Clythe Creek
Subwatershed Study Update

Community Information Session

October 26, 2023

6:00 – 8:00 p.m.

Land acknowledgement

As we gather, let us take time to reflect on our privilege to live and work in Guelph; a city built over rich Indigenous histories. We are guests here, and we should reflect upon the responsibility to care for this land, the people who live here today, and the generations to come. If our actions today can move us towards reconciliation, we should take pause and make those decisions with intention and gratitude.

This place we call Guelph has served as traditional lands and a place of refuge for many peoples over time, but more specifically the Attiwonderonk, and the Haudenosaunee. This land is held as the treaty lands and territory with the Mississaugas of the Credit First Nation. Guelph lies directly adjacent to the Haldimand Tract and is part of a long-established traditional hunting ground for the Six Nations of the Grand River. Many First Nations, Inuit, and Métis peoples who have come from across Turtle Island call Guelph home today.

Welcome and introductions

Team member, organization	Role for this study
Leah Lefler, City of Guelph	City Project Manager
Steve Chipps, WSP	Consulting Team Project Manager, Surface Water Lead
Ron Scheckenberger, Scheckenberger & Associates	Project Advisor
Daron Abbey, Matrix Solutions	Groundwater Lead
John McDonald, Matrix Solutions	Stream Dynamics Lead
Cam Portt, C. Portt & Associates	Aquatic Biology Lead
Christina Olar, Dougan & Associates	Terrestrial Ecology Lead
Margot Ursic, Grounded Solutions	Engagement Lead, Natural Heritage Advisor

… and many others at the City and on the consulting team

How to use Zoom

Please:

- use the ‘chat’ box for technical support
- use the ‘Q&A’ box to submit questions
- turn on ‘Live Transcript’ for subtitles

A recording of this presentation will be made available on the project Have Your Say page.

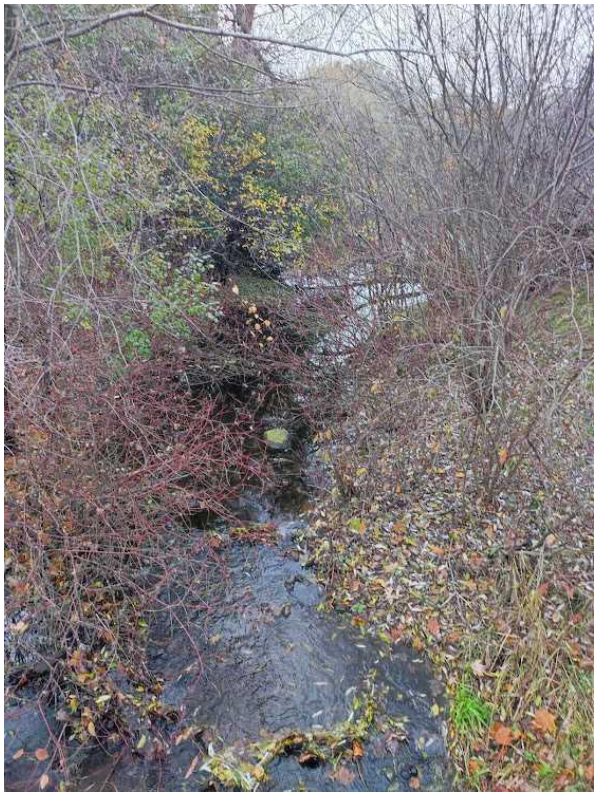


Photo of Hadati Creek in Guelph

If you require an alternate accessible format or communication support, please contact Kelly Guthrie at 519-362-1152.

What is the purpose of this Community Information Session?

1. To inform you about the Clythe Creek Subwatershed Study Update
2. To provide an opportunity for you to:
    a. share your perspectives about this project, and
    b. ask the City and our panel of experts questions related to this project

Photo of Hadati area stormwater management pond in Guelph

Agenda for this session

1. Welcome, introductions, Zoom basics (15 minutes)
    - **Territorial Acknowledgement**

2. Presentation with breaks for questions or comments

    Part 1: Study rationale, scope and process (10 minutes)

    - Break for questions / comments (up to 15 minutes)

    Part 2: Overview of the work being done (40 minutes)

    - Break for questions / comments (up to 15 minutes)

    Part 3: Summary of anticipated outcomes and next steps (10 minutes)

    - Break for questions / comments (up to 15 minutes)

Clythe Creek
Subwatershed Study Update:

Part 1: Study rationale, scope and process

What is a subwatershed?

Watersheds and subwatersheds are land areas that drain to a common location. They are identified based on landform, water drainage patterns and local surface water catchment areas.

Why assess and plan at the subwatershed scale? It is

- a science-based approach supported by the Province; and
- a useful scale for assessing natural heritage and water resource systems, and for monitoring changes to these systems.

Photo of a pond on the Guelph Correctional Centre lands

Why is this study important?

The original subwatershed study for this area was completed in 1998. Since that time, many land use changes have occurred in this area, and more changes are planned over the next 25 years.

This update study will make recommendations for sustainable land use planning based on current data and the best available approaches for

- protection of local drinking water;
- managing stormwater;
- prioritizing infrastructure improvements; and
- sustaining and, where opportunities exist, enhancing local natural heritage and water resource systems.

What is the scope of this study?

This study will

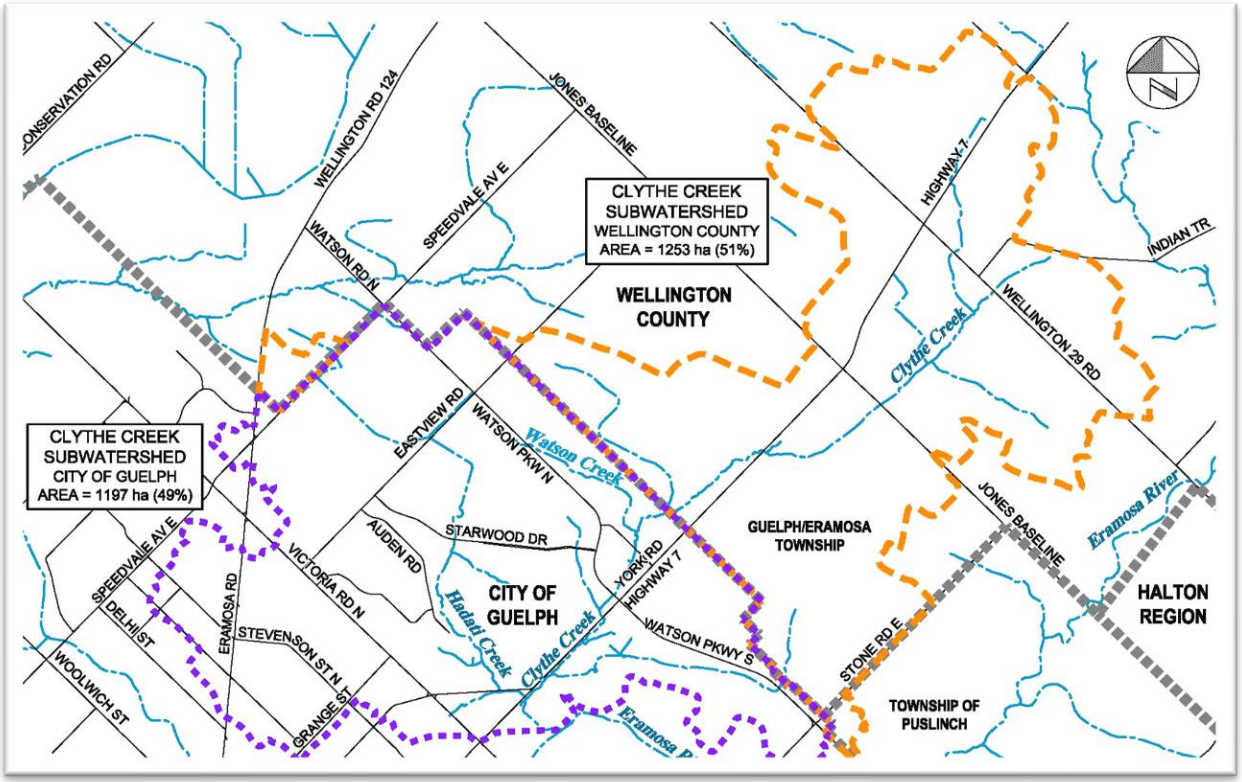
- integrate information from various sources to characterize the existing environmental and land use conditions;
- assess the impacts of future land use conditions on the natural environment with consideration for climate change;
- recommend approaches and measures to protect and, where appropriate restore the quality and quantity of water in the subwatershed; and
- recognize the complex inter-relationships between the natural heritage and water resource systems.

