

“The Project”

Evaluation of Policy Options to Achieve Phosphorus/Nutrients Reductions from Canadian Sources to Lake Erie

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Context for “The Project”

The following information is provided to ensure that consultants bidding on The Project have a common understanding of the political commitments, objectives, targets, timelines, and broad context in which the identification and analysis of policy options will be conducted.

Four Appendices are attached:

- Appendix A: Agreements, Strategies, and Plans governing and guiding the control and management of Lake Erie (and other Great Lakes) nutrients.
- Appendix B: Legislation/Regulations and Programs – the policy instruments that are (or may) be applied, and the funding and other support programs and incentives that are (or have been) used to reduce phosphorus (and other nutrients) loadings to Lake Erie (and other Great Lakes).
- Appendix C: Key Reference Documents – a synopsis of scientific and technical studies and policy analyses completed, underway, or proposed that can be drawn upon in conducting The Project.
- Appendix D: Stakeholder Consultations/Engagements – a preliminary list of significant stakeholder consultations and engagements related to the control and management of Lake Erie (and other Great Lakes) nutrients.

Geographic Scope of Project:

For Lake Erie: The Canadian side of the Lake Huron to Lake Erie corridor, and the Canadian Lake Erie basin up to the outlet from Lake Erie into the Niagara River. **[Map of geographic extent/watersheds to be provided by Environment Canada]**

1.0 The Amended 2012 Great Lakes Water Quality Agreement, Annex 4 Nutrients

The amended 2012 Great Lakes Water Quality Agreement (GLWQA), Annex 4 Nutrients, commits Canada and the United States (the Parties) to achieve the following:

1. By February 2016, the Parties in consultation with other level of governments, tribal governments, watershed agencies' and the public, shall establish binational phosphorus (and other nutrient) objectives, loading targets and allocations for the nearshore and offshore waters necessary achieve the Lake Ecosystem Objectives for each lake, starting with Lake Erie;
2. The Parties in consultation with other level of governments, tribal governments, watershed agencies' and the public, shall assess and where necessary develop and implement regulatory and non-regulatory programs and other measures to reduce phosphorus loadings from agricultural, rural non-farm, urban and industrial point and non-point sources; and,
3. By 2018, the Parties in consultation with other level of governments, tribal governments, watershed agencies' and the public, shall develop phosphorus reduction strategies and domestic action plans designed to meet the nearshore and open water phosphorus objectives and loading targets for Lake Erie.

A binational GLWQA Annex 4 Nutrients committee structure under the leadership of Environment Canada and the United States Environmental Protection Agency has been established to lead the effort to achieve these three GLWQA commitments. Three task groups have been formed and are working, as follows:

- A science programs task group is working on developing binational phosphorus objectives, loading targets and allocations for the nearshore and offshore waters of Lake Erie;
- An agriculture programs task group is focused on the actions required to review and evaluate the effectiveness of programs to manage phosphorus runoff to Lake Erie from agriculture; and,
- A municipal/rural programs task group is focused on the actions required to review and evaluate the effectiveness of programs to manage point and non-point sources of phosphorus from urban and rural communities.

The following key milestones drive the charge and tasks of the Sub-Committee and Task Groups in meeting Annex 4 commitments:

- By February 2015, begin to engage and consult on proposed P [phosphorus] objectives, loading targets, and allocations for Lake Erie.
- By July 2015, establish P load reduction targets for Lake Erie priority watersheds.
- By February 2016, ratify P objectives by Canada and the United States.

The Agriculture Programs Task Group has developed a work plan that outlines how they will work to achieve the following tasks. Assess and evaluate the efficiency of existing Agriculture programs to reduce P loads to the Great Lakes, and document the progress Agriculture programs will make in reducing P during the interim years 2014-2018 while domestic action plans are being developed.

- By February 2014, develop a baseline assessment for Agriculture Programs which includes:
 - An inventory of existing efforts (baseline information about current agriculture programs in both countries)

- Short-term implementation objectives with built in adaptive management and critical milestones.
- Determine how existing and proposed actions will be measured and tracked
- Identify opportunities for innovation/experimentation
- Identify opportunities for outreach and/or engagement with key stakeholders
- By June 2014, and annually thereafter, review and update the baseline assessment in order to document the progress being made in meeting implementation objectives. Prepare an operating plan which identifies key actions that will be taken to manage P inputs to Lake Erie, such as identification of priority watersheds for load reduction targets from agriculture programs, opportunities for innovation, and ways to sustain and accelerate adoption and effectiveness of BMPs [Beneficial (or Best) Management Practices].

The Urban and Rural Programs Task Group has developed a work plan that outlines how they will work to achieve the following tasks:

- Assess and evaluate the efficiency of existing Urban and Rural programs to reduce P loads to the Great Lakes, and document the progress Urban and Rural programs will make in reducing P during the interim years 2014-2018 while domestic action plans are being developed.
- By February 2014, develop a baseline assessment for Urban and Rural Programs which includes:
 - An inventory of existing efforts (baseline information about current urban and rural programs in both countries)
 - Short-term implementation objectives with built in adaptive management and critical milestones.
 - Determine how existing and proposed actions will be measured and tracked
 - Identify opportunities for innovation/experimentation
 - Identify opportunities for outreach and/or engagement with key stakeholders
- By June 2014, and annually thereafter, review and update the baseline assessment in order to document the progress being made in meeting implementation objectives. Prepare an operating plan which identifies key actions that will be taken to manage P inputs to Lake Erie, such as identification of priority watersheds for load reduction targets, new approaches for reduction of P from wastewater and stormwater, and ways to optimize existing wastewater treatment facilities.

By November 1, 2013, the Objectives and Targets Development Task Group will develop a work plan which outlines how they will work to achieve the following key milestones:

For Lake Erie:

- By November 2014, review and update Substance Objectives (P concentrations) for offshore Waters and develop Substance Objectives for nearshore Waters
- By February 2015, review and update P loading targets for offshore Waters and establish nearshore P load reduction targets necessary to achieve Substance Objectives and allocate by country

2.0 Lake Ecosystem Objectives, Substance Objectives, Programs and Other Measures, and Science Needs

The following **Lake Ecosystem Objectives** have been set by the Parties:

- Minimize the extent of hypoxic zones in the Waters of the Great Lakes associated with excessive phosphorus loading, with particular emphasis on Lake Erie;
- Maintain the levels of algal biomass below the level constituting a nuisance condition;
- Maintain algal species consistent with healthy aquatic ecosystems in the nearshore Waters of the Great Lakes;
- Maintain cyanobacteria biomass at levels that do not produce concentrations of toxins that pose a threat to human or ecosystem health in the Waters of the Great Lakes;
- Maintain an oligotrophic state, relative algal biomass, and algal species consistent with healthy aquatic ecosystems, in the open waters of Lakes Superior, Michigan, Huron and Ontario; and,
- Maintain mesotrophic conditions in the open waters of the western and central basins of Lake Erie, and oligotrophic conditions in the eastern basin of Lake Erie.

The Parties are using the following **Substance Objectives** on an interim basis for phosphorus concentration in the open Waters of the Great Lakes (until the objectives are updated):

Interim Substance Objectives for Total Phosphorus Concentration in Open Waters (ug/l) (as represented by Spring means)	
Lake Superior	5
Lake Huron	5
Lake Michigan	7
Lake Erie (western basin)	15
Lake Erie (central basin)	10
Lake Erie (eastern basin)	10
Lake Ontario	10

The Parties are using the following phosphorus loading targets for the Waters of the Great Lakes on an interim basis (until the loading targets are updated):

Interim Phosphorus Load Targets (Metric Tonnes Total P Per Year)	
Lake Superior	3400
Lake Michigan	5600
Main Lake Huron	2800
Georgian Bay	600
North Channel	520
Saginaw Bay	440
Lake Erie	11000
Lake Ontario	7000

The Parties, in cooperation and consultation with State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and the Public, shall:

1. for the open Waters of the Great Lakes:
 - (a) review the interim Substance Objectives for phosphorus concentrations for each Great Lake to assess adequacy for the purpose of meeting Lake Ecosystem Objectives, and revise as necessary;
 - (b) review and update the phosphorus loading targets for each Great Lake; and,
 - (c) determine appropriate phosphorus loading allocations, apportioned by country, necessary to achieve Substance Objectives for phosphorus concentrations for each Great Lake;

2. for the nearshore Waters of the Great Lakes:
 - (a) develop Substance Objectives for phosphorus concentrations for nearshore waters, including embayments and tributary discharge for each Great Lake; and,
 - (b) establish load reduction targets for priority watersheds that have a significant localized impact on the Waters of the Great Lakes.

In establishing Substance Objectives for phosphorus concentrations and phosphorus loading targets, the Parties shall take into account the bioavailability of various forms of phosphorus, related productivity, seasonality, fisheries productivity requirements, climate change, invasive species, and other factors, such as downstream impacts, as necessary.

The Parties shall complete this work for Lake Erie within three years of entry into force of this Agreement and complete this work for the other Great Lakes on a schedule to be determined by the Parties.

The Parties shall periodically review the Substance Objectives for phosphorus concentrations, phosphorus loading targets, and phosphorus loading allocations, apportioned by country to ensure that Lake Ecosystem Objectives are met.

The Parties shall establish Substance Objectives, loading targets and loading allocations for other nutrients, apportioned by country, as required, to control the growth of nuisance and toxic algae to achieve Lake Ecosystem Objectives.

Programs and Other Measures:

The Parties, in cooperation and consultation with State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and the Public, shall develop and implement the following programs and other measures to achieve the Lake Ecosystem and Substance Objectives for phosphorus concentrations, loading targets, and loading allocations apportioned by country, established pursuant to this Annex:

1. The Parties shall assess and, where necessary, develop and implement regulatory and non-regulatory programs to reduce phosphorus loading from urban sources including:
 - (a) programs to prevent further degradation of the Waters of the Great Lakes from wastewater treatment plants located in the Great Lakes basin;
 - (b) programs to optimize existing wastewater treatment facilities;
 - (c) programs to ensure that construction and operation of municipal wastewater treatment facilities that discharge one million liquid gallons or more per day achieve a maximum effluent concentration of 1.0 milligram per litre total phosphorus for plants in the basins of Lakes Superior, Michigan, and Huron, and of 0.5 milligram per litre total phosphorus for plants in the basins of Lakes Ontario and Erie;
 - (d) more stringent restrictions on phosphorus discharges from wastewater treatment plants may be considered as action plans are developed and implemented; and,
 - (e) new approaches and technologies for the reduction of phosphorus from wastewater, storm water discharge, and other urban sources;
2. The Parties shall develop and implement regulatory and non-regulatory programs to reduce phosphorus loading from industrial discharges, and continue to develop and implement new technologies, as necessary;
3. The Parties shall assess and, where necessary, develop and implement regulatory and non-regulatory programs to reduce phosphorus loading from agricultural and rural non-farm point and non-point sources including:
 - (a) programs to assess the effectiveness of current phosphorus management options including best management practices; and,
 - (b) programs to support the ongoing development and implementation of new approaches and technologies for the reduction of phosphorus from agricultural and rural non-farm sources;

4. The Parties shall take appropriate measures to reduce phosphorus in household laundry and dishwashing detergents and household cleaners to 0.5 percent by weight, where necessary to meet the Substance Objectives for phosphorus concentrations, loading targets, and loading allocations apportioned by country to be developed pursuant to this Annex;
5. The Parties shall evaluate programs and practices to manage phosphorus inputs;
6. The Parties shall develop for Lake Erie, within five years of entry into force of this Agreement and for other Great Lakes as required, phosphorus reduction strategies and domestic action plans to meet Substance Objectives for phosphorus concentrations, loading targets, and loading allocations apportioned by country, developed pursuant to this Annex. These strategies and action plans shall include:
 - (a) assessment of environmental conditions;
 - (b) identification of priorities for binational research and monitoring; and
 - (c) identification of priorities for implementation of measures to manage phosphorous loading to the Waters of the Great Lakes;
7. The Parties shall identify watersheds that are a priority for nutrient control, and shall develop and implement management plans, including phosphorus load reduction targets and controls, for these watersheds, as appropriate.

Science:

The Parties, in cooperation and consultation with State and Provincial Governments, Tribal Governments, First Nations, Métis, Municipal Governments, watershed management agencies, other local public agencies, and the Public, shall undertake the necessary research, monitoring and modeling to establish, report and assess Substance Objectives for phosphorus concentrations, loading targets, and loading allocations apportioned by country for the management of phosphorus and other nutrients, as required, and to further the understanding of issues, such as:

- nutrient distribution and movement within the Great Lakes and its contributing watersheds;
- the causes of toxic algal blooms and nuisance algal blooms;
- phosphorus sources and forms;
- nutrient conditions and biological responses in the Great Lakes;
- adverse effects from excessive inputs of phosphorus;
- the influence of climate change on nutrient inputs to the Waters of the Great Lakes and the formation of algae and other emerging issues related to nutrients;
- non-point source phosphorus control methods;
- the use of objectives and targets based on soluble reactive phosphorus (or bioavailable phosphorus), or use of surrogate measures; and,
- improved technologies and management practices.

3.0 The State of Lake Erie and Related Nutrient Loadings¹

Lake Erie (LE) is the most vulnerable of the North American Great Lakes. It is the shallowest, warmest and the most susceptible to eutrophication and the effects of climate change. The recent accelerating decline of this lake, manifest as impaired water quality, massive, summer-long algal blooms, hypoxia and fish kills, has focussed attention on the need for rapid action to reduce external inputs of total phosphorus (TP) and in particular, the rising proportion of the most bioavailable form of P, soluble reactive P (SRP) which is seen as one of the primary causes of this decline.

Current External and Internal P Loading:

The bulk of the external P loading to LE is delivered to the West Basin (WB) from six major tributaries. In order to guide prioritised management actions, annual external TP and SRP loading estimates were updated to 2011 using a mass balance approach; however these are provisional on the inclusion of loads from Canadian tributaries and a more rigorous evaluation of Detroit River inputs. US tributary inputs were further resolved to sub-basin inputs by SWAT-based modelling to identify areas contributing the highest P and SRP from within the 6 drainage basins (Maumee, Sandusky, Grand, Raisin, Cuyahoga and Vermillion). Annual P loads are greatest from the Maumee and Sandusky Rivers, which also have high P and SRP concentrations. Inputs from the Detroit River also contribute a significant fraction of the total annual P loads, which are discharged at much lower concentrations but weighted by a very high volume of flow.

In general, algal growth responds most immediately to the concentration of biologically-available P, and it is proposed that the WB blooms develop primarily in response to spring SRP inputs from the Maumee, while other loading (e.g., the Detroit River) contributes to longer term processes that drive Central Basin (CB) hypoxia. SWAT model outputs were of mixed success, with a high level of uncertainty around simulated results particularly for SRP. SWAT loading estimates were most reliable for basins dominated by agricultural inputs (Maumee, Sandusky), but unable to simulate urban-dominated inputs, and failed to capture the all-important inputs during extreme events, which can represent up to half of a total annual load. Atmospheric sources of P to Lake Erie include wet and dry deposition and are likely influenced by basin use, with potentially higher inputs from basins with high agricultural and urban development. Estimates are that SRP may account for up to 12% of the TP in wet deposition from some areas. Current estimates of atmospheric sources as ~6% of the total external TP input are likely underestimates, as they are based only on wet and not bulk deposition. There is a significant need for more detailed direct monitoring of both wet and dry fractions of atmospheric deposition; however, efforts to track atmospheric P are lacking in existing monitoring programs, such as the Integrated Atmospheric Deposition Network and the Great Lakes Precipitation Network. Coordination with existing nutrient monitoring efforts is an alternative, and a binational nutrient strategy approach could be considered similar to the existing Great Lakes Binational Toxics Strategy. Environment Canada's Great Lakes Nutrient Initiative is the most recent effort supporting advancements in research and management for nutrients in the Great Lakes, and inclusion of atmospheric P measurements in such an initiative would provide a much needed opportunity to expand our understanding of the phosphorus cycle.

¹ Selected information drawn from: Taking Action on Lake Erie (TACLE) Work Group Science Summary Report (April 2013), International Joint Commission.

Internal loading occurs within the lake itself, and includes inter-basin exchange, biological processing and sediment regeneration. The external loading delivered to WB is eventually transferred to the central and deeper East Basin. Biological processing from uptake, sequestering and exchange across the food web recycle or transform P between particulate and dissolved fractions. Invasive dreissenid mussels have profoundly altered the lake's response to nutrient inputs by altering the efficiency of internal P cycling and inshore-offshore exchange, and trapping nutrients and material in the warmer and shallower nearshore zones. Sediment SRP release under hypoxic conditions (CB) and aerobic decomposition of organic matter from the sediment-water interface and resuspended material (WB) may be significant. Evidence suggests that hypoxic sediment P regeneration in the CB does occur, but its significance and frequency is unclear and should be examined in detail. Current monitoring may have failed to capture this process adequately, which has yet to be measured directly. None of these internal loading processes have been well characterised in LE, which sometimes unduly casts doubt on the rationale for management actions, because this mechanism may delay response to expensive nutrient controls. Based on the lake's recovery seen in the 1980s it is reasonable to expect that LE's response would not be unduly delayed past 10-15 years, but regime shifts, changes in the nature and timing of the external loading and climate change may necessitate more stringent management targets and a re-evaluation of expected response times.

The potential effects of climate change on external loading are of particular concern, since this has implications both for setting and achieving nutrient targets. This issue was also examined using SWAT models, which predicted that in-stream sediment and nutrient yields would generally increase under alternative climate scenarios, but these yields decreased in several instances. Overall, across the six watersheds the models predicted increasing flow, sediment and N (total & dissolved) with moderate and severe climate change. Total annual flows and in stream sediment increased by up to 17-22% under severe climate change, while more modest increases were predicted in nutrients. The response of N and P, and TP and SRP, were different. At the watershed level, in-stream flow, sediment and nutrient yields from the six Lake Erie watersheds responded very differently to alternative climate scenarios; management strategies aimed at TP management, therefore, may not address SRP.

