



Implementation Plan for Protecting Shaws Creek Subwatershed



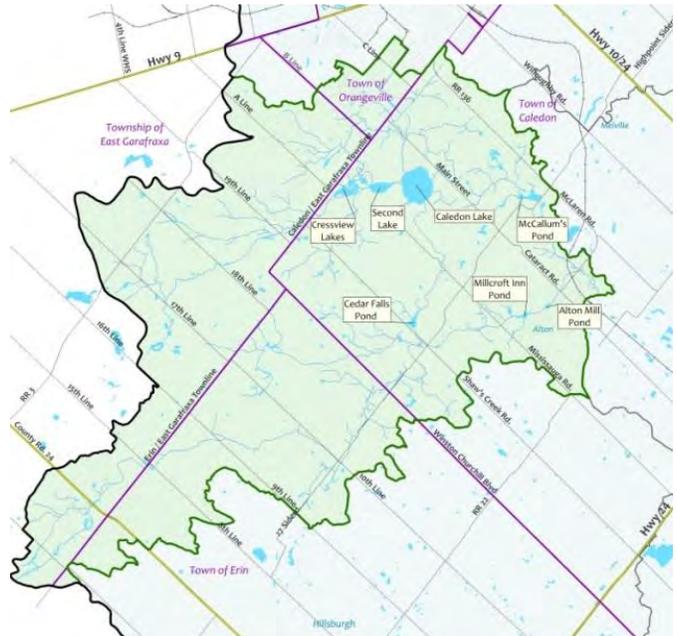
CREDIT VALLEY
CONSERVATION

Credit Valley Conservation is a community-based environmental organization, dedicated to protecting, restoring and managing the natural resources of the Credit River watershed. **Together, it's our nature to conserve and our future to shape through the power of science, education, policy and leadership.** That is our mission, our reason for being. It provides a path to achieve our shared vision of **a thriving environment that protects, connects and sustains us.**

The Credit River is 90 km long. It meanders through some of the most densely populated regions of Canada while supporting some of the most diverse landscapes in southern Ontario. Twenty smaller subwatershed areas make up the expansive network of brooks, creeks and rivers that feed the Credit River and support the rich natural environment that is loved in our communities. Shaws Creek is one of these subwatershed areas, a jewel among the rugged and beautiful headwaters of the Credit River.

Shaws Creek subwatershed is made up of several small communities in Caledon, Erin, East Garafraxa, Orangeville and Alton. Our communities are unique places to live. We want to protect them for our lifetime, our children's and our grandchildren's. We have a vested interest in creating a healthy, vibrant and diverse environment that provides us with many valuable services including abundant and clean water; clean air; a variety of connected habitats that support wildlife, wetlands, streams and ponds; diverse fish communities; natural flowing rivers and streams; and a variety of recreational spaces and places for us to play.

Our work is directed through sound planning, beginning at the watershed level, then focusing on the distinct conditions in individual subwatersheds. From there, we move to the neighbourhood level for targeted implementation. These plans leverage leading-edge science and up-to-date monitoring data from various disciplines across our organization. This report presents the results and recommendations of the Shaws Creek Subwatershed Study and helps us move towards our goal. This becomes even more important in the face of an unpredictable and changing climate.

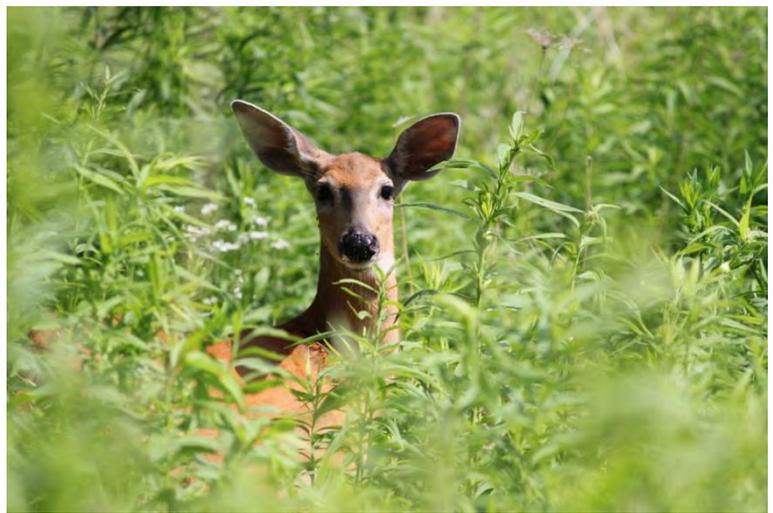


This report is a call for action. Together we can implement solutions that will restore and maintain the natural environment of the Shaws Creek Subwatershed. We can keep our environment safe, stable and beautiful for generations to come.