Where is the study area?

The study area is divided into two distinct areas

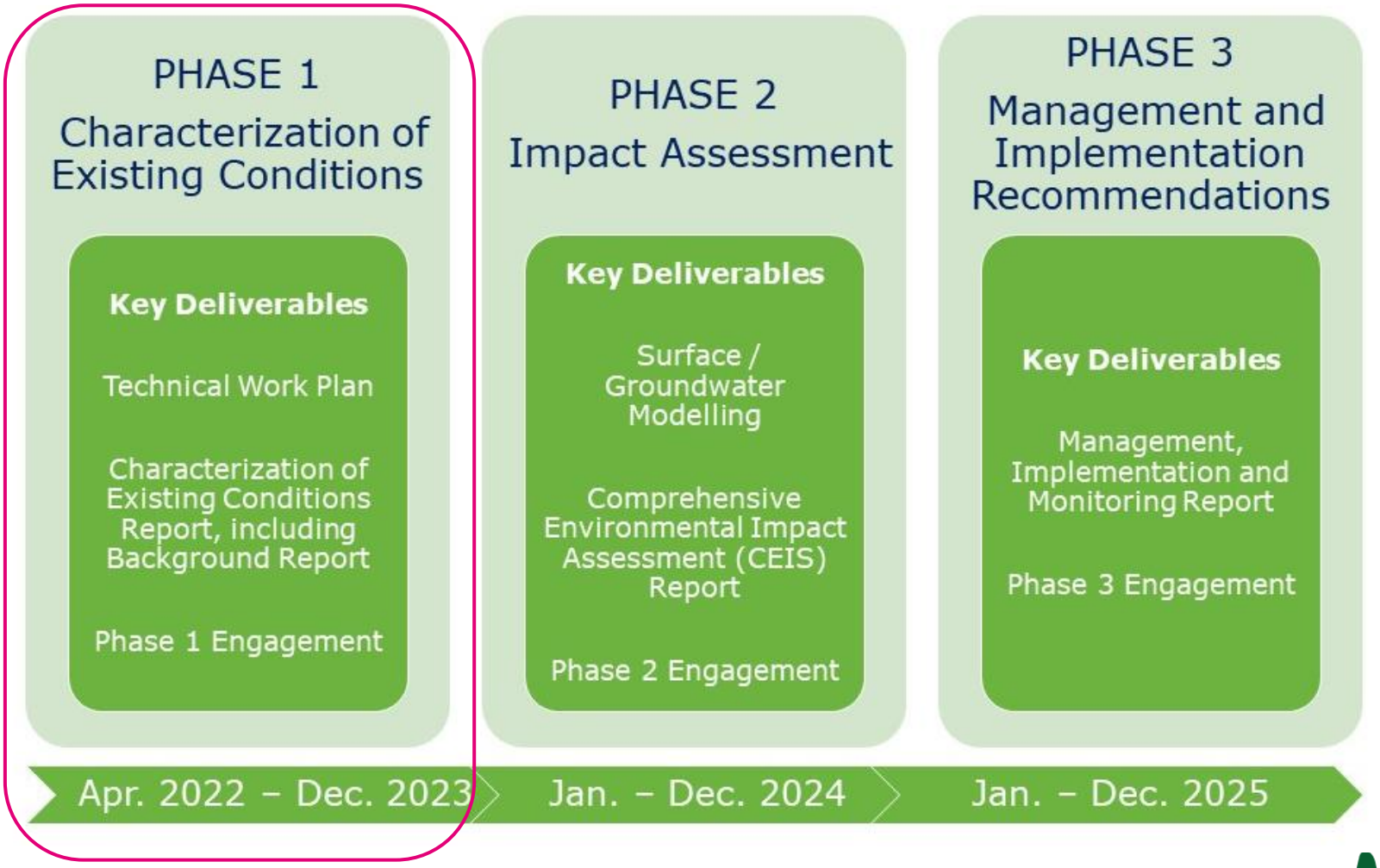
- **Primary Study Area** in the City of Guelph
- **Secondary Study Area** in Wellington County

Connections to adjacent lands are being considered in the study.



Primary Study Area is outlined in purple.
Secondary study Area is outlined in orange.

What is the study timeline?



Other related studies

- City water monitoring programs (ongoing)
- Ontario Reformatory Heritage Conservation District Study (ongoing)
- York Road Phase 4 Detailed Design (ongoing)
- City Stormwater Management Master Plan (2023)
- City Water Supply Master Plan (2022)
- York Road and Elizabeth Street Land Use Study and Urban Design (2022)
- Guelph Innovation District Secondary Plan (2014)

Clythe Creek
Subwatershed Study Update:

Part 1: Study rationale, scope and process: Questions?

Clythe Creek
Subwatershed Study Update:

Part 2: Overview of work being completed

Study approach

- Targeted data collection.
- Assessment of multiple years of data.
- Consideration and integration of information from all disciplines.
- Collaboration with the City, Grand River Conservation Authority, Wellington County, Guelph / Eramosa Township and other consultants working in the study area.
- Engagement with the Technical Advisory Group, Natural Heritage Advisory Committee, Indigenous Nations, other interested parties / organizations and the community-at-large.

Work completed to date

- Review of relevant and available background documents and data.
- Confirmation of study area boundaries.
- Securing access to various lands for multi-year field monitoring.
- Preparation of an Engagement Plan and a Technical Work Plan.
- Preliminary engagement with the City's Natural Heritage Advisory Committee, expanded Project Team, Indigenous Nations and study Technical Advisory Group.
- Completion of the first two years of field data collection (2022, 2023).
- Preparation of initial groundwater and surface water models.

Groundwater: Local context

The City relies on local groundwater (from a deep bedrock aquifer) for its potable water.

- Clythe Creek Well is currently permitted to provide 39 litres per second to the City's system but is not currently in use.

This same groundwater also supports local streams, creeks and other natural areas.

- Groundwater discharge to lower reaches of Clythe Creek may support cool/coldwater aquatic habitat.