Summary and Recommendations:

A critical role for science within Lake Erie is to inform both lake and land management practices. Efforts to improve water quality and ecological integrity are underway at local, state, national, and international levels in both Canada and the United States. Current focus on reduction of non-point source loading of TP and SRP remains a priority for national and state level organizations. *The ongoing debate for managing nutrients with a focus on P or both N and P should not delay action.* Efforts to resolve this debate will advance both management practices and the science of freshwater cHABs [cyanobacteria HABs]. Continued engagement in monitoring and scientific endeavours along with monitoring and modelling to track changes in nutrients and algal blooms in Lake Erie is a high priority for provincial, state and national organizations. Overall, the key results of the TAcLE workgroups are:

- *Current knowledge justifies immediate and targeted effort to reduce external loading of nutrients and sediment to Lake Erie from both agricultural and urban sources.* Phosphorus and especially SRP is of primary concern; but the roles of N and climate in modifying the lake's response to P need to be resolved. The highest priority for management action should be the Maumee and Detroit River basins, followed by the Sandusky basin. Updated and revaluated loading estimates for the Detroit River and Canadian tributaries represent a second important

priority need. Nevertheless, it is important to work quickly towards a cooperative whole basin approach for long-term sustainable recovery.

- *To understand and manage expectations for recovery, there is a critical need for:*
 - *urban & farm-based land management practice information (associated with land uses)* (aspects of which are currently restricted by privacy legislation): to identify high-input sub-basin areas and reduce the high level of uncertainty in current modelled basin inputs.
 - *direct measures of internal P loading:* current estimates are that that recovery will take 10-15 yrs. even if external inputs are reduced in the near future – and longer, if management actions are further delayed.

- *BMPs play a critical role in effective nutrient management yet current practices in the Erie basin have not been rigorously evaluated.* Most BMPs are used in combination with at least one other BMP and many are not designed for nutrient removal and a few may actually increase nutrient inputs. There is no single solution to non-point source pollution, particularly SRP, and the use of a suite of BMPs is recommended along with more rigorous testing (especially for TP/SRP), standard metrics, and a central database. In view of the lack of information specific to Lake Erie, it is also recommended that a further BMP assessment could derive examples from other analogous water basins (e.g., Lake Winnipeg, Lake Ontario) as well as expert advice from AAFC scientists (located in Harrow and Guelph, ON).

- *Anoxia* is a major issue in the central basin (CB) where it may exacerbate internal nutrient loading and present a threat to fish and other elements of the food web. The areal extent and severity of anoxia has been linked with overall TP inputs to the WB and CB, particularly the Detroit River (~ 50% of the total load).

- *Phosphorus is a key factor driving harmful algal/cyanobacterial blooms in Lake Erie*, but it is clear that the severity and frequency of these events are significantly modified by other factors (notably N, climate and food web) which need to be incorporated into management models and actions. Evidence indicates:
 - Toxic cHABs in the west basin (WB) have been largely attributed to agricultural SRP inputs from WB tributaries (notably the Maumee but the direct/indirect causes of the increasing occurrence of toxic cHABs in other areas (e.g. North central, east basins) requires resolution.
 - Shoreline benthic algal impairment (HNABS) [harmful and nuisance algal blooms] show two distinct patterns: the (nontoxic) cyanobacteria *Lyngbya* is problematic in the WB where it responds to low light, high P and DOC; *Cladophora* is most severe in the less eutrophic central and east basins where its resurgence is most clearly linked with increased water transparency and shoreline/mussel nutrient inputs. In both cases, more science is urgently required to develop effective management actions.

- *Models have the potential to provide evidence-based goals for reduction of nutrient inputs to Lake Erie* but to be of value, their limitations and level of uncertainty must be explicitly stated and critically evaluated.

- *Much research is required to fully understand the complex interactions between nutrients and effects on Lake Erie, and funds to support this are essential.* This is particularly true given the range of possible changes in climate, including changes in ice-cover, precipitation patterns, lake levels and temperature and resulting effects on fish populations which have shown a significant shift in species composition and incidents of large-scale fish kills.
- *Overall, there is an urgent need for prompt action to reduce TP/DRP inputs to Lake Erie.* Modelled response curves were generated to provide two achievable interim targets to guide management actions, pending improved data. These show that:
 - a 23% reduction in Maumee River spring TP input is required to minimise WB cHABs.
 - a 53% reduction in Lake Erie annual TP load is required to minimise other cHABs and CB anoxia.
- It is further recognized that to allow for effective basin-wide restoration and evaluation of success, there is a critical need for:
 - a standardized, targeted and adequate monitoring system which would incorporate the newly revised Indicators (SAB [Science Advisory Board]/IJC) as measures of progress.
 - public engagement through communication and workshops.

4.0 Policy Options to Consider for The Project:

A range of policy instruments and measures may be relevant to reducing phosphorus loadings to Lake Erie (and other Great Lakes).

Policy instruments to consider may include, but not be limited to:

- Legislation (new and/or changes to existing laws)
- Regulations (and municipal by-laws)
- Codes and standards
- Incentives of various forms:
 - Data gathering, monitoring, modelling, and research
 - Financial support
 - Taxes or financial penalties
- Voluntary initiatives (with or without incentives)
- Education and awareness raising
- Recognition (awards)

Measures to consider and assess may include, but not be limited to:

- Sewage treatment plant optimization and upgrades, as well as new facilities
- Sewage lagoons
- Storm sewer outfall controls and stormwater pond controls
- Urban runoff management (sewered and unsewered areas, and other sources)
- Lawn fertilizers restrictions (ban phosphorus fertilizer use or sale in phosphorus-sensitive basins, or prohibit fertilizer application on impervious, frozen, or saturated surfaces)

- Require fertilizer application setbacks from water bodies, such as lakes or rivers
- Manure management regulations
- Household laundry and dishwashing detergents and household cleaners restrictions (e.g., 0.5 percent by weight) from agricultural and rural non-farm and non-point sources
- Regulatory and non-regulatory programs to reduce industrial phosphorus discharges
- Septic system controls (e.g., diversion of leachate and runoff from failed systems; disconnection of direct systems; mandatory septic inspections when land ownership transfer transactions)
- Shoreline development controls/modifications (e.g., prevent and reduce the impact of incompatible shoreline developments and alterations)
- Phosphorus/nutrients trading (e.g., Fox River/Green Bay phosphorus trading)
- Agricultural BMPs²
- In-situ remediation (e.g., sediments, agricultural soils)
- Improve habitat connectivity by reducing the impact of dams and other barriers on downstream nutrient transport
- Prevent and reduce the impact of invasive species
- Agricultural point sources of phosphorus

5.0 Consultation/Engagement Approaches and Processes to Consider for The Project

Key experts and a range of stakeholders will be consulted during the conduct of The Project to solicit ideas on policy options, gather information, and gauge reactions to the use of various policy instruments and measures to reduce phosphorus loadings to Lake Erie (see Appendix D for more information on key stakeholder groups).

Who to Engage:

Consultations/engagements can be considered at several levels, including:

- Individuals (academic and other experts, senior policy analysts, decision makers)
- Conservation authorities and watershed organizations
- Non-governmental organizations (NGOs) from environmental, industrial/business, farming, developers, and municipal sectors, among others
- Cities, towns, and counties
- Aboriginal peoples (First Nations, Métis)
- General public (including landowners)

How to Engage:

A range of consultation/engagement approaches may be employed, including but not limited to:

- One-on-one meetings
- NGO-specific meetings

² For more details, under Key Reference Documents, see the IJC TAcLE Work Group Science Summary Report (April 2013), as well as The Phosphorus Primer: Best Management Practices for Reducing Phosphorus from Agricultural Sources, Ontario Federation of Agriculture (2011).

- Multi-stakeholder workshops and round tables
- Webinars
- Public forums (evening, weekends)
- Social media (twitter, blogs, ...)
- Websites (run by government and stakeholder groups, as well as Aboriginal peoples)
- NGO newsletters and other outreach materials/methods
- Media articles and sponsored information supplements
- Presentations at existing consultation/engagement initiatives (e.g., LaMP meetings, IJC Binational Public Forums, Latornell Conservation Symposium, etc.)

Drawing on the preliminary list of Consultations and Engagements on Lake Erie (see Appendix D), collaborative structures and organizations relevant to The Project will be identified and discussed with Environment Canada (and other organizations designated by Environment Canada). The Terms of Reference for The Project will require consultants to develop a draft consultation/engagement plan for Environment Canada to consider on how to obtain stakeholder input and foster general public knowledge of and comments on policy options identified and assessed by The Project.

Appendix A: Agreements, Strategies, and Plans

This appendix contains Agreements, Strategies, and Plans that govern and guide the control and management of Lake Erie (and other Great Lakes) nutrients.

Agreements:

2005 **Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement (2005)**
http://www.mnr.gov.on.ca/en/Business/Water/2ColumnSubPage/STEL02_164560.html

The Ontario government signed a historic agreement with Quebec and the eight Great Lakes states (Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania and Wisconsin) that share the basin with Ontario. The agreement's objective is to restore the Great Lakes and facilitate collaborative approaches to deal with phosphorus loadings to the Great Lakes to prevent significant impact of withdrawals and losses to the basin ecosystem and its watersheds.

2008 **Great Lakes-St. Lawrence Cities Initiative (GLSLCI)** (<http://www.glslicities.org/>)

The GLSLCI is a binational coalition of mayors and other local officials that works actively with federal, state, and provincial governments to advance the protection and restoration of the Great Lakes and the St. Lawrence River.

In July 2008, the Ontario Government and the GLSLCI signed an agreement of cooperation to "build collaboration between the Ontario Government and Ontario municipalities in the protection and conservation of the Great Lakes Basin Ecosystem." The Canada-Ontario Agreement Memorandum of Cooperation (COA MOC) committed GCSLCI to facilitate a process of engagement with Ontario municipalities and the provincial signatories to the COA. GLSLCI has coordinated the first phase of this process on behalf of all Ontario municipalities, including GLSLCI members and non-members.

The goals of the COA MOC are:

- To build collaboration between the Ontario Government and Ontario municipalities in the protection and conservation of the Great Lakes Basin Ecosystem.
- To establish mechanisms to discuss and pursue common objectives and address issues of concern to municipalities and the Ontario Government related to the protection and conservation of the Great Lakes Basin Ecosystem.

12/02/2013 **Great Lakes Water Quality Agreement (Annex 4 nutrients)**
http://www.ijc.org/en /Great_Lakes_Water_Quality

In the 2012 Amended Agreement [which was ratified on February 12, 2013], Canada and the United States [the Parties] established a shared vision and common objectives and commitments to science, governance and action that will help to restore and protect

Great Lakes water quality and ecosystem health. The Parties updated the Agreement's goals and committed to developing and reporting on environmental indicators that will allow Canadians to assess how the Great Lakes are responding in relation to the following:

- Providing a source of safe, high-quality drinking water;
- Allowing for unrestricted swimming and other recreational use;
- Allowing for unrestricted human consumption of the fish and wildlife;
- Supporting healthy and productive habitats to sustain our native species;
- Being free from pollutants that could harm people, wildlife or organisms;
- Being free from nutrients that promote unsightly algae or toxic blooms;
- Being free from aquatic invasive species;
- Being free from the harmful impacts of contaminated groundwater;
- Being free from other substances, materials or conditions that may negatively affect the Great Lakes.

Annex 4 – Nutrients: The purpose of this Annex is to contribute to the achievement of the General and Specific Objectives of this Agreement by coordinating binational actions to manage phosphorus concentrations and loadings, and other nutrients if warranted, in the Waters of the Great Lakes.

2014

Canada-Ontario Agreement on Great Lakes Water Quality and Ecosystem Health

Canada and Ontario are currently negotiating a revised Canada-Ontario Agreement (COA) on Great Lakes Water Quality and Ecosystem Health, which includes draft provisions to address the issue of excess nutrients/phosphorus inputs to Lake Erie and the other Great Lakes from sources in Canada. The scope of the Annex includes the implementation of projects and research activities to enhance scientific understanding of nutrient dynamics, develop targets and action plans, reduce inputs from urban and rural stormwater and wastewater, and increase the efficiency of agricultural nutrient use consistent with a healthy Great Lakes ecosystem and economy. The Commitments set out in the Annex are to be delivered within a 5-year timeframe. Commitments will be achieved using existing vehicles (e.g., LAMPs, watershed plans) where possible. The scope of the COA Nutrient Annex also includes the coordination of actions to manage nutrients for the entire Great Lakes basin, and thus work will be identified for all the Great Lakes. Initial focus will be on time-bounded commitments within the Agreement (i.e., related to Lake Erie). The science and policy approaches developed for Lake Erie will be transferable to the other Great Lakes.

2015

Environment Canada Integrated Great Lakes Nearshore Assessment and Management Framework - draft report – final report due 2015 (Environment Canada/W.F. Baird & Associates Coastal Engineers Ltd.)

The 2012 Great Lakes Water Quality Agreement (GLWQA) was recently signed into force by Canada and the United States. The overarching purpose of this agreement, to restore and maintain the chemical, physical and biological integrity of the water in the Great Lakes, remains unchanged from previous versions. What is new, however, is the call for the development of an integrated nearshore framework to assess the state of nearshore

waters, identify areas of high stress and high ecological value, monitor, prioritize restoration efforts, and engage all stakeholders. The Lakewide Action and Management Plans will ultimately be the mechanism to implement the new nearshore framework on a lake-by-lake basis.

It is important to note that a critical first step is the definition of “nearshore”. While the GLWQA provides several important definitions, nearshore has not been included. This term must be defined with the support of the Steering Committee during this investigation. It is clear, however, that this latest GLWQA recognizes that to achieve the desired end results, the sphere of influence must extend beyond the lakes themselves and include all connected watersheds.

The GLWQA calls for the development of the nearshore framework within three years. The purpose of this initiative is to develop a roadmap for that process for the Canadian portion of the Great Lakes. A critical first step in formulating the nearshore framework will be the review of integrated management approaches from other jurisdictions and an initial engagement and consultation process. The findings from this contract will lay the foundation for the multi-year engagement and consultation, leading to the development of the final integrated framework for the assessment and management of the Great Lakes nearshore areas. This future multi-year process will be guided by a Project Plan and Charter, which will be delivered at the completion of this consulting contract.

Strategies:

2008 Southern Grand River: Current Conditions and Restoration Strategy

Decision analysis process to be completed by March 2015.

2010 Lake Erie Biodiversity Conservation Strategy (LEBCS)

http://www.conservationgateway.org/ConservationByGeography/NorthAmerica/whole_systems/greatlakes/Pages/lakeerie.aspx

This process to develop the LEBCA was led by The Nature Conservancy, Michigan Natural Features Inventory, and Nature Conservancy Canada, with support from Environment Canada and USEPA, and participation from hundreds of individuals and organizations from around the Lake Erie watershed and beyond.

The strategy was initiated to provide a more in-depth assessment of the lake’s biodiversity status and challenges, as well as develop a comprehensive set of strategies to maintain and increase the viability of Lake Erie’s biodiversity and abate the threats to biodiversity. The Strategy aims to facilitate coordination of actions among diverse and widespread partners, providing a common vision for conservation of Lake Erie, and help to put local actions and priorities into a basin-wide context. The results of this Strategy support several of the new and updated Annexes of the 2012 GLWQA. This includes establishing baseline and assessment information that will inform future monitoring and the setting of ecosystem objectives, identifying areas of high ecological value, providing

tools to assess the impacts of climate change, and the development of strategies that will support the Lakewide Action and Management Plan for Lake Erie.

2011

Lake Erie Binational Nutrient Management Strategy

http://www.epa.gov/lakeerie/binational_nutrient_management.pdf

The Lake Erie Binational Nutrient Management Strategy is a coordinated and strategic response from Canada and the United States that outlines nutrient management actions to reduce excessive phosphorus loading and the eutrophication of Lake Erie. The Strategy was created by the Lake Erie Lakewide Management Plan (LaMP) Work Group to inform the Lake Erie LaMP Management Committee and its respective agencies of management actions needed to mitigate nutrient threats to Lake Erie: it is a blueprint for action. The Strategy outlines the goals, objectives, quantitative targets, and actions needed to improve current conditions and prevent further eutrophication. The success of this Strategy will depend on the commitment from various stakeholders to join forces and change how nutrients are currently used, applied, transported and discharged. Multiple jurisdictions, in both Canada and the United States, will be responsible for implementing actions. As part of the LaMP's commitment to adaptive management, the LaMP will closely monitor advancements and recommend appropriate adjustments to nutrient management actions and targets, and will ensure that sound science continues to serve as the basis for responsible public policy.

17/12/2012

Ontario Great Lakes Strategy

http://www.ene.gov.on.ca/environment/en/resources/STDPROD_101828.html

This strategy builds on engagement with a wide variety of Great Lakes experts, First Nations and Métis communities and Great Lakes stakeholders on the feedback received since the release of Ontario's Draft Great Lakes Strategy in June 2012, and on the 2009 discussion paper, Healthy Great Lakes, Strong Ontario. The strategy responds to what was heard from people across Ontario, including the need to protect shorelines, beaches and wetlands, reduce impacts of sewage and runoff, tackle algae problems and provide opportunities for people to clean up their corner of the Great Lakes.

With respect to reducing excessive nutrients, the strategy commits to:

- Improve understanding of the effectiveness of agricultural stewardship programs and practices and enhance adoption of effective practices, including the development of community partnerships to encourage the uptake of effective agricultural best management practices.
- Seek opportunities to reduce nutrient inputs to the environment and advance monitoring of agricultural best management practices, in priority geographic areas and in agricultural production systems to enhance performance.
- Evaluate the potential of using water quality trading in priority areas to reduce nutrient loadings, where economically and ecologically feasible and acceptable to community partners.
- Continue to promote rural and agricultural environmental stewardship practices, including water quality protection, water conservation, and the development practices related to water and nutrient recycling, agricultural drainage and green infrastructure.

