by Lotowater Geoscience Consultants Ltd.

A 72-hour pumping test of Well 3 was conducted October 3 to 6, 2022 to provide information in support of a future Category 3 Permit to Take Water application. This report provides a summary of Well 3 well construction details, pump test results and an analysis of impact of the proposed taking to groundwater resources and to the natural environment.

2.0 SITE SETTING, GEOLOGY AND HYDROGEOLOGY

The Well 3 site is situated within the eastern periphery of the developed portion of the Century Heights and Maitland subdivisions, atop the uplands of Saltford. Lands surrounding the site are developed as residential lots to the south and west, with lands to the north and east mostly undeveloped, and partially in passive agricultural use.

The community of Saltford is divided topographically by the steep, ±20m high bluff forming the eastern and northeastern slope of the Maitland River Valley, the bluff extending along the River from the shore of Lake Huron to the west. The crest of the bluff is located about 200m southwest of Well 3, and the Maitland River is located about 350m southwest of Well 3.

Well 3 is located within the Huron Slope physiographic region of southern Ontario, a clay plain situated between the Lake Huron shore bluff to the west and the Wyoming Moraine to the east. According to Ontario Geological Survey Map P.1232 "Quaternary Geology of the Goderich Area", upper soils in the vicinity of Well 3 are locally

characterized as glaciofluvial sand and gravel. According to local Ministry of the Environment, Conservation and Parks (MECP) water well records, the overburden in the vicinity of Well 3 ranges in depth between 30.2m and 41.7m, averaging 35.3m. The mapped upper granular deposits at Well 3 are reported to be 1.2m deep, with the balance of the overburden reported to consist fine-grained deposits (i.e. clay, hardpan, etc...).

The bedrock in the vicinity of the site consists of limestone, dolostone or shale of the Dundee Formation and the Detroit River Group.

The bedrock aquifer is the primary aquifer reported to be utilized in the vicinity of the Saltford. However, the mapped coarse-grained deposits (i.e. sand and gravel) locally reported is utilized by a small number of reported shallow wells. Shallow wells are often under-reported to the MECP, so more shallow wells may exist than have been reported.

According to Figure 3.9 of the Maitland Valley Source Protection Area Assessment Report (amended January 31, 2019), groundwater in the bedrock aquifer is interpreted to flow generally westwards towards Lake Huron.

According to the Huron County Mapping Portal, source water protection mapping indicates the following for the Well 3 area:

- The standard 100m radius Well Head Protection Area A (WHPA-A) surrounds Century Heights Wells 1 and 2, with Well Head Protection Areas WHPA-B, WHPA-C and WHPA-D extending in an easterly direction.

- A Highly Vulnerable Aquifer area is mapped within the portion of Saltford below the bluff.

- Significant Groundwater Recharge Areas are mapped in the vicinity of Well 3 above the bluff, and along much of Saltford below the bluff, both recharge areas assumed to be associated with mapped granular upper soils in these areas.

- A Groundwater Under Direct Influence of Surface Water (GUDI) Zone is mapped along most of the floor of the Maitland River, and is related to the exposed bedrock surface along portions of the floor of the valley.

3.0 REPORTED LOCAL WELLS

According to the Ministry of the Environment, Conservation and Parks (MECP) water well record database, there are eleven records for water wells within about 500m of Well 3. Copies of the eleven water well records are included in the appendix. Due to poor contractor's mapping, the locations of five recorded wells likely to be within 500m (based on Lot/Concession) are unknown. Known locations of recorded wells are shown on Figure 1. The following provides a summary of the water well record information:

Well #	Distance/ Direction from Well 3	Depth (m)	Aquifer	Reported Well Use
3004832 on-site	on-site	67.1	Bedrock	Former 1988 "Maitland Well" Abandoned (see record 7114784/Z86395).
3003809 Well 1	475m NW	65.8	Bedrock	Municipal Well 1
3007682 Well 2	480m NW	65.8	Bedrock	Municipal Well 2
3002835	330m S	53.6	Bedrock	Domestic
3004711	unknown	56.1	Bedrock	Domestic
3005597	unknown	51.5	Bedrock	Domestic
3005707	270m W	54.9	Bedrock	Domestic
3006006	450m NW	4.9	Upper Overburden	Domestic
3007255	unknown	62.5	Bedrock	Domestic
3007475	unknown	67.1	Bedrock	Domestic
3007516	unknwon	62.5	Bedrock	Domestic

4.0 WELL CONSTRUCTION - Well 3

The following information was obtained from the water well record for Well 3 as supplied by the drilling contractor, W.D. Hopper & Sons Ltd. Figure 1 shows the location of the well. A copy of the water well record (A328704) is included in the appendix.

Contractor's Log of Formations Penetrated

Depth (m)	Materials
0 - 0.3	brown topsoil
0.3 - 1.2	brown stones with sand
1.2 - 4.6	brown clay
4.6 - 30.2	grey clay with stones
30.2 - 34.7	brown limestone, with clay layers
34.7 - 45.7	brown limestone
45.7 - 75.0	brown limestone, layered, fractured
75.0 - 76.2	brown limestone

Water was reported to have been encountered in the limestone bedrock at depths of 45.7m, 54.3m, 65.5m and 73.2m below grade.

Casing Record:

Setting:	0.6m above grade to 35.7 metres below grade
Length:	36.3 metres
Diameter:	20.96cm ID
Wall thickness:	0.64cm
Material:	steel
Bedrock liner:	17.8cm-diameter slotted (0.64cm) steel sleeve with set from 40.8m to 74.7m, suspended on a 16.8cm-diameter lead pipe set from 34.7m to 40.8m.
Bedrock open hole:	74.7m to 76.2m
Annular space:	Neat cement from grade to 35.7m below grade

The bedrock liner was required due to unstable bedrock fracturing below 54.3m.

5.0 WELL 3 TESTING

5.1 Pumping Test - Well 3:

The Well 3 pumping test was conducted under EASR registration No. R-011-6192292142. Copies of the registration confirmation, Pumping Test Design Report (September 27, 2022) and neighbour notification letter are included in the appendix.

Well 3 was pumped continuously for a 72 hour period at rates of 560L/min (0 - 20 minutes), 700L/min (20 - 40 minutes) and 850L/min (40 - 4,320 minutes) from October 3 to October 6, 2022, starting at 2:38pm, October 3, 2022. Water levels were observed on a regular basis in Well 3 using an electronic water level meter during pumping and for an 18 hour period of recovery after pumping ceased, initially observed using an electronic water level meter and subsequently a Solinst submersible pressure transducer (with on-site barometric compensation). Water levels were also observed on a regular basis during pumping in Century Heights Well 1 (OW1) and in four off-site wells (OW2, OW3, OW4 and OW5). Pumping rates were determined using a calibrated in-line digital flow meter. Water from Well 3 was discharged to the municipal ditch/drain which follows the site's southern property line.

More than 48 hours prior to the commencement of the pumping test, the Township circulated written notification of the pumping test to all privately-serviced properties within 500m of Well 3.

Figure 2 is a semi-logarithmic plot of the test results showing the drawdown of the water level in Well 3 versus the elapsed time from the start of each pumping rate, and residual drawdown versus the ratio of elapsed time from the start of pumping to the time since pumping ceased (ratio t/t').

The specific capacity of Well 3 remained relatively high after the 20 minute period of pumping at each successive pumping rate (295L/min/m at 560L/min, 277L/min/m at 700L/min and 267L/min/m at 850L/min).

The water level in Well 3 lowered 1.39m during the first minute of pumping at 560L/min and assumed a slowly moderating downward trend. After 20 minutes, the pumping rate was increased to 700L/min, and the water level lowered to a total drawdown of 2.24m, and assumed a shallow downward trend. After 40 minutes of pumping, the pumping rate was increased to 850L/min, with the water level in the well lowering to a total drawdown of 3.18m and assuming a shallow, slightly moderating downward trend. After about 300 minutes of pumping at 850L/min, the downward trend of the water level in Well 3 steepened slightly, this slightly steeper trend lasting the balance of the 72-hour pumping test.

The final water level in Well 3 was 39.53m below grade. Total water level drawdown was 3.58m, which represents about 37% of the available drawdown above the reported uppermost water-bearing zone in the bedrock (at 45.7m below grade), and about 9% of the total column of water in Well 3 (40.3m).

A total of about 3,663,200 litres of water were withdrawn from Well 3 during the pumping test.

The water level in Well 3 initially recovered at a moderate rate, recovering to 0.39m below the original static water level (89% recovery) within one hour of the conclusion of pumping. However, the rate of recovery slowed, with the water level in the well stabilizing at 0.21m below the original static water level (94% recovery) 14.2 hours after the conclusion of pumping. The water level in the well then lowered slightly, starting 16.5 hours after the conclusion of pumping. The on-site barologger indicated that atmospheric pressure varied upwards of 1.51kPa throughout the test period, which will have contributed to some static water level variance in the deep bedrock well.

5.2 Well Testing Summary and Analysis:

The following provides a summary of the pumping test data:

	Well 3
Dates of Test	October 3 to 6, 2022
Static Water Level (m below grade)	35.95
Final Drawdown (m)	3.58
Final Pumping Level (m below grade)	39.53
Pumping Rates (L/min)	560 (0 - 20 minutes) 700 (20 - 40 minutes) 850 (40 - 4,320 minutes)
Final Specific Capacity (L/min/m)	237.4
Available Drawdown Above Upper Waterbearing Zone (m)	9.75m
% Available Drawdown Used Above Upper Waterbearing Zone	37%
Extrapolated Water Level Drawdown after 10 Years (m)	4.23 (282 - 4,280 min. extrapolation)
% Avail. Drawdown Above Upper Water-Bearing Zone used @ 10 Years	43%
Coefficient of Transmissivity (m^2/day)	1,600 (10 - 100 minutes) 1,120 (100 - 1,000 minutes)
Coefficient of Storage (dimensionless)	$7x10^{-4}$ at OW2 $5x10^{-4}$ at OW3
Safe Yield (L/min)	850

The coefficient of transmissivity and coefficient of storage were calculated using the Cooper and Jacob modified non-equilibrium methodology using a log-cycle drawdown of 0.14m (10-100 minutes (at 850L/min)) and of 0.20m (100 - 1,000 minutes), an estimated zero-drawdown intercept of 45 minutes at OW2 (400m away), and an estimated zero-drawdown intercept of 30 minutes at OW3 (395m away).

The safe yield of Well 3 is interpreted from acceptable water level recovery within 72 hours of test conclusion, as well as the 10-year extrapolated water level above the upper water-bearing zone in the bedrock.

Based on a well head (top of casing) elevation of 221.17m above sea level (masl) (per B. M. Ross and Associates Limited), the elevation of the static water level was 184.48masl, and the elevation of the final pumping level was 180.90masl. The approximate surface level of the Maitland River about 350m southwest of the Well 3 site is 182masl (based on available contour mapping and data from the 2003 Lotowater report). As such, the static level of Well 3 is about 2.5m above the approximate surface level of the River, and the final pumping water level of Well 3 is about 1.1m below the approximate surface level of the River.

As indicated in Section 2.0, according to Figure 3.9 of the Maitland Valley Source Protection Area Assessment Report (amended January 31, 2019), groundwater in the bedrock aquifer is interpreted to flow generally westwards towards Lake Huron. Figure 3.9 of the Maitland Valley Source Protection Area Assessment Report indicates an overall bedrock aquifer piezometric surface gradient in the range of 7.4×10^{-3}.

The approximate distance to Well 3's capture zone downgradient null point is estimated using the formula:

$$X_L = Q / (2\pi Ti)$$

Where X_L = distance to downgradient null point
Q = well yield
T = aquifer transmissivity
I = aquifer hydraulic conductivity

Assuming a well yield of 1,224m^3/day (850L/min), a long-term transmissivity of 1,120m^2/day (from later portions of the pumping test) and an aquifer hydraulic gradient of 7.4×10^{-3} (as above), the estimated distance to Well 3's capture zone's downgradient (i.e west) null point is about 24m.

The approximate width of Well 3's capture zone (north to south) is estimated using the formula:

$$Y_L = Q / (2Ti)$$

Where Y_L = width of capture zone
Q = well yield
T = aquifer transmissivity
I = aquifer hydraulic conductivity

Assuming a well yield of 1,224m^3/day (850L/min), a long-term transmissivity of 1,120m^2/day (from later portions of the pumping test) and an aquifer hydraulic gradient of 7.4x10^{-3} (as above), the estimated width (i.e. north to south) of Well 3's capture zone is about 74m.

Aquifer response at Well 3 and the observed wells completed in the bedrock aquifer (i.e. OW2 and OW3), and the relatively low coefficient of storage (5x10^{-4} to 7x10^{-4}) is consistent with confined aquifer conditions. The above estimates of Well 3's capture zone downgradient null point distance and width suggest that Well 3 will not capture water from the Maitland River (even if the bedrock aquifer is exposed at the base of the River valley), situated about 350m south of Well 3.

5.3 Interference:

Water levels were observed on a regular basis during the Well 3 pumping test in Century Heights Well 1 (OW1, r = ±480m) and in four off-site wells (OW2 r = ±400m, OW3 r = ±395m, OW4 r = ±390m and OW5 r = ±320m). The water levels were observed in OW1, OW2, OW3 and OW4 using an electronic water level meter, and in OW5 using a Solinst datalogger with barologger (due to the heavy weight of the 0.9m diameter bored well concrete lid with no access port). OW1, OW2 and OW3 are drilled wells completed in the bedrock aquifer, and OW4 and OW5 are shallow bored wells completed in the upper overburden aquifer. Copies of the water well records for OW1 and the probable well record for OW5 (3006006) are included in the appendix. Due to poor contractor's well mapping, available well records cannot be correlated with OW2, OW3 and OW4.

A request from the well owner at 36584C Saltford Road (about 430m west of Well 3) to observe their deep drilled well during the pumping test could not be undertaken due to an obstruction in the well at approximately 38m below grade, above the water level in the well. Based on encountered conditions at Well 3, the obstruction in the well at 36584C Saltford Road is assumed to be collapsed bedrock.

Figures 3 to 7 are semi-logarithmic plots of the observation well data showing the water level or water level change versus the elapsed time from the start of pumping from Well 3. The observation data are included in the appendix (except the automated water level data for OW5, which can be made available upon request).

As Century Heights Well 2 was in use supplying the Century Heights Water System throughout the Well 3 pumping test, the water level in nearby (to Well 2) OW1 varied considerably with Well 2 use. The water level in OW1 variably lowered to maximum drawdown of 0.42m by 2,505 minutes, but rose to above the well's initial static level for all subsequent observations.

The pre-test static water level in OW2 could not be obtained, as the well owner withheld permission to observe the well until after the test start. Based on subsequent water level responses in OW2 and in OW3, it is estimated that the static water level of OW2 would have been in the range of 39.19m below top of casing. The water level in OW2 progressively lowered to an estimated maximum of 0.16m by the conclusion of the pumping test.

The water level in OW3 varied due to domestic well use, but progressively lowered to a maximum of 0.42m by the conclusion of the pumping test. A pump-operating maximum drawdown of 0.56m was observed at 271 minutes.

The water level in OW4, a shallow bored well, varied due to domestic use. The water level in OW4 was not obviously impacted by the pumping test, rising upwards of 0.12m during the test period.

The water level in OW5 was observed continuously during the pumping test with a datalogger due to the heavy concrete lid on the well. The water level in OW5 varied with well use, but lowered about 1cm by the conclusion of pumping, which is assumed to be due to typical recession associated with usage and precipitation patterns. Typical operating drawdown was about 6cm.

Observed potential interference in the observed deep drilled wells located more than about 395m from Well 3 ranged between 0.16m (estimated) to about 0.4m. This degree of drawdown in deep drilled wells completed in the bedrock is minor in relation to the depth of water in the wells.

The closest recorded well to Well 3 is MECP No. 3005707, located about 270m west of Well 3. The well record for No. 3005707 indicates a standing column of water of about 18m, an available drawdown of about 7m above the reported upper waterbearing zone, and a contractor's pumping test drawdown of 5.8m after 2 hours of pumping at 54.6L/min (6,552L withdrawal). As domestic well use will be far less than 6,552L, operating drawdown in this well will be far less than 5.8m. Interference potential of 0.4m to 1.0m (estimated, due to closer distance relative to OW2 and OW3) does not represent a significant risk to the function to Well No. 3005707.

There should be no risk to the function of shallow wells completed in the upper overburden resulting from the operation of Well 3, based on hydraulic isolation.

No complaints were reported during the pumping test period.

To calculate the long-term interference that could result from the operation of Well 3 , the following analysis uses the Cooper and Jacob modified non-equilibrium equation to assess the theoretical water level impact:

$$s = (0.183Q \div T) \log ((2.25Tt) \div (r^2S))$$

Where: T = coefficient of transmissivity (1,120m^2/day)
Q = daily rate of withdrawal (1,224m^3)
s = water level drawdown
S = coefficient of storage ($7x10^{-4}$)
t = elapsed time (180 days, to allow for aquifer recharge)
r = distance from Well 3 (270m to 3005707)

Theoretical water level impact after 180 days of continuous pumping at 1,224m^3/day is 0.79m at a distance of 270m. As above, this degree of drawdown does not represent a significant risk to the function to Well No. 3005707 or any similarly-constructed well in the bedrock aquifer.

6.0 WATER QUALITY

Samples of water were collected from Well 3 after 1 hour, 24 hours, 48 hours and at test end for an analysis of bacteriological and general chemistry parameters. The test end sample also included an analysis for all parameters included in Ontario Regulation 170/03 Schedules 23 and 24. For comparison, a sample was also collected from the Maitland River for general chemistry analysis. All samples were collected in laboratory-supplied bottles, stored in an ice-packed cooler, and submitted to Bureau Veritas Laboratories under chain of custody for analysis.

The water from Well 3 contained no detectable total coliform or E. Coli bacteria in all collected samples. Background bacteria counts declined from 56 CFU/100mL in the 1 hour sample, to 3 CFU/100mL sample in the 24 hour sample, to non-detectable in the subsequent samples, which is common in newly-constructed wells. The water from Well 3 is bacteriologically secure.

The water from Well 3 is moderately hard, with hardness values lowering from 270mg/L as $CaCO_3$ in the 1 hour sample to between 210 and 220mg/L as $CaCO_3$ in all subsequent samples. The water is slightly alkaline, with a pH value of 7.96 to 8.07.

The fluoride content of the water from Well 3 at 2.2 to 2.3 mg/L is at a level which the Ontario Drinking Water Quality Standards (ODWQS) require that the local Medical Officer of Health be notified (1.5 mg/L), but slightly below the maximum acceptable level of 2.4mg/L. Elevated fluoride levels are naturally occurring, and common in groundwater from the bedrock aquifer in the region.

All other parameters determined were at acceptable levels under the ODWQS's.

Apart from some variance in the early 1-hour sample, the overall quality of water from Well 3 was generally stable throughout the pumping test. All typical indicators of surface water influence (i.e. dissolved organic carbon (DOC), nitrate, chloride, bacteria, etc...) were at non-detectable to low levels.

The quality of water from Well 3 is distinct from the quality of water from the Maitland River for many of the determined chemical parameters (i.e. carbonate alkalinity, ion balance, DOC, pH, sulphate, chloride, nitrate, and most metals).

7.0 MONITORING PROGRAM AND CONTINGENCY PLAN

The risk posed by pumping from Well 3 to off-site water supplies and surface water resources is indicated to be low. As such, a comprehensive monitoring program is not considered necessary. The recording of daily withdrawals from Well 3 and the weekly recording of the water level in Well 3 are considered adequate for monitoring purposes.

In the very unlikely event of adverse impact to an off-site water supply, it will most likely be a result of an inadequately deep pump setting. Pump lowering will be effective to restore impacted water supplies.

8.0 AQUIFER SECURITY

The information gathered during the Well 3 pumping test program indicates that Well 3 is secure from surface water influence, specifically the Maitland River, as follows;

- The water level response in Well 3, OW2 and OW3 indicates no "positive" aquifer boundary.
- The static water level in Well 3 is about 2.5m above the approximate surface level of the Maitland River.
- The low pumping level in Well 3 is about 1.1m below the approximate surface level of the Maitland River.
- Although the low pumping level is below the approximate surface level of the Maitland River, observed and calculated water level interference indicates that water levels within 270m of Well 3 will lower about 0.8m as a result of extended withdrawals. As the static level in the aquifer at Well 3 is about 2.5m higher than the approximate level of the River surface, interference of up to 0.8m will maintain the piezometric surface in the aquifer above the approximate River level between the River and Well 3. As such, potential to draw water from the River to Well 3 is minimized.
- The calculated capture zone of Well 3 extends about 24m downgradient (west) of Well 3, and laterally (north-south) about 74m. As such, the calculated capture zone is far less than the distance from Well 3 to the Maitland River, 350m to the south.

- The bacteriological quality of water from Well 3 is secure and stable.
- The chemical quality of water from Well 3 is stable and mostly distinct from the quality of water from the Maitland River.

9.0 CONCLUSIONS

1. Well 3 has a safe yield of 850L/min.
2. The risk of disruptive off-site water level interference resulting from the operation of Well 3 is considered low, for the reasons outlined in Section 5.3 of this report.
3. The bacteriological quality of the water from Well 3 is acceptable.
4. Apart from fluoride, the chemical quality of water from Well 3 is acceptable. The water from Well 3 contains naturally-occurring fluoride at a level requiring that the local Medical Officer of Health be notified.
5. Information gathered from the Well 3 testing program indicates that Well 3 is completed in a geologically-secure setting. Impacts from surface water are not anticipated.
6. The risk of impacts to the function of local surface water bodies is low.
7. A comprehensive monitoring program is not considered necessary. The recording of daily withdrawals from Well 3 and the weekly recording of the water level in Well 3 are considered adequate for monitoring purposes. In the very unlikely event of adverse impact to an off-site water supply, it will most likely be a result of an inadequately deep pump setting. Pump lowering will be effective to restore impacted water supplies.
8. A Category 3 Permit to Take Water is required before daily withdrawals exceeding 50,000 litres can occur from Well 3.

IAN D. WILSON ASSOCIATES LIMITED

Geoffrey Rether, P.Geo.

November 21, 2022

PROFESSIONAL GEOSCIENTIST
GEOFFREY B. RETHER
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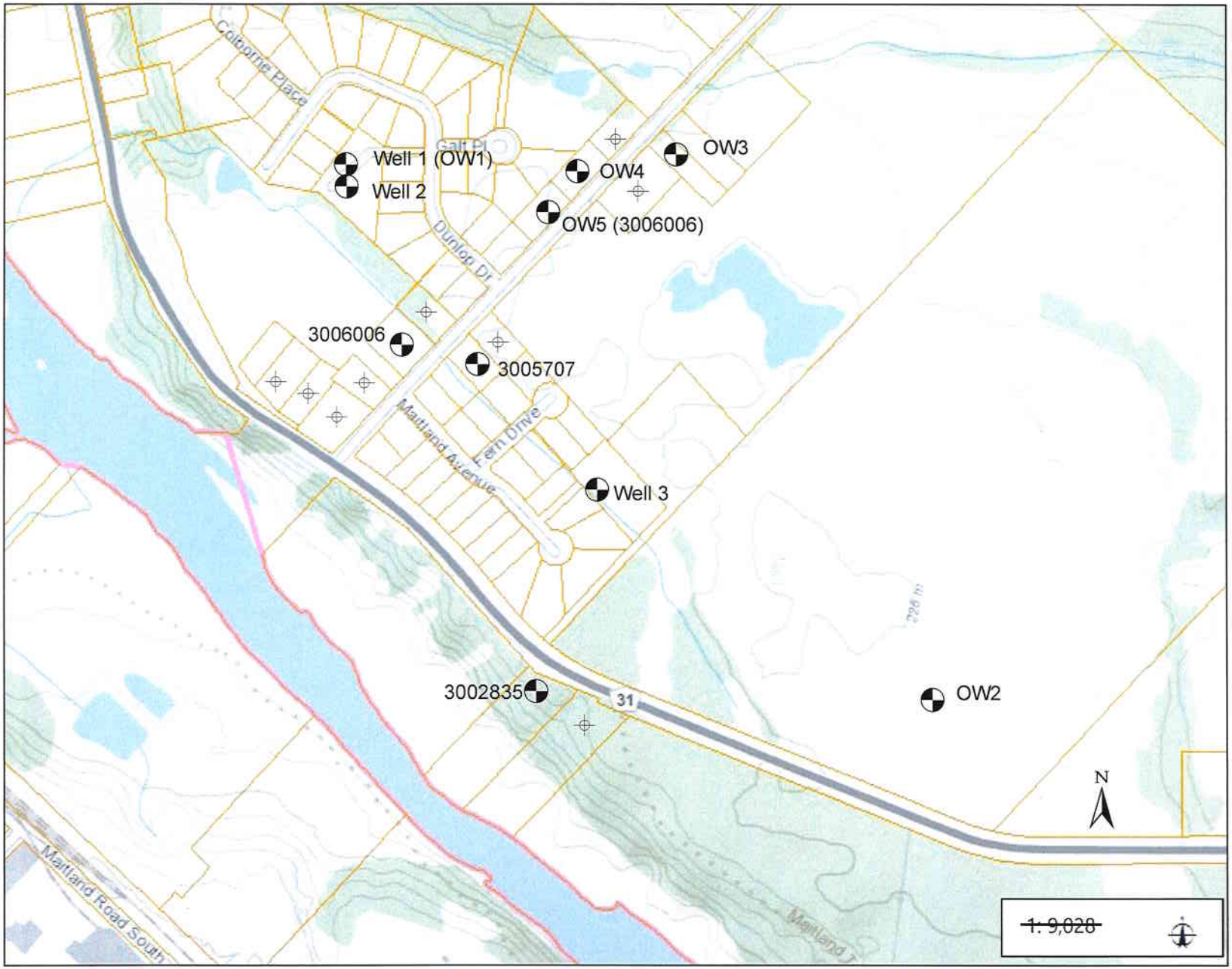
FIGURES AND APPENDIX



Legend

- Parcel Fabric
- Municipal Boundary
- County Boundary

Location of Well 3, Observation Wells, and Locations of Known and Probable Off-Site Wells Within 500m of Well 3

Figure 1

Scale: 1:6,900 (approx.)

- Probable Well
- Known Well

Notes

458.6 0 229.31 458.6 Meters

WGS_1984_Web_Mercator_Auxiliary_Sphere

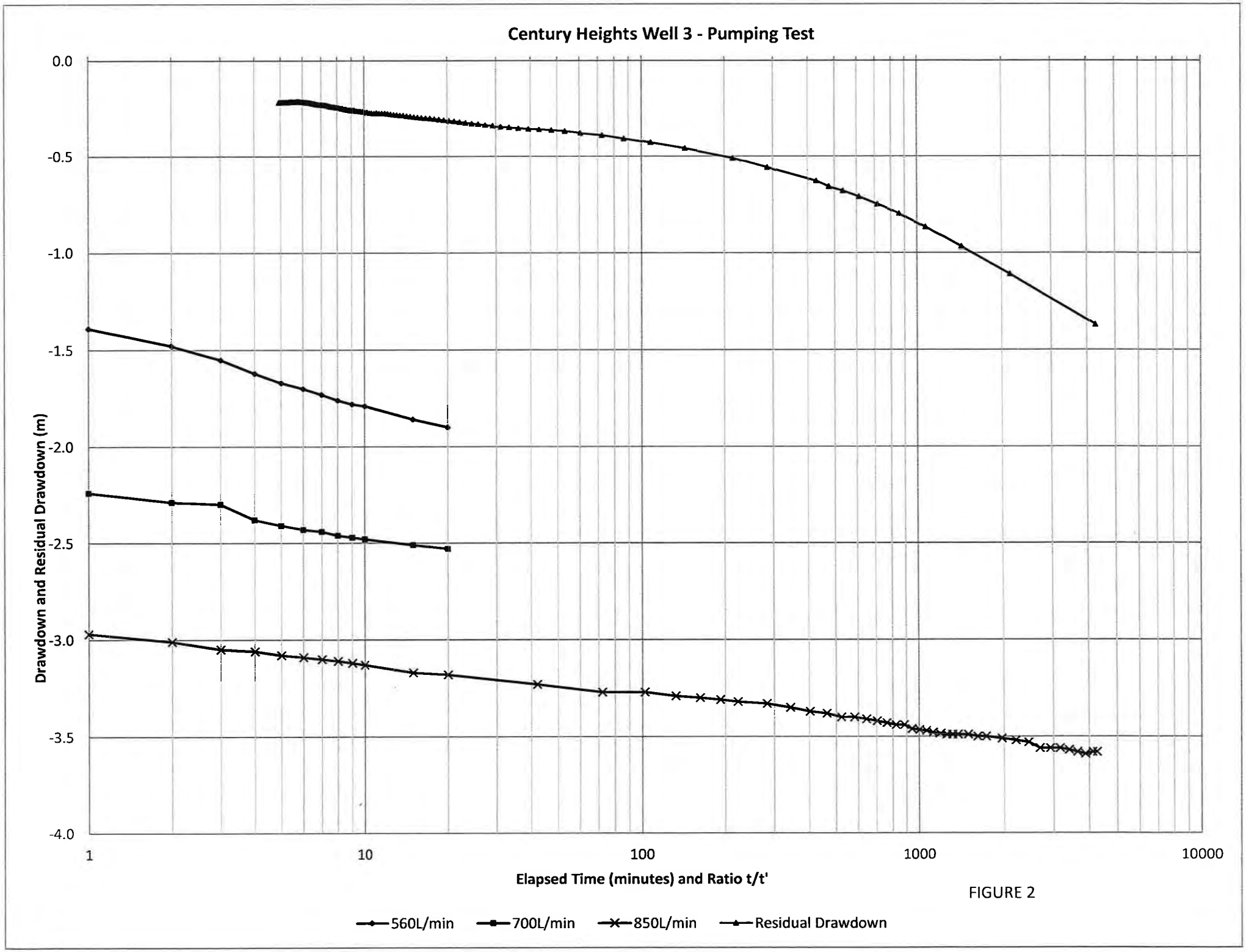

Century Heights Well 3 - Pumping Test
0.0
-0.5
-1.0
-1.5
-2.0
-2.5
-3.0
-3.5
-4.0
Drawdown and Residual Drawdown (m)
1
10
100
1000
10000
Elapsed Time (minutes) and Ratio t/t'
560L/min
700L/min
850L/min
Residual Drawdown

FIGURE 2

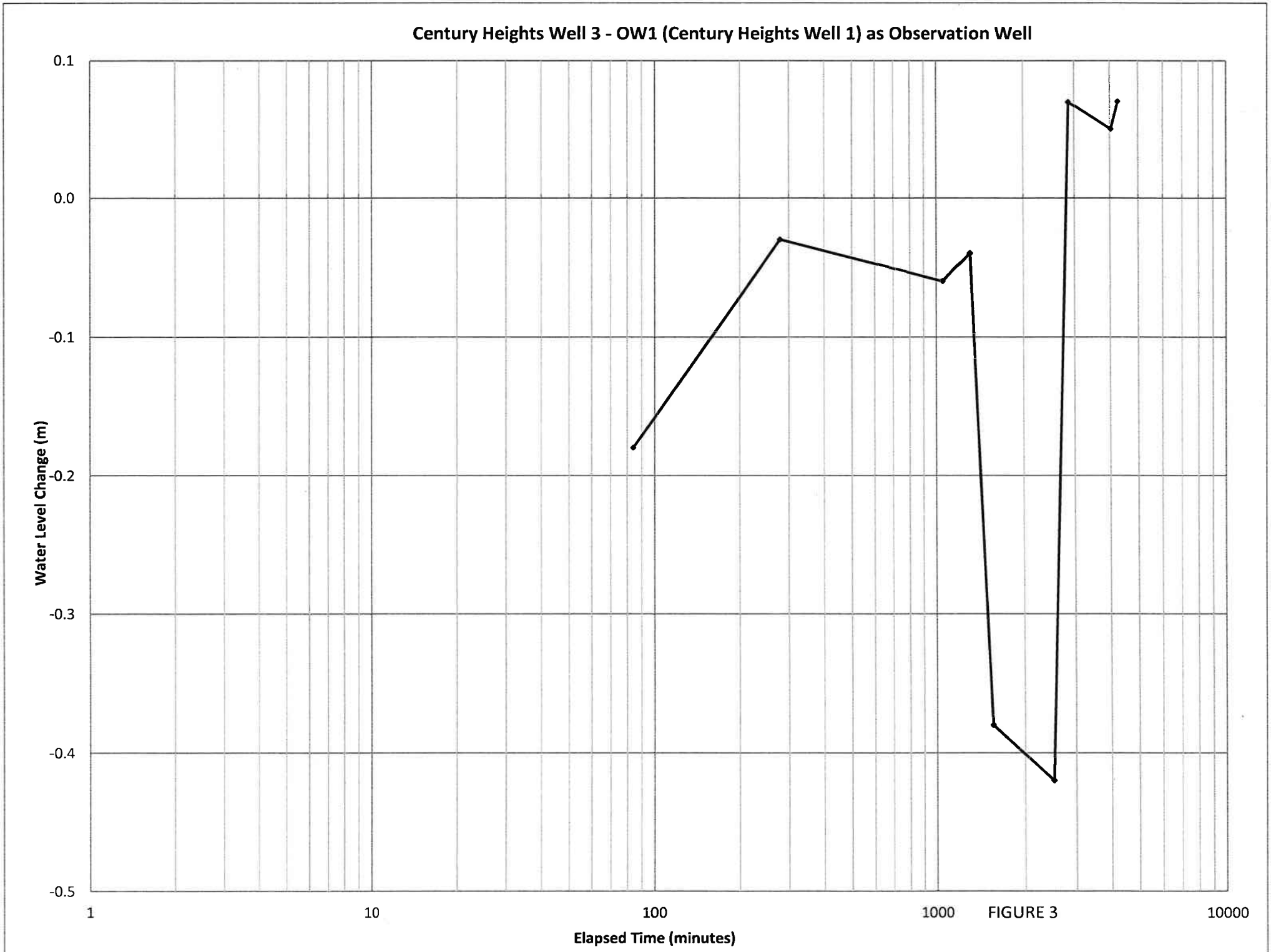

Century Heights Well 3 - OW1 (Century Heights Well 1) as Observation Well
0.1
0.0
-0.1
-0.2
-0.3
-0.4
-0.5
Water Level Change (m)
1
10
100
1000
10000
Elapsed Time (minutes)

FIGURE 3

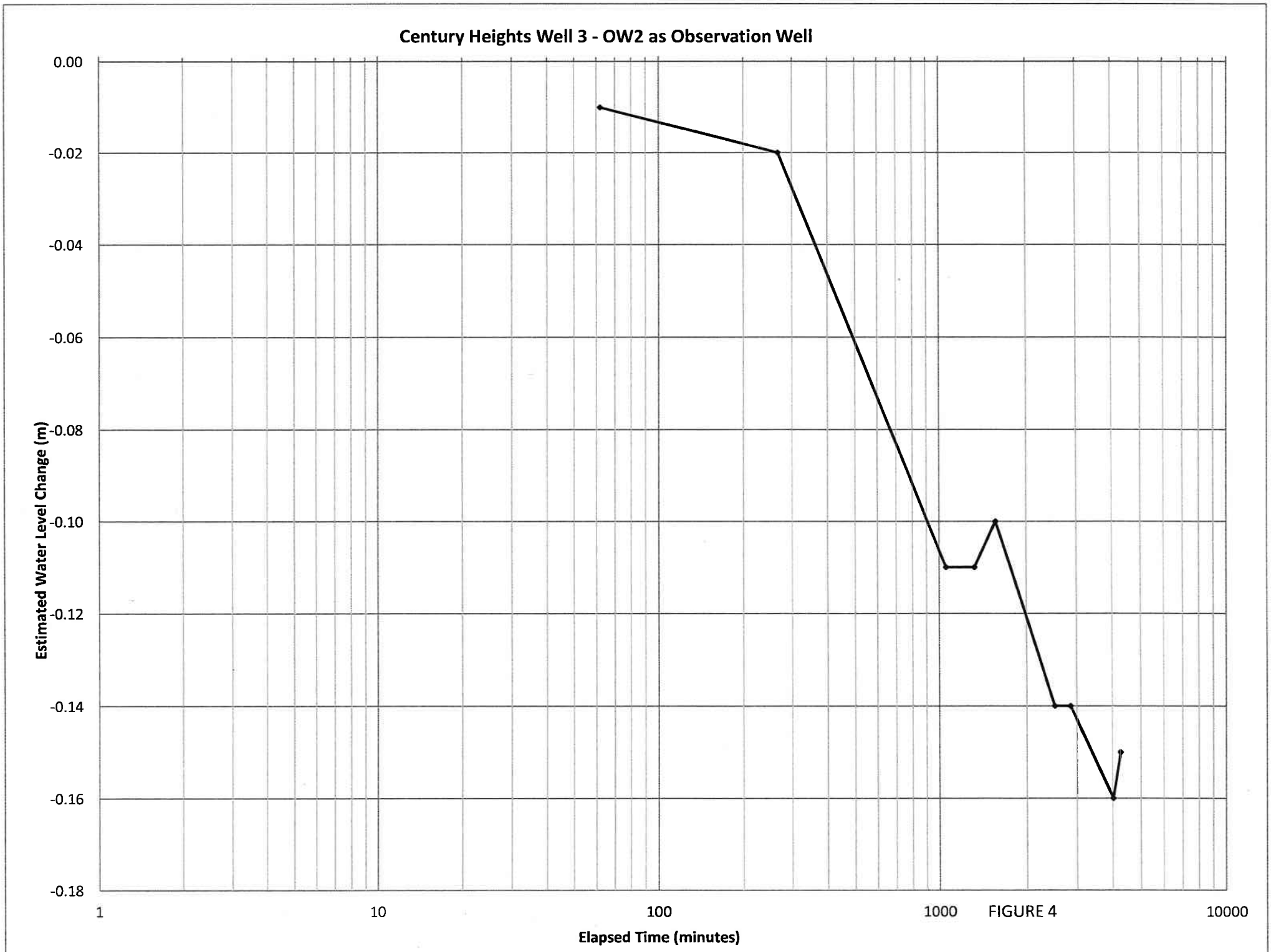

Century Heights Well 3 - OW2 as Observation Well
0.00
-0.02
-0.04
-0.06
-0.08
-0.10
-0.12
-0.14
-0.16
-0.18
Estimated Water Level Change (m)
1
10
100
1000
10000
Elapsed Time (minutes)

FIGURE 4

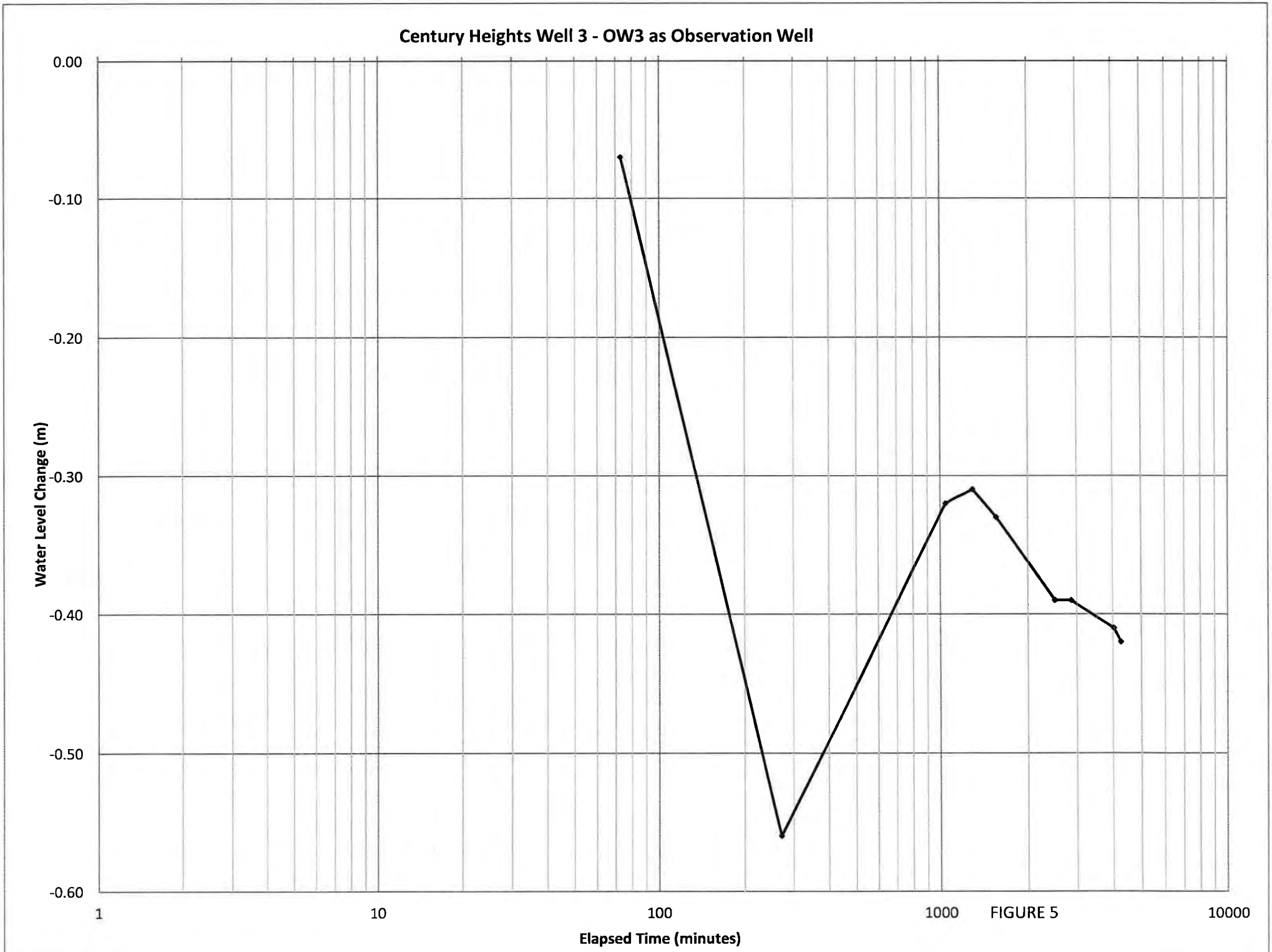

Century Heights Well 3 - OW3 as Observation Well
0.00
-0.10
-0.20
-0.30
-0.40
-0.50
-0.60
Water Level Change (m)
1
10
100
1000
10000
Elapsed Time (minutes)

FIGURE 5

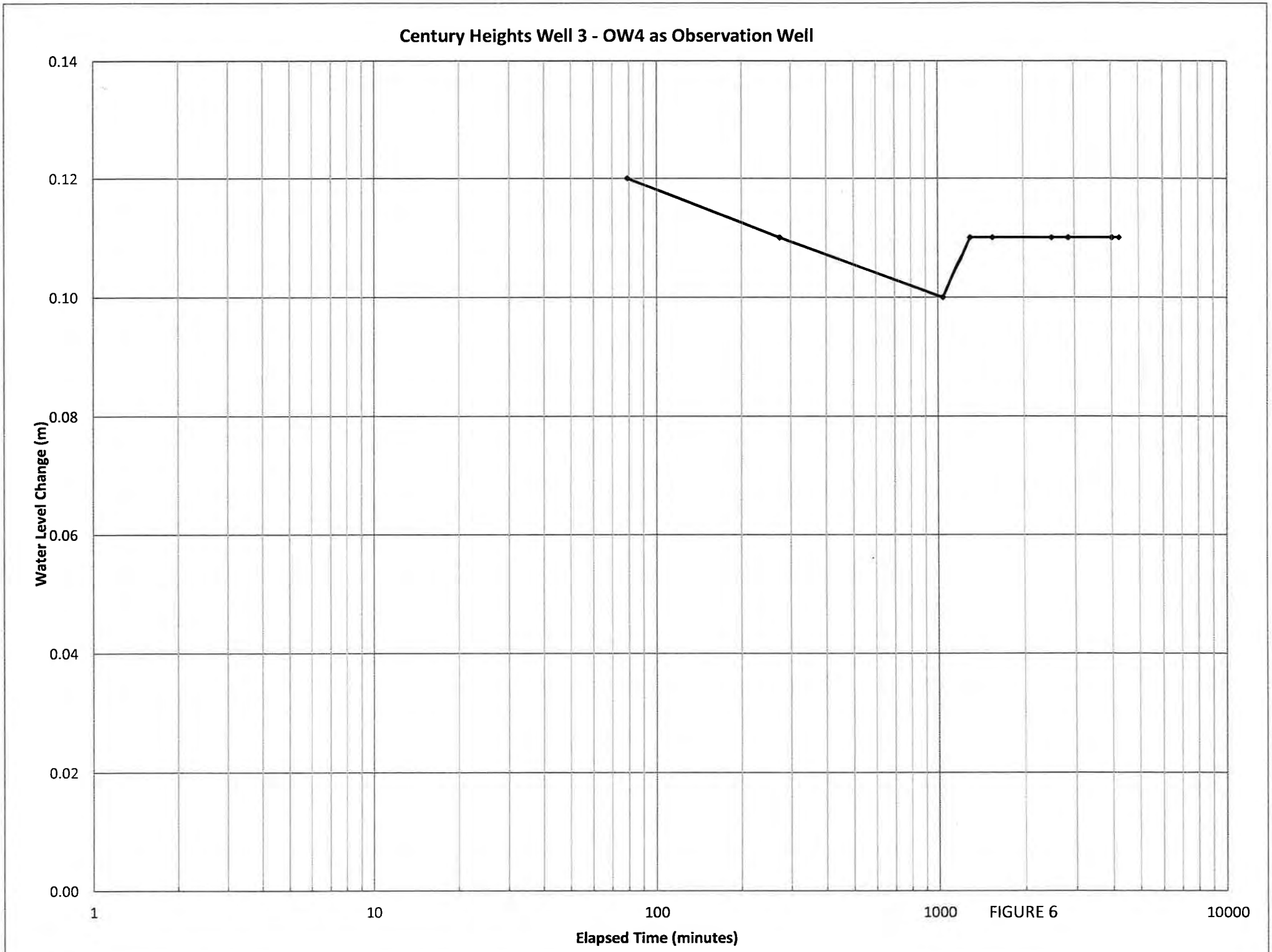

Century Heights Well 3 - OW4 as Observation Well
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
Water Level Change (m)
1
10
100
1000
10000
Elapsed Time (minutes)