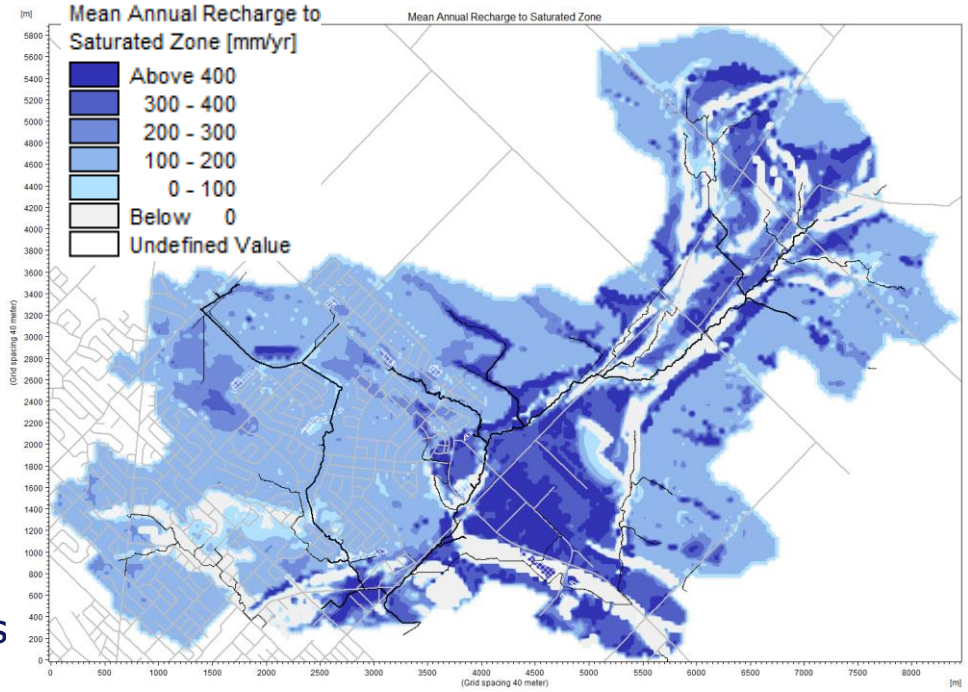
Existing policies protect groundwater for both potable uses and ecological functions.

Photo of a stormwater management pond and new construction near York and Watson Roads

Photo of a pond along Clythe Creek fed in part by groundwater in Guelph/Eramosa Township

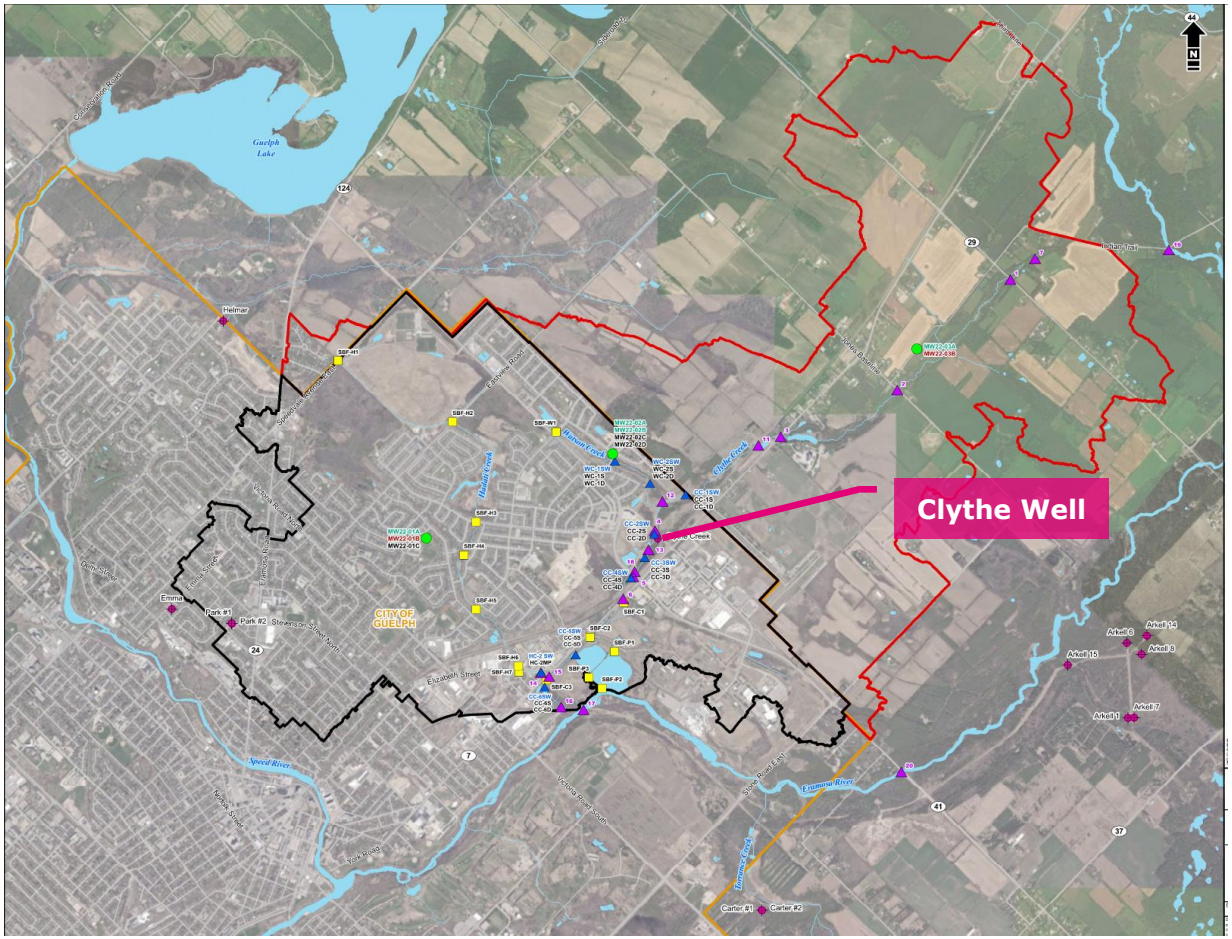
Groundwater: Preliminary findings

- Groundwater flows from north to south in the subwatershed.
- Recharge ranges from 150-300 millimetres per year or more.
- Recharge is greatest in sands and gravels along stream valleys, and lower in silt and clay soils, and in developed areas.
- Groundwater discharges primarily along the upper and lower reaches of Clythe Creek.
- Bedrock valleys influence bedrock groundwater flow locally.



Groundwater recharge areas are shown in blue.
Groundwater discharge areas are shown in white.

Groundwater:
Assessment and monitoring stations



- Continuous groundwater level monitoring.
- Continuous stream flow/temperature monitoring at surface water stations.
- Spot baseflow stream flow monitoring.

Groundwater:
Assessment and monitoring work

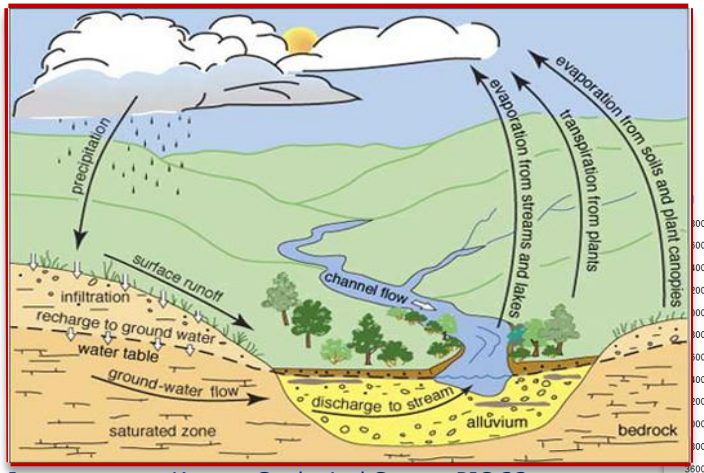
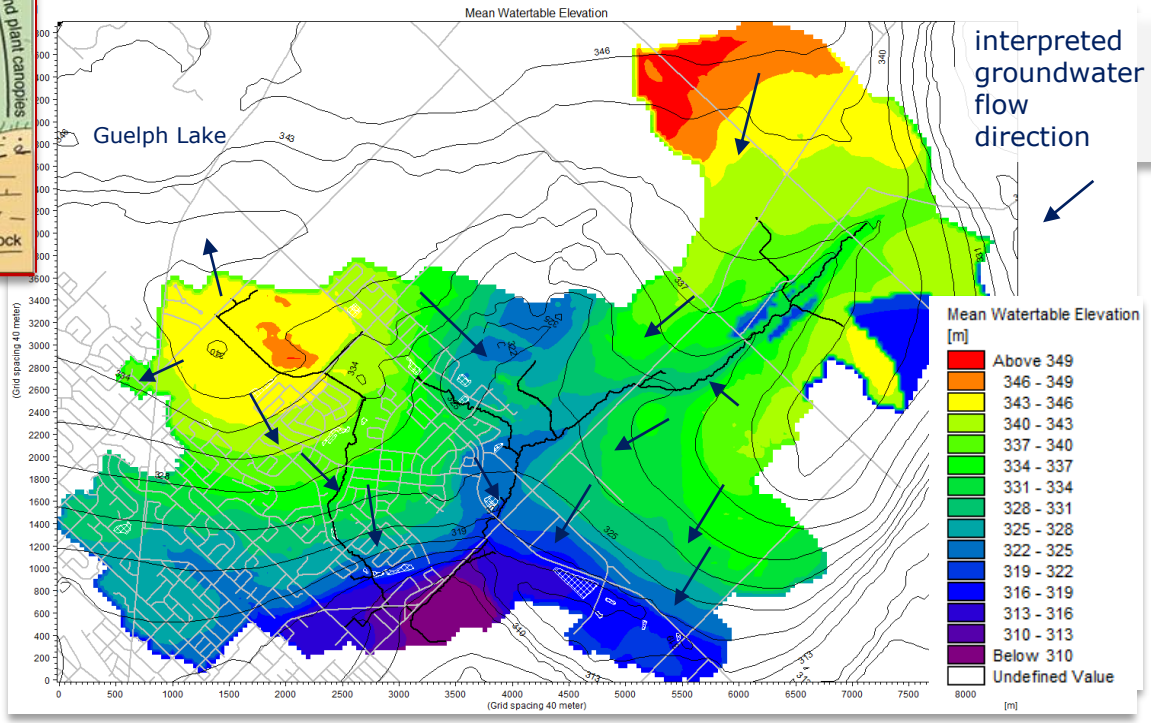