- Work to better understand and reduce harmful and nuisance algal blooms, including effectively managing conditions such as excess nutrients that contribute to these blooms. This includes collaborating on the establishment of phosphorus loadings and concentration targets for Lake Erie, and on implementing phosphorus management plans and targets in priority watersheds of Lakes Huron, Erie and Ontario. This will help support actions under the Canada-U.S. Great Lakes Water Quality Agreement.
- Continue to work with partners to encourage the development, demonstration, and adoption of innovative technologies and approaches that reduce excess nutrients to the environment and foster the continued competitiveness of the agriculture and agri-food sectors, including support to the sector to understand the approval requirements for pilot/demonstration projects.

Plans:

2008 **Lake Erie Action and Management Plan (See Section 3: Vision, Ecosystem Management Objectives, and Indicators)** (<http://binational.net/erie/whatis-e.html>)

Under the Great Lakes Water Quality Agreement (GLWQA), the governments of Canada and the United States agreed “to restore and maintain the chemical, physical and biological integrity of the waters of the Great Lakes basin ecosystem.” This is accomplished in part through binational Lakewide Management Plans [LaMPs] that are developed and implemented in consultation with US state and Ontario provincial governments. In Canada, the Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem supports the development and implementation of LaMPs.

The goal of the Lake Erie LaMP is to preserve, restore and protect the beneficial uses of Lake Erie. The development of the Lake Erie LaMP can best be thought of as a problem solving process. We first must identify the water quality problems occurring in Lake Erie. Second, we must identify the key causes of those problems. Finally, we must identify what our desired state for the lake is, once the water quality problems have been resolved. A vision of the desired state of Lake Erie allows us to gauge our progress in resolving water quality problems and to identify when we have reached our objectives for a clean and healthy lake. The completion of these steps will set the stage for action.

The Lake Erie Forum's vision is a Lake Erie basin where: diverse life forms exist in harmony; social and economic benefits at maximum sustainable levels co-exist; citizens and governments are committed to binational cooperation; and a philosophy of stewardship ensures a clean, safe environment.

For recent information, see the Lake Erie LaMP Annual Report 2013 at: (<http://www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=5A2E69DC-1>)

2009 **Environmental Farm Planning in Canada: a 2006 overview (Agriculture and Agri-food Canada)** (http://publications.gc.ca/collections/collection_2011/agr/A125-15-2011-eng.pdf)

Statistics Canada, in partnership with Agriculture and Agri-Food Canada, followed up a 2001 study into the use of beneficial management practices (BMPs) by Canadian agricultural producers by conducting a second Farm Environmental Management Survey (FEMS) in 2006. The survey was delivered to 20,000 crop and livestock producers across Canada (excluding Yukon, Nunavut and Northwest Territories) who reported more than \$10,000 in gross receipts in the 2006 Census of Agriculture. Producers were asked about a variety of BMPs, including manure storage and spreading, grazing practices, crop and nutrient management, pesticide application, wildlife damage, land and water management, waste management, and environmental farm planning. The questionnaire had a response rate of approximately 80 per cent. The 2006 FEMS built on the results of the 2001 FEMS, and provides information for trend analysis on the adoption rates of some BMPs.

2011 Lake St. Clair (2011 Canadian Work Plan)

17/02/2011 News Release: FCM's Green Municipal Fund supports the Municipality of Chatham-Kent's Shoreline Areas Sustainable Community Plan
http://www.fcm.ca/Documents/news/2011/FCMs_Green_Municipal_Fund_supports_the_Municipality_of_Chatham-Kents_Shoreline_Areas_Sustainable_Community_Plan_EN.pdf

Drawing on extensive recent planning experience, the Municipality of Chatham-Kent will create a Shoreline Areas Sustainable Community Plan and Secondary Plan to clearly define the balance between public access, private development, and preservation of natural areas in its lakeshore and shoreline communities. The plans will use approaches that recognize the relationships between economic, social and environmental aspects of development and preservation. They will also contribute to the overall sustainability of the Municipality's lands, including the shorelines and waterfront areas of Lake Erie, Lake St. Clair, the Thames River, and the Sydenham River / Chenal Ecarté (Snye) River system.

A major goal will be to consolidate the recommendations from the many municipal plans already in place, as well as the existing conservation authority and provincial and federal ministry plans and recommendations relevant to the catchment area. Such an action-oriented sustainability approach for a clearly identified catchment area is innovative, in that multiple plans and strategies are rarely coordinated with respect to development and environmental protection. The shoreline areas plan will identify a vision for the shoreline lands within the study area, to assist in guiding decision-making concerning those lands.

The objective of the project is to ensure the long-term health of the Municipality of Chatham-Kent's extensive shoreline areas through a sustainable planning approach that recognizes the interconnected nature of the community, the environment and the economy. By focusing at the community level, the plans will encourage a long-range perspective that considers all the consequences of development within the subject areas as well as policies, practices and projects that enhance conservation of resources, pollution prevention, waste management and quality of life.

2011

Haldimand County Landscape Action Plan (Haldimand County/EDA Collaborative Inc./Sierra Planning and Management)

(http://www.haldimandcounty.on.ca/uploadedFiles/Our_County/Projects_and_Initiatives/Lakescape_Action_Plan/Final%20Report%20-%20Lakescape%20Action%20Plan.pdf)

The Landscape Action Plan builds upon the vision established for the Lakeshore area in the County's Official Plan of 2006. The purpose of the plan is to provide a focused ten-year integrated strategy identifying key issues, development opportunities, and constraints along Haldimand County's Lake Erie shoreline. It will focus on design strategies, tourism and recreation, and sustainable growth management. The Action Plan is a detailed, visionary paper addressing the balance between local interests and product development. The scope of the project does not extend further than county-owned land to increase and promote sustainable tourism, while improving quality of life for residents.

2012

Grand River Water Management Plan 2013 Update: A Framework for Identifying Indicators of Water Resource Conditions – Support of Ecological Health by Water Resources in the Grand River-Lake Erie Interface (Report from the Grand River - Lake Erie Working Group)

(http://www.grandriver.ca/waterplan/WaterResourceIndicatorFramework_V2.pdf)

This report is the result of work undertaken to update the Grand River Water Management Plan, which was last documented in the 1982 Grand River Basin Water Management Study. The updated Water Management Plan represents a collective plan for sustainable water management agreed to by the Grand River Conservation Authority, municipalities, the federal and provincial governments, First Nations and others. It is a key component of the broader Integrated Watershed Plan for the Grand River Watershed. This plan for the management of water will complement other efforts, including plans for the management of fish (e.g., Grand River Fisheries Management Plan, Lake Erie Fisheries Objectives) and other wildlife (e.g., recovery strategies for rare or threatened species), natural heritage features in the Grand River Watershed (e.g., Dunnville Marsh Management Plan), and the Lake Erie ecosystem (e.g., Lake Erie Lakewide Management Plan). Goals of the updated Water Management Plan are to:

- Improve water quality to improve river health and reduce impact on the eastern basin of Lake Erie;
- Ensure sustained water supplies for communities, economies and ecosystems;
- Reduce flood damage potential; and
- Increase resiliency to deal with climate change

In Progress

Thames River Clear Water Revival (<http://thamesrevival.webnode.com/>)

The Thames River Clear Water Revival is a new partnership initiative that aims to improve the health of the Thames River, Lake St. Clair and Lake Erie. The first step is to develop a Water Management Plan that focuses on issues related to water quantity and water quality. The broader Thames Revival will consider all the interactions of land, water, plants, animals and people in the Thames River watershed. A key goal of the Thames Revival is to encourage the active participation from First Nations who have traditional stewardship and spiritual ties to the Thames River and can provide valuable

expertise and knowledge for the work that lies ahead. [Note: The website contains recent (2013) useful case studies and other publications relevant to phosphorus control and management.]

The Thames Revival is being guided by a steering committee with representatives from the following First Nations, municipalities and agencies:

- Bkejwanong Territory (Walpole Island First Nation)
- Chippewas of the Thames First Nation
- Delaware Nation of the Thames
- Oneida Nation of the Thames
- Lower Thames Valley Conservation Authority
- Upper Thames River Conservation Authority
- City of London
- Environment Canada
- Ontario Ministry of Agriculture and Food
- Ontario Ministry of the Environment
- Ontario Ministry of Natural Resources

An updated Thames River Water Management Plan (TRWMP) will be a key component of a broader Watershed Strategy, known as the Thames River Clearwater Revival (TRCWR) that considers all the interactions of land, water, plants, animals and people, with the overall objective of improving the ecological condition of the Thames River, Lake St. Clair, and Lake Erie. Terms of Reference for the Management Plan were posted on 20/11/2013 (see <http://thamesrevival.webnode.com/news/thames-river-water-management-plan-terms-of-reference-posted/>). The TRWMP will be a 20 year plan focusing on water quantity and quality to provide broad and strategic guidelines regarding water conservation and management that consider extreme weather events, land use, and land management.

Thames River Water Management Plan goals include:

- Identify and address water quantity management issues.
- Improve water quality of the Thames River watershed and reduce the river's impact on Lake St. Clair, the Detroit River and Lake Erie.
- Strengthen community connections with the Thames River watershed and understanding of the river's relationship to the Great Lakes.
- Understand Traditional Ecological Knowledge (TEK) and determine how it can inform water resource management decisions.
- Strengthen collaborations among water managers: First Nations, municipalities, Conservation Authorities, Provincial ministries and Federal departments.

2013

Lake Erie Lakewide Action and Management Plan Annual Report 2013

(<http://www.ec.gc.ca/grandslacs-greatlakes/default.asp?lang=En&n=5A2E69DC-1>)

The top priority for Lake Erie Lakewide Action and Management Plan (LAMP) partners is to address excess algal blooms by reducing nutrient inputs to the lake. This Annual Report summarizes recent progress, identifies current challenges, and defines next step actions. Recent progress includes:

- An update on the LAMP's Nutrient Management Strategy and nutrient reduction efforts at local and regional scales;
- An update on the Biodiversity Conservation Strategy (BCS) for Lake Erie;
- Report on projects supported by the Great Lakes Restoration Initiative (GLRI) and Canada-Ontario Agreement (COA); and
- Progress reports on the St. Clair-Detroit Connecting Waterway and priority watersheds in Canada and the United States.

Appendix B: Legislation/Regulations and Programs

The following policy instruments are being (or may be) applied to reduce phosphorus loadings to Lake Erie (and other Great Lakes). Funding and other support programs and incentives are also identified and briefly described.

Federal Government

Environment Canada:

International Boundary Water Treaty Act: An Act respecting the International Joint Commission that was established under the treaty of January 11, 1909 relating to boundary waters. Provides the principles and mechanisms to help resolve disputes and prevent future ones, primarily those concerning water quantity and water quality along the boundary between Canada and the United States. This Act provides the legal framework governing the GLWQA. (<http://laws-lois.justice.gc.ca/eng/acts/I-17/>)

Canada Water Act: An Act to provide for the management of the water resources of Canada, including research and the planning and implementation of programs relating to the conservation, development and utilization of water resources. Phosphorus Concentration Regulations limiting the P concentrations in laundry detergents were added to the Water Pollution section. These limits were included under CEPA when it came into force.

Canadian Environmental Protection Act (CEPA): An Act respecting pollution prevention and the protection of the environment and human health in order to contribute to sustainable development. Phosphorus Concentration Regulations (SOR/89-501) limit the concentration of phosphorus in laundry detergents to five percent by weight expressed as phosphorus pentoxide or 2.2% by weight expressed as elemental phosphorus. Amendments to the Phosphorus Concentration Regulations came into effect on July 1, 2010, and broaden the scope of the regulations to include other detergents and cleaners, as well as lowering the limits on permissible phosphorus concentrations.

Fisheries Act: Environment Canada administers Section 36 of the Fisheries Act. The Department of Fisheries and Oceans (DFO) is the enabling partner on everything else. Subsection 36(3) prohibits the deposit of deleterious substances. A deleterious substance is any substance that, if added to water, makes the water deleterious to fish or fish habitat or any water containing a substance in such quantity or concentration or has been changed by heat or other means, that if added to water makes that water deleterious to fish or fish habitat. Currently there are regulations that authorize the deposit of effluents from industrial sectors. These provisions deal with manure spills and other effluents that affect fish habitat by phosphorus loadings and resultant eutrophication.

EcoAction Community Funding Program: This program provides financial support to community-based, non-profit organizations for projects that have measurable, positive impacts on the environment. It funds projects that divert and reduce phosphorus. Maximum funding of \$100,000 per project is available. (<http://www.ec.gc.ca/ecoaction/>)

Cleaning Up Lake Simcoe and South-eastern Georgian Bay (2013): This program deals with nutrients, and fish and wildlife habitat. It supports community-based projects that are focused on priorities, including

reducing phosphorous inputs from urban and rural sources. The five-year \$29 million fund is part of the Government of Canada's Comprehensive Approach to Clean Water and is managed by Environment Canada.

Great Lakes Nutrient Initiative (GLNI): The \$16 million GLNI, announced in October 2012, advances the science to understand and address the complex problem of recurrent toxic and nuisance algae in the Great Lakes. The focus of the GLNI is on Lake Erie, the smallest and shallowest of the Great Lakes and most susceptible to nearshore water quality issues. The science and policy approaches developed through the GLNI will be transferable to other Great Lakes and other bodies of water in Canada. The Initiative targets five priority areas:

- Establishing current nutrient loadings from selected Canadian tributaries;
- Enhancing knowledge of the factors that impact tributary and nearshore water quality, ecosystem health, and algae growth;
- Establishing binational lake ecosystem objectives, phosphorus objectives, and phosphorous load reduction targets;
- Developing policy options and strategies to meet phosphorous reduction targets;
- Developing a binational nearshore assessment and management framework.

Note: For progress on the GLNI, see "Great Lakes Nutrient Initiative, 2012-2013 Annual Report."

Agriculture and Agri-Food Canada:

Until March 2013, agriculture policy in Canada was coordinated through a 5-year Federal/Provincial/Territorial initiative called Growing Forward. The Growing Forward framework agreement focused on achieving results, reflected input from across the sector, and delivered programs that were simple, effective and tailored to local needs. It was a voluntary initiative that was phased out in March 2013 (and replaced by Growing Forward 2 – see below). Canada-Ontario Farm Stewardship Program (COFSP), and Environmental Farm Plans (EFP) provided a framework to fund BMPs, which reduce phosphorus. Governments invested \$1.3 billion over five years in Growing Forward programs. Funding was cost-shared on a 60:40 basis between the Government of Canada and provincial/territorial governments. It had a chapter on environment, but that was phased out in Growing Forward 2. (<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1286477571817&lang=eng>)

Growing Forward 2: This five year (2013-2018) policy framework represents a \$3 billion investment by federal, provincial and territorial (FPT) governments, including a 50% increase in governments' cost-shared investments in innovation, competitiveness, and market development. The AgriInnovation Program, and within it Sustainable Science Technology Advancement (SSTA) program, will fund projects that improve phosphorus use and recovery. A review of Growing Forward 1 is being conducted and will be available soon.

Sustainable Science Technology Advancement (SSTA): Provides for improved phosphorus use and phosphorus recovery. Voluntary. Funding will come from Growing Forward 2.

Canadian Agricultural Adaptation Program (CCAP): This is a five-year (2009-2014), \$163 million program with the objective of facilitating the agriculture, agri-food, and agri-based products sector's ability to seize opportunities, respond to new and emerging issues, and pilot solutions to new and ongoing issues in order to adapt and remain competitive. Funding is available for eligible projects and is carried out by the agriculture, agri-food and agri-based products sector. It has funded projects related to phosphorus,

such as constructing wetlands for dairy waste waters. (<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1286477571817&lang=eng>)

AgriInnovation Program: This is a five-year (2013-2018), up to \$698 million, initiative under the Growing Forward 2 policy framework. Of this, \$468 million is available for funding projects based on applications submitted by industry. The remaining funds go towards AAFC-led research, development and knowledge transfer activities, as well as program administration that complement industry-directed initiatives. The program is designed to accelerate the pace of innovation by supporting research and development activities in agri-innovations and facilitating the demonstration, commercialization and/or adoption of innovative products, technologies, processes, practices and services. It will likely fund projects that retain phosphorus and lead to innovative farming techniques/practices that reduce phosphorus loading. The total maximum contribution to an applicant from all streams under the AgriInnovation Program cannot exceed \$10 million per year. (<http://www4.agr.gc.ca/AAFC-AAC/display-afficher.do?id=1354301302625&lang=eng>)

Soil Water Environmental Enhancement Program (SWEEP): This program ran from 1986-1991 and was the first big response to looking at managing excess phosphorus. The federal and provincial governments provided cost share funding and research. For a comprehensive review of historical phosphorus management strategies and plans, see the following report, "Analysis of Historical Lake Erie Phosphorus Management Processes" by The Soil Resource Group for Agriculture and Agri-Food Canada. Pages 31-50 contain a retrospective assessment of the P management strategy implementation.

Ontario Government:

Ministry of the Environment and Climate Change:

Ontario Water Resources Act: This Act is designed to conserve, protect and manage Ontario's water resources for efficient and sustainable use. It focuses on groundwater and surface water throughout the province. The Act regulates sewage disposal and "sewage works" and prohibits the discharge of polluting materials that may impair water quality. All municipalities are required to undertake site specific receiving water assessments to set limits (such as phosphorus limits) based on B-1 series policies and procedures commonly referred to as "Blue Book" and "Green Book" and which include Provincial Water Quality Objectives (PWQOs). Actual approval is under the EPA however the requirement for approval is under the OWRA. F series policies and procedures provide further requirements specific to municipal wastewater treatment.

In 1997 the MOE released Procedure F-5-5 which outlines expectations for municipalities to manage combined sewer overflows (CSOs) under Ontario Water Resources Act, Environmental Protection Act. Municipalities are expected to prepare Pollution Prevention Control Plans, per Ontario procedure F-5-5, when they have combined sewer systems. In Ontario, sewage bypasses (i.e. quantity of sewage being bypassed without treatment) are required to be monitored and reported to the province according to MOECC policy F 5 1. In 2006 the MOE completed a compliance review initiative to assess the status of municipal compliance with F-5-5. The review found that a high number of municipalities are monitoring and reporting overflows; that updates are being made to inspection processes to place a greater emphasis on overflows; and that direction has been given to staff at municipalities with combined sewers that they are to complete studies related to the systems and prepare comprehensive Pollution Prevention and Control Plans, if required.