FIGURE 6

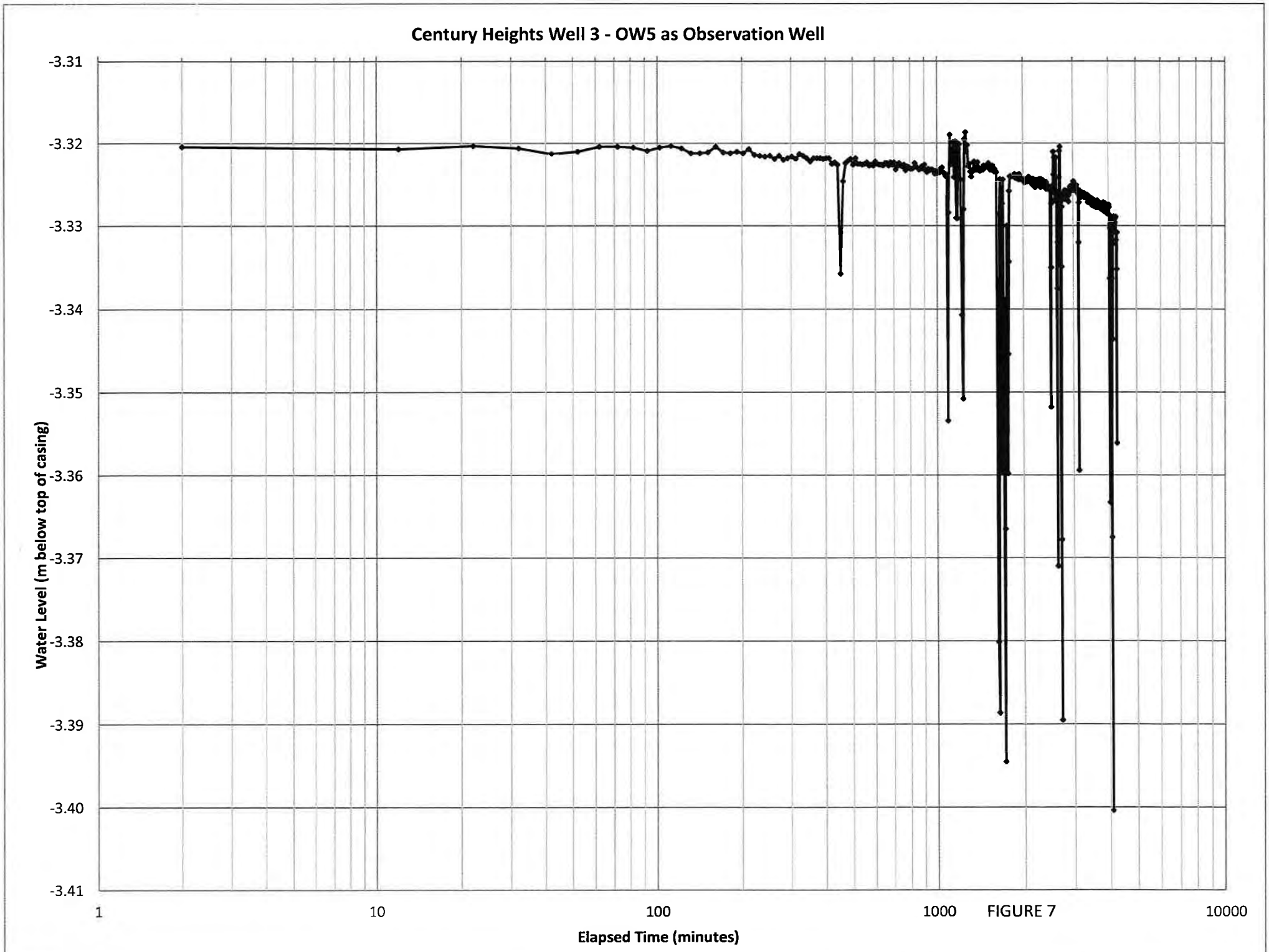

Century Heights Well 3 - OW5 as Observation Well
-3.31
-3.32
-3.33
-3.34
-3.35
-3.36
-3.37
-3.38
-3.39
-3.40
-3.41
Water Level (m below top of casing)
1
10
100
1000
10000
Elapsed Time (minutes)

FIGURE 7

Pumping Test Data
Century Heights Well 3

Dates of Test: October 3 to 6, 2022
Static Water Level: 36.69m below top of casing (elevation 221.17masl)
Measuring Point Elevation: 0.74m (top of casing)
Pumping Rates: 560L/min (0-32 minutes)
700L/min (20 - 40 minutes)
850L/min (40 to 4320 minutes)

Note: * Recovery shown as ratio t/t'

		560 L/min		700 L/min		850 L/min			
Elapsed	Recovery	Pumping	Water Level	Pumping	Water Level	Pumping	Water Level	Recovery	Residual
Time (min.)*	Elapsed Time	Water Level	Drawdown	Water Level	Drawdown	Water Level	Drawdown	Water Level	Drawdown
	(min.)	(m btoc)	(m)	(m btoc)	(m)	(m btoc)	(m)	(m btoc)	(m)
0		36.69	0.00						
1		38.08	-1.39	38.93	-2.24	39.66	-2.97		
2		38.17	-1.48	38.98	-2.29	39.70	-3.01		
3		38.24	-1.55	38.99	-2.30	39.74	-3.05		
4		38.31	-1.62	39.07	-2.38	39.75	-3.06		
5		38.36	-1.67	39.10	-2.41	39.77	-3.08		
6		38.39	-1.70	39.12	-2.43	39.78	-3.09		
7		38.42	-1.73	39.13	-2.44	39.79	-3.10		
8		38.45	-1.76	39.15	-2.46	39.80	-3.11		
9		38.47	-1.78	39.16	-2.47	39.81	-3.12		
10		38.48	-1.79	39.17	-2.48	39.82	-3.13		
15		38.55	-1.86	39.20	-2.51	39.86	-3.17		
20		38.59	-1.90	39.22	-2.53	39.87	-3.18		
42						39.92	-3.23		
72						39.96	-3.27		
102						39.96	-3.27		
132						39.98	-3.29		
162						39.99	-3.30		
192						40.00	-3.31		
222						40.01	-3.32		
282						40.02	-3.33		
342						40.04	-3.35		
402						40.06	-3.37		
462						40.07	-3.38		

522						40.09	-3.40		
582						40.09	-3.40		
642						40.10	-3.41		
702						40.11	-3.42		
762						40.12	-3.43		
822						40.13	-3.44		
882						40.13	-3.44		
942						40.15	-3.46		
1002						40.155	-3.47		
1062						40.16	-3.47		
1122						40.17	-3.48		
1182						40.175	-3.49		
1242						40.18	-3.49		
1302						40.18	-3.49		
1362						40.18	-3.49		
1482						40.18	-3.49		
1602						40.19	-3.50		
1722						40.19	-3.50		
1962						40.2	-3.51		
2202						40.21	-3.52		
2442						40.22	-3.53		
2682						40.25	-3.56		
2922						40.25	-3.56		
3162						40.25	-3.56		
3402						40.26	-3.57		
3642						40.27	-3.58		
3882						40.28	-3.59		
4122						40.27	-3.58		
4280						40.27	-3.58		
4281	1							38.06	-1.37
2141	2							37.8	-1.11
1427.7	3							37.66	-0.97
1071.0	4							37.56	-0.87
857.0	5							37.49	-0.80
714.3	6							37.44	-0.75
612.4	7							37.4	-0.71
536.0	8							37.37	-0.68
476.6	9							37.35	-0.66
429.0	10							37.32	-0.63
286.3	15							37.25	-0.56
215.0	20							37.2	-0.51
143.7	30							37.15	-0.46
108.0	40							37.12	-0.43

86.6	50							37.098	-0.41
72.3	60							37.08	-0.39
60.58	72							37.07	-0.38
53.32	82							37.0606	-0.37
47.63	92							37.0556	-0.37
43.06	102							37.0515	-0.36
39.30	112							37.0491	-0.36
36.16	122							37.0453	-0.36
33.50	132							37.0403	-0.35
31.21	142							37.0374	-0.35
29.22	152							37.0315	-0.34
27.48	162							37.0285	-0.34
25.94	172							37.0233	-0.33
24.57	182							37.0198	-0.33
23.34	192							37.0161	-0.33
22.24	202							37.0123	-0.32
21.24	212							37.0077	-0.32
20.32	222							37.0047	-0.31
19.49	232							37.0019	-0.31
18.73	242							36.9986	-0.31
18.02	252							36.9957	-0.31
17.37	262							36.9928	-0.30
16.77	272							36.9919	-0.30
16.21	282							36.9899	-0.30
15.69	292							36.988	-0.30
15.21	302							36.9856	-0.30
14.75	312							36.9826	-0.29
14.32	322							36.9803	-0.29
13.92	332							36.9777	-0.29
13.54	342							36.9763	-0.29
13.19	352							36.9741	-0.28
12.85	362							36.9732	-0.28
12.53	372							36.9716	-0.28
12.23	382							36.9689	-0.28
11.94	392							36.9663	-0.28
11.67	402							36.9668	-0.28
11.41	412							36.9662	-0.28
11.17	422							36.9638	-0.27
10.93	432							36.967	-0.28
10.71	442							36.9654	-0.28
10.49	452							36.9641	-0.27
10.29	462							36.9603	-0.27
10.09	472							36.9587	-0.27

9.90	482							36.9576	-0.27
9.72	492							36.9556	-0.27
9.55	502							36.9545	-0.26
9.38	512							36.9532	-0.26
9.22	522							36.9506	-0.26
9.06	532							36.9486	-0.26
8.92	542							36.9462	-0.26
8.77	552							36.9437	-0.25
8.63	562							36.9421	-0.25
8.50	572							36.94	-0.25
8.37	582							36.9374	-0.25
8.25	592							36.9365	-0.25
8.13	602							36.9341	-0.24
8.01	612							36.9328	-0.24
7.90	622							36.9321	-0.24
7.79	632							36.9296	-0.24
7.68	642							36.93	-0.24
7.58	652							36.9281	-0.24
7.48	662							36.9262	-0.24
7.38	672							36.9228	-0.23
7.29	682							36.9213	-0.23
7.20	692							36.9193	-0.23
7.11	702							36.9195	-0.23
7.03	712							36.9189	-0.23
6.94	722							36.919	-0.23
6.86	732							36.9174	-0.23
6.78	742							36.9164	-0.23
6.70	752							36.9144	-0.22
6.63	762							36.9133	-0.22
6.56	772							36.913	-0.22
6.49	782							36.9111	-0.22
6.42	792							36.9092	-0.22
6.35	802							36.9087	-0.22
6.28	812							36.908	-0.22
6.22	822							36.9061	-0.22
6.16	832							36.9064	-0.22
6.10	842							36.9051	-0.22
6.04	852							36.9049	-0.21
5.98	862							36.9039	-0.21
5.92	872							36.9033	-0.21
5.86	882							36.9029	-0.21
5.81	892							36.9018	-0.21
5.76	902							36.9019	-0.21

5.70	912							36.9026	-0.21
5.65	922							36.9031	-0.21
5.60	932							36.9033	-0.21
5.55	942							36.9034	-0.21
5.51	952							36.9033	-0.21
5.46	962							36.9031	-0.21
5.41	972							36.9031	-0.21
5.37	982							36.904	-0.21
5.32	992							36.9058	-0.22
5.28	1002							36.9057	-0.22
5.24	1012							36.9053	-0.22
5.20	1022							36.9053	-0.22
5.16	1032							36.9055	-0.22
5.12	1042							36.9056	-0.22
5.08	1052							36.9053	-0.22
5.04	1062							36.9061	-0.22
5.00	1072							36.9067	-0.22
4.96	1082							36.9065	-0.22
4.93	1092							36.9072	-0.22

Observation Well Data
Century Heights Well 3 Pumping Test

Century Heights Well 1 (OW1)		
Elapsed	Pumping	Water Level
Time (min.)	Water Level	Change
	(m btoc)	(m)
-78	38.24	0
84	38.42	-0.18
279	38.27	-0.03
1052	38.3	-0.06
1307	38.28	-0.04
1555	38.62	-0.38
2505	38.66	-0.42
2870	38.17	0.07
4032	38.19	0.05
4264	38.17	0.07

OW2 36654B Saltford Road*		
Elapsed	Pumping	Water Level
Time (min.)	Water Level	Change
	(m btoc)	(m)
--	39.19	0.00
62	39.20	-0.01
267	39.21	-0.02
1057	39.30	-0.11
1317	39.30	-0.11
1561	39.29	-0.10
2515	39.33	-0.14
2854	39.33	-0.14
4017	39.35	-0.16
4270	39.34	-0.15

* Permission to observe well withheld until after start of pumping test. Static Level estimate

OW3 81280 Westmount Line		
Elapsed	Pumping	Water Level
Time (min.)	Water Level	Change
	(m btoc)	(m)
-97	37.97	0
73	38.04	-0.07
271	38.53	-0.56
1045	38.29	-0.32
1286	38.28	-0.31
1548	38.3	-0.33
2498	38.36	-0.39
2861	38.36	-0.39
4025	38.38	-0.41
4257	38.39	-0.42

OW4 81273 Westmount Line		
Elapsed	Pumping	Water Level
Time (min.)	Water Level	Change
	(m btoc)	(m)
-108	3.32	0
79	3.2	0.12
274	3.21	0.11
1040	3.22	0.1
1292	3.21	0.11
1550	3.21	0.11
2500	3.21	0.11
2865	3.21	0.11
4028	3.21	0.11
4259	3.21	0.11

LABORATORY ANALYSES

Site Location: SALTFORD
Your C.O.C. #: 161970

Attention: Geoff Rether

Ian D Wilson Associates Ltd
PO Box 299
76722 Airport Rd
Clinton, ON
CANADA N0M 1L0

Report Date: 2022/10/14
Report #: R7341998
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2S7957
Received: 2022/10/04, 16:00

Sample Matrix: Water
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Alkalinity	2	N/A	2022/10/12	CAM SOP-00448	SM 23 2320 B m
Alkalinity	1	N/A	2022/10/07	CAM SOP-00448	SM 23 2320 B m
Carbonate, Bicarbonate and Hydroxide	1	N/A	2022/10/07	CAM SOP-00102	APHA 4500-CO2 D
Carbonate, Bicarbonate and Hydroxide	2	N/A	2022/10/08	CAM SOP-00102	APHA 4500-CO2 D
Chloride by Automated Colourimetry	3	N/A	2022/10/11	CAM SOP-00463	SM 23 4500-Cl E m
Conductivity	3	N/A	2022/10/07	CAM SOP-00414	SM 23 2510 m
Dissolved Organic Carbon (DOC) (1)	3	N/A	2022/10/07	CAM SOP-00446	SM 23 5310 B m
Fluoride	3	2022/10/06	2022/10/07	CAM SOP-00449	SM 23 4500-F C m
Hardness (calculated as CaCO3)	3	N/A	2022/10/07	CAM SOP 00102/00408/00447	SM 2340 B
Metals Analysis by ICPMS (as received) (2)	3	N/A	2022/10/07	CAM SOP-00447	EPA 6020B m
Ion Balance (% Difference)	1	N/A	2022/10/11		
Ion Balance (% Difference)	2	N/A	2022/10/12		
Anion and Cation Sum	1	N/A	2022/10/07		
Anion and Cation Sum	2	N/A	2022/10/08		
Total Coliforms/ E. coli, CFU/100mL	2	N/A	2022/10/05	CAM SOP-00551	
Total Ammonia-N	3	N/A	2022/10/14	CAM SOP-00441	USGS I-2522-90 m
Nitrate & Nitrite as Nitrogen in Water (3)	1	N/A	2022/10/11	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (3)	1	N/A	2022/10/12	CAM SOP-00440	SM 23 4500-NO3I/NO2B
Nitrate & Nitrite as Nitrogen in Water (3)	1	N/A	2022/10/13	CAM SOP-00440	SM 23 4500-NO3I/NO2B
pH	3	2022/10/06	2022/10/07	CAM SOP-00413	SM 4500H+ B m
Orthophosphate	3	N/A	2022/10/12	CAM SOP-00461	EPA 365.1 m
Sat. pH and Langelier Index (@ 20C)	1	N/A	2022/10/11		Auto Calc
Sat. pH and Langelier Index (@ 20C)	2	N/A	2022/10/12		Auto Calc
Sat. pH and Langelier Index (@ 4C)	1	N/A	2022/10/11		Auto Calc
Sat. pH and Langelier Index (@ 4C)	2	N/A	2022/10/12		Auto Calc
Sulphate by Automated Colourimetry	3	N/A	2022/10/11	CAM SOP-00464	EPA 375.4 m
Total Dissolved Solids (TDS calc)	1	N/A	2022/10/11		Auto Calc
Total Dissolved Solids (TDS calc)	2	N/A	2022/10/12		Auto Calc

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Microbiology testing is conducted at 6660 Campobello Rd. Chemistry testing is conducted at 6740 Campobello Rd.

Site Location: SALTFORD
Your C.O.C. #: 161970

Attention: Geoff Rether

Ian D Wilson Associates Ltd
PO Box 299
76722 Airport Rd
Clinton, ON
CANADA N0M 1L0

Report Date: 2022/10/14
Report #: R7341998
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2S7957
Received: 2022/10/04, 16:00
Remarks:

Bureau Veritas is accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Bureau Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Bureau Veritas
14 Oct 2022 19:01:13

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Archana Gothoskar, B.Sc., Project Manager
Email: archana.gothoskar@bureauveritas.com
Phone# (905) 817-5700

==========

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

RCAP - COMPREHENSIVE (DRINKING WATER)

Bureau Veritas ID		TXP235		TXP236				TXP237			
Sampling Date		2022/10/03 15:28		2022/10/04 14:30				2022/10/04 14:00			
COC Number		161970		161970				161970			
	UNITS	1 HOUR	QC Batch	24 HOURS	RDL	MDL	QC Batch	RIVER	RDL	MDL	QC Batch
Calculated Parameters											
Anion Sum	me/L	5.54	8263050	5.38	N/A	N/A	8263050	5.57	N/A	N/A	8263050
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	200	8262956	190	1.0	0.20	8262956	190	1.0	0.20	8262956
Calculated TDS	mg/L	300	8263048	290	1.0	0.20	8263048	300	1.0	0.20	8263048
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.2	8262956	1.6	1.0	0.20	8262956	6.1	1.0	0.20	8262956
Cation Sum	me/L	5.83	8263050	5.11	N/A	N/A	8263050	6.12	N/A	N/A	8263050
Hardness (CaCO3)	mg/L	260	8262635	220	1.0	1.0	8262635	270	1.0	1.0	8262635
Ion Balance (% Difference)	%	2.53	8263049	2.52	N/A	N/A	8263049	4.77	N/A	N/A	8263049
Langelier Index (@ 20C)	N/A	0.728	8263046	0.542			8263046	1.21			8263046
Langelier Index (@ 4C)	N/A	0.479	8263047	0.293			8263047	0.959			8263047
Saturation pH (@ 20C)	N/A	7.34	8263046	7.41			8263046	7.33			8263046
Saturation pH (@ 4C)	N/A	7.59	8263047	7.66			8263047	7.58			8263047
Inorganics											
Total Ammonia-N	mg/L	0.23	8271696	0.14	0.050	0.0080	8271696	ND	0.050	0.0080	8271696
Conductivity	umho/cm	520	8270475	520	1.0	0.20	8270464	520	1.0	0.20	8270475
Dissolved Organic Carbon	mg/L	0.68	8269292	0.73	0.40	0.070	8269292	4.7	0.40	0.070	8269292
Orthophosphate (P)	mg/L	ND	8270496	ND	0.010	0.0050	8270496	ND	0.010	0.0050	8270496
pH	pH	8.07	8270484	7.96			8270454	8.53			8270484
Dissolved Sulphate (SO4)	mg/L	67	8270477	67	1.0	0.10	8270477	32	1.0	0.10	8270477
Alkalinity (Total as CaCO3)	mg/L	200	8270472	190	1.0	0.20	8270451	200	1.0	0.20	8270472
Dissolved Chloride (Cl-)	mg/L	2.2	8270488	1.9	1.0	0.30	8270488	29	1.0	0.30	8270488
Nitrite (N)	mg/L	ND	8270443	ND	0.010	0.0020	8269684	ND	0.010	0.0020	8270443
Nitrate (N)	mg/L	ND	8270443	ND	0.10	0.010	8269684	2.19	0.10	0.010	8270443
Metals											
Aluminum (Al)	ug/L	79	8270952	7.9	4.9	1.0	8270952	18	4.9	1.0	8270952
Antimony (Sb)	ug/L	ND	8270952	ND	0.50	0.10	8270952	ND	0.50	0.10	8270952
Arsenic (As)	ug/L	3.5	8270952	3.7	1.0	0.20	8270952	ND	1.0	0.20	8270952
Barium (Ba)	ug/L	81	8270952	79	2.0	1.0	8270952	32	2.0	1.0	8270952
Beryllium (Be)	ug/L	ND	8270952	ND	0.40	0.10	8270952	ND	0.40	0.10	8270952
Boron (B)	ug/L	78	8270952	86	10	2.0	8270952	18	10	2.0	8270952
Cadmium (Cd)	ug/L	ND	8270952	ND	0.090	0.020	8270952	ND	0.090	0.020	8270952
Calcium (Ca)	ug/L	60000	8270952	53000	1000	200	8270952	63000	200	40	8270952
Chromium (Cr)	ug/L	ND	8270952	ND	5.0	1.0	8270952	ND	5.0	1.0	8270952
Cobalt (Co)	ug/L	ND	8270952	ND	0.50	0.10	8270952	ND	0.50	0.10	8270952

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RCAP - COMPREHENSIVE (DRINKING WATER)

Bureau Veritas ID		TXP235		TXP236				TXP237			
Sampling Date		2022/10/03 15:28		2022/10/04 14:30				2022/10/04 14:00			
COC Number		161970		161970				161970			
	UNITS	1 HOUR	QC Batch	24 HOURS	RDL	MDL	QC Batch	RIVER	RDL	MDL	QC Batch
Copper (Cu)	ug/L	ND	8270952	ND	0.90	0.20	8270952	ND	0.90	0.20	8270952
Iron (Fe)	ug/L	210	8270952	130	100	20	8270952	ND	100	20	8270952
Lead (Pb)	ug/L	ND	8270952	ND	0.50	0.10	8270952	ND	0.50	0.10	8270952
Magnesium (Mg)	ug/L	26000	8270952	22000	50	10	8270952	26000	50	10	8270952
Manganese (Mn)	ug/L	4.8	8270952	3.2	2.0	0.40	8270952	2.6	2.0	0.40	8270952
Molybdenum (Mo)	ug/L	8.0	8270952	9.0	0.50	0.20	8270952	0.60	0.50	0.20	8270952
Nickel (Ni)	ug/L	1.5	8270952	1.3	1.0	0.20	8270952	ND	1.0	0.20	8270952
Phosphorus (P)	ug/L	ND	8270952	ND	100	20	8270952	ND	100	20	8270952
Potassium (K)	ug/L	940	8270952	930	200	40	8270952	2900	200	40	8270952
Selenium (Se)	ug/L	ND	8270952	ND	2.0	0.40	8270952	ND	2.0	0.40	8270952
Silicon (Si)	ug/L	5800	8270952	5900	50	10	8270952	230	50	10	8270952
Silver (Ag)	ug/L	ND	8270952	ND	0.090	0.020	8270952	ND	0.090	0.020	8270952
Sodium (Na)	ug/L	13000	8270952	14000	100	20	8270952	17000	100	20	8270952
Strontium (Sr)	ug/L	50000	8270952	50000	5.0	1.0	8270952	950	1.0	0.20	8270952
Thallium (Tl)	ug/L	0.065	8270952	0.050	0.050	0.010	8270952	ND	0.050	0.010	8270952
Titanium (Ti)	ug/L	ND	8270952	ND	5.0	1.0	8270952	ND	5.0	1.0	8270952
Uranium (U)	ug/L	1.3	8270952	1.2	0.10	0.020	8270952	1.3	0.10	0.020	8270952
Vanadium (V)	ug/L	ND	8270952	ND	0.50	0.20	8270952	ND	0.50	0.20	8270952
Zinc (Zn)	ug/L	60	8270952	34	5.0	1.0	8270952	ND	5.0	1.0	8270952

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		TXP235		TXP236		TXP237			
Sampling Date		2022/10/03 15:28		2022/10/04 14:30		2022/10/04 14:00			
COC Number		161970		161970		161970			
	UNITS	1 HOUR	QC Batch	24 HOURS	QC Batch	RIVER	RDL	MDL	QC Batch
Inorganics									
Fluoride (F-)	mg/L	2.2	8270479	2.2	8270467	0.28	0.10	0.020	8270479

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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MICROBIOLOGY (WATER)

Bureau Veritas ID		TXP235	TXP236		
Sampling Date		2022/10/03 15:28	2022/10/04 14:30		
COC Number		161970	161970		
	UNITS	1 HOUR	24 HOURS	MDL	QC Batch
Microbiological					
Background	CFU/100mL	56	3	N/A	8267810
Total Coliforms	CFU/100mL	0	0	N/A	8267810
Escherichia coli	CFU/100mL	0	0	N/A	8267810

QC Batch = Quality Control Batch
N/A = Not Applicable

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TEST SUMMARY

Bureau Veritas ID: TXP235
Sample ID: 1 HOUR
Matrix: Water

Collected: 2022/10/03
Shipped:
Received: 2022/10/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8270472	N/A	2022/10/12	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	8262956	N/A	2022/10/08	Automated Statchk
Chloride by Automated Colourimetry	KONE	8270488	N/A	2022/10/11	Alina Dobreanu
Conductivity	AT	8270475	N/A	2022/10/07	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8269292	N/A	2022/10/07	Nimarta Singh
Fluoride	ISE	8270479	2022/10/06	2022/10/07	Kien Tran
Hardness (calculated as CaCO3)		8262635	N/A	2022/10/07	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	8270952	N/A	2022/10/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	8263049	N/A	2022/10/12	Automated Statchk
Anion and Cation Sum	CALC	8263050	N/A	2022/10/08	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	8267810	N/A	2022/10/05	Sonja Elavinamannil
Total Ammonia-N	LACH/NH4	8271696	N/A	2022/10/14	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8270443	N/A	2022/10/12	Chandra Nandlal
pH	AT	8270484	2022/10/06	2022/10/07	Kien Tran
Orthophosphate	KONE	8270496	N/A	2022/10/12	Samuel Law
Sat. pH and Langelier Index (@ 20C)	CALC	8263046	N/A	2022/10/12	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8263047	N/A	2022/10/12	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8270477	N/A	2022/10/11	Samuel Law
Total Dissolved Solids (TDS calc)	CALC	8263048	N/A	2022/10/12	Automated Statchk

Bureau Veritas ID: TXP236
Sample ID: 24 HOURS
Matrix: Water

Collected: 2022/10/04
Shipped:
Received: 2022/10/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8270451	N/A	2022/10/07	Kien Tran
Carbonate, Bicarbonate and Hydroxide	CALC	8262956	N/A	2022/10/07	Automated Statchk
Chloride by Automated Colourimetry	KONE	8270488	N/A	2022/10/11	Alina Dobreanu
Conductivity	AT	8270464	N/A	2022/10/07	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8269292	N/A	2022/10/07	Nimarta Singh
Fluoride	ISE	8270467	2022/10/06	2022/10/07	Kien Tran
Hardness (calculated as CaCO3)		8262635	N/A	2022/10/07	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	8270952	N/A	2022/10/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	8263049	N/A	2022/10/11	Automated Statchk
Anion and Cation Sum	CALC	8263050	N/A	2022/10/07	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	8267810	N/A	2022/10/05	Sonja Elavinamannil
Total Ammonia-N	LACH/NH4	8271696	N/A	2022/10/14	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8269684	N/A	2022/10/11	Chandra Nandlal
pH	AT	8270454	2022/10/06	2022/10/07	Kien Tran
Orthophosphate	KONE	8270496	N/A	2022/10/12	Samuel Law
Sat. pH and Langelier Index (@ 20C)	CALC	8263046	N/A	2022/10/11	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8263047	N/A	2022/10/11	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8270477	N/A	2022/10/11	Samuel Law
Total Dissolved Solids (TDS calc)	CALC	8263048	N/A	2022/10/11	Automated Statchk

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TEST SUMMARY

Bureau Veritas ID: TXP236 Dup
Sample ID: 24 HOURS
Matrix: Water

Collected: 2022/10/04
Shipped:
Received: 2022/10/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8270451	N/A	2022/10/07	Kien Tran
Conductivity	AT	8270464	N/A	2022/10/07	Kien Tran
Fluoride	ISE	8270467	2022/10/06	2022/10/07	Kien Tran
pH	AT	8270454	2022/10/06	2022/10/07	Kien Tran

Bureau Veritas ID: TXP237
Sample ID: RIVER
Matrix: Water

Collected: 2022/10/04
Shipped:
Received: 2022/10/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8270472	N/A	2022/10/12	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	8262956	N/A	2022/10/08	Automated Statchk
Chloride by Automated Colourimetry	KONE	8270488	N/A	2022/10/11	Alina Dobreanu
Conductivity	AT	8270475	N/A	2022/10/07	Kien Tran
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8269292	N/A	2022/10/07	Nimarta Singh
Fluoride	ISE	8270479	2022/10/06	2022/10/07	Kien Tran
Hardness (calculated as CaCO3)		8262635	N/A	2022/10/07	Automated Statchk
Metals Analysis by ICPMS (as received)	ICP/MS	8270952	N/A	2022/10/07	Arefa Dabhad
Ion Balance (% Difference)	CALC	8263049	N/A	2022/10/12	Automated Statchk
Anion and Cation Sum	CALC	8263050	N/A	2022/10/08	Automated Statchk
Total Ammonia-N	LACH/NH4	8271696	N/A	2022/10/14	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8270443	N/A	2022/10/13	Chandra Nandlal
pH	AT	8270484	2022/10/06	2022/10/07	Kien Tran
Orthophosphate	KONE	8270496	N/A	2022/10/12	Samuel Law
Sat. pH and Langelier Index (@ 20C)	CALC	8263046	N/A	2022/10/12	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8263047	N/A	2022/10/12	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8270477	N/A	2022/10/11	Samuel Law
Total Dissolved Solids (TDS calc)	CALC	8263048	N/A	2022/10/12	Automated Statchk

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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8269292	NS3	Matrix Spike	Dissolved Organic Carbon	2022/10/07		94	%	80 - 120
8269292	NS3	Spiked Blank	Dissolved Organic Carbon	2022/10/07		93	%	80 - 120
8269292	NS3	Method Blank	Dissolved Organic Carbon	2022/10/07	ND, RDL=0.40		mg/L	
8269292	NS3	RPD	Dissolved Organic Carbon	2022/10/07	0.63		%	20
8269684	C_N	Matrix Spike	Nitrite (N)	2022/10/11		113	%	80 - 120
			Nitrate (N)	2022/10/11		NC	%	80 - 120
8269684	C_N	Spiked Blank	Nitrite (N)	2022/10/11		109	%	80 - 120
			Nitrate (N)	2022/10/11		99	%	80 - 120
8269684	C_N	Method Blank	Nitrite (N)	2022/10/11	ND, RDL=0.010		mg/L	
			Nitrate (N)	2022/10/11	ND, RDL=0.10		mg/L	
8269684	C_N	RPD	Nitrite (N)	2022/10/11	3.3		%	20
			Nitrate (N)	2022/10/11	0.59		%	20
8270443	C_N	Matrix Spike	Nitrite (N)	2022/10/12		101	%	80 - 120
			Nitrate (N)	2022/10/12		89	%	80 - 120
8270443	C_N	Spiked Blank	Nitrite (N)	2022/10/12		107	%	80 - 120
			Nitrate (N)	2022/10/12		94	%	80 - 120
8270443	C_N	Method Blank	Nitrite (N)	2022/10/12	ND, RDL=0.010		mg/L	
			Nitrate (N)	2022/10/12	ND, RDL=0.10		mg/L	
8270443	C_N	RPD	Nitrate (N)	2022/10/12	2.0		%	20
8270451	KIT	Spiked Blank	Alkalinity (Total as CaCO3)	2022/10/07		93	%	85 - 115
8270451	KIT	Method Blank	Alkalinity (Total as CaCO3)	2022/10/07	ND, RDL=1.0		mg/L	
8270451	KIT	RPD [TXP236-01]	Alkalinity (Total as CaCO3)	2022/10/07	0.42		%	20
8270454	KIT	Spiked Blank	pH	2022/10/07		101	%	98 - 103
8270454	KIT	RPD [TXP236-01]	pH	2022/10/07	0.15		%	N/A
8270464	KIT	Spiked Blank	Conductivity	2022/10/07		101	%	85 - 115
8270464	KIT	Method Blank	Conductivity	2022/10/07	ND, RDL=1.0		umho/cm	
8270464	KIT	RPD [TXP236-01]	Conductivity	2022/10/07	0		%	25
8270467	KIT	Matrix Spike [TXP236-01]	Fluoride (F-)	2022/10/07		101	%	80 - 120
8270467	KIT	Spiked Blank	Fluoride (F-)	2022/10/07		103	%	80 - 120
8270467	KIT	Method Blank	Fluoride (F-)	2022/10/07	ND, RDL=0.10		mg/L	
8270467	KIT	RPD [TXP236-01]	Fluoride (F-)	2022/10/07	1.9		%	20
8270472	YPA	Spiked Blank	Alkalinity (Total as CaCO3)	2022/10/12		92	%	85 - 115
8270472	YPA	Method Blank	Alkalinity (Total as CaCO3)	2022/10/12	ND, RDL=1.0		mg/L	
8270472	YPA	RPD	Alkalinity (Total as CaCO3)	2022/10/12	1.4		%	20
8270475	KIT	Spiked Blank	Conductivity	2022/10/07		101	%	85 - 115
8270475	KIT	Method Blank	Conductivity	2022/10/07	ND, RDL=1.0		umho/cm	
8270475	KIT	RPD	Conductivity	2022/10/07	0.64		%	25
8270477	S1L	Matrix Spike	Dissolved Sulphate (SO4)	2022/10/11		104	%	75 - 125
8270477	S1L	Spiked Blank	Dissolved Sulphate (SO4)	2022/10/11		109	%	80 - 120
8270477	S1L	Method Blank	Dissolved Sulphate (SO4)	2022/10/11	ND, RDL=1.0		mg/L	
8270477	S1L	RPD	Dissolved Sulphate (SO4)	2022/10/11	0.20		%	20
8270479	KIT	Matrix Spike	Fluoride (F-)	2022/10/07		101	%	80 - 120
8270479	KIT	Spiked Blank	Fluoride (F-)	2022/10/07		108	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8270479	KIT	Method Blank	Fluoride (F-)	2022/10/07	ND, RDL=0.10		mg/L	
8270479	KIT	RPD	Fluoride (F-)	2022/10/07	6.1		%	20
8270484	KIT	Spiked Blank	pH	2022/10/07		101	%	98 - 103
8270484	KIT	RPD	pH	2022/10/07	0.32		%	N/A
8270488	ADB	Matrix Spike	Dissolved Chloride (Cl-)	2022/10/11		106	%	80 - 120
8270488	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2022/10/11		104	%	80 - 120
8270488	ADB	Method Blank	Dissolved Chloride (Cl-)	2022/10/11	ND, RDL=1.0		mg/L	
8270488	ADB	RPD	Dissolved Chloride (Cl-)	2022/10/11	0.22		%	20
8270496	S1L	Matrix Spike	Orthophosphate (P)	2022/10/12		87	%	75 - 125
8270496	S1L	Spiked Blank	Orthophosphate (P)	2022/10/12		101	%	80 - 120
8270496	S1L	Method Blank	Orthophosphate (P)	2022/10/12	ND, RDL=0.010		mg/L	
8270496	S1L	RPD	Orthophosphate (P)	2022/10/12	0.30		%	25
8270952	ADA	Matrix Spike	Aluminum (Al)	2022/10/07		103	%	80 - 120
			Antimony (Sb)	2022/10/07		104	%	80 - 120
			Arsenic (As)	2022/10/07		98	%	80 - 120
			Barium (Ba)	2022/10/07		98	%	80 - 120
			Beryllium (Be)	2022/10/07		103	%	80 - 120
			Boron (B)	2022/10/07		104	%	80 - 120
			Cadmium (Cd)	2022/10/07		101	%	80 - 120
			Calcium (Ca)	2022/10/07		NC	%	80 - 120
			Chromium (Cr)	2022/10/07		92	%	80 - 120
			Cobalt (Co)	2022/10/07		96	%	80 - 120
			Copper (Cu)	2022/10/07		98	%	80 - 120
			Iron (Fe)	2022/10/07		98	%	80 - 120
			Lead (Pb)	2022/10/07		98	%	80 - 120
			Magnesium (Mg)	2022/10/07		99	%	80 - 120
			Manganese (Mn)	2022/10/07		96	%	80 - 120
			Molybdenum (Mo)	2022/10/07		100	%	80 - 120
			Nickel (Ni)	2022/10/07		95	%	80 - 120
			Phosphorus (P)	2022/10/07		98	%	80 - 120
			Potassium (K)	2022/10/07		102	%	80 - 120
			Selenium (Se)	2022/10/07		100	%	80 - 120
			Silicon (Si)	2022/10/07		102	%	80 - 120
			Silver (Ag)	2022/10/07		98	%	80 - 120
			Sodium (Na)	2022/10/07		95	%	80 - 120
			Strontium (Sr)	2022/10/07		93	%	80 - 120
			Thallium (Tl)	2022/10/07		100	%	80 - 120
			Titanium (Ti)	2022/10/07		99	%	80 - 120
			Uranium (U)	2022/10/07		100	%	80 - 120
			Vanadium (V)	2022/10/07		93	%	80 - 120
			Zinc (Zn)	2022/10/07		98	%	80 - 120
8270952	ADA	Spiked Blank	Aluminum (Al)	2022/10/07		102	%	80 - 120
			Antimony (Sb)	2022/10/07		100	%	80 - 120
			Arsenic (As)	2022/10/07		99	%	80 - 120
			Barium (Ba)	2022/10/07		100	%	80 - 120
			Beryllium (Be)	2022/10/07		106	%	80 - 120
			Boron (B)	2022/10/07		105	%	80 - 120
			Cadmium (Cd)	2022/10/07		98	%	80 - 120
			Calcium (Ca)	2022/10/07		99	%	80 - 120
			Chromium (Cr)	2022/10/07		93	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Cobalt (Co)	2022/10/07		98	%	80 - 120
			Copper (Cu)	2022/10/07		99	%	80 - 120
			Iron (Fe)	2022/10/07		100	%	80 - 120
			Lead (Pb)	2022/10/07		99	%	80 - 120
			Magnesium (Mg)	2022/10/07		102	%	80 - 120
			Manganese (Mn)	2022/10/07		96	%	80 - 120
			Molybdenum (Mo)	2022/10/07		100	%	80 - 120
			Nickel (Ni)	2022/10/07		97	%	80 - 120
			Phosphorus (P)	2022/10/07		112	%	80 - 120
			Potassium (K)	2022/10/07		100	%	80 - 120
			Selenium (Se)	2022/10/07		100	%	80 - 120
			Silicon (Si)	2022/10/07		100	%	80 - 120
			Silver (Ag)	2022/10/07		96	%	80 - 120
			Sodium (Na)	2022/10/07		99	%	80 - 120
			Strontium (Sr)	2022/10/07		97	%	80 - 120
			Thallium (Tl)	2022/10/07		99	%	80 - 120
			Titanium (Ti)	2022/10/07		98	%	80 - 120
			Uranium (U)	2022/10/07		99	%	80 - 120
			Vanadium (V)	2022/10/07		94	%	80 - 120
			Zinc (Zn)	2022/10/07		98	%	80 - 120
8270952	ADA	Method Blank	Aluminum (Al)	2022/10/07	ND, RDL=4.9		ug/L	
			Antimony (Sb)	2022/10/07	ND, RDL=0.50		ug/L	
			Arsenic (As)	2022/10/07	ND, RDL=1.0		ug/L	
			Barium (Ba)	2022/10/07	ND, RDL=2.0		ug/L	
			Beryllium (Be)	2022/10/07	ND, RDL=0.40		ug/L	
			Boron (B)	2022/10/07	ND, RDL=10		ug/L	
			Cadmium (Cd)	2022/10/07	ND, RDL=0.090		ug/L	
			Calcium (Ca)	2022/10/07	ND, RDL=200		ug/L	
			Chromium (Cr)	2022/10/07	ND, RDL=5.0		ug/L	
			Cobalt (Co)	2022/10/07	ND, RDL=0.50		ug/L	
			Copper (Cu)	2022/10/07	ND, RDL=0.90		ug/L	
			Iron (Fe)	2022/10/07	ND, RDL=100		ug/L	
			Lead (Pb)	2022/10/07	ND, RDL=0.50		ug/L	
			Magnesium (Mg)	2022/10/07	ND, RDL=50		ug/L	
			Manganese (Mn)	2022/10/07	ND, RDL=2.0		ug/L	
			Molybdenum (Mo)	2022/10/07	ND, RDL=0.50		ug/L	
			Nickel (Ni)	2022/10/07	ND, RDL=1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Phosphorus (P)	2022/10/07	ND, RDL=100		ug/L	
			Potassium (K)	2022/10/07	ND, RDL=200		ug/L	
			Selenium (Se)	2022/10/07	ND, RDL=2.0		ug/L	
			Silicon (Si)	2022/10/07	ND, RDL=50		ug/L	
			Silver (Ag)	2022/10/07	ND, RDL=0.090		ug/L	
			Sodium (Na)	2022/10/07	ND, RDL=100		ug/L	
			Strontium (Sr)	2022/10/07	ND, RDL=1.0		ug/L	
			Thallium (Tl)	2022/10/07	ND, RDL=0.050		ug/L	
			Titanium (Ti)	2022/10/07	ND, RDL=5.0		ug/L	
			Uranium (U)	2022/10/07	ND, RDL=0.10		ug/L	
			Vanadium (V)	2022/10/07	ND, RDL=0.50		ug/L	
			Zinc (Zn)	2022/10/07	ND, RDL=5.0		ug/L	
8270952	ADA	RPD	Aluminum (Al)	2022/10/07	NC		%	20
			Calcium (Ca)	2022/10/07	1.2		%	20
			Copper (Cu)	2022/10/07	NC		%	20
			Iron (Fe)	2022/10/07	NC		%	20
			Magnesium (Mg)	2022/10/07	0.020		%	20
			Manganese (Mn)	2022/10/07	NC		%	20
			Potassium (K)	2022/10/07	0.86		%	20
			Sodium (Na)	2022/10/07	1.6		%	20
8271696	AGD	Matrix Spike	Total Ammonia-N	2022/10/14		NC	%	75 - 125
8271696	AGD	Spiked Blank	Total Ammonia-N	2022/10/14		103	%	80 - 120
8271696	AGD	Method Blank	Total Ammonia-N	2022/10/14	ND, RDL=0.050		mg/L	
8271696	AGD	RPD	Total Ammonia-N	2022/10/14	2.8		%	20

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

Cristina Carriere, Senior Scientific Specialist

Sonja Elavinamannil, Master of Biochemistry, Team Lead

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Your Project #: Century Heights
Your C.O.C. #: 900010-01-01

Attention: Geoff Rether

Ian D Wilson Associates Ltd
PO Box 299
76722 Airport Rd
Clinton, ON
CANADA N0M 1L0

Report Date: 2022/10/18
Report #: R7346607
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BUREAU VERITAS JOB #: C2T1405
Received: 2022/10/06, 16:01

Veritas are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Bureau Veritas' profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Bureau Veritas in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Bureau Veritas liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Bureau Veritas has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Bureau Veritas, unless otherwise agreed in writing. Bureau Veritas is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Bureau Veritas, results relate to the supplied samples tested.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) Dissolved Organic Carbon (DOC) present in the sample should be considered as non-purgeable DOC.
(2) Metals analysis was performed on the sample 'as received'.
(3) Values for calculated parameters may not appear to add up due to rounding of raw data and significant figures.