Image source: Kansas Geological Survey PIC 23

Understanding of groundwater and surface water flow systems and interactions – based on field/monitoring data, model simulations.



Observed and simulated groundwater flow direction (comparison of regional and local understanding).

Groundwater: Work underway

- Monitoring of
  - groundwater levels (to understand groundwater flow, seasonal changes, influence of well use), and
  - groundwater-surface water interactions (to understand influence on aquatic habitat).
- Characterization of existing groundwater flow conditions to
  - identify constraints and opportunities; and
  - guide development and approach to protection of natural systems.
- Development of an integrated model of existing conditions to simulate
  - existing groundwater/surface water flows and interactions; and
  - potential future land use conditions and comparison to existing conditions.

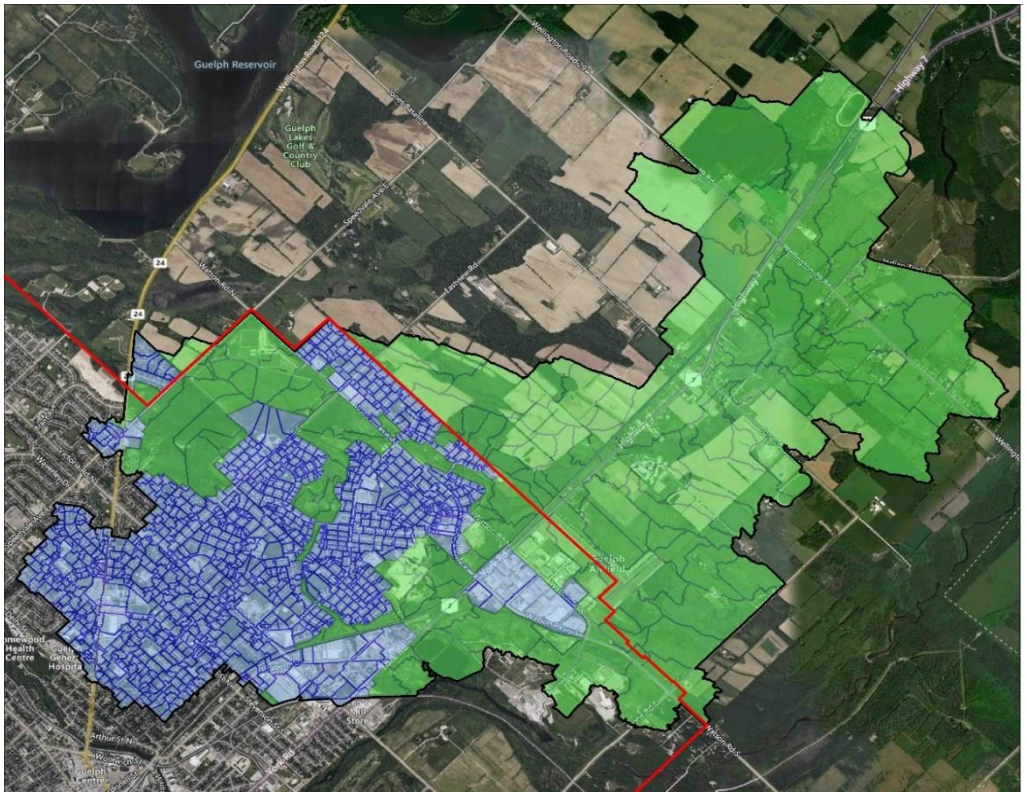
Surface water: Local context

Clythe Creek subwatershed is 2,450 ha in size.

- The **Primary Study Area** is 1,197 ha and includes Hadati Creek (which is 811 ha) and Watson Creek (which is 62 ha).
- The **Secondary Study Area** (outside the City) is 1,253 ha.

Modelling is being used to

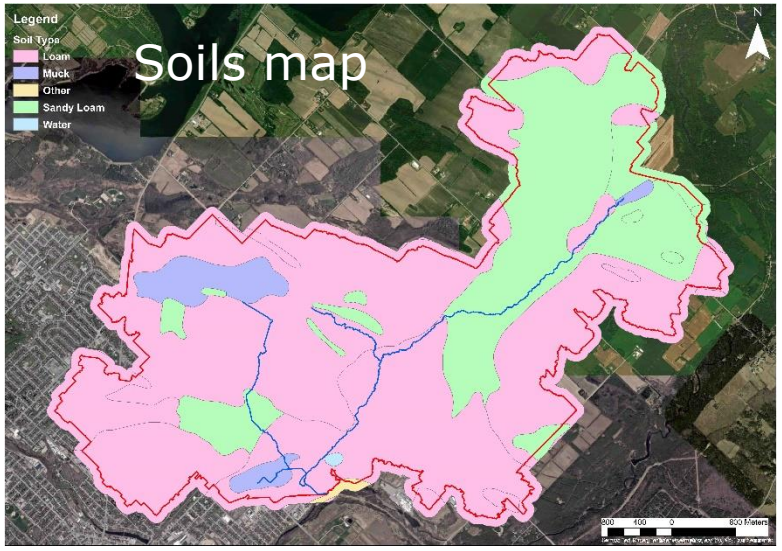
- determine flow rates and runoff volumes, and
- provide flow characterization related to flood plains.

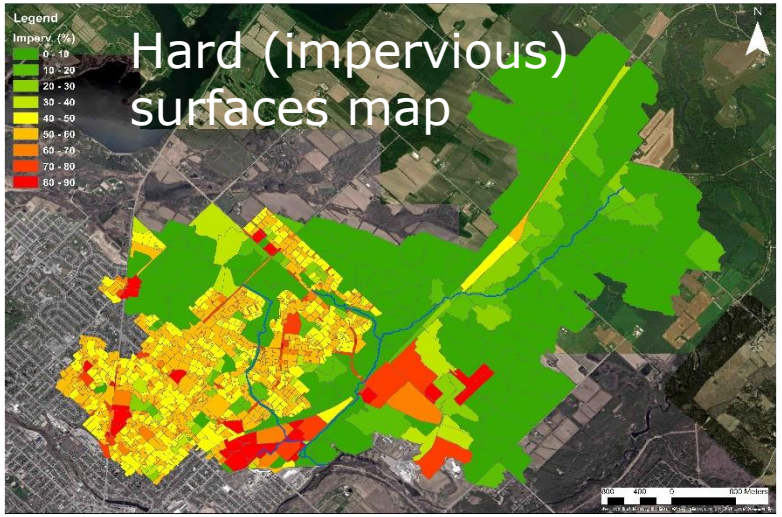


City Stormwater Management Master Plan catchments shown in blue. Other subcatchments shown in green.