Environmental Compliance Approvals (permits) are required under the *Ontario Water Resources Act* for municipal stormwater conveyances and treatment systems. Guidance is given through the MOECC 2003 Stormwater Management Planning and Design Manual which describes stormwater management systems design standards for water quality, quantity, water balance and erosion. As part of this process, the MOE issues certificates of approval for urban and industrial stormwater sewer systems. The MOE works with municipalities and conservation authorities in the implementation of stormwater management policies.

In Ontario, all systems larger than 10,000 liters are subject to approval and inspection. Systems smaller than 10,000 liters are regulated under the Building Code. Septic systems administered under the Ontario Water Resources Act must abide by conditions in an Environmental Compliance Approval, and are subject to review and inspection.

OWRA also protects water resources by regulating water takings from ground or surface water. Regulation (903) – 1998 governs waste management, including spills that may come from agricultural sources.

http://www.ene.gov.on.ca/environment/en/legislation/ontario_water_resources_act/index.htm

Environmental Assessment Act: The Act requires an environmental assessment of any major public sector undertaking that has the potential for significant environmental effects. This includes public roads, transit, and wastewater and stormwater installations. The Environmental Assessment Act sets out a planning and decision-making process so that potential environmental effects are considered before a project begins. The act applies to: provincial ministries and agencies, municipalities such as towns, cities, and counties, public bodies such as conservation authorities and Metrolinx. Examples of projects include: public roads and highways, transit projects, waste management projects, water and wastewater works, resource management, flood protection projects.

http://www.ene.gov.on.ca/environment/en/legislation/environment_assessment_act/index.htm

Environmental Protection Act: This Act sets out enabling authority for pollution prevention and the protection of the environment and human health, including the requirement for provincial approvals of sewage works. The following programs support implementation of the EPA:

- I. Industrial Sites Environmental Compliance Program - All industries are required to undertake site specific receiving water assessments to set limits. In addition some industries are required to meet regulated technology based limits set out in the industrial effluent monitoring and limits regulation under the Environmental Protection Act (known as the MISA regulation). Some industries may be required to monitor effluent to meet regulated technology based limits which may include nutrient limits (Environmental Protection Act 1990, MISA –EMEL Regs).
- II. Sewer Use Best Management Practices (BMPs) - In August 2007, Ontario released ten sewer use BMP documents for various industrial, commercial, and institutional sectors focusing on prevention and treatment to minimize the discharge of harmful substances into municipal sewers.
- III. Biosolids Land Application for non- agricultural land, the application of sewage biosolids is covered under the Environmental Protection Act and O.Reg. 347.

Water Opportunities Act: This Act encourages the creation and export of innovative clean water technology, promotes water conservation, sustainable water infrastructure, economic development, and jobs. The Water Opportunities Act was implemented to encourage a new innovative approach to

planning for municipal water infrastructure. The Act enabled the development of a regulation which would require municipalities to develop Municipal Water Sustainability Plans. These plans would involve asset management and financial planning for infrastructure including sewage treatment plants, sewage collection systems and lagoons, evaluating risks such as climate change impacts and opportunities for innovation and collaboration on a watershed basis. The Water Technology Acceleration Partnership (WaterTAP), which was created under Ontario's Water Opportunities Act, to support research and development as well as the commercialization of new technologies and innovations in Ontario's water sector. (http://www.ene.gov.on.ca/environment/en/legislation/water_opportunities/index.htm)

Showcasing Water Innovation (SWI) Program (2011-2014): This program complements the *Water Opportunities Act* by fostering innovation, creating opportunities for economic development, and protecting water resources. Applications from small rural, remote, and Northern communities are encouraged. Individual projects may receive funding for up to 50% of eligible project costs, to a maximum of \$1,000,000 per project. In total, SWI will provide \$17 million in grants over three years to fund projects that meet the program's objective.

(http://www.ene.gov.on.ca/environment/en/funding/showcasing_water_innovation/index.htm)

Clean Water Act: This Act helps protect drinking water from source to tap with a multi-barrier approach that stops contaminants from entering sources of drinking water, including lakes, rivers and aquifers. It requires communities to assess existing and potential threats to their water, and to set out and implement the actions needed to reduce or eliminate these threats. It empowers communities to take action and prevent threats from becoming significant. Public participation is required on every local source protection plan, and it requires all plans and actions to be based on sound science. Nutrient related threats identified include wastewater discharges, combined sewer overflows, sewage bypasses, stormwater outfalls and industrial discharges. Blue Green algae has been identified as a major drinking water threat. It also introduces the Ontario Drinking Water Stewardship Program (see below).

(http://www.ene.gov.on.ca/environment/en/legislation/clean_water_act/index.htm)

Ontario Drinking Water Stewardship Program (2007-2012): Technical and financial assistance was made available from the Ministry of the Environment to assist landowners to protect municipal drinking water sources; namely municipal wellheads and municipal surface water intakes across the province. The funding went towards implementing practices like: well decommissioning, septic system decommissioning and upgrading, runoff and erosion control measures, and pollution prevention reviews for small business. The program funded projects that prevented runoff and erosion on landowner property. Improving manure storage and handling and manure treatment was eligible for 70% to \$60,000. (http://www.ene.gov.on.ca/environment/en/subject/protection/STDPROD_080599 and http://www.conservation-ontario.on.ca/source_protection/protection.html)

As a result of the *Clean Water Act*, Communities in Ontario are required to develop Source Water Protection Plans in order to protect their municipal sources of drinking water. These plans identify risks to local drinking water sources and develop strategies to reduce or eliminate these risks. The planning process involves municipalities, conservation authorities, property owners, farmers, industry, businesses, community groups, public health officials, and First Nations. Phosphorus threats and implement actions needed to eliminate or remediate these threats will be addressed in source protection plans. Funding is available through the Ontario Drinking Water Stewardship Program. In its first four years, the ODWSP funds supported more than 2,100 projects. For a phosphorus-related example, see *The Application and Storage of Agricultural Source Material (2011)*, and Halton Region

Source Protection Area (2011).

(http://www.ene.gov.on.ca/environment/en/subject/protection/STDPROD_080598.html)

Great Lakes Protection Act (proposed): This proposed legislation would help restore and protect the Great Lakes so they stay drinkable, swimmable, and fishable. The purposes of the Act are:

- (a) to protect and restore the ecological health of the Great Lakes-St. Lawrence River Basin; and
- (b) to create opportunities for individuals and communities to become involved in the protection and restoration of the ecological health of the Great Lakes-St. Lawrence River Basin.

(http://www.ontla.on.ca/web/bills/bills_detail.do?locale=en&Intranet=&BillID=2649)

Great Lakes Guardian Community Fund: Created in 2012, this program supports local, community activities that restore and protect the Great Lakes and St. Lawrence River Basin. It complements the proposed Great Lakes Protection Act and the Great Lakes Strategy. The fund provides a maximum of \$25,000 per project for up to 100% of eligible projects. It offers grants totalling \$1.5 million. In 2013 and 2014, funds were awarded for projects which result in measurable environmental improvements and contribute to at least one of the following goals: Protecting water quality for human and ecological health, improving wetlands, beaches and coastal areas, protecting habitats and species.

(http://www.ene.gov.on.ca/environment/en/funding/great_lakes_fund/index.htm)

Lake Simcoe Protection Act, 2008 and Lake Simcoe Protection Plan (2009):

The Lake Simcoe Protection Act and Plan together represent a legal framework for the protection and restoration of Lake Simcoe's aquatic resources. The Plan has established a common objective for a watershed (late-summer, hypolimnetic oxygen concentration, phosphorus loading target), put structures into place to implement and advise (Ontario Ministry of the Environment as a leading role, Science and Coordinating committees), and set out legally binding policies for certain activities, including effluent load caps for municipal sewage treatment plants and stormwater best management practices as well as voluntary strategies that address all land uses.

http://www.ene.gov.on.ca/environment/en/resources/STD01_076301.html

Lake Partner Program: This is a province-wide, volunteer-based, water quality monitoring program that has run since 1996. The objective is to protect and restore source-water quality. Volunteers collect total phosphorus samples and make monthly water clarity observations on their lakes. This information enables the early detection of changes in the nutrient status and/or water clarity of the lake due to the impacts of shoreline development, climate change, and other stresses. The ministry continues to monitor more than 600 of the province's inland lakes through this program. Data are published annually on the ministry's public Lake Partner Program webpage.

(http://www.ene.gov.on.ca/environment/en/local/lake_partner_program/index.htm)

Open Water Dredging: The MOECC provides guidance on determining the appropriate options for open water disposal of dredged sediments "Evaluating Construction Activities Impacting on Water Resources, Part III: Handbook for Dredging and Dredged Material Disposal in Ontario – Legislation, Policies, Sediment Classification and Disposal Options (January 2011)." Open water sediment disposal is subject to conditions.

Ontario Municipal Affairs and Housing

Provincial Policy Statement 2014 (PPS): The Provincial Policy Statement provides for appropriate development while protecting resources of provincial interest, public health and safety, and the quality

of the natural and built environment. The Provincial Policy Statement supports improved land use planning and management, which contributes to a more effective and efficient land use planning system. Recent amendments to the PPS include section 1.6.2 that planning authorities should promote *green infrastructure* to complement *infrastructure*. **Stormwater Management Planning** is conducted at the discretion of each municipality - Section 2.2.1 of the Provincial Policy Statement requires that municipal planning authorities ensure that “stormwater management practices minimize volumes and contaminant loads, and maintain or increase the extent of vegetative and pervious surfaces”

Septic System Regulation under the Municipal Building Code: Ontario’s Building Code enables discretionary on-site sewage system maintenance inspection programs for small systems (less than 10,000 litres) to be administered by principal authorities, and governs mandatory inspection programs in certain areas. In Ontario, all systems larger than 10,000 litres are subject to OWRA approval and inspection. The Ontario Building Code was amended by regulation in 2011 to establish and govern mandatory and discretionary on-site sewage system maintenance inspection programs to be administered by principal authorities (municipalities, conservation authorities) in specific areas. The mandatory re-inspection program is intended to support the implementation of the Clean Water Act, 2006 and the Lake Simcoe Protection Plan. To date, mandatory septic re-inspection areas are limited to certain “vulnerable areas” approved under the Clean Water Act and “priority areas” in the Lake Simcoe watershed.

Ministry of Economic Development Employment and Infrastructure

Ontario and Federal Infrastructure Funding Programs—Small Communities Fund under the Building Canada Plan: The Province is planning more than \$130 billion in infrastructure investments over the next ten years. These investments will help to strengthen communities across the province. As part of this ten-year commitment, Ontario is continuing its support for strong communities under the Municipal Infrastructure Strategy by launching:

- The Ontario Community Infrastructure Fund or the OCIF, which will provide \$100 million per year to continue to support the revitalization and repair of roads, bridges and water and wastewater facilities in small, rural and northern communities. The OCIF includes \$50 million per year in application-based funding and another \$50 million per year in stable, predictable formula-based funding.
- An intake to identify priority municipal projects (including wastewater) for the federal government’s Small Communities Fund (SCF). Through the SCF, Ontario and Canada will each provide \$272 million to support projects in municipalities with populations less than 100,000. The SCF is part of the federal government’s ten-year Building Canada Fund.

Ontario Ministry of Agriculture Food and Rural Affairs:

Nutrient Management Act: This Act provides a comprehensive nutrient management framework for Ontario's agricultural industry, municipalities, and other generators of materials containing nutrients. It governs Nutrient Management Strategies, management of manure, snow that has manure, milking centre waste water, nutrient storage, and vegetated filter strips. **Proposed Greenhouse Regulation under the Nutrient Management Act** - A new regulation is being proposed under the Nutrient Management Act (NMA) to allow for the land application of greenhouse nutrient feedwater (GNF) as a

nutrient source for agricultural crops. The purpose of the NMA is to provide for the management of materials containing nutrients in ways that will enhance protection of the natural environment and provide a sustainable future for agricultural operations and rural development.

(<http://www.omafra.gov.on.ca/english/agops/index.html>)

Nutrient Management Strategy (NMS): The Nutrient Management Act, 2002, requires any building project relating to livestock housing or manure storage facility to have an approved Nutrient Management Strategy (NMS) before a building permit will be issued. This includes manure management, manure volume, manure storage, management of runoff, available land and/or agreements to utilize the manure, location of sensitive features, and the location of the nearest municipal well. The NMS applies to all farms that generate more than five nutrient units and are proposing to build, expand or renovate. (<http://www.omafra.gov.on.ca/english/agops/index.html>)

Canada-Ontario Environmental Farm Plans (EFP): Created in 1993, Environmental Farm Plans (EFPs) are assessments voluntarily prepared by farm families to increase their environmental awareness in up to 23 different areas on their farm. Through the EFP local workshop process, farmers highlight their farm's environmental strengths, identify areas of environmental concern, and set realistic action plans with timetables to improve environmental conditions. Environmental cost-share programs are available to assist in implementing projects. EFPs assess and promote the management of nutrient sources, including storage and transport, through various worksheets and BMPs. EFPs are not likely to change under Growing Forward 2. Some EFPs describe manure storage and manure soil levels and are trying to meet specific phosphorus thresholds. Cost-share funding for EFPs was available under GF1.

(<http://www.omafra.gov.on.ca/english/environment/efp/efp.htm>)

Canada-Ontario Farm Stewardship Program (COFSP): Under the COFSP, GF1 offered cost-share opportunities to assist farmers in implementing environmental improvement projects identified in their EFP action plans. COFSP ran from April 2009 to March 2013, and addressed improved manure storage and handling, manure treatment, manure land application, in-barn improvements for water efficiency, farmyard and horticultural facilities runoff control, relocation of livestock confinement and horticultural facilities from riparian areas, wintering site pasture management, produce and waste management, upland and riparian habitat management, erosion control structures, etc. It provided top-up funds, prioritized to a specific area, jurisdiction or watershed body. Different percentages of cost share and funding cap were available depending on BMPs. Relocation of Livestock offered the highest support of 50% to \$30,000 of costs. COFSP is not likely to change under GF2.

(<http://www.omafra.gov.on.ca/english/environment/efp/efp.htm>)

Watershed-Based Best Management Practices Evaluation (WBBE) projects: Created in 2010, WBBE projects support COA commitments to improve the adoption and effectiveness of agricultural non-point source stewardship actions in one or two key areas in the Lake Erie and Lake Huron Basins. The total available funding under the WBBE Program was up to \$450,000 in fiscal year 2010-11, \$570,000 in fiscal year 2011-12, and \$100,000 in fiscal year 2012-13.

(<http://science.yorku.ca/index.php/faculty/upcoming-grant-deadlines/details/104-watershed-based-management-practices-evaluation-wbbe-omafra.html>)

Agricultural Resource Inventory: The objective of the ARI, which was initiated in 1983, is to indicate differences in farm operations in a way that will remain valid for a number of years. Every hectare of each township is given a land use designation, including non-agricultural land uses. The compiled base maps are geographically referenced to aid the digitization process. ARI has provided an extensive

Geographic Information Systems (GIS) digital polygon framework and corresponding database for field-specific cropping and tillage system information in the Fairchild Creek Watershed (a tributary of the Grand River), Rondeau Bay Watershed (on the coast of Lake Erie) and coastal watersheds in central Huron County (between the Bayfield and Maitland Rivers) in the Lake Huron Basin. As of March 2010, the ARI has been available as a single data set covering Southern Ontario. (http://www.omafra.gov.on.ca/english/landuse/gis/ari_1983.htm)

Soil Test Lab Accreditation: Created in the early 1990s. The OMAF Agronomic Test Accreditation Program requires that laboratories demonstrate acceptable accuracy in testing soils for soil pH, buffer pH, plant available P, K, Mg, and Mn and Zn Indexes. An accurate soil test is the key to agronomically and environmentally sound nutrient management. Knowing what nutrients are available in the soil and the materials applied to a crop is an important basis for sound economic and environmental nutrient management. In spring 2008, OMAF launched "Test before you Invest," an information campaign using all regional offices to promote soil testing. Many of these same labs analyze nutrient content of land applied materials, such as manures, washwaters, and biosolids. The lab accreditation program deals indirectly with phosphorus loading inasmuch as it helps growers apply the correct rate for crop needs by ensuring accuracy of the measurement in the labs; and, in the case of phosphorus, accuracy in rate recommendations, because the accredited test (sodium bicarbonate extract) was selected based on best relation to plant availability in Ontario soils, and the rate recommendations are derived from field trials conducted in Ontario. (<http://www.omafra.gov.on.ca/english/crops/resource/soillabs.htm>)

Soils Ontario Program: The soils data will evolve into a digital database that is spatially accurate throughout Ontario, consistent, and easily accessible in digital and paper format. Using GIS and NRVIS (Natural Resource Values Information System), staff are updating soil attribute information and correlating soil polygons that cross administrative boundaries. The Soils Ontario Project is applied to: source water protection, nutrient management, soil erosion modelling, specialty crop mapping, and non-agricultural source material. The soils data can be used in many applications, including source water protection, land use planning, nutrient management, and soil erosion modelling. (http://www.omafra.gov.on.ca/english/landuse/gis/soils_ont.htm)

The Phosphorus Index: The Phosphorus Index has been introduced into Ontario as a means to rank the relative risk of surface water contamination resulting from phosphorus application on crop land, select management strategies that can be used to reduce this risk, determine the distance that phosphorus applications must be set back from surface water, and set restrictions on rates of phosphorus applied to a field. The index is used as a means to address the risk of surface water environmental concerns resulting from phosphorus. (<http://www.omafra.gov.on.ca/english/engineer/facts/05-067.htm>)

Nutrient Management Technology Transfer: Numerous voluntary nutrient management activities have been developed and promoted by OMAFRA through environmental specialists, engineers, agronomists, scientists, and regional offices, including: field crop and horticultural crop fertility research, recommendations, and publications; phosphorus reduction through promotion of the technical and economic aspects of livestock ration manipulation; nutrient and water management; waste water treatment and related nutrient recovery; training of Certified Crop Advisors and Certified Nutrient Management Planners in nutrient management principles; continuous improvement of NMAN computer software for tracking nutrient and manure applications (planning and record keeping); soil and manure tests; sizing storages; and economic analysis of manure nutrients applied. BMP booklets have been produced on various topics, such as "Managing Crop Nutrients", "Manure Management", and "Buffer Strips".