Humankind has not woven the web of life. We are but one thread within it. Whatever we do to the web, we do to ourselves. All things are bound together...all things are connected.

-Chief Seattle



Working Together to Protect Our Local Environment

This report is a citizen's guide. It will answer your questions about why it is important to focus on environmental conservation, maintaining pristine natural areas, and how conservation benefits will ripple out to the rest of the watershed. Restoring and protecting Shaws Creek subwatershed benefits not just the upper reaches of the Credit River watershed but the entire health of the downstream river and groundwater reliant communities.

With this in mind and recognizing that ecosystems are, by their nature, complex and in a state of constant evolution, CVC and partners took the time to understand the area's natural environment and what will stress it in the long-term. Using this information, we have developed a strategy for the next 20 years. The strategy builds on existing plans developed by municipalities (i.e. Official Plans) and the Province (i.e. Source Water Protection Plans). This strategy recognizes that the needs of our natural environment are imperative to improve the conditions in the subwatershed. These improvements will flow downstream to linked environmental systems and communities. The environment cannot maintain current conditions or improve unless steps are taken to preserve, protect and enhance the natural systems in the Shaws Creek subwatershed.

We are already working to ensure the long term health of the Shaws Creek subwatershed, which is essential to the health of the whole Credit River, the availability of water and our health and well-being. Politicians, municipal workers, community groups and residents are all doing their part

To help protect and enhance Shaws Creek, some of the current initiatives underway include:

- The **Alton Village Study and Servicing and Settlement Master Plan**. A joint project involving the Town of Caledon, the Region of Peel and Credit Valley Conservation. The study will address planning, new development implications and improve existing conditions in Alton.
- **Alton Millpond Rehabilitation**. Led by the Alton Millpond Rehabilitation Committee, this initiative is addressing the deterioration of the Millpond due to sediment build-up, age of the infrastructure and wastewater treatment plant inflow. The objective of the rehabilitation is to provide fish passage, improve water quality, create a recreational amenity and maintain hydro-electric power potential.
- **Caledon Lake Management**. An on-going project that began in 2009 to address flooding concerns raised by cottage owners that live along the lake. The end result is to have a self-maintaining channel flowing out of the lake that will aid in lowering water levels and reduce the risk of flooding.
- **Source Water Protection Assessment**. This initiative is in effect due to the *Clean Water Act*, 2006 and Ontario Regulation 287/07. The results of the assessment will identify risks to drinking water sources, determine the severity of the risks and provide measures to mitigate threats.

We still have work to do. Shaws Creek Subwatershed is changing under the pressures of growing urbanization, poor forest cover and connectivity, dams blocking fish and sediment, and the pressures of natural resource extraction. It is important to acknowledge the issues in order to improve the existing conditions of the subwatershed and work towards restoring it to a more natural state. We need to be proactive if we want to keep our water clean, maintain diverse fish communities and preserve our natural habitat corridors.



Where You Live

What is a Watershed?

The entire area of land that drains its rain or snow melt into a particular river is known as the watershed of that river. The area surrounding a smaller river or creek which contributes to a larger river system is called a subwatershed.

Shaws Creek Subwatershed covers an area of about 78 square kilometres, making up approximately 9% of the total area within the Credit River watershed. The subwatershed includes parts of the Town of Caledon, Town of Erin, Township of East Garafraxa, and the Town of Orangeville, and supports the Village of Alton near where Shaws Creek joins the Credit River.

Shaws Creek is located in the rich rural headwaters of the Credit River. It is dominated by agricultural fields over rugged, hummocky terrain in the far upper reaches of the watershed. Unique topography and bedrock geology produce large amounts of groundwater in Shaws Creek - one of the highest groundwater yields in the entire watershed - which in turn feeds baseflow in the Credit River. This baseflow is critical for maintaining water quality in the Credit River and diverse aquatic ecosystems. The topography and extensive deposits of the Orangeville Moraine also make this area a significant interest to the aggregate extraction industry.