Surface water: Assessment and modelling

- Flow rate and runoff volume assessment considers: soil conditions, land uses, hard surfaces, sewer systems, drainage paths, and stormwater management facilities / structures.
- Model is made more accurate (i.e., calibrated) based on the monitoring data, and used to determine peak flows and runoff volumes at key locations.





Surface water:
Assessment and monitoring stations

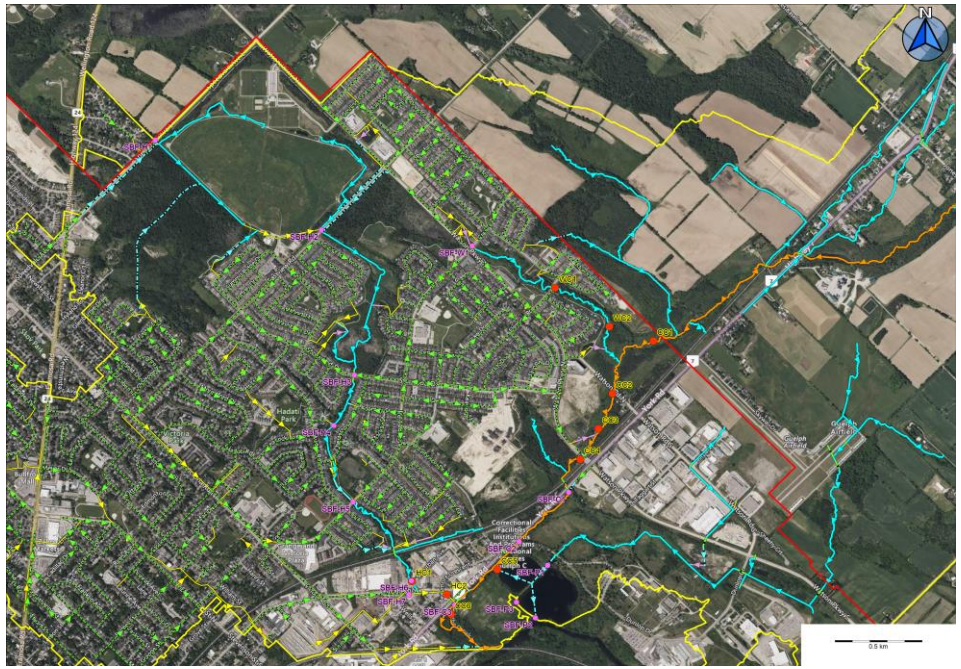
Study uses local rainfall data from Guelph Lake, Turfgrass Institute (1950-2022) and City (to 2023).

Surface water monitoring network to measure flow depths

- six (6) historical stations
- three (3) new stations

Water quality assessments

- temperature and conductivity
- sampling for two years at 12 events per year



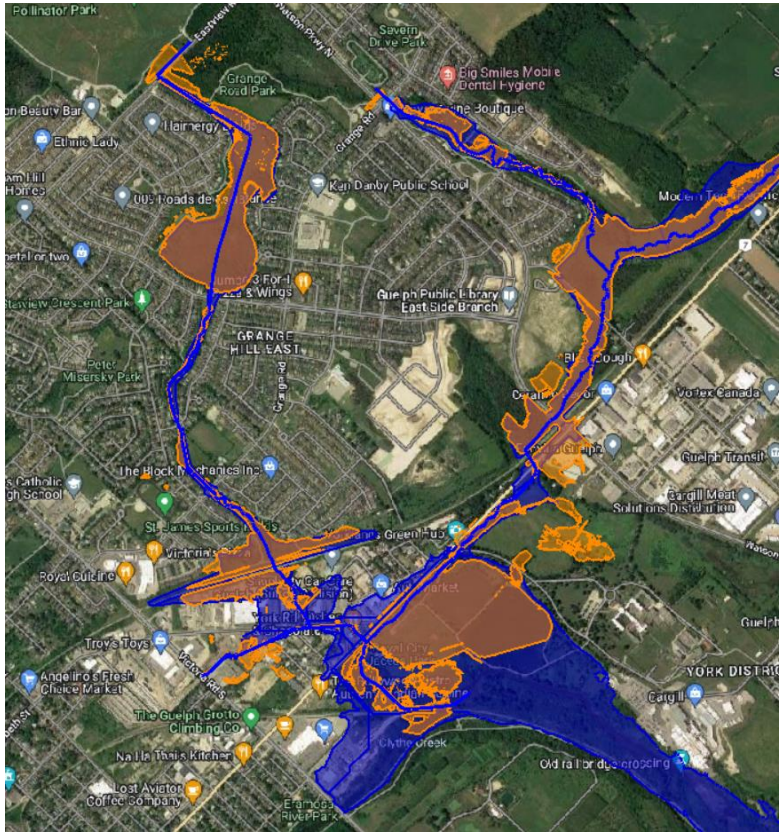
Surface water: Work underway

Assessments include

- flow depths, velocities, elevations, and extents;
- Regulatory floodplain mapping in Primary Study Area (i.e., Clythe, Hadati and Watson Creeks); and
- high-level (coarser) assessment in Secondary Study Area.

Model to be

- calibrated to 2023–2024 data; and
- used to determine Regulatory flood elevations.



Preliminary surface water mapping in the study area

Stream dynamics: Local context

- Local streams include Clythe Creek plus two tributaries: Hadati Creek, and Watson Creek.
- Historical channel interventions substantial throughout Guelph (e.g., piping, channel straightening, grade control, erosion control structures).
- Many segments can benefit from rehabilitation/enhancement.

Photos of Clythe Creek in Guelph

Stream dynamics:
Defining key terms

Features identified and mapped based on the following types

- A **watercourse** is a permanent to intermittent drainage feature with defined bed and banks, and active channel processes (e.g., erosion, deposition, migration, etc.).
- A **headwater drainage feature** is a non-permanent flowing feature (i.e., ephemeral) and may or may not have defined bed and banks.
    - Drainage area typically less than 50 hectares.
    - Collectively important for water storage, and downstream contributions of flow, sediment, and habitat contributions.

Stream dynamics: Progress to date

- Watercourse delineation and rapid field assessments include:
  - reach delineation and confirmation, building on previous studies;
  - assessments of stream stability and health at a high-level;
  - field-identified potential obstructions to fish movement;
  - confirmed erosion sites; and
  - assessments of watercourse crossings (e.g., roads, rail, pedestrian – bridges and culverts).
- Preliminary headwater drainage features delineated.
- Detailed site surveys at two sensitive locations (i.e., Clythe Creek at Watson Parkway and Hadati Creek near Schroder Crescent).