Encryption Key

Bureau Veritas
18 Oct 2022 15:20:49

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Archana Gothoskar, B.Sc., Project Manager
Email: archana.gothoskar@bureauveritas.com
Phone# (905) 817-5700

==========

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RCAP - COMPREHENSIVE (DRINKING WATER)

Bureau Veritas ID		TYG965	TYG966			
Sampling Date		2022/10/05 14:30	2022/10/06 14:15			
COC Number		900010-01-01	900010-01-01			
	UNITS	48 HOURS	72 HOURS	RDL	MDL	QC Batch
Calculated Parameters						
Anion Sum	me/L	5.72	5.71	N/A	N/A	8269552
Bicarb. Alkalinity (calc. as CaCO3)	mg/L	210	200	1.0	0.20	8271552
Calculated TDS	mg/L	290	300	1.0	0.20	8269041
Carb. Alkalinity (calc. as CaCO3)	mg/L	2.1	1.9	1.0	0.20	8271552
Cation Sum	me/L	4.87	5.04	N/A	N/A	8269552
Hardness (CaCO3)	mg/L	210	220	1.0	1.0	8270710
Ion Balance (% Difference)	%	8.04	6.29	N/A	N/A	8269551
Langelier Index (@ 20C)	N/A	0.621	0.619			8269554
Langelier Index (@ 4C)	N/A	0.372	0.370			8269555
Saturation pH (@ 20C)	N/A	7.41	7.38			8269554
Saturation pH (@ 4C)	N/A	7.65	7.63			8269555
Inorganics						
Total Ammonia-N	mg/L	0.14	0.13	0.050	0.0080	8280909
Conductivity	umho/cm	520	520	1.0	0.20	8273760
Dissolved Organic Carbon	mg/L	0.84	0.65	0.40	0.070	8273565
Orthophosphate (P)	mg/L	ND	ND	0.010	0.0050	8273863
pH	pH	8.03	8.00			8273758
Dissolved Sulphate (SO4)	mg/L	68	70	1.0	0.10	8273866
Alkalinity (Total as CaCO3)	mg/L	210	210	1.0	0.20	8273759
Dissolved Chloride (Cl-)	mg/L	1.7	1.4	1.0	0.30	8273865
Nitrite (N)	mg/L	ND	ND	0.010	0.0020	8273490
Nitrate (N)	mg/L	ND	ND	0.10	0.010	8273490
Metals						
Aluminum (Al)	ug/L	ND	8.2	4.9	1.0	8280304
Antimony (Sb)	ug/L	ND	ND	0.50	0.10	8280304
Arsenic (As)	ug/L	3.5	3.7	1.0	0.20	8280304
Barium (Ba)	ug/L	81	81	2.0	1.0	8280304
Beryllium (Be)	ug/L	ND	ND	0.40	0.10	8280304
Boron (B)	ug/L	77	79	10	2.0	8280304
Cadmium (Cd)	ug/L	ND	ND	0.090	0.020	8280304
Calcium (Ca)	ug/L	50000	53000	1000	200	8280304
Chromium (Cr)	ug/L	ND	ND	5.0	1.0	8280304

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RCAP - COMPREHENSIVE (DRINKING WATER)

Bureau Veritas ID		TYG965	TYG966			
Sampling Date		2022/10/05 14:30	2022/10/06 14:15			
COC Number		900010-01-01	900010-01-01			
	UNITS	48 HOURS	72 HOURS	RDL	MDL	QC Batch
Cobalt (Co)	ug/L	ND	ND	0.50	0.10	8280304
Copper (Cu)	ug/L	ND	ND	0.90	0.20	8280304
Iron (Fe)	ug/L	130	130	100	20	8280304
Lead (Pb)	ug/L	ND	ND	0.50	0.10	8280304
Magnesium (Mg)	ug/L	21000	21000	50	10	8280304
Manganese (Mn)	ug/L	2.9	3.1	2.0	0.40	8280304
Molybdenum (Mo)	ug/L	8.8	8.6	0.50	0.20	8280304
Nickel (Ni)	ug/L	1.2	1.6	1.0	0.20	8280304
Phosphorus (P)	ug/L	ND	ND	100	20	8280304
Potassium (K)	ug/L	950	960	200	40	8280304
Selenium (Se)	ug/L	ND	ND	2.0	0.40	8280304
Silicon (Si)	ug/L	5700	6000	50	10	8280304
Silver (Ag)	ug/L	ND	ND	0.090	0.020	8280304
Sodium (Na)	ug/L	14000	14000	100	20	8280304
Strontium (Sr)	ug/L	53000	54000	5.0	1.0	8280304
Thallium (Tl)	ug/L	ND	ND	0.050	0.010	8280304
Titanium (Ti)	ug/L	ND	ND	5.0	1.0	8280304
Uranium (U)	ug/L	1.0	0.99	0.10	0.020	8280304
Vanadium (V)	ug/L	ND	ND	0.50	0.20	8280304
Zinc (Zn)	ug/L	25	23	5.0	1.0	8280304

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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REG 170, SCHEDULE 24 (NEW 2016)

Bureau Veritas ID		TYG966			
Sampling Date		2022/10/06 14:15			
COC Number		900010-01-01			
	UNITS	72 HOURS	RDL	MDL	QC Batch
Semivolatile Organics					
2,3,4,6-Tetrachlorophenol	ug/L	ND	0.50	0.010	8276529
2,4,6-Trichlorophenol	ug/L	ND	0.50	0.011	8276529
2,4-D	ug/L	ND	1.0	0.013	8276529
2,4-Dichlorophenol	ug/L	ND	0.25	0.0090	8276529
Alachlor	ug/L	ND	0.50	0.078	8276529
Atrazine	ug/L	ND	0.50	0.020	8276529
Des-ethyl atrazine	ug/L	ND	0.50	0.011	8276529
Atrazine + Desethyl-atrazine	ug/L	ND	1.0	N/A	8276529
Bromoxynil	ug/L	ND	0.50	0.0080	8276529
Carbaryl	ug/L	ND	5.0	0.010	8276529
Carbofuran	ug/L	ND	5.0	0.015	8276529
Chlorpyrifos (Dursban)	ug/L	ND	1.0	0.021	8276529
Diazinon	ug/L	ND	1.0	0.021	8276529
Dicamba	ug/L	ND	1.0	0.018	8276529
Diclofop-methyl	ug/L	ND	0.90	0.050	8276529
Dimethoate	ug/L	ND	2.5	0.024	8276529
Malathion	ug/L	ND	5.0	0.018	8276529
MCPA	ug/L	ND	10	N/A	8276529
Metolachlor	ug/L	ND	0.50	0.025	8276529
Metribuzin (Sencor)	ug/L	ND	5.0	0.020	8276529
Pentachlorophenol	ug/L	ND	0.50	0.024	8276529
Phorate	ug/L	ND	0.50	0.011	8276529
Picloram	ug/L	ND	5.0	0.010	8276529
Prometryne	ug/L	ND	0.25	0.013	8276529
Simazine	ug/L	ND	1.0	0.012	8276529
Terbufos	ug/L	ND	0.50	0.011	8276529
Triallate	ug/L	ND	1.0	0.013	8276529
Trifluralin	ug/L	ND	1.0	0.010	8276529
Benzo(a)pyrene	ug/L	ND	0.0050	0.0010	8276529
Volatile Organics					
1,1-Dichloroethylene	ug/L	ND	0.10	N/A	8272148
1,2-Dichlorobenzene	ug/L	ND	0.20	N/A	8272148

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

N/A = Not Applicable

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REG 170, SCHEDULE 24 (NEW 2016)

Bureau Veritas ID		TYG966			
Sampling Date		2022/10/06 14:15			
COC Number		900010-01-01			
	UNITS	72 HOURS	RDL	MDL	QC Batch
1,2-Dichloroethane	ug/L	ND	0.20	N/A	8272148
1,4-Dichlorobenzene	ug/L	ND	0.20	N/A	8272148
Benzene	ug/L	ND	0.10	N/A	8272148
Carbon Tetrachloride	ug/L	ND	0.10	N/A	8272148
Chlorobenzene	ug/L	ND	0.10	N/A	8272148
Methylene Chloride(Dichloromethane)	ug/L	ND	0.50	N/A	8272148
Ethylbenzene	ug/L	ND	0.10	N/A	8272148
Tetrachloroethylene	ug/L	ND	0.10	N/A	8272148
Toluene	ug/L	ND	0.20	N/A	8272148
Trichloroethylene	ug/L	ND	0.10	N/A	8272148
Vinyl Chloride	ug/L	ND	0.20	N/A	8272148
o-Xylene	ug/L	ND	0.10	N/A	8272148
p+m-Xylene	ug/L	ND	0.10	N/A	8272148
Total Xylenes	ug/L	ND	0.10	N/A	8272148
PCBs					
Aroclor 1016	ug/L	ND	0.05	0.01	8281288
Aroclor 1221	ug/L	ND	0.05	0.01	8281288
Aroclor 1232	ug/L	ND	0.05	0.01	8281288
Aroclor 1242	ug/L	ND	0.05	0.01	8281288
Aroclor 1248	ug/L	ND	0.05	0.01	8281288
Aroclor 1254	ug/L	ND	0.05	0.01	8281288
Aroclor 1260	ug/L	ND	0.05	0.01	8281288
Total PCB	ug/L	ND	0.05	0.01	8281288
Pesticides & Herbicides					
Glyphosate	ug/L	ND	10	0.65	8277260
Diquat	ug/L	ND	7.0	0.26	8276202
Diuron	ug/L	ND	10	0.049	8279315
Guthion (Azinphos-methyl)	ug/L	ND	2.0	0.059	8279315
Paraquat	ug/L	ND	1.0	0.15	8276202
Surrogate Recovery (%)					
2,4,6-Tribromophenol	%	82			8276529
2,4-Dichlorophenyl Acetic Acid	%	77			8276529
2-Fluorobiphenyl	%	69			8276529

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
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N/A = Not Applicable

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REG 170, SCHEDULE 24 (NEW 2016)

Bureau Veritas ID		TYG966			
Sampling Date		2022/10/06 14:15			
COC Number		900010-01-01			
	UNITS	72 HOURS	RDL	MDL	QC Batch
D14-Terphenyl (FS)	%	92			8276529
D5-Nitrobenzene	%	82			8276529
Decachlorobiphenyl	%	89			8281288
4-Bromofluorobenzene	%	101			8272148
D4-1,2-Dichloroethane	%	108			8272148
D8-Toluene	%	96			8272148

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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REG 170, SCHEDULE 23 (WATER)

Bureau Veritas ID		TYG966			
Sampling Date		2022/10/06 14:15			
COC Number		900010-01-01			
	UNITS	72 HOURS	RDL	MDL	QC Batch
Metals					
Mercury (Hg)	mg/L	ND	0.00010	0.000050	8280843

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
ND = Not Detected at a concentration equal or greater than the indicated Detection Limit.

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RESULTS OF ANALYSES OF WATER

Bureau Veritas ID		TYG965	TYG966			
Sampling Date		2022/10/05 14:30	2022/10/06 14:15			
COC Number		900010-01-01	900010-01-01			
	UNITS	48 HOURS	72 HOURS	RDL	MDL	QC Batch
Inorganics						
Fluoride (F-)	mg/L	2.3	2.3	0.10	0.020	8273757

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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MICROBIOLOGY (WATER)

Bureau Veritas ID		TYG965	TYG966		
Sampling Date		2022/10/05 14:30	2022/10/06 14:15		
COC Number		900010-01-01	900010-01-01		
	UNITS	48 HOURS	72 HOURS	MDL	QC Batch
Microbiological					
Background	CFU/100mL	0	0	N/A	8273268
Total Coliforms	CFU/100mL	0	0	N/A	8273268
Escherichia coli	CFU/100mL	0	0	N/A	8273268

QC Batch = Quality Control Batch
N/A = Not Applicable

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TEST SUMMARY

Bureau Veritas ID: TYG965
Sample ID: 48 HOURS
Matrix: Water

Collected: 2022/10/05
Shipped:
Received: 2022/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8273759	N/A	2022/10/11	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	8271552	N/A	2022/10/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	8273865	N/A	2022/10/14	Alina Dobreanu
Conductivity	AT	8273760	N/A	2022/10/11	Yogesh Patel
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8273565	N/A	2022/10/11	Nimarta Singh
Fluoride	ISE	8273757	2022/10/08	2022/10/11	Yogesh Patel
Hardness (calculated as CaCO3)		8270710	N/A	2022/10/17	Ewa Pranjic
Metals Analysis by ICPMS (as received)	ICP/MS	8280304	N/A	2022/10/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8269551	N/A	2022/10/17	Automated Statchk
Anion and Cation Sum	CALC	8269552	N/A	2022/10/17	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	8273268	N/A	2022/10/07	Soham Patel
Total Ammonia-N	LACH/NH4	8280909	N/A	2022/10/17	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8273490	N/A	2022/10/11	Chandra Nandlal
pH	AT	8273758	2022/10/08	2022/10/11	Yogesh Patel
Orthophosphate	KONE	8273863	N/A	2022/10/12	Samuel Law
Sat. pH and Langelier Index (@ 20C)	CALC	8269554	N/A	2022/10/17	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8269555	N/A	2022/10/17	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8273866	N/A	2022/10/17	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	8269041	N/A	2022/10/17	Automated Statchk

Bureau Veritas ID: TYG966
Sample ID: 72 HOURS
Matrix: Water

Collected: 2022/10/06
Shipped:
Received: 2022/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Alkalinity	AT	8273759	N/A	2022/10/11	Yogesh Patel
Carbonate, Bicarbonate and Hydroxide	CALC	8271552	N/A	2022/10/12	Automated Statchk
Chloride by Automated Colourimetry	KONE	8273865	N/A	2022/10/14	Alina Dobreanu
Conductivity	AT	8273760	N/A	2022/10/11	Yogesh Patel
Diuron, Guthion, Temephos	LC/UV	8279315	2022/10/12	2022/10/13	Furneesh Kumar
Dissolved Organic Carbon (DOC)	TOCV/NDIR	8273565	N/A	2022/10/11	Nimarta Singh
Diquat / Paraquat	LC/UV	8276202	2022/10/11	2022/10/14	Furneesh Kumar
Fluoride	ISE	8273757	2022/10/08	2022/10/11	Yogesh Patel
Glyphosate	LC/FLU	8277260	2022/10/12	2022/10/12	Furneesh Kumar
Hardness (calculated as CaCO3)		8270710	N/A	2022/10/17	Ewa Pranjic
Mercury in Water by CVAA	CV/AA	8280843	2022/10/13	2022/10/13	Japneet Gill
Metals Analysis by ICPMS (as received)	ICP/MS	8280304	N/A	2022/10/17	Arefa Dabhad
Ion Balance (% Difference)	CALC	8269551	N/A	2022/10/17	Automated Statchk
Anion and Cation Sum	CALC	8269552	N/A	2022/10/17	Automated Statchk
Total Coliforms/ E. coli, CFU/100mL	PL	8273268	N/A	2022/10/07	Soham Patel
Total Ammonia-N	LACH/NH4	8280909	N/A	2022/10/17	Anna-Kay Gooden
Nitrate & Nitrite as Nitrogen in Water	LACH	8273490	N/A	2022/10/11	Chandra Nandlal
ODWS - Semi-Volatiles	GC/MS	8276529	2022/10/11	2022/10/13	Wendy Zhao
Polychlorinated Biphenyl in Water	GC/ECD	8281288	2022/10/13	2022/10/14	Svitlana Shaula
pH	AT	8273758	2022/10/08	2022/10/11	Yogesh Patel

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TEST SUMMARY

Bureau Veritas ID: TYG966
Sample ID: 72 HOURS
Matrix: Water

Collected: 2022/10/06
Shipped:
Received: 2022/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Orthophosphate	KONE	8273863	N/A	2022/10/12	Samuel Law
Sat. pH and Langelier Index (@ 20C)	CALC	8269554	N/A	2022/10/17	Automated Statchk
Sat. pH and Langelier Index (@ 4C)	CALC	8269555	N/A	2022/10/17	Automated Statchk
Sulphate by Automated Colourimetry	KONE	8273866	N/A	2022/10/17	Alina Dobreanu
Total Dissolved Solids (TDS calc)	CALC	8269041	N/A	2022/10/17	Automated Statchk
VOCs (Drinking Water)	P&T/MS	8272148	N/A	2022/10/12	Gabriella Morrone

Bureau Veritas ID: TYG966 Dup
Sample ID: 72 HOURS
Matrix: Water

Collected: 2022/10/06
Shipped:
Received: 2022/10/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Chloride by Automated Colourimetry	KONE	8273865	N/A	2022/10/14	Alina Dobreanu
Orthophosphate	KONE	8273863	N/A	2022/10/12	Samuel Law
Sulphate by Automated Colourimetry	KONE	8273866	N/A	2022/10/17	Alina Dobreanu

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GENERAL COMMENTS

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8272148	GMN	Matrix Spike	4-Bromofluorobenzene	2022/10/12		104	%	70 - 130
			D4-1,2-Dichloroethane	2022/10/12		100	%	70 - 130
			D8-Toluene	2022/10/12		100	%	70 - 130
			1,1-Dichloroethylene	2022/10/12		94	%	70 - 130
			1,2-Dichlorobenzene	2022/10/12		96	%	70 - 130
			1,2-Dichloroethane	2022/10/12		94	%	70 - 130
			1,4-Dichlorobenzene	2022/10/12		113	%	70 - 130
			Benzene	2022/10/12		92	%	70 - 130
			Carbon Tetrachloride	2022/10/12		103	%	70 - 130
			Chlorobenzene	2022/10/12		97	%	70 - 130
			Methylene Chloride(Dichloromethane)	2022/10/12		100	%	70 - 130
			Ethylbenzene	2022/10/12		94	%	70 - 130
			Tetrachloroethylene	2022/10/12		93	%	70 - 130
			Toluene	2022/10/12		94	%	70 - 130
			Trichloroethylene	2022/10/12		106	%	70 - 130
			Vinyl Chloride	2022/10/12		87	%	70 - 130
			o-Xylene	2022/10/12		95	%	70 - 130
			p+m-Xylene	2022/10/12		100	%	70 - 130
8272148	GMN	Spiked Blank	4-Bromofluorobenzene	2022/10/12		107	%	70 - 130
			D4-1,2-Dichloroethane	2022/10/12		108	%	70 - 130
			D8-Toluene	2022/10/12		96	%	70 - 130
			1,1-Dichloroethylene	2022/10/12		91	%	70 - 130
			1,2-Dichlorobenzene	2022/10/12		99	%	70 - 130
			1,2-Dichloroethane	2022/10/12		103	%	70 - 130
			1,4-Dichlorobenzene	2022/10/12		113	%	70 - 130
			Benzene	2022/10/12		95	%	70 - 130
			Carbon Tetrachloride	2022/10/12		104	%	70 - 130
			Chlorobenzene	2022/10/12		100	%	70 - 130
			Methylene Chloride(Dichloromethane)	2022/10/12		103	%	70 - 130
			Ethylbenzene	2022/10/12		92	%	70 - 130
			Tetrachloroethylene	2022/10/12		90	%	70 - 130
			Toluene	2022/10/12		91	%	70 - 130
			Trichloroethylene	2022/10/12		103	%	70 - 130
			Vinyl Chloride	2022/10/12		84	%	70 - 130
			o-Xylene	2022/10/12		96	%	70 - 130
			p+m-Xylene	2022/10/12		98	%	70 - 130
8272148	GMN	Method Blank	4-Bromofluorobenzene	2022/10/12		100	%	70 - 130
			D4-1,2-Dichloroethane	2022/10/12		106	%	70 - 130
			D8-Toluene	2022/10/12		95	%	70 - 130
			1,1-Dichloroethylene	2022/10/12	ND, RDL=0.10		ug/L	
			1,2-Dichlorobenzene	2022/10/12	ND, RDL=0.20		ug/L	
			1,2-Dichloroethane	2022/10/12	ND, RDL=0.20		ug/L	
			1,4-Dichlorobenzene	2022/10/12	ND, RDL=0.20		ug/L	
			Benzene	2022/10/12	ND, RDL=0.10		ug/L	
			Carbon Tetrachloride	2022/10/12	ND, RDL=0.10		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chlorobenzene	2022/10/12	ND, RDL=0.10		ug/L	
			Methylene Chloride(Dichloromethane)	2022/10/12	ND, RDL=0.50		ug/L	
			Ethylbenzene	2022/10/12	ND, RDL=0.10		ug/L	
			Tetrachloroethylene	2022/10/12	ND, RDL=0.10		ug/L	
			Toluene	2022/10/12	ND, RDL=0.20		ug/L	
			Trichloroethylene	2022/10/12	ND, RDL=0.10		ug/L	
			Vinyl Chloride	2022/10/12	ND, RDL=0.20		ug/L	
			o-Xylene	2022/10/12	ND, RDL=0.10		ug/L	
			p+m-Xylene	2022/10/12	ND, RDL=0.10		ug/L	
			Total Xylenes	2022/10/12	ND, RDL=0.10		ug/L	
8272148	GMN	RPD	1,1-Dichloroethylene	2022/10/12	NC		%	30
			1,2-Dichlorobenzene	2022/10/12	NC		%	30
			1,2-Dichloroethane	2022/10/12	NC		%	30
			1,4-Dichlorobenzene	2022/10/12	NC		%	30
			Benzene	2022/10/12	NC		%	30
			Carbon Tetrachloride	2022/10/12	NC		%	30
			Chlorobenzene	2022/10/12	NC		%	30
			Methylene Chloride(Dichloromethane)	2022/10/12	NC		%	30
			Ethylbenzene	2022/10/12	NC		%	30
			Tetrachloroethylene	2022/10/12	NC		%	30
			Toluene	2022/10/12	NC		%	30
			Trichloroethylene	2022/10/12	NC		%	30
			Vinyl Chloride	2022/10/12	NC		%	30
			o-Xylene	2022/10/12	NC		%	30
			p+m-Xylene	2022/10/12	NC		%	30
			Total Xylenes	2022/10/12	NC		%	30
8273490	C_N	Matrix Spike	Nitrite (N)	2022/10/11		108	%	80 - 120
			Nitrate (N)	2022/10/11		95	%	80 - 120
8273490	C_N	Spiked Blank	Nitrite (N)	2022/10/11		108	%	80 - 120
			Nitrate (N)	2022/10/11		94	%	80 - 120
8273490	C_N	Method Blank	Nitrite (N)	2022/10/11	ND, RDL=0.010		mg/L	
			Nitrate (N)	2022/10/11	ND, RDL=0.10		mg/L	
8273490	C_N	RPD	Nitrite (N)	2022/10/11	NC		%	20
			Nitrate (N)	2022/10/11	NC		%	20
8273565	NS3	Matrix Spike	Dissolved Organic Carbon	2022/10/11		95	%	80 - 120
8273565	NS3	Spiked Blank	Dissolved Organic Carbon	2022/10/11		96	%	80 - 120
8273565	NS3	Method Blank	Dissolved Organic Carbon	2022/10/11	ND, RDL=0.40		mg/L	
8273565	NS3	RPD	Dissolved Organic Carbon	2022/10/11	NC		%	20
8273757	YPA	Matrix Spike	Fluoride (F-)	2022/10/11		104	%	80 - 120
8273757	YPA	Spiked Blank	Fluoride (F-)	2022/10/11		101	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8273757	YPA	Method Blank	Fluoride (F-)	2022/10/11	ND, RDL=0.10		mg/L	
8273757	YPA	RPD	Fluoride (F-)	2022/10/11	0		%	20
8273758	YPA	Spiked Blank	pH	2022/10/11		101	%	98 - 103
8273758	YPA	RPD	pH	2022/10/11	0.20		%	N/A
8273759	YPA	Spiked Blank	Alkalinity (Total as CaCO3)	2022/10/11		96	%	85 - 115
8273759	YPA	Method Blank	Alkalinity (Total as CaCO3)	2022/10/11	ND, RDL=1.0		mg/L	
8273759	YPA	RPD	Alkalinity (Total as CaCO3)	2022/10/11	3.1		%	20
8273760	YPA	Spiked Blank	Conductivity	2022/10/11		102	%	85 - 115
8273760	YPA	Method Blank	Conductivity	2022/10/11	ND, RDL=1.0		umho/cm	
8273760	YPA	RPD	Conductivity	2022/10/11	0.79		%	25
8273863	S1L	Matrix Spike [TYG966-06]	Orthophosphate (P)	2022/10/12		109	%	75 - 125
8273863	S1L	Spiked Blank	Orthophosphate (P)	2022/10/12		102	%	80 - 120
8273863	S1L	Method Blank	Orthophosphate (P)	2022/10/12	ND, RDL=0.010		mg/L	
8273863	S1L	RPD [TYG966-06]	Orthophosphate (P)	2022/10/12	NC		%	25
8273865	ADB	Matrix Spike [TYG966-06]	Dissolved Chloride (Cl-)	2022/10/14		123 (1)	%	80 - 120
8273865	ADB	Spiked Blank	Dissolved Chloride (Cl-)	2022/10/14		103	%	80 - 120
8273865	ADB	Method Blank	Dissolved Chloride (Cl-)	2022/10/14	ND, RDL=1.0		mg/L	
8273865	ADB	RPD [TYG966-06]	Dissolved Chloride (Cl-)	2022/10/14	13		%	20
8273866	ADB	Matrix Spike [TYG966-06]	Dissolved Sulphate (SO4)	2022/10/17		NC	%	75 - 125
8273866	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2022/10/17		99	%	80 - 120
8273866	ADB	Method Blank	Dissolved Sulphate (SO4)	2022/10/17	ND, RDL=1.0		mg/L	
8273866	ADB	RPD [TYG966-06]	Dissolved Sulphate (SO4)	2022/10/17	0.12		%	20
8276202	FKU	Matrix Spike	Diquat	2022/10/14		114	%	50 - 130
			Paraquat	2022/10/14		99	%	50 - 130
8276202	FKU	Spiked Blank	Diquat	2022/10/14		102	%	50 - 130
			Paraquat	2022/10/14		87	%	50 - 130
8276202	FKU	Method Blank	Diquat	2022/10/14	ND, RDL=7.0		ug/L	
			Paraquat	2022/10/14	ND, RDL=1.0		ug/L	
8276202	FKU	RPD	Diquat	2022/10/14	NC		%	40
			Paraquat	2022/10/14	NC		%	40
8276529	WZ	Matrix Spike	2,4,6-Tribromophenol	2022/10/14		93	%	30 - 130
			2,4-Dichlorophenyl Acetic Acid	2022/10/14		91	%	30 - 130
			2-Fluorobiphenyl	2022/10/14		63	%	30 - 130
			D14-Terphenyl (FS)	2022/10/14		95	%	30 - 130
			D5-Nitrobenzene	2022/10/14		76	%	30 - 130
			2,3,4,6-Tetrachlorophenol	2022/10/14		115	%	30 - 130
			2,4,6-Trichlorophenol	2022/10/14		100	%	30 - 130
			2,4-D	2022/10/14		82	%	30 - 130
			2,4-Dichlorophenol	2022/10/14		82	%	30 - 130
			Alachlor	2022/10/14		108	%	40 - 130
			Atrazine	2022/10/14		103	%	30 - 130
			Des-ethyl atrazine	2022/10/14		38	%	30 - 130
			Atrazine + Desethyl-atrazine	2022/10/14		71	%	30 - 130
			Bromoxynil	2022/10/14		105	%	40 - 130
			Carbaryl	2022/10/14		109	%	40 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Carbofuran	2022/10/14		122	%	40 - 130
			Chlorpyrifos (Dursban)	2022/10/14		109	%	40 - 130
			Diazinon	2022/10/14		110	%	40 - 130
			Dicamba	2022/10/14		82	%	30 - 130
			Diclofop-methyl	2022/10/14		104	%	40 - 130
			Dimethoate	2022/10/14		99	%	40 - 130
			Malathion	2022/10/14		101	%	40 - 130
			MCPA	2022/10/14		94	%	10 - 130
			Metolachlor	2022/10/14		108	%	40 - 130
			Metribuzin (Sencor)	2022/10/14		97	%	40 - 130
			Pentachlorophenol	2022/10/14		106	%	25 - 130
			Phorate	2022/10/14		89	%	40 - 130
			Picloram	2022/10/14		46	%	10 - 130
			Prometryne	2022/10/14		109	%	30 - 130
			Simazine	2022/10/14		82	%	40 - 130
			Terbufos	2022/10/14		89	%	40 - 130
			Triallate	2022/10/14		113	%	40 - 130
			Trifluralin	2022/10/14		104	%	40 - 130
			Benzo(a)pyrene	2022/10/14		126	%	30 - 130
8276529	WZ	Spiked Blank	2,4,6-Tribromophenol	2022/10/14		89	%	30 - 130
			2,4-Dichlorophenyl Acetic Acid	2022/10/14		89	%	30 - 130
			2-Fluorobiphenyl	2022/10/14		62	%	30 - 130
			D14-Terphenyl (FS)	2022/10/14		91	%	30 - 130
			D5-Nitrobenzene	2022/10/14		72	%	30 - 130
			2,3,4,6-Tetrachlorophenol	2022/10/14		108	%	30 - 130
			2,4,6-Trichlorophenol	2022/10/14		93	%	30 - 130
			2,4-D	2022/10/14		77	%	30 - 130
			2,4-Dichlorophenol	2022/10/14		78	%	30 - 130
			Alachlor	2022/10/14		102	%	40 - 130
			Atrazine	2022/10/14		95	%	30 - 130
			Des-ethyl atrazine	2022/10/14		34	%	30 - 130
			Atrazine + Desethyl-atrazine	2022/10/14		64	%	30 - 130
			Bromoxynil	2022/10/14		99	%	40 - 130
			Carbaryl	2022/10/14		104	%	40 - 130
			Carbofuran	2022/10/14		119	%	40 - 130
			Chlorpyrifos (Dursban)	2022/10/14		100	%	40 - 130
			Diazinon	2022/10/14		100	%	40 - 130
			Dicamba	2022/10/14		76	%	30 - 130
			Diclofop-methyl	2022/10/14		98	%	40 - 130
			Dimethoate	2022/10/14		96	%	40 - 130
			Malathion	2022/10/14		93	%	40 - 130
			MCPA	2022/10/14		89	%	10 - 130
			Metolachlor	2022/10/14		102	%	40 - 130
			Metribuzin (Sencor)	2022/10/14		88	%	40 - 130
			Pentachlorophenol	2022/10/14		100	%	25 - 130
			Phorate	2022/10/14		81	%	40 - 130
			Picloram	2022/10/14		43	%	10 - 130
			Prometryne	2022/10/14		103	%	30 - 130
			Simazine	2022/10/14		78	%	40 - 130
			Terbufos	2022/10/14		81	%	40 - 130
			Triallate	2022/10/14		104	%	40 - 130
			Trifluralin	2022/10/14		98	%	40 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Benzo(a)pyrene	2022/10/14		120	%	30 - 130
8276529	WZ	RPD	2,3,4,6-Tetrachlorophenol	2022/10/14	1.7		%	40
			2,4,6-Trichlorophenol	2022/10/14	3.4		%	40
			2,4-D	2022/10/14	1.9		%	40
			2,4-Dichlorophenol	2022/10/14	5.4		%	40
			Alachlor	2022/10/14	0.73		%	40
			Atrazine	2022/10/14	1.8		%	40
			Des-ethyl atrazine	2022/10/14	3.0		%	40
			Atrazine + Desethyl-atrazine	2022/10/14	2.1		%	40
			Bromoxynil	2022/10/14	1.7		%	40
			Carbaryl	2022/10/14	5.1		%	40
			Carbofuran	2022/10/14	0.017		%	40
			Chlorpyrifos (Dursban)	2022/10/14	0.090		%	40
			Diazinon	2022/10/14	0.41		%	40
			Dicamba	2022/10/14	5.1		%	40
			Diclofop-methyl	2022/10/14	0.43		%	40
			Dimethoate	2022/10/14	3.7		%	40
			Malathion	2022/10/14	0.63		%	40
			MCPA	2022/10/14	0.71		%	40
			Metolachlor	2022/10/14	4.5		%	40
			Metribuzin (Sencor)	2022/10/14	3.5		%	40
			Pentachlorophenol	2022/10/14	2.3		%	40
			Phorate	2022/10/14	3.3		%	40
			Picloram	2022/10/14	14		%	40
			Prometryne	2022/10/14	6.9		%	40
			Simazine	2022/10/14	1.1		%	40
			Terbufos	2022/10/14	2.5		%	40
			Triallate	2022/10/14	0.067		%	40
			Trifluralin	2022/10/14	4.3		%	40
			Benzo(a)pyrene	2022/10/14	5.9		%	40
8276529	WZ	Method Blank	2,4,6-Tribromophenol	2022/10/13		80	%	30 - 130
			2,4-Dichlorophenyl Acetic Acid	2022/10/13		78	%	30 - 130
			2-Fluorobiphenyl	2022/10/13		57	%	30 - 130
			D14-Terphenyl (FS)	2022/10/13		83	%	30 - 130
			D5-Nitrobenzene	2022/10/13		73	%	30 - 130
			2,3,4,6-Tetrachlorophenol	2022/10/13	ND, RDL=0.50		ug/L	
			2,4,6-Trichlorophenol	2022/10/13	ND, RDL=0.50		ug/L	
			2,4-D	2022/10/13	ND, RDL=1.0		ug/L	
			2,4-Dichlorophenol	2022/10/13	ND, RDL=0.25		ug/L	
			Alachlor	2022/10/13	ND, RDL=0.50		ug/L	
			Atrazine	2022/10/13	ND, RDL=0.50		ug/L	
			Des-ethyl atrazine	2022/10/13	ND, RDL=0.50		ug/L	
			Atrazine + Desethyl-atrazine	2022/10/13	ND, RDL=1.0		ug/L	
			Bromoxynil	2022/10/13	ND, RDL=0.50		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Carbaryl	2022/10/13	ND, RDL=5.0		ug/L	
			Carbofuran	2022/10/13	ND, RDL=5.0		ug/L	
			Chlorpyrifos (Dursban)	2022/10/13	ND, RDL=1.0		ug/L	
			Diazinon	2022/10/13	ND, RDL=1.0		ug/L	
			Dicamba	2022/10/13	ND, RDL=1.0		ug/L	
			Diclofop-methyl	2022/10/13	ND, RDL=0.90		ug/L	
			Dimethoate	2022/10/13	ND, RDL=2.5		ug/L	
			Malathion	2022/10/13	ND, RDL=5.0		ug/L	
			MCPA	2022/10/13	ND, RDL=10		ug/L	
			Metolachlor	2022/10/13	ND, RDL=0.50		ug/L	
			Metribuzin (Sencor)	2022/10/13	ND, RDL=5.0		ug/L	
			Pentachlorophenol	2022/10/13	ND, RDL=0.50		ug/L	
			Phorate	2022/10/13	ND, RDL=0.50		ug/L	
			Picloram	2022/10/13	ND, RDL=5.0		ug/L	
			Prometryne	2022/10/13	ND, RDL=0.25		ug/L	
			Simazine	2022/10/13	ND, RDL=1.0		ug/L	
			Terbufos	2022/10/13	ND, RDL=0.50		ug/L	
			Triallate	2022/10/13	ND, RDL=1.0		ug/L	
			Trifluralin	2022/10/13	ND, RDL=1.0		ug/L	
			Benzo(a)pyrene	2022/10/13	ND, RDL=0.0050		ug/L	
8277260	FKU	Matrix Spike	Glyphosate	2022/10/12		96	%	50 - 130
8277260	FKU	Spiked Blank	Glyphosate	2022/10/12		95	%	50 - 130
8277260	FKU	Method Blank	Glyphosate	2022/10/12	ND, RDL=10		ug/L	
8277260	FKU	RPD	Glyphosate	2022/10/12	NC		%	40
8279315	FKU	Matrix Spike	Diuron	2022/10/13		93	%	40 - 130
			Guthion (Azinphos-methyl)	2022/10/13		125	%	40 - 130
8279315	FKU	Spiked Blank	Diuron	2022/10/13		90	%	40 - 130
			Guthion (Azinphos-methyl)	2022/10/13		98	%	40 - 130
8279315	FKU	Method Blank	Diuron	2022/10/13	ND, RDL=10		ug/L	
			Guthion (Azinphos-methyl)	2022/10/13	ND, RDL=2.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
8279315	FKU	RPD	Diuron	2022/10/13	NC		%	40
			Guthion (Azinphos-methyl)	2022/10/13	NC		%	40
8280304	ADA	Matrix Spike	Aluminum (Al)	2022/10/13		101	%	80 - 120
			Antimony (Sb)	2022/10/13		102	%	80 - 120
			Arsenic (As)	2022/10/13		100	%	80 - 120
			Barium (Ba)	2022/10/13		101	%	80 - 120
			Beryllium (Be)	2022/10/13		98	%	80 - 120
			Boron (B)	2022/10/13		91	%	80 - 120
			Cadmium (Cd)	2022/10/13		101	%	80 - 120
			Calcium (Ca)	2022/10/13		102	%	80 - 120
			Chromium (Cr)	2022/10/13		94	%	80 - 120
			Cobalt (Co)	2022/10/13		100	%	80 - 120
			Copper (Cu)	2022/10/13		104	%	80 - 120
			Iron (Fe)	2022/10/13		101	%	80 - 120
			Lead (Pb)	2022/10/13		96	%	80 - 120
			Magnesium (Mg)	2022/10/13		101	%	80 - 120
			Manganese (Mn)	2022/10/13		98	%	80 - 120
			Molybdenum (Mo)	2022/10/13		98	%	80 - 120
			Nickel (Ni)	2022/10/13		96	%	80 - 120
			Phosphorus (P)	2022/10/13		96	%	80 - 120
			Potassium (K)	2022/10/13		106	%	80 - 120
			Selenium (Se)	2022/10/13		96	%	80 - 120
			Silicon (Si)	2022/10/13		103	%	80 - 120
			Silver (Ag)	2022/10/13		99	%	80 - 120
			Sodium (Na)	2022/10/13		NC	%	80 - 120
			Strontium (Sr)	2022/10/13		97	%	80 - 120
			Thallium (Tl)	2022/10/13		101	%	80 - 120
			Titanium (Ti)	2022/10/13		100	%	80 - 120
			Uranium (U)	2022/10/13		95	%	80 - 120
			Vanadium (V)	2022/10/13		95	%	80 - 120
			Zinc (Zn)	2022/10/13		96	%	80 - 120
8280304	ADA	Spiked Blank	Aluminum (Al)	2022/10/13		100	%	80 - 120
			Antimony (Sb)	2022/10/13		102	%	80 - 120
			Arsenic (As)	2022/10/13		99	%	80 - 120
			Barium (Ba)	2022/10/13		100	%	80 - 120
			Beryllium (Be)	2022/10/13		100	%	80 - 120
			Boron (B)	2022/10/13		95	%	80 - 120
			Cadmium (Cd)	2022/10/13		101	%	80 - 120
			Calcium (Ca)	2022/10/13		101	%	80 - 120
			Chromium (Cr)	2022/10/13		93	%	80 - 120
			Cobalt (Co)	2022/10/13		99	%	80 - 120
			Copper (Cu)	2022/10/13		103	%	80 - 120
			Iron (Fe)	2022/10/13		103	%	80 - 120
			Lead (Pb)	2022/10/13		98	%	80 - 120
			Magnesium (Mg)	2022/10/13		100	%	80 - 120
			Manganese (Mn)	2022/10/13		97	%	80 - 120
			Molybdenum (Mo)	2022/10/13		99	%	80 - 120
			Nickel (Ni)	2022/10/13		96	%	80 - 120
			Phosphorus (P)	2022/10/13		111	%	80 - 120
			Potassium (K)	2022/10/13		103	%	80 - 120
			Selenium (Se)	2022/10/13		95	%	80 - 120
			Silicon (Si)	2022/10/13		102	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Silver (Ag)	2022/10/13		101	%	80 - 120
			Sodium (Na)	2022/10/13		96	%	80 - 120
			Strontium (Sr)	2022/10/13		96	%	80 - 120
			Thallium (Tl)	2022/10/13		101	%	80 - 120
			Titanium (Ti)	2022/10/13		99	%	80 - 120
			Uranium (U)	2022/10/13		95	%	80 - 120
			Vanadium (V)	2022/10/13		95	%	80 - 120
			Zinc (Zn)	2022/10/13		95	%	80 - 120
8280304	ADA	Method Blank	Aluminum (Al)	2022/10/13	ND, RDL=4.9		ug/L	
			Antimony (Sb)	2022/10/13	ND, RDL=0.50		ug/L	
			Arsenic (As)	2022/10/13	ND, RDL=1.0		ug/L	
			Barium (Ba)	2022/10/13	ND, RDL=2.0		ug/L	
			Beryllium (Be)	2022/10/13	ND, RDL=0.40		ug/L	
			Boron (B)	2022/10/13	ND, RDL=10		ug/L	
			Cadmium (Cd)	2022/10/13	ND, RDL=0.090		ug/L	
			Calcium (Ca)	2022/10/13	ND, RDL=200		ug/L	
			Chromium (Cr)	2022/10/13	ND, RDL=5.0		ug/L	
			Cobalt (Co)	2022/10/13	ND, RDL=0.50		ug/L	
			Copper (Cu)	2022/10/13	ND, RDL=0.90		ug/L	
			Iron (Fe)	2022/10/13	ND, RDL=100		ug/L	
			Lead (Pb)	2022/10/13	ND, RDL=0.50		ug/L	
			Magnesium (Mg)	2022/10/13	ND, RDL=50		ug/L	
			Manganese (Mn)	2022/10/13	ND, RDL=2.0		ug/L	
			Molybdenum (Mo)	2022/10/13	ND, RDL=0.50		ug/L	
			Nickel (Ni)	2022/10/13	ND, RDL=1.0		ug/L	
			Phosphorus (P)	2022/10/13	ND, RDL=100		ug/L	
			Potassium (K)	2022/10/13	ND, RDL=200		ug/L	
			Selenium (Se)	2022/10/13	ND, RDL=2.0		ug/L	
			Silicon (Si)	2022/10/13	ND, RDL=50		ug/L	
			Silver (Ag)	2022/10/13	ND, RDL=0.090		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Sodium (Na)	2022/10/13	ND, RDL=100		ug/L	
			Strontium (Sr)	2022/10/13	ND, RDL=1.0		ug/L	
			Thallium (Tl)	2022/10/13	ND, RDL=0.050		ug/L	
			Titanium (Ti)	2022/10/13	ND, RDL=5.0		ug/L	
			Uranium (U)	2022/10/13	ND, RDL=0.10		ug/L	
			Vanadium (V)	2022/10/13	ND, RDL=0.50		ug/L	
			Zinc (Zn)	2022/10/13	ND, RDL=5.0		ug/L	
8280304	ADA	RPD	Aluminum (Al)	2022/10/13	1.6		%	20
			Antimony (Sb)	2022/10/13	NC		%	20
			Arsenic (As)	2022/10/13	NC		%	20
			Barium (Ba)	2022/10/13	1.9		%	20
			Boron (B)	2022/10/13	1.9		%	20
			Cadmium (Cd)	2022/10/13	NC		%	20
			Chromium (Cr)	2022/10/13	NC		%	20
			Copper (Cu)	2022/10/13	1.5		%	20
			Iron (Fe)	2022/10/13	NC		%	20
			Lead (Pb)	2022/10/13	NC		%	20
			Manganese (Mn)	2022/10/13	NC		%	20
			Selenium (Se)	2022/10/13	NC		%	20
			Sodium (Na)	2022/10/13	2.3		%	20
			Uranium (U)	2022/10/13	NC		%	20
			Zinc (Zn)	2022/10/13	0.30		%	20
8280843	JGC	Matrix Spike	Mercury (Hg)	2022/10/13		98	%	75 - 125
8280843	JGC	Spiked Blank	Mercury (Hg)	2022/10/13		99	%	80 - 120
8280843	JGC	Method Blank	Mercury (Hg)	2022/10/13	ND, RDL=0.00010		mg/L	
8280843	JGC	RPD	Mercury (Hg)	2022/10/13	NC		%	20
8280909	AGD	Matrix Spike	Total Ammonia-N	2022/10/17		100	%	75 - 125
8280909	AGD	Spiked Blank	Total Ammonia-N	2022/10/17		102	%	80 - 120
8280909	AGD	Method Blank	Total Ammonia-N	2022/10/17	ND, RDL=0.050		mg/L	
8280909	AGD	RPD	Total Ammonia-N	2022/10/17	NC		%	20
8281288	SVS	Matrix Spike [TYG966-04]	Decachlorobiphenyl	2022/10/14		81	%	60 - 130
			Aroclor 1260	2022/10/14		82	%	60 - 130
			Total PCB	2022/10/14		82	%	60 - 130
8281288	SVS	Spiked Blank	Decachlorobiphenyl	2022/10/14		81	%	60 - 130
			Aroclor 1260	2022/10/14		75	%	60 - 130
			Total PCB	2022/10/14		75	%	60 - 130
8281288	SVS	Method Blank	Decachlorobiphenyl	2022/10/14		72	%	60 - 130
			Aroclor 1016	2022/10/14	ND, RDL=0.05		ug/L	
			Aroclor 1221	2022/10/14	ND, RDL=0.05		ug/L	
			Aroclor 1232	2022/10/14	ND, RDL=0.05		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Aroclor 1242	2022/10/14	ND, RDL=0.05		ug/L	
			Aroclor 1248	2022/10/14	ND, RDL=0.05		ug/L	
			Aroclor 1254	2022/10/14	ND, RDL=0.05		ug/L	
			Aroclor 1260	2022/10/14	ND, RDL=0.05		ug/L	
			Total PCB	2022/10/14	ND, RDL=0.05		ug/L	
8281288	SVS	RPD	Aroclor 1242	2022/10/14	NC		%	30
			Aroclor 1248	2022/10/14	NC		%	30
			Aroclor 1254	2022/10/14	NC		%	30
			Aroclor 1260	2022/10/14	NC		%	30
			Total PCB	2022/10/14	15		%	40

N/A = Not Applicable

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by:

Anastassia Hamanov, Scientific Specialist

Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Soham Patel, Senior Analyst

Bureau Veritas has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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EASR REGISTRATION

Ontario

Ministry of the Environment, Conservation and Parks
Environmental Assessment and Permissions Division

Confirmation of Registration

Registration Number: R-011-6192292142
Version Number: 1.0
Date Registration Filed: September 27, 2022 15:05:31
Date Registration Updated: September 27, 2022 15:05:31

TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH

82133 Council Line
Goderich
ON
N7A 3Y2

You have registered, in accordance with Section 20.21 (1) (a) of the Environmental Protection Act, for the taking of ground water from a well for the purposes of conducting a pumping test, as prescribed in O. Reg. 63/16.

