Meeting Agenda

City of Guelph

Joint meeting of:

Environmental Advisory Committee

River Systems Advisory Committee

August 8, 2018

City Hall, Meeting Room C

From 7:00 to 9:00 p.m.

Meeting Chair: Colin Oaks

Agenda Items

Welcome to all

Item 1, 2, 3 and 4

Item 1, Roll call and certification of quorum

Item 2, Declaration of conflict of interest

Item 3, Environmental Advisory Committee: Approval of minutes of June 11, 2018

Item 4, River Systems Advisory Committee: Approval of minutes of May 16, and June 20, 2018

Item 4

Draft Natural Heritage Action Plan

- Review of Staff Report and Council presentation
- In Committee discussion – motion

Item 6

Other business

Next Meeting:

EAC: September 12, 2018 from 7:00 to 9:00 p.m., City Hall, Meeting Room C

RSAC: September 19, 2018 from 4:00 to 6:00 p.m., City Hall, Meeting Room B

August 8, 2018
Environmental Advisory Committee
River Systems Advisory Committee

Item **Natural Heritage Action Plan**

Staff presented a draft Natural Heritage Action Plan to Committee of the Whole (COW) on July 4. The draft NHAP was also circulated to both EAC and RSAC at this time.

Report

Please see the attached July 4th report to Committee of the Whole for more information. This also includes the draft NHAP document which was also circulated to both committees previously.

Suggested Motion:

That the XXXX Committee formally supports the City's Draft Natural Heritage Action Plan and offers the following comments:

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Staff Report

To	**Committee of the Whole**
Service Area	Infrastructure, Development and Enterprise Services
Date	Tuesday, July 3, 2018
Subject	**Draft Natural Heritage Action Plan**
Report Number	IDE-2018-92

Recommendation

1. That the draft Natural Heritage Action Plan, included as Attachment 1, to the Infrastructure, Development & Enterprise Services Report (IDE 2018-92), dated July 3, 2018 be received.

Executive Summary

Purpose of Report

To provide Council with the draft Natural Heritage Action Plan (NHAP). The action plan proposes an implementation framework to achieve Official Plan vision, objectives and policies that support the City's natural heritage system and watershed planning. The draft action plan is being presented to seek input from Council prior to it being finalized.

Key Findings

The Natural Heritage Action Plan is being developed by the Policy Planning and Urban Design division of Planning, Urban Design and Building Services in collaboration with other departments. This project will serve a number of purposes, including:

- assisting in implementing the City's natural heritage and watershed planning policies of the Official Plan; and,
- developing the long term work plan for the City to fulfill its Official Plan objectives.

A main component of implementing natural heritage and water resources policies is engagement with the public, either through formal advisory committees or other means. The review of the Environmental Advisory Committee and the River System Advisory Committee is recommended as part of a review of engagement models for the NHAP.

Staff is presenting the draft Natural Heritage Action Plan to Council for receipt and input.

Financial Implications

Funding is not required for the development of the Natural Heritage Action Plan. The action plan is being prepared by City staff and using existing resources.

The implementation of the NHAP may have implications on the City's operating and capital budgets associated with specific actions, while other actions already have funding and/or staff capacity allocated. Actions that will require future funding will be subject to future budget processes for funding approval.

Background

The City's Official Plan commits to maintain, enhance and restore its natural heritage system (NHS) and to protect, improve and restore its water resources as part of an environment first approach to ensure the integrity of our natural systems are not compromised. The natural heritage system and our water resources contribute to enhancing the quality of life within the city by preserving the integrity of a wide range of natural features and ecological services, while also providing natural and open spaces for leisure activities and enjoyment opportunities for residents and visitors.

As part of City's Official Plan policies aimed at maintaining, enhancing and restoring the NHS and protecting the quality and quantity of water, there are requirements for additional studies, tools and resources needed to fulfil the vision and objectives for the our NHS and water resources.

Council approved the project charter for the Natural Heritage Action Plan (NHAP) in March of 2017. The scope of the NHAP is to create an implementation framework for Official Plan policies regarding the natural heritage system and watershed planning and water resources. This will include the identification and development of recommendations, strategies and guidelines that would assist staff to maintain enhance and restore natural heritage, surface water and ground water features within the City.

Since March of 2017 significant internal and external engagement has occurred following the scope and direction of the approved project charter. This has been used to develop the draft NHAP that is being presented through this report. A copy of the March 6, 2017 staff report is included as Attachment 2.

Report

In conformity with the Province's Growth Plan for the Greater Golden Horseshoe, Guelph expects to add 55,000 residents and 21,000 jobs between 2016 and 2041. In parts of the city, significant population growth and more compact development patterns are occurring, as required by Provincial legislation. Development in Guelph is becoming increasingly dense and includes a variety of housing options and a broad mix of uses representing a change from how the city developed over the post-war period. Management of growth and intensification while also supporting the protection, maintenance, restoration and improvement of Guelph's natural ecosystems is both a challenge and opportunity. If managed well, healthy and

resilient ecosystems can enhance the high quality of life for which Guelph is known. By continuing to maintain our biodiversity we can also continue to support and create vibrant and liveable neighbourhoods as we continue to grow.

The NHAP is being developed by environmental planning staff within the Policy Planning and Urban Design division of Planning, Urban Design and Building Services in collaboration with other departments across the corporation. Attachment 3 provides a listing of the departments and staff members involved in the development of the draft NHAP. Development of the draft NHAP involved a corporate-wide examination of the City's current environmental policies and practices, engagement of staff and stakeholders in setting directions and the creation of an action plan to establish the framework to guide our efforts in managing our natural heritage system and water resources while allowing for compatible development and growth.

Community input has also supported the development of the NHAP through consultation on environmental initiatives, programs and projects, which informed the development of actions included in this plan. A summary of community engagement to date is provided under the consultations section below. A detailed summary of the engagement results from each of the events held to date is also available on the NHAP project webpage.

The Natural Heritage Action Plan (NHAP)

Building from the established vision, objectives and policies of the Official Plan, the NHAP is divided into five sections which incorporate specific themes under which actions are contained. The NHAP represents a 10 year work plan for the City's environmental initiatives, programs and projects consisting of 38 actions. The proposed framework is a robust and forward thinking implementation plan which will achieve the Official Plan objectives and policies regarding the natural heritage system and watershed planning.

Each section also contains tables that outline: the actions and expected outcomes for each theme area; the general timeframe for implementation; and, whether or not the action requires a new allocation in the City's budget. The tables also highlight priority actions. It is recommended the City initiate priority actions within the next two to three years. Those actions which are medium to long term projects represent the longer term milestones staff will work towards over time and are dependent on some of the foundational projects identified as priority actions.

Prioritization of actions has considered interdependencies between both the actions within the NHAP as well corporate interdependent projects and programs, to help align timelines and staff resources based on when projects and programs are anticipated to be commenced, reviewed or updated.

Section 1: Watershed Planning to Manage Growth and Infrastructure
Watershed planning to manage growth and infrastructure includes actions to assist with supporting growth through watershed planning as it relates to understanding how subwatershed studies can help inform growth and infrastructure planning in Guelph. This section also highlights actions around how environmental monitoring

to support science-based decision making is a critical interdependency to help support watershed planning related actions, as well as to inform natural heritage, and restoration and biodiversity conservation.

Section 2: Natural Heritage & Biodiversity Conservation
Natural heritage & biodiversity conservation emphasizes how actions to increase our understanding and enhancement of our biodiversity are critical to inform actions that assist with how plant and wildlife management in an urban setting is approached. Connections are also made to showcase opportunities for continuous improvements in institutional processes and practices to help protect biodiversity, as well as show how we can use conservation land securement tools to support long term conservation of our natural heritage system.

Section 3: Data and Information Management
This section is representative of a foundational component which supports all of the other NHAP sections, and therefore is critical to the NHAP's success. Data management and technology to improve efficiencies and share knowledge will also help support success in the completion of other actions, initiatives and programs, including subwatershed study updates, environmental monitoring and community outreach.

Section 4: Resilience and Restoration Planning
The first theme in this section recognizes that Guelph depends on urban ecosystem resilience to support our healthy community as the City transforms into a more compact, connected neighbourhoods, and adapts to climate change. A second theme in this section highlights the importance of restoring urban ecosystems to support biodiversity and ecosystem resilience and to help create a culture that values biodiversity and green infrastructure. A third theme highlights opportunities for continuous improvements in institutional processes and practices.

Section 5: Fostering Community Support, Raising Awareness and Engagement
This section recognises the importance of education, outreach and stewardship and leveraging the community's participation, input and support through effective engagement models for supporting implementation in order to achieve our mission, principles and objectives for the protection of our natural heritage and water resource systems.

Priority Action Summary
A summary of the priority actions within the document is provided at the end of the NHAP. There are 16 priority actions which are proposed to be initiated within the next two to three years. These actions will also contribute to setting the foundation that future actions will continue to build upon.

Next Steps

The draft NHAP is being presented to Council to seek input and feedback prior to finalizing the NHAP. This version of the NHAP is also available for community comment and input through the City's website through July 24, 2018.

All feedback received on the draft NHAP will be used to help make revisions and produce a final document which will be brought back to Council for approval.

Financial Implications

Funding is not required for the development of the Natural Heritage Action Plan. The action plan is being prepared by City staff and using existing resources.

The implementation of the NHAP may have implications on the City's operating and capital budgets associated with specific actions, while other actions already have funding and/or staff capacity allocated. Actions that will require future funding will be subject to future budget processes for funding approval. Further details will be provided when the final NHAP is recommended to Council for approval.

Consultations

Internal Engagement

A series of 15 focused meetings have been held internally over 2017 and 2018 looking at themes and topic areas, generating ideas for actions, providing input into the draft NHAP document and providing input into the prioritization and timing of actions. This has been part of an inclusive process involving staff from across the organization, including:

- Infrastructure, Development & Environmental Engineering
- Transportation Services
- the Climate Change Office and the City's sustainability board
- Open Space Planning
- Park Operations and Forestry
- Water Services
- Wastewater Services
- Development Planning
- Information Technology
- Operations-Bylaw Compliance

Summary of Community Engagement

Community input has supported the development of the draft NHAP by helping explore and inform a range of environmental initiatives, programs and projects that have become part of the draft actions included in NHAP. Community engagement to date has included:

- **Community Survey - Natural Heritage Action Plan**

Following the commencement of the Action Plan by Council, a community survey in July of 2017 was completed with 390 responses received that helped inform how the community values its natural spaces and to help generate and refine possible theme areas for the action plan.

- **Council tours**

Through September and October of 2017, 3 tours were held with various members of council and senior management staff. The tours focused on highlighting on the ground challenges and successes around the various themes within the NHAP. This allowed members of City council an opportunity to ask questions, provide feedback, and gain understanding as to how the NHAP will help influence changes in neighbourhoods throughout the City.

- **Draft action workshops**

In January of 2018 a series of 3 draft action workshops were held to gain input from the community on proposed actions developed by staff and to seek additional ideas regarding actions from the community. An electronic survey version of the workshop materials was also posted on the City's website for two weeks following the workshops as an opportunity for further input. 51 people attended the workshops and additional 16 survey responses were received. Staff have considered what was heard and incorporated feedback into the development of the draft NHAP.

- **Nature in Guelph campaign**

Throughout the duration of this project, staff have participated in numerous events across the City where the "Nature in Guelph" postcard was available to the public. This postcard provided the opportunity for citizens to show what nature means to them using words, drawings and doodles. This campaign was used to raise the profile of the Natural Heritage Action Plan and reach a wider audience by providing the opportunity to creatively express connections to nature. Some of these ideas have contributed toward the development of graphic and visual content being used as part of the project.

Staff have also met with representatives from the Grand River Conservation Authority (GRCA).

Corporate Administrative Plan

Overarching Goals
Service Excellence
Innovation
Financial Stability

Service Area Operational Work Plans
Our People- Building a great community together
Our Resources - A solid foundation for a growing city
Our Services - Municipal services that make lives better.

Attachments

ATT-1 Draft Natural Heritage Action Plan – July 2018

ATT-2 IDE 17-25 Natural Heritage Action Plan (NHAP) Project Initiation Report March 6, 2017

ATT-3 Interdepartmental Team

Departmental Approval

Not applicable.

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Natural Heritage Action Plan

Draft
July 2018

Alternate formats are available as per the Accessibility for Ontarians with Disabilities Act by contacting Policy Planning and Urban Design at 519-837-5616

Table of Contents

Introduction: The way Guelph is growing is changing

In conformity with the Province's Growth Plan for the Greater Golden Horseshoe, Guelph expects to add 55,000 residents and 21,000 jobs between 2016 and 2041. In parts of the city, significant population growth and more compact development patterns are occurring, as required by Provincial legislation. These changes are also being influenced by other shifts, such as demographic changes (for example, aging baby boomers and millennials entering the workforce), climate change awareness and action, and trends in economics, municipal governance, environment and health.

Development in Guelph is becoming increasingly dense and includes a variety of housing options and a broad mix of uses representing a change from how the city developed over the post-war period. Management of growth and intensification while also supporting the protection, maintenance, restoration and improvement (herein after referred to as management) of Guelph's natural ecosystems is both a challenge and opportunity.

Challenge accepted!

Ecosystem stressors like invasive species, encroachment, habitat loss, population growth, resource use, pollution and climate change can drive changes to our natural ecosystems which support our local biodiversity. Plants and wildlife depend on interconnected ecosystems. Connectivity can be a challenge to maintain in urban areas. At times, biodiversity conservation can conflict with other important community objectives such as flood and erosion protection, resource use, recreation, aesthetics and health and safety. Similarly, fish and wildlife such as coyote, deer, geese and bees are part of our natural ecosystems and create challenges in how we perceive, interact and live with wildlife in the city.

Climate change presents increased risk for extreme weather events. Drought can reduce stream baseflows and drinking water supplies, intense heavy rains can result in dangerous and damaging floods, ice and wind storms can affect our natural ecosystems, utilities and telecommunication, and extreme heat coupled with poor air quality can result in public health risks to vulnerable populations. Healthy and biologically diverse ecosystems can help reduce vulnerability to climate change and other ecosystem stressors in order to support healthy communities.

How effectively Guelph responds to these challenges depends on our success at taking action to fulfill our Official Plan policies to manage our natural ecosystems and support our local biodiversity. If managed well, healthy and resilient ecosystems can enhance the high quality of life for which Guelph is known.

Figure 1. The natural heritage system supports the creation of vibrant and healthy neighbourhoods. The City's approach to managing the natural heritage system must consider how it is growing.

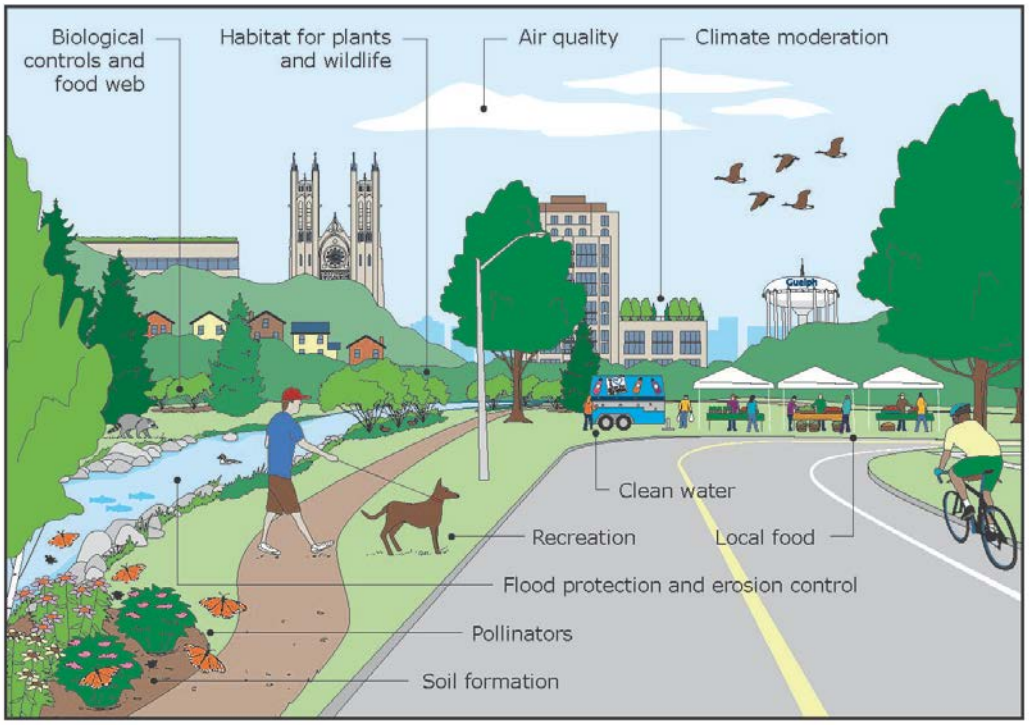
Box 1 – What is biodiversity and why should it be conserved?

Biodiversity is the variety of life on Earth. It includes all living things and the ways in which they interact with one another and their environment. Simply put, biodiversity is life. There are three levels of biodiversity:

- genetic diversity—the variety of genetic information contained in individual plants, animals and micro-organisms
- species diversity—the variety of species
- ecosystem diversity—the variety of habitats, ecological communities and ecological processes.

Biodiveristy is vital to ecosystem health. Conserving biodiversity is very important because healthy ecosystems sustain healthy people and a healthy economy. We derive benefits from the ecosystem services provided by biodiversity including food, fibre and medicine, clean air and water and outdoor recreation that nourishes our physical and mental health. Ontario's biodiversity also has inherent value and deserves to be recognized, appreciated and conserved for its own sake.[1]

Figure 2. Biodiversity is found throughout the city, from the wildlife that lives here to the provision of clean air and drinking water.



[1] Ontario Biodiversity Council. 2011. Ontario's Biodiversity Strategy, 2011: Renewing Our Commitment to Protecting What Sustains Us. Ontario Biodiversity Council, Peterborough, ON.

Opportunities abound!
There are plenty of opportunities in Guelph to support biodiversity conservation by building from work already done and embracing innovative strategies and tools. These include: identifying and designating a natural heritage system and associated policies; learning from our experiences in developing subwatershed studies, developing and implementing wise use and conservation plans; promoting and implementing restoration and enhancement plans; valuing natural assets; and providing opportunities for our community to connect with nature.

Guelph's natural heritage system supports local biodiversity
Our biodiversity includes the terrestrial and aquatic ecosystems that form part of Guelph's natural heritage system. It includes everything from the confluence of the Speed and Eramosa rivers downtown to the headwaters and wetlands of Hanlon Creek, the coldwater habitat in Clythe Creek and Eastview Pollinator Park. It extends to the reformatory ponds and surrounding natural landscape along York Road, the Paris Moraine in the south end and all natural areas across the city.

The natural heritage system supports a variety of species through provision of a variety of habitats. The City's Official Plan policies have specific direction around how the natural heritage system should be managed by improving biodiversity and connectivity of the system. Healthy and biologically diverse natural heritage systems are more resilient to ecosystem change and will therefore be able to better adapt to Guelph's urban future.

Box 2 – What is the natural heritage system?

The City's natural heritage system (NHS) is made up of a combination of natural spaces like rivers, streams, woodlands, wetlands, meadows and wildlife habitats that are interwoven and connected by hydrological and ecological linkages. The NHS supports the complex ecosystems that provide habitat for plants, fish and wildlife.

Conservation, wise-use and watershed management shape Guelph's history
In 1993 the Hanlon Creek Subwatershed Study put the City of Guelph at the forefront of watershed planning in Southern Ontario. Working with the Grand River Conservation Authority (GRCA) and Wellington County this was followed by a series of additional studies for Clythe Creek and Mill Creek (1997), Torrance Creek (1998) and the Eramosa River (1999). Guelph also released the River System Management Study in 1993, and this document was a key influence in the evolution of the Official Plan policies in the 1990s.