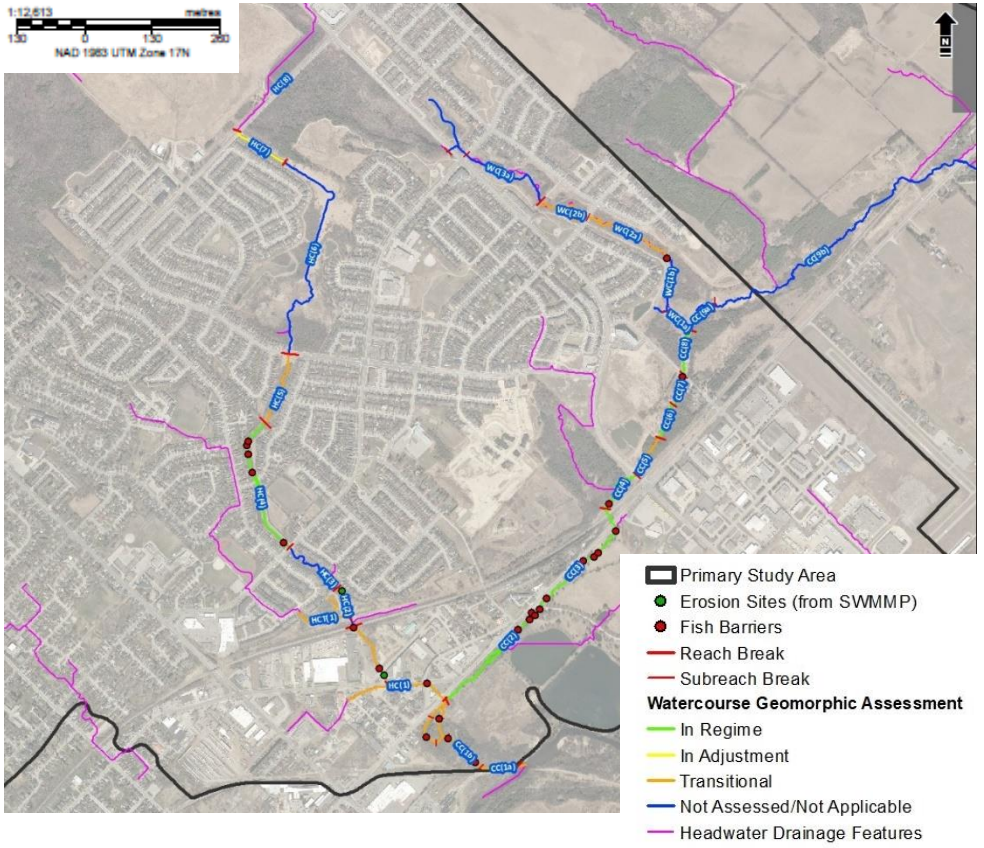
Stream dynamics: Findings to date

Stream reaches are either:

- "in regime" (i.e., stable);
- in a stage of transition; or
- in adjustment (i.e., unstable).

Several obstructions to fish movement; many from past works (e.g., perched culverts, weirs).

Headwater drainage features identified, but not yet evaluated in detail.



Preliminary watercourse assessments in the Primary Study Area

Stream dynamics: Work underway

- **Historic assessment:** Review historic data and mapping to characterize changes over time within the watercourses and broader subwatershed.
- **Erosion hazard delineation:** Outline areas currently and potentially impacted by erosion due to channel migration and valley contact.
- **High level characterization of headwater features:** Recommendations to be made for future detailed assessments.
- **Determination of erosion thresholds:** Calculations to support stormwater management requirements.

Aquatic biology: Local context

- Clythe Creek is classified as a coldwater stream by the Ministry of Natural Resources and Forestry (MNRF) based on the presence of Mottled Sculpin and the historic (1950s) presence of Brook Trout, which are coldwater fish species.
- Watson Creek is also classified as coldwater by MNRF.
- Hadati Creek is classified as a warmwater stream by MNRF.
- Groundwater discharge is necessary to maintain the water temperature regime required by coldwater fish species.
- Existing water temperature data indicate that Clythe Creek in the vicinity of Watson Parkway is coolwater or warmwater, not coldwater.

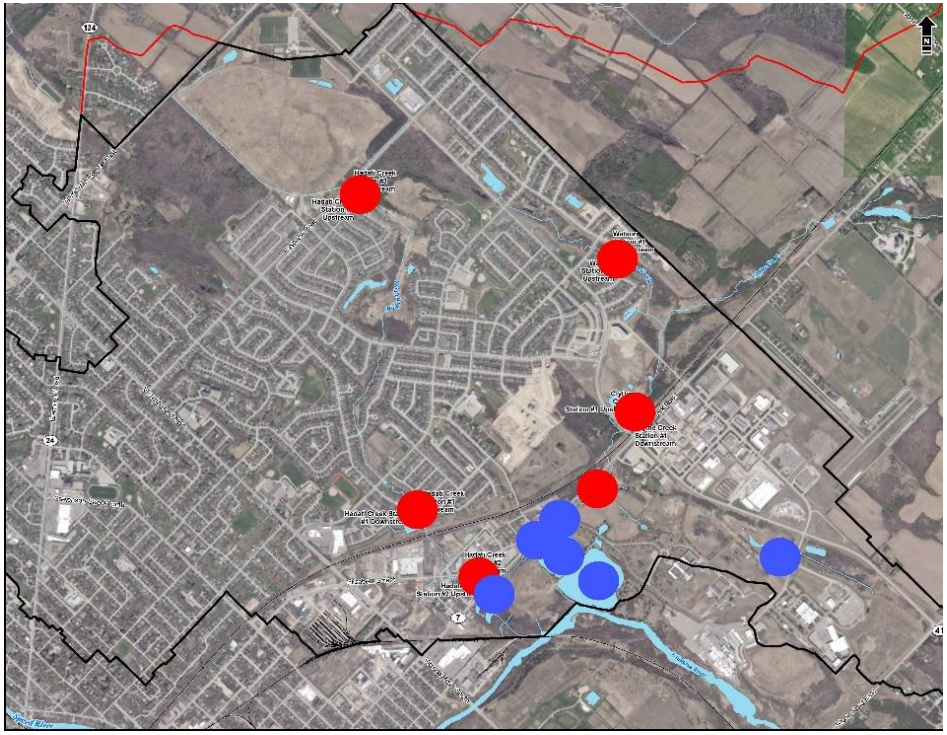
Aquatic biology:
Assessment and monitoring work

Assessment/monitoring stations

- six (6) aquatic monitoring sites for fish, benthic invertebrates (i.e., aquatic insects and larvae) and aquatic habitat

plus

- six (6) additional fish sampling sites



Red dots show aquatic monitoring stations.
Blue dots show supplemental fish sampling stations.

Aquatic biology: Preliminary findings

Mottled Sculpin (a coldwater fish species) were captured at all three stations along the south side of York Road.

Mottled Sculpin has not been found at the station upstream from Watson Parkway or the station downstream from the Hadati confluence.

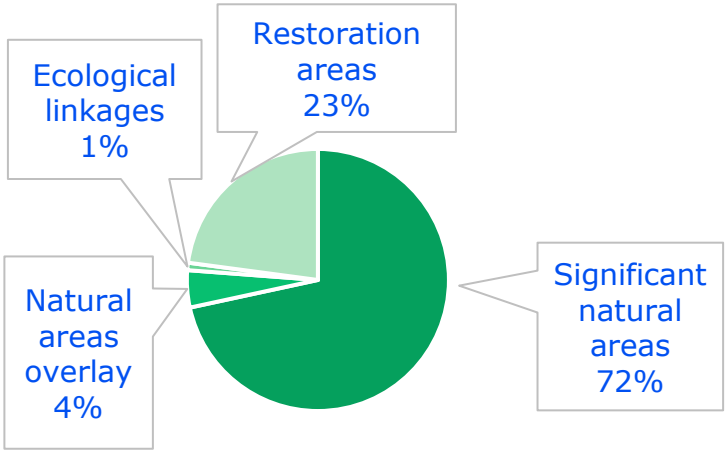
Photo of Mottled Sculpin found in Clythe Creek in the Primary Study Area