Shaws Creek supports several large and significant wetland complexes, making up over 16% of the total area within the subwatershed. These wetlands are supported by the significant baseflow in Shaws Creek and play a critical role in maintaining good water quality and biodiversity in the subwatershed. Shaws Creek is one of the most productive brook trout fisheries in the Credit River watershed, although there are signs that the fishery is declining. Challenges facing the fishery in Shaws Creek include a lack of riparian and forest cover and the presence of several dams along the Creek, both of which degrade water quality and reduce habitat. Restoring the natural forests of the subwatershed and mitigating the impacts of dams will be an important goal to improve the overall health of the ecosystem.

The health of headwaters like Shaws Creek has profound impacts on everyone and everything that lives in the Credit River watershed. Shaws Creek is a jewel among the headwaters of the Credit River – conserving and rehabilitating the natural functions of the subwatershed will be overwhelmingly positive for the entire watershed.



There is a lot of interest in aggregate extraction in the Shaws Creek subwatershed



Wetlands account for 16% of the total area of the subwatershed



Trout are on the decline in the watershed due to poor forest cover and the presence of dams



Restoring natural forest cover will help improve the ecosystem

Goals and Objectives

Goal

Our goal is to ensure abundant, safe, clean water for environmentally, socially and economically healthy communities within the Credit River Watershed.

Our vision for Shaws Creek subwatershed is a place where human uses are in harmony with the environment. It consists of natural heritage systems linking its terrestrial, aquatic and riparian systems, which contain healthy, diverse and self-sustaining populations of fish and wildlife. The residents of the region value the area and are aware of their impacts on the environment. They use the subwatershed for responsible agriculture and passive recreation, including bird watching, and hiking, and they will attempt to live in balance with nature.



Objectives

Connect our communities with nature.

- Demonstrate and promote awareness of the linkages between healthy water, healthy lifestyle and the economic viability of rural and urban land uses.
- Promote the need for environmental stewardship and better understanding of the importance of natural features and functions of the Credit River watershed.
- Monitor and conduct research to continue to enhance our understanding of the subwatershed and to monitor environmental conditions and stresses.

Protect and preserve our waters.

- Promote the wise use of surface and groundwater having regard to both human and ecological needs.
- Preserve and re-establish the natural hydrologic cycle.
- Maintain, enhance or restore natural stream processes to achieve a balance of flow and sediment transport.
- Manage stream flow to reduce erosion impacts on habitats and property.
- Minimize risk to human life and property due to flooding.
- Maintain groundwater levels and baseflows (groundwater discharge to streams) to sustain watershed functions, human uses and climatological change.
- Maintain or enhance water and sediment quality to achieve ecological integrity.

Protect, restore and improve Shaws Creek natural heritage to help ensure a healthy ecosystem throughout the Credit River Watershed.

- Protect, restore or enhance the integrity of the watershed ecosystem, through an integrated network of natural areas, habitats and connecting links.
- Protect, restore or enhance native terrestrial and aquatic plant and animal species, community diversity and productivity.
- Promote integrated resource management of the aquatic and terrestrial systems and areas within the watershed for plan, animal and human uses.

What We've Learned

Little change has occurred in the Shaws Creek subwatershed over the past 60 years, leaving it relatively healthy. The networks of farms, roads, creeks and forests have remained stable for decades. Despite this stability, the natural heritage system is still impaired due to human development in 1800's and early 1900's. In addition, there are several stresses that work against the enhancement of the subwatershed, and may be leading to the slow decline of the brook trout fishery in Shaws Creek which was until recently the most productive fishery in the entire Credit River watershed. These stresses and other features of the subwatershed are discussed below, summarizing the technical findings of the Shaws Creek Subwatershed Characterization Study.

Surface Water and Groundwater

The health of a subwatershed's water resources is fundamental to the health and function of the entire ecosystem and natural environment.

- Rich groundwater recharge in the Shaws Creek subwatershed produces an average of about 550 litres per second of average baseflow to Shaws Creek and ultimately to the Credit River.
- Shaws Creek is a critical source of baseflow to the Credit River, contributing about 40% of the baseflow at Cataract, and 12% of the baseflow at Norval.
- Four primary existing dams along the watercourse which act as barriers to fish and sediment in Shaws Creek –Alton Mill Dam, Millcroft Inn Dam, Orpen Lake Dam and Cedar Falls Dam.
- There is an increasing trend of chloride levels in Shaws Creek, a substance that can be toxic to aquatic life. This may be due to increased urban development and road salting practices. Chloride and other contaminants impair aquatic habitat and threaten one of the Credit River watershed's most productive fishery.
- Caledon Lake impairs both dissolved oxygen and water temperature in Shaws Creek, directly affecting the quality of fish habitat.

