

Underground stormwater management keeping John Galt's town plan alive

By David J. Penny, BES



Sensitive wetlands have been protected as conservation lands.

On St. Georges Day, April 23, 1827, there was a ceremonial felling of a large maple tree near the confluence of the Speed and Eramosa Rivers. The site was selected as the headquarters for the Canada Company. Company Superintendent, John Galt presented an imaginative town plan of European design that radiated out from the focal point at the river. And so the town of Guelph, Ontario, was founded and became one of Canada's first planned communities.

In 1827 the Speed River was recognized as one of the best cold water,

The Ontario School of Agriculture (University of Guelph) opened its doors. A storm drain system, appropriate for the times, closely followed development.

The river continued to play a significant role in the City's development. A major flood in 1948 almost destroyed the town and prompted major changes. The wide flood plain south of town, with its meandering stream, was straightened and contained between dykes and walls of concrete and stone. With the guidance of the Grand River Conservation Authority (GRCA), flood

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trout streams in the country. The development of the town and surrounding countryside changed the ecology of the river, removing much of the natural cover and increasing erosion, sedimentation and water temperature. Through evolution Eastern brook trout have been replaced by several warm water species.

As the town expanded outward from the focal point at the river, an infrastructure began to develop. On May 1, 1874, on farmlands south of the river,

control structures were installed upstream. These reduced the danger of flooding and provided a mechanism to increase river flow during drought periods, and to dilute the effluent flowing from Guelph's sewage treatment plant to cities further down the Grand.

Since 1827, Guelph has grown into a city with a population of 120,000. It is expected that this managed growth will continue to an estimated population of 150,000 by the year 2021. The growth of the inland city has brought increased

challenges to those implementing John Galt's plan.

Originally dependent on the river for its water, Guelph has since developed a series of 23 deep wells to tap the Amabel aquifer that runs beneath it. Water from the aquifer is famous for its purity, as attested to by the bottled water and brewing industry located in the area (John Sleeman established his brewery in Guelph in 1834).

What seemed to be an infinite supply is, however, being taxed by recent urban development. According to Dave Belanger of the City's Waterworks Department (established in 1879) a "Water Supply Master Plan" has been developed to conserve and protect the City's water supply. The plan defines a protection area that radiates 25 kilometres from the city centre and restricts land use according to several criteria.

Challenges include increased sediment in surface water and contamination of ground water from such things as road salt, pesticides and fertilizers. Of greatest concern is contamination due to organisms leaking from an older and sometimes overloaded sewer system. The geomorphology of the area is diverse. In some areas fragmented limestone is exposed at the surface allowing for rapid infiltration to the ground aquifer. In other areas, deep gla-



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cial tills filter out contaminants as water percolates downward.

In the southern sector of Guelph there is an area that is defined as the Hanlon Creek Watershed. It is now almost completely encircled by industrial, residential and commercial development. The creek is a cold water tributary of the Speed River and still supports a small population of brook trout. This is testament to the planning process started by John Galt.

Guelph has always supported planned growth providing that stormwater is managed properly. This sector was originally developed in the 1970s when the Hanlon Expressway (HWY 6) was built through the watershed. Sensitive wetlands and forests close to the stream were protected as conservation lands. "Preservation Park" is protected from urban runoff by a series of stormwater management dykes, ditches, ponds and infiltration basins. These are designed to catch the sediments, pollutants and excess flows before they can overwhelm the natural stream which continues to flow much as it did in 1827.

The ponds require a considerable land area to be effective. Similar to the older storm sewers built closer to the river, their functionality is threatened by development in the upper watershed.

Increased runoff from shopping centres industrial parks, roadways and subdivisions is addressed by the City's stormwater management plan. In very simple terms, the City allows and even encourages development, providing post development stormwater flows do not exceed predevelopment flows. Post development flows from paved surfaces and rooftops generally exceed the predevelopment flows from naturally vegetated and agricultural lands. They also often contain higher levels of sediment and pollutants, creating challenges for developers and the City.

Braun Consulting Engineers has met the challenge in Guelph on several occasions by designing systems for underground stormwater detention. By installing a battery of large diameter corrugated steel pipe (CSP) under parking lots, developers have been able to meet the runoff criteria without sacrificing expensive land area. Most of the installations utilize underground stormwater detention (USWD). These store runoff generated during the period of peak flow and then slowly release the flow at a predevelopment rate. At one condominium site in the city, where soil conditions permitted, a system using perforated CSP was specified. In this case the stormwater is allowed to flow through the pipe walls and percolate into the ground.

The University lands presented a unique challenge. The original storm sewer system was built when the school was an agricultural college with many acres of farmland and more horses than cars. As new buildings and parking lots were added, the runoff factor increased, creating a potential overload for the infrastructure. As a solution, USWD tanks using CSP have been installed under the parking areas.

When the University had an opportunity to sell some of its excess property for private commercial development there was a concern that stormwater criteria might prevent the deal and significant revenue potential for both the university and the City would be lost. The developers were able to satisfy the stringent stormwater requirements by installing USWD systems of CSP.

John Galt could not have predicted the change and growth when he presented his plan for Guelph. The town could not have afforded to build the infrastructure that is needed today. Good planning and creative stormwater management have served the city well since 1827.

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