Aquatic biology: Work underway

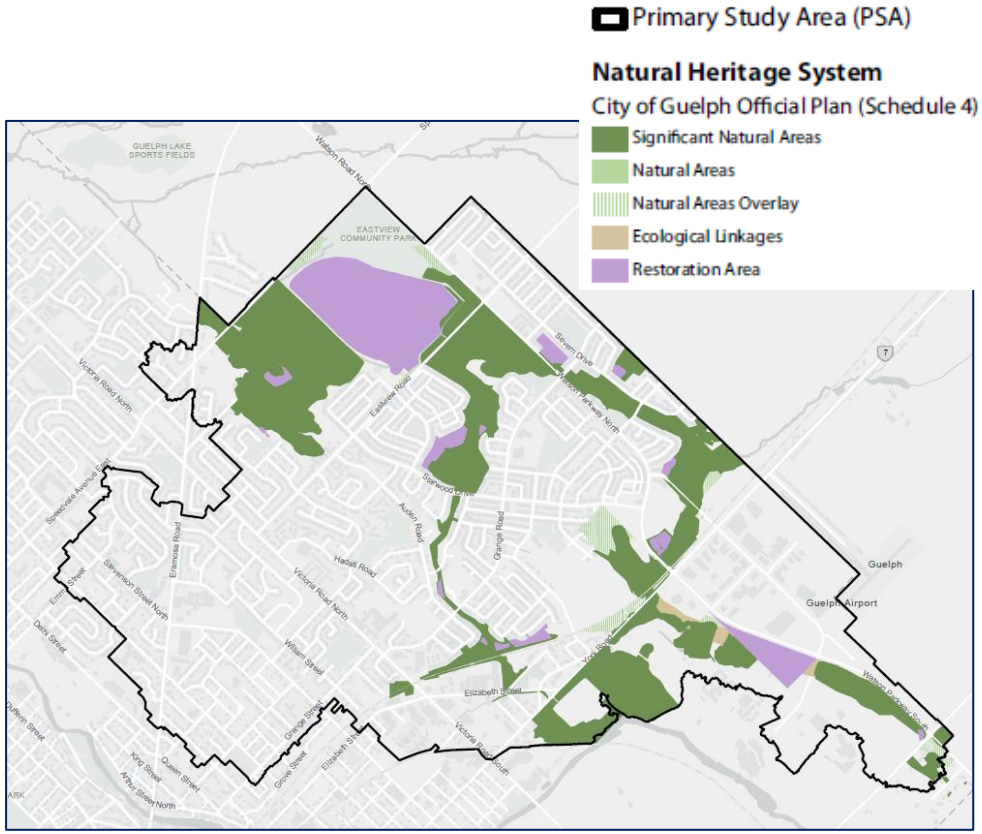
- Assessment of water temperature data from 2023.
- Identification of benthic invertebrates (i.e., aquatic insects) collected.
- Integration with other disciplines, particularly hydrogeology.

Terrestrial ecology: Local context

The City's existing Natural Heritage System mapping covers 23 per cent of the Primary Study Area.



Proportions of different Natural Heritage System components in the PSA.



Current Natural Heritage System in the Primary Study Area

Terrestrial ecology: Preliminary findings

- In 1997 landcover in the Primary Study Area was mainly urban and agricultural, with some natural land cover (e.g., including forests/woodlands, meadows, plantations and wetlands).
- Landcover has changed substantially since 1997, including the transition of some agricultural lands to residential and other urban land uses.
- Field verification of land cover types, focused on natural areas, is being undertaken as part of this study to update and confirm existing conditions.

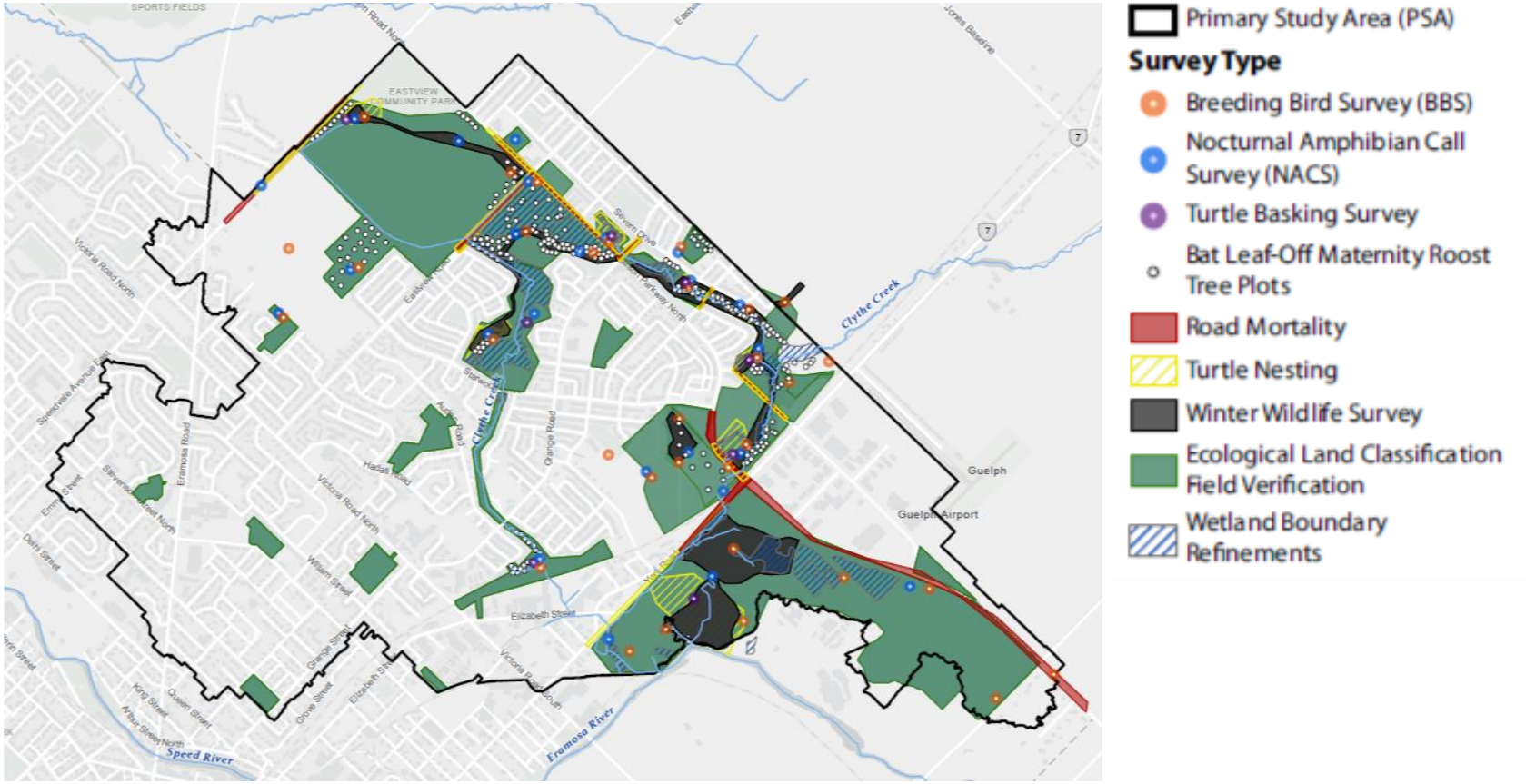
Terrestrial ecology: Assessment and monitoring work

Targeted field assessments in the City

- vegetation community surveys
- plant surveys
- wetland boundary refinements, and
- wildlife habitat assessments including
    - winter wildlife and bat habitat surveys;
    - breeding surveys for birds, frogs and toads;
    - road mortality and movement surveys; and
    - turtle basking and nesting surveys.

Photos of a wetland (above)and a meadow (below) in the study area

Terrestrial ecology:
Assessment and monitoring stations



Map of ecological survey locations in the Primary Study Area

Terrestrial ecology: Work underway

- Completion of targeted field work.
- Analysis of data and mapping.
- Synthesis of findings to inform the ecological existing conditions.
- Refine the City's Natural Heritage System in the Primary Study Area.
- Compile current land cover mapping in the Secondary Study Area with guidance/input from the County.