What is baseflow?

Baseflow is the water in a river that comes from groundwater. Measuring baseflow helps water resource managers understand impacts of weather conditions and groundwater extraction on rivers and streams.

Fisheries and Aquatic Habitat

Fish communities' health provides an environmental indicator that can be related to the overall health of the subwatershed. The long term goal is to predict how land use and development will affect the health of aquatic communities. Healthy fisheries also serve as an important recreational opportunity, particularly for sensitive coldwater species such as trout.

- Since the 1980s, fish collection records have been compiled and include a range of both warmwater and coldwater species (over 20 species) in Shaws Creek. Wetlands and groundwater influences appear to be related to the quality of habitat for the various species.
- The existing dams in the subwatershed are limiting factors to fish mobility and Caledon Lake impacts the quality of sensitive fish habitat.
- Shaws Creek watershed are lacking several critical factors for fish habitat, including too much fine substrate which impacts sensitive fish species (potential source from agricultural fields); water temperature which is impacted from Caledon Lake and the dams; further impacts from the dam affecting fish mobility and water quality; and lack of riparian cover in agricultural areas, impacting water temperature and quality.



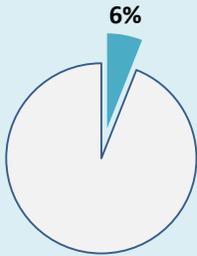
Terrestrial Ecology Characterization

Forests provide benefits to aid in watershed functions including; moderating the water cycle, capturing carbon, improving water quality, providing shade for creeks and streams and habitat for numerous wildlife species. Conservation areas with remnant forests also provide valuable education, tourism and biological research.

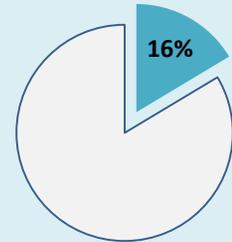
- Historically, Southern Ontario was covered in over 70% forest. As of now, Shaws Creek subwatershed is covered by only 8.5% natural forests with an additional 5.1% in plantations.
- The Ministry of Natural Resources and Forestry as well as Environment Canada recommends a minimum of 30% forest coverage to maintain environmental health and CVC has adopted this recommendation.
- Less than 26% of Shaws Creek Subwatershed can be considered to be relatively natural.

How Much Habitat is Enough?

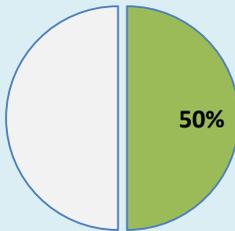
Environment Canada's recommended wetland habitat in a subwatershed



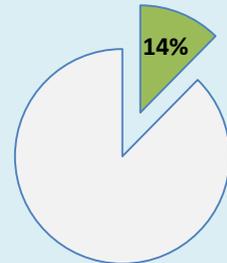
Wetland Habitat in Shaws Creek



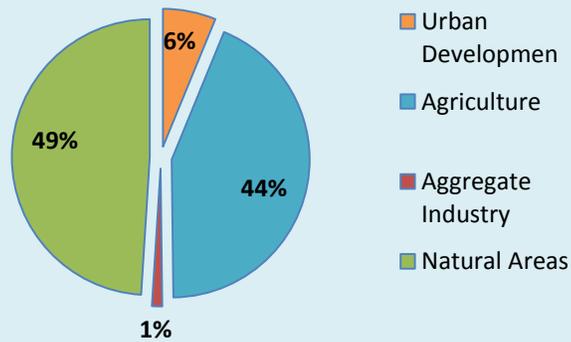
Environment Canada's Recommended Forest Cover to Support Terrestrial Species and Aquatic Systems



Forest Cover in Shaws Creek



Overall Land Use in the Shaws Creek Subwatershed



Creating a Healthier Shaws Creek

We have an unprecedented opportunity to halt – and potentially reverse – the impacts of human development in the watershed by protecting and restoring the Shaws Creek subwatershed. To best decide how to achieve this ambitious objective we must confront the challenges that lie ahead.