36604 Maitland Avenue (ave)
Ashfield-Colborne-Wawanosh ON N7A 3Y1

Ministry District Office: Owen Sound Area Office

Please note that the water taking for pumping tests are subject to the applicable provisions of O. Reg. 245/11 and O. Reg. 63/16. The activity related information provided during the registration process is included as part of the confirmation of registration as schedule 'A'.

Dated on September 27, 2022 15:05:31

Director
Client Services and Permissions Branch
Ministry of the Environment, Conservation and Parks
135 St. Clair Avenue West, 1st Floor Toronto ON M4V 1P5

Any questions related to this registration and the Environmental Activity and the Sector Registry should be directed to:

Client Services and Permissions Branch
Ministry of the Environment, Conservation and Parks
Phone:(416) 314-8001
Toll free: 1-800-461-6290
Email: enviropermissions@ontario.ca

Schedule 'A'

Activity Information

Registration Information

Will you be taking water for the purpose of conducting a pumping test from a well?	Yes
Will you be taking more than 50,000 litres of water per day on any day?	Yes
Is the site where the activity will occur a mine or is being used for mining exploration activities?	No
Will you be taking water for seven or less days within a single 30-day period?	Yes
Will the pumping test take water at a volume of 5,000,000 litres per day or less?	Yes
Does the taking involve a transfer from a water basin described in subsection 34.3 (1) of the *Ontario Water Resources* Act or a transfer as defined in subsection 34.5 (1) of that Act?	No

Please describe what the site is currently used for.
Undeveloped vacant property

Has a Qualified Person (QP) prepared a pumping test design report? Yes

Please provide the Name(s) of the Qualified Person(s) and the date that the pumping test design report was prepared.

First Name	Last Name	Company Name	Licence Number(s)	Date Signed
Geoffrey	Rether	Ian D. Wilson Associates Limited	0426	2022-09-27

According to the pumping test design report, where is the water taken being discharged (select all that apply)?
Discharge to municipal storm sewer(s)

Please provide additional information if available.
Discharge to adjacent storm sewer, which eventually drains to the Maitland River. Capacity to handle pumping test discharge confirmed by Municipal Engineer.

Has the Qualified Person (QP) included one or more of the following as part of the pumping test design report? (select all that apply)
Monitoring of groundwater (flow, etc.)
Monitoring of discharge (flow, chemical parameters, etc.)

Source Information

Instructions:
On this page you will enter information about the pumping test. Please note that the source specified here will each be required to report daily water taking volumes on an annual basis.

36604 Maitland Avenue

Address
36604 Maitland AVE, ONTARIO, N7A 3Y1

Special Policy Area

Well 3

Source

Source Type	Well
Water Taking Source(s)	Groundwater
Well Record	328704
What is the maximum estimated drawdown of the water table (in metres), if available?	20

Geographic (GPS) Coordinates (to be provided in Datum NAD83)

Method of Collection	Accuracy Estimate	UTM Zone	UTM East (M)
Map	1-10 M(Map)	17	444539

UTM North (M)
4843650

Watershed Name	Watershed Use - Annual	Watershed Use - Summer
Maitland River	N/A	N/A

Source Protection Area

Source Protection Area (SPA)	Wellhead Protection Area Q1	Wellhead Protection Area Q1 Stress
Maitland Valley	No	N/A

Intake Protection Zone Q1	Intake Protection Zone Q1 - Stress
No	N/A

Well Related Information

Estimated start date of water taking * 2022-10-03

Estimated end date of water taking * 2022-10-06

Water Taking Volumes (Units in Litres):

Descriptor (i.e. Nickname)	Purpose Category	Specific Purpose	Activity	Maximum rate per minute	Maximum number of hours of taking a day	Maximum volume per day	Typical volume per day	Maximum number of days of taking in a year	Earliest month of taking	Latest month of taking
Well 3	91 - Public administration	Pumping Test	Pumping Test	900	24	1296000	1166400	3	October	October

If the information for the following fields is not in the QP report or if you do not know the value of these fields, enter "0" in the field.

- Maximum rate per minute
- Maximum number of hours of taking a day
- Maximum volume per day
- Typical Volume per day

Water Taking Summary

Descriptor (i.e. Nickname)	Purpose Category	Specific Purpose	Activity	Maximum rate per minute	Maximum number of hours of taking a day	Maximum volume per day	Typical volume per day	Maximum number of days of taking in a year	Earliest month of taking	Latest month of taking
Site Name:36604 Maitland Avenue **36604 Maitland AVE, ONTARIO, N7A 3Y1**							**Special Policy Area:**			
Source Name:Well 3					**UTM: 17 / 444539 / 4843650**					
Well 3	91 - Public administration	Pumping Test	Pumping Test	900	24	1296000	1166400	3	October	October
							Total Number of Well Intakes			1

Related Approvals

Water Taking Permissions Information:

Do you have a Permit to Take Water for other water taking activities on the site that you are registering?	No
Do you have another EASR registration for water taking activities at the site that you are registering?	No

The fee for this registration is $1916

Ian D. Wilson Associates Ltd.
since 1974

Tel: 519.233.3500
Fax: 519.233.3501

P. O. Box 299
Clinton, Ontario
N0M 1L0

Wilson Associates

Consulting Hydrogeologists

September 26, 2022

To the Residents in the Vicinity of New Municipal Well:

Re: Notification of Water Well Pumping Test
New Municipal Well, Century Heights Water Supply
36604 Maitland Avenue, Township of Ashfield-Colborne-Wawanosh

---

As required by the Ministry of the Environment, Conservation and Parks (MECP) , this letter is provided to notify residents of privately-serviced properties within 500 metres of the new Century Heights municipal well at 36604 Maitland Avenue of a water well pumping test planned for October 3 to 6, 2022.

The new well is completed in the deep bedrock aquifer to a depth of 75.0m. The purpose of the pumping test is to gather scientific information regarding the bedrock aquifer serving the area, and to identify off-site interference potential with neighbouring users of groundwater.

Weather permitting, the pumping test is planned to begin the morning of October 3, 2022 and proceed for a 72 hour period.

Should there be any questions, or should issues arise during the test, please contact W.D. Hopper & Sons at 519-522-1737, Ian D. Wilson Associates Limited at 519-440-6432 (or via email at grether@tcc.on.ca), or the Township at 519-524-4669.

Yours sincerely,
IAN D. WILSON ASSOCIATES LIMITED

Geoffrey Rether, P.Geo.

Ian D. Wilson Associates Ltd.
since 1974

Tel: 519.233.3500
Fax: 519.233.3501

P. O. Box 299
Clinton, Ontario
N0M 1L0

Wilson Associates

Consulting Hydrogeologists

September 27, 2022

Township of Ashfield-Colborne-Wawanosh
821333 Council Road
R.R. #5
Goderich, ON
N7A 3Y2

Re: Pumping Test Design Report - Century Heights Municipal Well 3
36604 Maitland Avenue, Community of Saltford, Ashfield-Colborne-Wawanosh

---

Description:

New Century Heights Municipal Well 3 is located on the vacant parcel of land at 36604 Maitland Avenue, in the community of Saltford. Well 3 was drilled during August and September, 2022 to a depth of 76.2m.

The well is located at UTM coordinates Zone 17, 444539E, 4843650N

A copy of the water well record for Well 3 is attached. A location map showing the location of Well 3, and all recorded and potential wells within 500m of Well 3 is attached.

A 72-hour pumping test of Well 3 is to be conducted to gather scientific information in support of a Category 3 Permit to Take Water (PTTW) application to the Ministry of the Environment, Conservation and Parks (MECP). It is anticipated that the pumping test will be conducted at a rate of up to 900L/min (237.8USgpm), and that the test will take place October 3 to 6, 2022.

Site-Specific Impact Assessment (Groundwater):

The risk of impact of the pumping test to neighbouring users of groundwater is considered low for the following reasons:

- Available water level drawdown in wells completed in the bedrock aquifer is in excess of 20m.
- The closest known off-site wells completed in the bedrock aquifer are situated approximately 270m to the west and south. Interference potential at this distance is anticipated to be minor.
- Historical well testing programs completed for Century Heights Wells 1 and 2, and a historical test well located at the site of Well 3, is indicative of limited water level drawdown and low interference potential.

Site-Specific Impact Assessment (Surface Water):

The risk of adverse impact of the pumping test to local surface water resources is considered low for the following reasons:

- The bedrock is confined by about 30m of overburden, and is hydraulically isolated from local (<500m) surface water resources.

- The deeply incised Maitland River is located about 500m south of Well 3. The River is locally likely to be flowing on the surface of the bedrock. The risk of interference potential at this distance is low, and the flow of the River will be substantially greater than the rate of withdrawal from Well 3. The proposed rate of withdrawal from Well 3 (up to 900L/min) represents about 0.5% of the recorded low flow in the Maitland River in 2021 (3.28m^3/sec) at the Environment Canada upstream gauging station No. 02FE015.

- All water withdrawn during the pumping test will be directed to a municipal storm sewer. There is no potential for erosion or sedimentation in local surface water resources.

Notification Protocol:

All neighbours will be notified by hand-delivered letter of the pumping test at least 48 hours in advance. The letter will include:

- A description of where the taking is to occur.

- The dates on which the water is intended to be taken (anticipated to be October 3 to 6, 2022)

- The approximate time and duration that the water takings will occur (72 hours, anticipated to start the morning of October 3, 2022)

- The EASR registration number (to be determined)

- The name and telephone number of a person who can be contacted to report any concerns about interference with another water supply (W.D. Hopper & Sons at 519-522-1737, Ian D. Wilson Associates Limited at 519-440-6432 (or via email at grether@tcc.on.ca), or the Township at 519-524-4669).

Monitoring Plan:

The monitoring plan is as follows:

- Water levels observed in Well 3 at a standard pumping test frequency.

- Pumping rate to be determined using a calibrated in-line flow meter.

- Water levels observed at a frequency of 1 hour to 4 hours (to be determined, based on aquifer response) in one of existing Century Heights Wells 1 and 2.

- Water levels observed at a frequency of 1 hour to 4 hours (to be determined, based on aquifer response) in at least one off-site bedrock well (with permission to be obtained).

Discharge Plan:

The discharge plan is as follows:

- All water withdrawn during the pumping test will be directed to the existing municipal storm sewer on the adjacent property. The capacity of the storm sewer to accept the discharge water has been confirmed by the Township's engineer.

Contingency Plan:

The contingency plan is as follows:

- As detailed above, anticipated impacts to neighbouring users of groundwater are low.
- If a report of adverse impact is received during the test, the pumping test will be immediately halted and the impact assessed.
- It is anticipated that aquifer recovery will be rapid after pumping test shut-down. Bottled water will be delivered to impacted users, if needed.
- The MECP district office will be immediately notified of the complaint (Owen Sound, 519-376-4440).

Qualifications:

Ian D. Wilson Associates Limited is a full service hydrogeology consulting firm in continuous practice since 1974 and is a limited corporation. Wilson Associates has completed over 1,400 hydrogeology-related projects throughout Ontario for numerous government, municipal and private clientele. A significant number of the over 1,400 projects completed Provincially have necessarily incorporated some or all components of the proposed pumping test.

The primary staff involved with the hydrogeologic aspects of the project will be Mr. Geoffrey Rether, B.Sc., P.Geo., President of Ian D. Wilson Associates Limited since 1999. Mr. Rether is a licenced Professional Geoscientist, has been a hydrogeologist with Wilson Associates since 1990 and has been involved with all aspects of several hundred projects with the firm. Mr. Rether has overseen several hundred pumping tests.

All of which is respectfully submitted,
IAN D. WILSON ASSOCIATES LIMITED

Geoffrey Rether, P.Geo.
(PGO Licence No. 0426)

WATER WELL RECORDS

Ontario

Ministry of the Environment, Conservation and Parks

Well Record - Regulation 903

Ontario Water Resources Act

Notice of Collection of Personal Information

Personal information contained on this form is collected pursuant to sections 35-50 and 75(2) of the *Ontario Water Resources Act* and section 16.3 of the Wells Regulation. This information will be used for the purpose of maintaining a public record of wells in Ontario. This form and the information contained on the form will be stored in the Ministry's well record database and made publicly available. Questions about this collection should be directed to the Water Well Customer Service Representative at the Wells Help Desk, 125 Resources Road, Toronto Ontario M9P 3V6, at 1-888-396-9355 or wellshelpdesk@ontario.ca.

Fields marked with an asterisk (*) are mandatory.

Well Tag Number *
A328704

Century Heights Well 3

Type *

☑ Construction ☐ Abandonment

Measurement recorded in: *

☐ Metric ☑ Imperial

1. Well Owner's Information

Last Name and First Name, or Organization is mandatory. *

Last Name	First Name

Organization	Email Address
Township of Ashfield-Colborne-Wawanosh	

Current Address

Unit Number	Street Number *	Street Name *	City/Town/Village
	821333	Council Rd., RR#5	Goderich

Country	Province	Postal Code	Telephone Number
	On	N7A 3Y2	

2. Well Location

Address of Well Location

Unit Number	Street Number *	Street Name *	Township
	36604	Maitland Ave	Colborne

Lot	Concession	County/District/Municipality
1	1WD	Huron

City/Town	Province	Postal Code
	Ontario	

UTM Coordinates	Zone *	Easting *	Northing *		Municipal Plan and Sublot Number
NAD 83	17	444539	4843650	Test UTM in Map	

Other

3. Overburden and Bedrock Material *

Well Depth * 250 (ft)

General Colour	Most Common Material	Other Materials	General Description	Depth From	Depth To

				(ft)	(ft)
Brown	Topsoil			0	1
Brown	Stones	Sand		1	4
Brown	Clay			4	15
Grey	Clay	Stones		15	99
Brown	Limestone	Clay	Layered	99	114
Brown	Limestone			114	150
Brown	Limestone	Layered	Fractured	150	246
Brown	Limestone			246	250

4. Annular Space *

Depth From (ft)	Depth To (ft)	Type of Sealant Used (Material and Type)	Volume Placed (cubic feet)
0	117	neet cement	35

5. Method of Construction *

- [ ] Cable Tool
- [x] Rotary (Conventional)
- [ ] Rotary (Reverse)
- [ ] Boring
- [ ] Air percussion
- [ ] Diamond
- [ ] Jetting
- [ ] Driving
- [ ] Digging
- [x] Rotary (Air)
- [ ] Augering
- [ ] Direct Push
- [ ] Other (specify) _____

6. Well Use *

- [x] Public
- [ ] Industrial
- [ ] Cooling & Air Conditioning
- [x] Domestic
- [ ] Commercial
- [ ] Not Used
- [ ] Livestock
- [x] Municipal
- [ ] Monitoring
- [ ] Irrigation
- [ ] Test Hole
- [ ] Dewatering
- [ ] Other (specify) _____

7. Status of Well *

- [x] Water Supply
- [ ] Replacement Well
- [ ] Test Hole
- [ ] Recharge Well
- [ ] Dewatering Well
- [ ] Observation and/or Monitoring Hole
- [ ] Alteration (Construction)
- [ ] Abandoned, Insufficient Supply
- [ ] Abandoned, Poor Water Quality
- [ ] Abandoned, other (specify) _____
- [ ] Other (specify) _____

8. Construction Record - Casing * (use negative number(s) to indicate depth above ground surface)

Inside Diameter (in)	Open Hole **or** Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness	Depth From (ft)	Depth To (ft)
8.25	Steel	0.25	-2	117
6.6	Steel	0.219	114	134
6	Open Hole		246	250

9. Construction Record - Screen

Outside Diameter (in)	Material (Plastic, Galvanized, Steel)	Slot Number	Depth From (ft)	Depth To (ft)
7	Steel	0.25	134	245

10. Water Details

Water found at Depth 150	(ft)	☐ Gas	Kind of water	☑ Fresh	☐ Untested	☐ Other		
Water found at Depth 178		☐ Gas	Kind of water	☑ Fresh	☐ Untested	☐ Other		
Water found at Depth 215		☐ Gas	Kind of water	☑ Fresh	☐ Untested	☐ Other		
Water found at Depth 240		☐ Gas	Kind of water	☑ Fresh	☐ Untested	☐ Other		

11. Hole Diameter

Depth From (ft)	Depth To (ft)	Diameter (in)
0	117	12
117	246	8
246	250	6

12. Results of Well Yield Testing

☐ Pumping Discontinued

Explain

If flowing give rate

☐ Flowing _____ (GPM)

Draw down

Time (min)	Static Level	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)	119													

Recovery

Time (min)	1	2	3	4	5	10	15	20	25	30	40	50	60
Water Level (ft)													

After test of well yield, water was

☑ Clear and sand free ☐ Other (specify)

Pump intake set at	Pumping rate	Duration of pumping	Final water level end of pumping	Disinfected? *
150 (ft)	(GPM)	hrs + min	(ft)	☑ Yes ☐ No

Recommended pump depth	Recommended pump rate	Well production
(ft)	220 (GPM)	240 (GPM)

13. Map of Well Location *

Map 1. Please Click the map area below to import an image file to use as the map. ☐ Make map area bigger

14. Information

Well owner's information package delivered	Date Package Delivered (yyyy/mm/dd)	Date Work Completed (yyyy/mm/dd) *
☐ Yes ☐ No		

Comments

Drilling completed Sept.12,2022, long term flow test yet to be conducted
Scott Hopper tech #3085 also onsite
The 7" sleeve has .25" slots

15. Well Contractor and Well Technician Information

Business Name of Well Contractor *			Well Contractor's License Number *
W.D.Hopper & Sons Ltd.			2604

Business Address

Unit Number	Street Number	Street Name *		
	30	Harpurhey Rd.		
City/Town/Village *			Province	Postal Code *
Seaforth			Ont.	N0K 1W0
Business Telephone Number		Business Email Address		
519-522-1737		wdhopper@tcc.on.ca		
Last Name of Well Technician *		First Name of Well Technician *		Well Technician's License Number *
Hopper		Allan		2576

16. Declaration *

☑ I hereby confirm that I am the person who constructed the well and I hereby confirm that the information on the form is correct and accurate.

Last Name	First Name	Email Address
Hopper	Ron	wdhopper@tcc.on.ca
Signature		Date Submitted (yyyy/mm/dd)

17. Ministry Use Only

Audit Number

Incomplete Record

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☑ CORRECT BOX WHERE APPLICABLE

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON.	BLOCK, TRACT, SURVEY, ETC.	LOT
HURON	COLBORNE	1	W.D.	1

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
ARMSTRONG & STEPHENSON	RR#5 GODERICH	DAY APR. 5 MO APR. YR 88

Historical Maitland Well

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
grey	GRAVEL		LOOSE	0	11
GREY	SILTY CLAY		SOFT	11	30
BLUE	BLUE CLAY		SOFT	30	60
GREY	HARD PAN	STONES	MED.	60	100
GREY	GRAVEL	CEMENTED MARL	HARD	100	113
YEL	CLAY	WHITE CLAY	SOFT	113	115
BROWN	LIMESTONE	MARL	HARD	115	120
GREY	LIMESTONE		HARD	120	170
BROWN	LIMESTONE	GREY LIMESTONE		170	205
TAN	LIMESTONE		MED. HARD	205	220

WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
150	☑ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
170	☑ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
198-215	☑ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH FEET FROM	DEPTH FEET TO
6 1/4"	☑ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	.188	+1	120'
6"	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☑ OPEN HOLE		120	220
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SLOT NO.	DIAMETER INCHES	LENGTH FEET
MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET	

PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE	CEMENT GROUT LEAD PACKER ETC.

PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
☑ PUMP ☐ BAILER	60 GPM	24 HOURS MINS

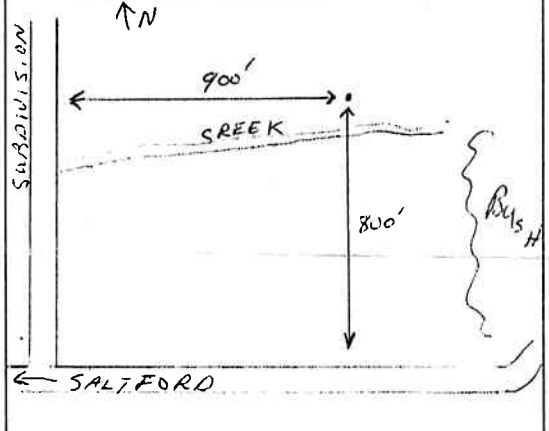
STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☑ PUMPING ☐ RECOVERY			
		15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
124' FEET	128'7" FEET	127' FEET	127' FEET	127'6" FEET	127'6" FEET

IF FLOWING, GIVE RATE	PUMP INTAKE SET AT	WATER AT END OF TEST
GPM	145' FEET	☑ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE	RECOMMENDED PUMP SETTING	RECOMMENDED PUMPING RATE
☐ SHALLOW ☑ DEEP	FEET	60 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



DRILLERS REMARKS

FINAL STATUS OF WELL	☑ WATER SUPPLY ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ OBSERVATION WELL ☐ ABANDONED, POOR QUALITY ☐ TEST HOLE ☐ UNFINISHED ☐ RECHARGE WELL
WATER USE	☐ DOMESTIC ☐ COMMERCIAL ☐ STOCK ☐ MUNICIPAL ☐ IRRIGATION ☐ PUBLIC SUPPLY ☐ INDUSTRIAL ☐ COOLING OR AIR CONDITIONING ☑ OTHER SUBDIVISION ☐ NOT USED
METHOD OF DRILLING	☐ CABLE TOOL ☐ BORING ☑ ROTARY (CONVENTIONAL) ☐ DIAMOND ☐ ROTARY (REVERSE) ☐ JETTING ☑ ROTARY (AIR) ☐ DRIVING ☐ AIR PERCUSSION

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
W.D. HOPPER & SONS LTD.	2604

ADDRESS	
RR#2 SEAFORTH ONT	

NAME OF DRILLER OR BORER	LICENCE NUMBER
RON HOPPER	T-0135

SIGNATURE OF CONTRACTOR	SUBMISSION DATE
	DAY 14 MO APR YR 88

CONTRACTOR'S COPY

OFFICE USE ONLY

FORM NO. 0506 - 4 - 77 FORM 7

Ontario Ministry of the Environment

Well Tag No. *(Place Sticker and/or Print Below)*

Well Record

Regulation 903 Ontario Water Resources Act

Measurements recorded in: ☐ Metric ☒ Imperial

Page 1 of 1

Historical Maitland Well Abandonment

Well Owner's Information

First Name	Last Name / Organization	E-mail Address	☐ Well Constructed by Well Owner
TOWNSHIP OF	ASHFIELD,COLBORE,WAWANSOH		

Mailing Address (Street Number/Name)	Municipality	Province	Postal Code	Telephone No. (inc. area code)
RR#7	GODERICH	ONT	N7A3Y2	

Well Location

Address of Well Location (Street Number/Name)	Township	Lot	Concession
	COLBORNE	01	01WD

County/District/Municipality	City/Town/Village	Province	Postal Code
HURON		Ontario	

UTM Coordinates Zone	Easting	Northing	Municipal Plan and Sublot Number	Other
NAD 83 17	444129	4843661		

Overburden and Bedrock Materials/Abandonment Sealing Record *(see instructions on the back of this form)*

General Colour	Most Common Material	Other Materials	General Description	Depth (m/ft) From	To
	PREVIOUSLY	DRILLED WELL 3004832		0	220

Annular Space

Depth Set at (m/ft) From	To	Type of Sealant Used (Material and Type)	Volume Placed (m³/ft³)
0	6	NATIVE FILL	
6	9	CEMENT	
9	133	BENTOITE	
133	220	GRAVEL	

Method of Construction

☐ Cable Tool ☐ Diamond ☐ Rotary (Conventional) ☐ Jetting ☐ Rotary (Reverse) ☐ Driving ☐ Boring ☐ Digging ☐ Air percussion ☐ Other, specify

Well Use

☐ Public ☐ Commercial ☐ Not used ☐ Domestic ☐ Municipal ☐ Dewatering ☐ Livestock ☐ Test Hole ☐ Monitoring ☐ Irrigation ☐ Cooling & Air Conditioning ☐ Industrial ☐ Other, specify

Construction Record - Casing

Inside Diameter (cm/in)	Open Hole OR Material (Galvanized, Fibreglass, Concrete, Plastic, Steel)	Wall Thickness (cm/in)	Depth (m/ft) From	To

Construction Record - Screen

Outside Diameter (cm/in)	Material (Plastic, Galvanized, Steel)	Slot No.	Depth (m/ft) From	To

Status of Well

☐ Water Supply ☐ Replacement Well ☐ Test Hole ☐ Recharge Well ☐ Dewatering Well ☐ Observation and/or Monitoring Hole ☐ Alteration (Construction) ☐ Abandoned, Insufficient Supply ☐ Abandoned, Poor Water Quality ☒ Abandoned, other, specify NOT NEEDED ☐ Other, specify

Water Details

Water found at Depth ___ (m/ft) Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Water found at Depth ___ (m/ft) Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Water found at Depth ___ (m/ft) Kind of Water: ☐ Fresh ☐ Untested ☐ Gas ☐ Other, specify

Hole Diameter

Depth (m/ft) From	To	Diameter (cm/in)

Results of Well Yield Testing

After test of well yield, water was: ☐ Clear and sand free ☐ Other, specify

If pumping discontinued, give reason:

Pump intake set at (m/ft)

Pumping rate (l/min / GPM)

Duration of pumping ___ hrs + ___ min

Final water level end of pumping (m/ft)

If flowing give rate (l/min / GPM)

Recommended pump depth (m/ft)

Recommended pump rate (l/min / GPM)

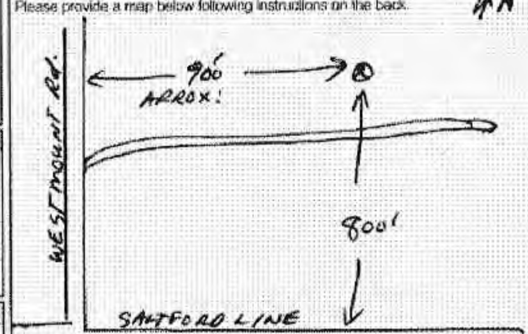
Well production (l/min / GPM)

Disinfected? ☒ Yes ☐ No

Draw Down Time (min)	Water Level (m/ft)	Recovery Time (min)	Water Level (m/ft)
Static Level	123		
1		1	
2		2	
3		3	
4		4	
5		5	
10		10	
15		15	
20		20	
25		25	
30		30	
40		40	
50		50	
60		60	

Map of Well Location

Please provide a map below following instructions on the back.



Well Contractor and Well Technician Information

Business Name of Well Contractor	Well Contractor's Licence No.
W. D. Hopper and Sons Ltd	2604

Business Address (Street Number/Name)	Municipality
RR#2, #32 Harpurhey Rd.	Seaforth

Province	Postal Code	Business E-mail Address
Ont.	N0K1W0	wdhopper@tcc.on.ca

Bus. Telephone No. (inc. area code)	Name of Well Technician (Last Name, First Name)
5195221737	PAUL HOPPER

Well Technician's Licence No.	Signature of Technician and/or Contractor	Date Submitted
2577	[signature]	10/8/2008

Comments:

Well owner's information package delivered	Date Package Delivered	Date Work Completed
☐ Yes ☐ No — NO		9/28/2008

Ministry Use Only

Audit No. Z 86395

Received: NOV 12 2008

0506E (12/2007)

Ministry's Copy

Ministry of the Environment

Ontario

The Ontario Water Resources Act 40P/12G

WATER WELL RECORD

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

(11) 3003809 MUNICIP. 30002 CON. WD 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY ETC.	LOT
[redacted]	Colborne W.D.	Con. 1 W.D.	001 Pt. 1

[redacted] onestoga-Rovers & Associates, [redacted] ing St. N., Waterloo, Ontario

DATE COMPLETED: DAY 14 MO 02 YR. 79

[redacted] 43700 RC 5 ELEVATION 0725 RC 5 BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Grey	Clay	Stones	Hard	0	6
Sand	Gravel	Stones	Mixed	6	23
Blue	Clay		Hard	23	86
Grey	Hardpan	Stones		86	111
Lt. Bn.	Limesone	White Shale	Mixed, Hard	111	127
Dk, Bn.	Limestone	Blue Shale Streaks	Medium	127	135
Lt. Bn.	Limestone	White Shale	Medium Hard	135	164
Dk. Bn.	Limestone		Medium	164	181
Lt. Bn.	Limestone		Soft, Broken	181	188
Brown	Limestone		Medium Soft	188	216

(31) 0006205 2 73 | 0023 28 11 2 | 0086 30 5 73 | 0111 2 4 2 | 0127 6 5 73 | 0135 6 5 74 | 1

(32) 0164 6 5 73 | 0181 6 5 78 65 | 0188 6 5 85 71 | 0216 6 5 78 85

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
22 ~~153~~	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
184 ~~219~~	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	.188	0	0113 ~~113-2~~
06	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE		113-2	0216
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER	LENGTH
	INCHES	FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN
	FEET

(61) PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD	☒ PUMP ☐ BAILER
PUMPING RATE	~~75 Imp.~~ 0075 GPM
DURATION OF PUMPING	24 HOURS 00 MINS
STATIC LEVEL	126 / 125.79 FEET
WATER LEVEL END OF PUMPING	129 / 129.03 FEET
WATER LEVELS DURING	☒ PUMPING ☐ RECOVERY
15 MINUTES	129 / 129.17
30 MINUTES	129 / 129.37
45 MINUTES	129 / 129.45 FEET
60 MINUTES	129 / 129.49 FEET
IF FLOWING GIVE RATE	GPM
PUMP INTAKE SET AT	170 FEET
WATER AT END OF TEST	☒ CLEAR ☐ CLOUDY
RECOMMENDED PUMP TYPE	☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING	150 FEET
RECOMMENDED PUMPING RATE	0075 GPM

FINAL STATUS OF WELL 1

☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED

WATER USE 07

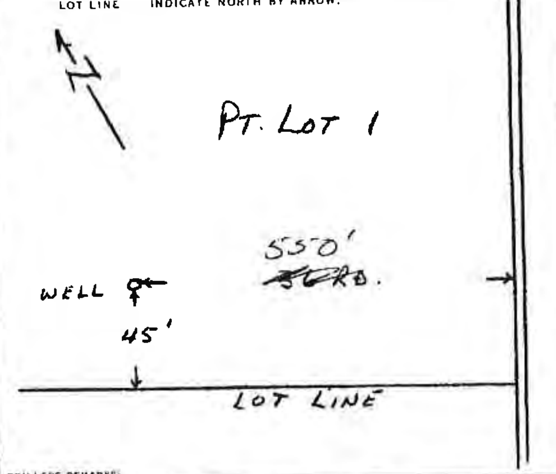
☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☐ MUNICIPAL ☒ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING 2

☐ CABLE TOOL ☒ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☒ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR	Davidson Well Drilling Limited
LICENCE NUMBER	1737
ADDRESS	P.O. Box 486, Wingham, Ontario
NAME OF DRILLER OR BORER	D. Casemore
SIGNATURE OF CONTRACTOR	D. J. Davidson
SUBMISSION DATE	DAY 15 MO. 02 YR. 79

OFFICE USE ONLY

DATA SOURCE	1
CONTRACTOR	1737
DATE RECEIVED	080579
DATE OF INSPECTION	25/8/80
INSPECTOR	7
REMARKS	T. Parry A.P.L. P/P W/P

CSS.S8

FORM NO. 0506-4-77

MINISTRY OF THE ENVIRONMENT COPY

Century Heights Well 1

Ontario Ministry of Environment and Energy

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 3007682 Municipality 30002 Con. WD ... 01

Century Heights Well 2

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
Huron	Colborne Twp.W.D.	Con.1	Pt.1

Owner's surname / First Name	Address of Well Location	Date completed
Township of Ashfield-Colborne-Wawanosh	c/o B.M.Ross& Assoc. 62 N.St.Goderich,Ont	5 June 03 (day month year)

21 Zone Easting Northing RC Elevation RC Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
	Re: Well For Century Heights Water Supply				
Brown	Clay		Sandy	0	18
Grey	Clay	Stones		18	26
Grey	Clay			26	91
Grey	Clay	Stones		91	105
Lt.Brn.	Limestone			105	118
Brown	Limestone	Dk.Blue shale streaks		118	216

31

32

41 WATER RECORD

Water found at - feet	Kind of water
122 / 170	☒ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
215	☒ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6	☒ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic	.188	+2	118
6	☐ Steel ☐ Galvanized ☐ Concrete ☒ Open hole ☐ Plastic		118	216
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter	Length
	inches	feet

Material and type	Depth at top of screen
	feet

61 PLUGGING & SEALING RECORD

☒ Annular space ☐ Abandonment

Depth set at - feet From	To	Material and type (Cement grout, bentonite, etc.)
118	0	Cement

71 PUMPING TEST

Pumping test method ☐ Pump ☐ Bailer	Pumping rate GPM	Duration of pumping Hours Mins		
Static level 122 feet	Water level end of pumping feet	Water levels during ☐ Pumping ☐ Recovery: 15 minutes feet	30 minutes feet	45 minutes feet / 60 minutes feet
If flowing give rate GPM	Pump intake set at feet	Water at end of test ☐ Clear ☐ Cloudy		
Recommended pump type ☐ Shallow ☐ Deep	Recommended pump setting feet	Recommended pump rate GPM		

FINAL STATUS OF WELL

☒ Water supply
☐ Observation well
☐ Test hole
☐ Recharge well
☐ Abandoned, insufficient supply
☐ Abandoned, poor quality
☐ Abandoned (Other)
☐ Dewatering
☐ Unfinished
☐ Replacement well

WATER USE

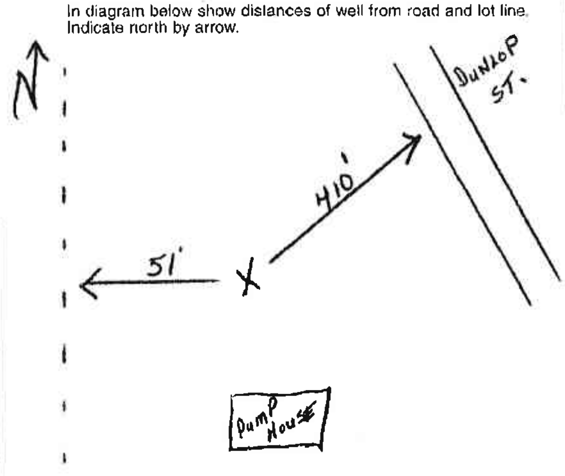
☐ Domestic
☐ Stock
☐ Irrigation
☐ Industrial
☐ Commercial
☒ Municipal
☐ Public supply
☐ Cooling & air conditioning
☐ Not use
☐ Other

METHOD OF CONSTRUCTION

☐ Cable tool
☒ Rotary (conventional)
☐ Rotary (reverse)
☐ Rotary (air)
☐ Air percussion
☐ Boring
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging
☐ Other

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



261735

Name of Well Contractor: Davidson Well Drilling Ltd.	Well Contractor's Licence No. 1737
Address: Box 486, Wingham, Ontario NOG 2WO	
Name of Well Technician: K. Losch	Well Technician's Licence No. T0927
Signature of Technician/Contractor: J.C. Davidson	Submission date: 28 July 03

MINISTRY USE ONLY

Data source	Contractor 1737	Date received DEC 05 2003
Date of inspection	Inspector	
Remarks		

2 - MINISTRY OF ENVIRONMENT AND ENERGY COPY

0506 (06/02) Front Form 9

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

40P/12E

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

(11) 3002835 | MUNICIP. 30002 | CON. W.D. | 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Colborne Township	Conc. 1, W. Division	002

[redacted] Warren St., Goderich, Ontario

DATE COMPLETED: DAY 07 MO. 06 YR. 74

[redacted] 43141 | RC. 4 | ELEVATION 0710 | RC. 5 | BASIN CODE 22

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Topsoil			0	1
	Gravel	Stones		1	21
Brown	Sand	Gravel Stones	Hard	21	35
Brown	Clay		Hard	35	60
Blue	Clay	Stones	Soft	60	76
Brown	Limestone		Hard	76	176

(31) 0001602 | 0021 1112 | 0035628 1112 | 0060605 | 0076305 12 | 0176615

32

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0174 ~~28~~ ~~176~~	1 ☒ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
05	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐	.258	0	~~0079~~ 0079 ~~0176~~
05	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE			0176
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE	DEPTH TO TOP OF SCREEN FEET

(61) PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
1 ☒ PUMP 2 ☐ BAILER	0010 GPM	01 HOURS 45 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
119 FEET	126 FEET	121 FEET	126 FEET	126 FEET	126 FEET

WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

IF FLOWING GIVE RATE: GPM

PUMP INTAKE SET AT: 170 FEET

WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 145 FEET

RECOMMENDED PUMPING RATE: 0010 GPM

001.4 GPM./FT. SPECIFIC CAPACITY

FINAL STATUS OF WELL 1

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE 01

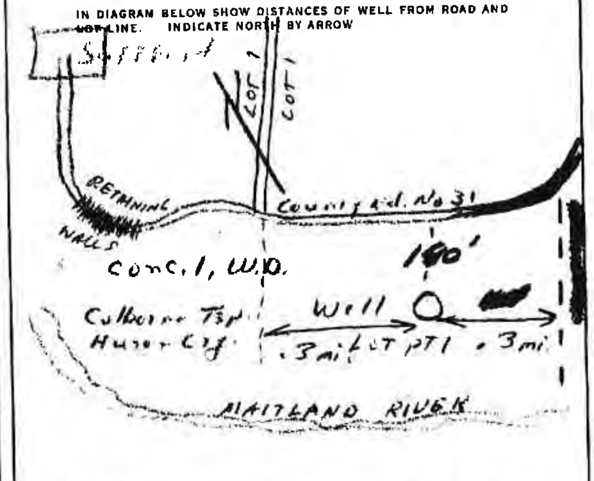
1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING 2

1 ☐ CABLE TOOL
2 ☒ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

LOCATION OF WELL 4443

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



DRILLERS REMARKS:

CONTRACTOR

NAME OF WELL CONTRACTOR	LICENCE NUMBER
Davidson Well Drilling Limited	1737

ADDRESS: Box 486, Wingham, Ontario

NAME OF DRILLER OR BORER: Rick Jardine, Lucknow | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: per H. T. Davidson | SUBMISSION DATE: DAY 15 MO. June YR. 74

OFFICE USE ONLY

DATA SOURCE	CONTRACTOR	DATE RECEIVED
1	1737	080774

DATE OF INSPECTION: July 11/75 | INSPECTOR

REMARKS:

P B.A.
WI B.A.

FORM 7 07-091

MINISTRY OF THE ENVIRONMENT COPY

Ministry of the Environment

Ontario

The Ontario Water Resources Act 40P/12E

WATER WELL RECORD

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2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 3004711 MUNICIP 30002 CON WD 01

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
[redacted]	Colborne W.D. Twp.	con. 1	Pt. 1

[redacted] 5, Goderich, Ontario. N7A 3Y2

DATE COMPLETED DAY 7 MO Aug. YR. 87.

43650 RC ELEVATION 800 RC BASIN CODE

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
Brown	Sand	Gravel	Coarse	0	15
Brown	Clay	Gravel, Sand	Mixed	15	42
Grey	Clay	Stones	Hard	42	105
Brown	Limestone		Hard	105	112
Brown	Limestone		Medium soft	112	184

31

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41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
174	1 ☒ FRESH 3 ☐ SULPHUR 2 ☒ SALTY 4 ☐ MINERAL
182	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL
	1 ☐ FRESH 3 ☐ SULPHUR 2 ☐ SALTY 4 ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
5	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	.188	0	108-9
5	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE		108-9	184
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.)	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE — DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP air 2 ☒ BAILER — PUMPING RATE 8 GPM — DURATION OF PUMPING 2 HOURS MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
129 FEET	135 FEET	132 FEET	134 FEET	135 FEET	135 FEET

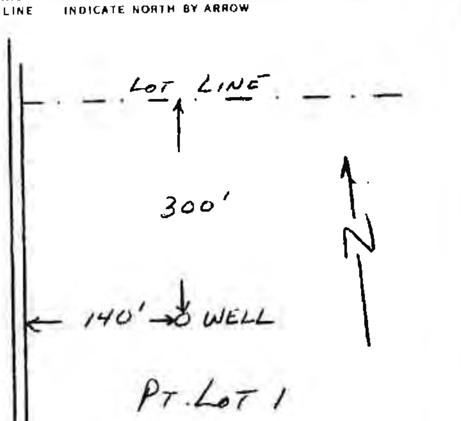
WATER LEVELS DURING: 1 ☒ PUMPING 2 ☐ RECOVERY

IF FLOWING, GIVE RATE: GPM — PUMP INTAKE SET AT 165 FEET — WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP — RECOMMENDED PUMP SETTING 55 FEET — RECOMMENDED PUMPING RATE 8 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



04495

DRILLERS REMARKS

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY
2 ☐ OBSERVATION WELL
3 ☐ TEST HOLE
4 ☐ RECHARGE WELL
5 ☐ ABANDONED, INSUFFICIENT SUPPLY
6 ☐ ABANDONED, POOR QUALITY
7 ☐ UNFINISHED

WATER USE

1 ☒ DOMESTIC
2 ☐ STOCK
3 ☐ IRRIGATION
4 ☐ INDUSTRIAL
☐ OTHER
5 ☐ COMMERCIAL
6 ☐ MUNICIPAL
7 ☐ PUBLIC SUPPLY
8 ☐ COOLING OR AIR CONDITIONING
9 ☐ NOT USED

METHOD OF DRILLING

1 ☐ CABLE TOOL
2 ☒ ROTARY (CONVENTIONAL)
3 ☐ ROTARY (REVERSE)
4 ☐ ROTARY (AIR)
5 ☐ AIR PERCUSSION
6 ☐ BORING
7 ☐ DIAMOND
8 ☐ JETTING
9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Davidson Well Drilling Limited — LICENCE NUMBER 1737

ADDRESS: Box 486, Wingham, Ontario. N0G 2W0

NAME OF DRILLER OR BORER: D. Casemore — LICENCE NUMBER T0154

SIGNATURE OF CONTRACTOR: [signature] — SUBMISSION DATE DAY 12 MO Aug. YR 87

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR — DATE RECEIVED AUG 31 1987

DATE OF INSPECTION 18/11/88 — INSPECTOR

REMARKS: CSS.58

FORM NO. 0506—4—77 FORM 7

MINISTRY OF THE ENVIRONMENT COPY

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

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11 — 3005597 — MUNICIP 30002 — CON W.D. — LOT 10.1

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON. BLOCK, TRACT, SURVEY, ETC.	LOT
Huron	Colborne Twpp W.D.	Con. 1	1

[redacted] R. 4, Goderich Ontario. N7A 3Y1

DATE COMPLETED: DAY 5 MO July YR 93.