Ministry of Natural Resources:

Conservation Authorities Act (e.g., 178/06; 155/06): Conservation Authorities (CAs) are local watershed management agencies established under the Conservation Authorities Act of 1946. CA's operate across southern Ontario, as well as in areas of northern Ontario near urban centres. In addition to their main function of protecting residents lives and property from natural hazards such as flooding and erosion, CA's deliver services and programs that protect and manage water and other natural resources in partnership with government, landowners and other organizations. CAs implement municipally and privately funded programs that support septic system upgrades, well capping and a variety of agricultural BMPs. Examples include the Clean Water Program in the South Nation Conservation (http://www.nation.on.ca/clean_water.htm)

Funding for Conservation Authorities is derived from a variety of sources, but on average, 42% comes from self-generated revenues, 33% is provided through municipal levies, 23% comes from provincial grants and special projects, and 2% is provided by federal grants or contracts.

(http://www.conservation-ontario.on.ca/planning_regulations/section28.html and http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90c27_e.htm)

Ontario Stewardship Program (1995): Each year, more than 16,000 volunteers dedicate time and energy to more than 600 projects to restore shorelines, enhance habitats for wildlife, and educate others about the environment. The projects encourage local employment, increase the community's capacity, and help direct financial support in their areas. Each year, the volunteers restore more than 1,500 hectares of wetlands and headwater areas, plant 1.2 million trees, and restore more than 40 kilometres of shoreline. Restoring shorelines and other projects provide vegetative erosion and water control measures that can reduce phosphorus runoff. The program is governed by 45 Stewardship Councils across the province. (http://www.ontariostewardship.org/index.php/about_us)

Water and Erosion Control Infrastructure Program (WECI): Provides 50% funding to conservation authorities for projects associated with water and erosion control structures.

(<http://www.spiritofbothwell.com/dispatcher/fwd/www.amherstburgecho.com/2012/10/12/provincial-water-erosion-control-infrastructure-program-reduced>)

Water Resources Information Program (WRIP) (2000): The Water Resources Information Program (WRIP) ensures that information about Ontario's water resources is accessible, accurate and useable. Provincial government ministries, municipalities and conservation authorities are just some of the agencies that rely on good water-related information to create maps, conduct geographic analysis and support decisions about the province's water resources. It provides water resource information about phosphorus. WRIP is executed by Conservation and Authorities, but support is provided by the Ministry of Natural Resources. (<http://www.mnr.gov.on.ca/en/Business/WRIP/index.html>)

Wetland Drain Restoration Project (WDRP): Enhancing Water Storage and Water Quality within a Watershed through Wetland Restoration:

Conservation Ontario: (<http://www.conservationontario.ca/>)

Conservation Ontario is the network of 36 Conservation Authorities (CAs), which are local watershed management agencies that deliver services and programs that protect and manage water and other natural resources in partnership with government, landowners, and other organizations. CAs promote an integrated watershed approach balancing human, environmental, and economic needs.

Conservation Authority Watershed Stewardship Programs: In collaboration with Conservation Authorities, local municipalities across the province are offering cost-sharing grants to qualified landowners for beneficial management practices that improve ground and surface water quality. Funds projects that have a link to phosphorus, including tillage, erosion control structures, buffer strips, and nutrient management.

Conservation Authorities:

There are nine Conservation Authorities in the Lake Erie Basin. They implement a large number of measures that control or manage phosphorus loadings, including: erosion control measures, wetland and riparian habitat restoration, wellhead protection and decommissioning, livestock access restriction, clean water diversion, and more. A few examples of the important work CAs do in the basin are profiled below.

- **Essex Region: Clean Water-Green Spaces Program (2012):** A comprehensive Clean Water – Green Spaces program aimed at improving regional water quality and enhancing natural areas and biodiversity. Implements projects that help improve local water quality, reduce soil erosion, and increase natural areas cover. Measures include manure storage, buffer strips and wind breaks, and soil erosion control structures. Target audience is rural landowners. Grants of up to 90% of project costs are available to qualifying landowners (~\$1,500-5,000). (<http://erca.org/programs-services/landowner-grants/>)

Water Quality Monitoring Program (2002): The WQMP strives to provide a greater understanding of potential impact associated with land uses on natural water courses, help prioritize areas within watersheds for restoration improvements, track the success of habitat enhancement and clean-up projects in and along watercourses, and assess the effectiveness of BMPs for water quality improvements. Essex Region CA monitors nutrients that contribute to water quality issues and determines the amounts entering Lake Erie. A water quality report card is produced approximately every five years and has shown that phosphorus trends are improving in 9 sites, steady in 23 sites, and deteriorating in 10 sites. Concentrations of total phosphorus routinely exceed the provincial objective of 30 ug/L at many sites in the region. The highest TP concentration, at 18,000 ug/L, was found in Sturgeon Creek Watershed. (<http://erca.org/programs-services/water-quality/>)

Also: Big Creek Watershed Plan (pending): The Town of Amherstburg, Essex Region Conservation Authority, and its partners are initiating a watershed planning process for the Big Creek watershed. The plan will be supported by several technical studies and will be subject to a broad public consultation process. It will be used to inform and influence decisions and policies relating to land and water stewardship throughout the watershed once it is completed. Funding is from OMAFRA's Ontario Great Lakes Program.

Also: Sustainable Management Strategy for Southeast Leamington (pending, began in 2005): This Sustainable Management Strategy for Southeast Leamington provides the science (coastal and ecological), engineering, and socio- and agro-economic research needed to develop a range of options to determine the long term sustainable protection and management of the lands along the Lake Erie coastline between Wheatley, Ontario, and the southerly limit of Point Pelee National Park and associated flood prone inland areas. Options will include erosion, flooding, and protection works that will indirectly reduce phosphorus input. This Initiative involves Environment Canada, Parks Canada, the Ontario Ministry of Natural Resources (Water and Erosion Control Infrastructure Program), and the Municipality of Leamington.

<http://erca.org/resource-info/projects/southeast-leamington/>

- **Grand River:** Grand River Management Plan (1982). See Appendix A for the 2013 report, “A Framework for Identifying Indicators of Water Resource Conditions” and Appendix C for, “Grand River Watershed Case Study: A Cost-Benefit Analysis of Improved Phosphorus Management Using an Ecological Goods and Services Approach (2014).”

Also: In order to help farmers achieve environmental goals, the Grand River Conservation Authority initiated the Rural Water Quality Program (RWQP) in conjunction with municipal, provincial, and federal governments. The program was developed with the advice and assistance of farm organizations. Financial assistance is available to qualified landowners to share the cost of implementing selected best management practices that improve water quality. Projects directly related to phosphorus include manure storage, tillage, nutrient management plans, BMP toolkit review, etc. Although watershed-wide, some municipalities provide more funds than others, but all municipalities participate to some extent. Mostly involves farmers.

Also: Lake Erie Shoreline Protection Policy (2006): This policy complements the current Provincial Policy Statement regarding Natural Hazards and provides guidance to GRCA staff for the implementation of the Regulation. The intent of this policy is to provide a stronger level of protection for properties and residents along the Lake Erie shoreline.

<http://www.grandriver.ca/index/document.cfm?sec=17&sub1=76&sub2=4>

Also: Haldimand Rural Water Quality Program (see **Long Point** for details).

Also: Brant Rural Water Quality Program (see **Long Point** for details).

Also: Water Quality Forecasting and Water Management Planning (MOE developed a model in 1978, and there is ongoing continuous improvement of the model): A dynamic in-river model (Grand River Simulation Model) is used to forecast water quality conditions within the central Grand River region to assist with the management of multiple point sources (e.g., wastewater treatment plants). In-river nutrient processes, including phosphorus-macrophyte/algae-oxygen interactions, are modelled for use in point/nonpoint source water management planning with municipalities and provincial agencies.

http://www.grandriver.ca/waterplan/TechBrief_AssimilativeCapacity_2012.pdf

Also: Stormwater Management: The Grand River CA reviews plans and provides comments at the plan review and/or subwatershed/master drainage planning stage. Looks at sediments and associated nutrients. http://www.grandriver.ca/PolicyPlanningRegulations/GRCA_Policies.pdf

Also: Wastewater Treatment Plant Optimization Pilot/Program (2010): GRCA staff, work with wastewater treatment plant operators, supervisors, and managers to facilitate a 'community of practice' to achieve high quality effluent from all wastewater treatment plants. Phosphorus in wastewater effluent is reduced through optimization of treatment plants to achieve effluent quality performance targets. This program had MOE Showcasing Water Innovation Funds until 2013. (<http://www.grandriver.ca/index/document.cfm?Sec=67&Sub1=2&Sub2=8>)

- **Lower Thames Valley:** Restoring Rondeau Bay (2005-2007): This report addresses the major anthropogenic impacts degrading Rondeau Bay's ecological integrity and threatening its future viability as a region of high biodiversity, SAR refuge, and fisheries resource. The report makes recommendations for short-and-long-term restoration and protective measures which would ensure this valuable, and unique, Southern Ontario aquatic resource thrives in perpetuity. Set targets to reduce extent, biomass, episodes of nuisance algal blooms, and submerged aquatic vegetation mats. Achieved by reducing total phosphorus inputs. Specific targets: Mean TP concentrations at the mouth of each tributary not to exceed 0.03 mg/L, Total Phosphorus <600 ug/g.
http://www.mnr.gov.on.ca/en/Business/GreatLakes/2ColumnSubPage/STDPROD_088533.html
and
http://www.mnr.gov.on.ca/en/Business/GreatLakes/1ColumnSubPage/STDPROD_084013.html

Also: Elgin Clean Water Program (see **Kettle Creek** for details). (<http://www.lowerthames-conservation.on.ca/publications/Elgin%20Clean%20Water%20Program%20Announcement.pdf>)

- **Kettle Creek:** Kettle Creek Clean Water Initiative (2012): Successful applicants will receive up to 50% of the cost of environmental projects undertaken on their property. Maximum grants up to \$3000-4000. (<http://www.kettlecreekconservation.on.ca/content.php?doc=107>)

Also: Elgin Clean Water Program (2012): Funding is provided from the Royal Bank of Canada (RBC) Blue Water Project and targeted at rural landowners, the program is Elgin County-wide and includes Kettle Creek, Lower Thames, Catfish Creek, and Long Point. 50% cost-share, maximum of \$3,000-4,000:

- To improve local water quality through the reduction and elimination of animal waste contamination by restricting livestock access to water sources.
- To improve local water quality through the reduction and elimination of erosion and sedimentation to water sources.
- To reduce the amount of contaminated runoff from manure storages and exercise yards by diverting clean rain and snow meltwater away from sources of contamination to a satisfactory outlet.
- To improve local water quality/quantity, habitat structure, functionality, and diversity to support healthy and diverse aquatic and terrestrial communities.

(<http://www.kettlecreekconservation.on.ca/content.php?doc=112>)

Also: Middlesex and London Clean Water Initiative: Will likely fund BMPs traditionally used to target phosphorus, but will be more unique in offering projects for things like invasive species, etc. Targeted at rural landowners. \$200,000 from London Community Foundation. Different cost-share percentages. Involves Middlesex, London, and other Middlesex CA's.

- **Long Point:** Elgin Clean Water Program (2012): See **Kettle Creek** for details.

Also: Haldimand Rural Water Quality Program (2012): An initiative of Haldimand County and its partners to improve water quality. The Program has been developed in conjunction with representatives of the agricultural community and is based on successful programs in Wellington, Waterloo, and Brant Counties. Will be delivered by the Grand River Conservation Authority, Long Point Region Conservation Authority, and Niagara Peninsula Conservation Authority. Projects include livestock access restriction, erosion control structures, tree planting/natural restoration-stream buffers, fragile land retirement, and field windbreaks, as well as sediment basins/wetland creation. Targeted at rural landowners, mostly farmers.

Also: Brant Rural Water Quality Program (RWQP) (2006): Provides financial assistance to improve and protect water quality on Brant County farms. The Brant RWQP is an initiative funded by the County of Brant and the City of Brantford. Grants for projects include manure storage, clean water diversion, livestock access restriction, fertilizer and/or chemical handling and storage, and erosion control structures (grassed waterways, water and sediment control basins, stream bank stabilization, nutrient management plans, tree planting-stream buffers, field windbreaks, milkhouse water storage/treatment). Targeted mostly at farmers, the RWQP provides financial assistance to qualified landowners to share the cost of and protect water quality. An Environmental Farm Plan is required. RWQP funding may be combined with Environmental Farm Plan funding for cost-share opportunities of up to 80%. (<http://www.brant.ca/notices/pdfs/brantgrantsflyer06.pdf>)

Also: Oxford Tri-County Water Quality Program (CWP) (2001): The Oxford CWP is in its 10th year of delivering financial and technical assistance to landowners in the Tri-County area. Initiated in 2001 as a collaborative effort between municipalities and local conservation authorities to help improve and protect water quality in the counties of Oxford, Middlesex and Perth, the CWP has delivered funding to more than 80 environmental projects in the Long Point Region watershed. Through the program, technical and financial assistance is provided for best management practices that improve and protect ground and surface water quality. All projects require the completion of an Environmental Farm Plan (EFP) or CWP Worksheet for Septic Systems and Wells. Supports nutrient management plans, fertilizer, chemical and fuel storage or handling, clean water diversion, milkhouse washwater disposal, erosion control structures, fragile land retirement, livestock access restrictions to watercourses, woodlands and wetlands conservation and enhancement. Involves rural landowners in the counties of Oxford, Middlesex, and Perth. The grant rate for all projects is 50% and ranges from a maximum of \$500 to \$5,000, depending on the project type.

Also: Long Point Watershed: Tree Planting Programs (OPG Forest Corridor 2001, Trees Ontario 2004): Private Land Tree Program; MNR 50 million trees; OPG forest corridor. Each program has different criteria so depends on landowner. Tree planting along shorelines will help prevent erosion and P runoff. Targets the general public.

Also: Erosion Control Assistance Program: Landowners in the Long Point Region watershed are eligible for financial and technical assistance to undertake projects that will help reduce soil erosion and improve water quality on their land. This program helps keep soil and nutrients on the field and out of water courses. It includes things like grass waterways, wetland features, and controlling phosphorus runoff from agriculture. Targets all landowners. Five projects/year,

maximum \$1000, and landowners have to contribute a portion as well – generally 50% but can cover up to 100%.

- **Niagara Peninsula:** Watershed Stewardship Cost-Sharing Program (2010): This program delivers a comprehensive cost-sharing program that offers local landowners financial incentives to implement water quality and habitat improvement projects on their properties. Eligible project types include wetland habitat restoration, manure storing and handling/nutrient management, and nutrient management – waste water reduction. Also, livestock restriction, alternate watering systems and crossings, conservation farm practices, irrigation/water conservation practices, shelterbelts/windbreaks, woodland habitat restoration, and riparian habitat and connective corridors. Mostly directed at rural landowners, but there are a few urban projects as well. 75-90% cost-share, \$5,000-\$12,000 per grant, depending on the project. (<http://www.npca.ca/planning-permits/watershed-restoration-cost-sharing/>)

Also: Haldimand Rural Water Quality Program: See **Long Point** for details.

Also: Lake Erie Shoreline Management Plan (1992, updated 2010): The Lake Erie Shoreline Management plan was commissioned by the Niagara Peninsula Conservation Authority and considered the shoreline from the western limit of the watershed in Haldimand County to the Niagara River at Fort Erie. The Fort Erie Watershed Plan included an update to the majority of the shoreline within the Town of Fort Erie, and considered new policies and guidelines. The Niagara Peninsula CA commissioned an update for the remainder of the shoreline and the Lake Erie Shoreline Management Plan Update, which integrated the mapping from the Fort Erie Watershed Plan. The update was published in 2010. The Shoreline plan covers erosion and flooding hazards and prevention measures, which can help reduce phosphorus loadings. (<http://www.npca.ca/planning-permits/lake-erie-shoreline/>)

- **Catfish Creek:** Elgin Clean Water Program: See **Kettle Creek** for details.
- **Upper Thames:** Clean Water Program (2006): This is a water quality improvement program that provides technical assistance and financial incentives to rural landowners implementing water protection projects for on farms. Currently funded by local municipalities and delivered by local Conservation Authorities.

Also: Forestry and Naturalization Programs: Provides technical assistance and financial incentives to rural landowners to implement water quality, soil protection, and habitat improvement projects for landowners. Planting projects include windbreaks, highly erodible land retirement, and buffer strips along watercourses.

Also: Integrated Watershed Monitoring Program: Requires a Watershed Report Card every five years (2001, 2007, 2012 so far), which include data on water quality and phosphorus reporting. (http://www.thamesriver.on.ca/downloads/Water_Report.htm) Report cards cover the major 28 subwatersheds of the Upper Thames, with the purpose of measuring environmental progress and targeting actions.

Also: Target Watershed Program (2011): Uses a community-based watershed strategy to focus funding and implementation projects on target watersheds, determined based on local environmental issues, including water monitoring results. Total phosphorus has been monitored

in Trout Creek since 1979. Over this time period, total phosphorus has consistently been above the provincial guideline. Phosphorus concentrations of Wildwood have remained fairly consistent over time at approximately three times the provincial objective. Samples upstream of Wildwood have shown an increase in the past 15 years.