The quality of the fishery in Shaws Creek is declining; indicating that human impacts are having adverse effects on the natural features in the subwatershed and action must be taken to ensure Shaws Creek is restored as the most productive fishery in the Credit River Watershed.

The quality of water in Shaws Creek faces several threats, including degraded riparian areas, dams that retain sediment, impacts from septic beds, and impacts from the man-made Caledon Lake.

Natural spaces are often small and disconnected, limiting their benefit in providing terrestrial and aquatic habitat and in providing clean water to the Credit River.

There are pressures to expand aggregate extraction and urban development in the subwatershed, causing concerns over the impacts to natural areas and functions, as well as over proper rehabilitation of current and future aggregate extraction pits.

The impacts and benefits of dams on Shaws Creek must be balanced, taking into consideration the impacts to aquatic life and the cultural and recreational benefits to local residents and cottagers.

Climate change is expected to impair many functions of the subwatershed, with projected dryer conditions resulting in reduced base flows, impacts to the already declining fishery, and impacts to the form and function of Shaws Creek.

These challenges are a call to action for residents, agencies, municipalities, community groups and businesses in the subwatershed. They also provide a roadmap and a target to protect and enhance Shaws Creek. Working together we can ensure that Shaws Creek remains the jewel of the Credit River watershed now and in the future.

Without action to better manage water and natural areas, the environment in the Shaws Creek Subwatershed will continue to degrade.



What Do We Need to Do?

There are many opportunities and initiatives that can be taken to confront these challenges head-on, and the Shaws Creek Subwatershed Study is an important first step. The findings of the Characterization Report informed our understanding of the form and function of the subwatershed. The analysis and modelling carried out under the Impact Assessment has identified the sensitivity of the subwatershed conditions to land use changes. Together the Characterization Report and the Impact Assessment have led to the development of the Management and Implementation Plan. The Management and Implementation Plan provides recommendations for informing decisions and management actions over the next 20 years. In the short term, all three reports provide impetus for immediate and priority action in the following areas:

1. Stream Restoration;
2. Agricultural Practices;
3. Existing urban development;
4. On-line ponds and dams; and
5. Aggregate extraction.

1. Stream Restoration

As part of the Subwatershed Study process every stream reach was given a score from each discipline on the condition and restoration potential. The conditions table (summarized in Appendix A) describes each reach in terms of their condition in geomorphology, hydrology/hydraulics, hydrogeology, terrestrial, water quality and fish habitat. The potential table describes each reach according to the anticipated potential and benefit of restoration in each of the technical disciplines. The information from both the condition and potential assessment were combined to identify the restoration effectiveness (full methodology is described in section 3.0). The restoration effectiveness determines the reaches with existing low quality conditions and a high restoration potential. Figure 2 (also Figure 3.8.3 of the Phase 2/3 Report) summarizes the restoration effectiveness for each reach in Shaws Creek Subwatershed. Given that Shaws Creek is one of the most productive brook trout fisheries in the Credit River watershed and that there are signs that the fishery is declining, as well as increasing stream temperatures, stream restoration is significantly important to meeting the goals, objectives, and targets of the subwatershed. As well, this analysis identifies those reaches in which opportunity exists to mitigate flooding concerns, improve hydrologic function, reduce channel erosion, and improve water quality.

It is recommended that CVC work in partnership with landowners to implement stream restoration recommendations in key areas that show high restoration effectiveness including (see Figure 9.1.1):

- **Upper Alton Branch Tributary** – the entire length of the tributary upstream of 27 Sideroad has a medium-high to high restoration effectiveness, due to their poor condition and high potential for restoration.
- **Western Drainage Features** – two Grouped Drainage Features (GDF11 and GDF29) in the west-central portion of the subwatershed show a medium-high restoration effectiveness, and would contribute to the improvement of headwater functions.
- **Orangeville** – the reaches and Group Drainage features upstream/north of Caledon Lake, adjacent to Orangeville.
- **Village of Alton** – The Millcroft Inn Pond, Alton Millpond and the connecting reach, R5a, between them.

The restoration initiatives should align with riparian planting recommendations (Figure 5.8.4 of the Shaws Creek Management and Implementation Plan) and the natural heritage system.