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	DEPTH - FEET TO
Brown	Clay	Stones	Soft	0	13
Brown	Sand		Soft	13	15
Grey	Clay		Soft	15	43
Grey	Clay		Hard	43	54
Grey	Clay	Stones	Hard	54	71
Brown	Hardpan	Stones	Hard	71	105
Brown	Limestone		Med. soft	105	134
Brown-Gry.	Limestone		MEd.	134	169

31

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
156	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☒ MINERALS 6 ☐ GAS
163	
169	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 6 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	DEPTH - FEET TO
6	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	0	109-0
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☒ OPEN HOLE 5 ☐ PLASTIC		109-0	169
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE-SLOT NO. OF OPENING	DIAMETER INCHES	LENGTH FEET

MATERIAL AND TYPE — DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☒ PUMP 2 ☐ BAILER

PUMPING RATE: 18 GPM — DURATION OF PUMPING: HOURS 1 MINS 30

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY			
		10 MINUTES	20 MINUTES	45 MINUTES	60 MINUTES
125 FEET	129 FEET	129 FEET	127 FEET	126 FEET	125 FEET

IF FLOWING GIVE RATE: GPM

PUMP INTAKE SET AT: 150 FEET

WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

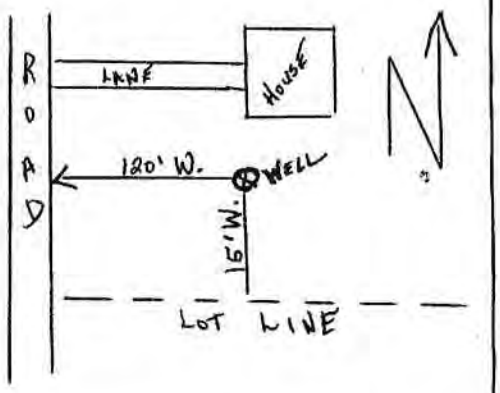
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP

RECOMMENDED PUMP SETTING: 145 FEET

RECOMMENDED PUMPING RATE: 12 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



DRILLERS REMARKS: 122502

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY; 2 ☐ OBSERVATION WELL; 3 ☐ TEST HOLE; 4 ☐ RECHARGE WELL; 5 ☐ ABANDONED, INSUFFICIENT SUPPLY; 6 ☐ ABANDONED, POOR QUALITY; 7 ☐ UNFINISHED; ☐ DEWATERING

WATER USE

1 ☒ DOMESTIC; 2 ☐ STOCK; 3 ☐ IRRIGATION; 4 ☐ INDUSTRIAL; ☐ OTHER; 5 ☐ COMMERCIAL; 6 ☐ MUNICIPAL; 7 ☐ PUBLIC SUPPLY; 8 ☐ COOLING OR AIR CONDITIONING; 9 ☐ NOT USED

METHOD OF CONSTRUCTION

1 ☐ CABLE TOOL; 2 ☒ ROTARY (CONVENTIONAL); 3 ☐ ROTARY (REVERSE); 4 ☐ ROTARY (AIR); 5 ☐ AIR PERCUSSION; 6 ☐ BORING; 7 ☐ DIAMOND; 8 ☐ JETTING; 9 ☐ DRIVING; ☐ DIGGING; ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: Davidson Well Drilling Limited
WELL CONTRACTOR'S LICENCE NUMBER: 1737
ADDRESS: Box 486, Wingham, Ontario N0G 2W0
NAME OF WELL TECHNICIAN: D. Casemore
WELL TECHNICIAN'S LICENCE NUMBER: T0154
SIGNATURE OF TECHNICIAN/CONTRACTOR: D. F. Davidson per: G. C. Davidson
SUBMISSION DATE: DAY 12 MO July YR 93.

MINISTRY OF THE ENVIRONMENT COPY

OFFICE USE ONLY

DATA SOURCE — CONTRACTOR: 1737 — DATE RECEIVED: AUG 31 1993
DATE OF INSPECTION — INSPECTOR
REMARKS: CSS.ES

FORM NO. 0506 (11/86) FORM 9

Ministry of the Environment
Ontario

The Ontario Water Resources Act

WATER WELL RECORD

1 PRINT ONLY IN SPACES PROVIDED
2 CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 — 3005707 — MUNICIP 30002 — CON W.D. — LOT 01

COUNTY OR DISTRICT: [redacted]
TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE: [redacted]NE
CON, BLOCK, TRACT, SURVEY, ETC: 01 WD
LOT: 01
DATE COMPLETED: DAY 9 /8 /1994
[redacted]DERICH ONT.

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
GREY	GRAVEL	STONES		0	18
BLUE	SILT		SOFT	18	26
BLUE	CLAY			26	60
GREY	STONES	CLAY		60	90
GREY	HARDPAN		PACKED	90	105
YELLOW	CLAY	WHITE CLAY		105	113
YELLOW	CLAY	BROWN LIMESTONE	LAYERED	113	117
BROWN	LIMESTONE		MED	117	119
BROWN	LIMESTONE	GREY LIMESTONE	SOFT	119	165
BROWN	LIMESTONE	GREY LIMESTONE	MED	165	180

31
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
144	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
156	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
176	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERALS 5 ☐ GAS

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
6	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC	.188	1	119
5	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC		119	180
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE 5 ☐ PLASTIC			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) — DIAMETER — LENGTH
MATERIAL AND TYPE — DEPTH TO TOP OF SCREEN

61 PLUGGING & SEALING RECORD

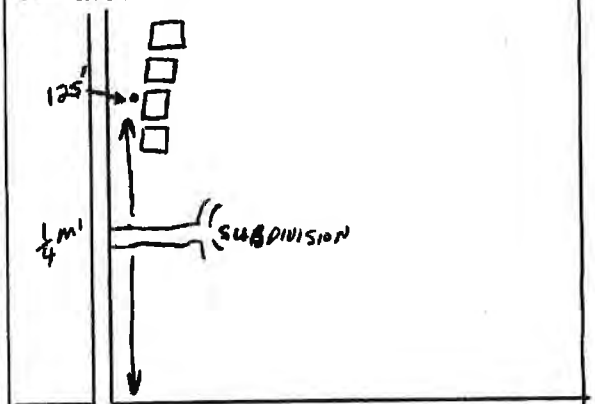
DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD, PACKER, ETC.)
10-13	14-17	
18-21	22-25	
26-29	30-33	

71 PUMPING TEST

PUMPING TEST METHOD: 1 ☐ PUMP 2 ☐ BAILER
PUMPING RATE: 12 GPM
DURATION OF PUMPING: 2 HOURS ___ MINS
STATIC LEVEL: 121 FEET
WATER LEVEL END OF PUMPING: 140 FEET
WATER LEVELS DURING: 1 ☐ PUMPING 2 ☒ RECOVERY
15 MINUTES: 125 FEET
30 MINUTES: FEET
45 MINUTES: FEET
60 MINUTES: FEET
IF FLOWING, GIVE RATE: GPM
PUMP INTAKE SET AT: 160 FEET
WATER AT END OF TEST: X 1 ☐ CLEAR 2 ☐ CLOUDY
RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING: 160 FEET
RECOMMENDED PUMPING RATE: 10 GPM

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW



PUMP BY W.D.HOPPER
DRILLERS REMARKS

132836

FINAL STATUS OF WELL
1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED ☐ DEWATERING

WATER USE
1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☐ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF CONSTRUCTION
1 ☐ CABLE TOOL 2 ☒ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☒ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING ☐ DIGGING ☐ OTHER

CONTRACTOR

NAME OF WELL CONTRACTOR: W.D.HOPPER & SONS LTD.
WELL CONTRACTOR'S LICENCE NUMBER: 2604
ADDRESS: RR#2 SEAFORTH ONT.
NAME OF WELL TECHNICIAN: RON HOPPER
WELL TECHNICIAN'S LICENCE NUMBER: T-0135
SIGNATURE OF TECHNICIAN/CONTRACTOR: Ron Hopper
SUBMISSION DATE: DAY 21 /9 /1994

OFFICE USE ONLY

DATA SOURCE
CONTRACTOR: 2604
DATE RECEIVED: OCT 17 1994
DATE OF INSPECTION
INSPECTOR
REMARKS: CSS.ES

MINISTRY OF THE ENVIRONMENT COPY

FORM NO. 0506 (11/86) FORM 9

Ministry of Environment and Energy
Ontario

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11

3006006

Municipality 30002 Con. WD 01

County or District [redacted]

Township/Borough/City/Town/Village COLBORNE

Con block tract survey, etc. 1

Lot 1

Address R.R. #4 GODERICH.

Date completed 06 05 96 (day month year)

Northing RC Elevation RC Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth – feet From	Depth – feet To
BLACK	TOPSOIL		LOOSE	0	1.
BROWN	CLAY		PACKED	1	3
BROWN	GRAVEL.	STONES	DRY	3	8
BROWN	FINE GRAVEL, COARSE SAND.		WATER BEARING	8	15
GREY	CLAY		HARD PACKED	15	16.

WATER RECORD

Water found at – feet	Kind of water
7	☑ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas
	☐ Fresh ☐ Salty ☐ Sulphur ☐ Minerals ☐ Gas

CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth – feet From	Depth – feet To
36"	☐ Steel ☐ Galvanized ☑ Concrete ☐ Open hole ☐ Plastic	3"	0	12.5
30"	☐ Steel ☐ Galvanized ☐ Concrete ☑ Open hole ☐ Plastic	OPEN HOLE	12.5	15
	☐ Steel ☐ Galvanized ☐ Concrete ☐ Open hole ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet

Material and type: FILTERSAND

Depth at top of screen feet

PLUGGING & SEALING RECORD

☑ Annular space ☐ Abandonment

Depth set at – feet From	Depth set at – feet To	Material and type (Cement grout, bentonite, etc.)
0	8	HOLEPLUG 1 AND
		CLAY SLURRY.

PUMPING TEST

Pumping test method: ☐ Pump ☑ Bailer

Pumping rate: 20 GPM

Duration of pumping: 1 Hours 0 Mins

Static level	Water level end of pumping	Water levels during: ☐ Pumping ☐ Recovery			
		15 minutes	30 minutes	45 minutes	60 minutes
7 feet	12 feet	feet	feet	feet	feet

If flowing give rate: GPM

Pump intake set at: 12 feet

Water at end of test: ☐ Clear ☐ Cloudy

Recommended pump type: ☑ Shallow ☐ Deep

Recommended pump setting: 12 feet

Recommended pump rate: 5 GPM

(12 FT. FROM TOP FILL)

FINAL STATUS OF WELL

☑ Water supply
☐ Observation well
☐ Test hole
☐ Recharge well
☐ Abandoned, insufficient supply
☐ Abandoned, poor quality
☐ Abandoned (Other)
☐ Dewatering
☐ Unfinished
☐ Replacement well

WATER USE

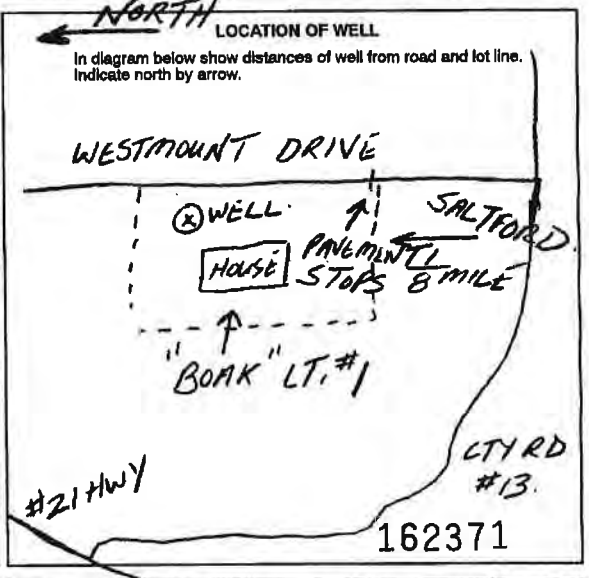
☑ Domestic
☐ Stock
☐ Irrigation
☐ Industrial
☐ Commercial
☐ Municipal
☐ Public supply
☐ Cooling & air conditioning
☐ Not used
☐ Other

METHOD OF CONSTRUCTION

☐ Cable tool
☐ Rotary (conventional)
☐ Rotary (reverse)
☐ Rotary (air)
☐ Air percussion
☑ Boring
☐ Diamond
☐ Jetting
☐ Driving
☐ Digging
☐ Other

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



162371

Name of Well Contractor: HAYDEN WATER WELLS — Well Contractor's Licence No.: 2552

Address: R.R.#1 LUCAN.

Name of Well Technician: JAY HAYDEN — Well Technician's Licence No.: T1034

Signature of Technician/Contractor — Submission date: day mo yr

MINISTRY USE ONLY

Data source — Contractor: 2552 — Date received: MAR 04 1997

Date of inspection — Inspector

Remarks: CSS. S

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Ontario Ministry of the Environment

The Ontario Water Resources Act
WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 — 3007255 — Municipality 30002 — Con. W/D — 01

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
HURON	COLBORNE	01	01

Address: RR# 4 GODERICH ONT.

Date completed: 10 / 7 / 2002 (day / month / year)

21 — UTM — Northing — RC — Elevation — RC — Basin Code — ii — iii — iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
BROWN	SAND			0	8
BROWN	CLAY			8	13
GREY	CLAY			13	70
GREY	CLAY	STONES		70	95
GREY	HARDPAN		PACKED	95	110
BROWN	LIMESTONE		SOFT	110	113
BROWN	LIMESTONE		MED.	113	205

31 — 32

41 WATER RECORD

Water found at - feet	Kind of water
195-200	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6"	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	.188	0	114
6"	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		114	205
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

ABM ☐ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0	114	BENTONITE & DRILL SLURRY

71 PUMPING TEST

Pumping test method: 1 ☒ Pump 2 ☐ Bailer

Pumping rate: 20 GPM

Duration of pumping: 2 Hours ____ Mins

Water levels during: 1 ☒ Pumping 2 ☐ Recovery

Static level	Water level end of pumping	15 minutes	30 minutes	45 minutes	60 minutes
147 feet	198 feet	151 feet	159 feet	190 feet	191 feet

If flowing give rate: ____ GPM

Pump intake set at: 185 feet

Water at end of test: ☒ Clear ☐ Cloudy

Recommended pump type: ☐ Shallow ☒ Deep

Recommended pump setting: 165 feet

Recommended pump rate: 10 GPM

FINAL STATUS OF WELL

1 ☒ Water supply 2 ☐ Observation well 3 ☐ Test hole 4 ☐ Recharge well 5 ☐ Abandoned, insufficient supply 6 ☐ Abandoned, poor quality 7 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE

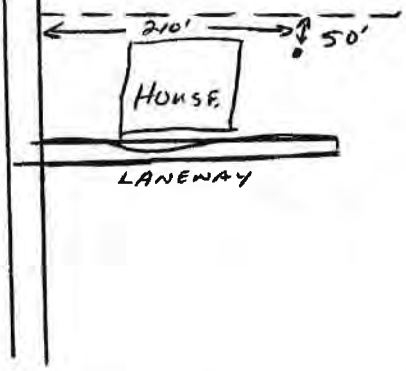
1 ☒ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☐ Not use 10 ☐ Other

METHOD OF CONSTRUCTION

1 ☐ Cable tool 2 ☐ Rotary (conventional) 3 ☒ Rotary (reverse) 4 ☐ Rotary (air) 5 ☐ Air percussion 6 ☐ Boring 7 ☐ Diamond 8 ☐ Jetting 9 ☐ Driving 10 ☐ Digging 11 ☐ Other

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



PUMP BY W.D.HOPPER

251192

Name of Well Contractor	Well Contractor's Licence No.
W.D.HOPPER & SONS LTD.	2604
Address: RR# 2 SEAFORTH ONT.	
Name of Well Technician: ALLAN HOPPER	Well Technician's Licence No.: T-2576
Signature of Technician/Contractor	Submission date: day 25 / 09 / 2002

MINISTRY USE ONLY

Data source	Contractor	Date received
	2604	OCT 0 3 2002
Date of inspection	Inspector	
Remarks		

C22532

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Ontario **Ministry of Environment and Energy**

The Ontario Water Resources Act

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 **3007475** Municipality B0002 Con. W/D Lot 01

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
[redacted]	COLBORNE	01	01
	Address of Well Location: GODERICH ONT.	Date completed: 18 /3 /2003 (day month year)	

21 Zone Easting Northing RC Elevation RC Basin Code

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
BROWN	SAND			0	10
BROWN	CLAY		SANDY	10	15
GREY	CLAY			15	60
GREY	CLAY	STONES		60	75
GREY	HARDPAN		PACKED	75	108
BROWN	LIMESTONE		FRACTURED	108	109
BROWN	LIMESTONE		MED.	109	115
BROWN	LIMESTONE		FRACTURED	115	125
BROWN	LIMESTONE		MED-HARD	125	205
BROWN	LIMESTONE		MED.-FRACTURED	205	220

31

32

41 WATER RECORD

Water found at - feet	Kind of water
200-220	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 5 ☐ Gas

61 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	.188	0	111
6	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		111	220
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0	111	BENTONITE & DRILL SLURRY

71 PUMPING TEST

Pumping test method: 1 ☒ Pump 2 ☐ Bailer

Pumping rate: 15 GPM

Duration of pumping: 2 Hours Mins

Water levels during: 1 ☒ Pumping 2 ☐ Recovery

Static level	Water level end of pumping	15 minutes	30 minutes	45 minutes	60 minutes
148 feet	175 feet	152 feet	157 feet	161 feet	164 feet

If flowing give rate: GPM

Pump intake set at: feet

Water at end of test: ☐ Clear ☐ Cloudy

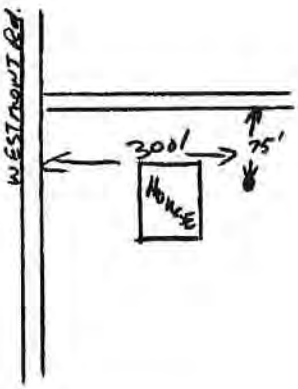
Recommended pump type: ☐ Shallow ☒ Deep

Recommended pump setting: 180 feet

Recommended pump rate: 10 GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



PUMP BY W.D.HOPPER

256894

FINAL STATUS OF WELL

1 ☒ Water supply 2 ☐ Observation well 3 ☐ Test hole 4 ☐ Recharge well 5 ☐ Abandoned, insufficient supply 6 ☐ Abandoned, poor quality 7 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE

1 ☒ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☐ Not use 10 ☐ Other

METHOD OF CONSTRUCTION

1 ☐ Cable tool 2 ☐ Rotary (conventional) 3 ☒ Rotary (reverse) 4 ☐ Rotary (air) 5 ☐ Air percussion 6 ☐ Boring 7 ☐ Diamond 8 ☐ Jetting 9 ☐ Driving 10 ☐ Digging 11 ☐ Other

Name of Well Contractor	Well Contractor's Licence No.
W.D.HOPPER & SONS LTD.	2604
Address: RR# 2 SEAFORTH ONT.	
Name of Well Technician: ALLAN HOPPER	Well Technician's Licence No.: T-2576
Signature of Technician/Contractor	Submission date: day 5 /05 /2003

MINISTRY USE ONLY

Data source	Contractor	Date received
	2604	MAY 26 2003
Date of inspection	Inspector	
Remarks		CSS.ES3

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Ontario **Ministry of Environment and Energy**

The Ontario Water Resources Act

WATER WELL RECORD

Print only in spaces provided.
Mark correct box with a checkmark, where applicable.

11 **3007516** Municipality **30002** Con. **WD** **01**

County or District	Township/Borough/City/Town/Village	Con block tract survey, etc.	Lot
	COLBORNE	**01**	**01**
	Address of Well Location **GODERICH ONT.**	Date completed **28 / 5 / 2003** (day / month / year)	

21 UTM Zone | Easting | Northing | RC | Elevation | RC | Basin Code | ii | iii | iv

LOG OF OVERBURDEN AND BEDROCK MATERIALS (see instructions)

General colour	Most common material	Other materials	General description	Depth - feet From	Depth - feet To
BROWN	**SAND**			**0**	**4**
BROWN	**CLAY**			**4**	**16**
GREY	**CLAY**			**16**	**32**
GREY	**CLAY**	**STONES**		**32**	**36**
GREY	**CLAY**			**36**	**70**
GREY	**CLAY**	**STONES**		**70**	**100**
BROWN	**LIMESTONE**		**FRACTURED**	**100**	**113**
BROWN	**LIMESTONE**		**MED.**	**113**	**205**

31
32

41 WATER RECORD

Water found at - feet	Kind of water
175	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
198-205	1 ☒ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas
	1 ☐ Fresh 2 ☐ Salty 3 ☐ Sulphur 4 ☐ Minerals 6 ☐ Gas

51 CASING & OPEN HOLE RECORD

Inside diam inches	Material	Wall thickness inches	Depth - feet From	Depth - feet To
6"	1 ☒ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic	**.188**	**+2**	**113**
6"	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☒ Open hole 5 ☐ Plastic		**113**	**205**
	1 ☐ Steel 2 ☐ Galvanized 3 ☐ Concrete 4 ☐ Open hole 5 ☐ Plastic			

SCREEN

Sizes of opening (Slot No.)	Diameter inches	Length feet
Material and type	Depth at top of screen feet	

61 PLUGGING & SEALING RECORD

☐ Annular space ☐ Abandonment

Depth set at - feet From	Depth set at - feet To	Material and type (Cement grout, bentonite, etc.)
0	**142**	**BENTONITE**

71 PUMPING TEST

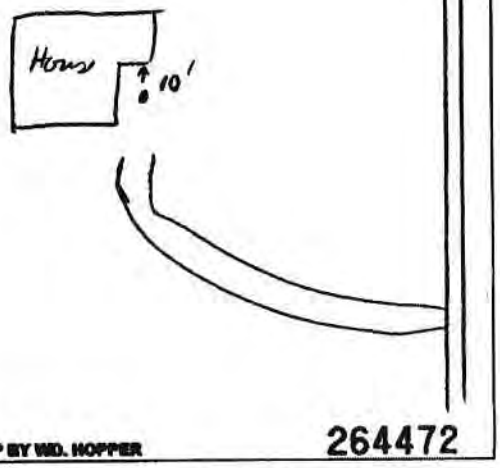
Pumping test method: 1 ☒ Pump 2 ☐ Bailer
Pumping rate: **20** GPM
Duration of pumping: **3** Hours ..... Mins

Static level	Water level end of pumping	Water levels during: 1 ☒ Pumping 2 ☐ Recovery			
137 feet	**146** feet	15 minutes **138** feet	30 minutes **140** feet	45 minutes **142** feet	60 minutes **143** feet

If flowing give rate: GPM
Pump intake set at: **190** feet
Water at end of test: ☒ Clear ☐ Cloudy
Recommended pump type: ☐ Shallow ☒ Deep
Recommended pump setting: **190** feet
Recommended pump rate: **12** GPM

LOCATION OF WELL

In diagram below show distances of well from road and lot line. Indicate north by arrow.



PUMP BY WD. HOPPER

264472

FINAL STATUS OF WELL

54
1 ☒ Water supply 2 ☐ Observation well 3 ☐ Test hole 4 ☐ Recharge well 5 ☐ Abandoned, insufficient supply 6 ☐ Abandoned, poor quality 7 ☐ Abandoned (Other) 8 ☐ Dewatering 9 ☐ Unfinished 10 ☐ Replacement well

WATER USE

55-56
1 ☒ Domestic 2 ☐ Stock 3 ☐ Irrigation 4 ☐ Industrial 5 ☐ Commercial 6 ☐ Municipal 7 ☐ Public supply 8 ☐ Cooling & air conditioning 9 ☐ Not use 10 ☐ Other

METHOD OF CONSTRUCTION

57
1 ☐ Cable tool 2 ☐ Rotary (conventional) 3 ☒ Rotary (reverse) 4 ☐ Rotary (air) 5 ☐ Air percussion 6 ☐ Boring 7 ☐ Diamond 8 ☐ Jetting 9 ☐ Driving 10 ☐ Digging 11 ☐ Other

Name of Well Contractor	Well Contractor's Licence No.
W.D.HOPPER & SONS LTD.	**2604**
Address: **RR# 2 SEAFORTH ONT.**	
Name of Well Technician: **ALLAN HOPPER**	Well Technician's Licence No.: **T-2578**
Signature of Technician/Contractor	Submission date: day **3** / **JUL** / **2003**

MINISTRY USE ONLY

Data source 58	Contractor 59-62	Date received 63-68	69
	2604	**JUL 09 2003**	
Date of inspection	Inspector		
Remarks			

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0506 (06/02) Front Form 9

Appendix C

Wellhead Protection Area Delineation and Vulnerability Scoring for Well 3, Matrix Report

PRELIMINARY WELLHEAD PROTECTION AREA DELINEATION AND VULNERABILITY SCORING, CENTURY HEIGHTS WELL 3 COMMUNITY OF SALTFORD, ONTARIO

Prepared for:
TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH

Prepared by:
MATRIX SOLUTIONS INC., A MONTROSE ENVIRONMENTAL COMPANY

Version 1.0
November 2023
Guelph, Ontario

Unit 7B, 650 Woodlawn Rd. W
Guelph, ON, Canada N1K 1B8
T 519.772.3777 F 226.314.1908
www.matrix-solutions.com

PRELIMINARY WELLHEAD PROTECTION AREA DELINEATION AND VULNERABILITY SCORING, CENTURY HEIGHTS WELL 3 COMMUNITY OF SALTFORD, ONTARIO

Prepared for Township of Ashfield-Colborne-Wawanosh, November 2023

Jim Graham, M.A.Sc., P.Eng.
Senior Hydrogeological Engineer

reviewed by
Dave Van Vliet, M.A.Sc., P.Eng.
Senior Vice President, Technical Excellence & Innovation

CONTRIBUTORS

Name	Job Title	Role
Jim Graham, M.A.Sc., P.Eng.	Senior Hydrogeological Engineer	Author and modelling
Henry Hecky, M.Sc., P.Geo.	Hydrogeologist	Project manager and GIS
Dave Van Vliet, M.A.Sc., P.Eng.	Senior Vice President, Technical Excellence & Innovation	Technical reviewer

VERSION CONTROL

Version	Date	Issue Type	Filename	Description
V0.1	10-Oct-2023	Draft	35869-527 Saltford LR 2023-10-10 draft V0.1.docx	Issued to client for review.
V1.0	22-Nov-2023	Final	35869-527 Saltford LR 2023-11-22 Final V1.0.docx	Issued to client.

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IN-TEXT TABLES

FIGURES

1 INTRODUCTION

In the fall of 2005, the Government of Ontario introduced Bill 43, the *Clean Water Act* (Government of Ontario 2021), to protect drinking water at the source as part of an overall commitment to human health and the environment. Protecting source water is the first step in a multibarrier approach to ensure that the quality and sustainability of our drinking water supplies are maintained for generations to come (Government of Ontario 2021). A focus of the government's legislation is the production of locally developed science-based Assessment Reports and Source Protection Plans. Assessment Reports are prepared by Source Protection Authorities and include a watershed characterization, water budget, groundwater and surface water vulnerability assessment, threats assessment and issues evaluation, and water quality and quantity risk assessment studies. Groundwater vulnerability assessments are a requirement of the *Clean Water Act* (Government of Ontario 2021). These assessments identify vulnerable areas (e.g., Wellhead Protection Areas [WHPAs]); characterize the relative vulnerability of the municipality's supply aquifers as high, moderate, or low; and assign vulnerability scores to zones within those vulnerable areas.

The Township of Ashfield-Colborne-Wawanosh (the Township) retained Matrix Solutions Inc., a Montrose Environmental company, to develop the draft preliminary WHPAs and complete vulnerability scoring for a new Century Heights well, located in the Century Heights subdivision in the community of Saltford, Ontario. In 2010, Waterloo Numerical Modelling Corp. (WNMC) completed the groundwater study for the Ausable Bayfield Conservation Authority (ABCA)/Maitland Valley Conservation Authority (MVCA; *ABCA/MVCA Groundwater Model Updates and Capture Zone Delineation*; WNMC 2010). A large regional numerical model built for that study extended from Lake Huron to east of Molesworth, Ontario, and south of Goderich, Ontario to north of Wingham, Ontario. The 2010 Visual MODFLOW numerical model was used previously to delineate WHPAs for the Century Heights subdivision but was not available for this study. The WNMC (2010) report was used to inform the local and regional characterization work along with current data sets (Ontario Ministry of the Environment, Conservation and Parks [MECP] water well records, surficial geology, bedrock geology, tile drain network, etc.).

1.1 Scope of Work

The *2021 Technical Rules under the Clean Water Act* (the Technical Rules; MECP 2021) document provides definitions of vulnerable areas and vulnerability scoring within vulnerable areas. The Government of Ontario released the *Groundwater Vulnerability Analysis* (Guidance Module 3; MOE 2006), and it recommends methods to delineate vulnerable areas. The methods documented in this report are consistent with the approaches laid out in Guidance Module 3 and the Technical Rules.

The main objectives for this current project include:

- developing a conceptual site model of the area surrounding the existing and planned Century Heights municipal wells

- developing a three-dimensional (3D) groundwater flow model of the area surrounding the existing and planned Century Heights municipal wells
- delineating the capture zones and draft WHPAs for a new single proposed municipal well in the Century Heights subdivision (Century Heights Well-3)
- completing vulnerability scoring within the draft WHPAs using existing aquifer vulnerability mapping

1.2 Background

Developing a groundwater flow model suitable for WHPA delineation relies on the physical characteristics of the groundwater and surface water flow systems on a local and regional scale. Technical studies have previously been completed throughout the area on a regional and local (wellfield) scale, with the goal of enhancing the understanding of the hydrogeology of the study area. The following subsections summarize the study area (Figure 1), municipal water supplies, and the hydrostratigraphy and introduce the concept of WHPAs, vulnerability, and vulnerability scoring. Further details on local and regional hydrogeology, bedrock hydrogeology, and physical characterization are provided in WMNC (2010).

1.2.1 Hydrostratigraphy

Hydrostratigraphic units refer to zones of similar geologic and hydrogeologic properties influencing groundwater flow. The delineation of hydrostratigraphic units is completed using knowledge of the regional and local understanding of the spatial distribution of stratigraphic units, relying on information provided in both geological mapping and borehole logs (i.e., water well records). The geologic cross-sections from the North Huron model (WNMC 2010) were used to form the basis of the conceptual model for this study, along with an understanding of the hydrostratigraphic setting on the eastern shore of Lake Huron. The hydrostratigraphy represented in the ACW model (WNMC 2010) was primarily developed from water well records (MECP 2023). Most of the domestic wells contributing to the Water Well Information System (WWIS; MECP 2022) record database are drilled to bedrock with primarily till or low permeability material reported in the overburden. As such, the model overburden layer was conceptualized as a single layer, defined from the digital elevation model (DEM) shown in Figure 2 to the top of bedrock shown in Figure 3. The top-of-bedrock surface was created by interpolating the topmost bedrock unit in the water well records, which was then clipped with the DEM to represent the bedrock surface in low-lying areas, especially around the rivers where the overburden has historically eroded away. The surficial geology of the area as mapped by the Ontario Geological Survey (Figure 4) was assigned to this overburden unit.

Century Heights Well-3 was completed as an open hole below the fractured bedrock from a depth of 32.0 m. Figure 5 illustrates the two uppermost regional bedrock units of the area: the Dundee Formation (west) and the Detroit River Group (east).

1.2.2 Wellhead Protection Areas

A WHPA is a term used to describe scientifically based capture zones delineated for water supply wells. A capture zone is the area of land surrounding a groundwater extraction well, where water (and contaminants, if they were to exist) located at and below the ground surface may travel toward that well within a defined period. The Technical Rules (MECP 2021) require that the following WHPAs for water quality be delineated for each municipal drinking water supply well:

- WHPA-A: the surface and subsurface area centred on the well with an outer boundary identified by a radius of 100 m.
- WHPA-B: the surface and subsurface areas within which the time-of-travel to the well is less than or equal to 2 years but excluding WHPA-A.
- WHPA-C: the surface and subsurface areas within which the time-of-travel to the well is greater than 2 years, but less than or equal to 5 years.
- WHPA-D: the surface and subsurface areas within which the time-of-travel to the well is greater than 5 years, but less than or equal to 25 years.

1.2.3 Vulnerability Scoring

Vulnerability is a relative indicator of where contamination may be more likely to reach an underlying aquifer if introduced at the ground surface. Aquifers that are unconfined or have little protective overburden cover are more susceptible to surface contamination, if a spill were to occur, than those that have a substantial amount of fine-grained overburden protection. Fine-grained overburden units as well as deep aquifers that are confined by thick layers of fine-grained material would be identified as having low vulnerability to surficial contaminants as compared to shallow sand and gravel aquifers.

Existing groundwater vulnerability mapping for the study area obtained from the MVCA and ABCA and relied upon for this study. This vulnerability mapping was overlain with the WHPA polygons delineated in this study, and a vulnerability score was applied to the intersecting polygon areas based on the WHPA type and vulnerability category (Table 1) as per the Technical Rules (MECP 2021).

TABLE 1 Wellhead Protection Areas Vulnerability Scores

Groundwater Vulnerability	Location Within a WHPA			
	WHPA A	WHPA B	WHPA C	WHPA D
High	10	10	8	6
Medium	10	8	6	4
Low	10	6	4	2

Notes:
WHPA - Wellhead Protection Area

2 CAPTURE ZONE AND WELLHEAD PROTECTION AREAS DELINEATION METHODOLOGY AND RESULTS

2.1 Groundwater Flow Modelling

Several technical studies were previously conducted for the purposes of groundwater protection in Huron County (WNMC 2010). Studies included the development of groundwater flow models to evaluate the long-term sustainability of municipal wells and to delineate capture zones around municipal pumping wells. As new wells are drilled, the understanding of the hydrogeology of the area can be refined with additional borehole data, and this may necessitate updates to a groundwater flow model. In addition, as new water supply wells are put into production, and other wells are taken offline, the capture zones, WHPAs, and vulnerability scores need to be updated.

A Visual MODFLOW model was previously developed for the area that included Huron County and the Township (WNMC 2010). The objectives of the 2010 study were to map regional groundwater conditions, inventory groundwater uses, identify groundwater quality threats, and conduct a contaminant source assessment. Regional groundwater modelling and WHPAs of the municipal wells in the municipality were delineated using the Visual MODFLOW model. The groundwater flow model developed for this study was unavailable for this project, which resulted in the requirement to develop a new local-scale model.

2.2 Groundwater Flow Model Development

2.2.1 Model Domain and Grid

The numerical model developed for the current study was based on the reporting of the previous larger regional-scale groundwater flow model (WNMC 2010). The boundaries of the revised groundwater flow model are illustrated on Figure 6 and extend 17 km east from Lake Huron and 10 km from north to south. The model domain was selected based on the understanding of regional groundwater flow, extent of previous WHPA's, and natural flow boundaries. Regional and local horizontal groundwater flow direction is westward; flow from higher elevations in the east towards Lake Huron.

2.2.2 Model Hydraulic Properties

The mapped surficial geology (Figure 4) was used to define the uppermost layer in the model. Table 2 lists the model layers and the hydraulic conductivity values associated with the hydrostratigraphic units in those layers. The 2010 Visual MODFLOW model was used to inform the initial estimates of hydraulic conductivity. Figures 8 and 9 illustrate two hydrostratigraphic cross-sections extending west to east and north to south, respectively, through Century Heights Well-3. Layers 2 and 3 represents a 5 m thick weathered bedrock zone, with the top defined as the upper bedrock surface. Layers 4 to 7 represents the Dundee Bedrock Formation and Layers 8 to 10 represent the Detroit River Bedrock Group. Each bedrock unit has a uniform thickness of 100 m, resulting in a 200 m overall bedrock thickness.

Porosity was assumed to be 25% for the overburden layers and 5% for the bedrock layers, similar to the previous study (WNMC 2010).

TABLE 2 Summary of Hydrostratigraphic Units in Study Area

Model Layer	Geologic Unit	2010 Regional Model Hydraulic Conductivity (m/s)	Simulated Hydraulic Conductivity (m/s)	Simulated Porosity (%)
1	Clay or Peat	1×10^{-6} to 5×10^{-6}	1×10^{-6}	25
1	Sand and Gravel	1×10^{-4}	1×10^{-4}	25
1	Silt Till	1×10^{-6} to 5×10^{-6}	1×10^{-6}	25
2-3	Bedrock Contact Zone	3×10^{-5}	2×10^{-4}	5
4-7	Dundee Formation	2×10^{-5}	2×10^{-5}	5
8-10	Detroit River Group	2×10^{-5}	2×10^{-5}	5

2.2.3 Model Boundaries

Boundary conditions were applied in the model to represent different flow conditions (lateral flow in and out of the model, surface water features, recharge from precipitation, and water removal via permitted pumping wells). Water withdrawal from private wells is not considered to influence the groundwater system, as most water removed is replaced back via septic systems. The regional lateral boundaries are placed far enough away from the Century Heights municipal wells that they will not have a direct influence on the wells.

- **Western Boundary:** Layers 1 to 5 were assigned constant head boundaries to represent Lake Huron set at an elevation of 176 m above sea level (asl).

- **Eastern Boundary:** Layers 2 to 10 were assigned constant head boundaries to represent a bedrock groundwater contour of 274 m asl on the north side of the Maitland River and 275 m asl on the south side of the Maitland River.

- **Northern Boundary:** Layers 1 to 5 were assigned a no-flow boundary to represent groundwater flow parallel to the model edge (no groundwater flow across the model edge).

- **Southern Boundary:** South of the Maitland River, the model was assigned a no-flow boundary condition, as it is inferred that the groundwater flow originating south of the river will not contribute water to the area north of the river.

- **Recharge:** The surficial geology of the area is primarily low-permeability material. The study area is largely farmland, and agricultural tile drains have been installed to prevent ponding of precipitation. Where tile drains are mapped, the recharge was set to 5 mm/year, and where there were no mapped tile drains, the recharge was set to 50 mm/year.

- **Rivers and Streams:** The major rivers and streams were assigned river boundary conditions within the model domain based on the DEM and a conductance term that was adjusted during the calibration process.

- **Pumping:** Table 3 summarizes historical pumping of the Century Heights wells as provided by B.M. Ross and Associated Limited (Devries, R. pers. comm. March 29, 2023). B.M. Ross also estimated the projected pumping rates to generate the WHPAs for the three Century Heights wells. Projected pumping rates are based on estimated average day demand for anticipated build-out conditions over the next 15 years. It anticipated that the new Century Heights Well-3 will service the existing Maitland View Estates properties, along with the new development properties, for an estimated 156 customers. Century Heights Well-1 and -2 combined demand will be reduced from 85 customers to 58 customers, and the corresponding pumping rates are expected to drop as well. The pumping rates at Well-1 and Well-2 are estimated by halving the total remaining demand for the 58 customers. Due to their proximity, it is assumed that the total demand can be evenly distributed between the two wells even though exact pumping rates may fluctuate above and below the WHPA values. Although the two systems will be connected, they will operate independently at different pressures, and that pumping from either of the systems will not have to increase to support the other.

- The pumping rates represented at each of the other municipal wells in the model area were not updated for this study. The pumping rate at the Auburn Hall Well was maintained at 9 m^3/day and Benmiller Well was maintained at 59 m^3/day. These wells are sufficiently far away from the Century Heights wells that they will not interfere with the pumping at Century Heights.

TABLE 3 Historic and Future Pumping Rates

Well	2018 2021 Calibrated Model (m^3/day)	2023 WHPA Model (m^3/day)
Century Heights Well-1	52	35
Century Heights Well-2	52	35
Century Heights Well-3	0	147
Auburn Hall Well (1)	9	9
Benmiller Well (1)	59	59

Notes:
(1) Rates for Auburn Hall and Benmiller wells are assumed to be the same as the WNMC (2010, Table 2-1) study.

2.3 Model Calibration

Given the model updates described in the preceding section, and the availability of groundwater level data representing long-term average (steady-state) conditions, a calibration dataset consisting of observed groundwater elevations was compiled within the study area.

To maximize the number of data points available for calibration, WWIS data (MECP 2021), ranging from the year 1970 onward, were added to the existing model. The WWIS data are considered representative only of the time when the water level was collected, typically when it was drilled. These static water level observations offer the significant benefit of having a high number of model calibration targets that extend across the entire study area. However, there can be uncertainty associated with individual observations. Uncertainties arise due to errors in the reported location of the wells, measurement techniques that were not designed to provide reliable scientific information and variability in water levels over time at individual well locations. The water well records from WWIS were used as targets to calibrate the model and identify regional trends in observations; however, they were not considered to be accurate indicators of an exact water level at a specific location. In total, 176 calibration targets were used for the steady-state calibration.

2.3.1.1 Steady-state Model Calibration Results

The steady-state calibration to existing pumping conditions involved comparing simulated hydraulic heads against those reported in the WWIS wells for different hydrostratigraphic units. A scatter plot showing the match between simulated and observed values for these wells is presented on Figure 12 for the base case model.

The scatter plot (Figure 12) illustrates the goodness-of-fit for hydraulic head targets with model-simulated heads plotted on the vertical axis and observed hydraulic heads plotted on the horizontal axis. The 1:1 line corresponds to simulated head being equal to observed head, and the objective of the calibration effort is to have the points as close as possible to this line.

The scatter plots indicate that most of the calibration targets were within the 95% interval and were generally distributed both above and below 1:1 line. Table 4 summarizes the calibration statistics computed as measures of the goodness-of-fit between model-simulated and observed hydraulic heads for all 176 calibration targets for the base case: WHPA Scenario 1 and WHPA Scenario 2. WHPA scenarios 1 and 2 are discussed in Section 2.4. Each of these scenarios includes different model parameters that result in an acceptably calibrated model.

TABLE 4 Steady-state Calibration Statistics

Calibration Statistic	Calibrated Model	WHPA Base Case	WHPA Scenario 1	WHPA Scenario 2
Number of Calibration Targets	176	176	176	176
Mean Error (m)	3.01	3.00	3.04	3.2
Mean Absolute Error (m)	6.25	6.24	6.27	6.24
Root Mean Squared Error (m)	7.85	7.85	7.84	7.88
Normalized Root Mean Squared Error (%)	6.88	6.88	6.87	6.91

Notes:
WHPA - Wellhead Protection Area

The industry standard for model calibration is having a normalized root mean square error (NRMSE) below 10%. Based on these calibration results (NRMSE <10%), the model calibration is considered typical for the situation represented and reasonable for the purposes of draft WHPA delineation.

2.4 Model Uncertainty

Alternative combinations of model parameters may result in changes to WHPAs for the same pumping well when predictions are made with a groundwater model. Hence, two distinct scenarios were considered after calibrating the base case model. The scenarios involved a model simulation with an increased recharge rate (75 mm/year) and hydraulic conductivities doubled for WHPA Scenario 1, and a model simulation with decreased recharge rate (33 mm/year) and hydraulic conductivities halved for WHPA Scenario 2. The hydraulic conductivity values used are listed in Table 5.

Overburden and bedrock porosity does not affect the groundwater flow model results and was not adjusted for the model calibration step. Porosity is input into the model to compute groundwater velocity and affects the calculation of pathlines. Typical ranges of overburden and bedrock porosity are 20%-30% and 5%-10%, respectively. Smaller porosities result in higher velocities and longer pathlines. The porosity for the overburden units were increased and decreased by 5 % for WHPA scenarios 1 and 2, respectively. The porosity for the bedrock increased by a factor of 5% for WHPA Scenario 1 but did not decrease for WHPA Scenario 2, as the value of 5% is already at the lower range for bedrock porosity.

TABLE 5 Model Uncertainty of Hydrostratigraphic Units

Model Layer	Geologic Unit	Base Case		WHPA Scenario 1		WHPA Scenario 2	
		K (m/s)	Porosity	K (m/s)	Porosity	K (m/s)	Porosity
1	Clay or Peat	1×10^{-6}	25	2×10^{-6}	30	5×10^{-7}	20
1	Sand and Gravel	1×10^{-4}	25	2×10^{-4}	30	5×10^{-5}	20
1	Silt Till	1×10^{-6}	25	2×10^{-6}	30	5×10^{-7}	20
2-3	Bedrock Contact Zone	2×10^{-4}	5	4×10^{-4}	10	1×10^{-4}	5
4-7	Dundee Formation	2×10^{-5}	5	4×10^{-5}	10	1×10^{-5}	5
8-10	Detroit River Group	2×10^{-5}	5	4×10^{-5}	10	1×10^{-5}	5

Notes:
K – Hydraulic Conductivity
Base case recharge: 50 mm/year
WHPA Scenario 1 increased recharge: 75 mm/year
WHPA Scenario 2 decreased recharge: 33 mm/year
WHPA - Wellhead Protection Area

2.5 Capture Zone and Wellhead Protection Area Delineation

Capture zones represent the area of land surrounding a groundwater pumping well where water located at and below the ground surface may travel toward that well within a set period. A WHPA, in contrast, refers to an area of land derived from capture zones to manage and plan activities near municipal water

supply wells for the purposes of protecting drinking water quality. The following sections describe the methods used to delineate the capture zones and draft WHPAs for the new Century Heights Well 3 and the subsequent results.

