The Holland Marsh: Challenges and Opportunities in the Greenbelt

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Friends of the Greenbelt Foundation Occasional Paper Series
April 2007

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ISSN 1912-4171 Friends of the Greenbelt Foundation Occasional Paper Series (Print)
ISSN 1912-418X Friends of the Greenbelt Foundation Occasional Paper Series (Online)

The Friends of the Greenbelt Foundation is committed to promoting awareness and education about Ontario's Greenbelt. To this end we will occasionally publish research and general interest papers that explore our three program areas: viable agriculture and viticulture; vibrant rural communities; and, a restored and protected natural environment.

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ISBN 978-0-9781524-2-0

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Our living countryside

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Summary

This report provides an overview of the Holland Marsh, its uniqueness, features and challenges. The purpose of this report is to provide a better understanding of the importance of this area for the *Friends of the Greenbelt Foundation* as we strive to meet our goal to promote a viable agricultural sector.

Ontario's Holland Marsh is an area of land running astride the Holland River south of County Road 88, southeast of Bradford to the shoulder of King Township. It has been used for growing vegetables since 1930, when a canal system was constructed to drain the Marsh for agricultural use.

Designated as part of the Holland Marsh Specialty Crop Area in the Greenbelt Plan, it holds a place as one of the unique features of Ontario's Greenbelt. The Specialty Crop Area boundary is delineated based upon provincial muck soil analysis and current agricultural production. At over 7,000 acres, the land is comprised of some the most fertile soil in Canada, organic black soil, that supports the growth of a wide variety of plants. While carrots and onions are the two most common crops, ethnic vegetables, such as Chinese cabbage, are becoming increasingly common. Some 100 farms are located in the area, generating millions of dollars in annual revenue and creating employment for agricultural growers, packagers, and processors. Economically, the Marsh plays a large role in Canada's food export market, and finds a substantial local market in the neighbouring Greater Toronto Area's six million residents.

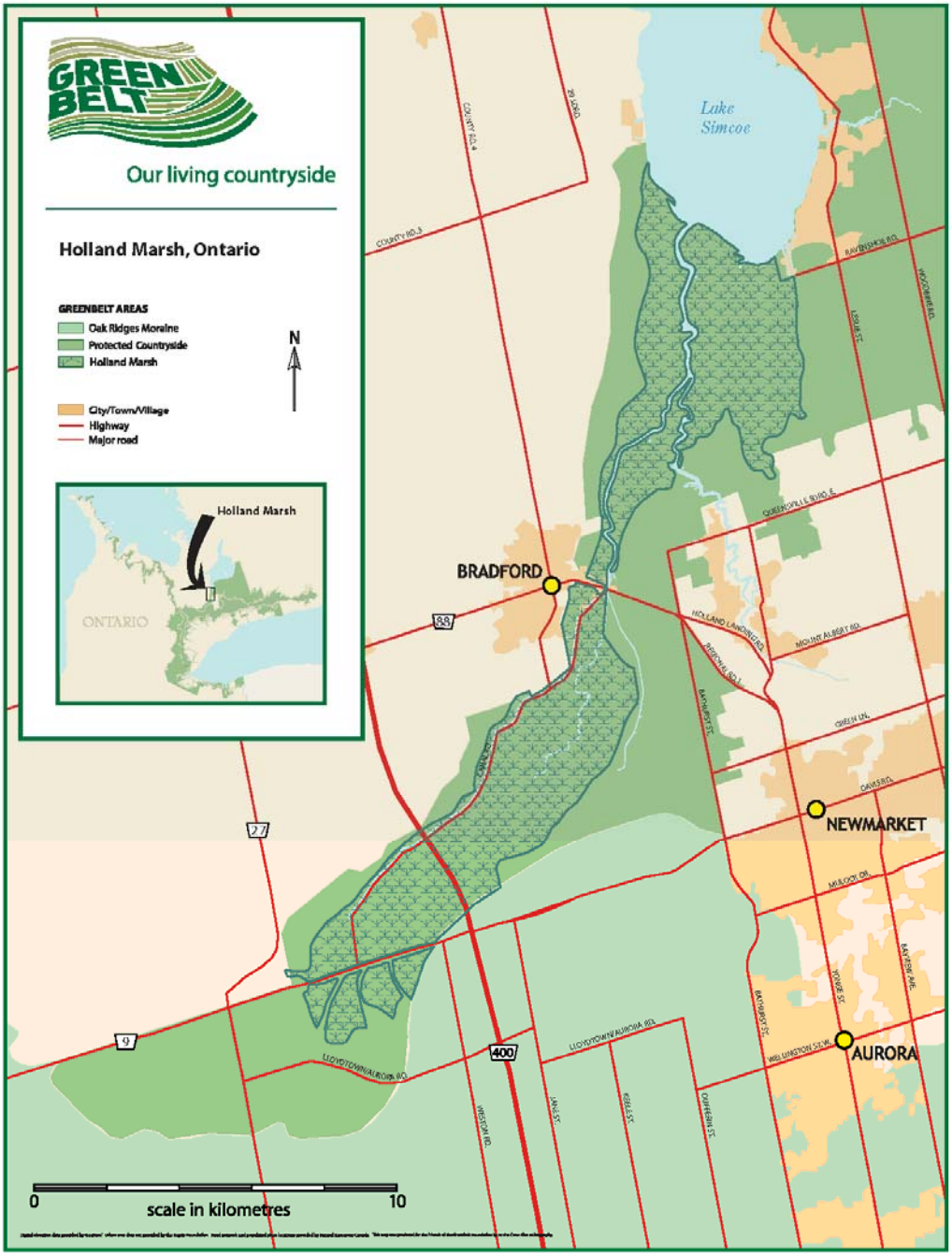
There are a number of challenges currently facing the Marsh. The canal system, which has been keeping it drained for agricultural use for over 70 years, has not been properly serviced since the 1950s and requires maintenance. Phosphorus pollution, partially a result of farm runoff, has shown a marked effect on the health of Lake Simcoe and the surrounding watershed. Soil erosion is another major concern, as its natural decomposition rate combined with farming practices will drain the soil of its potency in about 100-200 years.