Further, it is recommended that continued stream restoration efforts be directed to the remaining reaches identified in Figure 1 (Figure 3.8.3 and summarized in Table 3.8.2 of the Shaws Creek Management and Implementation Plan).

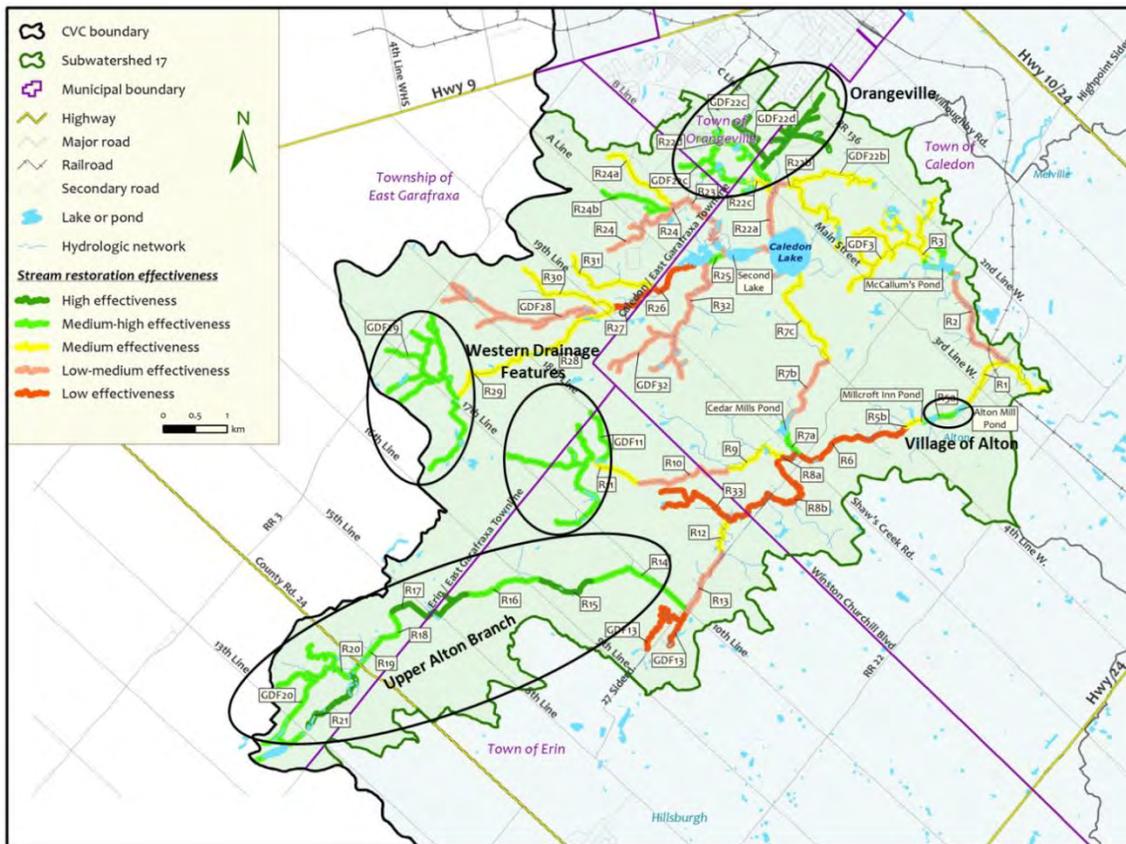


Figure 1: Stream Restoration Effectiveness and identified stream restoration priorities

2. Agriculture Land Use

Over 40% of the total land area in the subwatershed is used for agriculture, intensive agricultural lands making up 38% and non-intensive agriculture making up 6%. In areas of agriculture, vegetation and forests are limited, with little riparian buffer around the many tributaries to Shaws Creek. In many places the tributaries consist of swales, agricultural drains and intermittent streams. The lack of riparian cover has left many of these surface water features vulnerable to erosion and high stream temperatures, and capable of providing only sparse habitat for aquatic biota. As well, within these agricultural lands, water courses tend to have poorer water quality.

It is recommended that CVC, landowners, and municipal partners improve riparian cover to achieve a 30 metre buffer focusing on priority areas (priorities are identified in Figure 5.8.4 of the Shaws Creek Management and Implementation Plan). The improvement of riparian cover in the subwatershed will mitigate some of the projected impacts of climate change, increasing stream temperatures, impacts to vegetation species and work towards achieving the natural heritage system goals.