A long standing leader in water conservation and efficiency efforts, Guelph remains one of the largest communities in Canada that depends on groundwater as the source of our drinking water. Guelph is recognized as a trailblazer in energy

planning and water conservation; as well as for being innovative in how waste, recycling and compost are managed. Our commitment to sustainable use of resources and use of watershed planning in decision making will help us conserve local biodiversity.

Monitoring and restoration are important aspects of biodiversity conservation

Through our Official Plan policies, we have made a commitment to monitor, restore and enhance the natural heritage system to support biodiversity. This action plan highlights the need to invest resources in monitoring and management, including restoration and enhancement, of our natural heritage system. Monitoring allows us to understand ecosystem needs and helps to inform where, and what kinds of, restoration and enhancement efforts should occur. It also provides a basis for us to value our natural heritage system as a City asset that reflects how our natural heritage system is part of the green infrastructure that supports the quality of life experienced by our community. As well, restoration and enhancement efforts provide opportunities to further connect community members with nature through participation in stewardship activities that can improve both physical and mental health.

Our community is our most valuable player

Guelph is fortunate to have the wealth of community support, awareness and environmental mindedness to build upon as we look at how to manage intensification and growth in our city while supporting the management of our natural environment. Guelph's past successes in conservation are the result of both strong leadership and grassroots initiatives. Through collaboration, groups and associations like the Environmental Advisory Committee, the River Systems Advisory Committee, the Water Conservation and Efficiency Public Advisory Committee, the Guelph Hiking Trail Club, Nature Guelph, Pollination Guelph, the Ontario Public Interest Research Group (Guelph chapter), various groups from the University of Guelph and more have been instrumental in our success. Our community stewards continue to be a driving force that sets Guelph apart.

Background

The Official Plan policies establish the vision and policy framework for protecting what is valuable

In 2010, the City completed its natural heritage strategy which provided the technical basis and background for the development of a new comprehensive set of policies and the identification of a natural heritage system, to update the greenlands system policies in the City's Official Plan. This update became Official Plan Amendment 42 (OPA 42) and provided new natural heritage system policies for the City. These policies came into full effect in June of 2014.

Guelph received the Lee Symmes Municipal Award for its community leadership and exceptional achievement developing leading-edge natural heritage system policies from Ontario Nature in 2015. The natural heritage system policies include: increased protection for woodlands and wildlife habitat; recognition of the importance of pollinators and meadows; and focus on watershed planning as a way to support science-based decision making.

The City's natural heritage system policies are leading-edge

The City is comprised of 1900 hectares of natural spaces and features that create the City's natural heritage system, which represents nearly 22% of Guelph's total land area.

The City's commitment to manage its natural heritage system includes an environment first approach to ensure the health of the system is not compromised. The natural heritage system contributes to enhancing the quality of life within the city by preserving the integrity of a wide range of natural features and ecological services, while also providing recreation opportunities for residents and visitors in natural spaces.

The City's natural heritage system is made up of a combination of natural heritage features and areas, including:

- Significant Wetlands and Other Wetlands;
- Significant Woodlands and Cultural Woodlands;
- Significant Valleylands and Surface Water and Fish Habitat;
- Significant Wildlife Habitats, including Ecological Linkages, and Habitats for (locally) Significant Species;
- Habitats of Endangered and Threatened Species;
- Significant Landform;
- Restoration Areas; and
- Wildlife crossings.

Together, these elements represent a portion of the City's natural assets including its distinct and variable physiography, ecological and hydrological functions and connectivity which in turn support natural processes, populations of indigenous species and sustain local biodiversity.

Figure 3. The City's natural heritage system and water resources are found in every corner and across the city!

To fulfill the City's Official Plan policies additional studies, tools and resources are needed. This action plan will provide the framework to support achievement of the natural heritage system vision, objectives and policies.

While the emphasis of this action plan is on our natural heritage system; it also recognizes the value of human-made habitats and green infrastructure such as green roofs, stormwater ponds, pollinator gardens and the urban forest in contributing to our local biodiversity.

Purpose of the Natural Heritage Action Plan

This action plan represents the City's implementation framework to support its Official Plan policies for the natural heritage system and watershed planning.

Box 3 -What is an action plan?

An action plan is a strategic and forward-looking plan that establishes actions required to reach certain goals, which in this case are the Official Plan natural heritage system and watershed planning policies.

The Natural Heritage Action Plan (NHAP) presents a mission, principles and actions for supporting the policies and objectives for our natural heritage systems and water resources as established in the City's Official Plan. This plan, together with the City's Urban Forest Management Plan, Stormwater Management Master Plan, Water Supply Master Plan and Water Efficiency Strategy, Water and Wastewater Servicing Master Plan, Transportation Master Plan, Parks and Recreation Master Plan, Active Transportation Network Study and the Guelph Trails Master Plan; guides our efforts in managing our natural heritage system and water resources while allowing for compatible development and growth.

Mission

Supporting the vision and following the policies of our Official Plan, Guelph will lead by example to protect, maintain, restore and improve (herein after referred to as management) our natural heritage system and water resources supported through community partnerships and stewardship networks. Our actions and decision-making practices will be informed by science to assist in building a healthy community, where the urban environment is inclusive of nature and resilient to climate change.

Protecting what is valuable: understanding our natural environment objectives

The City has set out objectives for protecting our natural heritage system and water resources through the Official Plan. The following objectives are derived from the Official Plan and are particularly important in the informing the Natural Heritage Action Plan.

1. To implement a systems approach that ensures that the diversity and connectivity of natural features in the City, and the long-term ecological function and biodiversity of the natural heritage system is managed with recognition of linkages between and among natural heritage features, surface water features and groundwater features.
2. To manage the quality and quantity of the City's surface water and groundwater resources through municipal initiatives and community stewardship.
3. To recognize that the natural heritage system provides important ecosystem services that benefit current and future generations.
4. To manage the natural heritage system to the greatest extent possible, while providing for compatible development and activities that do not negatively impact natural heritage features and areas and their ecological and hydrological functions now and in the long term.
5. To manage tree canopy cover while providing for other habitats such as thickets and meadows, at appropriate locations to support biodiversity.
6. To use an ecosystem based watershed planning approach to inform the identification, evaluation and management of the natural environment.
7. To provide for clear mechanisms for assessing the potential impacts of development, site alteration and other activities on the natural heritage system.
8. To recognize that natural heritage features and areas in urban settings are subject to a variety of impacts and stressors, and seek to identify opportunities to mitigate these influences through ongoing stewardship, monitoring and management.
9. To foster appreciation and local stewardship of the natural heritage system.
10. To support the ongoing monitoring and management of the City's natural heritage system to ensure its long–term sustainability and resilience in relation to the impacts and stresses associated with the urban context, as well as other systemic factors, such as climate change.
11. To practice and encourage effective management of stormwater in order to maintain or enhance the water resources of the City.
12. To support a natural heritage system resilient to climate change.

Principles of natural heritage and water resource management to support implementation

The following principles help guide the implementation of actions that form the natural heritage action plan. These principles support the objectives of our natural heritage system and water resources and will inform how we balance our objectives as a City, as we continue to grow and intensify.

Monitor and manage our biodiversity using an ecosystem based approach

An ecosystem–based approach recognizes the interdependencies of land, air, water and living organisms and recommends a precautionary approach to allow for sustainable development that supports economic development and conserves biodiversity. Biodiversity management includes management of the areas within the City's natural heritage system while also recognizing that backyard gardens, neighbourhood parks, green roofs, and other urban spaces also contribute to and sustain our local biodiversity.

Use watersheds or subwatersheds as the most meaningful hydrologic unit for protecting the quantity and quality of water

Use watershed planning, an ecosystem-based approach, as a mechanism to efficiently integrate and manage ecosystem services into growth and infrastructure decision making, particularly with respect to water quality and quantity.

Lead and innovate to find solutions

Lead by example and integrate sustainable community design and natural heritage system management into our actions, programs and decision making processes. Implement and promote best management practices and seek opportunities to support and inform leading edge technology to help shape the natural environment and environmental actions, programs and operations.

Collaborate and engage with a range of partners

Raise awareness and increase our community's understanding and appreciation of natural heritage system and water resources. Develop partnerships and provide opportunities to collaborate with our community to implement stewardship activities that span areas such as restoration, education and outreach about our natural spaces and ecosystems.

Work with supporting agencies and governments

Recognize that biodiversity and subwatersheds are not limited by jurisdictional boundaries and seek opportunities to work with neighbouring governments, agencies and jurisdictions to manage our natural heritage system and water resources in a coordinated manner.

Integrate to be effective and efficient
Implement actions based on integrated knowledge stemming from various City departments, with contributions from our community and partners. Align departmental plans, strategies and actions supporting the city's natural spaces, water resources and ecosystem services to achieve objectives and optimize implementation in an effective and efficient manner.

Be sustainable and resilient
Be mindful that the actions taken should meet the needs of our community without compromising the ability of future generations to enjoy, interact and benefit from the ecological services provided by our natural spaces. Identify and consider risks and recognize opportunities when developing programs and implementation actions to reduce negative impacts, enhance ecosystem services, and support green infrastructure.

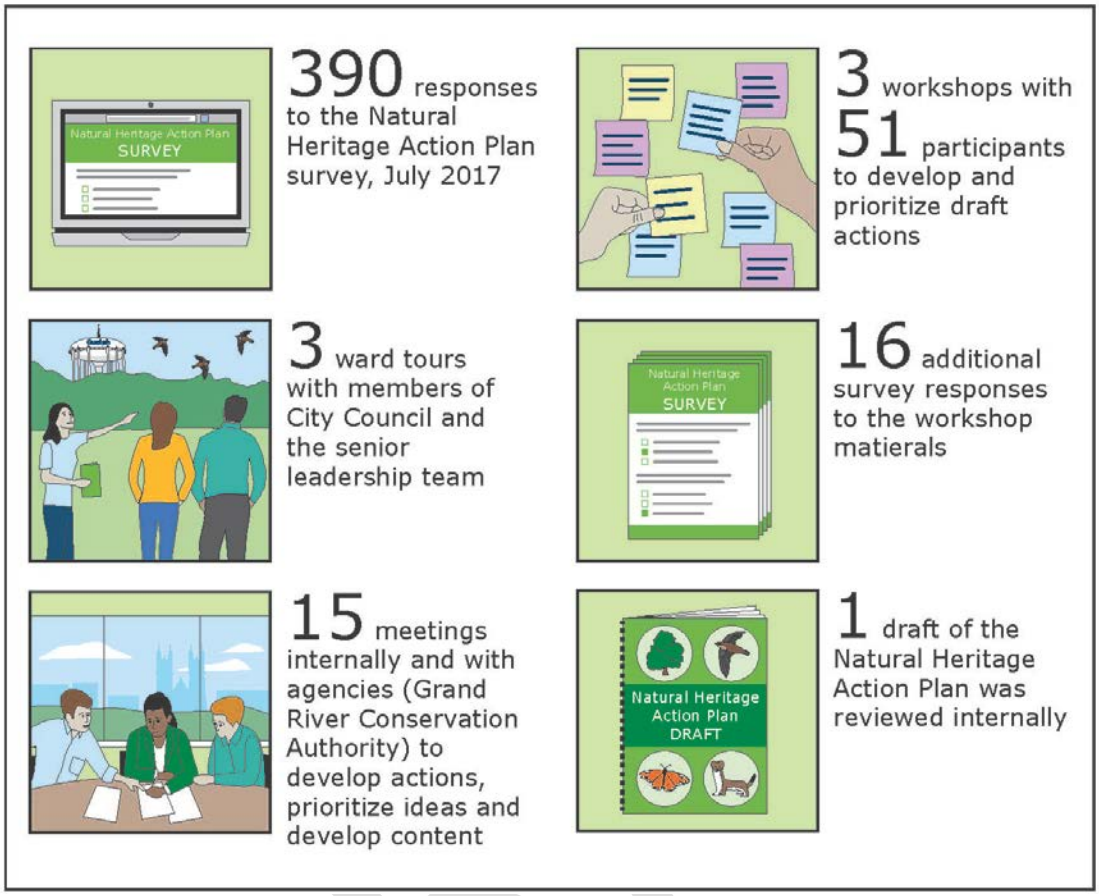
Science-based decision making and adaptive management
Increase the City's understanding and appreciation of the natural heritage system and water resources using science and evidence-based processes to inform our decision making. Improve data management and knowledge transfer to increase our collective understanding of risks and implications of actions and inactions that impact or influence the environment. Monitor outcomes of management decisions and adjust and adapt as needed to achieve objectives and ensure healthy diverse ecosystems and the well-being of our community.

Measure and highlight our successes and failures
Monitor and assess the status of the natural heritage system, water resources and associated programs and projects. Report and share the successes and failures of our efforts to learn, improve and celebrate.

Community Engagement Summary

Community input supported the development of this draftaction plan through consultation on environmental initiatives, programs and projects, which informed the actions included in this plan. Community engagement to date includes the following:

Figure 4. Summary of community engagement and corporate integration undertaken to develop the draft Natural Heritage Action Plan.



1. Community survey – Summer 2017

Following the commencement of the action plan by Council a community survey was conducted resulting in 390 responses that informed how the community values its natural spaces and helped generate and refine possible theme areas for the action plan.

2. Council tours – Fall 2017

In the fall of 2017, three tours were held with members of Council and senior management staff. The tours focused on highlighting on-the-ground challenges and successes around the various themes within the action plan. This allowed members of City Council an opportunity to ask questions, provide feedback and gain understanding as to how the action plan will help influence changes in neighbourhoods throughout the city.

3. Action plan workshops – January 2018

In January of 2018 a series of three workshops were held to gain input from our community on proposed actions developed by staff and to seek additional ideas regarding actions from our community. An electronic survey version of the workshop materials was posted on the City's website for two weeks following the workshops as an opportunity for further input.

Fifty-one people attended the workshops and 16 survey responses were received. Staff considered what was heard and incorporated feedback into the development of the NHAP.

4. "Nature in Guelph" campaign

Throughout the duration of this project, staff have participated in numerous events across the city where the "Nature in Guelph" postcard was made available. This postcard provided the opportunity for citizens to show what nature means to them using words, drawings and doodles. This campaign was used to raise the profile of the action plan and reach a wider audience by providing the opportunity to creatively express connections to nature.

Figure 5. Front side of "Nature in Guelph" postcard

How the Natural Heritage Action Plan is organized

This document provides an implementation framework for the established vision, objectives and policies of the Official Plan. The NHAP is divided into five sections which incorporate specific themes; each of these themes in turn includes specific actions and supporting or related information.

At the end of each section is a set of proposed actions presented in table format. The outcome for each action is categorized in the tables as being: PS for plans and strategies; GS for guidelines and standards; CO for community outreach; EMM for environmental management and monitoring; and/or GO for governance and oversight. Each table also includes a target date, budget status and lead City division for each action. The lead City division will be responsible for all components of project management including ensuring budget is allocated, obtaining budget when required and initiating the action by the anticipated target date.

Priority actions are identified in each section of the NHAP and illustrated in their respective tables by green shading. At the end of this document there is a summary of priority actions. Priority actions are those actions that will be initiated in the short-term (i.e., 1-3 years).

A series of actions representing the theme of **continuous improvements in institutional processes and practices** are distributed among certain sections as described below. These actions focus on how we can improve our day-to-day operational protocols, build partnerships, and streamline processes through technical manuals, guidelines and standards; and, incorporate natural heritage and biodiversity conservation and wildlife protection into our way of doing business.

Section 1 - Watershed Planning to Manage Growth and Infrastructure includes actions to assist with **supporting growth through watershed planning** as it relates to understanding how the completion and update of subwatershed studies can help inform growth and infrastructure planning in Guelph. A second theme highlights actions around how **environmental monitoring to support science-based decision making** is a critical interdependency to help support watershed planning related actions, as well as to inform natural heritage, and restoration and biodiversity conservation.

Section 2 - Natural Heritage & Biodiversity Conservation emphasizes how actions to increase our **understanding and enhancement of our biodiversity** are critical to inform actions that assist with how **plant and wildlife management in an urban setting** is approached. Connections are also made to showcase opportunities for **continuous improvements in institutional processes and practices** to help protect biodiversity, as well as how we can use **conservation land securement to support long term conservation** of our natural heritage system.

Section 3- Data and Information Management represents a foundational component which supports all of the other NHAP sections and is therefore critical to this plan's success. **Data management and technology to improve efficiencies and share knowledge** will also help us succeed in the completion of other actions,

initiatives and programs, including subwatershed study updates, environmental monitoring and community outreach.

Section 4 - Resilience and Restoration Planning recognizes that Guelph depends on **urban ecosystem resilience to support our healthy community** as we transform into more compact, connected neighbourhoods and adapt to climate change. A second theme in this section highlights the importance of **restoring urban ecosystems to support biodiversity and ecosystem resilience** and to help create a culture that values biodiversity and green infrastructure. A third theme highlights opportunities for **continuous improvements in institutional processes and practices**.

Section 5 - Fostering Community Support, Raising Awareness and Engagement recognizes the importance of **education, outreach and stewardship** and leveraging our community's participation, input and support through effective **engagement models for supporting implementation** of our mission, principles and objectives related to the protection of our natural heritage system and water resources.

Figure 6. How the NHAP is organized

Section 1 Watershed planning to manage growth and infrastructure	• 1.1 Theme: Supporting Growth through Watershed Planning • 1.2 Theme: Environmental Monitoring to Support Science-Based Decision Making
Section 2 Natural heritage and biodiversity conservation	• 2.1 Theme: Understanding and Enhancing our Biodiversity • 2.2 Theme: Continuous Improvements in Institutional Processes and Practices • 2.3 Theme: Plant and Wildlife Habitat Management in the Urban Setting • 2.4 Theme: Supporting Long-Term Conservation of Natural Heritage Lands
Section 3 Data and information management	• 3.1 Theme: Data Management and Technology to Improve Efficiencies and Share Knowledge
Section 4 Resilience and restoration planning	• 4.1 Theme: Urban ecosystem resilience to support a healthy community • 4.2 Theme: Restoring urban ecosystems to support biodiversity • 4.3 Theme: Continuous Improvements in Institutional Processes and Practices
Section 5 Fostering community support, raising awareness & engagement	• 5.1 Theme: Engagement models for supporting implementation • 5.2 Theme: Education, Outreach and Stewardship

Section 1: Watershed Planning to Manage Growth and Infrastructure

1.1 Theme: Supporting growth through watershed planning

Watershed planning enables an ecosystem–based approach for land use management. It recognizes the interdependencies of land, air, water and living organisms and recommends a precautionary approach to environmental protection to allow for sustainable development that supports economic development. One of the over-arching principles in watershed planning is adaptive management, which means the continuous improvement of policies and management strategies and actions through monitoring, assessing effectiveness, considering new science and technology and adjusting management actions.

The Grand River Watershed is at the heart of watershed planning in Ontario

The Grand River Conservation Authority (GRCA) has been managing the largest watershed in Southern Ontario for almost 80 years. They are one of the first Conservation Authorities (CA) to develop a water management plan. The Grand River Water Management Plan has been updated throughout the years including 1954, 1971, 1982 and most recently in 2014. The City is a partner in this plan which discusses how water resources are managed at the watershed scale.

Watershed planning has supported the development of healthy neighbourhoods across our city. By promoting a clean healthy environment, watershed plans also promote and support long-term economic viability.

Watershed management is in Guelph's DNA

Our existing subwatershed plans include recommendations for water quantity and quality improvements by reducing the use of salt as a de-icing agent, incorporating the use of lot level stormwater controls, setting infiltration targets to ensure our aquifers are recharged, removing online ponds to reduce stream temperatures and enacting by-laws to enforce the maintenance of erosion and sediment controls during development. They also include recommendations for the protection of wetlands, tableland woodlands and wildlife habitats as well as support for community stewardship groups to assist with cultivating a culture of conservation and wise use.

These recommendations were well ahead of their time 25 years ago when these plans were developed. They have set our community apart as a leader in environmental protection and conservation, as well as in terms of efficiency and wise use, all qualities that are attractive to development and economic renewal efforts in our city.