A number of groups are presently tackling each of these issues. The Holland Marsh Drainage Commission is working with the municipalities on canal maintenance. The Lake Simcoe Region Conservation Authority (LSRCA), Rescue Lake Simcoe Coalition (RLSC) and the Ladies of the Lake are broadening public awareness of phosphorous pollution and developing a strategy to improve the watershed. The Muck Research Station assists farmers in identifying threats to their crops and provides ongoing agricultural research.

At this time, the farming community does not appear to be cohesive or particularly engaged with any government or non-governmental organizations to deal with issues facing farming in the Marsh.

An economic impact study could aid in quantifying the Marsh's importance to the province and country as a whole, while more detailed and up-to-date crop data specific to the Marsh could also serve to help solidify the importance of the Marsh to the Province's agricultural economy.

There appear to be opportunities for the *Friends of the Greenbelt Foundation* in funding education around best agricultural management practices, building public awareness of the importance of agriculture and local food, funding benchmarking and economic impact studies, and promoting the Holland Marsh as a Specialty Crop Area in the Greenbelt.

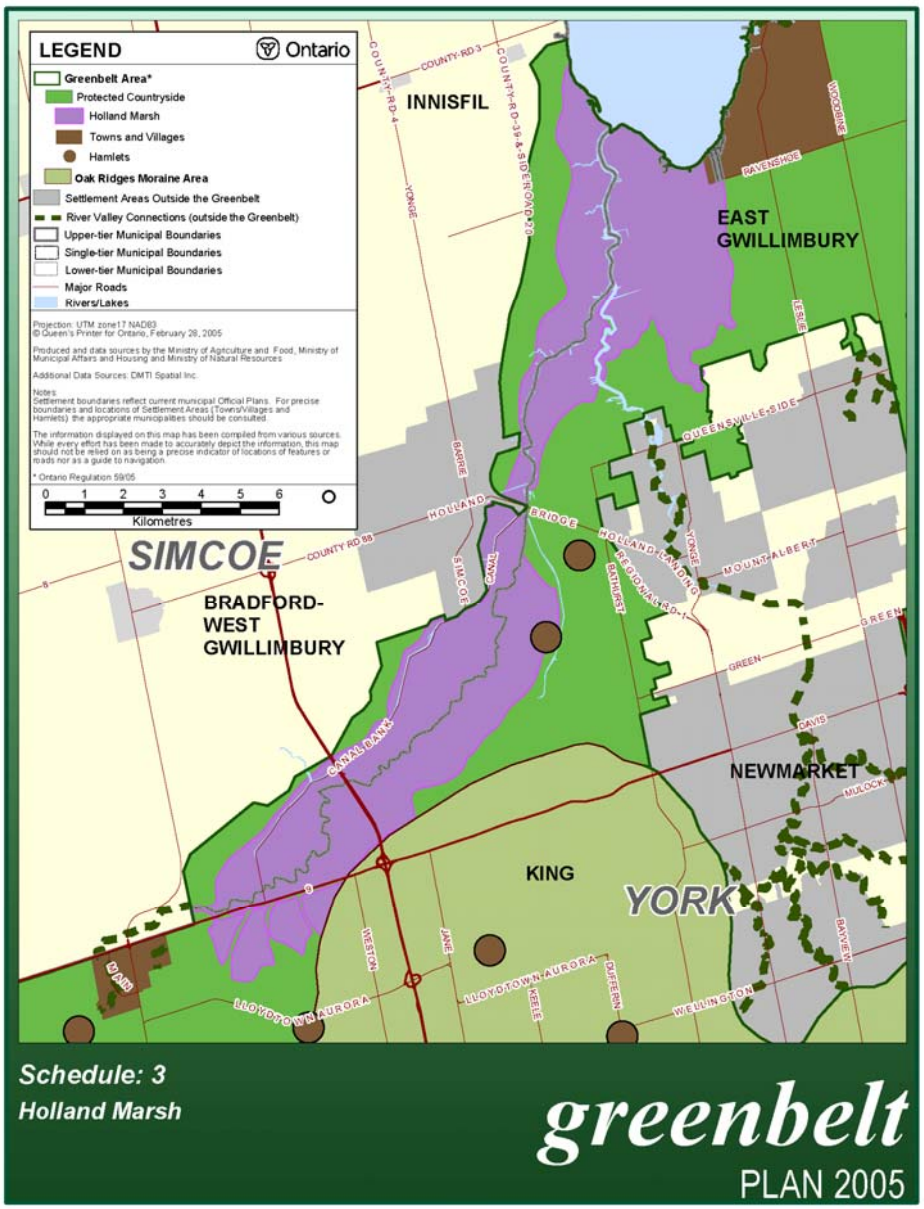


1. Limitations with This Study

A number of research limitations were encountered during the preparation of this study, mainly in the realm of statistics, making it difficult to find data specific to the Marsh itself. Information provided by Statistics Canada is organized by region, making it impossible to focus specifically on the agricultural production of the Marsh, as its land is split by both local and regional jurisdictions. Therefore, only a vague estimate can be made based on the given data. The percentage of food exported from the Marsh is also unknown, though it has been suggested that the majority of food grown in the Marsh is exported to the United States. Finally, though it is evident that the Holland Marsh is a crucial part of Ontario's economy, and therefore the Greenbelt's, the lack of an economic impact study makes it difficult to discern exactly how much of an effect the Marsh's agricultural production has on the economy of the province and the country as a whole.

2. The Holland Marsh in Ontario's Greenbelt

The Holland Marsh is often called the "Salad Bowl of Ontario," growing a variety of vegetables including carrots, onions, snow peas and cabbage. Farmers devote 70-80% of their fields to carrots and onions, the most popular yields, producing enough carrots each year to supply every person in Canada with a four pound bag. According to Carl Wierenga, Marsh farmer and Chair of York Region's Farm Fresh Marketing Association, the Marsh produces over $1 billion of revenue annually from its various crops, making it a crucial part of Ontario's agricultural economy.[1]