As well, the Peel and Wellington Rural Water Quality Programs should continue to support the voluntary implementation of the nutrient management strategies and nutrient management plans to reduce the risk of excess nutrient and pathogen discharge to surface and groundwater sources during the storage and application of manure and other fertilizers. CVC should work in partnership with Dufferin County to adopt a Rural Water Quality Program similar to Peel and Wellington’s within their municipal jurisdiction.

3. Existing Urban Development

For Shaws Creek, the majority of the landscape largely reveals natural and rural settings (agriculture), although there are some more urban areas and urban development occurring, particularly in the Town of Orangeville and Alton Village. While the overall water quality is good, there has been evidence of negative impacts specific to urban development around Orangeville and Alton. In general, urban activities are affecting water quality (ground and surface water) through nutrient loadings (especially nitrate) associated with septic systems, elevated chlorides associated with road salting, and elevated metals due to urban activities. Similarly, the Alton Village Study identified that Alton is having an impacts on groundwater quality due to existing septic systems. **To reduce the negative impact of the existing development within Alton on Shaws Creek CVC, the Town of Caledon and the Region of Peel should work together to:**

- i. Implement a septic system inspection program for Alton Village;**
- ii. Implement the stormwater retrofit strategy outlined in Environmental Master Plan; and**
- iii. Monitor and mitigate the impacts of the new development and the performance of their stormwater management facilities.**

The implementation of urban high priority recommendations should be implemented by the Town of Caledon and the Region of Peel with support from CVC over the next five years (2017-2023).

4. On-line Ponds and Dams

There are a number of on-line ponds throughout the subwatershed with the majority providing aesthetic and recreational benefits. These on-line ponds are of concern through the impacts on stream processes, fluvial geomorphology, and water quality, primarily nutrients and temperature. In addition, they provide a barrier to fish movement and habitat linkages. Through the subwatershed study, on-line ponds have been evaluated for restoration potential. The dams with highest potential include (see Figure 2 below or Figure 5.1.1 of the Phase 2/3 Report):

- McCallum's Pond
- Alton Millpond
- Millcroft Inn Pond
- Cedar Falls Pond
- Dam remnant downstream of Alton Mill Main Street

It is recommended that CVC work in partnership with landowners to mitigate the impact of the McCallum, Alton, Millcroft, Cedar Falls and the remnant dam downstream of Alton Mill Main Street.