Photo of wetland boundary staking in the Primary Study Area

Clythe Creek
Subwatershed Study Update:

Part 2: Overview of work being completed: Questions?

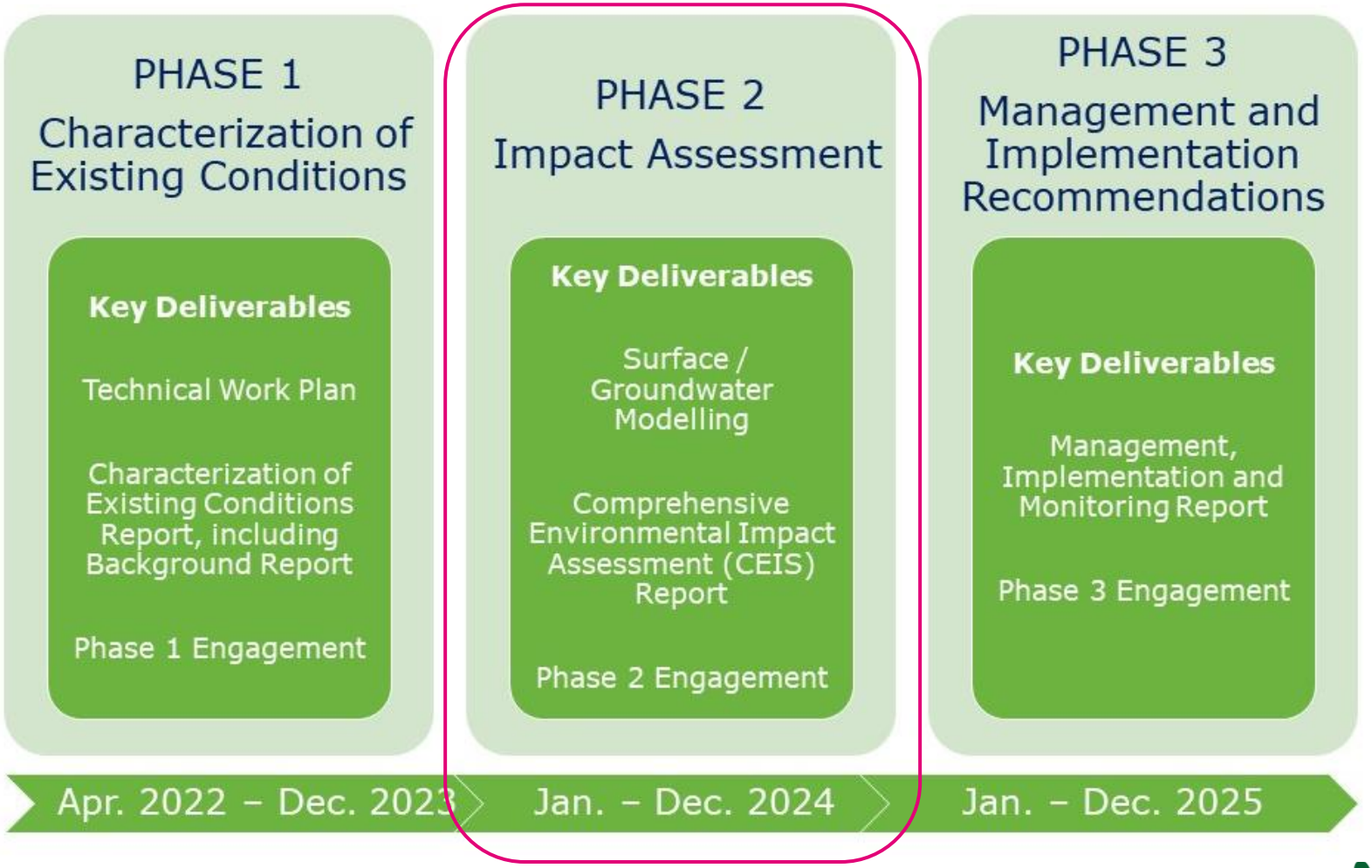
Clythe Creek
Subwatershed Study Update:

Part 3: Anticipated outcomes and next steps

What are some of the key deliverables of this study?

- **Recommendations for managing groundwater** to ensure it will continue to sustain local potable water needs and natural heritage features.
- Updated **floodplain mapping** for the Clythe Creek and its tributaries (in the Primary Study area).
- Updated **Natural Heritage System mapping**.
- Recommended **stormwater management approaches and tools** in the context of anticipated development and climate change.
- Identification of **partnerships** and, where they already exist, approaches to enhancing them to collaboratively better manage the subwatershed.
- A **monitoring framework** for tracking changes in the natural heritage and water resource systems as development in the area progresses.

Where do we go from here?



What are the immediate next steps?

- Ongoing field monitoring through 2024.
- Completion of the Characterization of Existing Conditions Report.
- Phase 2 engagement (planned for late 2024 or early 2025).

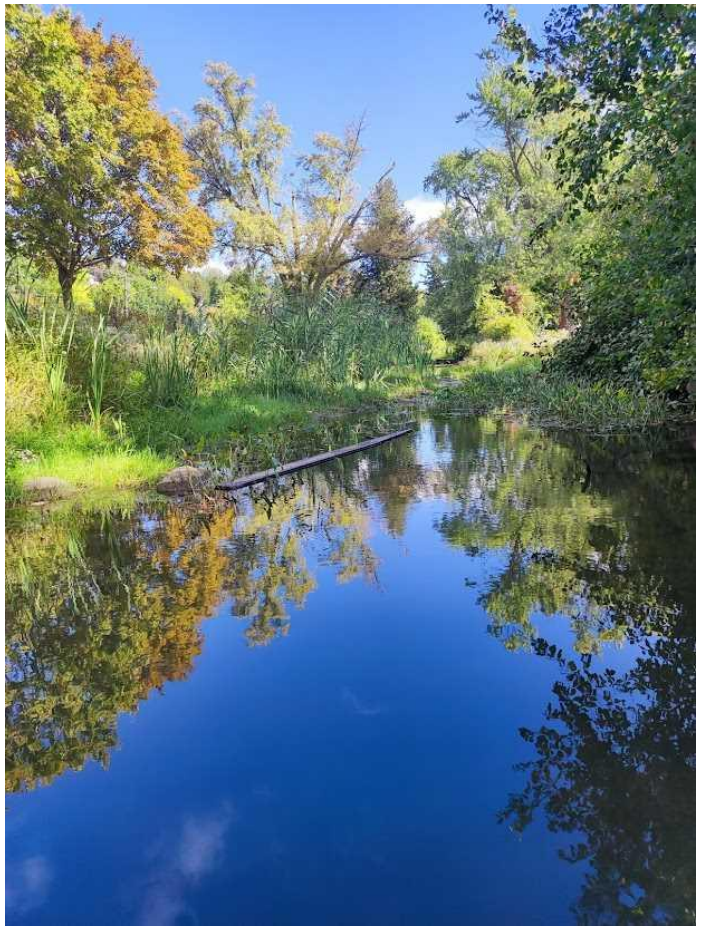


Photo of pond and natural areas south of York Road in Guelph

Clythe Creek
Subwatershed Study Update:

Part 3: Anticipated outcomes and next steps: Questions?

Do you have any comments or questions about this study?

Visit the project Have Your Say web page at

https://www.haveyoursay.guelph.ca/clythe-creek

and/or reach out to the project team contacts below.

Leah Lefler **Environmental Planner** Planning and Building Services, City of Guelph 519-822-1260 extension 2362 leah.lefler@guelph.ca	**Steve Chipps** **Consultant Project Manager** WSP Environment & Infrastructure Canada 289-208-4576 steve.chipps@wsp.com

Clythe Creek
Subwatershed Study Update

www.haveyoursay.Guelph.ca/clythe-creek

Thank you for engaging with us!