Watersheds are the most important hydrologic unit for protecting the quantity and quality of water

The Growth Plan (2017) for the Greater Golden Horseshoe provides direction to integrate watershed and subwatershed planning into municipal decision making related to community planning for secondary plans and infrastructure including water, waste water and stormwater management. Moving forward, the provincial guidance materials will provide direction for watershed planning.

Guelph's Official Plan includes watershed planning policies and recognizes that a watershed planning approach helps to support the City's natural heritage system and water resources.

The physical land area of Guelph is within nine subwatersheds that are part of the broader Grand River Watershed.

Subwatershed studies have been completed historically for some of these subwatersheds, typically in partnership with the GRCA and in advance of development occurring. Figure 4 provides an overview of existing subwatershed studies and/or equivalents in Guelph.

Subwatershed studies have not been completed for the Speed River, a major tributary of the Grand River, as well as Silvercreek, Howitt Creek and Irish Creek. In part, the lack of subwatershed studies in the Speed River, Silvercreek and Howitt Creek subwatersheds is attributed to settlement and development in these areas occurring before watershed planning was used as part of a broader planning framework. However, the timing of development within the areas of the Hanlon, Torrance, Clythe and Eramosa subwatersheds meant that these developments were informed by subwatershed studies.

Subwatershed studies set goals and objectives based on local needs

Watershed planning uses boundaries that are based on geologic and hydrologic processes to study and manage water and natural systems. Watershed planning is applied at many scales and the level of detail in a study increases as the size of the planning area is reduced. A watershed is an area drained by a river and its tributaries while a subwatershed is an area comprised of land drained by an individual tributary to the main river.

Subwatershed studies set goals and objectives based on local needs. They are used to characterize streams, wetlands, forests, groundwater recharge areas, and other natural features and functions through data collection at long-term monitoring stations. Subwatershed plans recommend management practices to support how water resources and natural heritage systems are protected and enhanced to coincide with existing and changing land uses. They include recommendations and targets to protect, improve and restore natural heritage systems as well as water quality and quantity. They establish specific criteria and actions for development,

for water and wastewater servicing, for stormwater management and to support ecological needs.

A subwatershed plan relies on site-specific surface water, groundwater, and ecological data as well as input from a steering committee and community stakeholders to determine local priorities. It requires substantial commitment, budget and partnership.

These studies should be reviewed and updated from time to time as areas change and development or redevelopment occurs. These studies are typically implemented through incorporation into Official Plans, master plans and development plans as well as through monitoring and adaptive management programs as well as operations and stewardship initiatives.

Figure 7. Summary of the state of subwatershed studies in Guelph

Subwatershed	Subwatershed Study	Prepared For	Notes
Clythe & Hadati Creeks	Clythe Creek Subwatershed Study, 1997	Metrus Developments (approved by City of Guelph)	Completed to provide management direction and in anticipation of land use changes (urbanization in east Guelph)
Ellis/ Chillico Creek	East Side Subwatersheds Study 2005-2010 (2014)	Region of Waterloo, City of Cambridge, GRCA	This subwatershed study is a characterization study only and was prepared to inform the Region of Waterloo's subwatershed studies for the East Side Lands of the Region.
Eramosa River	Eramosa River Blue Springs Creek Watershed Study (1999)	GRCA	Completed to characterize landscape, identify trail and heritage assets and sensitivities to potential land use changes (aggregates, golf courses, agriculture).
Hanlon Creek	Hanlon Creek Subwatershed Plan, 1993	City of Guelph, GRCA	Studies providing partial updates to the study: • South Guelph Secondary Plan SEIS, 1998 • State of the Watershed Study, 2004 • Clair-Maltby Secondary Plan CEIS, ongoing
Mill Creek	Mill Creek Subwatershed Plan, 1997	GRCA	Clair-Maltby Secondary Plan Comprehensive Environmental Impact Study(CEIS)- (ongoing)
Silvercreek & Howitt Creeks	None	N/A	
Speed River	None	N/A	
Torrance Creek	Torrance Creek Subwatershed Study, 1998	City of Guelph, GRCA	Completed to provide management direction and in anticipation of land use changes (urbanization in east Guelph)
Irish Creek	None	N/A	
Equivalent	Clair-Maltby Comprehensive Environmental Impact Study (CEIS)	City of Guelph	The Clair-Maltby Project includes updated data & information for the sub-catchment areas of the Hanlon and Mill Creek within the City boundary.
Equivalent	Block Plans (depending on scope)	TBD	Will be undertaken to inform future development within the Guelph Innovation District

There are many interdependencies in watershed planning

Watershed planning requires integrated knowledge and as such depends on multi-disciplinary teams that recognize interdependencies across work programs.

The relationship between watershed planning and municipal infrastructure and growth planning is strong and complex. With proper integration, synergies can be identified between them to assist in resolving common challenges that accompany intensification, growth and complex processes. Watershed plans and subwatershed studies provide a common and comprehensive understanding of how water moves through the landscape, how ecosystems function and perhaps most importantly – how our community can be integrated into the surrounding ecology of the natural heritage system and water resources. The figure below illustrates the relationship between watershed planning and municipal processes.

Figure 8. Watershed planning enables the ability to protect water quantity and quality using the most appropriate hydrologic unit

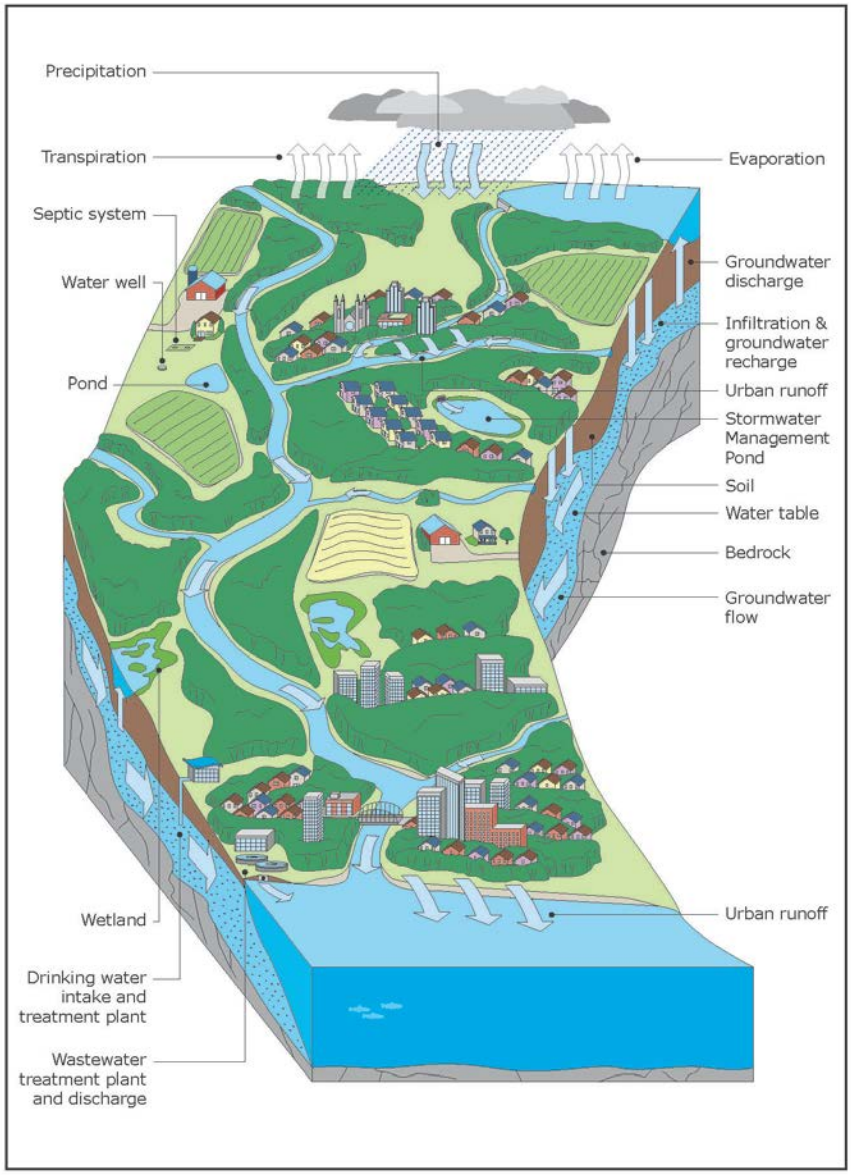
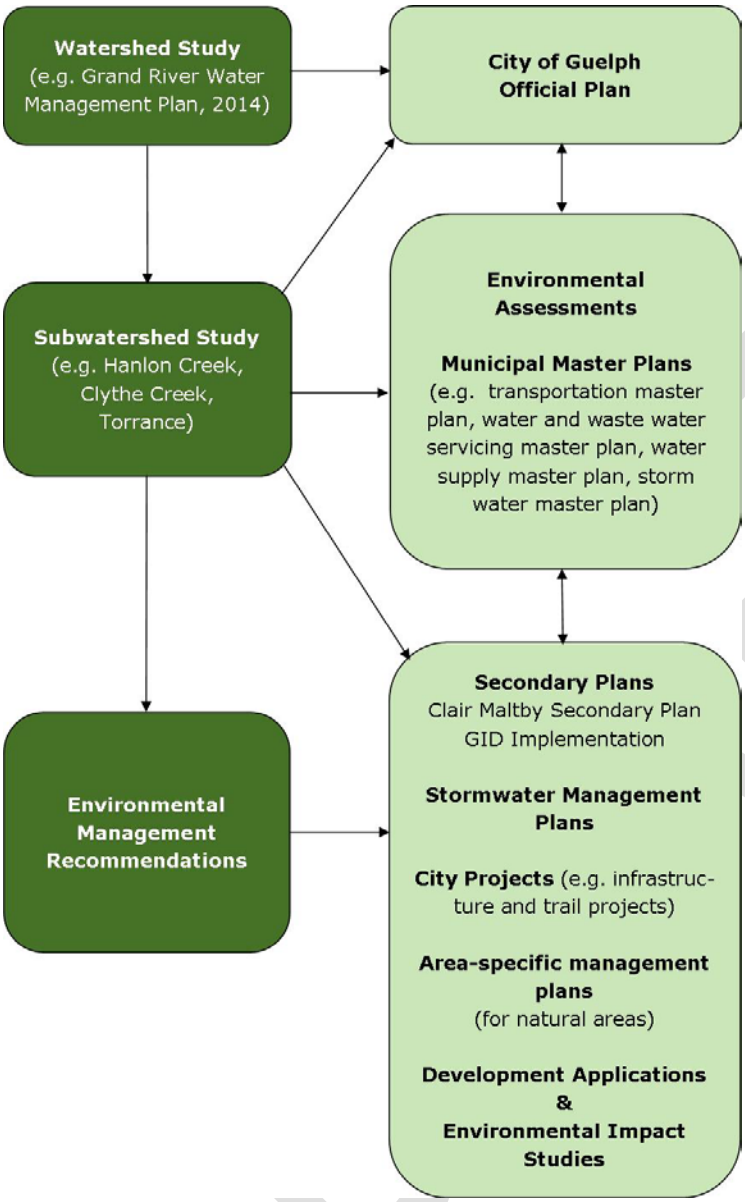


Figure 9. Depiction of the relationship between watershed planning and municipal land use planning



Identification of challenges and opportunities in watershed planning in Guelph

As part of the development of this action plan, staff from across departments participated in sessions to inform the interdependencies, challenges and opportunities to revitalize our subwatershed study work program.

Staff identified the following key challenges:

- **Lack of data:** Existing data gaps means that substantial funding is required at the onset of subwatershed studies and updates for monitoring. A subwatershed study requires a minimum of three years of baseline data which is currently only

collected in portions of our city through discrete projects, and not on a comprehensive city-wide basis.

- **Need for additional staff resources:** Staff need to be resourced, coordinated and aligned properly. Subwatershed studies require resources as they are being undertaken, and during the implementation, monitoring and adaptive management phases.
- **Limited implementation:** Implementation of subwatershed plans through restoration projects, monitoring programs and adaptive management practices are not always considered at the time of budget setting, an issue that has been identified as the most prevalent challenge by Conservation Ontario (May 2013).
- **Challenges with financial resources:** While it is desirable for cross-jurisdictional studies to be cost-shared with partner municipalities (i.e., County and Townships) as well as the GRCA, the growth pressures in Guelph may be a main driver for undertaking studies which may result in a need for Guelph to take on more cost.
- **Need for clear guidance on roles and responsibilities:** To assist with implementation of the Growth Plan (2017), the province is in the process of developing a watershed planning guidance document which is expected to assist with clearly defining roles and responsibilities. Partnerships will need to be built and strengthened and roles and responsibilities well understood in order to gain consensus and move issues forward.
- **Need for guidance on how climate change should be considered in subwatershed plans:** Some clarity may come with the new provincial watershed planning guidance document referenced above.
- **Timing of studies versus timing of development:** Growth and economic development pressures are continuous. There is a need to prepare and update subwatershed studies to avoid delays in providing necessary data and direction for growth (i.e., greenfield development, infill and redevelopment) and infrastructure (maintenance, upgrades and new).
- **Interdependency alignment:** Municipal work plans and budgets should be coordinated to identify interdependencies and efficiencies.

Staff also identified the following key opportunities:

- **Environmental protection and preservation:** Identify areas that are sensitive to land use changes to protect and enhance the resilience of our natural heritage system and water resources.
- **Increased knowledge and data:** Enhance local data, knowledge acquisition and transfer to improve our understanding of local natural processes, enable proactive management of natural spaces, and facilitate knowledge mobilization in our community and between developers, city staff and decision makers.
- **Improved management of the natural heritage system and water resources:** Improve servicing and stormwater management systems based on increased knowledge and capacity to integrate effective green infrastructure principles.

- **Improved customer service:** Improve our ability to understand and integrate knowledge and messaging when reviewing development applications and capital projects. Look for opportunities to build upon the subwatershed monitoring and adaptive management program to fulfill individual development-based monitoring requirements. Make data available to share with applicants during the preparation of development applications.
- **More collaboration:** Achieve a common understanding based on data, robust planning and engineering to reduce local opposition to municipal planning decisions.
- **Ability to fulfill provincial requirements:** Align our work program with provincial requirements set out in the Growth Plan (2017), which requires municipal decision-making on growth and infrastructure to be supported by watershed planning. Subwatershed studies are used to inform master plans and vice-versa. In addition, subwatershed plans can include a scope of work that assists with meeting Planning Act and Environmental Assessment Act requirements.
- **Natural asset inventory:** Use background data to assist with evaluating the economic value of ecological goods and services to produce a natural asset inventory. Valuation of our natural assets enables ecological goods and services to be accounted for in our city's assets, and may include areas that are relied upon by our community, but are technically located outside city limits, such as the Arkell Spring grounds.
- **Increased efficiencies in work planning:** Identify project and program interdependencies to align and prioritize work plans, with the objective of improving efficiency.
- **Efficient spending:** Align budgets to leverage funding opportunities.

Formation of an interdisciplinary, internal staff working group

In an effort to ensure Guelph is well-positioned to respond to Provincial requirements with respect to growth and infrastructure planning, a staff working group is being formed. The purpose of this group is to provide oversight, lead and coordinate the advancement of watershed planning initiatives, to identify and leverage funding opportunities and manage budget needs. This staff working group will develop a framework for completing subwatershed studies that considers municipal interdependencies, identifies challenges and recommends tools for overcoming barriers. Through the process of developing a framework, gaps in our knowledge of local subwatersheds and priorities for data collection will be identified. The staff working group will engage partner agencies and our community in this work.

1.2 Theme: Environmental monitoring to support science-based decision making

Consistent with Official Plan policies, and complementary to the watershed planning work, it is recommended that a city-wide environmental monitoring program be developed and implemented to assess the effectiveness of our natural heritage system and watershed planning policies. In the development of such a program, opportunities for collaboration with neighbouring municipalities and partner agencies, including the GRCA and the Ministry of Natural Resources and Forestry (MNRF), will be pursued.

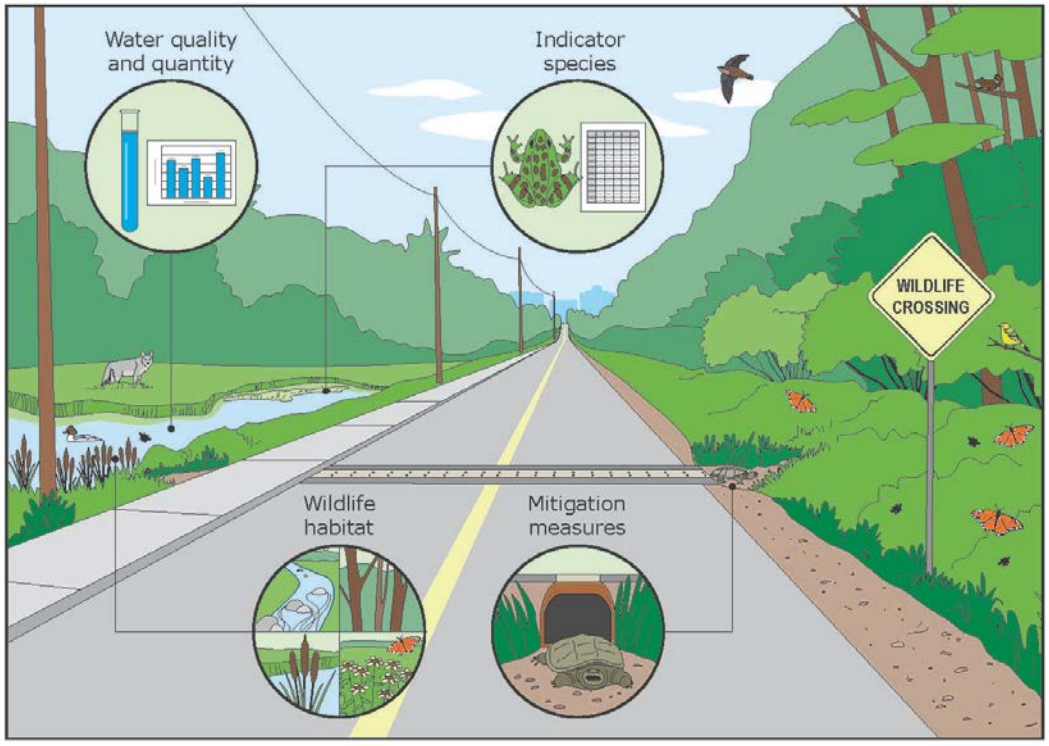
An integrated environmental monitoring program will support watershed planning and improve customer service

The purpose of environmental monitoring is to observe and evaluate species, populations and/or ecosystems to detect changes over time through a set of standardized ecological protocols, methods and indicators. Through the detection of trends, an integrated environmental monitoring program serves as the foundation for evaluating the goals and objectives of the natural heritage system and watershed planning policies.

Monitoring allows for early detection of disturbance and management needs to maintain and improve the health of natural areas, protect the services natural areas provide (e.g., clean air and water) and provide opportunities to enjoy the city's natural areas. Monitoring data will help to inform development and city projects as follows:

1. Provide baseline data for subwatershed studies and inform project design;
2. Improve our understanding of local biodiversity, ecological and hydrologic functions and their connections;
3. Provide advanced warning of disturbances or impacts to wildlife habitat (natural heritage system and water resources);
4. Inform restoration and stewardship projects;
5. Assess the effectiveness of mitigation measures as well as Official Plan policies;
6. Assist in the prioritization of natural heritage and water resource management; and
7. Assist in valuing our natural heritage system as a corporate natural asset.

Figure 10. A city-wide ecological monitoring program will support our ability to analyze trends and will assist in prioritizing and informing management of the natural heritage system and water resources.



The GRCA and the City of Guelph are partners

The GRCA has programs to monitor watershed conditions to support flood forecasting, water management, and research at watershed and subwatershed scales. The GRCA recognizes the benefit of partnering with member municipalities, government and agencies to optimize monitoring programs. There are many weather, river and stream flow, water quality, groundwater, and ecological monitoring stations spread across watershed. In 2015, the GRCA formed a Water Monitoring Review and Optimization Working Group to identify shared protocols for monitoring and data management.