All 7,000 plus acres of the Marsh lie within the Greenbelt borders; this uniquely fertile land with its black soil and high heat retention is designated a Special Crop Area in the Greenbelt Plan, able to grow vegetables that would not thrive in other soils. Carl Wierenga states that up to 90% of Marsh produce is processed and packaged in Bradford West Gwillimbury, connecting its agriculture to the Region's economy.

In addition to its 7,000 acres, water from more than 65,000 acres of surrounding area drain into Lake Simcoe via the Marsh's canals, including the municipalities of Caledon, King, Newmarket, Bradford-West Gwillimbury and New Tecumseh, making the drainage system vital to a large stretch of the Greenbelt.

3. History

Part of the Lake Simcoe watershed, the Marsh and the river that runs through it were named after Samuel Holland, one of Canada's first surveyors. Before it was converted to farmland the Marsh was a source of food to local Aboriginal tribes such as the Huron. Later, around 1825, early European settlers also fished and hunted in the area. In 1864, John Muir, who, along with other supporters formed the Sierra Club in 1892, found the rare Calypso Borealis orchid in the Marsh after searching it out across North America. Around 1900, the Bradford Mattress Factory used Marsh grasses as filler.

The possibility of draining the marshlands for agricultural use was first discussed in 1904. Dave Watson, a Bradford grocer, convinced William H. Day, a professor of physics at the Guelph Ontario Agricultural College (OAC), to investigate the project. After soil tests and successful experiments with vegetable growing, drainage operations began in 1925. A canal system with dykes measuring 28 kilometres long and 2 metres deep was constructed from old cars and refuse to divert the Holland River, with pumps installed to control the water table within the dykes. The system was created by engineer Alexander Baird of Sarnia and completed in 1930. From 1931 to 1934 eighteen Dutch families arrived to form the nucleus of a prosperous agricultural community. After World War II, another influx of immigrants from Europe and Asia made the Marsh their home.

All was going well for the Marsh until October 1954, when Hurricane Hazel swept Ontario leaving catastrophic damage in her wake. Holland Marsh was flooded when between 4 and 20 feet of water spilled over from Lake Simcoe, saturating the soil until it could no longer hold water, stranding residents and ruining crops. The worst flooding happened in the south and west ends, submerging them beneath 20 to 30 feet of water. This had a severe economic impact as the crops had been harvested but not yet brought in, leaving them ruined by the floodwaters. By the end of the storm, the Marsh area had become a lake, the water destroying 500 homes and leaving 3,000 residents homeless. During the 24 days after Hazel, approximately six to eight billion gallons of water – enough to fill eighteen Toronto Rogers Centres (f.k.a. SkyDomes) – were pumped from the 5,000 acres of Holland Marsh's eastern section, with the remaining 2,000 acres recovered soon afterwards. The fallout from Hurricane Hazel led to the raising of dykes and deepening of the drainage canals to 10 feet. Since then, the pumping station from the 1940s has been replaced and the pump house was rebuilt between 1993 and 1998.