- **St. Clair Region:** Sydenham River Recovery Strategy (1999): The purpose of Recovery Plans is to help rehabilitate and protect populations of threatened and endangered species. Recovery Plans identify priority actions that can be implemented to help species on their paths to recovery. The team completed four background reports on the river and species at risk before developing the Recovery Strategy. While the strategy focuses on species at risk and their habitat, one of their biggest threats is excessive phosphorus loading in this area.
(http://www.scrca.on.ca/HW_SydRecoveryStrategy.ht)

Also: Sydenham River Habitat Stewardship Program (2000): A cost-sharing financial assistance program that provides funding for landowners to implement BMPs in the drainage basin of the Sydenham River. Priority is given to projects that directly benefit species at risk. Relevant BMPs include stream stabilization, conservation tillage equipment, manure storage, milk house wash water treatment, clean water diversions, fencing livestock from watercourses, buffer strips, sediment traps, and wetland creation. (http://www.scrca.on.ca/HW_Grants.ht)

Also: Lambton Shores Clean Water Cost-Share Program (2011): A cost-sharing funding program that comes under the Healthy Lake Huron Initiative to address algal fouling through granting funding for implementing BMPs. Priority is given to projects that directly enhance water quality. Covers 15% of the watershed. The whole project runs from Tobermory to Sarnia. Mostly involves farmers. Funding from Healthy Lake Huron Initiative – up to 50% grant dollars.
(http://www.scrca.on.ca/HW_Grants.htm)

Also: Water Quality Monitoring Program (2001): The aquatic ecosystem of the Sydenham River is under stress because of high nutrient and sediment loads. Water quality monitoring has indicated significant differences between the East and North Branches of the Sydenham River. Nutrients come from both rural and urban sources, including manure, fertilizers, sewage treatment plants, and faulty septic systems. Nine CA's (in total, under the program) partner with MOE, which does the analysis to form a water quality monitoring network.
(http://www.scrca.on.ca/HW_EnvMonitoring.htm)

Also: Watershed Report Card (2001): The Total Phosphorus readings were highest in Lower Bear Creek (0.23 mg/L), Bear Creek Headwaters (0.22 mg/L), Black Creek (0.21 mg/L) and St. Clair River Tributaries (0.18 mg/L). All twelve monitoring site were above the Provincial Water Quality Objective of 0.03 mg/L to prevent the nuisance growth of algae.
(<http://www.scrca.on.ca/Reportcards.htm>)

International Institute for Sustainable Development

Experimental Lakes Area (ELA): The ELA project originated as a Canadian governmental response to the International Joint Commission's recommendation (1965) to Canada and the United States for additional support for studies on transboundary pollution in the lower Great Lakes.
(http://www.experimentallakesarea.ca/ELA_Website.html)

APPENDIX C: Key Reference Documents

The following scientific and technical studies and policy analyses have been identified for use by the consultant conducting The Project. Additional studies and analyses may be drawn upon by the consultant. Where web links aren't provided below, electronic copies of the documents will be made available on disk by Environment Canada.

2007 **AGREEMENT REVIEW COMMITTEE: Report to the Great Lakes Binational Executive Committee: Volume 1** (http://binational.net/glwqa/v1_glwqareview_en.pdf)

This report by the Agreement Review Committee (ARC) was a synthesis of findings, results and recommendations from nine Review Working Groups and a governance and institutions workshop formed to review the 1972 Canada-U.S. Great Lakes Water Quality Agreement (the Agreement, as amended in 1978, 1983, and 1987). Review Working Group D focused on Phosphorus and Non-Point Source Pollution. The main findings of the review of Annex 3 (which was initially designed to minimize eutrophication problems in the Great Lakes by reducing phosphorus loads from multiple point and non-point sources, provides accountability, reporting, and monitoring for the total phosphorus loads to the Great Lakes) and Annex 13 (which was formulated to abate and reduce diffuse pollution from non-point sources that negatively impact the Great Lakes ecosystem) are reproduced in the following paragraphs.

“This Review Workgroup recommends that the Parties should consider adding to Annex 3 a nearshore algal surveillance program, [and] revision of the 1970’s models to reflect ecosystem structure and function change (role of invaders) that have occurred in the lakes. These revisions should result in a concerted research, monitoring and integrated modeling effort to quantitatively address nuisance algal conditions, including cladophora, in near-shore areas and nutrient depletion in open waters. The improved models should simulate system-level cause-effect relationships, i.e. the simultaneous low productivity and fish carrying capacity in the open water areas and nuisance algal bloom and mat formations in the nearshore areas of the lake. These models will provide more accurate predictions and if necessary, revised target phosphorus loads could then be developed on a watershed basis to address eutrophication problems in near-shore areas and bays resulting from tributary and wet weather loadings. This will require significant engagement by local governments to formulate local goals, objectives, programs, strategies and measures to address land use and growth impacts. As a result, a closer interface between Annex 3 and Annex 13 may be needed. The Great Lakes monitoring programs of the two countries should focus a larger percentage of monitoring efforts on the nearshore conditions in order to compare with the more traditional open-water conditions.

Annex 13 was formulated to abate and reduce diffuse pollution from non-point sources that negatively impact the Great Lakes ecosystem. Science on the subject was just emerging at the time the Annex was incorporated in the Great Lakes Water Quality Agreement as amended in 1987. Annex 13 was not reviewed in the 1999 review

process. Annex 13 lacks substantive goals and objectives to guide efforts towards reducing non-point source loading contributions to the Great Lakes. For instance, there are no binational criteria for what constitutes the minimum elements of a watershed plan at each scale appropriate for reporting. Moreover, there are no reduction targets, methods or monitoring programs defined to allow the evaluation of abatement and reduction in diffuse pollution. Although this Annex helped to stimulate development of Watershed Management Plans on a localized basis, there is no coordinated watershed tracking system among the various levels of government. Even more, no common definition of watershed Priority Hydrologic Units and no prioritization system exist. The workgroup experts positively agree that land management practices and land use have changed since the agreement was signed by the parties. However, it appears that local governments are typically responsible for designing and implementing land use regulations and controls so there is a disconnect between the entities responsible for implementing the Agreement and the entities with the authority to address land use challenges.

Annex 13 clearly needs to be refurbished. The group recommends a better name and a main objective: « Watershed management to control diffuse pollution ». Wetlands protection, enhancement and restoration merit a separate consideration, but may or may not be included in Annex 13. Clear goals and objectives have to be defined to control diffuse pollution and evaluate progress made through application of watershed management plans. The Parties should also coordinate reliable land use inventories that provide the status of land use abatement activities and how these activities contribute to attaining the goals and objectives to control diffuse pollution in the Great Lakes Basin. Coordination should be provided by the parties and defined in Annex 13 to allow involvement of all levels of governments and organizations to report on the efficiency of diffuse pollution abatement and reduction programs.”

2007

America’s North Coast: A Benefit-Cost Analysis of a Program to Protect and Restore the Great Lakes (Brookings)

([http://www.healthylakes.org/site_upload/upload/America s North Coast Report 07.pdf](http://www.healthylakes.org/site_upload/upload/America_s_North_Coast_Report_07.pdf))

This report contains a macro-economic study of the Great Lakes region and the relationship between environmental quality improvements and economic benefit. Claims regarding the benefits of enhanced environmental quality are made from an overall basin or regional perspective and may or may not apply to any particular locale or result from any particular environmental enhancement. Specific benefits that may or may not occur as a result of specific actions at specific locations must be determined through other, more targeted examinations. The study was based on methods of environmental restoration suggested by the Great Lakes Regional Collaboration in their report, The Great Lakes Regional Collaboration Strategy.

2009

Status of Nutrients in the Lake Erie Basin (U.S. EPA)

(http://www.epa.gov/lakeerie/erie_nutrient_2010.pdf)

Scientific information contained in the report Status of Nutrients in the Lake Erie Basin was current as of November 2008. The report was created to inform the Lake Erie

Lakewide Management Plan (LaMP) Work Group and to provide a “weight of Evidence” rationale for the Lake Erie Binational Nutrient Management Strategy.

30/07/2010 **Economic Value of Protecting the Great Lakes: Literature Review Report (Ontario Ministry of the Environment/Marbek and Infrometrica)**
(http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@subject/@greatlakes/documents/nativedocs/stdprod_086944.pdf)

This report provides a comprehensive review and synthesis of the literature relating to the economic benefits the Great Lakes provide to society. It provides a better understanding of the direct, indirect, option and non-use values associated with Great Lakes protection. The specific objectives were:

- To summarize relevant literature on the economic value of the goods and services provided by Great Lakes;
- To explain main stressors to the Great Lakes ecosystem, and therefore impacts on the goods and services provided;
- To discuss limitations and gaps of previous studies;
- To contextualize the value estimates by reviewing a select number of cost benefit analysis; and
- To summarize economic valuation data that will contribute to stage two of this project.

The report was concerned with the Ontario side of the Great Lakes. Because of its unifying framework (TEV), common method (economic valuation) and metric (dollars), this report lays the foundation for future cost benefit analyses.

2010 **Spatial Analysis of the Adoption of Nutrient Management Related Best Management Practices in Ontario, April 2005-March 2010 (Agriculture and Agri-Food Canada)**
(<http://www.ontariosoilcrop.org/en/resources/publications.htm>)

This report should be added to the list of resources as it is an analysis of best management practices for nutrient management and is based on data collected through the Canada-Ontario Farm Stewardship Program.

2010 **Economic Value of Protecting the Great Lakes: Rouge River Case Study for Nutrient Reduction and Nearshore Health Protection – Final Report (Ontario Ministry of the Environment/Marbek)**
(http://www.ene.gov.on.ca/stdprodconsume/groups/lr/@ene/@subject/@greatlakes/documents/nativedocs/stdprod_086943.pdf)

The objective of this study was to undertake an economic analysis that will provide a better understanding of the economic value to Ontario of reduced nutrient loadings and improved nearshore health of the Great Lakes. The *Rouge River Watershed: Scenario Modeling and Analysis Report* (2007) by the Toronto and Region Conservation Authority (TRCA) and other stakeholders, provided the basis for a case study of the costs and benefits of intervention strategies and relative land cover changes. The results from this

case study were extrapolated to the Golden Horseshoe region of Ontario and benefits for Lake Ontario were discussed.

2011 A Phosphorus Primer: Best Management Practices for Reducing Phosphorus from Agricultural Sources (Ontario Federation of Agriculture) (www.publications.serviceontario.ca)

This publication and a companion 2012 brochure titled, *Best Management Practices for Phosphorus*, contain information on the various forms of phosphorus and the chemical changes it can undergo in soil and water, as well as a range of BMPs that can ensure the optimal use and management of phosphorus. More detailed information on BMPs can be accessed in related documents, such as:

- Buffer Strips
- Controlling Soil Erosion on the Farm
- Cropland Drainage
- Managing Crop Nutrients
- Manure Management
- Nutrient Management Planning
- No-Till: Making it Work
- Soil Management

13/10/2011 State of Water Quality in the Grand River Watershed (Grand River Conservation Authority) (<http://www.grandriver.ca/governance/CW101188.pdf>)

This report summarizes the current assessment of the state of water quality in the Grand River and its major tributaries. The assessment is based on the technical report: “*Water Quality in the Grand River Watershed: Current Conditions and Trends (2003-2008)*” as well as more recent (2009-2010) monitoring data.

30/01/2012 Costs and Benefits of Instruments to Reduce Nutrients in the Lake Winnipeg Basin: Using an ecological goods and services approach - Synthesis Report (Environment Canada/Marbek)

06/02/2013 Phosphorus Loading and Concentration Recommendations from the Loading and Concentrations Subcommittee of the Ohio Phosphorus Task Force

This report makes recommendations on phosphorus loadings and concentrations for the Maumee River in Ohio based on the best available information and the subcommittee’s best scientific judgment. One of the most important recommendations is to use an adaptive management approach to address the phosphorus problem. As phosphorus reductions are managed to reduce/eliminate HABs, the subcommittee recommends continuing to review the targets in conjunction with HAB bloom events. This approach would require a robust monitoring program to measure progress toward loading and concentration targets and HAB reduction, and to allow annual evaluations and modifications of targets in the future, as needed. The goal of the study was to focus on the Maumee River and harmful algal blooms (HABs). By virtue of its location, its high

discharges and its high loads and concentrations of total and dissolved phosphorus, the subcommittee believes the Maumee River is the dominant driving factor for algal blooms in the Western Basin of Lake Erie. They believe that attainment of the proposed targets loads for the Maumee River would eliminate HABs, or significantly reduce HABs, in the Western Basin and Lake Erie as a whole. In their discussions they considered the following issues.

- Pros and cons of targets based on total and/or dissolved reactive P.
- Pros and cons of seasonal versus annual P loads.
- The maximum P load from the Maumee River that will not produce a HAB.
- The minimum P concentration required to produce a HAB or the maximum P concentration that will not produce a HAB.

2013 BMPs in Urban Areas (Environment Canada/GENIVAR)

This study provides information on the effectiveness of BMPs in urban areas in reducing phosphorus concentrations (as particulate and dissolved forms) in discharges to Lake Erie. It includes a description and assessment of the effectiveness of current urban BMPs in place in the Lake Erie watershed and in other areas, such as the Lake Simcoe and Lake Winnipeg watersheds. Technologies currently in place or under evaluation outside of Canada are described, and their application in the Lake Erie watershed is evaluated for future implementation. The study notes that a lack of information exists on the efficiency of urban BMPs, especially the on the mitigation of bioavailable phosphorus.

2013 Great Lakes Nutrient Initiative: Feasibility Study for a Conservation Effects Assessment for the Canadian Lake Erie Basin (Environment Canada/The Thomsen Corporation)

In the early 2000s, the United States established a Conservation Effects Assessment Project (CEAP) with the goals of establishing the scientific understanding of the effects of conservation practices at the watershed scale and estimating conservation impacts and benefits for reporting at national and regional levels. This document reports on the feasibility of a CEAP type assessment for the Canadian Lake Erie Basin, and the extent to which such an assessment can be conducted with the data available in Canada. The project included a review of models and approaches that have been and are being used to quantify effects of conservation practice effects on nutrient issues. The majority of current models have been developed for use in smaller and local watershed applications. The US CEAP tools have been expanded for use on a larger geographic basis.

The report notes that the level of detail that can be achieved for a Canadian CEAP assessment is determined by available data, specifically the map scale and intensity of soil survey coverage available for the area under consideration, and the compilation of installed conservation practices with associated geographic location and crop system and management. In their current form, these data collections enable only a very general and nongeographic specific CEAP assessment for Canada. Before a Canadian CEAP can be completed, it will be necessary to make decisions concerning the costs and benefits of expending additional resources to develop this data such that it can be used

to generate more detailed and specific information and analysis. The report sets out what is possible using existing data, as well as alternatives for more thorough data development and analysis, including estimates of the associated resources required. Decisions based on these costs and benefits will determine the degree to which a Canadian CEAP will be comparable to the US CEAP.

2013

Great Lakes Nutrient Initiative: Agricultural Phosphorus Management Beneficial Management Practice Review (Environment Canada/The Thomsen Corporation)

The purpose of this report was to provide Environment Canada with a review of existing agricultural Beneficial or Best Management Practices (BMPs) from the perspectives of phosphorus management and their resiliency under climate change. Environment Canada provided a preliminary list of BMPs which was reviewed against and augmented by other lists for Ontario and the United States, as well as the scientific literature. BMPs were reviewed for their effectiveness and resiliency under climate change.

Climate change scenarios for use in the Grand River Water Management Plan (GRWMP) were reviewed to identify representative scenarios to assess the BMPs. For practical evaluation purposes, the GRWMP scenarios were reduced to two major components including a winter scenario of less snow and more rain and melt periods; and a summer scenario of higher temperatures and greater drought stress. Consideration was also given to changes in agricultural management associated with possible climate change. BMPs were evaluated for their resiliency in two major steps. In a first step, BMPs were assessed based on information derived from the scientific literature and practical Ontario experience. In a second step, the BMPs and preliminary assessment were reviewed and tested at a one day workshop involving researchers and representatives of government agencies, Conservation Authorities, and the farm community. Forty-six BMPs were evaluated for effectiveness and resiliency to climate change.

16/04/2013

Great Lakes Commission and USDA-NRCS launch innovative phosphorus trading program (<http://glc.org/announce/2013-04-glc-usda-nrcs-pttrade/>)

To help alleviate high nutrient levels and algal blooms, a phosphorus credit trading program for the Lower Fox River watershed in Wisconsin will be developed under a partnership between the Great Lakes Commission (GLC) and the U.S. Department of Agriculture Natural Resources Conservation Service (USDA-NRCS).

Funded through USDA-NRCS Great Lakes Restoration Initiative (GLRI) funds, the phosphorus credit trading program in the Lower Fox River area is seen as a cost-effective approach to achieve water quality goals and increase overall environmental and economic benefits. For example, it may be more cost effective for a point source, such as a sewage treatment plant, to pay for a credit to reduce pollution from urban or rural runoff sources than to install extremely expensive equipment to treat end-of-pipe discharges.

The project is expected to foster and support voluntary conservation action by private landowners to protect and restore priority watersheds within the Great Lakes basin. It also addresses issues in one of the priority watersheds identified by the GLRI. The Fox

River has been designated by the Wisconsin Dept. of Natural Resources as impaired under the U.S. Clean Water Act.

2013 Taking Action on Lake Erie: IJC Science Advisory Board TAcLE Work Group Science Summary Report (Prepared as part of the Lake Erie Ecosystem Priority)

This comprehensive report was prepared as part of the Lake Erie ecosystem priority. It contains an assessment of the current status and threats to Lake Erie, the effectiveness of current management measures, and the potential impacts of climate change. Data/information/analysis is presented on current and external phosphorus loads, as well as the effects of agricultural and urban best management practices (BMPs) on total P and SRP loads to Lake Erie. Modelling of lake parameters in relation to nutrient loading in Lake Erie is provided. Cost and effectiveness data/information is presented for a range of measures.

**2013 Assessment of Life Cycle Costs for Low Impact Development Stormwater Management Practices (Toronto and Region Conservation Authority and University of Toronto)
<http://step.trca.info/wp/wp-content/uploads/2013/05/LID-LCC-final-2013.pdf>**

This project evaluates the capital and life cycle costs of Low Impact Development (LID) practices over a 50 year time horizon based on a detailed assessment of local input costs, maintenance requirements, rehabilitation costs and design scenarios relevant to Canadian climates. The LID practices evaluated include bioretention cells, permeable pavement, infiltration trenches and chambers, enhanced swales, rainwater harvesting and green roofs. Dry swales and perforated pipe systems were considered to be similar to bioretention and infiltration trenches, respectively, and therefore were not evaluated as separate practices. The savings from LID approaches associated with improved aesthetics, air quality, community livability and other public benefits were not assessed, as these savings are best evaluated in relation to specific case study examples.