Currently, the GRCA operates two automated water quality stations and monitors five Provincial Water Quality stations on the Speed and Eramosa Rivers, including some within the city limits. The GRCA's network of real-time river and stream flow, and weather monitoring stations are an important part of flood forecasting and warning systems. The city will continue to partner with the GRCA through the development of a city-wide ecological monitoring program which establishes protocols to assess and monitor a suite of biodiversity and ecosystem indicators at

three spatial scales: species, community and landscape.

The City has various concurrent inventory and monitoring projects

The City commissions inventory and monitoring studies through capital projects, secondary plan studies, master planning work and as a landowner.

For example, the Hanlon Creek Business Park currently has a long-term monitoring program aimed at monitoring the effectiveness of mitigation measures to support the development of the business park and recognizes the need for adaptive management approaches. The city also has a groundwater monitoring program that evaluates drinking water quality and supply, and stormwater management systems are monitored to ensure compliance with approvals from the Ministry of Environment and Climate Change.

Development approvals often require post-construction monitoring to evaluate the effectiveness of mitigation measures and to enable adaptive management. This includes monitoring ecosystem response and health for multiple years following the implementation of development plans on a site specific basis.

A key gap within the current framework is the lack of long-term integrated monitoring at a consistent set of stations that can be used to support projects at broader scales (like subwatershed studies) and also smaller-scales (like temporary, project-specific monitoring). Integrated monitoring can be used to create baseline datasets and provide control sites to help support long term assessment of the effectiveness of mitigation measures. Integrated monitoring also supports the ability to understand cumulative impacts and apply adaptive management techniques to resolve complex issues.

There is tremendous value in coordinating monitoring work through a centralized program

Climate patterns and water processes are integral to how our forests, wetlands, meadows and specialized habitats function. To understand changes occurring within our natural heritage system, we need to know how the foundation of those systems might be changing too. To achieve the objectives of the NHAP, an integrated, interdepartmental monitoring program is required. Integration will enable us to build a program that leverages and supports corporate programs and projects to maximize the utility of the monitoring program across the city.

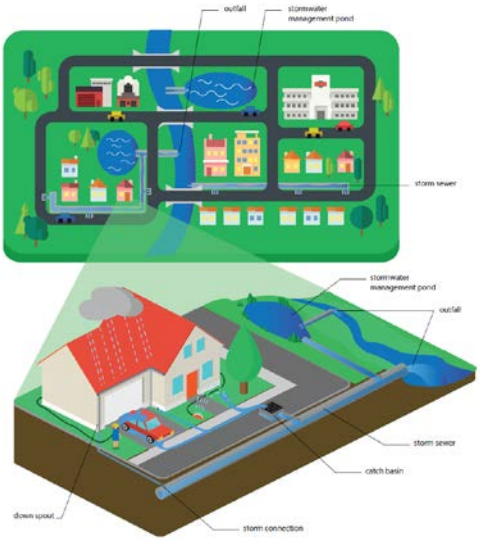
For example, expanding the stormwater management system monitoring program to include data collection on receiving water bodies will help us evaluate ecosystem responses to various stormwater techniques and understand green infrastructure performance and maintenance needs. It will also provide feedback into the design of development and capital projects as our knowledge is improved.

Through cross-departmental collaboration and work with partner agencies efficiencies across monitoring programs will be sought. The participation of our community in voluntary data collection will be encouraged. Ultimately, this program will support the city's ability to understand cumulative effects resulting from multiple, simultaneous stressors to the natural heritage system and water resources.

Box 4 - The City's Stormwater Service Fee Credit Program helps support improved water quality and protection of the natural environment

In developed areas, rainfall and melted snow travels quickly over roof tops, driveways, and roads. Water runs off these surfaces and collects pollutants like sediment, oil, fertilizer, grass-clippings, animal waste, litter etc. and carries them to our rivers and waterways. After heavy rains or snow melts, river levels can rise and cause flooding.

The City of Guelph has developed a credit program for industrial, commercial, institutional (ICI) and multi-residential properties of six units or more. Credits provide land owners with opportunities to reduce stormwater runoff on private property for a credit towards the stormwater service fee they pay. The credit program also recognizes the efforts Guelph property owners are already making to reduce stormwater runoff and the pollutants that flow with it. Everyone benefits from managing stormwater runoff. Property owners benefit from flood control, the community benefits from reduced pressures on our stormwater management system and cost savings, and the natural environment benefits from improved resiliency and better water quality. This, in turn, also helps protect fish habitat and the City's drinking water supply.



Citizen science leverages community interest and expertise by incorporating a public component into data collection

Citizen science programs provide opportunities for community members to participate in the collection of ecological data. Volunteers are trained on ecological data collection techniques, and data are provided to the city for quality control and incorporation into the city's datasets. Citizen science is an excellent way to connect community members with local natural spaces and to foster interest and awareness of the natural environment. An example of citizen science is the Frog Watch Ontario program, which provides the resources needed to complete a frog survey, including

information on how to identify frogs, the time and frequency to undertake surveys and how to report back with the data. A Bioblitz is another example, where expert biologists, citizen scientists and the public are brought together to inventory all species in an area. Experts verify species identification and a snapshot-in-time of biodiversity is created for the area surveyed. There are intensive Bioblitz events that occur over a 24 hr period, and less intensive events that are short (1-3hrs) with more of a public education focus.

Technology provides us with the opportunity to crowd source environmental information to help contribute to natural heritage datasets. The growing popularity of smart phone naturalist applications that assist with geospatial data collection of biodiversity, weather, and water data presents an opportunity to engage community members and foster a stewardship ethic. These tools can be used to reduce redundancy in monitoring data collection and support the city's GIS strategy and Open Data Guelph by providing an interface to share environmental information more broadly.

Table 1 : Section 1 Actions

Section 1 Watershed planning to manage growth and infrastructure					
#	Actions	Outcome	Target Dates	Budget Status	Lead Division(s)
1.1 Theme: Supporting growth through watershed planning					
1	Undertake a background review and gap analysis of existing subwatershed studies, subwatershed boundary refinement and supplemental stream characterization, to support the framework for undertaking and prioritizing the update or creation of new subwatershed studies with partner agencies.	EMM	2020	Not Required	Watershed Working Group
2	Develop a framework for undertaking and prioritizing subwatershed studies with partner agencies in the context of the Provincial Watershed Planning Guidance Manual and City master plans and programs	EMM	2019	Not Required	Watershed Working Group
1.2 Theme: Environmental monitoring to support science-based decision making					
3	Launch a City-wide Ecological Monitoring Program which establishes protocols to assess and monitor a suite of biodiversity and ecosystem indicators at three	EMM	2020	Required	Environmental Planning

	spatial scales: species, community and landscape.				
4	Expand and formalize existing weather monitoring stations to establish a City wide network that can support the analysis of trends in local climate, hydrology, hydrogeology and ecology	EMM	2019	Allocated	Infrastructure Engineering
5	Enhance and expand the stormwater management monitoring program to assist in improving the City's hydraulic performance of stormwater management facilities and downstream health of receiving watercourses	EMM	2019-2021	Allocated	Infrastructure Engineering
6	Work with partners to develop a citizen science component to the Ecological Monitoring Program to leverage local knowledge and engagement	CO/EMM	Long term (2026-29)	Required	Environmental Planning, Park Operations: Trails and Natural Areas Stewarship and IT
Governance: Establish an internal Watershed Working Group (WWG) to provide oversight, lead and coordinate the advancement of watershed planning initiatives and to identify and leverage funding opportunities and manage budget needs		GO	2019	Not Required	Interdepartmental Chair / Coordination TBD

Outcomes

PS Plans and Strategies
GS Guidelines and Standards
CO Community Outreach
GO Governance and Oversight
EMM Environmental Management and Monitoring

Priority NHAP Project

Section 2: Natural Heritage & Biodiversity Conservation

Biodiversity is the variety of life on earth. Plants, fish and wildlife (mammals, birds, amphibian, reptiles, insects and fish) and their habitats (forests, wetlands, thickets, meadows, rivers and streams) are the most recognisable components of biodiversity. While, the most visible, they only represent a small portion of the total number and types of species we have in Guelph. Smaller organisms like fungi, lichens, bacteria and invertebrates far outnumber their larger more visible counterparts as part of our natural ecosystem.

2.1 Theme: Understanding and enhancing our biodiversity

Guelph's settlement history has long influenced the shape of our natural heritage system and biodiversity. Many areas in Guelph were developed before modern day land use plans and environmental regulations were in place. This contributed to burying and straightening streams (like Silvercreek, Howitt Creek and Hadati Creek), lack of stormwater management controls and wildlife habitat loss through much of the built-up area of the City. With increased knowledge about natural ecosystems and their incredible value, environmental design elements such as the inclusion of stormwater management, ecological linkages, restoration areas and ecological landscaping to support biodiversity are now common practice in Guelph.

The Official Plan provides the policy framework for land use planning and the protection of the natural heritage system and water resources. To evaluate the effectiveness of our Official Plan policies, it is recommended that an assessment be undertaken to enable us to report on the state of the natural heritage system prior to the next Official Plan update.

Box 5 - To restore fish habitat we need to restore water quality and quantity

A number of Guelph's streams and rivers were once home to a wider range of species when better water quality and cooler temperatures were available. Today, only limited parts of Hanlon Creek have been confirmed to continue to support Brook Trout, a sensitive cold-water species, within the City limits.

Watershed plans, creek restoration opportunities and improved stormwater management may offer solutions to help restore water quality and fish habitat in Guelph in the future to ensure our water ways support a variety of fish species as the city continues to grow.

Biodiversity conservation can be achieved through strategic action

Biodiversity is exposed to a range of stressors such as pollutants in air, water and soil that can affect breeding success and even cause fish and wildlife mortality. Bird strikes with windows, predation from cats and dogs, mortality from vehicles on

roads, disturbance from noise and light pollution and invasive species also contribute to the disturbance or loss of wildlife in the city.

The development and implementation of a biodiversity strategy will help increase the understanding of local biodiversity, on a spatial and temporal scale, across the corporation and community-wide. It will also assist in recognizing and prioritizing management approaches that support the natural heritage system and water resources which are the foundation for biodiversity.

Box 6 - Important area sensitive bird habitats showcase why habitat suitability matters

The protection and management (i.e., shape and health) of large wooded areas (>30ha) such as the Torrance Creek Provincially Significant Wetland are important breeding habitats for area sensitive birds such as the yellow-bellied sapsucker, red-breasted nuthatch, ovenbird and scarlet tanager. These types of birds rely on quiet, insulated forests to nest and breed and are sensitive to noise, moisture and light from urban spaces. Protection of these habitats helps ensure food webs and complex ecosystems remain in place and function to help support the resilience of our natural heritage system as a whole.

Box 7- Pollinators are one example of an important ecological guild

The yellow banded bumble bee is listed as a species of special concern in Ontario. This means that the species is in decline and may become threatened or endangered due to threats and impacts to the species and/or its habitat. In 2017, local researchers confirmed that yellow banded bumble bee continues to make the Eastview Pollinator Park its home.

Recognizing the importance of ecological guilds and habitat suitability

Pollinators are one example of an ecological guild that plays a fundamental role in our ecosystems. This guild supports all organisms that depend on resources from flowering plants, including humans. While the honey bee is perhaps the most well-known pollinator, wild bees and pollinating insects support a wider range of ecosystem functions including food production. Wild pollinators also are active throughout cooler times of the year than honey bees, allowing for the pollination of plants blooming in early spring and late fall.

Worldwide, there are signs that managed bees and wild pollinators are under stress and, in a number of cases, in decline. At the same time, the need for pollination services (such as food production) continues to grow. Locally, Guelph has had a number of successes, led and supported by local partners such as Pollination Guelph, in creating habitat to support pollinator functions and improve biodiversity. The City recognizes and celebrates these achievements as a Bee City through the Bee City Canada program.

Box 8 - Each species has a role to play within the ecosystem

Many of the nearly two dozen mammal species considered locally significant are rodents, which play important roles within an ecosystem, consuming plants, seeds, fungi and insects while also being a food source for larger predators like fox, hawks and owls. The woodland jumping mouse is one of these species. Found in low lying damp woodlands that contain small seeps and small streams, the woodland jumping mouse hibernates through the winters and can jump up to 1.8m high. Habitat loss resulting from woodland removal is a threat for the species, particularly where it impacts hibernation sites. In addition, less snow, as a result of climate change, means less insulation during hibernation which may lead to greater winter mortality. Warming weather patterns may also push populations north and reduce the species distribution and population size. By protecting woodland features and their functions this also protects the habitats which support species such as the woodland jumping mouse as well as our other locally significant mammal species and contributes to the protection of the broader ecosystem as a whole.

The City's locally significant species list helps us understand the importance of local biodiversity

The identification of habitats for locally significant species plays an important role, particularly in urban areas, in supporting and sustaining local biodiversity for the long term. Protection and restoration of smaller natural areas that support habitat for locally significant species is supported through the City's Official Plan policies.

Within the natural heritage system there are two levels of habitat protection, significant wildlife habitat and habitat for (locally) significant species. While the Province has defined and established criteria for significant wildlife habitat, the City developed a list of locally significant species which is used to inform the identification, protection and restoration of habitats for locally significant species in order to support local biodiversity.

The City's locally significant species list was developed through the Natural Heritage Strategy in 2010 by evaluating how uncommon species are at a scale of Wellington County and to ensure an appropriate level of scientific defensibility. Different criteria were developed and used for various taxonomic groups including: plants, birds, reptiles and amphibians, mammals, damselflies and dragonflies, and butterflies. Of note is that fish were not assessed through the development of the list.

The Official Plan provides policy direction for the revision and update of the locally significant species list. The update process should be: science based; repeatable; transparent; and engage a range of partners.

The development of a review process could be based on adapting a similar, but simplified, process to those used by the Committee on the Status of Endangered

Wildlife in Canada (COSEWIC) and the Committee on the Status of Species at Risk in Ontario (COSSARO) by seeking input from local taxonomic experts as part of the evaluation process. Public input could also be incorporated through obtaining input from Council appointed committees. Establishing a formal process for updating and releasing updates to the list on a regular and reoccurring timeframe would also provide certainty for City partners and stakeholders applying the lists through ongoing projects.

2.2 Theme: Continuous improvements in institutional processes and practices

Guidelines help ensure minimum standards are met to support the management of our natural spaces

Another tool to assist ongoing projects is the development of guidance material and standards such as the City's Guidelines for the Preparation of Environmental Impact Studies, 2017**.** Standards provide clarity for applicants on how to satisfy the environmental study requirements found within the City's Official Plan whether this is part of a development proposal, or capital project. Environmental Impact Studies are completed at the time of a proposal to collect data, identify natural heritage features and functions, assess for potential negative impacts and develop mitigation plans and recommendations to prevent and avoid these impacts. Environmental implementation reports are primarily used to inform the detailed design of development proposals such as subdivisions and vacant land condominiums. A guideline for the preparation of environmental implementation reports could assist in providing:

- Clarity for applicants on how to satisfy the environmental study requirements for environmental implementation reports within the City's Official Plan as part of a development proposal or capital project;
- Clarity on the process for the submission and review of environmental implementation report terms of references and environmental implementation reports;
- Clarity as to the minimum requirements regarding report content and layout; and,
- Support for streamlining and enhancing the City's coordinated review of environmental implementation reports.

Design guidelines help us incorporate natural heritage conservation and wildlife protection into our way of doing business

To support mitigation and enhancement of the natural heritage system, a series of design guidelines will be produced. This series will build upon the guidelines for environmental impact studies and environmental implementation reports but will

provide issue-specific tools that can be read as standalone documents. The following are proposed to form part of the design guideline series:

- Road ecology guidelines will provide increased detail to assist meeting Official Plan policies related to ecological linkages and wildlife crossings where roads bisect habitats;
- Bird strike guidelines will provide a variety of tools to consider during building design to help prevent birds from striking buildings during flight;
- Wildlife friendly construction guidelines will include guidelines for working in and around natural heritage features to mitigate impacts to species and their habitats during construction;
- Trail compatibility and mitigation guidelines will provide guidance on the compatibility of trail alignments, design and operation in and around the natural heritage system to improve the ability to balance biodiversity needs with accessibility and active transportation needs, and will support Official Plan policies and the Guelph Trail Master Plan;
- Offsetting guidelines for Natural Areas will provide additional guidance to assist in meeting Official Plan policies for natural areas where in situ protection is not required; and
- Soil health and management guidelines will provide standards for managing soil on site during construction projects to help keep soil healthy and ensure silt, dirt and dust are not impacting natural areas. This also helps protect the function of the soil ecosystem and its role in supporting natural spaces.

2.3 Theme: Plant and wildlife management in an urban setting

In order to preserve biodiversity, there must be consideration for how plants and wildlife are affected in an urban setting. Innocent actions like letting a goldfish or red-eared slider free in a neighbourhood pond or transplanting overgrown or extra plants from your garden to a nearby natural area can have serious implications. Guelph is inclusive of nature and so a science-based management approach is applied to help ensure our actions don't have costly implications.

Invasive species are one of the largest threats to biodiversity, particularly in urban areas

Invasive species often out-compete native species and also alter or eliminate important habitats. The City's Official Plan defines invasive species as "species of plants, animals and microorganisms introduced by human action outside their natural past or present distribution whose introduction or spread threatens the environment. An invasive plant is one that has been moved from its indigenous habitat to a new area (possibly for garden/domestic use), and reproduces so aggressively that it displaces species within indigenous plant communities". The management of invasive species can be complex because management practices need to be both efficient and effective, which often requires different steps and practices for different species.

The development of a City-wide invasive species management strategy would help to: identify which species are already established in Guelph and those that are at risk of being introduced; prioritize management approaches for top invaders; develop tools to create and maintain an inventory as well as a rapid response protocol; complete a risk assessment in relation to species/populations and prioritize management of invasive species based on these risks; select preferred management and control methods to be used within the City; and identify monitoring requirements to assess effectiveness of controls and the spread of invasive species/populations. It would also provide implementation tools for management and controls to guide private development, city projects and operational procedures for City owned and managed natural areas.

Sharing information and knowledge about invasive species with local citizens can assist the City's efforts to manage them. It also provides opportunities to inform citizens about related management issues like how some native plants (e.g., prairie species with deep rooting depths) are more tolerant of natural drought periods than non-native plants.

Box 9 - Invasive Species come in all shapes and sizes

The most commonly known invasive species are usually plants such as common buckthorn, phragmites, purple loosestrife and Japanese knotweed. However invasive species can also be insects (emerald ash borer, gypsy moth), molluscs (banded mystery snail, zebra mussel), fish (goldfish), crustaceans (rusty crayfish) and many other types of wildlife.

Healthy landscapes throughout the city will support healthy ecosystems and in turn healthy communities

The City's Healthy Landscapes program is known for helping homeowners tackle gardening and landscaping challenges in the city while also promoting low maintenance and low water use solutions. Developed to support the City's Water Supply Master Plan and implemented through the Water Efficiency Strategy, the program also helps promote the use of native plants, increase local biodiversity and promote sustainable gardening, lessening the demand on municipal water supply. Growing the program to include outreach for institutional, commercial and industrial properties can help facilitate enhancement, restoration and water conservation at a larger scale. It can also assist in building relationships to promote increasing the urban forest canopy, habitat creation, and protecting source water within corporate grounds that are now largely mown monocultures.

Native plant species support native wildlife

The City's Official Plan requires all new development and City managed and maintained areas to use native species for plantings, except in instances where harsh conditions would limit their survival (e.g., street tree plantings). To support

this, park operations staff are moving forward to expand existing plant propagation practices to include native species for City maintenance and operational practices. This also presents an opportunity to build partnerships with other groups and organizations in Guelph that also complete native seed collection and propagation practices.

2.4 Theme: Using conservation land securement to support long term preservation

Land use planning tools, such as the City's Official Plan, are one tool used to support the long-term protection of our natural spaces and biodiversity. Another tool is land securement.