Another facet of Holland Marsh agricultural history is the Muck Research Station. Established in 1947 by the Guelph Ontario Agricultural College (OAC) and under their operation until the 1970's, the goal of the Station was to provide research on crops grown in the Marsh. The Ontario government managed it until 1998, at which time the University of Guelph resumed the Station's management, making it part of the Department of Plant Agriculture. Research money for projects comes from several agencies including the federal and provincial governments, industry groups and private companies.[2]

Since its inception, the Muck Research Station has studied crop protection, disease effect on crops, weed control, cultivars for quality and yield, fertilizers, and the evaluation of crops for long term storage. In recent years, the Station's projects have included the study of new pesticides with an emphasis on reduced risk materials, such as synthetic garlic oil, which can be used as a treatment for onion blight rot.

Research is also constantly being collected regarding integrated pest management (IPM), a system that has been in use since the 1980s and takes into account the evolving nature of agricultural pests. Of particular interest to Marsh farmers is the twice-weekly report outlining which insects and diseases are active in the Marsh, an important source of information to the Marsh's growers.[3] Until the 1990's, when the province turned the Station over to the University of Guelph, the Centre had a full staff complement and farmers could bring in crops to have pests identified and treated quickly. However, according to Carl Wierenga, Marsh farmer, the twice weekly reports are not effective enough and should be more frequent as pests and disease can multiply and spread quickly among the fields. When staff is available, the Station still provides education and assists growers with problem solving, giving them the option of bringing in a plant for the identification of disease and recommendations for subsequent measures to prevent its spread.

The Research Station also works with the Bradford Co-op, a grower-owned entity that stores crops and sells chemicals. Each March, the Muck Research Station and the Bradford Co-op collaborate to host an information session that features international speakers to provide research updates and present global agricultural innovations and discoveries.

Carl Wierenga, Marsh farmer and Chair of York Region's Farm Fresh Marketing Association harvests carrots on his farm.

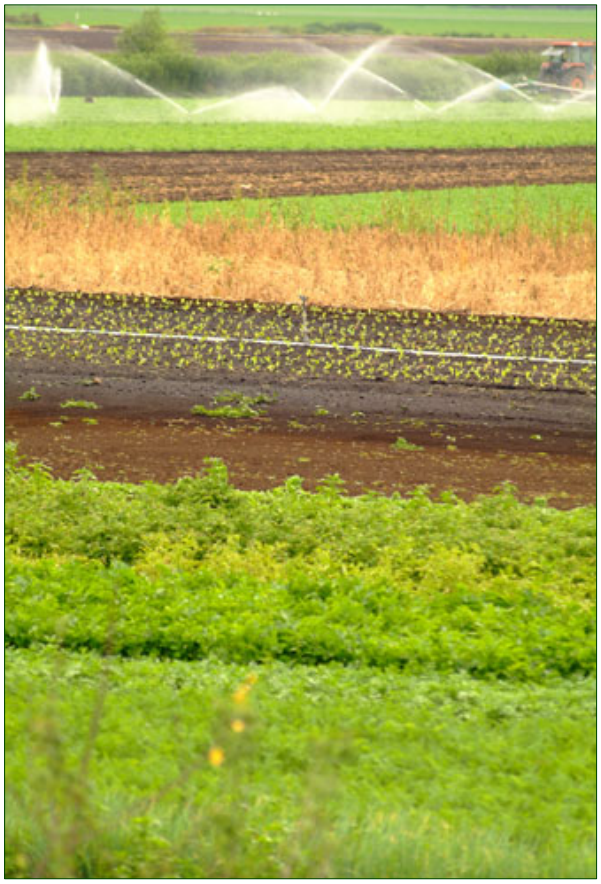
The Holland Marsh produces 59% of Ontario's carrots and has an economic impact of around $1 billion annually.

4. Changes

There are currently around 100 farms in the Holland Marsh, down from around 300 to 350 in the late 1970s. Smaller farms have been amalgamated into large operations as farms today tend to require more acreage to be profitable.[4] For instance, where five acres was once enough land to make a living, a farmer now requires as many as 40 to 100.[5] This decline is also considered a result of increasingly prohibitive production costs, and farmers' retiring without anyone taking over the business.

In tandem with the increase in farm areas, the land-use distribution has changed, with less pasture land used for raising livestock and an increase in field crops such as corn and beans. The last twenty years has also seen an increase in Asian vegetables, although it is difficult to gauge the impact of this crop shift as the 2001 Census data does not have statistics specifically for the Marsh.

The number of irrigation systems within the Marsh has increased recently. In 1985, few growers would irrigate onions and carrots, but due in part to climate change (increases in temperature and reduced rainfall), irrigation is now practiced throughout.[6]



Historically, crop irrigation was rarely used in the Marsh. However, due in part to recent climate change, it is now practised throughout.