2.5.1 Capture Zone Delineation Methodology

Virtual particles can be released in a groundwater flow model and tracked forward or backward in time through the subsurface for set time intervals. The computed pathlines travelled by these particles are projected to the ground surface and plotted on a plan view map. Time-of-travel capture zones are subsequently created by drawing polygons around the well and the particle pathlines for specific time intervals.

2.5.1.1 Particle Tracking Methodology and Results

Particle tracking was used in the Visual MODFLOW groundwater flow model to track the movement of hypothetical particles through the modelled steady-state flow domain. MODFLOW calculates a 3D velocity vector through each element. These velocities are then used to calculate the flow path of a particle of water from a specified starting location. Particles can be released anywhere in the model domain and tracked backward or forward in time through the subsurface until they reach the surface of the model or a model boundary condition.

Backward particle tracking was completed for the model, releasing a set of particles in a 10 m radius around the production well (i.e., Century Heights Well-3, at the top and bottom of the screened interval [and 10 m intervals in between the top and the bottom]). The particle tracks for each of the model runs are shown on Figure 13 (2-year time of travel), Figure 14 (5-year time of travel), and Figure 15 (25-year time of travel). As illustrated on these figures, the WHPAs are delineated at a relatively small distance from the particle paths, particularly along the north boundaries. Delineating the WHPAs at a small distance from the particle paths represents a conservative approach. The exact boundaries of a WHPA cannot be delineated exactly, and adding a buffer distance can be justified to account for seasonal variability and other uncertainties.

The backward tracks for the 2-, 5-, and 25-year times of travel, were overlaid in a GIS. The particle pathlines extend outward in the upgradient direction toward the east.

2.5.1.2 Capture Zones Results

Composite capture zones for each of the Century Heights wells (Well-1 and -2 were merged due to their proximity) were delineated from the combined set of all particle pathlines from the base case model and the two-uncertainty analysis model runs (WHPA Scenario 1 and WHPA Scenario 2). The pathlines were overlain in the GIS, and Figure 16 illustrates the composite capture zones drawn around the outer limits of all particle pathlines of Century Heights Well-1,- 2, and -3. The resultant 2-, 5-, and 25-year time-of-travel capture zones were used as the basis for the delineation of the draft WHPA-B, WHPA-C,

and WHPA D polygons, respectively. The size and shape of the resulting capture zones depend on many factors, including well pumping rate, length of the well screen, geologic material in which the well is screened, and surrounding geologic units that the pathlines will pass through.

2.5.2 Draft Wellhead Protection Area Delineation Results

The draft WHPAs for the wells were delineated from the capture zones with polygons that encompass the respective time of travel capture zones.

The following draft WHPAs were delineated for the Century Heights Well-1, -2, and -3 (Figure 16):

- WHPA-A was delineated as a 100 m fixed radius zone around the Century Heights Well-3, independent of the time-of-travel capture zone.
- WHPA-B was delineated as the area outside the WHPA-A, within which the time of travel to the well is less than or equal to 2 years.
- WHPA-C was delineated as the area outside WHPA-B, within which the time of travel to the well is greater than 2 years, but less than or equal to 5 years.
- WHPA D was delineated as the area outside WHPA-C, within which the time of travel to the well is greater than 5 years, but less than or equal to 25 years.

3 VULNERABILITY SCORING

Aquifer vulnerability is a relative measure of the susceptibility of an aquifer to be impacted from contamination introduced at the ground surface. The aquifer vulnerability is categorized as high, medium/moderate, or low depending on the geologic and hydrogeologic properties overlying the municipal aquifer of interest.

3.1 Relative Vulnerability Mapping

WNMC (2010) completed previous vulnerability assessments in the area to identify the vulnerability of the municipal groundwater resources to surficial sources of contamination. The vulnerability of the groundwater resources was evaluated using the Intrinsic Susceptibility Index, which is a calculated value estimating the susceptibility of groundwater resource to contamination at each WWIS well in the study area. The vulnerability mapping supplied by ABCA/MVCA (pers. comm. 2023) was used to provide a vulnerability scoring for the newly delineated WHPAs and is illustrated on Figure 17. In the study area, the vulnerability is mapped primarily as low due to the low permeability of the surficial sediments.

3.2 Draft Vulnerability Scoring

The draft WHPAs for the Century Heights Well-1, -2, and -3 were overlain on the existing vulnerability mapping. Vulnerability scores were assigned according to the vulnerability category and WHPA zones summarized in Table 1 (Section 1.2.2). Figure 18 illustrates the resultant draft vulnerability scoring for the draft WHPAs. Draft WHPA-A has a vulnerability score of 10, draft WHPA-B has a vulnerability score of 6, draft WHPA-C has a vulnerability score of 4, and draft WHPA-D has a vulnerability score of 2.

3.3 Vulnerability Uncertainty Assessment

As outlined in the Technical Rules (MECP 2021), an uncertainty rating of either “high” or “low” must be assigned to the assessment of vulnerability for each WHPA. The uncertainty rating applied should consider the uncertainty associated with quantity and quality of data used to assess the vulnerability, with delineating the time-of-travel capture zones, and with the assessment of the vulnerability of the WHPAs. If a high relative uncertainty rating is applied to a polygon for either assessment (time-of-travel delineation or vulnerability scoring), the uncertainty rating for that polygon is defined as “high.” Only if the uncertainty ratings associated with both the time-of-travel and the vulnerability rating were determined to be low would the resultant uncertainty score be defined as “low.”

The uncertainty analysis factors considered in this assessment follow Part I.4, Rule 14 of the Technical Rules (MECP 2021). Table 6 summarizes each factor.

TABLE 6 Uncertainty Analysis Factors[(1)] and Uncertainty Ranking for the Wellhead Protection Areas and Vulnerability Scores

Uncertainty Assessment Factors	Uncertainty Designation	Description
14(1) The distribution, variability, quality, and relevance of data used in the preparation of the Assessment Report	Low	Good coverage of MECP water well record data surrounding the study area, as well as high-quality water level data local to the well field.
14(2) The ability of the methods and models used to accurately reflect the flow processes in the hydrological system	Low	The groundwater flow model has been shown to reflect groundwater flow processes by representing water levels under long-term average and pumping conditions.
14(3) The quality assurance and quality control procedures applied	Low	Each step of the model development process relied on data that had been collected and/or reviewed by professional engineers or geoscientists. The development of the original model, which this current model is based upon, was fully documented (WNMC 2010) and that document was reviewed by leading academics and industry professionals for the purposes of fulfilling the requirements of the *Clean Water Act*.
14(4) The extent and level of calibration and validation achieved for models used or calculations or general assessments completed	Low	The groundwater model, including the model updates documented as part of this project, is a product of steady-state calibration efforts and the final parameters derived are both consistent with field observations and those that would be expected based on the conceptual model.
14(5) The accuracy to which the groundwater vulnerability categories effectively assess the relative vulnerability of the underlying hydrogeological features	Low	The groundwater vulnerability categories (i.e., low, medium, and high) were created and peer reviewed for the purposes of fulfilling the requirements of the *Clean Water Act*.

Note:
(1) MECP (2021)
MECP - Ontario Ministry of the Environment, Conservation and Parks

4 CONCLUSIONS AND RECOMMENDATIONS

The main objectives for this project included delineating draft WHPAs for the newly located Century Heights Well-3 in the community of Saltford, southeast of the existing Century Heights Well-1 and -2 and assigning draft vulnerability scores based on the existing vulnerability of the municipal groundwater aquifer.

This report describes the development of a new groundwater flow model that was based on the groundwater flow model originally developed for the Township in 2010 (WNMC 2010). Draft WHPAs were derived from groundwater capture zones delineated using this model and backward particle tracking

methods. These draft WHPAs were combined with existing aquifer vulnerability mapping to determine the draft groundwater vulnerability scoring for each draft WHPA.

The draft WHPAs and vulnerability scoring presented in this report are based on the latest numerical groundwater flow model for the area and existing vulnerability mapping.

5 REFERENCES

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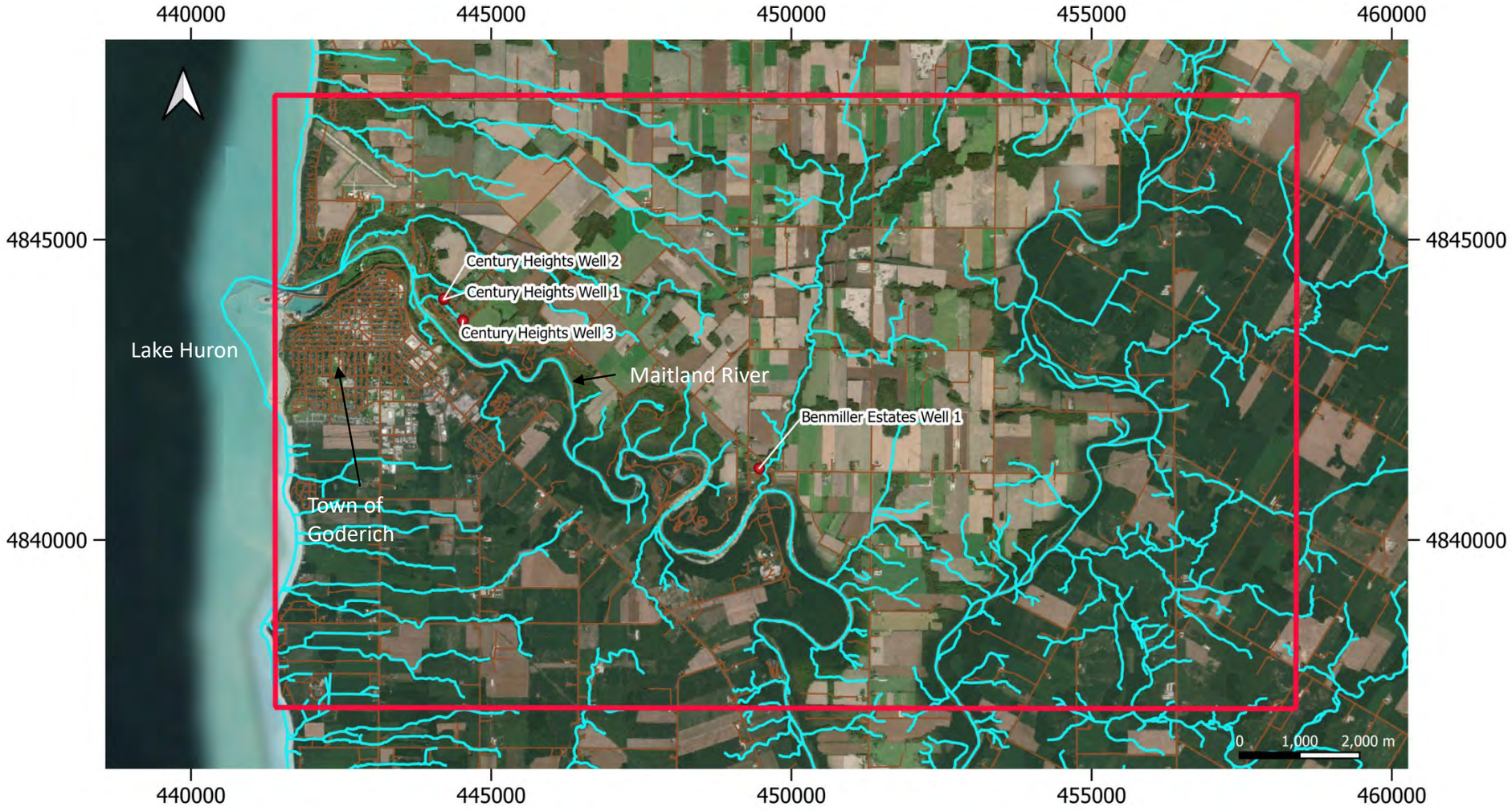


- Pumping Wells
- Model Domain Boundary
- Watercourse
- Roads

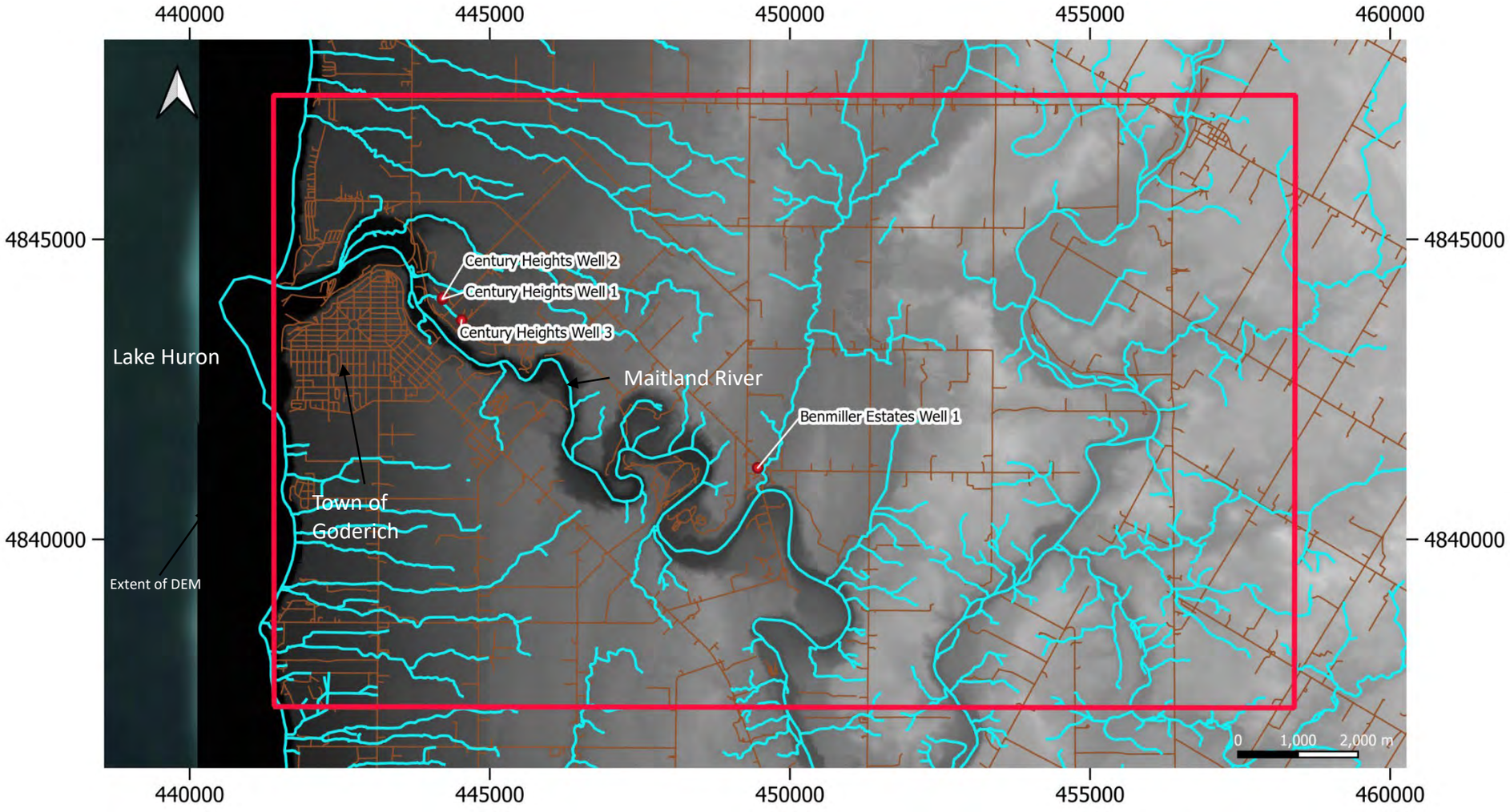
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Study Area

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 1



- Pumping Wells
- Model Domain Boundary
- Watercourse
- Roads

Digital Elevation Model - DEM (metres above sea level)

- 175
- 325

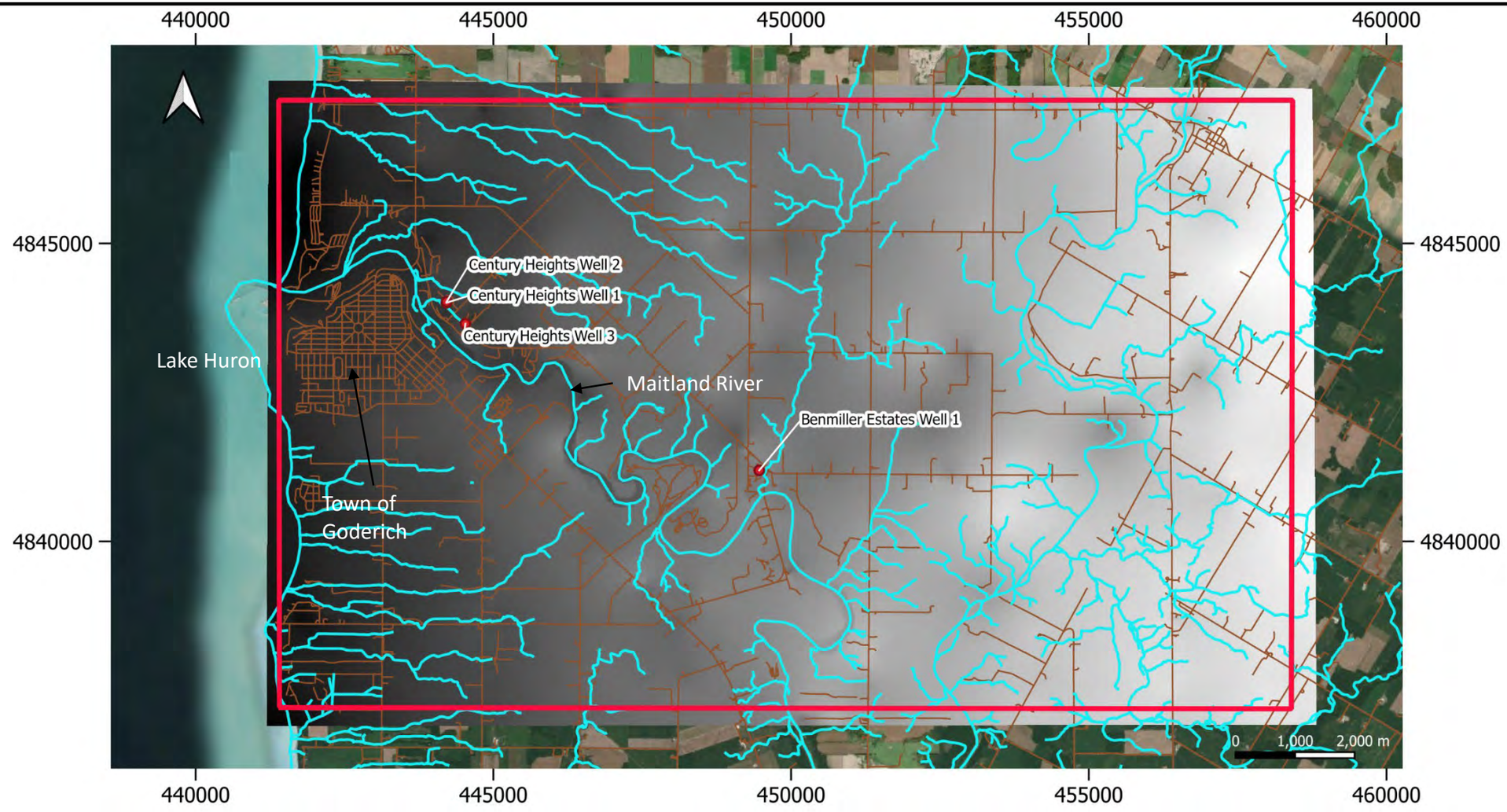
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Digital Elevation Model (DEM)

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 2



- Pumping Wells
- Model Domain Boundary
- Watercourse
- Roads

Bedrock Topography (WWIS Bedrock Pick Interpolation - metres above sea level)

- 157
- 278

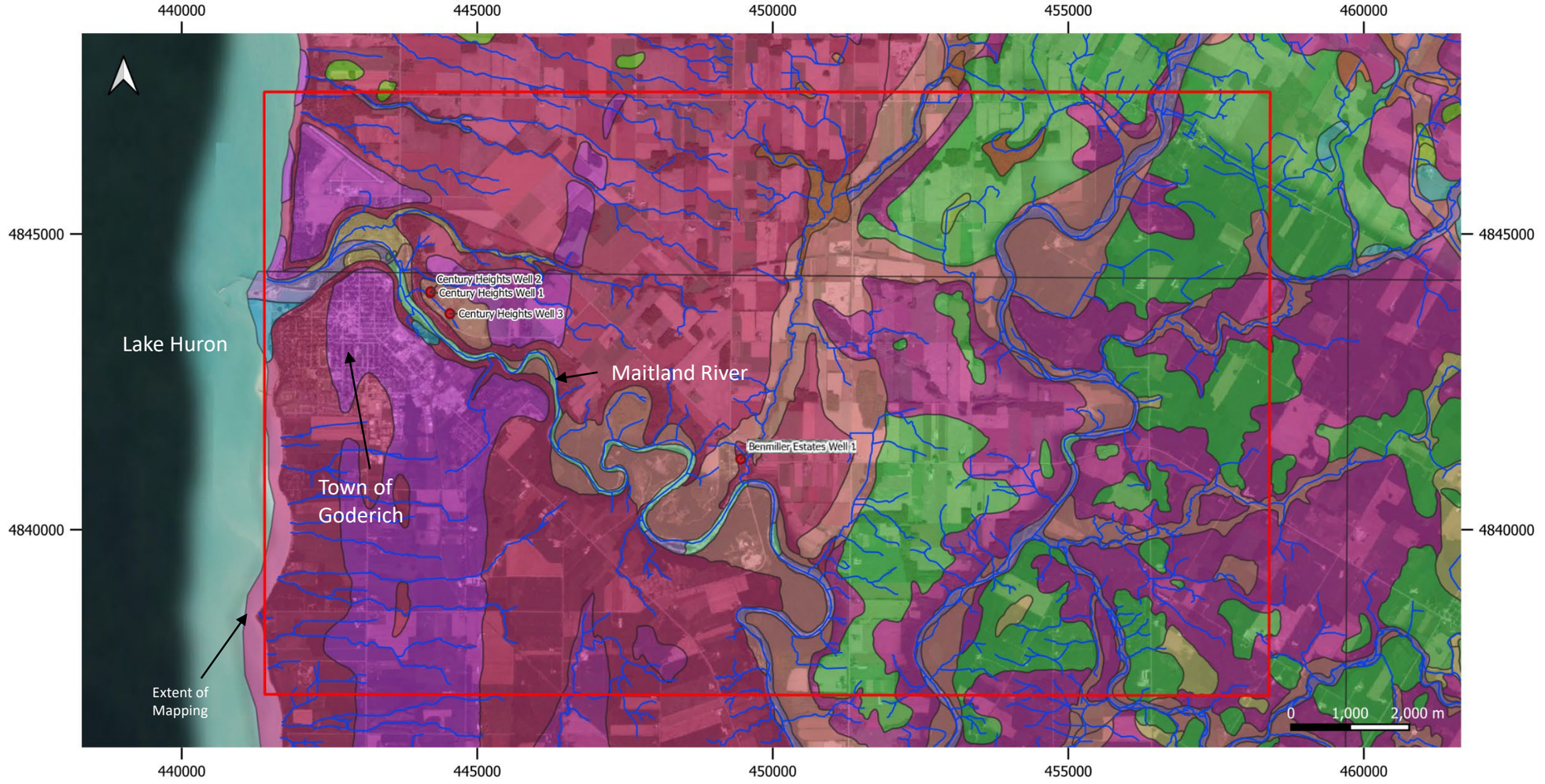
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Top of Bedrock Surface (WWIS Bedrock Pick Interpolation – m asl)

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 3



- Pumping Wells
- Model Domain Boundary
- Watercourse

Mapped Surficial Geology (Ontario Geologic Survey)

- Anthropogenic deposits
- Bedrock
- Glaciolacustrine shallow water deposits
- Elma Till
- Glaciofluvial outwash deposits
- Glaciolacustrine deep water deposits
- Ice-contact stratified drift
- Lacustrine
- Modern alluvium
- Older alluvium
- Organic deposits
- Rannoch Till
- St. Joseph Till

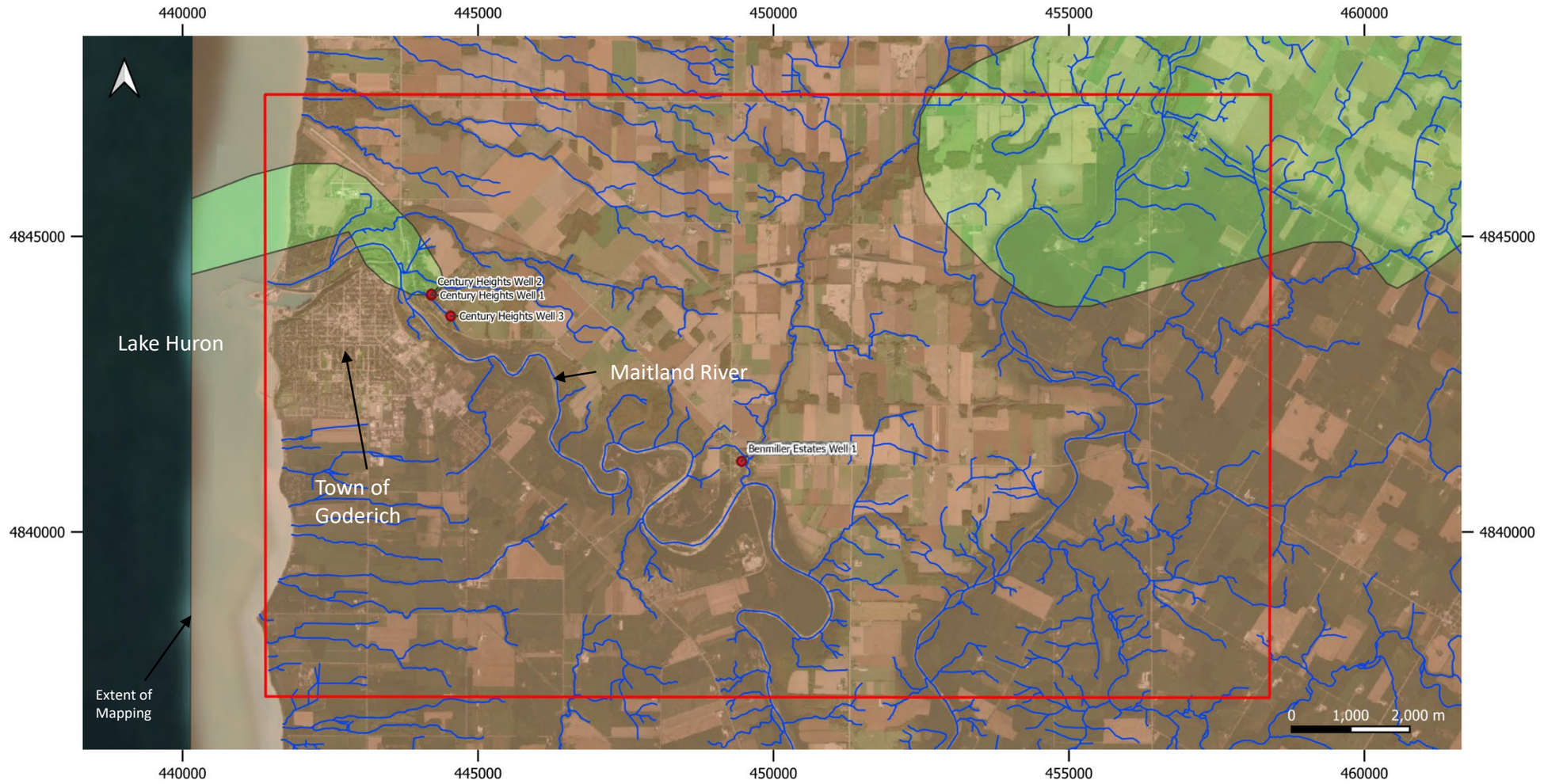
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Mapped Surficial Geology (Ontario Geological Survey)

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 4



- Pumping Wells
- Model Domain Boundary
- Watercourse

Mapped Bedrock Surface Geology (OGS)

- Detroit River Group; Onondaga Formation
- Dundee Formation

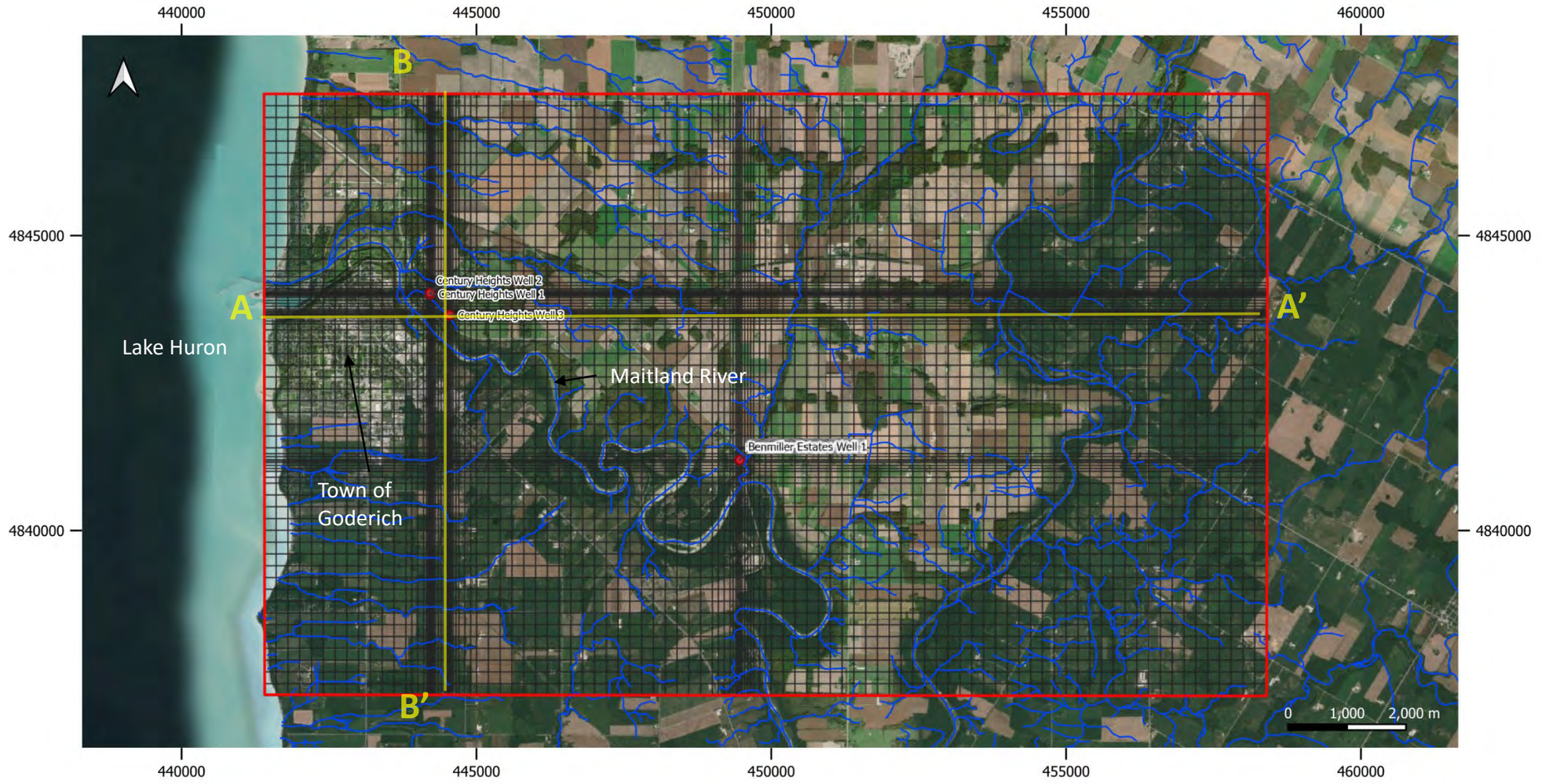
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Bedrock Surface Geology (Ontario Geological Survey)

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 5



- Pumping Wells
- Model Domain Boundary
- Model Grid from Visual MODFLOW
- Watercourse

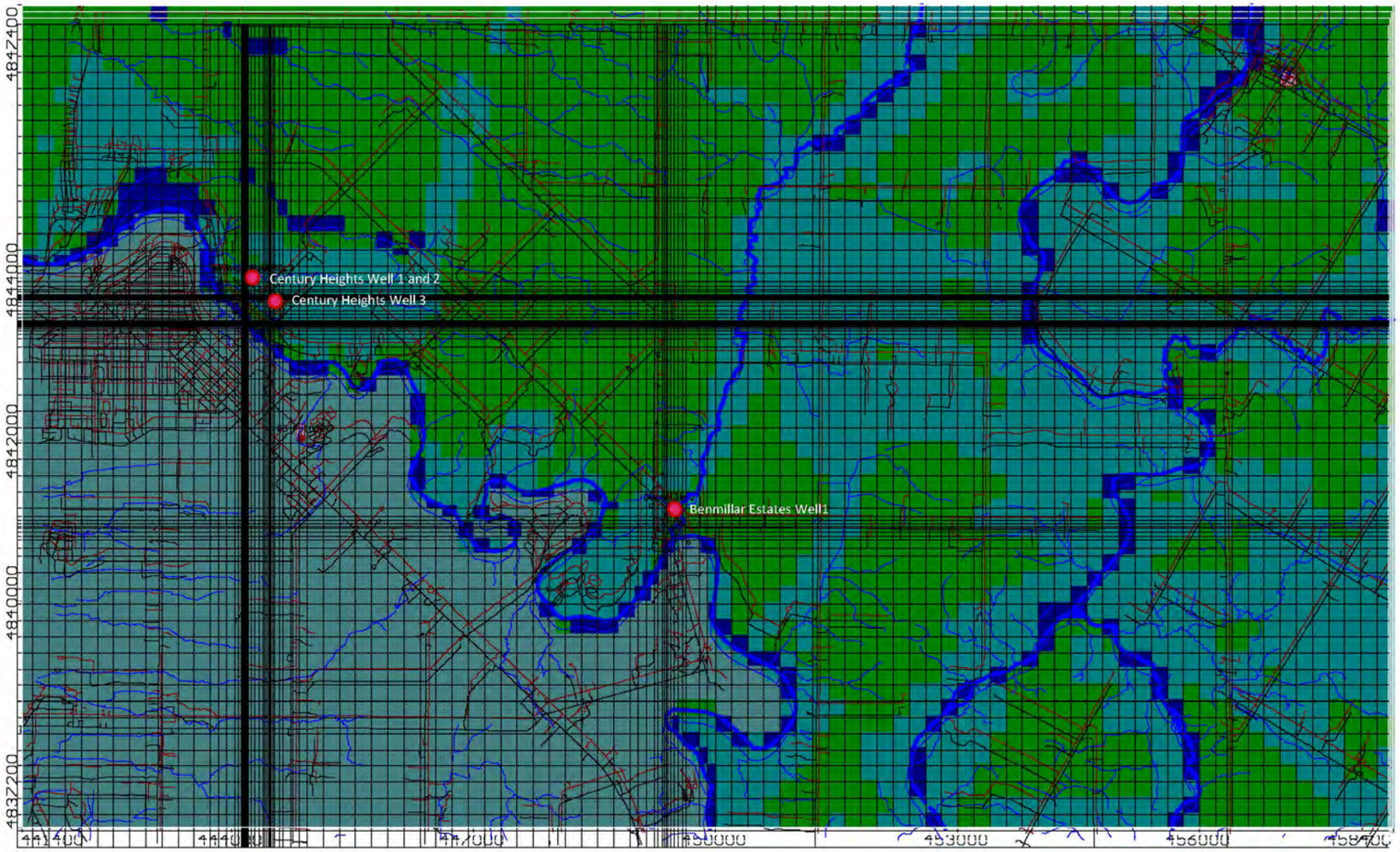
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Model Domain and Grid

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 6



- Clay or Peat
- Sand and Gravel
- Silt Till
- Bedrock Contact Zone
- Dundee Formation
- Detroit River Group

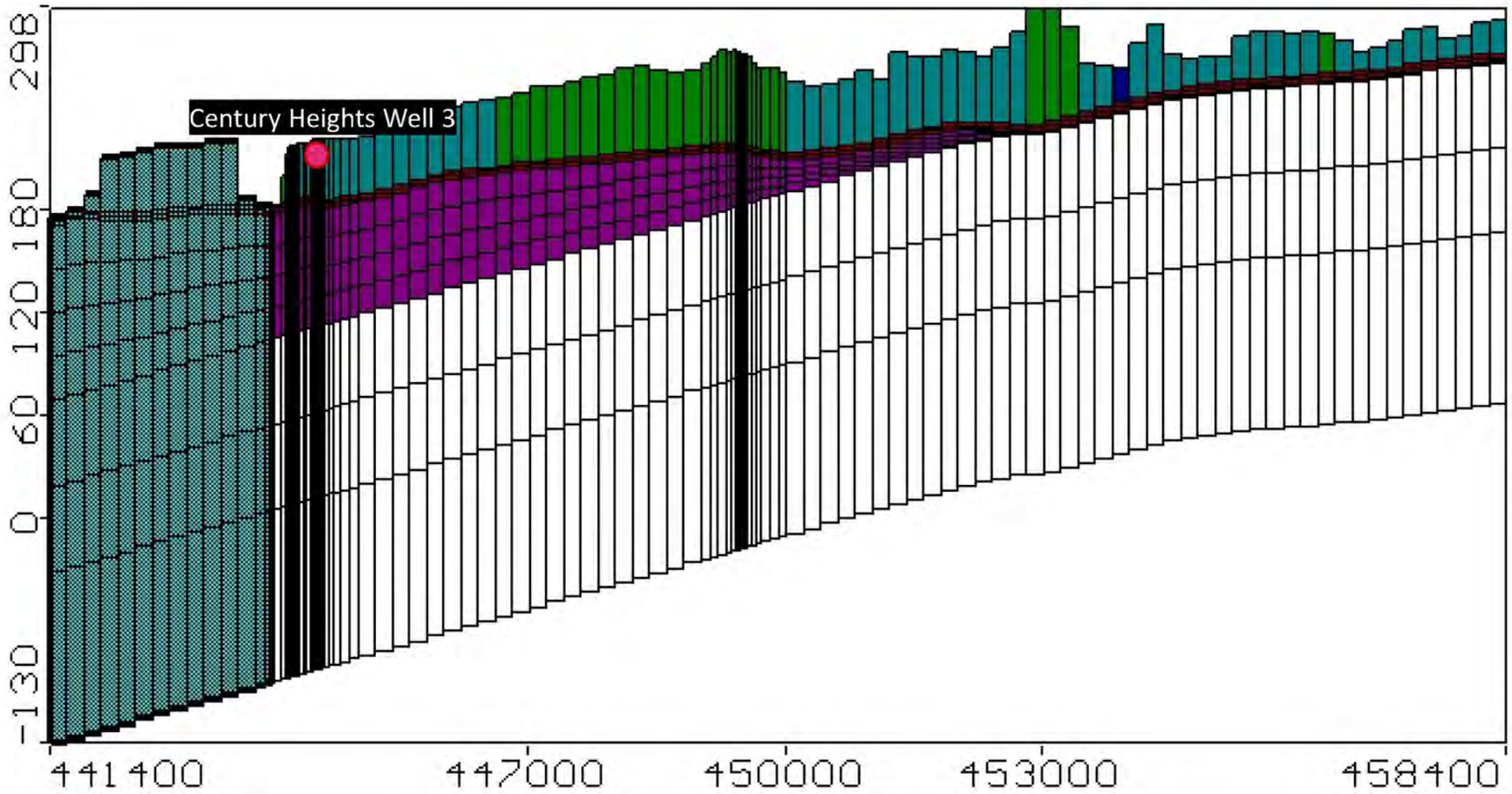
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Layer 1 Model Hydraulic Conductivity Zones

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 7



- Clay or Peat
- Sand and Gravel
- Silt Till
- Bedrock Contact Zone
- Dundee Formation
- Detroit River Group

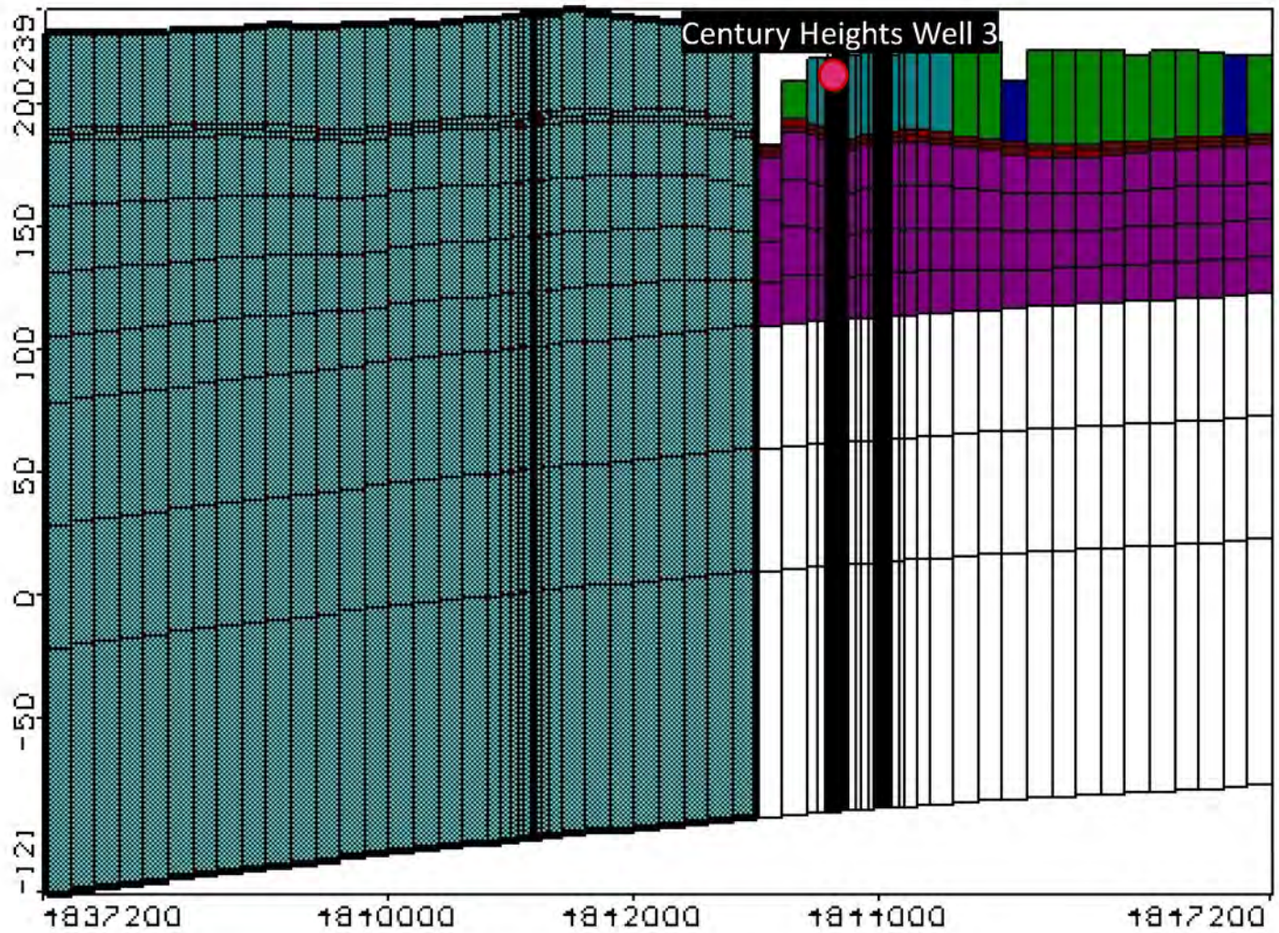
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Regional Cross-section A-A'

Date	Project	Submitter	Reviewer
November 2023	35869	H. Hecky	D. Van Vliet

Figure 8



- Clay or Peat
- Sand and Gravel
- Silt Till
- Bedrock Contact Zone
- Dundee Formation
- Detroit River Group