At present roughly 60 percent of the City's natural heritage system is in public ownership by either the City or the Grand River Conservation Authority. Another 12 percent is owned by the Province or the University of Guelph. The remaining 28 percent is in some form of private ownership.

Conservation land securement refers to the legal acquisition of natural heritage features or areas through a range of legal tools and methods to achieve the permanent protection of the lands in perpetuity. Lands that are secured are generally held in public or non-profit ownership with the goal to maintain, protect, restore and enhance the feature and its ecological functions.

Land securement should not be confused with land procurement which is the acquisition of land that may at some point be deemed disposable by the land owner/seller. Furthermore, whether or not lands that are part of the natural heritage system are protected from land use conversion to a non-natural state is independent of ownership but rather relies on processes for land use planning (i.e., application of the Planning Act, official plan and zoning by-law).

Through a coordinated application of land securement tools, it may be possible to secure additional lands within the natural heritage system for the long term. Successes of conservation land securement initiatives require both a willing seller/donor and a willing buyer/recipient, and can also include partnerships with other agencies and levels of government.

Land securement on its own does not address the management of natural areas; however partnerships built through securement exercises can in turn help support the development of management plans for things such as nature reserves, interpretive areas and the incorporation of trails into these spaces where they are compatible and will not have a negative impact on sensitive areas. Management plans for natural spaces can also support our biodiversity in helping address threats as well as enhance and restore biodiversity.

Table 2. Section 2 Actions

Section 2 Natural heritage and biodiversity conservation					
#	Actions	Outcome	Target Dates	Budget Status	Lead Division(s)
2.1 Theme: Understanding and Enhancing our Biodiversity					
7	Produce a status of the Natural Heritage System Report that measures the effectiveness of our natural heritage policies	PS	2020	Allocated	Environmental Planning
8	Create a biodiversity strategy to assist in identifying biodiversity and ecosystem targets, to develop recommendations to protect, maintain, restore and enhance biodiversity (including native pollinator habitats) and to establish key performance indicators that measure effectiveness of policies and guidelines	PS	2022	Required	Environmental Planning
9	Become a "Bee City" in partnership with Pollination Guelph to recognize existing and ongoing projects and partnerships	CO	2018	Not Required	Environmental Planning
10	Update the City's locally significant species lists and create a regular review process supported by a technical review panel of species and taxonomic experts	GS/EMM	2021	Not Required	Environmental Planning
2.2 Theme: Continuous Improvements in Institutional Processes and Practices					
11	Develop a series of ecological technical guidelines and standards to support mitigation and enhancement of the City's Natural Heritage System such as: road ecology guidelines, bird strike guidelines, wildlife sensitive mitigation & construction protocols, trail mitigation and compatibility guidelines, Natural Area offsetting guideline, soil health and management guideline	GS	2019 - 2028	Allocated - future years required	Environmental Planning
12	Develop an Environmental Implementation Report (EIR) guideline to assist with detailed design related development review processes including subdivision and vacant land condominium registration and site plans	GS	Medium term 2022	Not Required	Environmental Planning
13	Create an operations protocol	GS	2019	Not	Infrastructure

	based on the City's existing wildlife refuge practice for stormwater pond clean outs			Required	Engineering
2.3 Theme: Plant and Wildlife Habitat Management in the Urban Setting					
14	Create a comprehensive invasive species management strategy including implementation tools to guide private development, City capital projects and operational procedures	GS	2021	Required	Parks Operations and Forestry and Environmental Planning
15	Develop a healthy landscapes program for institutional, commercial and industrial properties to facilitate enhancement, restoration and water conservation	CO/EMM	Medium Term (2022 – 2025)	Allocated	Water Services
16	Develop a program to support native plant propagation and seed collection to use in City maintenance and operations	EMM/CO	2019	Required	Parks Operations and Forestry
2.4 Theme: Supporting Long-Term Conservation of Natural Heritage Lands					
17	Develop a land securement strategy to consider the application of land securement tools to protect the Natural Heritage System by establishing roles, responsibilities and practices in land conservation	PS	Medium term (2022-2025)	Required	Environmental Planning & Legal, Realty and Risk Services & Parks Planning

Outcomes
PS Plans and Strategies
GS Guidelines and Standards
CO Community Outreach
GO Governance and Oversight
EMM Environmental Management and Monitoring

Priority NHAP Project

Section 3: Data and Information Management

3.1 Theme: Data management and technology can improve efficiencies and knowledge mobilization

The way environmental data is managed will be foundational to the success of the implementation of this action plan. Every year the City commissions environmental studies to support city infrastructure and trail projects. At the same time, the development community completes site-specific environmental studies to support development applications in and around the natural heritage system. While currently much of the information and knowledge from these environmental studies is transferred to only those directly involved in a given project, it should be better leveraged to help improve the collective understanding about ecosystem functions and biodiversity in the city.

New, improved and enhanced data sources, in addition to, existing environmental studies are recommended as part of this action plan (i.e. subwatershed studies, ecological monitoring program, etc.). In addition, technology presents opportunities to crowd source environmental information resulting in an opportunity to incorporate citizen scientist data into natural heritage inventories. The popularity and accessibility of free environmental apps and geospatial websites to collect and share environmental data supports a growing interest in citizen scientist activities.

The City has an opportunity to take advantage of technological trends and leverage available information to reduce redundancy in data management, reduce the level of effort needed for project background research for both the corporation and the development community and optimize the amount of physical space required to store this information. Building on the City's GIS and Open Data strategies it is recommended that data management be improved to better leverage GIS technology and enable the sharing of environmental information more broadly while maintaining data sensitivity needs through the development of an environmental data management system.

Figure 11. Data sources are depicted as sources of nutrients which support products (i.e., subwatershed studies and biodiversity management) represented by the lush tree canopy. Nutrients are taken up through the roots system and up the trunk which represents the data management system.

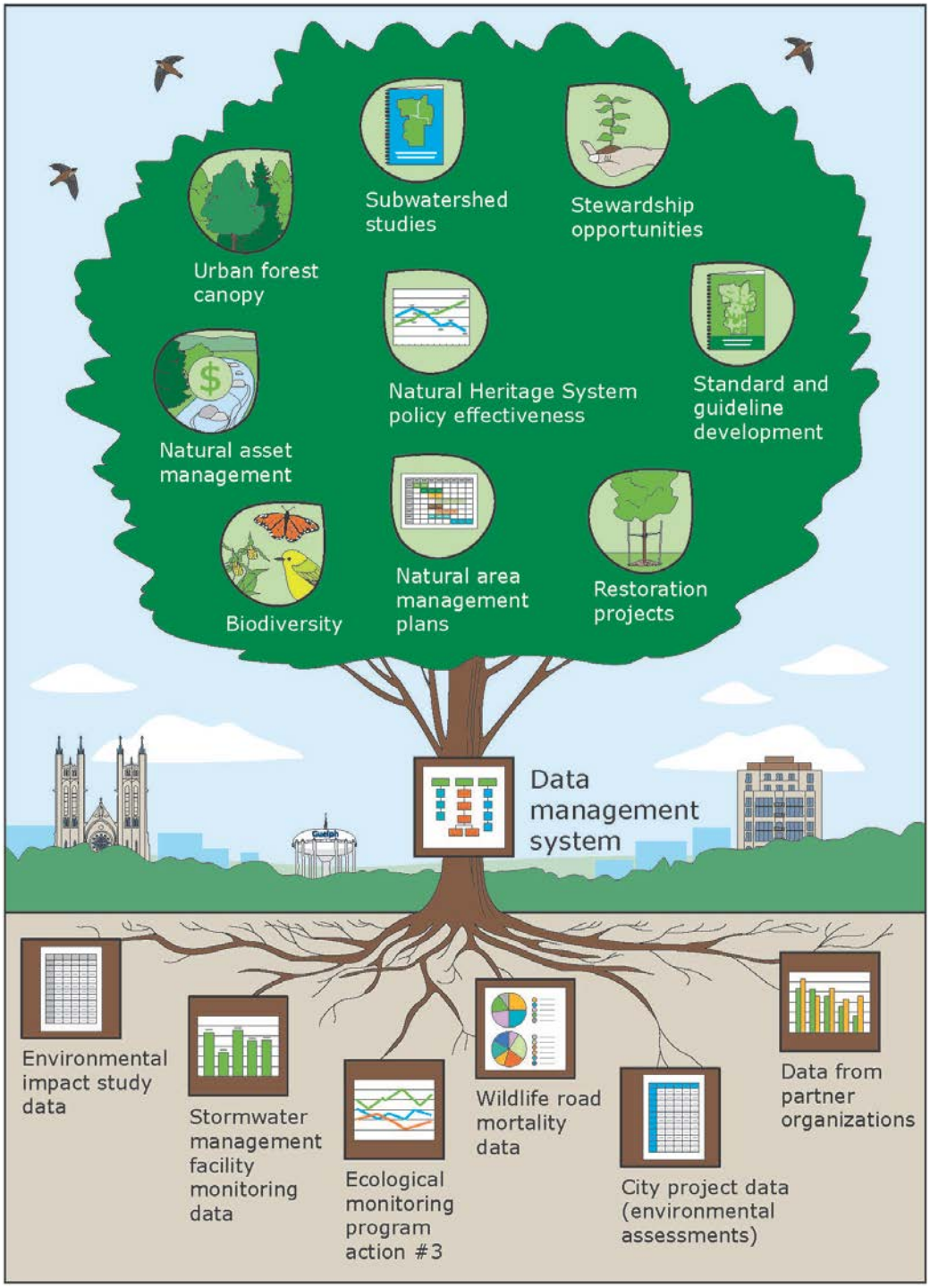


Table 3. Section 3 Actions

Section 3 Data and information management					
#	Actions	Outcome	Target Dates	Budget Status	Lead Division
3.1 Theme: Data management and technology to improve efficiencies and share knowledge					
18	Complete an inventory and examine existing City natural heritage datasets and user processes, understand gaps and user needs, and explore solutions to inform the scope and function of a centralized geospatial natural heritage data management system	GO/EMM	2019	Allocated	Environmental Planning & Information Technology Services
19	Identify opportunities to build partnerships in environmental data exchanges to take advantage of third party information and crowd sourcing opportunities	EMM	Medium term (2022-2025)	Not required	Environmental Planning & Information Technology Services
20	Implement the development of a data management system building on the outcomes and recommendations of Action 18	GO/EMM	2021 - 2022	Required	Environmental Planning & Information Technology Services

Outcomes
PS Plans and Strategies
GS Guidelines and Standards
CO Community Outreach
GO Governance and Oversight
EMM Environmental Management and Monitoring

Priority NHAP Project

Section 4 Resilience and Restoration Planning

Ecosystem resilience is the capacity of an ecosystem to maintain its ecological function in the face of stressors and disturbances. Resilient ecosystems have the ability to absorb disturbance while continuing to provide ecological goods and services to the surrounding neighbourhoods. Resilient ecosystems are a foundation for building resilient communities. Restoration of natural heritage and water resource systems can increase ecosystem and community resilience to the impacts of urbanization and climate change.

4.1 Theme: Urban ecosystem resilience supports a healthy community

Resilient and healthy ecosystems are able to respond to the pressures of urbanization. Infill and redevelopment are increasing density in established areas, and greenfield developments are accommodating higher densities than ever before. With increased densities, more pressure is placed on the natural heritage system. For example, an increase in impervious area generates more runoff and how we manage increased storm water runoff is crucial to protecting ecosystems. More people and pets also increase pressure on natural areas to provide recreational opportunities which can put stress on native flora and fauna and their ecology. The natural heritage system provides many services to our community, and investment in restoration, monitoring and data management is essential to keep them functioning at a high capacity while also providing appropriate opportunities for recreation.

Climate change adds complexity to the impacts of urbanization

The City recognizes that addressing climate change requires two complementary sets of strategies: mitigation and adaptation. Mitigation involves actions to reduce greenhouse gas emissions and actions to reduce or delay climate change. Guelph's approach to mitigation is embedded throughout the City's Community Energy Initiative (CEI) and throughout the Official Plan which includes policies addressing the natural heritage system, transportation, urban structure, urban design and land use.

In addition to the City's greenhouse gas emissions reduction target to reduce our overall energy use by 50 percent from 2007 levels by 2031, the long-term protection of our natural heritage system from development is a key component of climate change mitigation. The natural heritage system has potential to sequester and temporarily store carbon in trees, vegetation, soil and organic matter. On the flipside, dying and decomposing trees and vegetation release carbon. Natural disturbances such as disease and fire can emit carbon from natural areas. Science-

based management of ecosystems can assist the City in maximizing the benefits of the natural heritage system as a carbon sink.

Climate change adaptation involves actions to minimize vulnerabilities to the impacts of climate change and includes planning and strategic decisions that anticipate changes in temperature, precipitation, severe weather and increased variability in these both globally and locally. Among other issues, climate adaptation is particularly important to infrastructure planning, flood protection, emergency management and planning for secure access to water and food.

The effects of climate change on the natural system are important to consider when planning how the City will adapt to changes in climate norms. We recognize the important role that the natural heritage system plays in enabling climate change adaptation and that watershed planning can be used as a method to achieve both ecological and community resilience. Our natural spaces provide critical services such as attenuating flood water, filtering and absorbing urban runoff, mitigating heat impacts from paved urban spaces, cleaning the air we breathe and providing habitat for range of species.

Climate change can impact hydrologic and ecological functions

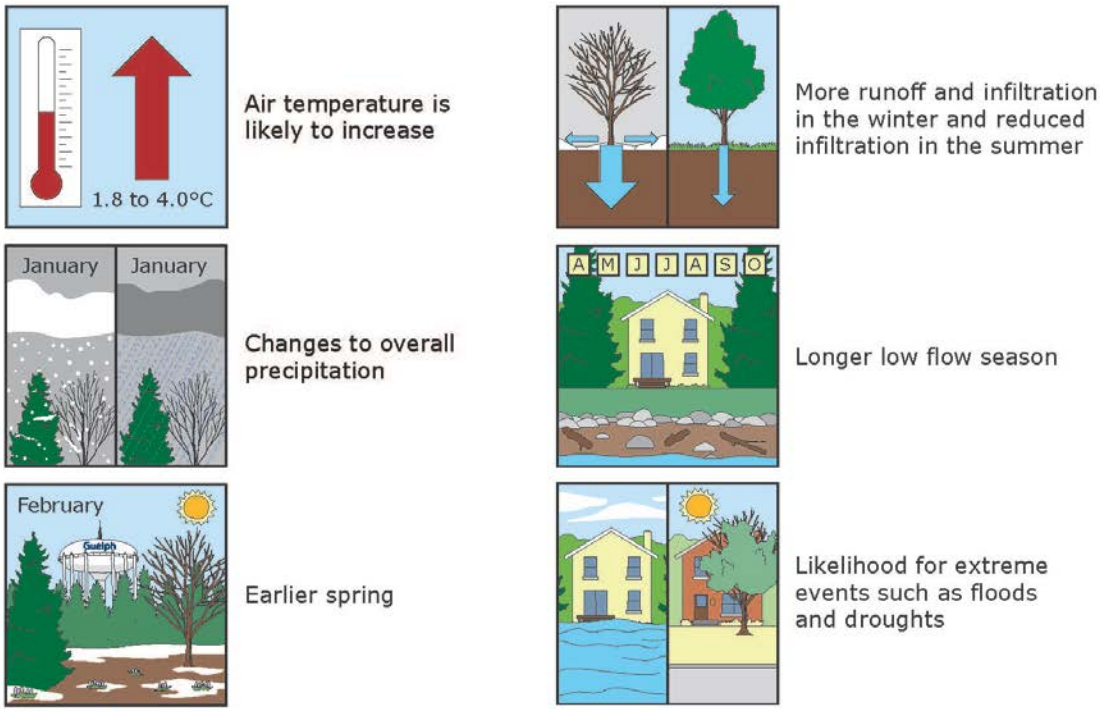
As part of the Grand River Watershed Water Management Plan (2014), the GRCA investigated the hydrologic effects of climate change on the Grand River Watershed. Climate change modelling was done in the Grand River watershed on a regional scale that allowed for weather patterns such as lake effect snow to be considered. The results of the climate change model were input into a hydrologic model to evaluate changes in watershed scale hydrologic processes and stream flow. The following figure illustrates climate change impacts on hydrologic functions as understood through the GRCA's work.

The potential ecological impacts of climate change are complex and largely unknown. The Ministry of Natural Resources and Forestry (MNRF) recognizes the need for increased science, research and knowledge about the ecological impacts of climate change in their 2017-2022 adaptation strategy, Naturally Resilient.

Most climate impact analyses, including those from the GRCA, identify the potential for shifts and changes to hydrologic processes such as an earlier onset of spring and longer low flow periods along with more winter melts and reduced snowpack accumulation. Many of these processes are also ecological cues for fish and wildlife to begin moving to breeding habitats to start reproducing, and as a result species will need to adapt to the changes. It is expected that species ranges will creep north, creating new opportunities for tree and shrub planting (e.g., planting more Carolinian trees) and also introducing new threats (e.g., range of kudzu creeping north). The City's approach to understanding and addressing the effects of climate change on the natural heritage system and water resources must recognize the

gaps in science, research and knowledge while still making the most of opportunities that arise through adaptation planning to increase resilience.

Figure 12. Climate change impacts on hydrologic functions include an increase in air temperature, changes to precipitation patterns that include the potential for more runoff and infiltration in the winter and reduced infiltration in summer, an earlier spring coupled with a longer low flow season and increased likelihood for extreme events such as floods, drought, wind and ice storms.



A climate change adaptation and resilience plan is being initiated

The City's Climate Change Office is initiating the development and implementation of a Climate Change Adaptation and Resilience Plan (CARP) to help ensure the City can continue to provide services despite extreme weather events and changing climate patterns, and/or can recover rapidly from the same. Ensuring that the ecosystems are resilient to climate change impacts will be an integral piece of this plan by using local climate projections developed through the CARP to assess impacts to the natural heritage system, as well as by identifying the natural environment as an important contribution to adaptation.

The natural heritage system and water resources are part of our green infrastructure

Green infrastructure is a broad term that includes natural assets, as well as landscaped and engineered assets. The inclusion of our natural heritage system and

water resources as part of green infrastructure should be embraced as it will ensure that ecological goods and services that support our community's well-being are available for future generations.

Figure 13. Consistent with the Provincial Policy Statement (2014), green infrastructure means "natural and human made elements that provide ecological and hydrological functions and processes. Green infrastructure can include components such as natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs."