5. Agricultural Overview

The Marsh is a community of approximately 100 farms on 7,000 acres of low-lying land that contains some of the richest farmland in the province, with another 2,500 surrounding acres also being recognized by growers as prime agricultural land.[7] The outlying areas contain other drained marshlands being used to grow vegetables–the Keswick, Colbar and Bradford marshes–but the Holland Marsh remains the largest and most productive as a result of the canal drainage system, which exposed the organic black soil with high heat retention allowing certain vegetables to thrive.

The most popular crops grown in the Marsh are onions and carrots, with around 35% of crops being devoted to each of these two vegetables for a total of 70-80% of the Marsh's farmland.[8] The last agricultural census done in the Marsh (2001) shows that it grows 59% of Ontario's carrots and 55% of its onions (% by area/ha).[9] Other crops include celery, lettuce, potatoes, parsnips, cabbage, cauliflower, beets, tomatoes, cucumbers and commercial flowers.

As ethnic populations grow in Ontario, so does the popularity of vegetables such as bok choy, Chinese broccoli and snow peas. Produce is grown both in the fields and for crops such as tomatoes and ornamental flowers, inside the 18.3 acres of year-round greenhouses.[10] The value of the Marsh's major crops give a sense of the possible economic impact each has on the province, carrots standing at around $130 million and onions at $160 million. Greens, such as celery and lettuce, also form a large part of the Marsh's economy, with a possible provincial impact of $160 million.[11] These are based on retail value figures by the Ontario Ministry of Agriculture, Food and Rural Affairs. According to Carl Wierenga, the Holland Marsh has a total economic impact of around $1 billion annually, including farm gate value, packaging and transportation, making the Marsh a key element in the agricultural economies of the province and the entire country.[12]

Green vegetables, such as the celery shown here, also form a large part of the Marsh's economy, with a possible provincial impact of $160 million.

6. The Canals

Today, the Holland Marsh land would not be agricultural land without the canals. The entire system is 28 kilometres long with around 750,000 feet of drains, consisting of two main canal areas (north and south), two dykes, the central river and two pumping stations. The canals and dykes reroute the Schomberg branch of the Holland River around the 7,000 acres of low lying marshland and roads, starting at Highway 9 and converging 13-14 kilometres east near Highway 11, south of Bradford. The river is held at about 2.6 metres below the canal water level to allow the land runoff to drain into the river itself.

6.1 Set-Backs

The Holland Marsh Drainage Commission, a joint commission established under by-law manages the canals. The Commission reports to the Township of Bradford-West Gwillimbury and the Township of King. The current state of the canals allows for sufficient drainage to occur, but Drainage Commissioner and long-time resident of the Marsh, Art Janse, suggests that there are currently a number of problems plaguing the Holland Marsh drainage system.

As a result of the 1955 emergency maintenance after Hurricane Hazel, the roadways are narrow and the banks leading to the canal are steep, a potentially dangerous situation in cases where the dyke is also used as a road. The narrow roads and an increase in commuter traffic over years may have been a factor in the 11 lives claimed by the canal in the last decade, including the recent death of Cassandra Read and her four-year-old son in 2006 when Read's SUV skidded out of control on the icy road and plunged into the canal. What were once roads used almost exclusively by farmers are now seeing increased numbers of daily commuters, upping the danger of the already narrow roads not built for the volume of traffic. As well, the peat soil the dykes and roads stand on is gradually sinking. The roads were last raised in 1982, and engineers recommend that they be raised again.

The canals have not been dredged since 1955, allowing a silt build-up of 1 metre over the original grade line of the canal bottom. The silt build-up poses a risk in the event of a torrential rainstorm, since the lack of maintenance over the past years has compromised the entire system. Reports prepared by the Holland Marsh Drainage Commissioner estimates that a "100 year storm" could cause up to $84 million in damage to local farmers and businesses alone, increasing to as much as $200 million when associated food processors, transportation companies and a rise in province-wide vegetable costs are taken into account. If the soil was saturated during a severe rainstorm the canals could easily be overwhelmed, inundating the dykes again flooding the 7,000 acres of farmland.

6.2 Solutions

Two options have been suggested as a means of remedying the canal issues. The first involves dredging the silt build-up from the canals, returning them to the depths established after Hurricane Hazel. This would be an intensive process involving an environmental assessment of the impact on the flora and fauna that live in canal system. According to a report by consulting engineers and architects Cole, Sherman & Associates, the costs involved in a full bottom cleanout of the Holland Marsh drainage system range from $4 to $7 million.[13]

Another option proposed by Cole, Sherman & Associates is entirely moving the canals. This would restore the buffer zone between the canals and roadways, improving the safety of Marsh roads. The project is estimated at a cost of about $500 per acre, a price tag that many farmers see as prohibitively expensive. Overall, it would cost $14 million dollars and take five-to-seven years to fully construct a new canal system.[14] The project is currently under review by the local municipalities and will most likely require an environmental assessment.

The entire Holland Marsh canal system is 28 kilometres long with around 750,000 feet of drains, consisting of two main canal areas (north and south), two dykes, the central river and two pumping stations.

The Art Janse Pumping Station is shown here.