Matrix Solutions Inc.
A Montrose Environmental Company

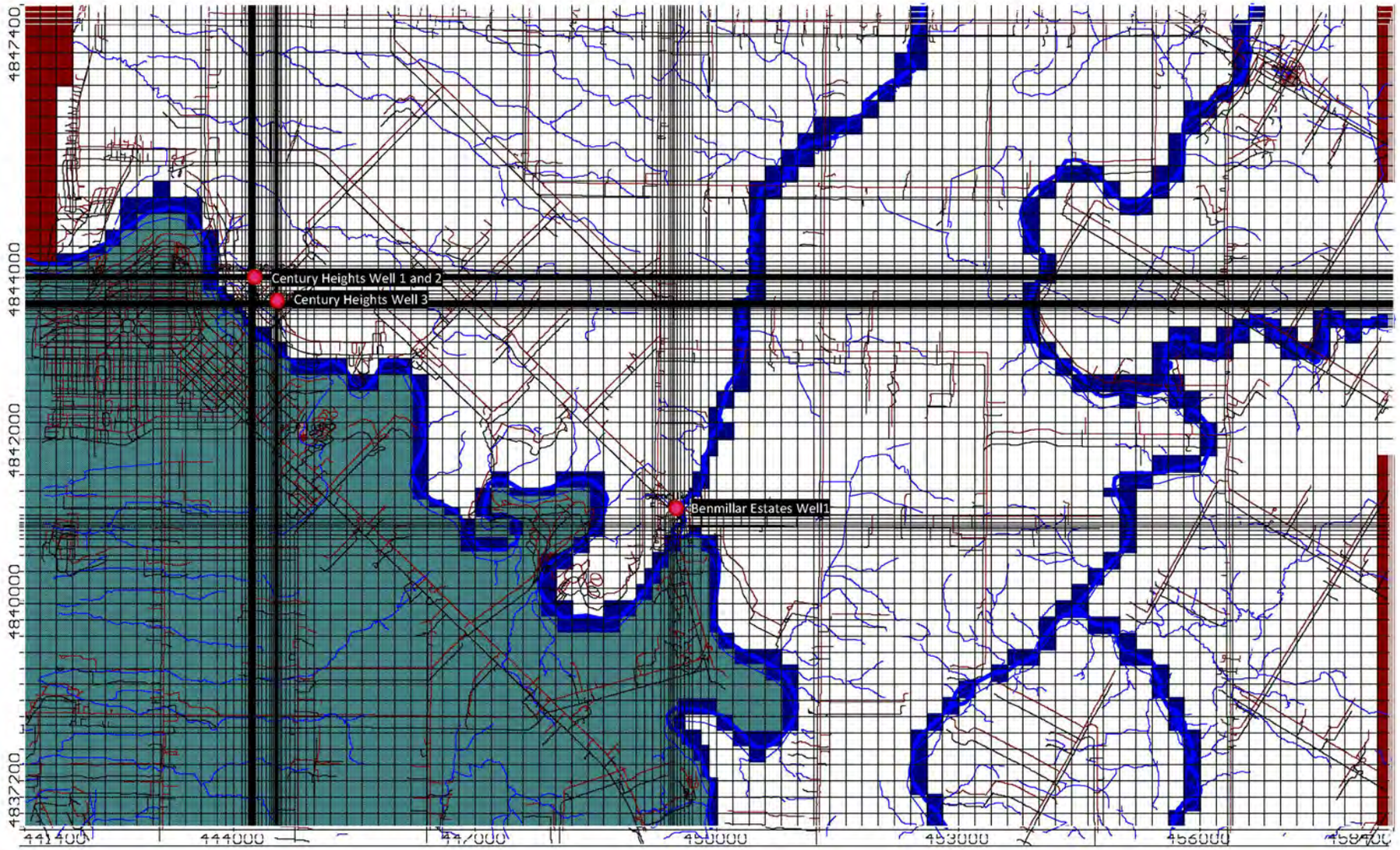
Century Heights Well 3
WHPA Delineation

Regional Cross-section B-B'

Date	Project	Submitter	Reviewer
November 2023	35869	H. Hecky	D. Van Vliet

Figure 9

176 m asl



274 m asl

275 m asl

No Flow Boundary
River Boundary
Constant Head Boundary

Matrix Solutions Inc.
A Montrose Environmental Company

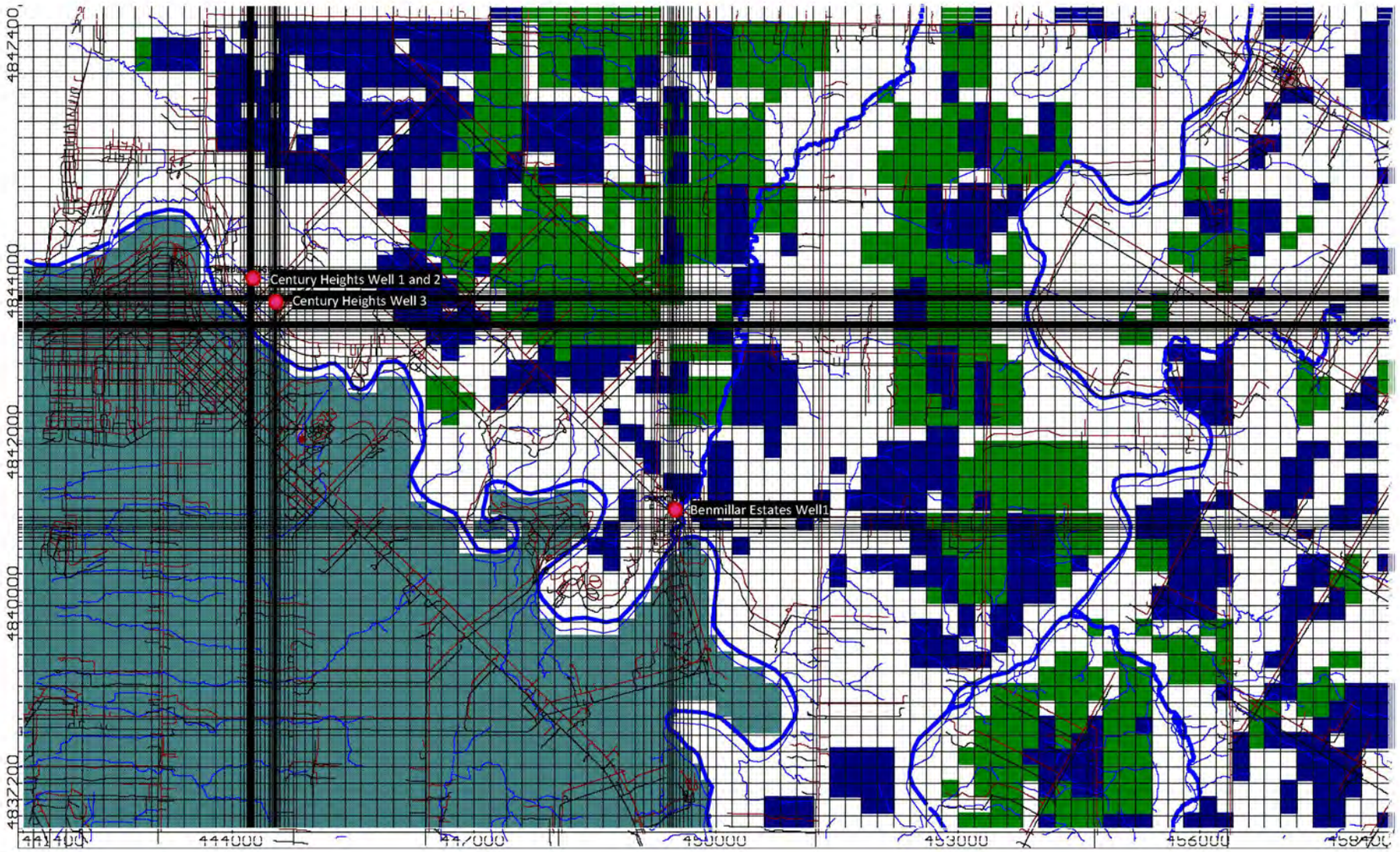
Century Heights Well 3
WHPA Delineation

Model Boundary Conditions

Date	Project	Submitter	Reviewer
November 2023	35869	H. Hecky	D. Van Vliet

Figure 10

f:\drafting department\software\powerpoint\figure ela - legal landscape.potm



50 mm/year
5 mm /year (tile drains)
5 mm/year (organized tile drains

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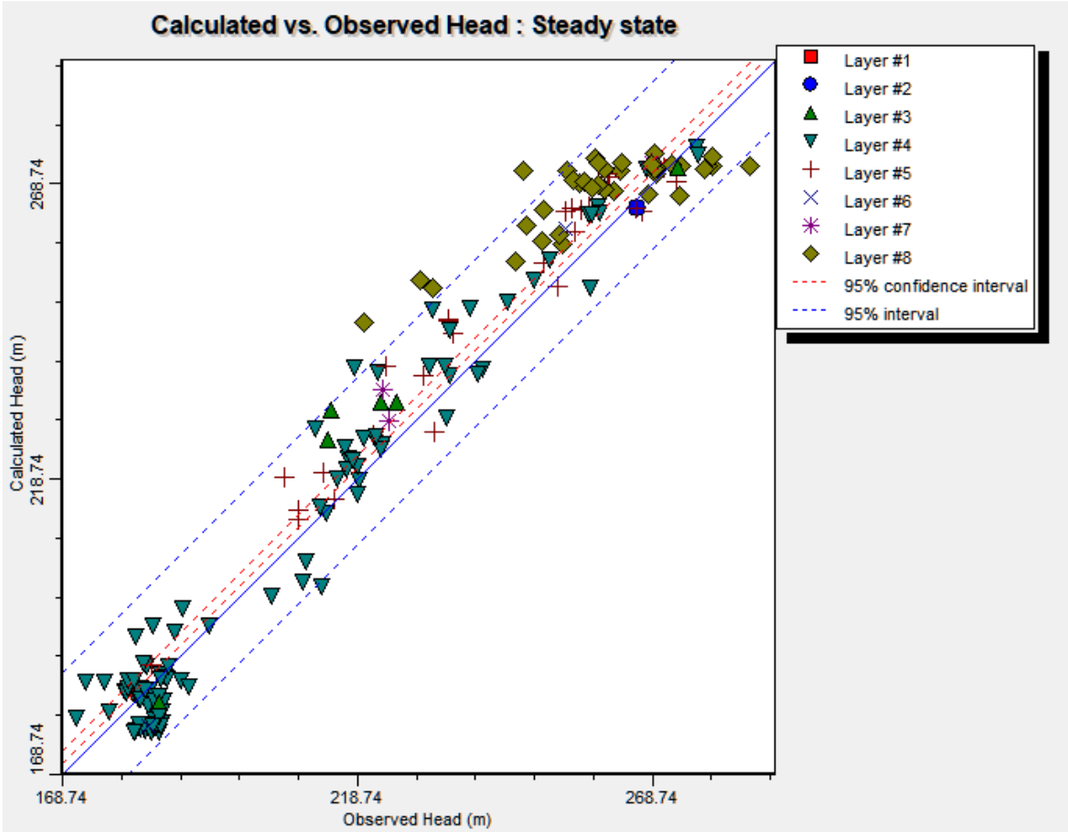
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Layer 1 Model Recharge Conditions

Date	Project	Submitter	Reviewer
November 2023	35869	H. Hecky	D. Van Vliet

Figure 11



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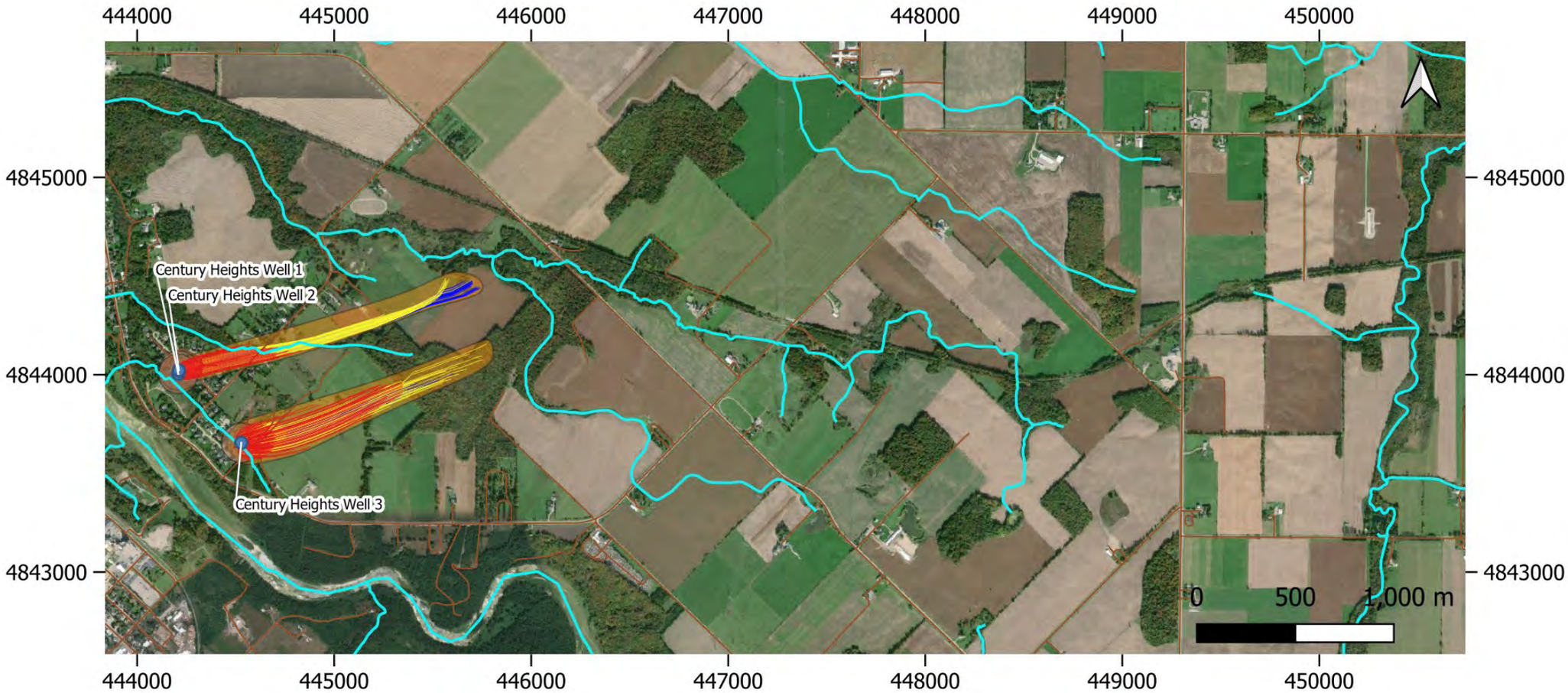
Century Heights Well 3
WHPA Delineation

Steady State Calibration Scatter Plot

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 12



- 2 Year Base Case Scenario
- 2 Year Uncertainty Scenario 1
- 2 Year Uncertainty Scenario 2
- WHPA-A: 100 m
- WHPA-B: 2 Year
- Century Heights pumping wells
- Roads
- Watercourse

Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

2-year Backwards Particle Tracks from Century Heights Wells

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 13

5 Year Base Case Scenario
5 Year Uncertainty Scenario 1
5 Year Uncertainty Scenario 2
WHPA-A: 100 m
WHPA-C: 5 Year
Century Heights pumping wells
Roads
Watercourse

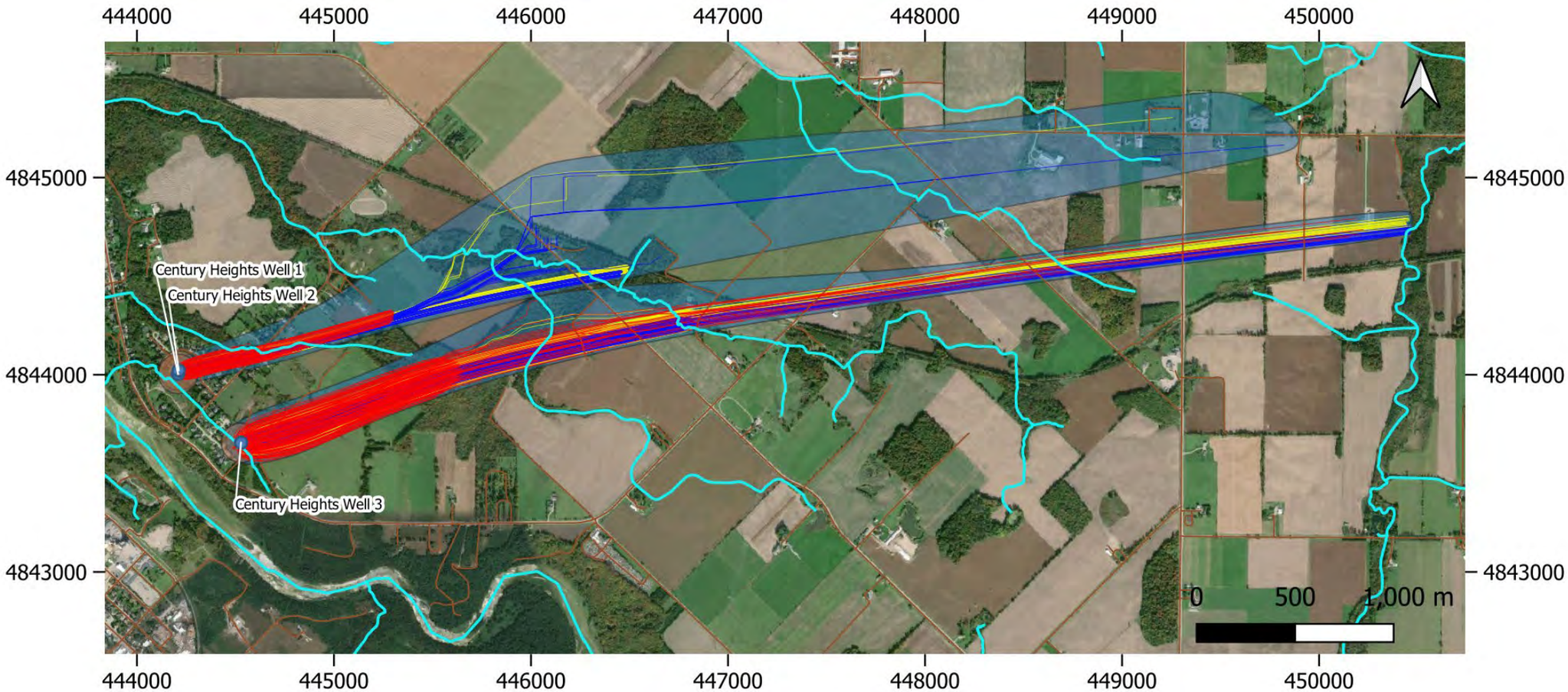
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

5-year Backwards Particle Tracks from Century Heights Wells

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 14



25 Year Base Case Scenario
25 Year Uncertainty Scenario 1
25 Year Uncertainty Scenario 2
WHPA-A: 100 m
WHPA-D: 25 Year
Century Heights pumping wells
Roads
Watercourse

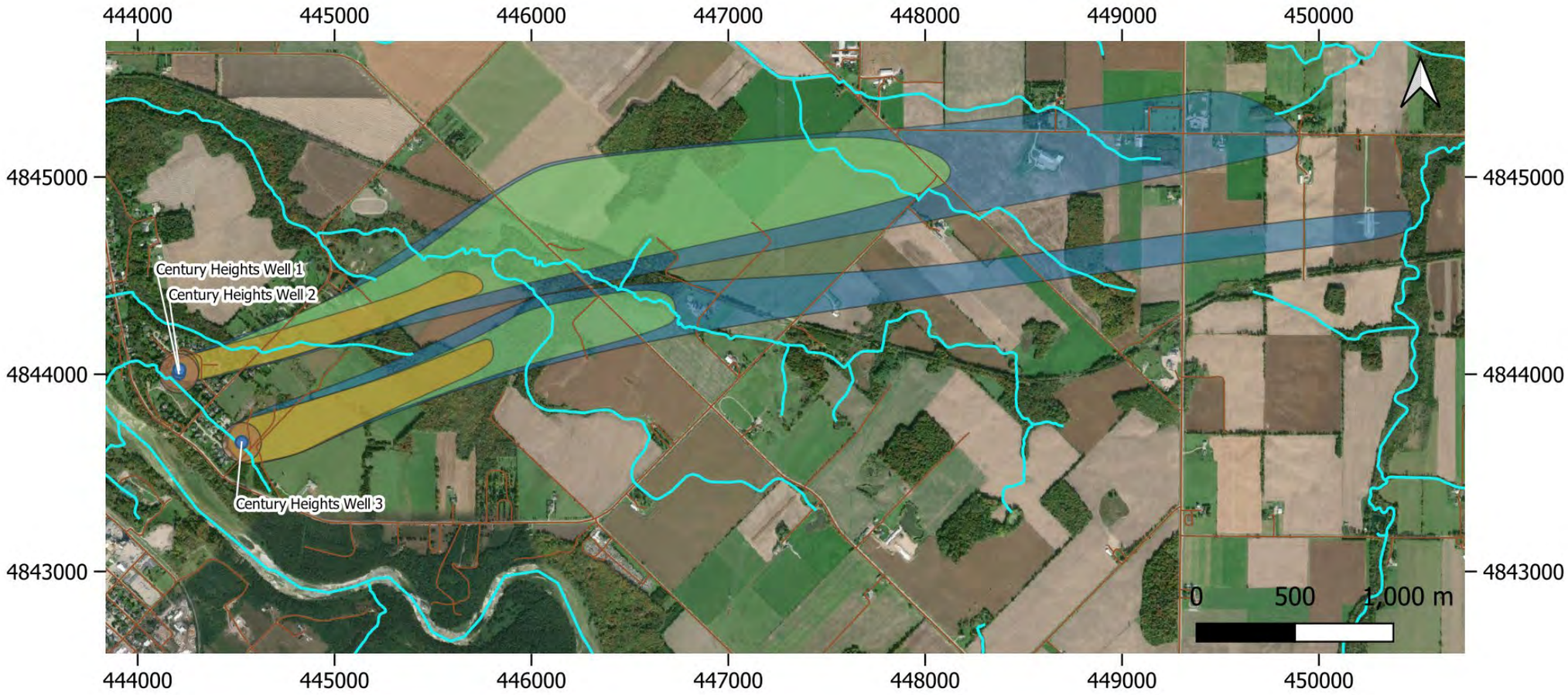
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

25-year Backwards Particle Tracks from Century Heights Wells

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 15



- WHPA-A: 100 m
- WHPA-B: 2 Year
- WHPA-C: 5 Year
- WHPA-D: 25 Year
- Century Heights pumping wells
- Roads
- Watercourse

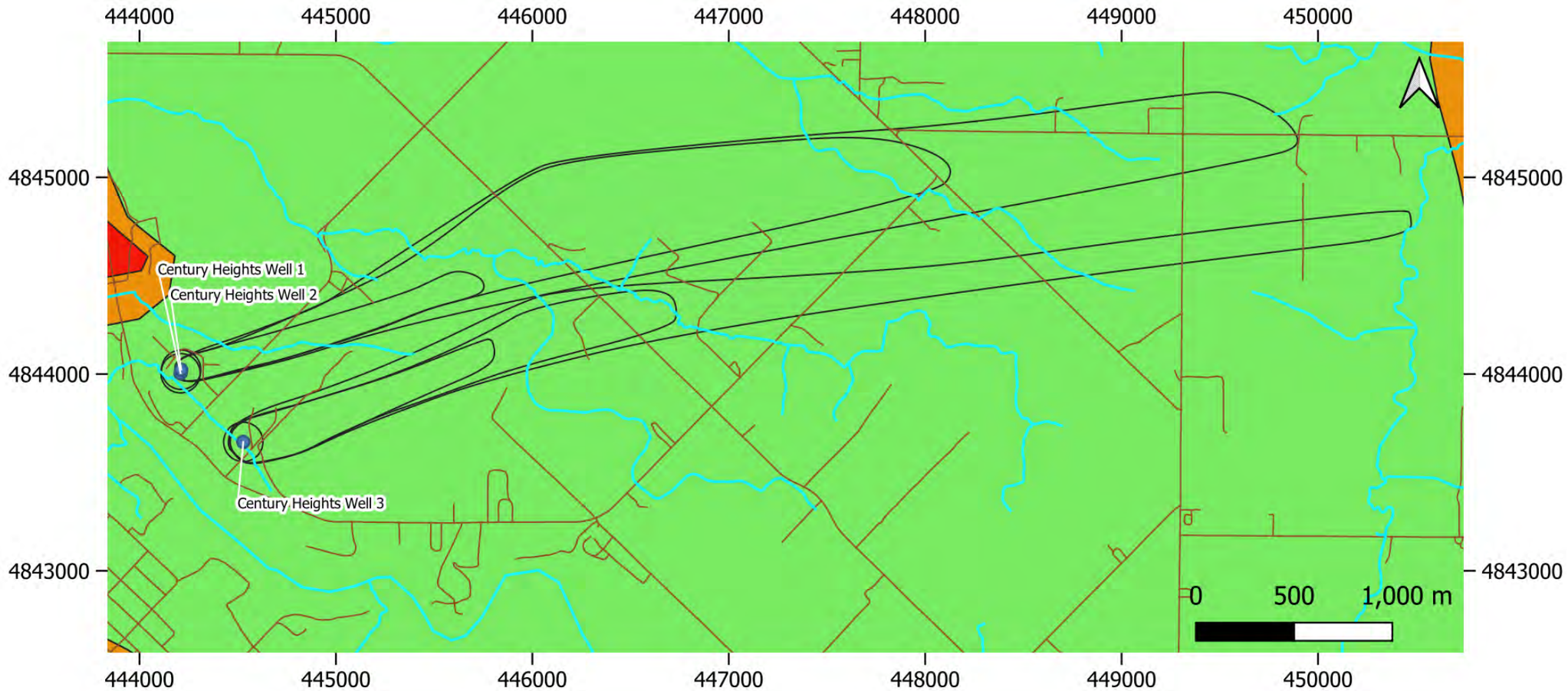
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Draft Wellhead Protection Areas

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 16



WHPAs

Intrinsic Susceptibility Index

- High
- Med
- Low

- Century Heights pumping wells
- Roads
- Watercourse

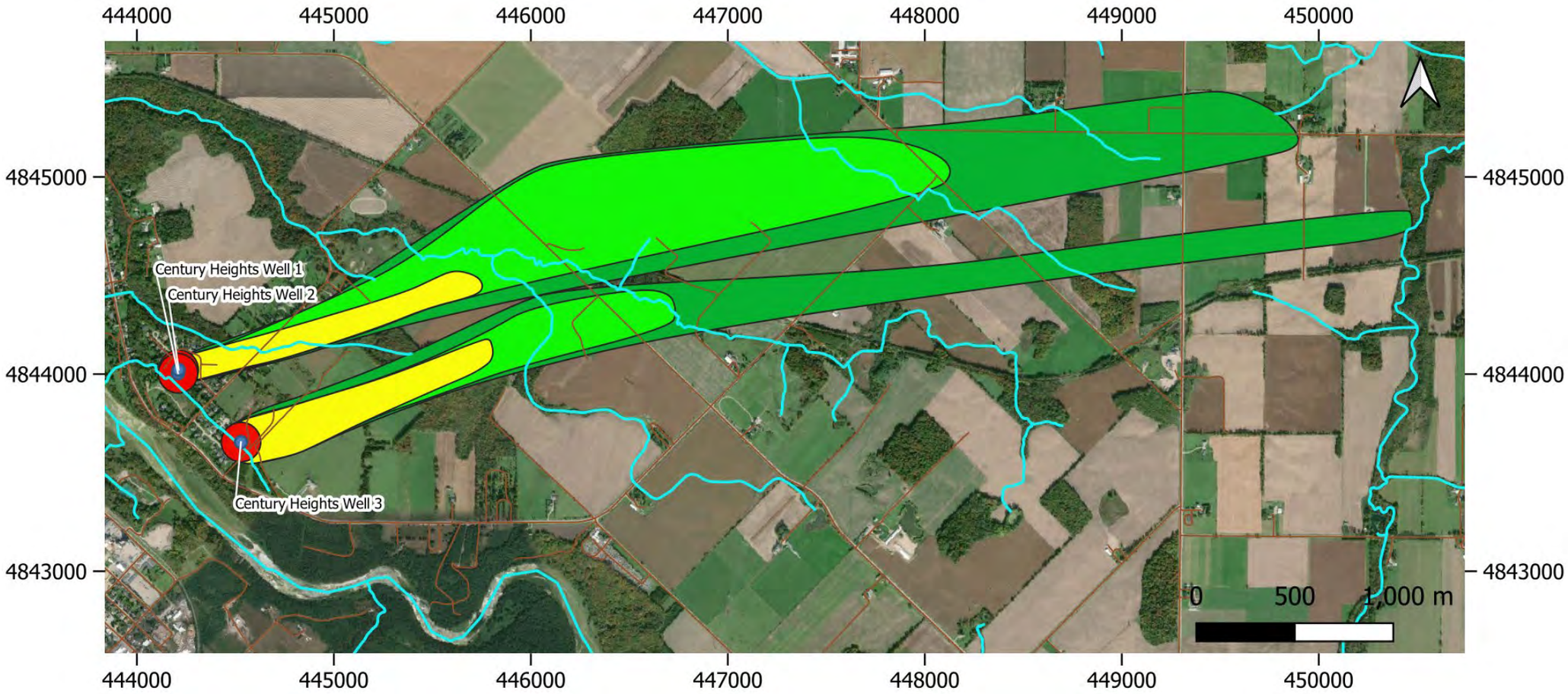
Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Existing Aquifer Vulnerability

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 17



Adjusted Vulnerability Score

- 10
- 8
- 6
- 4
- 2

- Century Heights pumping wells
- Roads
- Watercourse

Matrix Solutions Inc.
A Montrose Environmental Company

Century Heights Well 3
WHPA Delineation

Draft Well Vulnerability Scoring

Date:	Project:	Submitter:	Reviewer:
November 2023	35869	H. Hecky	D. Van Vliet

Figure 18

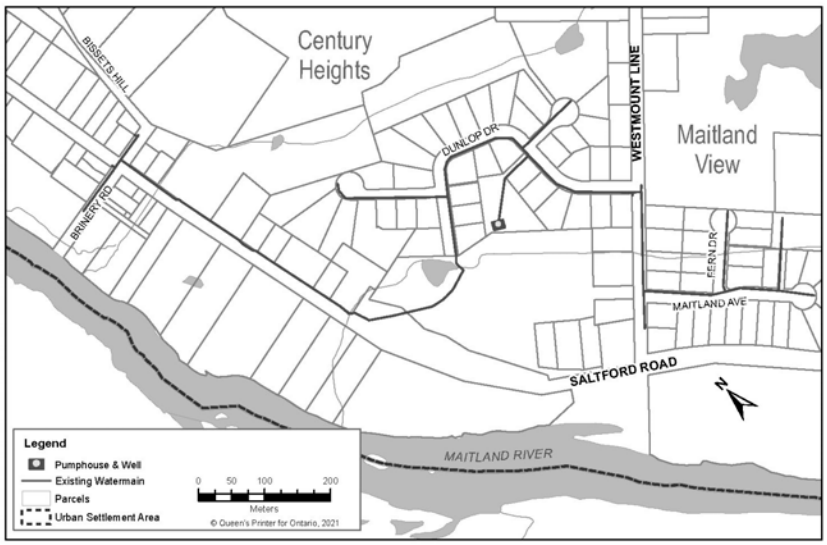
Appendix D

Consultation Materials

TOWNSHIP OF
ASHFIELD-COLBORNE-WAWANOSH

TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT FOR EXPANSION OF THE CENTURY HEIGHTS DRINKING WATER SYSTEM

NOTICE OF COMMENCEMENT



THE PROJECT:

The Township of Ashfield-Colborne-Wawanosh has initiated a Municipal Class Environmental Assessment (MCEA) process to investigate the expansion of the Century Heights Drinking Water System in the community of Saltford (see attached key plan). The current system services 84 properties from a groundwater supply. The expansion of the existing drinking water system is required to accommodate future development within the urban settlement area. The MCEA will investigate options with respect to increasing the existing drinking water supply and expanding the distribution system.

THE ENVIRONMENTAL SCREENING PROCESS:

The planning for this project is following the environmental screening process set out for Schedule B activities under the MCEA process. The purpose of the screening process is to identify potential environmental impacts associated with the project and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders, First Nation and Métis communities, and government review agencies.

PUBLIC INVOLVEMENT:

Public input and comments are invited for incorporation into the planning and design of this project. Initial comments are welcomed and will be received until **April 8, 2022**. Comments may be provided to the study team at B. M. Ross and Associates (contact information below). Any comments collected in conjunction with the study, 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.

For further information on this project, or to review the Municipal Class EA process, 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).

Brett Pollock, Chief Building Official
Township of Ashfield-Colborne-Wawanosh

This Notice issued March 9, 2022

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. 21285

March 9, 2022

Review Agency
(See attached list)

RE: Township of Ashfield-Colborne-Wawanosh
Municipal Class EA for Expansion of Century Heights Drinking Water System

The Township of Ashfield-Colborne-Wawanosh has initiated a Municipal Class Environmental Assessment (MCEA) process to investigate the expansion of the Century Heights Drinking Water System in the community of Saltford (see attached key plan). The current system services 84 properties from a groundwater supply. The expansion of the existing drinking water system is required to accommodate future development within the urban settlement area. The MCEA will investigate options with respect to increasing the existing drinking water supply and expanding the distribution system.

The planning for this project is following the environmental screening process established for Schedule 'B' activities under the MCEA document. Schedule B projects are approved subject to the completion of a screening process. The purpose of the Environmental Assessment process is to identify any potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders, Aboriginal communities, and review agencies.

Your organization has been identified as possibly having an interest in the project and we are soliciting your input. Please forward your response to our office by April 8, 2022. 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.

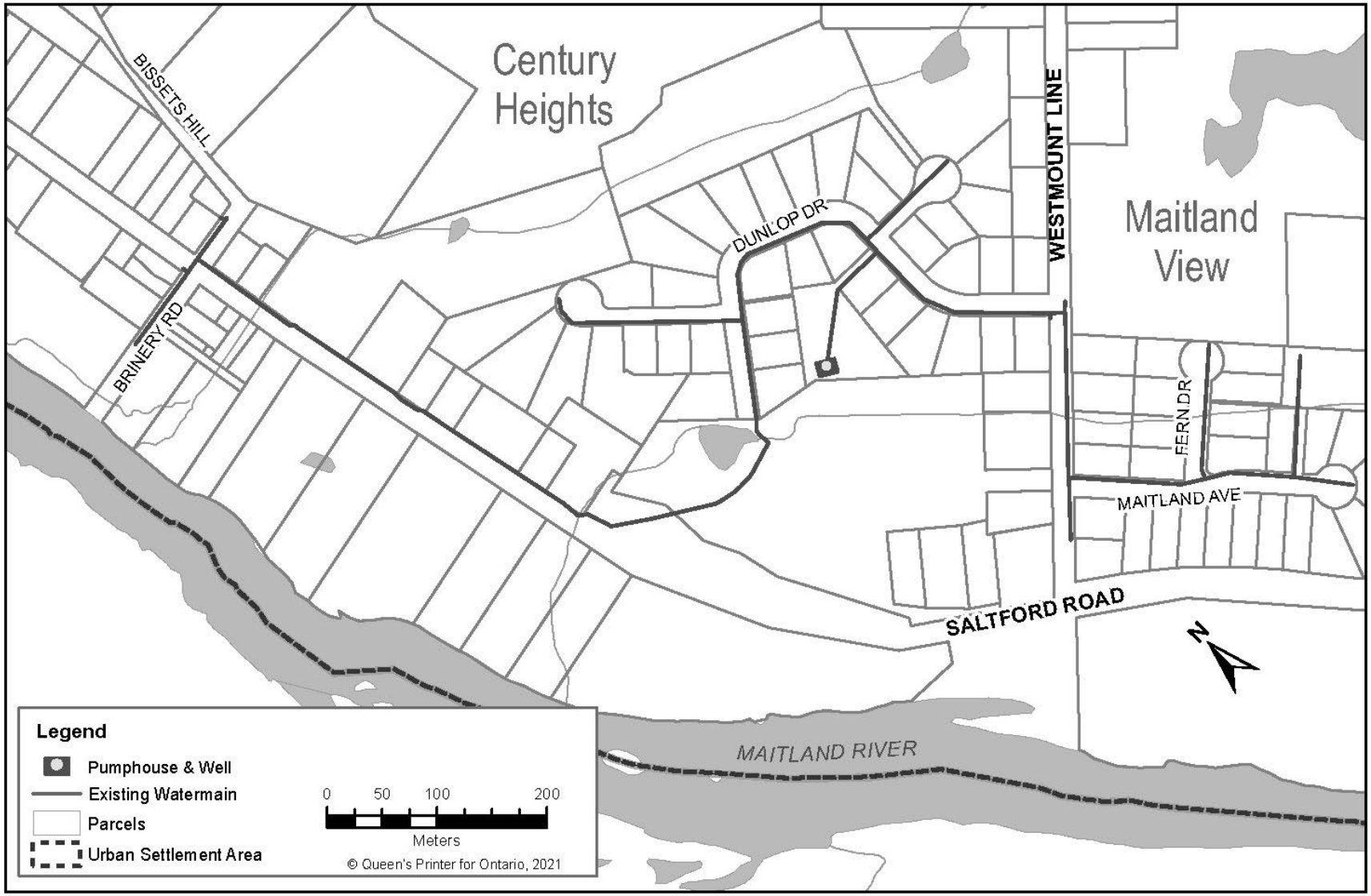
Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Lisa Courtney, MSc., MCIP, RPP
Environmental Planner

cc. Brett Pollock, Township of Ashfield-Colborne-Wawanosh

Figure 1: Key Plan Showing Current Extent of Century Heights Water System



TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH

CLASS ENVIRONMENTAL ASSESSMENT FOR
EXPANSION OF CENTURY HEIGHTS DRINKING WATER SYSTEM
REVIEW AGENCY CIRCULATION LIST

REVIEW AGENCY	CONTACT METHOD	ADDRESS & EMAIL	INVOLVEMENT
Ministry of Environment, Conservation and Parks	Email agency letter and site map.	Mark Badali, Regional Environmental Planner (REP)- Southwest Region Email: Mark.Badali1@ontario.ca South West Region Ministry Regional Office Email: eanotification.swregion@ontario.ca	Mandatory Contact
Ministry of Natural Resources and Forestry Guelph	Email agency letter and site map.	Karina Cerniavskaja, District Planner Email: Karina.Cerniavskaja@ontario.ca	Potential Impact on Natural Features
Ministry of Heritage, Sport, Tourism and Culture Industries (MHSTCI)	Email agency letter and site map.	Karla Barboza, Team Lead – Heritage (Acting) Email: karla.barboza@ontario.ca	Potential Impacts on Heritage, Sport, Tourism and Culture
County of Huron - Administration Department, - Planning & Development Department	Email agency letter and site map.	Administration and CAO's Office 1 Courthouse Square Goderich, ON N7A 1M2 huronadmin@huroncounty.ca Planning 57 Napier Street, 2nd Floor Goderich, ON N7A 1W2 519.524.8394 ext. 3 planning@huroncounty.ca	Project within County
Town of Goderich	Email agency letter and site map.	Administration Amanda Piskorski, Administrative Assistant to CAO and Clerk Email: apiskorski@goderich.ca	Adjacent to Township
Township of Ashfield-Colborne-Wawanosh	Email agency letter, agency list and site map.	Brett Pollock, Chief Building Official Email: cbo@acwtownship.ca	Proponent
Maitland Valley Conservation Authority	Email agency letter and site map.	Kirsten Snoek, Planning and Regulations Assistant Email: planningassistant@mvca.on.ca	Potential Impact on Natural Features
Ausable Bayfield Maitland Valley Source Protection	Email agency letter and site map	mmacdonald@abca.on.ca dclarkson@sourcewaterinfo.on.ca	Potential Impact on Source Water

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. 21285

March 9, 2022

Aboriginal Community
(see attached list)

RE: Township of Ashfield-Colborne-Wawanosh
Class EA for Expansion of Century Heights Drinking Water System

The Township of Ashfield-Colborne-Wawanosh has initiated a Municipal Class Environmental Assessment (MCEA) process to investigate the expansion of the Century Heights Drinking Water System in the community of Saltford (see attached key plan). The current system services 84 properties from a groundwater supply. The expansion of the existing drinking water system is required to accommodate future development within the urban settlement area. The MCEA will investigate options with respect to increasing the existing drinking water supply and expanding the distribution system.

The planning for this project is following the environmental screening process established for Schedule 'B' activities under the MCEA document. Schedule B projects are approved subject to the completion of a screening process. The purpose of the Environmental Assessment process is to identify any potential environmental impacts associated with the proposal and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders, Aboriginal communities, and review agencies.

Your community has been identified as possibly having an interest in this project and we are seeking your input. Please forward your response to our office by April 25,2022. 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.

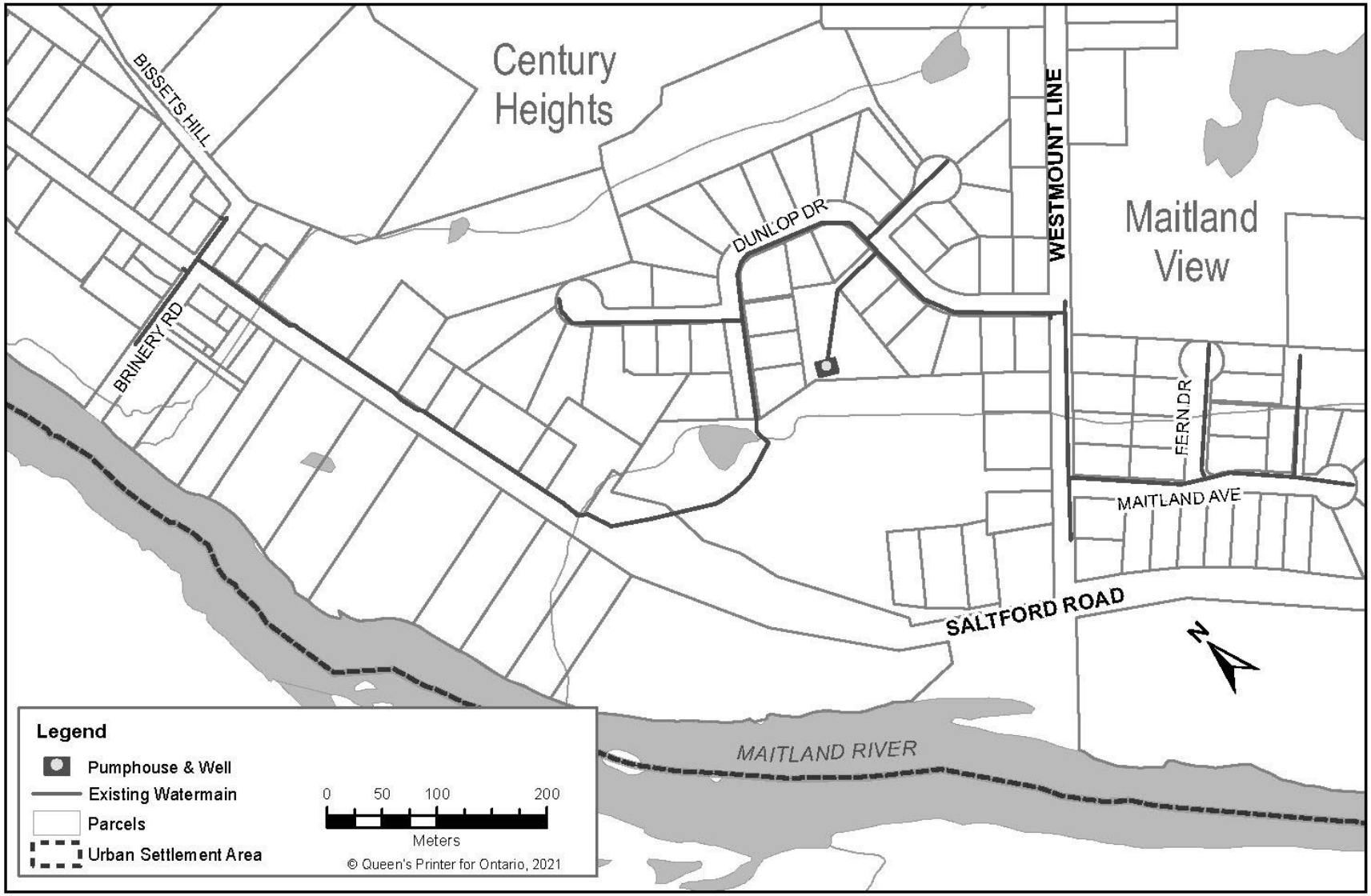
Yours very truly

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Lisa Courtney, MSc., MCIP, RPP
Environmental Planner

cc. Brett Pollock, Township of Ashfield-Colborne-Wawanosh

Figure 1: Key Plan Showing Current Extent of Century Heights Water System



TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH

CLASS ENVIRONMENTAL ASSESSMENT FOR
EXPANSION OF CENTURY HEIGHTS DRINKING WATER SYSTEM
FIRST NATION CIRCULATION LIST

COMMUNITY	CONTACT METHOD	ADDRESS & EMAIL
Chippewas of Kettle and Stony Point First Nation	Email Indigenous Community letter and location plan.	Chief Jason Henry Email: Jason.Henry@kettlepoint.org Valerie George Email: Valerie.George@kettlepoint.org Address: 6247 Indian Lane Lambton Shores, ON N0N 1J2
Chippewas of Nawash Unceded First Nation	Email Indigenous Community letter and location plan.	Chief Veronica Smith Email: chief.veronica@nawash.ca Address: 135 Lakeshore Blvd., Neyaashiinigmiing, ON N0H 2T0
Chippewas of Saugeen First Nation	Email Indigenous Community letter and location plan.	Chief Lester Anoquot Email: sfn@saugeen.org Address: 6493 Highway 21, R.R. #1 Southampton, ON N0H 2L0
Saugeen Ojibway Nation (SON) – Chippewas of Saugeen & Chippewas of Nawash	Email Indigenous Community letter and location plan.	Emily Martin, Infrastructure and Resources Manager Email: emily.martin@saugeenojibwaynation.ca Address: 25 Maadookii Subdivision Neyaashiinigmiing, ON N0H 2T0
Historic Saugeen Métis	Email Indigenous Community letter and location plan.	Email: saugeenmetis@bmts.com Chris Hachey Email: hsmlrcc@bmts.com Address: 204 High Street Southampton, ON N0H 2L0
Métis Nation of Ontario	Email Indigenous Community letter and location plan.	Email: info@mnoregistry.ca Address: Suite 1100 – 66 Slater Street Ottawa, ON K1P 5H1
Great Lakes Métis Council	Email Indigenous Community letter and location plan.	Peter Coture, President Email: peterc1908@hotmail.com Address: 380 9th Street East Owen Sound, ON N4K 1P1
Aamjiwnaang First Nation Administration Office	Email Indigenous Community letter and location plan.	Sharilyn Johnston, Environmental Coordinator Email: sjohnston@aamjiwnaang.ca Address: 978 Tashmoo Ave. Sarnia, ON N7T 7H5
Walpole Island First Nation, Bkejwanong Territory	Mail Indigenous Community letter and location plan.	Dean Jacobs, Consultation Manager Email: dean.jacobs@wifn.org Address: 117 Tahgahoning Rd. Wallaceburg, ON N8A 4K9
Chippewas of the Thames	Online through NationsConnect.cA	
Oneida of the Thames	Mail Indigenous Community letter and location plan	2212 Elm Ave., Southwold, Ontario N0L 2G0

Response Form

Project Name: Class EA for Expansion of Century Heights Drinking Water System

Project Description: The Township of Ashfield-Colborne-Wawanosh is investigating the expansion of the Century Heights Drinking Water System to accommodate new development.