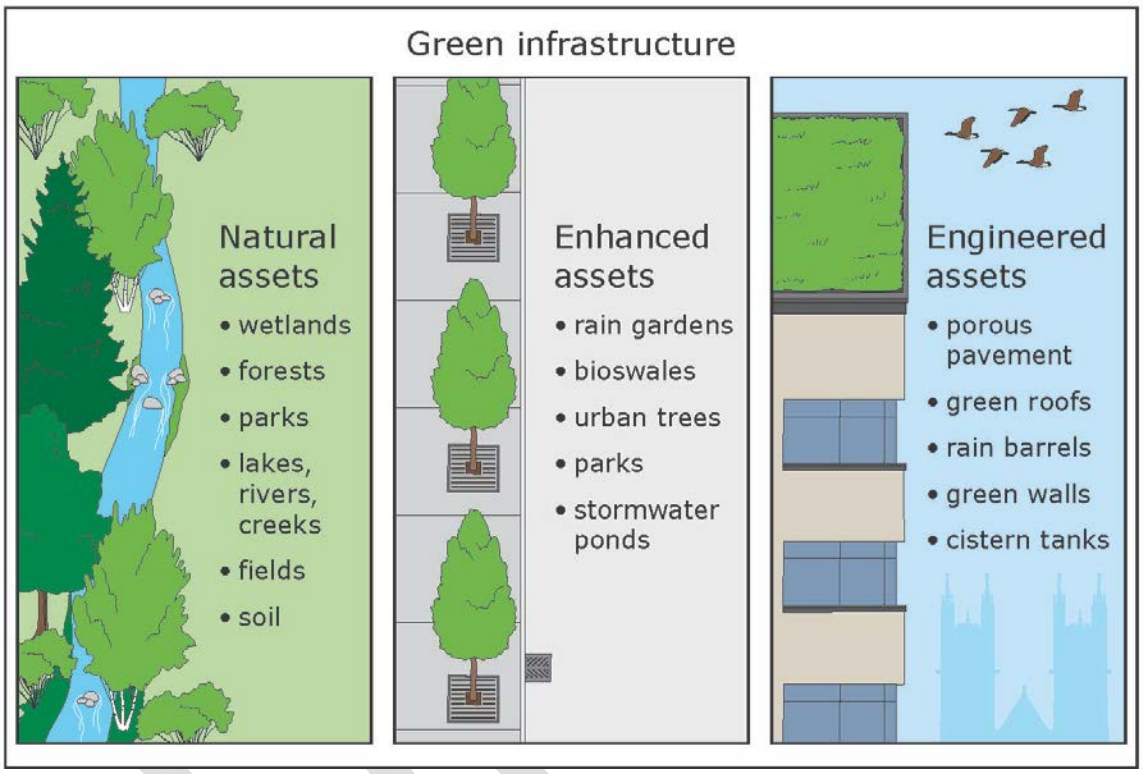
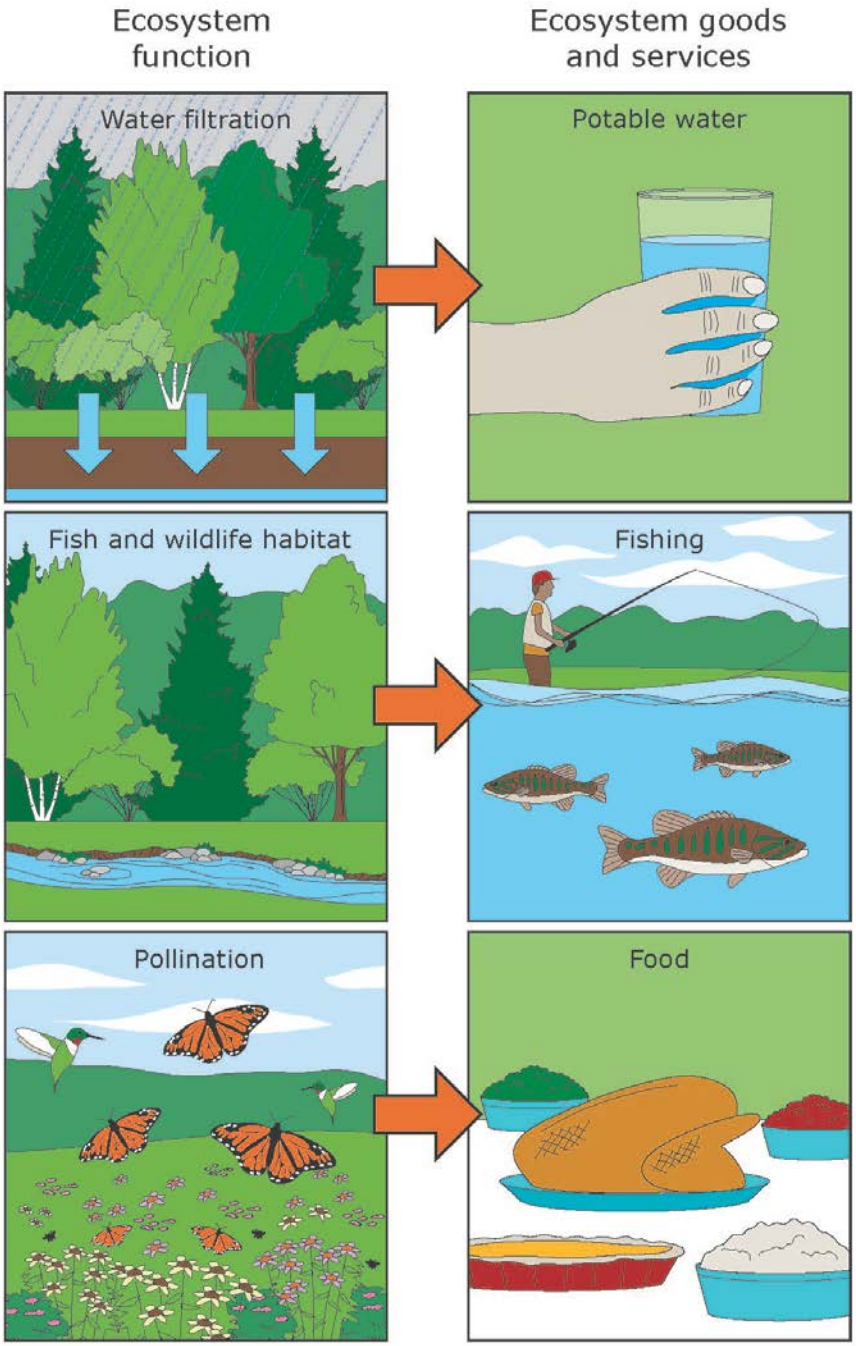


Figure 14. Understanding the relationship between ecosystem functions and ecological goods and services. Any product of an ecosystem function that benefits humans is an ecosystem good or service. Ecological goods are tangible things like drinking water, fish, crops, forestry products and wildlife. Ecological services, like flood protection, water filtration, pollination of plants, recreational opportunities and aesthetics, are intangible and incredibly valuable.



Valuing ecosystem goods and services means accounting for natural assets
The need for a definition for municipal natural assets that differentiates natural asset management from other approaches to municipal infrastructure asset management is recognized. The primary difference is that infrastructure assets are typically defined as engineered structures that provide municipal services such as roads, bridges, water treatment plants and pipes, while natural assets include natural ecosystems like wetlands and woodlands as well as fields and parks.

Natural asset valuation is complex and based on a thorough understanding of ecosystem functions and ecological goods and services. Most ecological goods can only be used or owned by one person, and they are generally easy to value and trade in markets. Ecosystem services cannot be traded in markets or privately owned and they are far more difficult to value in economic terms.

Natural asset management is an emerging concept that can support ecosystem-based decision-making by considering the economic value that natural ecosystems provide the community. Having a well-defined and developed natural asset management approach can assist in justifying investments in the natural heritage system by monetizing the role the natural heritage system plays in regulating climate, providing clean air and buffering the community from natural disasters such as flooding.

The City is well positioned to bring natural assets into the Corporate Asset Management Plan
Guelph defines an asset as “an item, thing or entity that has potential or actual value to an organization”. This definition acknowledges that the value can vary between organizations and their stakeholders, that it can be tangible or intangible and financial or non-financial.

Work needs to be done to ensure supporting information is available to inform the inclusion of the natural heritage system as a natural asset. The next steps would include undertaking an ecosystem service valuation to assign values to ecosystem services provided by various components of our NHS and beginning a natural asset inventory that is inclusive of our ecosystems and that promotes ecosystem restoration as essential infrastructure work. There is a strong interdependency with establishing a city-wide ecological monitoring program along with a supporting data management system as they form the basis for the valuation and inventory work.

4.2 Theme: Restoring Urban Ecosystems to Support Biodiversity

Official Plan policies speak to promoting, supporting and undertaking restoration for things like our river valleys, pollinator habitat, the urban forest, fish habitat and water quality and quantity. They also specifically designate “Restoration Areas” within areas for stormwater management, City parks, GRCA lands and isolated gaps within the natural heritage system.

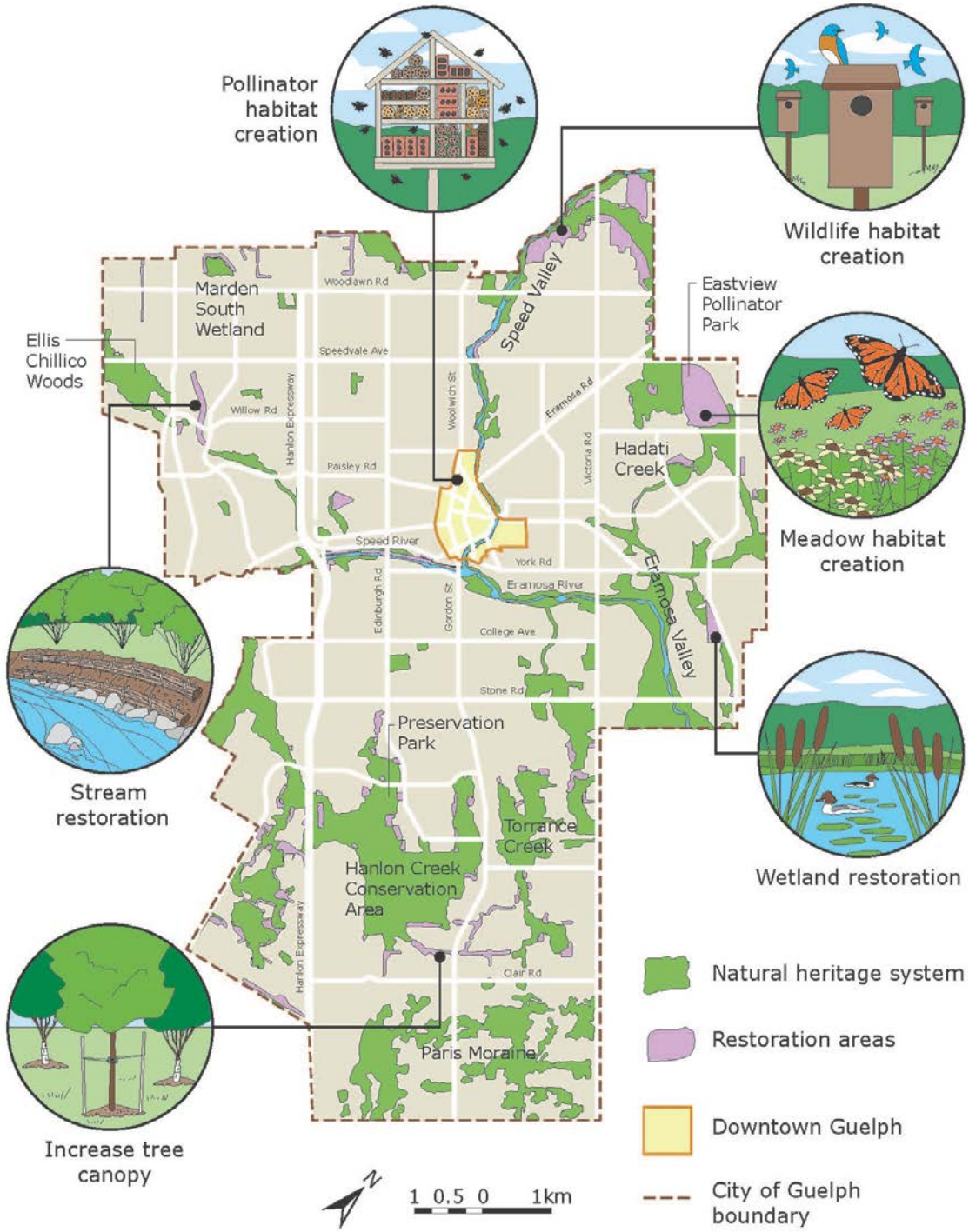
The Official Plan states that restoration means “active management of an area that results in accelerated regeneration and recovery of a desired vegetation community or habitat, typically one that once occurred naturally in the area. This may include the creation or re-creation of wetlands, woodlands or meadows.” This definition supports the Official Plan framework which includes recognition that in addition to restoring and increasing the urban forest canopy cover, there is value in restoring meadow habitats for pollinators, birds and other wildlife to promote ecosystem resilience and support our biodiversity for the long term.

A restoration strategy will assist in identifying threats and targets and setting out criteria for prioritization of restoration sites

In order to effectively restore an ecosystem, there is a need to understand the underlying cause of existing degraded conditions to assist in setting management targets. A restoration strategy will assist with mainstreaming positive management of the natural heritage system and water resources across the corporation to ensure efficient management of resources while leveraging community participation.

Building on the ecological monitoring program, a restoration strategy could identify areas in the city where threats and opportunities exist and help set targets and prioritize restoration efforts with confidence. Flowing from a high level restoration strategy, individual management plans should also be developed for natural areas like the Speed and Eramosa River valleys, Preservation Park and the Torrance Creek swamp, where the City owns or is responsible for the management of these spaces. Developing these plans in a coordinated manner provides opportunities for the community to participate and ensures policy objectives are being achieved by restoring habitat diversity at a City-scale to support local biodiversity.

Figure 4. There are many restoration opportunities in Guelph ranging from planting native vegetation to restoring stream functions that have been previously impaired. These activities also include opportunities for the public to get involved!



Box 10 - There are many benefits from having long term area based restoration and management plans

Area specific restoration and management plans can:

- ensure the site restoration project meets official plan goals and objectives
- be informed by monitoring data to help protect and enhance key habitats for sensitive species and biodiversity hot spots
- balance competing restoration objectives such as promoting meadow habitats and growing our urban forest canopy
- increase ecosystem resilience by restoring underlying ecological and hydrological processes
- contribute positively to neighbourhoods by providing opportunities for nature-based recreation
- facilitate stewardship and community opportunities to participate and support management activities in these spaces

There's more to ecological health than the health of plants and animals

Community members are seeking places where they can go and spend time in nature whether for physical fitness, for social interaction or for health and wellbeing. The public health sector continues to advocate that natural spaces are an essential part of human habitat and that spending time in nature can reduce stress and anxiety and other mental health challenges.

The Guelph Community Foundation and the Guelph and Wellington County Vital Signs report which uses a combination of research and collaborative partnerships to help provide a meaningful, high-level snapshot of strengths and challenges within the community. This is helping improve our understanding about the people who participate in stewardship activities in public parks or natural areas in their communities and their sense of attachment and appreciation for the natural areas where they live. Through community conversations it is also being recognised that there is a desire within the community to have even greater opportunities to appreciate nature and benefit from the corresponding health benefits. In the digital age we live in, it is important to provide opportunities to engage with nature through recreational and stewardship activities that are unplugged and outside. This desire and awareness within the community is also being used to identify priority for the preparation of Guelph's Community Plan.

At the same time, there are areas within the natural environment that are sensitive to disturbances. Particularly, biodiversity hotspots or areas where vulnerable species and functions occur can be threatened by increased noise and light, trampling and introduction of invasive species, disturbance or predation by pets, introduction of pollutants, changes to drainage and soil alteration. In the urban

setting, it is important to balance the needs of the natural environment with the need for public access, trails and recreation.

4.3 Theme: Continuous improvements in institutional processes and practices

Investing in restoration will promote ecosystem resilience, provide community stewardship opportunities and support nature based recreation
Ecosystem resilience is important to support biodiversity and the high quality of life in Guelph and restoration is a means to support and maintain resilience. Every time work is planned and implemented in and around the natural heritage system, restoration is part of the design.

The actions proposed in this plan seek to continue to improve the integration of restoration into projects. The development of Guelph-specific low impact development (LID) standards and refreshing the City's landscaping design principles for stormwater systems will improve the ability to restore important natural hydrologic processes such as infiltration. Similarly, ensuring alignment between City policies and programs as it relates to naturalized gardens throughout the city will assist with restoring habitat for important ecological guilds like pollinators.

During the development of a City-wide restoration strategy, restoration will continue to be part of the City's daily business when supporting development, city and community projects. Nature-based recreation through the development of long-term restoration and management plans that consider appropriate locations and management approaches for access and trails will also continue to be supported and enhanced. Community stewardship projects by individuals and groups that participate in native species plantings and invasive species removal on public lands will continue and will be optimized through streamlining efforts and increasing efficiencies to assist with planning and implementing such projects.

Internal governance will increase the ability to be effective and efficient
At present, the City undertakes restoration activities in an opportunistic, but not coordinated manner. When development projects are implemented or community groups and volunteers are available and express an interest, opportunities are sought to incorporate restoration into projects and communities. Inefficiencies in restoration occur when different service areas pursue opportunities in an uncoordinated fashion.

The establishment of an Ecological Restoration Implementation Committee (ERIC), comprised of representatives from City service areas that have a role in restoration, would be a platform to coordinate efforts and resources as the City moves toward formalizing these processes through a restoration strategy. The implementation committee will discuss different upcoming restoration projects, make connections to

identify and mitigate anticipated issues, find efficiencies and collaborate to take advantage of opportunities. The development of an internal governance group and new guidelines also supports the building partnerships internally and externally, contributing to continuous improvements in how we do business.

This same group would also assist with advancing the preparation of a restoration strategy and the development of restoration and management plans for natural spaces with opportunity for input from the public.

Table 4. Section 4 action table

Section 4 Resilience and restoration planning					
#	Actions	Outcome	Target Date	Budget Status	Lead Division(s)
4.1 Theme: Urban ecosystem resilience to support a healthy community					
21	Develop a climate change adaptation and resilience plan which incorporates natural ecosystems and watershed management to enhance ecosystem resilience	PS	2019	Allocated	Climate Change Office
22	Develop a natural asset inventory, inclusive of the natural heritage and water resource system and the ecological goods and services they provide, to facilitate the integration of green infrastructure into the City's Corporate Asset Management Plan	GS	2020	Required	Asset Management Program
4.2 Theme: Restoring urban ecosystems to support biodiversity					
23	Complete an Ecological Restoration and Management Strategy to examine underlying threats to ecosystem health, define restoration goals, set targets and develop criteria for prioritization to guide restoration and management plans and projects.	PS	Medium Term (2022 – 2025)	Required	Environmental Planning
24	Develop long-term restoration and management plans for City owned/managed natural areas including: Restoration Areas, the Speed and Eramosa River valleys, Preservation Park, Torrance Creek swamp and the Arkell Spring grounds	EMM	Medium Term (2022 – 2025)	Required	Various – project dependant
25	Focus upcoming City-led restoration efforts in areas such as the Silvercreek Stream Corridor (aka. Northwest Channel) and Eastview Pollinator Park and continue to support and collaborate with community stewardship groups on on-going events	EMM	2019-2021	Required	Various – project dependant

4.3 Theme: Continuous Improvements in Institutional Processes and Practices					
26	Develop Guelph specific low impact development (LID) standards for stormwater management to assist development and capital projects in integrating alternative designs for supporting water quality and quantity protection consistent with the MOECC LID companion document to the Stormwater Management Planning and Design Manual	GS	2019	Allocated	Infrastructure Engineering
27	Develop procedures including eligibility criteria for allocating the City's Tree Compensation Funds to support the urban forest and natural heritage system goals and objectives	GS	2019	Not Required	Planning and Urban Design Services, Parks Operations and Forestry
28	Review and update the City's design principles for stormwater management, demarcation and park naturalization policies in the context of the City's current natural heritage, urban forest and parks and recreation objectives	GS	2020	Required	Parks Planning and Infrastructure Engineering
29	Ensure alignment between the City's existing by-laws, policies and programs relating to the creation and maintenance of "naturalized gardens" through a coordinated review	GS	2021	Not required	By-law
30	Prepare green development standards to assist in evaluating the environmental sustainability of development proposals and capital projects through the application of sustainability metrics	GS	Medium Term (2022 – 2025)	Required	Policy Planning and Urban Design
Governance: Establish an internal Ecosystem Restoration Implementation Committee (ERIC) to provide oversight and support the mobilization of City-led restoration projects, obtain advice and public input through council-appointed committees and coordinate stewardship restoration activities		GO	2019	Not Required	Coordinated by Parks Operations and Forestry

Outcomes

PS Plans and Strategies
GS Guidelines and Standards
CO Community Outreach
GO Governance and Oversight
EMM Environmental Management and Monitoring

Priority NHAP Project

Section 5 Fostering Community Support, Raising Awareness & Engagement

Leveraging community participation, input and support to assist with the natural heritage system and water resource management is an essential component of successful action planning.