7. Agricultural Issues

Apart from the issues with the drainage system, there are a number of other challenges facing the Holland Marsh. Soil erosion is a major problem, since the organic black soil decomposes naturally. This inevitable decomposition happens as organic matter within the soil oxidizes, a process that will leave the Marsh stripped of its fertility in 100 to 200 years.[15] Though this cannot be stopped altogether, there are a number of processes that can help slow down the decomposition and extend the Marsh's productivity. Some beneficial practices that reduce environmental impact are the use of cover crops and improved cropping systems,[16] as well as low impact irrigation and riparian planting. In some areas of the Marsh the soil has already lost most of its unique qualities due to the combination of natural and agricultural processes, becoming primarily sandy or clay-based and unsuitable for many of the Marsh's usual harvests, though the soil is still fertile enough to be used for crops such as soybeans or as pastures for cattle.[17]

Agricultural challenges for the Marsh include both local and international issues. According to farmer Carl Wierenga, the encroaching urban areas have begun to affect the Marsh through an increase in trespassing and crop theft. He claims challenges also exist with farming practices, suggesting that some growers may benefit from additional training in land stewardship and conservation methods.[18]

The exchange rate between the Canadian and U.S. dollar is reducing the profit from exports to the United States.[19] This challenge is an opportunity for the farmers to become more involved in the local food movement, selling their produce at neighbouring farmers' markets and supplying organizations such as Local Flavour Plus, a Toronto-based group dedicated to facilitating the consumption of local, sustainably-produced food by connecting farmers to institutional food markets (universities, hospitals, etc.).

Sustainable farming practices are necessary to reduce the environmental impact on the Marsh and slow down the decomposition rate of its organic black soil.

8. Environmental Issues

Marshes are important ecological features of the landscape, acting as natural water filters and important habitat for biodiversity. As the Holland Marsh is foremost a marshland, its drainage for agricultural use has left it with a number of severe environmental issues.

Specific environmental issues associated with agricultural land-use include: soil erosion, lack of vegetative buffers along watercourses, and the application of herbicides, pesticides and commercial fertilizers resulting in polluted runoff that makes its way into nearby watercourses, and ultimately, Lake Simcoe.[20]

Most crops are grown using chemicals to fertilize them and protect them from disease. The absorptive properties of the organic black soil which makes it so effective in supporting high crop yields, result in those chemicals soaking into and polluting the surrounding watershed. The Lake Simcoe Region Conservation Authority has estimated that

> "[i]n 1998…the total phosphorous loading from the entire cultivated marshlands (polders) was 5.6 tonnes."

This "phosphorous loading" is believed to be from agricultural land use practices, urban runoff and atmospheric sources.[21] Other problems that threaten the Lake Simcoe watershed include flooding, reductions in groundwater recharge and discharge (affecting potable water supplies), and alteration or destruction of aquatic habitats. Mike Walters of the Lake Simcoe Region Conservation Authority notes that it is important to avoid singling out the farms as the sole polluters of the watershed as runoff from residential areas and air pollution also contribute to the current state of the Lake. Though the Marsh is a visible producer of phosphorous runoff, its contribution currently ranges from 1-3 tonnes, or 2% to 6% of the total phosphorous load into Lake Simcoe. This runoff varies greatly from year to year and has recently been reduced due to climate change, as fewer rainfalls result in less total runoff.[22]

There are a number of programs in place to lessen the environmental impact of the Marsh as both the Lake Simcoe Region Conservation Authority and the Muck Research Station work with farmers to keep them updated on best management practices. Nutrient management and the planting of buffers to reduce erosion on banks both serve to lessen the strain on the environment.[23] Many growers currently use too much fertilizer on their crops,[24] a problem that may be remedied through improved education and communication between the farmers and the Muck Research Station. Though environmentally friendly management practices are beneficial, there is currently a large build-up of phosphorous in the drainage system, therefore phosphorous would continue to leave the canal system even if all of Holland Marsh stopped using chemicals today.[25]

To identify solutions to the environmental issues facing the Marsh, the Lake Simcoe Region Conservation Authority performed an environmental assessment in 2004 and

recommended a water treatment plant to combat the phosphorous in the canal system. At a total cost of $25 million to build, this option is expensive.[26] Despite the fact the plant would remove 90% to 95% of the phosphorous in the Marsh,[27] sufficient funds have not yet been raised for the project. At the time of this study, the Lake Simcoe Region Conservation Authority is reportedly in discussions with farmers about a new technology that could potentially help remedy the phosphorous problem and possibly decrease the cost of a water treatment plant.[28]

An important part of the urgency of the Lake Simcoe Region Conservation Authority, farmers and other affiliates, such as the Rescue Lake Simcoe Charitable Foundation to reduce pollution is the great potential for local involvement in the revitalization of the watershed, and a desire to preserve the area soil and the water for future generations.

The application of herbicides, pesticides and commercial fertilizers results in polluted runoff that makes its way into nearby watercourses.