A spreadsheet decision support tool based on the cost calculations gathered during this study was developed to assist industry professionals calculate the initial capital and life cycle costs of site specific LID practice designs. The tool provides users with a more comprehensive understanding of all relevant costs, facilitates cost comparisons, and allows users to optimize proposed designs based on both performance and cost. The tool is available free of charge on the Toronto and Region Conservation's Sustainable Technologies Evaluation Program website.

10/05/2013 Great Lakes Nutrient Initiative: Best Management Practices for Urban Areas to Manage Phosphorus – Policy, Programs & Legislative Review (Environment Canada/Hutchison Environmental Sciences Ltd.)

This report provides a review of existing regulatory and voluntary policies, programs and legislation (PPL) related to reducing inputs of phosphorus to Lake Erie from urban and rural communities. The review conducted here lists those PPLs within the Canadian and U.S.A. portions of the Lake Erie watershed that reduce sources of phosphorus in several PPL categories:

- Urban sanitary systems (including combined sewer overflows),

- Urban stormwater, residential unsewered systems,
- Watersheds in general including urban watersheds (dust, fertilizer, etc.).
- Regional Municipal sources
- Combined Sewer Overflows
- Low Impact Development (LID)

The report considers the actors involved with each PPL and decisions that both affect the PPL and are affected by them. It reviews relevant policies that could be applied from other Great Lakes jurisdictions and outlines several case studies for phosphorus control programs that have been implemented in other areas. It also analyzes current regulatory or program gaps and recommends forward-looking tools that may be required for future management. The study notes that the most conspicuous need is for tools and programs to measure loadings of phosphorus to Lake Erie from non-point sources and to document the effectiveness of BMPs and LID techniques at reducing loadings.

23/05/2013 **Benefit/Cost Analysis of Phosphorus Management Alternatives: Grand River Watershed (Environment Canada/DSS Management Consultants Inc.)**

This study focuses on developing a systematic, comprehensive and rigorous framework for forecasting the benefits and costs of phosphorus (P) management alternatives within the Grand River watershed. This forecasting framework, referred to as the Phosphorus Management Decision Support System (PMDSS), includes benefits associated with both market and nonmarket goods and services that are supplied by the Grand River ecosystem. The well-established principles of benefit/cost analysis (BCA) guided the development of the PMDSS. However, the PMDSS goes beyond standard BCA requirements and forecasts how the benefits and costs of P management are distributed among different interests/stakeholders. The PMDSS was developed specifically for the Grand River watershed, but the core structure is generic and readily applicable to other watersheds in which P management alternatives are being considered. Benefits and costs are forecast over an extended planning horizon. Twenty years was used for the Grand River watershed analysis.

28/06/2013 **Lake Simcoe Region Conservation Authority, Board of Directors Meeting Minutes (http://www.lsrca.on.ca/pdf/board/minutes_2013_jun.pdf)**

General Manager, Watershed Management, Michael Walters, updated the Board members regarding the Showcasing Water Innovation: Water Quality Trading for Phosphorus Reduction in the Lake Simcoe Watershed study, a program introduced by the Ministry of the Environment (MOE) in April 2011. In December 2012, the Authority was successful in obtaining \$600,000 of provincial funding to develop a program for water quality trading for phosphorus reduction. In response to questions raised by the Board members, Mr. Walters explained that the study is proceeding on time, on budget, and a report is scheduled for completion in March 2014. A one-year pilot project is planned for 2014 contingent on MOE's approval of the program.

2013 **A Report of the Great Lakes Water Quality Board and Great Lakes Science Advisory Board to the International Joint Commission: Great Lakes Ecosystem Indicators –**

Summary Report: The Few That Tell Us The Most

http://www.ijc.org/files/publications/Summary%20Report_Eco%20Indicators_2013.pdf

The focus of this work was to identify a limited number of ecosystem indicators especially important to the health of the Great Lakes basin ecosystem and which tell us the most about it. Extensive work has been done over the years to measure the condition of the Lakes as part of the State of the Lakes Ecosystem Conference (SOLEC), and this work forms the basis for many of the indicators. The primary objective was to identify indicators that can be used to characterize the condition of the resource and the progress in protecting, restoring, and conserving it, as opposed to identifying what is causing the problems or what the responses to them are accomplishing. As time passes and knowledge expands, it may become evident that some previously unidentified indicators are more important, and current ones tracked are less important. Regular reviews and flexibility in the system to allow for such changes are recommended. At the same time, continuity of indicators over the years is important for tracking long term trends in the Great Lakes.

- 2013** **Lake Erie Ecosystem Priority: Scientific Findings and Policy – Recommendations to Reduce Nutrient Loadings and Harmful Algal Blooms (Draft Summary Report) (IJC Great Lakes Science Advisory Board)**
<http://www.ijc.org/files/tinymce/uploaded/Draft%20LEEP-Aug29Final.pdf>

In 2011, Lake Erie experienced its largest algal bloom in history. In 2012, the International Joint Commission (Commission) established the Lake Erie Ecosystem Priority (LEEP) in response to a growing challenge: lake-wide changes in Lake Erie related to problems of phosphorous enrichment from both rural and urban sources, compounded by the influence of climate change and aquatic invasive species. These changes have resulted in impaired water quality, with impacts on ecosystem health, drinking water supplies, fisheries, recreation and tourism, and property values. This Summary Report presents the Commission’s key findings and recommendations from the LEEP study. **[The final report was due in October 2013. Is it available yet?]**

- 28/11/2013** **Understanding the Complexity of Urban Phosphorus Flows and Eutrophication in Lake Erie – Using Fuzzy Cognitive Maps to Tap into Diverse Expertise (Brad Bass, Environment Canada)**

This draft slide deck discusses phosphorus loads to Lake Erie and uses cognitive mapping to translate knowledge and experience of complex systems into causal links between phenomena such as the urban land-eutrophication linkage.

- 2013** **Great Lakes Nutrient Initiative: 2012-2103 Annual Report (and year 2 outlook) – November 2013 revision (Environment Canada)**

This report shows the specific activities, outputs, and outcomes expected for each of the five priority areas of the GLNI.

- 2013** **Ohio Lake Erie Phosphorus Task Force II Final Report**

http://www.epa.state.oh.us/portals/35/lakeerie/ptaskforce2/Task_Force_Report_October_2013.pdf

Shortly after the 2010 publication of the *Ohio Lake Erie Phosphorus Task Force Final Report*, (Phase I) new information was becoming available and the conversation about nutrient management was broadening to include more stakeholders with additional areas of expertise. A wide range of participants in a variety of disciplines, including members of the original Ohio Lake Erie Phosphorus Task Force, agri-business representatives and crop consultants came together to build upon the findings of the 2010 Phosphorus Task Force report and assess new information.

The purpose of Phosphorus Task Force Phase II is to 1) develop reduction targets for total and dissolved reactive phosphorus that can be used to track future progress, and 2) develop policy and management recommendations based upon new and emerging data and information. The science of phosphorus movement and the factors affecting that movement is evolving. With increased attention to nutrient impacts to water bodies recent research and programmatic developments have been focused on addressing these issues. Phase II of the Ohio Lake Erie Phosphorus Task Force incorporates findings of current research results, develops a broader consensus on the management actions necessary to decrease algae blooms in the Lake Erie and proposes new recommendations. The recommendations in this report reflect the Task Force members' mutual agreement on key issues based on the science and data currently available. As additional research data and results from program implementation become available, the Task Force expects that recommendations for action will evolve over time.

31/03/2014 Great Lakes Nutrient Initiative: Agricultural Demographic & Landuse Scenarios in the Lake Erie Basin (Environment Canada/WhatIf? Technologies Inc.)

The goal of this study is to understand potential changes in demographic drivers agricultural practice that can impact phosphorus loadings into Lake Erie and its surrounding tributaries in the absence of any policies and programs specific to nutrient management. The specific objectives to meet this goal are:

- Understand the link between demographic changes and available agricultural land
- Understand the links between land use, agricultural activities and the fate of phosphorus

Project deliverables include:

- Rural land use scenarios by land use type (e.g. rural residential, cropland, other non-agricultural uses) driven by population and other variables.
- Cropland scenarios by crop type (e.g. corn, soybean, grass, etc.)
- Rural nutrient point source scenarios by point source type (dairy operations, feedlots, greenhouses, etc.)
- Phosphorus application on cropland scenarios by crop type (and if possible by soil type)
- Disposition of phosphorus based on predominant soil type and cropping choice

31/03/2014 Great Lakes Nutrient Initiative: Municipal Demographic & Landuse Scenarios in the Lake Erie Basin (Environment Canada/Hemson Consulting Ltd.)

The goal of this study is to understand potential changes in urban drivers that can increase phosphorus loadings into Lake Erie and its surrounding tributaries in the absence of any policies and programs. The specific objectives to meet this goal are:

- Understand the link between demographic changes and employment
- Understand the link between demographic changes and urban landuse
- Understand development pressures in smaller communities along the Lake Erie shore

Project deliverables include:

- Demographic, housing and employment scenarios for all upper single and lower tier municipalities including settlement areas within local municipalities
 - Employment will be broken down into retail, office, employment land and rural/other categories
 - Employment land uses include all those activities that segregated land uses in urban areas
 - Expected infrastructure investments or gaps that would affect growth
- Link between demand for housing and landuse change in urban areas, specifically the growth in urban areas and the increase in urban land areas, including the breakdown between impervious and urbanized, managed green space such as lawns and parks. Identify any environmental and infrastructural constraints to growth by county
- Link between employment and landuse change including the growth/decline in employment lands and employment land activities. Identify any environmental and infrastructural constraints to growth by county
- Expected development pressures that would result in increased urbanization, especially along the Lake.
- Scenarios will be provided for low, medium and high levels of growth indicating the key parameters that would engender a shift between scenarios

31/03/2014 Great Lakes Nutrient Initiative: Urban Phosphorus Inventory in the Lake Erie Basin: Data Sources and Estimation Methods (Environment Canada/Shawn P. McElmurry, Assistant Professor, Wayne State University)

The goal of this study is to provide recommendation on compiling an urban phosphorus inventory in the Lake Erie Basin. The specific objectives to meet this goal are:

- To identify available point and non-point source data from urban and rural non-farm areas in the Province of Ontario and the States of Indiana, Michigan, New York, Ohio and Pennsylvania
- To review approaches to estimate phosphorus in the absence of point-source and non-point source data
- To provide recommendations for using data and estimation methods in compiling an urban phosphorus inventory in the Lake Erie Basin

This review will address the following questions:

- What point and non-point source data from urban and rural non-farm areas in the Province of Ontario and the States of Indiana, Michigan, New York, Ohio and Pennsylvania
- What are the assumptions, uncertainties or caveats that affect the analysis and interpretation of the data and accepted methods for analysis and interpretation of these available data
- What approaches are available to estimate phosphorus in the absence of point-source and non-point source data, focusing as much as possible on methods that can be implemented without specialized software or hardware
- What other data or information are required, and how would these data be obtained and used with any recommended estimation method
- What are the critical assumptions and/or caveats with any recommended approach
- Can legacy phosphorus be accounted for in this inventory?
- What are the appropriate spatial and temporal scales for each technology?
- How might the consideration of climate change scenarios affect the analysis?

31/03/2014 Grand River Watershed Case Study: A Cost-Benefit Analysis of Improved Phosphorus Management Using an Ecological Goods and Services Approach (Environment Canada/DSS)

The project purpose is to augment the functionality of the Grand River Watershed Phosphorus Management Decision Support System (PMDSS) through the addition of biophysical routines, urban non-point source phosphorus, marginal benefit and cost curves and other routines to handle uncertainty. The specific objectives of this study are:

- To improve the functionality of the Grand River Watershed PMDSS through the addition of the following model components:
 - Biophysical routines and parameters for non-point source pollutants from agriculture
 - Demand curves and valuation of recreation and angling in the Grand River
 - Estimates of uncertainty
 - Urban non-point sources of phosphorus
 - Phosphorus management practices for urban areas and modify agricultural management options
 - Biophysical routines and parameters for point sources of phosphorus (Waste Water Treatment Plants and Soluble Reactive Phosphorus)
 - Modify the beneficiaries in the model

Project deliverables include:

- Improve description of the overall effectiveness of NPS phosphorus management techniques through the addition of
 - Relationship between phosphorus in the soil and crop productivity
 - Interaction between non-point source management techniques
 - Non-point source management techniques parameters
- Point source parameters
 - Waste water treatment plant parameters

- Soluble reactive phosphorus ratios
- Demand curves and valuation of recreation and angling reflecting changes in user patterns with changes in water quality
- Urban non-point sources of phosphorus
 - Phosphorus export via stormwater runoff from urban land uses
 - Management techniques for reducing phosphorus export including the cost function
- Add an additional beneficiary in the Grand River Watershed
- Monte Carlo Routine and ranges of uncertainty
- Provide a runtime version of the PMDSS.

APPENDIX D: Stakeholder Consultations/Engagements

The **Lake Erie Binational Nutrient Management Strategy (2011)** states that:

“Achieving the goals of the Lake Erie Binational Nutrient Management Strategy is essential for the successful restoration of Lake Erie and depends on a renewed commitment from LaMP partners. Accordingly, partnerships will be critical to the achievement of results, and require the dedication and participation of those responsible for improving water quality in the Lake Erie basin.

Partners that will play a key role in implementing nutrient management actions include:

- Canadian and U.S. federal, state and provincial governments
- Towns, cities and counties in the Lake Erie basin
- Conservation authorities as well as watershed and environmental organizations involved in lake-specific issues
- Industry, businesses, farmers, developers and landowners in the Lake Erie basin
- Academia”

Consultations/Engagements Summary:

The following list identifies consultations/engagements that have been held (or are proposed to be held) in which governments and LaMP “partners” have participated.

Examples of consultations/engagements:

1. Science-related consultations

- Great Lakes Climate Change and Policy Workshop (2009) – held in Burlington and had approximately 50 representatives from fed. and prov. gov’ts, CAs, universities and the private sector.
- LEEP – Science Synthesis Workshop (Feb. 2013)
- Lake Erie Millennium Network (a bi-national science network)
- January 2014 – Annex Implementation: Objectives and Targets Workshop
- Future – Lake Erie Millennium Network (LEMN)
- 2014 – Cooperative Science and Monitoring Initiative (CSMI) field year in 2014 (ref. CSMI Steering Committee)

2. Key stakeholder consultations/engagements

- Lake Erie [LaMP] Forum (2008 Forum Vision)
- Various LaMP forums/workshops/meetings
- Great Lakes-St. Lawrence Cities Initiative [**Contact: Nicola Crawhall - on how to engage smaller communities on the north shore of Lake Erie (esp. ones that are highly impacted by nutrients-related problems)**]
- Lake St. Clair Watershed Coordination Council (binational, formed in 2002; reference made to a 2011 Canadian Work Plan)

- 2013 State of the Straight binational conference (October 2013) – held every two years, with a focus on the Detroit River and Western Lake Erie
- Conservation Authorities (nine in the Lake Erie watershed – get list)
- Protected areas agencies – Parks Canada, Canadian Wildlife Service, provincial agencies (MNR/provincial parks, etc.) – e.g., Pelee, Long Point, and Rondeau are all highly managed areas
- Ontario Soil and Crop Improvement Association
- Thames River Clear Water Revival
- Grand River and Thames River Water Management Plans (consultation processes)
- Ontario Great Lakes Strategy (ref. Great Lakes Engagement Meetings Summary, July 17, 2009) – also fits under 3.
- 2014 – Binational Lake St. Clair (LSC) conference to be hosted by Canada – also fits under 3.

3. Broad public consultations

- Haldimand County Landscape Action Plan – Community Engagement Process – also fits under 2.
- LEEP – 2012 round tables and public meetings – Note: LEEP runs from 2012-2015 (<http://ijc/boards/leep/>)
- Ontario Great Lakes Strategy (ref. Great Lakes Engagement Meetings Summary, July 17, 2009)
- 2014 – Binational Lake St. Clair (LSC) conference to be hosted by Canada

An example of a significant multi-stakeholder and public engagement on developing The Great Lakes Strategy by the Province of Ontario is presented below. It is followed by an example of stakeholder and public engagement in the development of the Haldimand County Landscape Action Plan. Finally, an example of small group and one-on-one stakeholder engagement on an Analysis of Historical Lake Erie Phosphorus Management Processes is presented. Selected information is extracted from reports that will be made available to consultants bidding on The Project.

Selected extracts from: Great Lakes Engagement Meetings Summary (July 17, 2009)

Note: This document was prepared as a summary of what the province [Ontario] heard from participants during April and May 2009 Great Lakes Engagement Meetings. It does not represent the formal position of the province, but reflects the province’s best efforts to provide a record of discussion and was provided as a public service to interested parties and individuals. Any misrepresentations, errors or omissions were unintentional.

Introduction

In April and early May of 2009, the ministries of Environment, Natural Resources, and Agriculture, Food and Rural Affairs held Great Lakes engagement meetings with invited representatives of a broad range of organizations and other interested individuals. Lake-by-lake basis were followed by a meeting with a basin-wide focus. The dates and locations of these meetings were as follows:

Meeting	Location	Date
Lake Ontario	Kingston	April 3 rd
Lake Erie	London	April 6 th
Lake Huron	Goderich	April 20 th
Lake Superior	Thunder Bay	April 21 st

Feedback on draft goals and strategies for Ontario with respect to Great Lakes protection and restoration were elicited through plenary discussions and breakout group work. In the first half of the day, participants provided introductions and the one project, program or change that they would like to see happen in the future. A presentation was provided by the host ministries to provide relevant background and introduce the draft goals and strategies. A high-level plenary discussion followed where participants provided their assessment of effectiveness of the goals and strategies. In the afternoon, a second presentation by the host ministries was provided that described current actions and possible future actions that the province has or could take to implement the draft strategies. Break out groups based on the nine strategies followed the presentation, with participants providing feedback on possible improvements and priorities for action on each strategy. The meetings were wrapped up with a final plenary session where participants provided brief summaries of key themes and ideas that they heard during the meeting.