5.1 Theme: Engagement models for supporting implementation

Council appointed advisory committees are part of the process that the City currently to engage the public and obtain advice from experts who live in the community to feed into and support development applications and City-led projects. They also provide opportunities to network within the community and promote initiatives related to environmental restoration, rehabilitation and enhancement projects including community stewardship, and share the advice received from the community with staff and Council.

Within Ontario many municipalities, including Guelph, use Council appointed committees with environmental mandates to help:

- promote the preservation, conservation, protection and enhancement of the natural environment;
- promote corporate and community sustainability by advising on the implementation of corporate and community sustainability programs and strategies;
- review Planning Act (development) applications with respect to potential environmental impacts, as informed by municipal and provincial policies and provide advice to support the protection, restoration and enhancement of natural heritage system and water resource systems;
- participate in City capital and community projects, including Environmental Assessments to provide input and advice to social, economic and environmental impacts; and,
- undertake and participate in educational initiatives and stewardship activities which raise the profile and understanding of the natural environment.

Understanding Guelph's existing advisory committee framework

At present the City has three Council appointed committees with environmental related mandates: the Water Conservation and Efficiency Public Advisory Committee (WCEPAC); the Environmental Advisory Committee (EAC); and, the River System Advisory Committee (RSAC).

WCEPAC has a mandate which is specifically tied to the review and implementation of the Water Efficiency Strategy. Their mandate is reviewed and updated from time to time by staff in Water Services and is outside the scope of the NHAP.

The Environmental Advisory Committee

City Council established EAC on November 7, 1994 and their first meetings followed in 1995. Originally the committee consisted of 7 members and this was later increased to 9 members.

The existing mandate of EAC is:

- To provide advice to staff and Council with respect to conservation of the natural environment;
- To provide advice on submitted Planning Act applications such as official plan amendments, zoning by-law amendments, draft plan of subdivisions and condominiums, including Environmental Impact Studies (EISs) through early involvement in the development process;
- To provide advice on relevant City studies such as Master Plans, Secondary Plans, updates to the Official Plan, policy documents and any other study referred to committee; and

The River System Advisory Committee

The RSAC was established through the City's River System Management Plan in 1993 and held its first meeting in March of 1995. The committee ran from 1995 through 2004. In 2007 the committee mandate was updated and the committee was re-established.

The existing mandate of RSAC is:

- To provide advice and assistance to staff and Council on issues that impact waterways and adjacent lands within Guelph;
- To provide recommendations on monitoring, implementation and updating of the River System Management Study; monitoring, updating and implementation of subwatershed studies (SWS); planning and implementation of stream restoration not included in SWS;
- To deal with issues, including: land use compatibility in river valleys; stream ecology with emphasis on water quality and quantity; trails and recreational access to streams and valleylands; education and outreach about the river system; and

There is a desire to revisit the existing committee structure

Through the various community outreach and engagement opportunities the City has received feedback and input identifying and supporting a desire to modernize the framework and mandates of EAC and RSAC. This also included input from past and present members of the committees. Some of these ideas include:

- A desire to have greater committee input regarding education, outreach, stewardship and other City projects such as those addressing climate change and sustainable environmental design;

- A need to look at the level of involvement and the types of Planning Act applications being reviewed by the committees;
- Look at ways to make it easier to understand and follow committee procedures and rules, while allowing for integrated discussion and community participation;
- Reduce duplication and overlap within the existing committee structure where projects go to both EAC and RSAC; and
- Look at ways to streamline projects and applications and avoiding the duplication of staff workloads, while still allowing for community engagement
- Look at moving to a single environmental committee and use a subcommittee structure to provide focus on topics (i.e., development, stewardship and outreach, river systems, sustainability, climate change, etc.).
- A need to look at whether the committee format is the best way to engage the community on environmental matters.

A review of the current committee framework is recommended

Based on the feedback to date that the existing EAC or RSAC mandates have not been reviewed in over a decade and other factors such as current staff resources and expertise, through the implementation of the NHAP a review of the current committee system is proposed.

This will allow for an assessment of how best to integrate the Council appointed committee model to support the City's environmental programs moving forward and provide an opportunity to re-examine what the optimal model of community, engagement should be and how the council appointed advisory committee model may contribute.

5.2 Theme: Education, Outreach and Stewardship

The presence of nature in cities can be overshadowed by a focus on the built environment. As a groundwater dependent city with a vibrant natural heritage system, Guelph is fortunate to have local appreciation for, and a community that places a sense of value on the natural environment. The natural heritage system supports ecological goods and services that we all benefit from like clean air to breathe, clean water to drink, quiet places for refuge, the pursuit of hobbies and relaxation, as well as supporting the propagation of plants and food.

The long term health of these systems will be directly and indirectly the result of the decisions and actions taken by City staff and Council, residents, developers, businesses and others – meaning that the protection, enhancement and restoration of natural spaces is in everyone's best interest.

The City of Guelph provides support to a number of existing community members and groups that participate in regular and ongoing stewardship, education and outreach events in parks and on public properties such as the annual clean and green event, community gardens and annual tree and wildflower planting events . Depending on staff capacity and the nature of the activity, this support may include

leading or assisting in coordinating events, providing operational resources or providing financial donations. In addition, Guelph also benefits from a wide variety of community organized and lead events such as: the 2Rivers Festival; the annual Pollination Symposium hosted by Pollination Guelph; Nature in the City events hosted by Nature Guelph; GRCA events held at Guelph Lake; and tree planting/naturalization events led by Trees for Guelph and Ontario Public Interest Research Group.

Existing community support within Guelph presents an opportunity to work with existing partners, expand to include new ones, and to continue to find new ways and opportunities to educate, collaborate and participate in community activities to celebrate the natural environment in Guelph.

Community feedback received through the NHAP and additional outreach conducted by the City's community stewardship coordinator indicated a number of opportunities for improvement within existing stewardship and community outreach programs:

- The lack of a centralized point of contact creates difficulty in developing and growing an efficient network of local volunteers to assist with ongoing maintenance and upkeep of stewardship projects such as watering, mulching and weeding plantings over time. The City should help develop and support a local stewardship network to facilitate and support community projects through providing networking opportunities and resources like water, mulch, tools, training, etc.;
- Identification of new areas for community projects and coordination of current volunteer actions on City-owned sites is challenging. The City should develop streamlined processes to obtain permissions to make projects happen on City-owned/maintained natural spaces and parks with residents and community groups and increase efficiencies in communicating what other groups are doing, to increase coordination and collaboration between projects.
- There are knowledge gaps within the community and requests for additional support for educational activities. The City should develop education programs for citizens including programming that would help community members interested in taking ownership of natural spaces through stewardship activities.

In response to this feedback and building upon the Ecological Restoration Implementation Committee proposed in Section 4, a combination of actions focused on education, outreach and stewardship have been developed. These actions will help bridge existing gaps, improve programs moving forward and increase community awareness and participation in environmental programs and events.

Community participation in the stewardship of natural spaces will increase success

Promoting local involvement in the natural environment is one way to help connect people to natural spaces and provide opportunities to learn and share in these experiences. It also encourages members of the community to take ownership of public spaces and become more involved thereby building support for naturalization and natural area management efforts that the city may undertake throughout the city.

Improving the capacity for coordination of stewardship events also enables opportunities to improve communication with the community to let them know about events and encourage their participation.

One tool being recommended to support this is the creation of a Guelph adopt–a-space program. Adopt-a-space programs already exist in a number of other municipalities and provide a great opportunity to help coordinate community involvement in neighbourhoods across Guelph. These types of programs focus on park and natural spaces that can be "adopted" by organizations, businesses, or community groups who then become stewards of the spaces and organize community enhancement events, such as:

- Invasive species removal;
- Garbage clean-up events;
- Establishing and maintaining pollinator gardens/naturalization plantings;
- Planting, mulching & watering trees and plants;
- Bird/Bat/Bee house installation and maintenance;
- Gathering of native plants/seeds and propagation;
- Trail maintenance (i.e., boardwalks, etc.); and
- Installation of educational/community signage.

The City would establish agreements between the adopting group/stewards to clarify roles, responsibilities, types of events and activities, etc. The City's role would be to identify stewardship opportunities, help coordinate a program and provide some level of training and resources for participants to establish and grow the program.

Modernizing the City's environmental handbook

In 2000, EAC recommended that the City develop an environmental handbook to provide a consistent environmental outreach tool for residents. For example, homeowners in Guelph receive an environmental handbook upon purchase of a new home.

In 2001, City staff developed the first version of the EnviroGuide which included information about environmental stewardship, trees and landscaping, water, energy, conservation and rebates, waste management, transportation and air quality. The purpose of the guide was to help mitigate development-related impacts on the environment through education and outreach tools. The goal of the EnviroGuide was to help persuade behavioural changes based on communicating the impacts certain actions have on the natural environment.

The EnviroGuide has been reviewed and updated several times, and the development community reimburses the City for the publication costs of the document as residential developments are registered.

In 2016, staff commenced a review of the EnviroGuide as content in the guide was becoming dated. Staff identified interest and support in moving to an online platform and away from a hardcopy guideline. Based on this, staff are currently working to improve the City's existing web-based resources to create an online EnviroGuide portal through the City's website. The success of an online EnviroGuide moving forward will need continued support to grow, expand and coordinate the information showcased through the portal.

Promoting education of the natural environment through community events

As recognized through the EnviroGuide, education is one of the best and most effective ways to influence and change behaviours within the community to help support environmental sustainability and biodiversity. Education within the community also helps:

- Promote the responsible and sustainable use of natural resources including the conservation of resources such as water, minerals and wood by using them efficiently and recycling when appropriate, as well as protecting wildlife habitats around people's homes and businesses;
- Expand the appreciation and awareness of natural ecosystems, species and communities that surround us and form the City's biodiversity and identify activities that can help support them; and,
- Maintain environmental compliance by promoting awareness of the policies and by-laws that are in place to help ensure environmental protection and public safety.

Environmental education tools and programs are meant to help target various age ranges, interested groups and community members as well as help respond to specific issues or challenges we face as a City. This includes looking to create education tools and opportunities for: elementary school and high school aged youth; broader community events for residents, families, businesses and

community groups; and targeted tools to help respond to specific issues (such as reducing wildlife road mortality, invasive species awareness, etc.).

Recognising and celebrating local accomplishments and environmental leadership

Finally, in order to help the City recognize, learn, improve and celebrate accomplishments it is important that we also recognize local accomplishments and environmental leadership. An eco-awards program is proposed and will enable the City to recognize and celebrate achievements in areas such as environmental and sustainable design, restoration, community stewardship and environmental leadership. This could include using an independent jury, including awards as part of another existing program (e.g., Mayor's Awards or State of the City Address), partner with another community award program, or holding an awards ceremony.

Table 5. Section 5 Actions

Section 5 Fostering community support, raising awareness & engagement					
#	Actions	Outcome	Target Dates	Budget Status	Lead Division
5.1 Theme: Engagement models for supporting implementation					
31	Review the current mandates of the Environmental Advisory Committee and River Systems Advisory Committee	GO/CO	2019	Not Required	Policy Planning and Urban Design
5.2 Theme: Education, Outreach and Stewardship					
32	Establish an adopt-a-space program to formalize and facilitate community and neighbourhood based engagement and stewardship of natural spaces	CO	2019	Required	Park Operations: Trails and Natural Areas Stewardship
33	Continue to grow and improve the City's EnviroGuide as a web based platform to raise awareness about the City's natural spaces and programs	CO	2018-2020	Allocated	Environmental Planning & Communications
34	Develop a Nature Education Program that includes methods to build on and expand City-led education and outreach initiatives that promote awareness of ecosystem health including signage, interactive online tools/maps, resident letters, nature walks, and pop up events, etc.	CO	Medium Term (2022 – 2025)	Required	Park Operations: Trails and Natural Areas Stewardship & Environmental Planning
35	Explore the development of an urban ecology speaker series for the public in partnership with local organizations and academic institutions	CO	Long Term (2026 – 2029)	Required	Environmental Planning

36	Explore the development of educational programs with local partners including: • A kit regarding urban wildlife and ecology for primary schools in partnership with local organizations and school boards • A voluntary stewardship program for high school students to participate in City stewardship and environmental management • A conservation day camp focussed on outdoor environmental education	CO	2021 - 2022	Required	Park Operations: Trails and Natural Areas Stewardship
37	Develop a wildlife collision awareness and reduction campaign in partnership with groups such as the Guelph Humane Society and Guelph Police Service	CO	Medium Term (2022 – 2025)	Required	Park Operations: Trails and Natural Areas Stewardship and Environmental Planning
38	Develop an eco-awards program to showcase local environmental projects and leadership	CO	Medium Term (2022 – 2025)	Required	Environmental Planning

Outcomes
PS Plans and Strategies
GS Guidelines and Standards
CO Community Outreach
GO Governance and Oversight
EMM Environmental Management and Monitoring

Priority NHAP Project

Priorities: A summary of Priority Actions

This section summarizes the priority actions from the previous sections. It is recommended that these actions be initiated in the next two to three years. Some of these actions will have implications for the City's operating and capital budgets, while many will have little financial impact or have already been allocated for. Staff will report to Council on progress made, actions completed, changes to the plan and initiatives planned for each upcoming year. Monitoring and updating the actions is critical for maintaining relevancy and successful implementation.

Table 6. Summary of priority actions

Summary of Priority Actions					
#	Actions	Outcome	Target Date	Budget Status	Lead Division(s)
Section 1 Watershed planning to manage growth and infrastructure					
1.1 Theme: Supporting Growth through Watershed Planning					
1	Undertake a background review and gap analysis of existing subwatershed studies, subwatershed boundary refinement and supplemental stream characterization, to support the framework for undertaking and prioritizing the update or creation of new subwatershed studies with partner agencies.	EMM	2020	Not Required	Watershed Working Group
1.2 Theme: Environmental Monitoring to Support Science-Based Decision Making					
3	Launch a City-wide Ecological Monitoring Program which establishes protocols to assess and monitor a suite of biodiversity and ecosystem indicators at three spatial scales: species, community and landscape.	EMM	2020	Not Required	Environmental Planning
5	Enhance and expand the stormwater management monitoring program to assist in improving the City's hydraulic performance of stormwater management facilities and downstream health of receiving watercourses	EMM	2019-2021	Allocated	Infrastructure Engineering
Section 2 Natural heritage and biodiversity conservation					
2.1 Theme: Understanding and Enhancing Biodiversity					
7	Produce a status of the Natural Heritage System Report that measures the effectiveness of natural heritage policies	PS	2020	Required	Environmental Planning

8	Create a biodiversity strategy to assist in identifying biodiversity and ecosystem targets, to develop recommendations to protect, maintain, restore and enhance biodiversity (including native pollinator habitats) and to establish key performance indicators that measure effectiveness of policies and guidelines	PS	2022	Required	Environmental Planning
10	Update the City's locally significant species lists and create a regular review process supported by a technical review panel of species and taxonomic experts	GS/EMM	2021	Not Required	Environmental Planning
2.2 Theme: Continuous Improvements in Institutional Processes and Practices					
11	Develop a series of ecological technical guidelines and standards to support mitigation and enhancement of the City's Natural Heritage System such as: road ecology guidelines, bird strike guidelines, wildlife sensitive mitigation & construction protocols, trail mitigation and compatibility guidelines, Natural Area offsetting guideline, soil health and management guideline	GS	2019 - 2028	Allocated – future years required	Environmental Planning
2.3 Theme: Plant and Wildlife Habitat Management in the Urban Setting					
14	Create a comprehensive invasive species management strategy including implementation tools to guide private development, City capital projects and operational procedures	GS	2021	Required	Parks Operations and Forestry and Environmental Planning
Section 3 Data and information management					
3.1 Theme: Data Management and Technology to Improve Efficiencies and Share Knowledge					
18	Complete an inventory and examine existing City natural heritage datasets and user processes, understand gaps and user needs, and explore solutions to inform the scope and function of a centralized geospatial natural heritage data management system	GO/EMM	2019	Allocated	Environmental Planning & Information Technology Services
20	Implement the development of a data management system building on the outcomes and recommendations of Action 18	GO/EMM	2021 - 2022	Required	Environmental Planning & Information Technology Services

Section 4 Resilience and restoration planning					
4.1 Theme: Urban ecosystem resilience to support a healthy community					
22	Develop a natural asset inventory, inclusive of the natural heritage and water resource system and the ecological goods and services they provide, to facilitate the integration of green infrastructure into the City's Corporate Asset Management Plan	GS	2020	Required	Asset Management Program
4.2 Theme: Restoring urban ecosystems to support biodiversity					
25	Focus upcoming City-led restoration efforts in areas such as the Silvercreek Stream Corridor (aka. Northwest Channel) and Eastview Pollinator Park and continue to support and collaborate with community stewardship groups on on-going events	EMM	2018-2021	Required	Various – project dependant
4.3 Theme: Continuous Improvements in Institutional Processes and Practices					
26	Develop Guelph specific low impact development (LID) standards for stormwater management to assist development and capital projects in integrating alternative designs for supporting water quality and quantity protection consistent with the MOECC LID companion document to the Stormwater Management Planning and Design Manual	GS	2019-2022	Allocated	Infrastructure Engineering
Section 5 Fostering community support, raising awareness & engagement					
5.1 Theme: Engagement models for supporting implementation					
31	Review the current mandates of the Environmental Advisory Committee and River Systems Advisory Committee	GO/CO	2019	Not Required	Policy Planning and Urban Design
5.2 Theme: Education, Outreach and Stewardship					
32	Establish an adopt-a-space program to formalize and facilitate community and neighbourhood based engagement and stewardship of natural spaces	CO	2019	Required	Park Operations: Trails and Natural Areas Stewardship
33	Continue to grow and improve the City's EnviroGuide as a web based platform to raise awareness about the City's natural spaces and programs	CO	2018-2020	Allocated	Environmental Planning & Communications
Outcomes **PS** Plans and Strategies		Priority NHAP Project			

GS Guidelines and Standards
CO Community Outreach
GO Governance and Oversight
EMM Environmental Management and Monitoring

Conclusion: Looking forward to what the NHAP will bring

The preparation of the draft NHAP has followed an integrated process in an effort to drive transformative changes that support an inclusive and dynamic implementation approach that includes projects led and implemented across the organization and from within the community. The result is a robust and forward thinking implementation framework which will achieve the Official Plan objectives and policies regarding the natural heritage system and watershed planning.

Utilizing the watershed and subwatershed as a basis for land use planning is important for protecting the quantity and quality of water and will support the ability to accommodate growth and plan for infrastructure needs sustainably. Employing a City-wide monitoring program will further enable us to make decisions using a science-based approach and will also help us understand, appreciate and measure successes, opportunities and challenges as they relate to natural heritage, restoration and biodiversity conservation.

Through these achievements, we will better recognize how Guelph depends on its urban ecosystem resilience to support its healthy community as it grows into a more compact City, and adapts to unprecedented changes to climate patterns. Human adaptation to these stressors, trends, and patterns will depend on the ability to protect, restore, and enhance the urban ecosystems to support biodiversity, increase ecological resilience, and to help create a healthy culture and society that values biodiversity and green infrastructure.