9. Role of the *Friends of the Greenbelt Foundation*

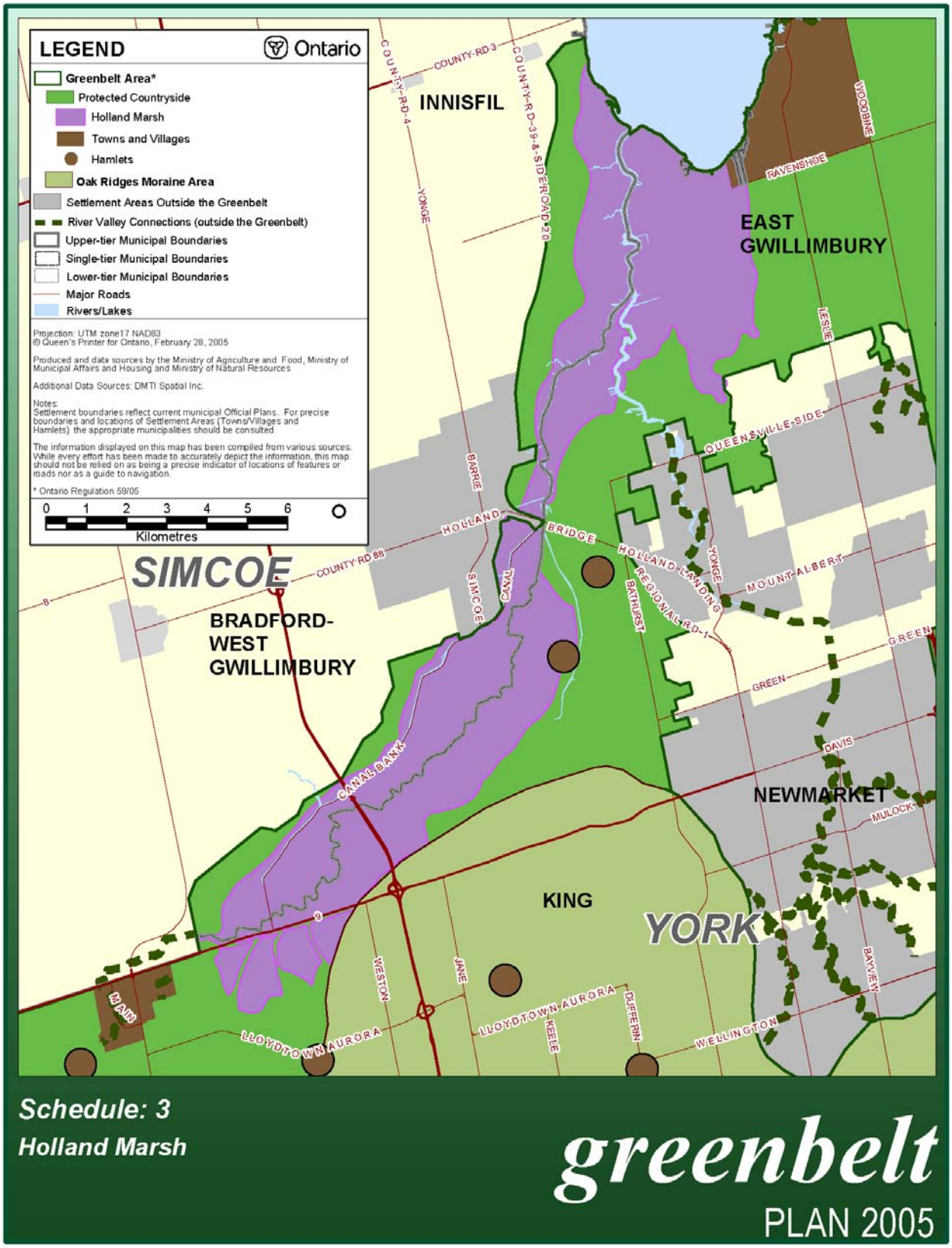
The Holland Marsh is designated as a Specialty Crop Area in the Greenbelt. Of the 7,000 farms in the Greenbelt only about 100 are in the Marsh, however, it is estimated that those farms generate almost $1 billion through agricultural produce and related business, making the Marsh a 'gem in the muck.'[29] The major issues specific to the Marsh farming community are problems with the canal drainage system, soil degradation and erosion, and chemical pollution. Opportunities exist to improve farming practices to care for the exceptional muck soil and lower the phosphorous runoff to the surrounding watershed. The Muck Research Station could assist in educational efforts.

While the Marsh farming appears to be economically viable there is limited available data to quantify this and a comprehensive economic analysis is needed. Further information is also needed on access to local markets for Marsh farmers as there is a growing consumer demand for fresh local nutritious food. Given the agricultural goal of the *Friends of the Greenbelt Foundation* to support a viable agricultural sector, a useful first step in defining our role may be to conduct an economic impact analysis in consultation with the farm community and stakeholders.