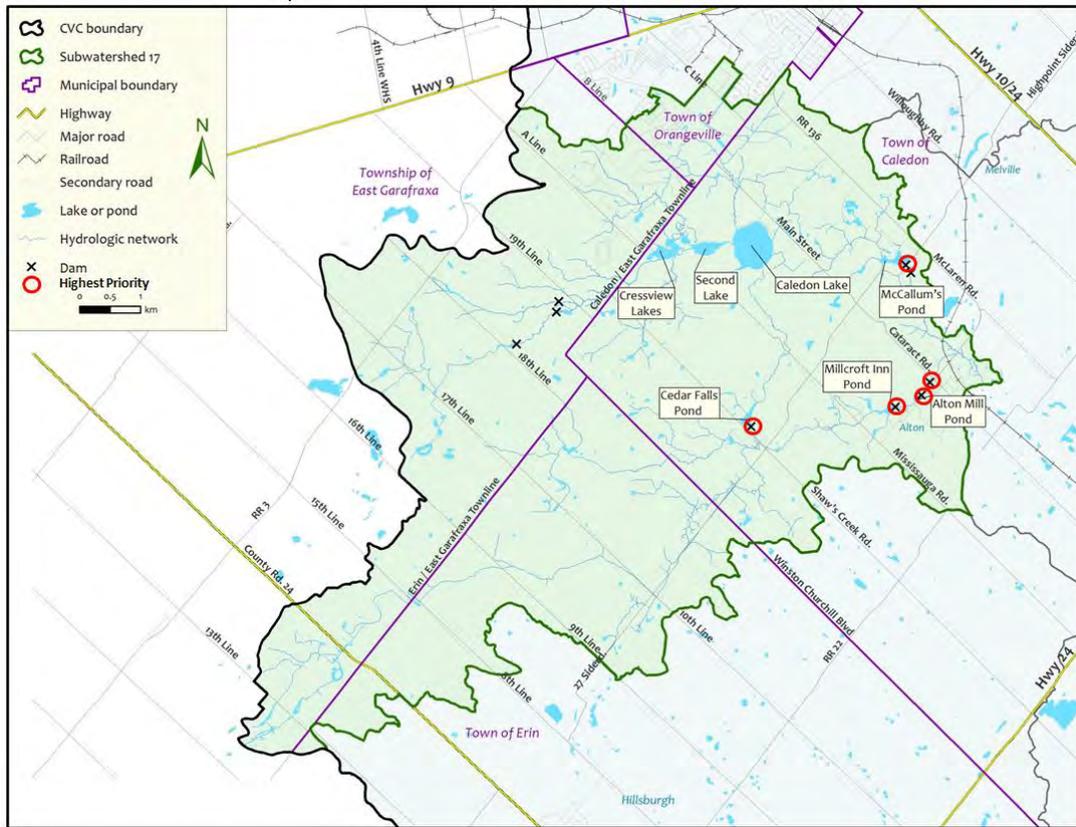


Figure 2: Priority On-line ponds and dams to direct mitigation measures

5. Water Takings

The unique topography and bedrock geology of the Shaws Creek Subwatershed produces large amounts of groundwater in Shaws Creek which is significantly supplemented by groundwater from the Grand River Watershed. This system results in one of the highest groundwater yields in the entire Credit River Watershed - which in turn feeds important baseflow in the Credit River. This baseflow is critical for maintaining water quality in the Credit River and diverse aquatic ecosystems. Water takings can impact available surface water and groundwater levels and flow paths. In Shaws Creek Subwatershed there is a high demands for water from aggregate extraction, golf courses, and agricultural activities (i.e. irrigation) which may result in low flow conditions during dry summer periods. As such, management of water takings is critical to maintaining the health of Shaws Creek. To reduce the impact of water takings on the subwatershed the following actions should be considered:

- I. **All permit to take water users need to be assessed based on cumulative and resulting potential impact to the subwatershed and watershed (groundwater levels and inter-basin transfer levels as well as base flow) through an integrated and holistic approach.**
- II. **More effort should be made to work with the Low Water Response team to mitigate impacts during low water events.**
- III. **Implement a public water advisory program to reduce water use during drought conditions.**

6. Aggregate Land Use

The Impact Assessment found that generally the development of aggregate extraction is expected to contribute a greater amount of baseflow to Shaws Creek; however, increased baseflow does not necessarily equate to positive benefits. Increased baseflow, as well as a change in the chemistry and how the baseflow is delivered to the streams (i.e. point source as opposed to groundwater seeps) will influence and change the natural conditions



of the receiving stream. As well, the development of aggregate activities are expected to impact to the natural heritage environment, with the highest impacts in those catchments where aggregate resources have been identified, and impact water quality and fisheries (i.e. may allow for the introduction of invasive species), with localized negative impacts where aggregate resources directly discharge to the creek.

As a result, it is recommended that the impact of aggregate extraction on the subwatershed be evaluated in greater detail to confirm the expectation of the impact. Any changes from historical or natural conditions must be cautiously assessed. For example, increased baseflows in other situations may increase aquatic plant growth and dissolved oxygen issues or change the natural functions of more intermittent headwaters.

CVC and municipal partners should develop an Implementation and Management Plan for the aggregate operations within Shaws Creek Subwatershed and neighbouring influenced subwatersheds. The Implementation and Management Plan should better understand the cumulative impacts of the development of aggregate extraction and to develop holistic rehabilitation plan that ensures the area provides overall benefit to the natural heritage system.

Detailed information and a comprehensive set of actions that we need to implement to safeguard human health, properties and the many beautiful features of Shaws Creek can be found in the Shaws Creek Subwatershed Study Reports.

This report has benefited from the local knowledge of our municipal partners in the Township of East Garafraxa, Towns of Caledon, Erin, and Orangeville, Village of Alton, and Region of Peel and the County of Dufferin.

The recommendations were developed by a committee of CVC staff and consultants, as well as provincial, regional and local governments and area residents. The committee included provincial staff from the Ministries of Municipal Affairs and Housing, Environment and Climate Change, Natural Resources and Forestry and staff for each of the municipalities.

We thank committee participants, municipal leaders and community members for their time, effort and energy. The recommendations will help protect the local land and waterways for generations, while reflecting the needs and aspirations of the community.