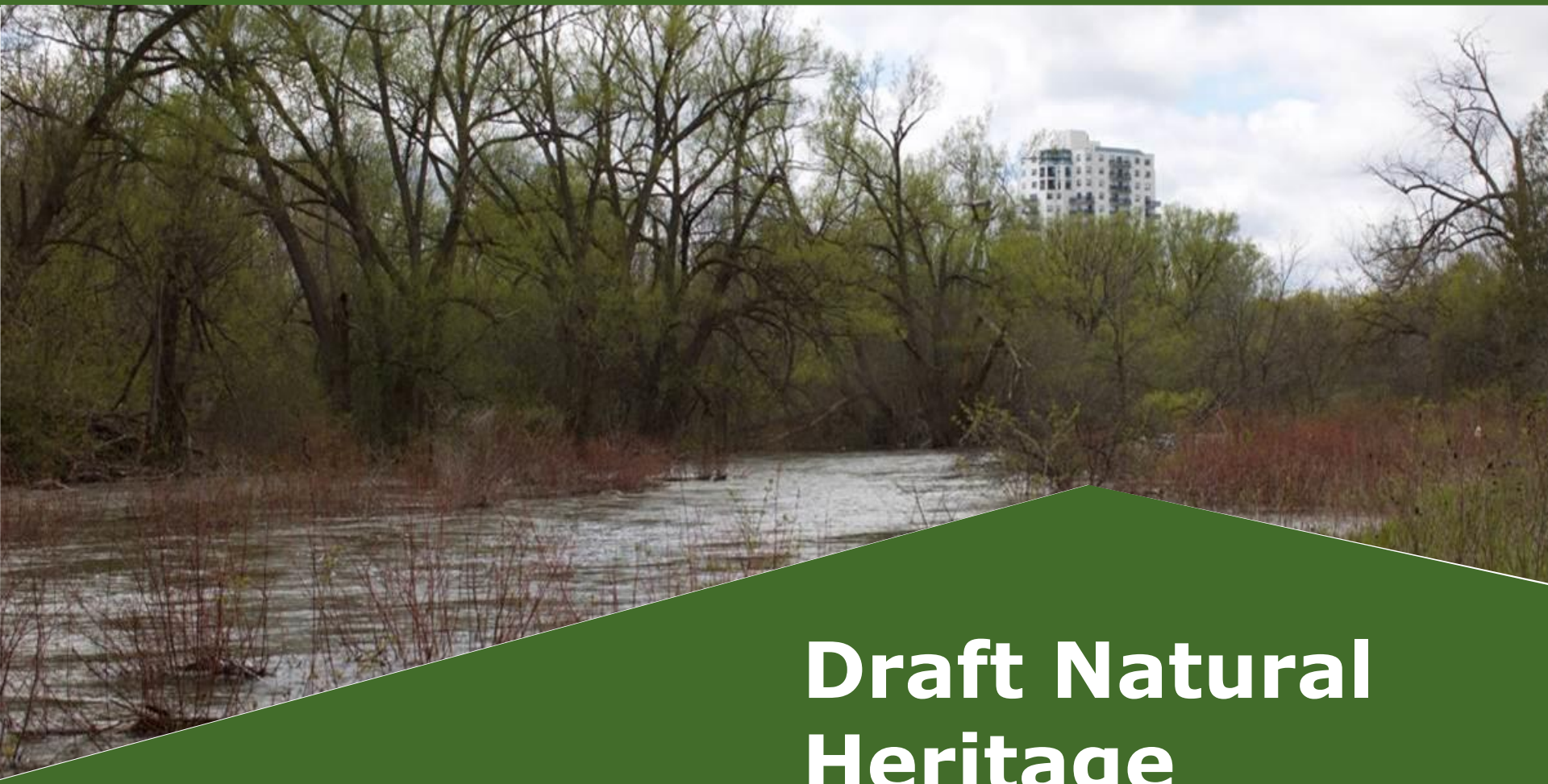
The long term health of ecosystems, and the success of actions, will be directly and indirectly the result of the decisions and actions taken by City staff, Council, residents, developers and others – meaning that the protection, enhancement and restoration of natural spaces is in everyone's best interest. Fostering community support, raising awareness and increased efforts to focus on education, outreach and stewardship opportunities will promote a culture of conservation and stewardship and will directly benefit the community's health and wellbeing.

The investments made through the implementation of this plan will continue to set Guelph apart as a municipal leader in natural heritage protection and watershed planning. A healthy and resilient natural heritage system and water resources will continue to support biodiversity, economic viability and a high quality of life for the community.

Attachment 3

NHAP - Interdepartmental Team

Staff	**Department**
Arun Hindupur, Jim Hall, Mary Angelo Terry Gayman	Infrastructure, Development & Environmental Engineering
Jennifer Juste , Benita van Miltenburg	Transportation Services
Alex Chapman	Climate Change Office
Luke Jefferson, Tiffany Brule	Open Space Planning
Martin Nuemann, Timea Filer, Dave Beaton, Samantha Dupre	Park Operations and Forestry
Emily Stahl, Heather Yates, Karen McKeown	Water Services
Tim Robertson	Wastewater Services
Chris DeVriendt, Michael Witmer,	Development Planning
Greg Bernardi	Legal Realty & Risk Management - Realty Services
Sanjay Saxena, Chris Sambol	Information Technology Services
David Wiedrick, Randy Berg	Operations-Bylaw Compliance



Draft Natural Heritage Action Plan

August 8, 2018

EAC and RSAC

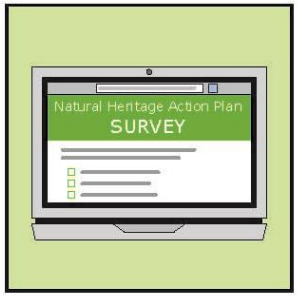
CITY OF Guelph

Making a Difference

What is the Natural Heritage Action Plan (NHAP)?

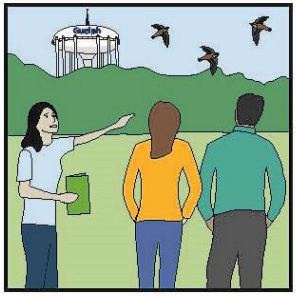
- Creation of an implementation framework
- Will serve to implement the policies and objectives the Official Plan for water resources and natural heritage system.
- Official Plan objectives inform the Natural Heritage Action Plan.

Community Engagement



390 responses to the Natural Heritage Action Plan survey, July 2017

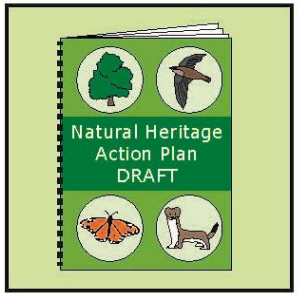
3 workshops with **51** participants to develop and prioritize draft actions



3 ward tours with members of City Council and the senior leadership team

16 additional survey responses to the workshop matierals

15 meetings internally and with agencies (Grand River Conservation Authority) to develop actions, prioritize ideas and develop content



1 draft of the Natural Heritage Action Plan was reviewed internally

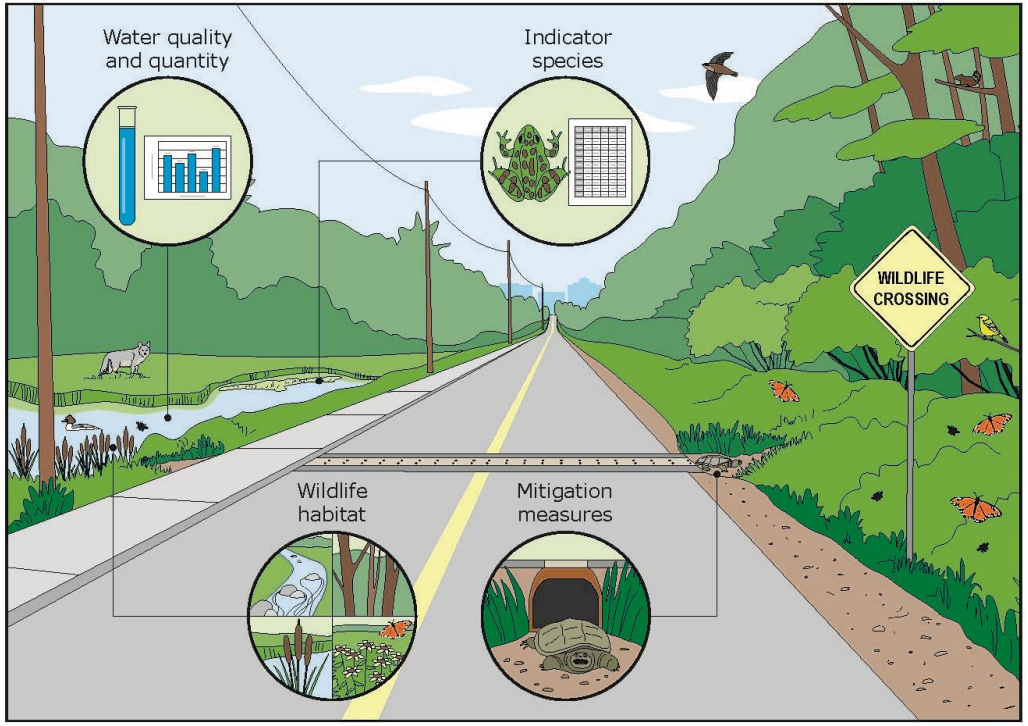
What’s in the action plan?

Section 1: Watershed planning to manage growth and infrastructure

Themes:

1.1 Supporting Growth through Watershed Planning

1.2 Environmental monitoring to support science-based decision making



Section 1: Watershed planning to manage growth and infrastructure

- Priority Actions:
  - Establish an internal watershed working group
  - Complete a background review and gap analysis
  - Launch a city wide ecological monitoring program
  - Enhance and expand the existing stormwater management monitoring program

Section 2: Natural heritage and biodiversity conservation

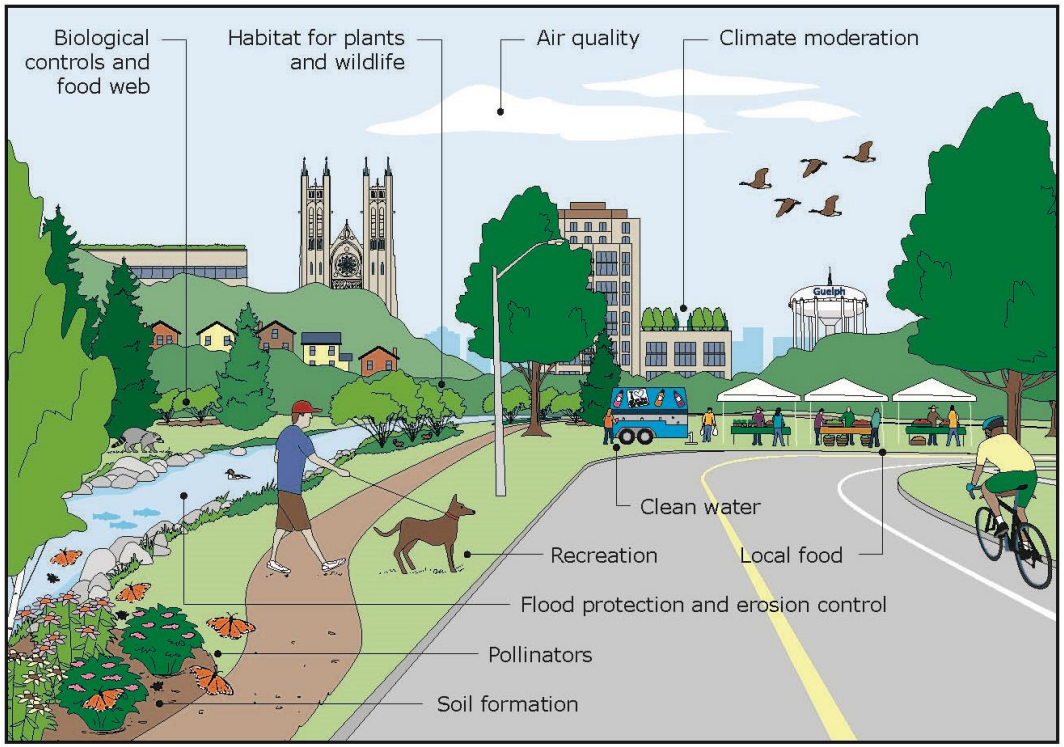
Themes:

2.1 Understanding and enhancing our biodiversity

2.2 Continuous improvements in institutional processes and practices

2.3 Plant and wildlife management in an urban setting

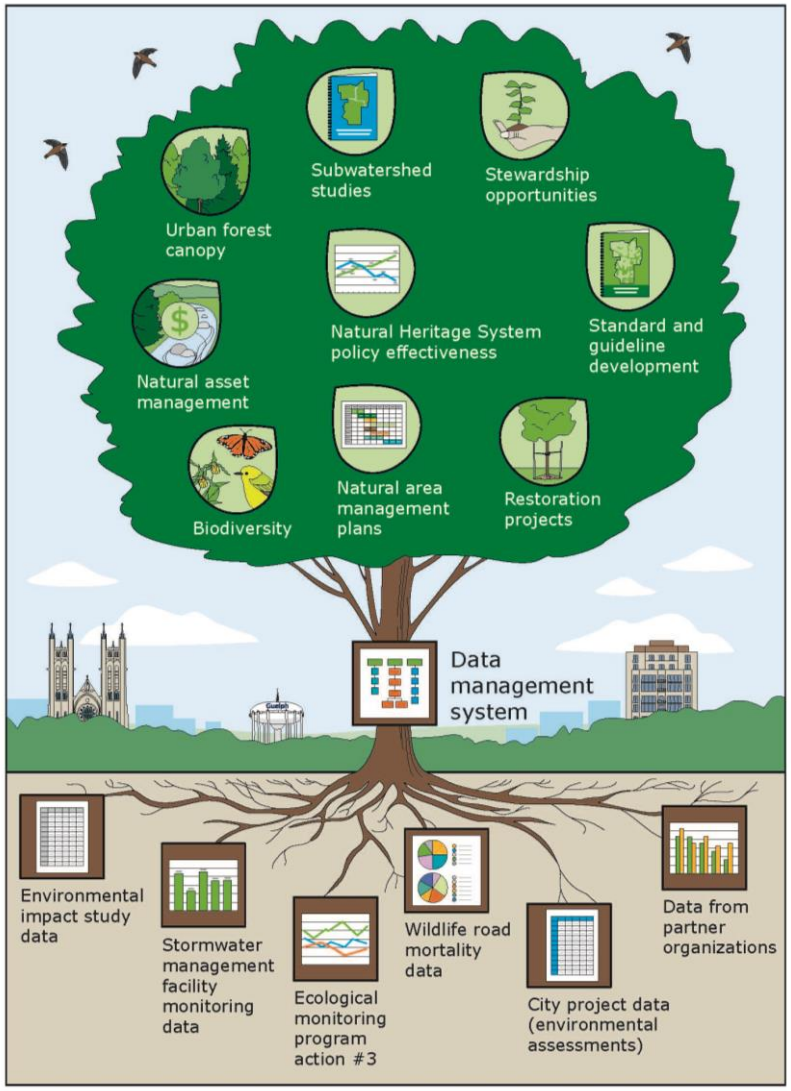
2.4 Using conservation land securement to support long term preservation



Section 2: Natural heritage and biodiversity conservation

- Priority Actions:
  - Produce a status of the Natural Heritage System Report that measures the effectiveness of our natural heritage policies
  - Create a biodiversity strategy
  - Update the City's locally significant species lists
  - Develop a series of ecological technical guidelines and standards
  - Create a comprehensive invasive species management strategy

Section 3: Data and Information Management



Theme:

3.1 Data management and technology can improve efficiencies and knowledge mobilization

Priority Actions:

- Complete a SWOT exercise to inform the scope and function of a data management system
- Implement the development of a data management system

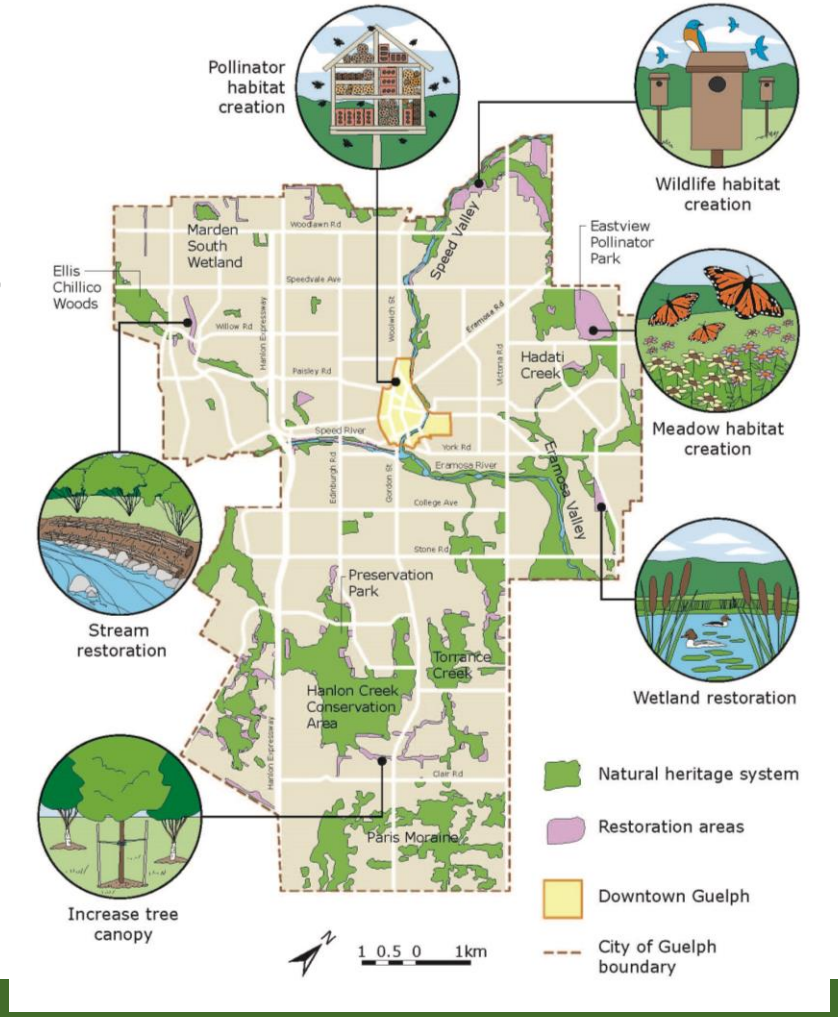
Section 4: Resilience and restoration planning

Themes:

4.1 Urban ecosystem resilience supports a healthy community

4.2 Restoring Urban Ecosystems to Support Biodiversity

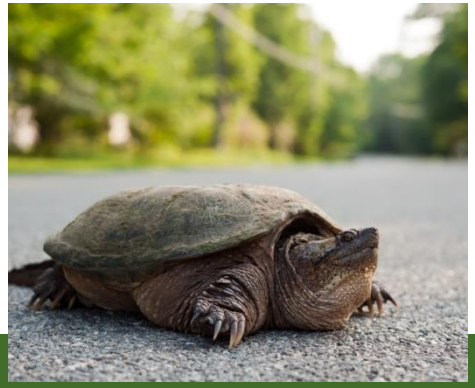
4.3 Continuous improvements in institutional processes and practices

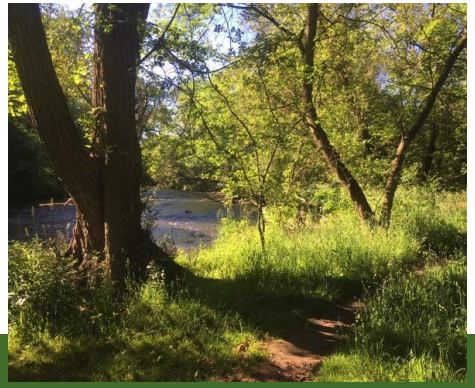


Section 4: Resilience and restoration planning

Priority Actions:

- Develop a natural asset inventory inclusive of ecological goods and services
- Focus upcoming City-led restoration through planned capital projects
- Support and collaborate with community stewardship groups
- Develop Guelph specific low impact development (LID) standards for storm water management





Section 5: Fostering community support, raising awareness & engagement

Themes:

5.1 Engagement models for supporting implementation

5.2 Education, Outreach and Stewardship

Section 5: Fostering community support, raising awareness & engagement

Priority Actions:

- Review the current mandates of the Environmental Advisory Committee and River Systems Advisory Committee
- Establish an adopt-a-space program
- Continue to grow and improve the City's EnviroGuide as a web based platform

Summary

- The draft includes 38 Actions, with 16 priority actions to be commenced in the next 2 to 3 years
- The protection, enhancement and restoration of our natural spaces is something that everyone can be a part of.
- Public comment period is ongoing with a deadline of July 24, 2018

Recommendation

A suggested motion has been included in the covering memo for the committees.

A final NHAP document will be brought back to Council for approval in September.