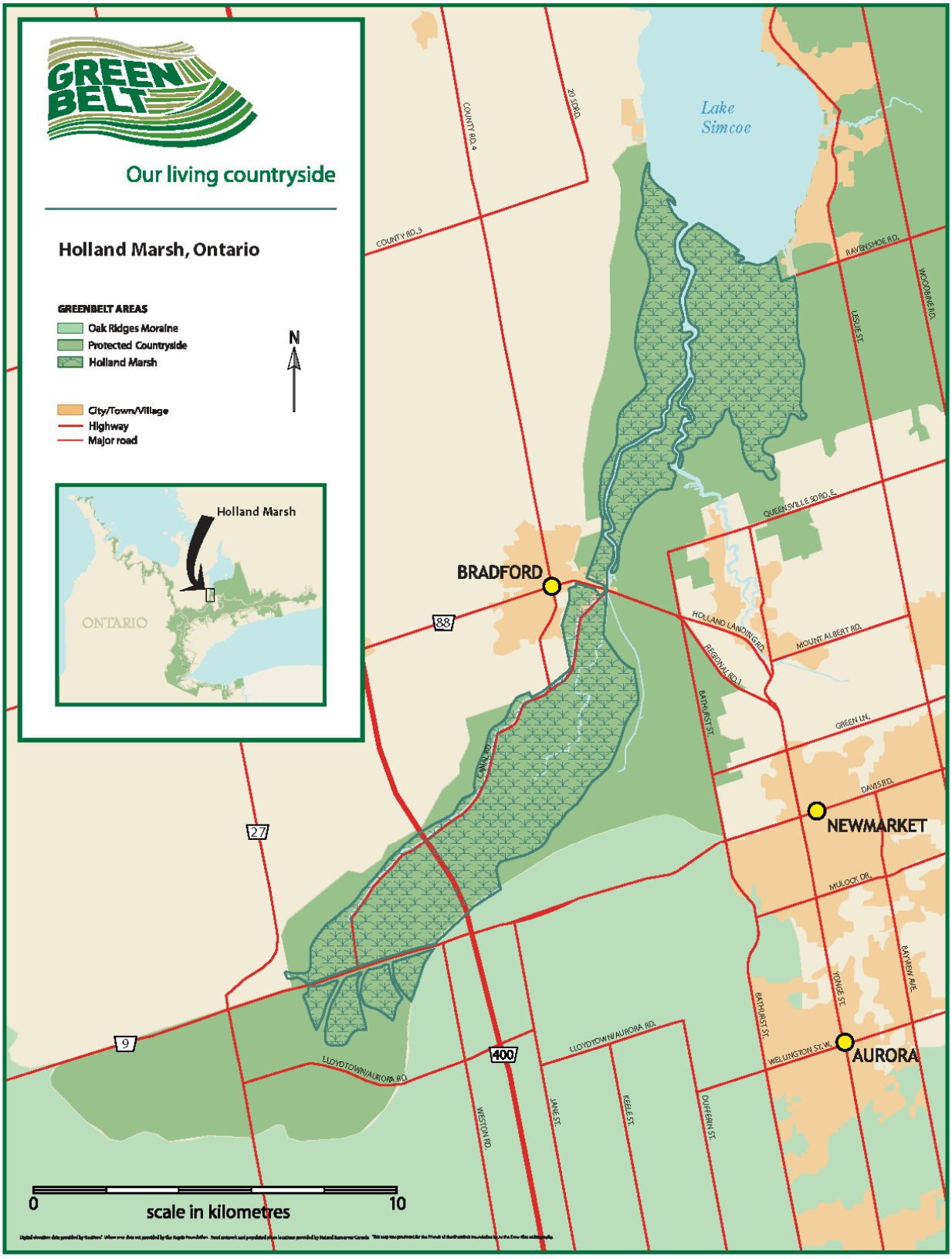
The Marsh is a small community of approximately 100 growers, but perhaps due to its division along municipal, regional and provincial boundaries there has been little engagement of or collaboration with the larger farming community as a whole. Leadership from the agriculture community is needed to maximize the Marsh's role in a local food economy for the Greater Toronto area.

There appear to be opportunities for the *Friends of the Greenbelt Foundation* in funding education around best agricultural management practices through the Muck Research Station, building public awareness of the importance of agriculture and local food, funding benchmarking and economic impact studies, and promoting the significant value of the Holland Marsh as a Specialty Crop Area in the Greenbelt.

Appendix A: Greenbelt Plan – Holland Marsh Detail



Appendix B: Holland Marsh - Greenbelt Context



Resources

Muck Research Station
http://www.plant.uoguelph.ca/stations/kettleby/kettleby.htm

Remembering Hurricane Hazel: Impacts – Holland Marsh
http://www.ns.ec.gc.ca/weather/hurricane/hazel/en/hm.html

Holland Marsh Drainage Scheme – K Smart and Associates
http://www.ksmart.on.ca/hollandmarsh.htm

Ministry of Agriculture, Food and Rural Affairs: Horticultural Statistics
http://www.omafra.gov.on.ca/english/stats/hort/index.html

Case Studies – IPM in the Holland Marsh (2002)
http://www.croplife.ca/english/pdf/Analyzing2003/T4.pdf

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[24] Ibid.
[25] Ibid.
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