Project Location: Saltford, in the Township of Ashfield-Colborne-Wawanosh

Please Detach and Return in Envelope Provided

Name of Aboriginal Community: _____

Please check appropriate box:

☐ **Please send additional information on this project**

☐ **We would like to meet with representatives of this project**

☐ **We have no concerns with this project and do not wish to be consulted further**

Project Name: Class EA for Expansion of Century Heights Drinking Water System

Location: Township of Ashfield-Colborne-Wawanosh

Lisa Courtney

From: Patrick Huber-Kidby <phuber-kidby@mvca.on.ca>
Sent: March 16, 2022 10:22 AM
To: lcourtney@bmross.net
Cc: Celina Whaling-Rae; Anna Soleski; Kirsten Snoek
Subject: Class EA - Century Heights Drinking Water System
Attachments: 21285-2022-03-09-MVCA Let.pdf

Lisa,

At this time MVCA would be happy to provide mapping related to our regulated areas around Saltford. I understand a great deal of background Hydrogeological investigation is underway or has already been completed (Ian D. Wilson & Associates Ltd.) for the Township. Celina, please advise if I have not captured the previous work done accurately in this statement.

We have no other comments at this time but look forward to discussing the details of this project.

Sincerely,

Patrick Huber-Kidby
Maitland Valley Conservation Authority
Phone: (519) 335-3557 x 237 **Fax:** (519) 335-3516
Mail: 1093 Marietta St. Box 127, Wroxeter, ON. N0G 2X0

Ministry of Heritage, Sport, Tourism and Culture Industries

Programs and Services Branch
400 University Ave, 5th Flr
Toronto, ON M7A 2R9
Tel: 613.242.3743

Ministère des Industries du Patrimoine, du Sport, du Tourisme et de la Culture

Direction des programmes et des services
400, av. University, 5e étage
Toronto, ON M7A 2R9
Tél: 613.242.3743

Ontario

April 1, 2022 EMAIL ONLY

Lisa J. Courtney
Environmental Planner
B. M. Ross and Associates Limited
Engineers and Planners
62 North Street
Goderich, ON N7A 2T4
lcourtney@bmross.net

MHSTCI File	**:**	**0016172**
Proponent	**:**	**Township of Ashfield-Colborne-Wawanosh**
Subject	**:**	**Notice of Commencement – MCEA Schedule B**
Project	**:**	**Expansion of Century Heights Drinking Water System**
Location	**:**	**Township of Ashfield-Colborne-Wawanosh**

Dear Lisa J. 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, which includes:

- archaeological resources, including land and marine;
- built heritage resources, including bridges and monuments; and
- cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on known (previously recognized) and potential cultural heritage resources.

Project Summary
The Township of Ashfield-Colborne-Wawanosh has initiated a Municipal Class Environmental Assessment (MCEA) process to investigate the expansion of the Century Heights Drinking Water System in the community of Saltford (see attached key plan). The current system services 84 properties from a groundwater supply. The planning for this project is following the environmental screening process established for Schedule 'B' activities under the MCEA document.

Identifying Cultural Heritage Resources
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation.

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 *Ontario Heritage Act (OHA)*, who is responsible for submitting the report directly to MHSTCI for review.

Built Heritage Resources and Cultural Heritage Landscapes

A Cultural Heritage Report: Existing Conditions and Preliminary Impact Assessment will be undertaken for the entire study area during the planning phase and will be summarized in the EA Report. This study will:

1. Describe the existing baseline cultural heritage conditions within the study area by identifying all known or potential built heritage resources and cultural heritage landscapes, including a historical summary of the study area. MHSTCI has developed screening criteria that may assist with this exercise: *Criteria for Evaluating for Potential Built Heritage Resources and Cultural Heritage Landscapes*.

2. Identify preliminary potential project-specific impacts on the known and potential built heritage resources and cultural heritage landscapes that have been identified. The report should include a description of the anticipated impact to each known or potential built heritage resource or cultural heritage landscape that has been identified.

3. Recommend measures to avoid or mitigate potential negative impacts to known or potential built heritage resources and cultural heritage landscapes. The proposed mitigation measures are to inform the next steps of project planning and design.

Given that this project covers a large study area, MHSTCI recommends that the Cultural Heritage Report is carried out so that step 1 described above is undertaken early in the planning process. Then, steps 2 and 3 can be undertaken once the preferred alternatives have been selected.

Cultural Heritage Reports will be undertaken by a qualified person who has expertise, recent experience, and knowledge relevant to the type of cultural heritage resources being considered and the nature of the activity being proposed.

Community input should be sought to identify locally recognized and potential cultural heritage resources. Sources include, but are not limited to, municipal heritage committees, historical societies and other local heritage organizations.

Cultural heritage resources are often of critical importance to Indigenous communities. 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 them.

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

Ontario

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
Fax.: 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

March 30, 2022

Brett Pollock
Chief Building Official
Township of Ashfield-Colborne-Wawanosh
cbo@acwtownship.ca

Re: **Century Heights Drinking Water System**
Township of Ashfield-Colborne-Wawanosh
Municipal Class EA
Response to Notice of Commencement

Dear Brett Pollock,

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 Ashfield-Colborne-Wawanosh (proponent) has indicated that the study is following the approved environmental planning process for a Schedule B 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) First Nation;
- Chippewas of Kettle and Stony Point;
- Chippewas of the Thames First Nation;
- Chippewas of Nawash First Nation and Saugeen First Nation, which are represented by the Saugeen Ojibway Nation (SON) Environment Committee;
- Oneida Nation of the Thames;
- Métis Nation of Ontario- Lands and Resources Dept with a copy to Region 7 Councillor David Dusome

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 the 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 30 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 Planner – Southwest Region

Cc: John Ritchie, Manager, Owen Sound District Office, MECP
Lisa Courtney, Environmental Planner, B.M. Ross and Associates

Encl. 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.

Lisa Courtney

From: MNRF Ayl Planners (NDMNRF) <MNRF.Ayl.Planners@ontario.ca>
Sent: March 11, 2022 2:54 PM
To: Lisa Courtney
Subject: RE: 21285 - MCEA Initial Notice - Township of ACW Expansion of Century Heights Water System
Attachments: 21285-2022-03-09-MNRF Let.pdf; NHGuide_MNRF_2019-04-01.pdf

Ministry of Northern Development, Mines, Natural Resources and Forestry

Ministère du Développement du Nord, des Mines, des Richesses naturelles et des Forêts

Ontario

March 11, 2022

Subject: 21285 - MCEA Initial Notice - Township of ACW Expansion of Century Heights Water System

The Ministry of Northern Development, Mines, Natural Resources and Forestry (NDMNRF) received the notice for the Township of ACW Expansion of Century Heights Water System project. Thank you for circulating this information to our office, however, please note that we have not completed a screening of natural heritage or other resource values for the project at this time. Please also note that it is your responsibility to be aware of and comply with all relevant federal or provincial legislation, municipal by-laws or other agency approvals.

This response provides information to guide you in identifying and assessing natural features and resources as required by applicable policies and legislation, and engaging with the Ministry for advice as needed.

Natural Heritage & Endangered Species Act

In order to provide the most efficient service possible, the attached Natural Heritage Information Request Guide has been developed to assist you with accessing natural heritage data and values from convenient online sources.

It remains the proponent's responsibility to complete a preliminary screening for each project, to obtain available information from multiple sources, to conduct any necessary field studies, and to consider any potential environmental impacts that may result from an activity. We wish to emphasize the need for the proponents of development activities to complete screenings prior to contacting the Ministry or other agencies for more detailed technical information and advice.

The Ministry continues to work on updating data housed by Land Information Ontario and the Natural Heritage Information Centre, and ensuring this information is accessible through online resources. Species at risk data is regularly being updated. To ensure access to reliable and up to date information, please contact the Ministry of the Environment, Conservation and Parks at SAROntario@ontario.ca.

Petroleum Wells & Oil, Gas and Salt Resource Act

There may be petroleum wells within the proposed project area. Please consult the Ontario Oil, Gas and Salt Resources Library website (https://link.edgepilot.com/s/5b1e13f8/eDT8bf6lukq9tEYzByZ9_A?u=http://www.ogsrlibrary.com/) for the best known data on any wells recorded by NDMNRF. Please reference the 'Definitions and Terminology Guide' listed in the publications on the Library website in order to better understand the well information available. Any oil and gas wells in your project area are regulated by the *Oil, Gas and Salt Resource Act*, and the supporting regulations and operating standards. If any unanticipated wells are encountered during development of the project, or if the proponent has questions regarding petroleum operations, the proponent should contact the Petroleum Operations Section at POSRecords@ontario.ca or 519-873-4634.

Public Lands Act & Lakes and Rivers Improvement Act

Some projects may be subject to the provisions of the *Public Lands Act* or the *Lakes and Rivers Improvement Act*. Please review the information on NDMNRF's web pages provided below regarding when an approval is required or not. Please note that many of the authorizations issued under the *Lakes and Rivers Improvement Act* are administered by the local Conservation Authority.

- For more information about the *Public Lands Act*: https://link.edgepilot.com/s/0ed93a99/j46fshSYA0C-hplj5SCrtQ?u=https://www.ontario.ca/page/crown-land-work-permits
- For more information about the *Lakes and Rivers Improvement Act*: https://link.edgepilot.com/s/43b57603/-hngIYdr80ylPyqpv132XQ?u=https://www.ontario.ca/document/lakes-and-rivers-improvement-act-administrative-guide

After reviewing the information provided, if you have not identified any of NDMNRF's interests stated above, there is no need to circulate any subsequent notices to our office.

If you have any questions or concerns, please feel free to contact me.

Sincerely,
Karina

Karina Černiavskaja | District Planner
Ministry of Northern Development, Mines, Natural Resources and Forestry
MNRF.Ayl.Planners@ontario.ca

Ontario

As part of providing accessible customer service, please let me know if you have any accommodation needs or require communication supports or alternate formats.

From: Lisa Courtney <lcourtney@bmross.net>
Sent: March-10-22 1:38 PM

To: Cerniavskaja, Karina (NDMNRF) <Karina.Cerniavskaja@ontario.ca>
Subject: 21285 - MCEA Initial Notice - Township of ACW Expansion of Century Heights Water System

Hello,
The Township of Ashfield-Colborne-Wawanosh is initiating a Municipal Class Environmental Assessment to investigations related to expanding the Century Heights Drinking Water System that currently services the community of Saltford. Please find attached a letter outlining the project and project area. Should you have any questions or comments at this time, please do not hesitate to reach out.
Thanks and cheers,

Lisa J. Courtney, MSc., MCIP, RPP
B. M. Ross and Associates Limited
Engineers and Planners
62 North Street
Goderich, ON N7A 2T4

Ph: (519) 524-2641
lcourtney@bmross.net
https://link.edgepilot.com/s/46331467/iLQmhNLuB0abkAt2k_UFoQ?u=http://www.bmross.net/

CHIPPEWAS OF THE THAMES FIRST NATION

Project Name:
Municipal Class EA - Expansion of Saltford Water System

FN Consultation ID:
21285

Consulting Org Contact:
Lisa Courtney

Consulting Organization:
B. M. Ross and Associates Limited

Date Received:
Friday, April 1, 2022

April 6, 2022

Dear: Lisa,

We have received information concerning the Municipal Class EA - Expansion of Saltford Water System, submitted April 1st, 2022. The proposed project falls within Chippewas of the Thames First Nation's (COTTFN) big bear creek additions to reserve land selection area as well as COTTFN's traditional territory.

In our screening of your project, we have identified no concerns with your project or the information that you have presented to us at this time. We ask that if there are any changes to your project that are of a substantive nature that you keep us informed.

We recommend that you engage First Nations in closer proximity to the proposed project. e.g. Kettle & Stoney Point, Walpole Island First Nation, Aamjiwnaang First Nation.

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. As per ‘Appendix D’ of the Wiindmaagewin attached is invoice 0267.

Please feel free to contact me if you have any questions.

Sincerely,

_____

Original Signed
Fallon Burch
Consultation Coordinator
Treaties, Lands & Environment Department
Chippewa of the Thames First Nation
fburch@cottfn.com

Lisa Courtney

From: Emily Martin <manager.ri@saugeenojibwaynation.ca>
Sent: May 9, 2022 4:46 PM
To: Lisa Courtney; Juanita Meekins
Subject: Re: 21285 ACW Century Heights Water Expansion EA
Attachments: ~WRD0126.jpg

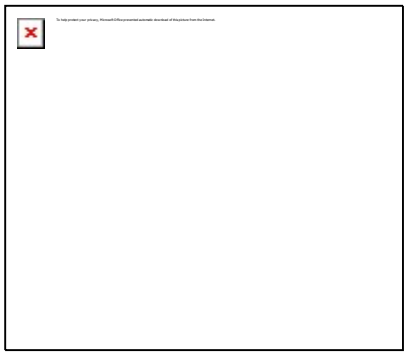
Categories: Archived

Thanks Lisa, Juanita see above for the LOA contact name.

Lisa we'll get back to you shortly.

Emily Martin (she/her)
Resources and Infrastructure Manager
manager.ri@saugeenojibwaynation.ca
T: (519) 379-0849

I am grateful to live, work, and benefit from the Territorial lands and waters of the Saugeen Ojibway Nation.



10129 Hwy 6 Georgian Bluffs, ON
N0H 2T0
saugeenojibwaynation.ca

On Wed, May 4, 2022 at 2:58 PM Lisa Courtney <lcourtney@bmross.net> wrote:

> Hi Emily,
>
> Yes, Brett Pollock is the project contact at ACW.
>
> Cheers,
>
> ***Lisa J. Courtney, MSc., MCIP, RPP***
>
> ***B. M. Ross and Associates Limited***
>
> ***Engineers and Planners***

62 North Street

Goderich, ON N7A 2T4

Ph: (519) 524-2641

lcourtney@bmross.net

https://link.edgepilot.com/s/4284d027/Cipz9vgEpk_MjS6joDCH1A?u=http://www.bmross.net/

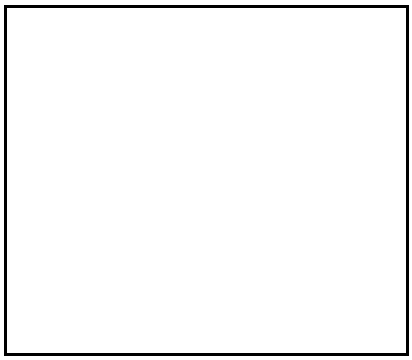
From: Emily Martin <manager.ri@saugeenojibwaynation.ca>
Sent: May 4, 2022 2:56 PM
To: Lisa Courtney <lcourtney@bmross.net>
Cc: Emily Martin <emily.martin@saugeenojibwaynation.ca>; Juanita Meekins <Juanita.meekins@saugeenojibwaynation.ca>
Subject: Re: 21285 ACW Century Heights Water Expansion EA

Hi Lisa, thanks for reaching out we'll get back to you shortly.

Is Brett Pollock considered the proponent representative if we need to follow up about budget?

Emily Martin (she/her)
Resources and Infrastructure Manager
manager.ri@saugeenojibwaynation.ca
T: (519) 379-0849

I am grateful to live, work, and benefit from the Territorial lands and waters of the Saugeen Ojibway Nation.



10129 Hwy 6 Georgian Bluffs, ON
N0H 2T0
saugeenojibwaynation.ca

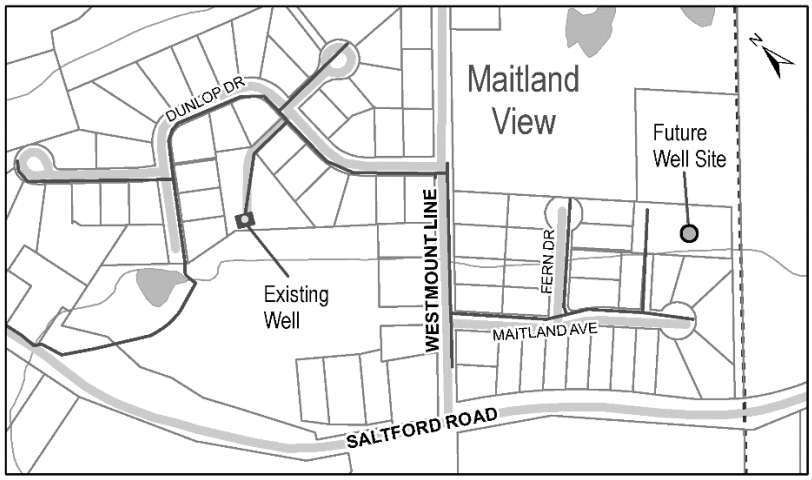
On Wed, Apr 27, 2022 at 3:35 PM Lisa Courtney <lcourtney@bmross.net> wrote:

> Good afternoon Emily and Juanita,
>
> Hope everyone is keeping well (and you haven't gotten too much snow today). I am following up on our initial Notice regarding the Township of Ashfield Colborne Wawaonsh's MCEA looking at the expansion of the Century Heights (Saltford) water system. If you have any questions or comments, please let me know.
>
> Thanks and cheers,
>
> ***Lisa J. Courtney, MSc., MCIP, RPP***
>
> ***B. M. Ross and Associates Limited***
>
> ***Engineers and Planners***
>
> *62 North Street*
>
> *Goderich, ON N7A 2T4*
>
> **Ph: (519) 524-2641**
>
> **lcourtney@bmross.net**
>
> **https://link.edgepilot.com/s/11ba11a2/9YV8rNdhNUmZjCspniR1ag?u=http://www.bmross.net/**

TOWNSHIP OF
ASHFIELD-COLBORNE-WAWANOSH

TOWNSHIP OF ASHFIELD-COLBORNE-WAWANOSH
MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT FOR EXPANSION OF THE CENTURY HEIGHTS DRINKING WATER SYSTEM

NOTICE OF PUBLIC OPEN HOUSE



THE PROJECT:

The Township of Ashfield-Colborne-Wawanosh has initiated a Municipal Class Environmental Assessment (MCEA) process to investigate the expansion of the Century Heights Drinking Water System in the community of Saltford. The current system services 84 properties from a groundwater supply. An additional well is required to accommodate future development within the urban settlement area. Through the MCEA process, a site for a new well has been identified and a test well has been drilled.

THE ENVIRONMENTAL SCREENING PROCESS:

The planning for this project is following the environmental screening process set out for Schedule B activities under the MCEA process. The purpose of the screening process is to identify potential environmental impacts associated with the project and to plan for appropriate mitigation of any impacts. The process includes consultation with the public, stakeholders, First Nation and Métis communities, and government review agencies.

PUBLIC INVOLVEMENT:

Public consultation is a key component of this study. A public open house has been scheduled to provide an opportunity for the public and interested parties to learn about the proposed project, as well as provide input and feedback. The public open house will be held:

Thursday, December 1, 2022 from 6:30-8:30 (presentation at 7 PM)
Benmiller Community Hall 37015 Londesboro Rd, Goderich, ON N7A 3Y1

Comments or questions may also be sent to the study team at B. M. Ross and Associates (contact information below). Any comments collected in conjunction with the study, 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.

For further information on this project, or to review the Municipal Class EA process, 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).

Brett Pollock, Chief Building Official
Township of Ashfield-Colborne-Wawanosh

This Notice issued November 9, 2022

Township of Ashfield-Colborne-Wawanosh

Century Heights Water System Upgrades Municipal Class Environmental Assessment

PUBLIC OPEN HOUSE

DEC. 1ST, 2022

1

Agenda

- Introduction
- Municipal Class Environmental Assessments
- Existing Century Heights Water System
- Projected Demands
- Problem Development
- Alternative Solutions and Evaluations
- Next Steps

2

Introduction

- The purpose of this Municipal Class Environmental Assessment (MCEA) is to determine the best approach to upgrade the Century Heights Water System to ensure a safe and secure supply of water for the present and future.
- The steps we followed were:
  - Understanding what the existing water demands are.
  - Projecting future water demands.
  - Understanding the existing system and constraints.
  - Determining when and what will need to be addressed to ensure adequate pressure and flow throughout the system.

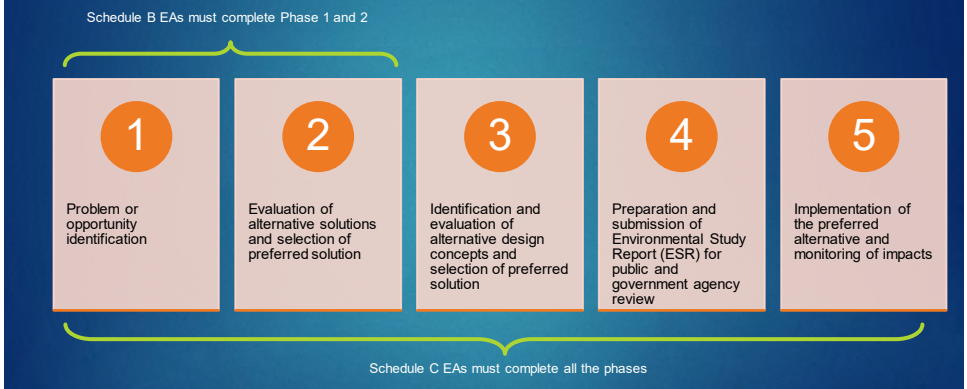
3

Municipal Class Environmental Assessments (MCEA)

- The MCEA is the planning and approval process for municipal road, water, wastewater and stormwater projects.
- Municipalities must follow the MCEA process to meet the requirements of the Environmental Assessment Act.
- Allows for the evaluation of feasible alternatives, identifies potential impacts and methods for mitigating impacts.
- Considers the impacts to the natural, socio-economic, cultural and technical environments.

4

Municipal Class EA Process



Expansion of the Century Heights Drinking Water System is a Schedule B project.

5

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.

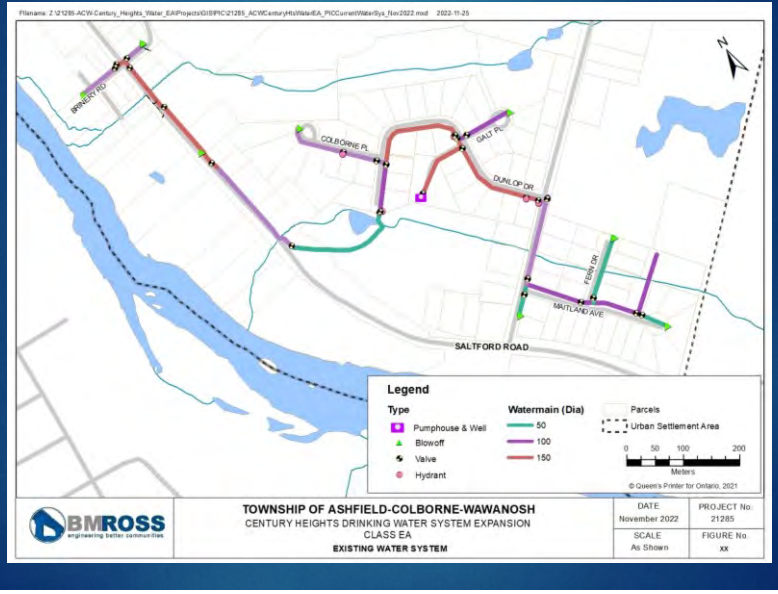
6

Existing Century Heights Water System

- Well 1 (4.2 L/s) + Well 2 (4.3 L/s) = 8.5 L/s; currently no redundancy.
- Wells are GUDI (Groundwater Under Direct Influence).
- Treatment building at Well 1/2 site is also designed for 8.5 L/s.
- 85 properties are currently serviced ~ 225 people
- The existing Average Day Flow (ADF) and Max Day Flow (MDF) values were determined as **104** and **382** m^3/day, respectively.
- The system currently does not have any fire protection or water storage.

7

Existing Supply Cont'd



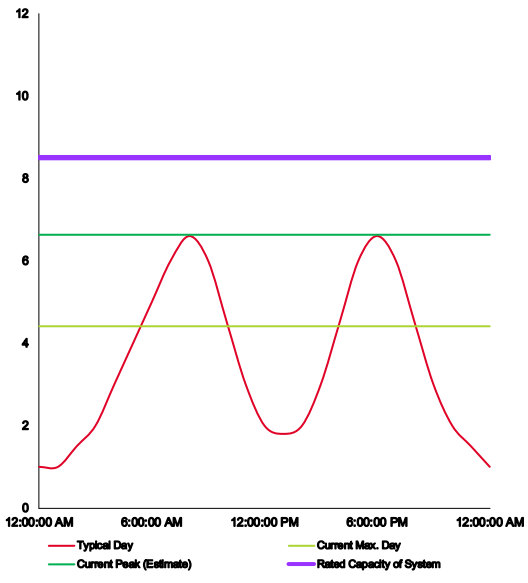
8

Projecting Growth

- There are 77 existing properties within the Official Plan boundary of Century Heights/Saltford that are not currently serviced by the water system ~ 204 people
- There are also a number of proposed developments and properties that are likely to be developed in the area, these include:

Development	# of Properties
Saltford Heights	66
Saltford Estates	30
Lamb property	60
Total	156

9



Current Demands

10

Projecting Demands

- Generally, the approach for determining future water demands was as follows:
  - Do not include any of the currently unserviced properties.
  - New development properties to have similar demands as current customers.
    - Average day demand = 1.22 m^3/d/customer
    - Maximum day demand = 4.5 m^3/d/customer

11

Projecting Demands

- Adding 156 customers to the system will increase flows by:
  - Maximum day flow ~ 702 m^3/d or 8.1 L/s
  - Peak day flow ~ 1140 m^3/d or 13.2 L/s
- Therefore projected future flows are:
  - Maximum day flow ~ 1084 m^3/d or 12.5 L/s
  - Peak day flow ~ 1752 m^3/d or 20.3 L/s

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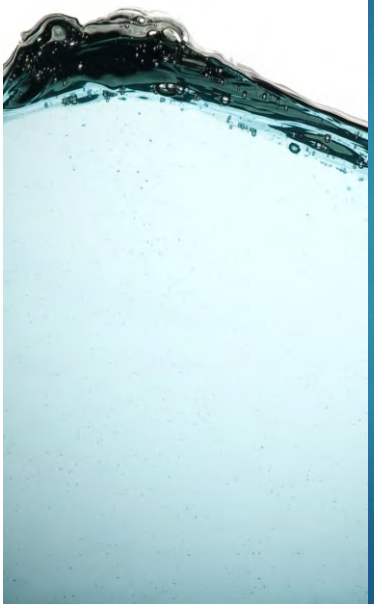


Effect of Water Storage

- Without storage, the current wells can support approximately 15 new customers.
- If storage was added to the system, the current wells could support approximately 75 new customers.
- Since 75 < 156, storage alone is not enough and additional water supply is required.

13

Current System Deficiencies

Some customers have reported poor water pressures.

Some smaller watermain diameters will act as “bottlenecks”

14

Problem Development

- The low pressures and smaller diameter watermains can be improved by replacing certain watermain and by upgrading the well pumps. Provided these works are carried out on lands owned by the Township, they do not require a Class EA; rather, they are pre-approved through the Township's Drinking Water Works Permit.
- The main problem that remains is the water supply deficiency.

15

Problem Definition

- *The Century Heights Drinking Water System does not have sufficient water supply to service anticipated future developments.*

16

Alternative Solutions

1. Expand existing wells
2. Construct a new well
3. Do Nothing

17

Evaluation of Alternatives

1. Expand Existing Well
   - Existing casings have physical limitations
   - Drawdown of existing wells could impact adjacent wells and expose the upper water bearing zones
   - Would require major upgrades to existing treatment plant.
   - Not considered a practical or feasible solution.

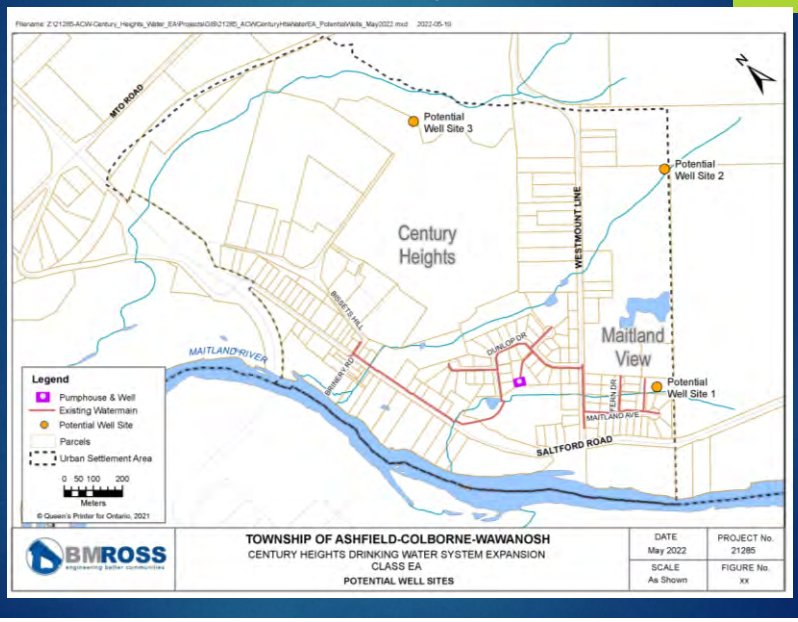
18

Alternative 2 – New Well Supply

- Construct a new well at a new site
  - Will require drilling a test well
- Considerations:
  - Potential for sufficient water supply
  - Ability to connect to existing system
  - Remote from existing wells provides some redundancy
  - Impacts related to Source Water Protection
  - Potential for GUDI well

19

New Well Supply



20

Evaluation of Well Sites

WELL SITE	ADVANTAGES	DISADVANTAGES
1	• Former well at this site had specific capacity values of 13 to 22 gpm/ft. • Greater potential to secure needed yields. • Less impactful to future development. • Near connection point to existing system • Site is municipally owned.	• Any properties within 100 m of the well with septic systems will require inspection under Source Water policy. • Potential for GUDI conditions • May require upgrades to existing watermain to supply development areas.
2	• Remote from existing well • Less potential for GUDI conditions • Site is at a relatively high elevation	• Potential yield suspected to decline away from the Maitland River. • Per the Source Policy Plan new lots cannot be established within 100 m of the proposed well – will impact development. • Will require easement/ driveway to access site. • Site is privately owned
3	• Less potential for GUDI conditions	• Per the Source Policy Plan new lots cannot be established within 100 m of the proposed well – will impact development. • Potential yield suspected to decline away from the Maitland River. • Will require easement/ driveway to access site. • Site is privately owned. • Too remote from existing well/distribution system

21

Preferred Well Site

- Well Site 1 is preferred site for test well
  - Greatest potential for required yield
  - Is a municipally-owned site
  - Near an existing connection point to the system
  - Good site access

22

Test Well

- Proceeded with installing a new test well at Well Site 1
- Details of new well:
  - Total depth – 76.2m
  - Top 35.7m is cased into the bedrock.
  - Bottom (40.8 – 74.7m) had a slotted casing installed to protect against unstable bedrock.
- Well has a safe yield of 14.2 L/s
- Water quality is similar to Well 1/2
- Initial indication is non-GUDI

23

New Well Supply Cont'd

- Once treatment is constructed and a well pump installed, total system capacity will be: 8.5 + 14.2 = 22.7 L/s
  - I.e. 22.7 L/s > 20.3 L/s
- This would be sufficient for all development discussed earlier.
- If storage is added to Well 3 site, it alone would be sufficient and Well 1 and 2 site could be abandoned
  - I.e. 14.2 L/s > 12.5 L/s

24

Source Water Protection

- Area is within Maitland Valley Source Protection Area
- Policies in place to protect municipal sources of drinking water.
- Potential impacts to existing properties within WHPA A (100 m radius from well).
  - Existing septic systems required to be inspected on a 5-year basis.
  - Where 250 L to 2500 L of fuel (furnace oil, diesel, gas) is stored, a Risk Management Plan will be required
  - Storage/handling of 25 L + of DNAPLS will require a Risk Management Plan.

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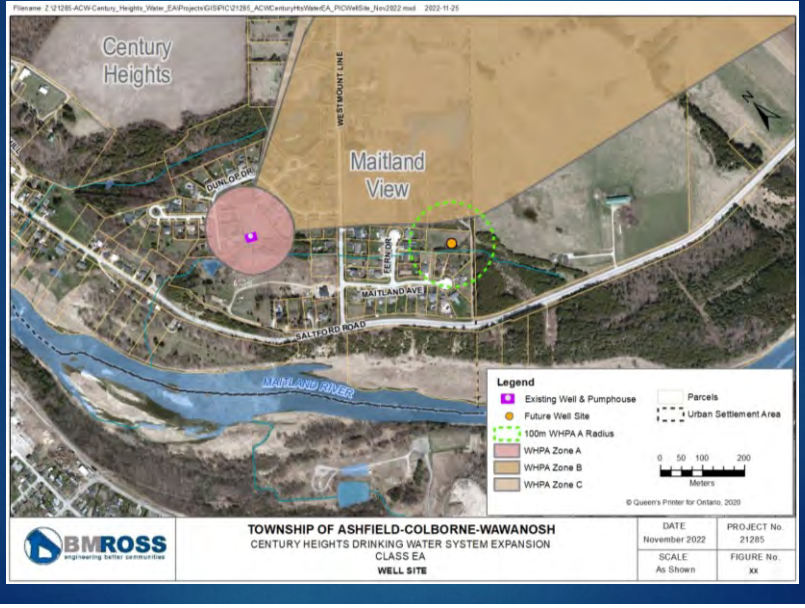
Wellhead Protection Area 'A'



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Solutions

- The water system was modelled using WaterCAD to project future pressures and flows that will be available.
- Multiple alternatives were modelled to determine best watermain routing and options to increase pressure.
- A number of customers currently experience < 275 kPa pressure. MECP recommends >275 or ideally >480 kPa.
- By installing a larger pump in existing Wells 1 and 2, the overall system pressure could be increased so that all customers would have > 275 kPa and many would be > 400 kPa.

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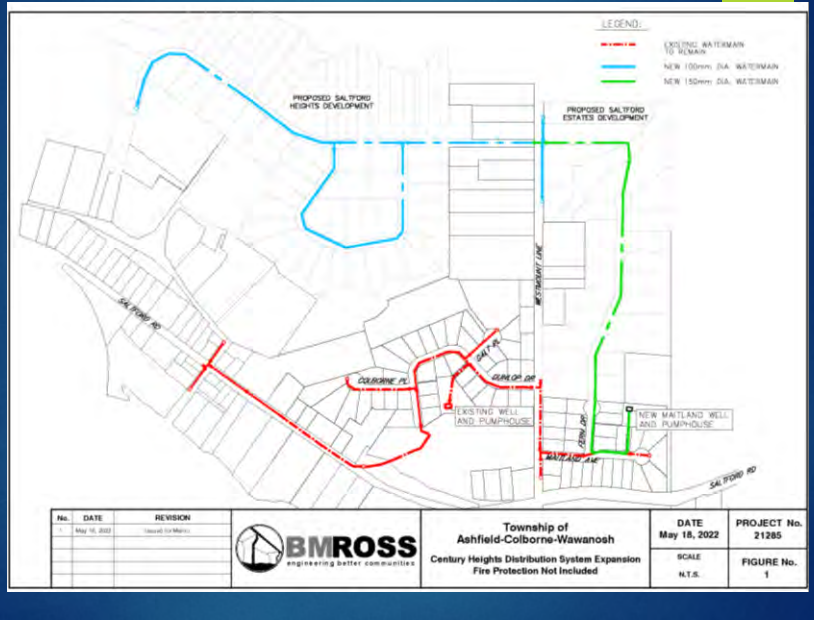
Solutions Cont'd



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Costs and Timing

- Majority of project costs expected to be attributed to future development.
  - Costs will be paid through development charges
- If there are upgrades that benefit existing users, those costs are expected to be paid through rates and reserves.
- Following completion of the EA, design will occur in 2023 and construction in 2024.

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Next Steps

- Collect and review input from the Public Meeting.
- Incorporate changes (if any) to the information provided earlier and re-evaluate alternatives if required.
- Complete Wellhead delineation and modeling work
- Final selection of a preferred alternative.
- Prepare a draft report and circulate to interested parties.
- Compile comments received.
- Incorporate comments into a final report.
- Provide notice of completion to review agencies and the public.
- Design, approvals (including Source Water amendments)

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Questions?

Please submit any questions or comments by December 14, 2022 to Lisa Courtney at BMROSS lcourtney@bmross.net

519-524-2641

Thank you.

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Lisa Courtney

From: [redacted]
Sent: March 15, 2022 2:16 PM
To: lcourtney@bmross.net
Subject: ACW Century Heights Drinking Water

Lisa: Couple of questions..

1) How is it determined that there is sufficient water to expand the system?
2) Do ANY costs of a proposed expansion be apportioned to the existing users?

[redacted]

Lisa Courtney

From: [redacted]
Sent: March 16, 2022 10:04 AM
To: lcourtney@bmross.net
Subject: ACW MCEA Process

Good Morning Lisa,

I received notification of the above process taking place for the possible expansion of the Century Heights Drinking Water System. I would like to receive further information and review the process. Would you please forward the information to me.

Thank you,

[redacted]
Goderich, ON
N7A 3Y1
[redacted]

Sent from my iPad

Lisa Courtney

From: [redacted]
Sent: March 30, 2022 6:45 PM
To: lcourtney@bmross.net
Subject: Expansion of the Century Heights Drinking Water System

Hello Lisa,

I recently received the Notice of Commencement for the Assessment for expanding the Drinking Water System in Century Heights.

I am wondering, following the assessment will this result in an expense to those of us already on this water system? I am aware that there are multiple plans for development in our area and that those areas will require a solution, however I am looking for additional information on what this means for the homeowners on this system already.

I am happy to discuss this if that is easier for you. My number is [redacted]

Thank you.

March 28, 2022

Lisa Courtney, Environmental Planner
B.M. Ross & Associates
62 North Street
Goderich, ON N7A 2T4

Delivered Via E-mail to:
lcourtney@bmross.net

Re: MCEA – Century Heights Drinking Water System, Saltford, ACW Township

Dear Lisa:

We wish to thank-you for the opportunity to provide comments re: the above noted MCEA Process. Please be advised that the below comments relating to this process were formally submitted as part of a letter dated March 3, 2022 (from 7 neighbouring property owners) to ACW Township and the County of Huron as part of the public consultation re: Plan of Subdivision 40T21003, Ashfield-Colborne-Wawanosh and Zoning By-law Amendment No. Z10/2021:

Condition of Support & Approval: As a neighbour to two proposed subdivisions, we are requesting written confirmation that we will not be required to connect to any municipal well or water systems resulting from these subdivisions or any future housing developments in Saltford. This will ensure that we retain the quality and autonomy of our existing wells. Should this become a requirement, it shall be at the sole expense of the subdivision developer(s).

Information Request: It was understood from the Public Meeting that additional feedback and recommendations from MVCA following a hydrogeology peer review are pending. Once completed, we are requesting that more information be provided to neighbours regarding the impacts from 66 new septic systems, ground water, drainage and storm water management.

Additional information is also requested regarding the recommended best practices to protect and manage the 'Significant Groundwater Recharge Area (SGRA)' where the subdivision is being proposed.

Yours truly,

[redacted]

Lisa Courtney

From: [redacted]
Sent: April 4, 2022 10:17 AM
To: lcourtney@bmross.net; cbo@acwtownship.ca
Cc: gmcneil@acwtownship.ca; bvanstone@acwtownship.ca; [redacted]
Subject: Notice of Commencement - Municipal Class Environmental Assessment (Century Heights)
Attachments: Notice of Commencement - Century Heights (1).pdf

Good morning,

As residents of Century Heights, we are asked to write our concerns/suggestions regarding the NOTICE OF COMMENCEMENT - Municipal Class Environmental Assessment of Century Heights issued on March 9th, 2022 from Brett Pollock, Chief Building Official of ACW. The letter suggested public input and comments are invited before April 8th, 2022. Please find the attached document regarding these concerns or suggestions.

Thanks.

[redacted]

Deliver to Via Email to:

lcourtney@bmross.net (Environment Planner)
cbo@acwtownship.ca (Brett Pollock *Chief Building Official)*
gmceil@acwtownship.ca (Glen McNeil - Mayor ACW)
bvanstone@acwtownship.ca (Bill Vanstone - Councillor)

Re: Municipal Class Environmental Assessment (MCEA) process (Century Heights Drinking Water System).

As neighbours to the proposed NOTICE of COMMENCEMENT, we wish to provide comments/concerns regarding the investigation of the expansion of Century Heights Drinking Water System in the community of Saltford.

Comments / Concerns:

- *We are requesting more information to be provided to neighbours regarding the impacts from additional new septic systems, ground water, drainage and stormwater management. Additional information is also requested regarding the recommended best practices to protect and manage the 'Significant Groundwater Recharge Area (SGRA)' where the subdivision is being proposed.*
- *A written confirmation that we will not be required to connect to any municipal well or water systems resulting from these subdivisions or any future housing developments in Saltford. This will ensure that we retain the quality and autonomy of our existing wells. (In some cases, existing wells have been upgraded within the last 2 years). Should this become a requirement, it shall be at the sole expense of the subdivision developer(s).*
- *A written confirmation that appropriate and effective mitigation of storm water and drainage infrastructure is constructed that will prevent potential flooding into adjacent existing properties, expecially between or behind house's* [redacted] *and* [redacted] *where a swale is located.*
- *A written confirmation of an updated ground water vulnerable score is conducted to ensure that it is within a safe range to build a subdivision in Saltford Heights.*
- The gravel pit is home to many wildlife species. A more in-depth study is requested to further study the impacts on the natural habitats, microhabitats and the possibility of endangered species located in the area (especially, when the gravel pit has been left untouched).
- *How does the gravel pit effect the existing ground water and d*rainage issues into the field area behind existing homes or where the subdivision is proposing to develop new lots?
- Does this study recognize the addition of a 66 detached residential subdivision West of Westmount Line and the addition of a 25-30 home subdivision proposed for the east side of Westmount line?

[redacted]

[Type here]

Dec 1/22

I am writing this letter in regards to the planned land change -Conc 1 WD PT Lot Colborne ,Township of Ashfield-Colborne- Wawanosh (81316 Westmount Line)

My wife and I purchased our home at [redacted] in June of 2012.

Our water supply is from a shallow dug well approx. 12 feet deep (4-5 meters)

This well has supplied adequate volume of water for our family use since 2012 and to our knowledge several neighbours have similar wells.

If the construction of this new development interferes with the aquafers and disrupts our water suppiy who is responsible.

The water supply which is spring fed for many years and has been more than adequate

My wife and I are 75yrs old and are not very tech savvy.Hope this letter conveys our concerns

[redacted]