Part One: Summary of Common Themes

The following are common themes that arose at several of the meetings. Many of these discussions were held in the early plenary portion of meetings that assessed what participants liked or thought was missing from the draft goals and strategies, as well as the actions they saw were necessary to implement them.

- In all of the meetings, there were generally strong levels of attendance and enthusiastic participation. While some participants expressed a sense of frustration with the high-level nature of the discussions, participants at each of the sessions expressed gratitude to the province and the three ministries for coming out with the discussion paper to discuss goals and strategies.
- A key message from participants was that this process must result in action – similar initiatives have taken place elsewhere in the basin that have produced similar information. This would be a waste of resources if it didn't result in concrete actions.
 - There is an expectation that this input will be used to influence COA, GLWQA and other upcoming initiatives.
- The goals and strategies were seen as positive because they:
 - Are broad and inclusive of the broad array of challenges in the Great Lakes Basin
 - Include and integrate environmental, social and economic considerations
 - Have the potential to turn into concrete actions
 - There is a focus on watersheds and lake basins and connections between activity on the land and the health of the lakes
 - Recognize that multiple jurisdictions are responsible for the lakes
- Suggestions to improve the goals and strategies focused on:
 - Moving from motherhood statements into greater detail
 - Providing specifics around how the goals and strategies will be met
 - Establishing specific budgets, timelines and targets
 - Mapping out how implementation success will be measured
- Participants pointed to the fact that because the Great Lakes are so big and so diverse in terms of both natural ecosystems and human communities, there are unique issues that need to be dealt with for each lake and for each watershed. Blanket approaches to challenges are not appropriate in many cases. Lake-wide and watershed-based planning is required where

nearshore and coastal areas are considered and where emphasis is placed on the protection of headwaters.

- There were comments at several meetings that suggested there is a need to assess and improve Great Lakes governance. Particularly at the Basin-Wide meeting, suggestions were provided by meeting participants that reflected the need for:
 - Increased transparency and accountability
 - Simplification and renewal of Great Lakes governance structures
 - Employment of a governance structure that emphasizes coordination between multiples scales (E.g., basin, lake, region, watershed)
 - Increased funding for broader stakeholder involvement in Great Lakes issues
 - Involvement of a broader cross section of Ontario ministries to address Great Lakes issues
- Some comments suggested that key agreements focus extensively on the binational or federal-provincial levels while municipalities are not formally a part of such agreements. Local government and organizations need to have a greater role to address localized issues. While local approaches are needed, there are also significant role for the provincial and federal government to play, particular on basin-wide and binational issues.
- Ecosystem resilience was generally recognized as a positive point of emphasis in the goals and strategies. However, it was noted by some as a potential compromise if we leave it to the ecosystem to adjust to human-induced impacts. It could be seen as implying more of a passive rather than proactive role.
- Participants were pleased to see that the three ministries are working in a united fashion and that 13 ministries had been involved in the development of the goals and strategies. Comments suggested that this interministerial approach would be critical to addressing the broad range of issues that have been targeted in the strategies.
- The need for an education, outreach and communications strategy was a clear theme that emerged in all meetings. Some common elements that emerged include:
 - All other strategies would stand to benefit from the success of such an initiative as a bottom-up and grassroots approach that could yield behavioral and attitudinal changes among Great Lakes Basin residents.
 - There is a distinct role for senior levels of government to play in establishing messaging and communications strategies while working with municipalities, Conservation Authorities and others to delivering them.
 - Education needs to target youth in particular through grade school and high school curricula. The Ministry of Education should be involved to ensure that curricula reflect this need.
 - There are co-benefits with tourism around awareness of the Great Lakes. The Ministry of Tourism should be involved in these discussions.
- In discussions of the need for education and awareness of Great Lakes issues, participants at several meetings suggested that somehow accounting for the economic valuation of the ecological goods and services of the Great Lakes and the ways they support every aspect of our economy is critical.
- There is a shared concern among participants that what we do on the land has significant impacts on the lakes. The following issues were discussed:
 - There is a need to move up the tributaries to address issues going on throughout the watersheds of the Great Lakes.

- This also includes groundwater sources and drainage areas within watersheds. Groundwater should be included in any definition of the Great Lakes System.
- Investing in green infrastructure and low impact development is seen as an important part of lessening the impacts of urban and agricultural development within watersheds.
- Some participants called for greater focus on nutrient management within the strategies.
- There is a strong need to have a broad range of municipalities, Aboriginal communities, the ENGO's, local organizations, lake and watershed committees, conservation authorities, industry and others on board. Any approach to taking action must address the need for ongoing, broad engagement and collaboration. In part, this depends on sustained funding to support longer term programs and initiatives.
- Many participants in the meetings discussed the need for coordination among those acting to protect and restore the Great Lakes. Comments suggested that there are many groups working on various projects and programs, but that these actions are for the most part isolated from what goes on elsewhere on a particular lake and across the Basin. Participants identified several areas for greater coordination for the more efficient use of resources:
 - Organizations, agencies and institutional arrangements
 - Scientific research and monitoring
 - Capital programs and funding
 - Education, communications and stewardship programs
 - Policy, legislation and regulations
 - Because the Great Lakes require such broad based action to raise awareness and incite action, a political champion or champions are needed at the highest levels to drive action from the bottom-up at the grassroots level. The Premier and Prime Minister were cited as potential candidates for taking on such a role. Other individuals with decision-making and resource-allocating and decision-making ability need to be brought on board to address current challenges.
 - There is a sense that in the U.S., with recent budget announcements for Great Lakes restoration by the Obama Administration and following from the work of the Great Lakes Regional collaboration (GLRC), that activity is proceeding at a grander scale and quicker pace on the U.S. side of the border. At several meetings, participants said that we need a GLRC type of initiative and an increase in funding to bring together many of the various groups and organizations involved in some way in Great Lakes protection and restoration. Effective lobbying at events such as Great Lakes Days was also discussed.
 - The ministries also heard there is a need to recognize and celebrate some of the good work and successes that we have seen in the past. This will help energize and create community among those acting to protect and restore the Great Lakes. Doom and gloom is not an effective way to communicate and entice action.
- Participants at each meeting highlighted the need to get AOCs cleaned up and RAPs completed so we can show progress, celebrate success and move on to other challenges. Some expressed fear that mechanisms for local collaborative effort on environmental issues in these areas might be eroded if they were no longer a part of the RAP process. There is a need to sustain engagement and local activity as environmental protection requires ongoing commitments.
- Wastewater management, including both stormwater and combined sewer overflows, was highlighted at each of the sessions as an area of investment with perhaps the greatest payoffs in terms of environmental improvements for the lakes. Local government representatives

suggested the need for senior government funding leadership in this area given the intense capital requirements associated with wastewater infrastructure improvements.

- Meeting participants called for greater involvement of groups not adequately represented at the lake meetings, including Aboriginal peoples and industry representatives.

Part Two: Lake-Specific Themes

At each of the lake-by-lake and basin-wide meetings, there emerged several unique areas of emphasis. In some cases, themes were shared in several of the meetings with many similarities. While these are mostly captured in Part One, portions of discussions that distinguished one meeting from another are highlighted below. [Note: Only discussions related to Lake Erie are shown below.]

Lake Erie

- Impatience was more apparent at this meeting than others with participants criticizing and scrutinizing more intensely the high-level nature of the goals and strategies statements. There were comments that the tools and mechanisms are in place, that what is really needed is just to get on with funding the projects and focusing on the completing actions and on-the-ground initiatives. There was a comment that the government doesn't appear to be building on past experience and that there is much to learn from programs and experiences from the past.
- Feedback at the meeting suggests there is skepticism in the farming community about potential government policies that result in increased regulatory burden and fail to support the needs of farmers. The farming community advocated that it plays a key role in environmental protection but needs to be engaged in a way that recognizes the value of the services they provide and the contribution made to local economies and the economy of the Great Lakes Basin. There were several comments on the need to have a long term program on providing payments to farmers for ecological goods and services and that the a program such as the Alternative Land Use System (ALUS) could be a model. Several comments suggested a need to take agriculture and food production more seriously and that water management can't be isolated from land management issues.
- Local stewardship committee representatives identified the important role that private land stewardship could play in mitigating and managing impacts to Lake Erie.
- Participants at this meeting were particularly interested in discussing the inclusion of goals and strategies related to economic development and specifically on renewable energy projects.
 - There was much discussion on the recently proposed *Green Energy and Green Economy Act* and what it would mean for residents of the Basin.
 - Participants focused on what could actually be manufactured and developed in Ontario, like the auto sector which is currently in decline but had requirements around Canadian content.
 - There is a need to be careful about increasing regulatory burdens and being realistic about what we can achieve in the Great Lakes Basin – we can't just reinvent the economy in the region although we do want to compete with others moving towards renewables and green technologies.
 - There was emphasis on making the Great Lakes region one where people want to live and raise families.
- On the need for education and outreach, a common theme to all the meetings, a point was raised on the importance of educating the public on issues related to technology such as wind farms and renewable energy. Once participant suggested there was a need for a partnership with municipalities and industry on this.

- Nutrient management along key waterways such as the Thames, Grand and Detroit Rivers was identified as an outstanding concern.

Appendix A: Participating Organizations

<i>In addition to host ministries (Natural Resources, Environment, and Agriculture, Food and Rural Affairs), representatives from the following organizations were in attendance at Great Lakes engagement meetings: AgCare</i>
Agriculture and Agrifood Canada
Algoma University College
Alliance of Ontario Food Producers
Alternative Land Use Services
Amherstburg Committee on the Environment
Ashfield Colborne Lakefront Association
Ausable Bayfield Conservation Authority
B.M. Ross & Associates
Bait Association of Ontario
Bay of Quinte RAP
Bird Studies Canada
Black Bay Fish and Game Club
Bluewater Shores Ratepayers Association
Bruce Beach Association
Building and Industry Land Development Association
Canadian Association of Physicians for the Environment
Canadian Consulate in Detroit
Canadian Environmental Law Association (CELA)
Canadian Federation of University Women
Canadian Institute for Environmental Law and Policy
Canadian Shipowners Association
Canadian Water Quality Association
Carolinian Canada
Cataraqui Region Conservation Authority
Cataraqui Source Protection Committee
Catfish Creek Conservation Authority
Centre for Engineering and Public Policy
Citizen's Environmental Alliance
City of Thunder Bay
City of Toronto - Toronto Water
Toronto and Region Remedial Action Plan
Coalition on the Niagara Escarpment
Collaborative Study to Protection Lake Ontario Drinking Water
Conservation Ontario
Cornwall Remedial Action Plan
County of Huron
CTC Source Protection Committee
CTC Source Protection Region
Fisheries and Oceans Canada

Dillon Consulting
Ducks Unlimited Canada
Durham Region Environmental Services
Ecojustice
EcoSuperior
Environment Canada
Environmental Defence
Essex Region Conservation Authority
Essex Region Source Protection Area
Federation of Ontario Cottagers' Association
FedNor (Industry Canada)
Flowers Canada
Friends of Sauble Beach
Georgian Bay Association
Georgian Bay Land Trust
Grand Bend Rotary
Grand River Conservation Authority
Great Lakes Fishery Commission
Great Lakes Institute for Environmental Research
Great Lakes St Lawrence Cities Initiative
Great Lakes United
Grey Sauble Conservation
Halton Region CA
Health Canada
Huron County Health Unit
Huron County Planning Department
Huron Farm Environmental Coalition
Kettle Creek Conservation Authority
Lake Huron Centre for Coastal Conservation
Lake Manitou Cottage Association
Lake Superior Binational Forum
Lake Superior Conservancy and Watershed Council
Lake Superior National Marine Conservation Area
Lakefront Utilities Corporation - Cobourg
Lakehead Region Conservation Authority
Lakehead Source Water Protection Committee
Lake Superior Binational Forum
Lakehead University
Land Improvement Contractors of Ontario
Long Point Waterfowl Wetlands Research Fund
Lower Trent Conservation Authority
Loyalist Township
Lura Consulting
Lurgan Beach Association
Manitoulin Streams
Marine Museum of the Great Lakes at Kingston
McMaster University
Middlesex Stewardship Council
Mississippi Valley Conservation Authority

Municipality of Huron-Kinloss
Municipality of Leamington
Municipality of Port Hope
Municipality of South Huron
Municipality of Trent Hills
Municipality of Port Hope
Nature Conservancy of Canada
Neebing Township
Newalta Corporation
Niagara Peninsula Source Protection Committee
Northumberland Stewardship Council
Northwestern Ontario Sportsmen's Alliance
Nottawasaga Valley Conservation Authority
Ontario Commercial Fisheries Association
Ontario Farm Animal Council
Ontario Farm Environmental Coalition
Ontario Federation of Agriculture
Ontario Federation of Anglers and Hunters
Ontario Fruit and Vegetable Growers Association
Ontario Groundwater Association
Ontario Live Bait Angling Association
Ontario Municipal Water Association
Ontario Parks
Ontario Pork Producers
Ontario Soil & Crop Improvement Association
Ontario Stewardship
Ontario Trillium Foundation
Ontario Veterinary College
Parks Canada
Peel Public Health
Perth Stewardship Network
Peterborough County Stewardship Council
Pine River Watershed Improvement Network
Pollution Probe
Prince Edward Stewardship Council
Queen's University
Region of Peel
Sarnia Lambton Environmental Association
Saugeen, Grey Sauble, Northern Bruce Peninsula Source Protection Committee
Sault Ste. Marie Source Protection Area
Severn Sound Environmental Association
St. Clair Township
St. Clair Region Conservation Authority
St. Lawrence Institute of Environmental Sciences
Stewardship Oxford
The Blue Mountains
The Salamander Foundation
Thunder Bay District Health Unit
Thunder Bay Salmon Association

Toronto and Region Conservation Authority
Toronto Zoo
Town of Goderich
Town of LaSalle
Town of Parry Sound
Township of Puslinch
Township of the Archipelago
Trout Unlimited Canada
Upper Thames Region Conservation Authority
Wallaceburg Advisory Team for a Cleaner Habitat
Waterloo Stewardship Network
Wildlands League

An example of a significant multi-stakeholder and public engagement by Haldimand County is briefly presented below:

Selected Extracts from: Haldimand County Landscape Action Plan (November 11, 2011)

Developing a successful Landscape Action Plan for the Haldimand Lakeshore Area required that the community be engaged from the beginning. The iterative process was equally as important as the product that has emerged.

From its inception, the approach to the project was deeply rooted in promoting total inclusion and engaging members of the community in productive dialogue. The process was premised on an ‘inclusive approach’ that fosters a sense of community ownership and civic pride. The community has shown a great deal of interest from the beginning of the process, with between 30 and 75 community members coming out to attend the first community meetings held on September 1st and 2nd, 2010 in Dunnville, Selkirk and Cayuga. Since the outset, the process has continued to engage stakeholders in an evolutionary way.

Information secured from the community formed the basis for the analytical work completed by the Consulting Team. Throughout the process, information was shared, ideas were obtained and challenges were understood. Guiding principles and fundamental design elements emerged from the community through a number of community listening sessions and open houses.

The community engagement process ran from August 2010 to June 2011. At the outset, the process involved information and data gathering. The second phase involved community input into the design of the plan and at each phase, the process was iterative with members of the team reporting back to the community to ensure that their input was accurately interpreted and community ideas offered a basis for moving forward.

The community engagement strategy that emerged was one that combined a number of critical components that included:

- One-on-One Interviews w/ Internal Staf , External Clients and Partners
- Individual Stakeholder Interviews
- Community Listening Sessions
- Open Houses & Community Discussions

At the very outset of the process, Municipal staff provided the Consulting Team with a list of key stakeholder informants – individuals that play a critical role in the community from a cultural, economic, social and environmental perspective. Those interviewed included recreation and service club representatives, business and restaurant owners, representatives from various sectors including education, arts, culture and heritage, marina and tourist operators, and representatives from the recreational facilities community. These key informant interviews offered an initial glimpse of the issues and opportunities for Haldimand from an individual vantage point. Following the key informant interviews, the Consulting Team conducted a number of Public Listening Sessions, held on September 1st and 2nd, 2010 in Dunnville, Selkirk and Cayuga. Each of the initial Listening Sessions drew between 30 and 75 people – all with an interest in the future of Haldimand. The County and the Consulting Team then hosted two Community Open Houses on June 23rd, 2011, to build upon the feedback received to date and gain insight into what the community’s vision for the future of Haldimand’s Lakeshore Area.

Throughout the planning process, County staff and members of the consulting team checked in with the community to ensure that suggestions were incorporated and ideas were understood. This process of continued validation allowed not only the community to remain involved but also continually kept up to date on the Consulting Team’s progress. Individual feedback and ideas were welcomed via e-mail and through the County web site during the duration of the project.

For more information, see Section 3: Community Engagement Process

(http://www.haldimandcounty.on.ca/uploadedFiles/Our_County/Projects_and_Initiatives/Lakescape_Action_Plan/Final%20Report%20-%20Lakescape%20Action%20Plan.pdf)

Selected extracts from the draft final report “Analysis of Historical Lake Erie Phosphorus Management Processes” by The Soil Resource Group for Agriculture and Agri-Food Canada).

This report contains an example of small group and one-on-one stakeholder engagements. Over 30 people were invited to participate in discussions to get their perspectives on the development, implementation and outcomes of the historical phosphorus management processes, and the changes in today’s circumstances. Most of the invitees had been involved in the SWEEP program, but were also representative of people with knowledge of PLUARG, post-PLUARG, post-SWEEP, and co-existing programs.

The discussions centered on the questions outlined in the project Statement of Work, as follows:

- The context under which the phosphorus management efforts were developed:
 - The initial conditions regarding phosphorus management in urban and agricultural settings – regulatory, biophysical, economic and social
 - What were the drivers for developing a phosphorus management strategy
 - What was the scientific understanding of the processes of phosphorus sources and transport at the time

- Identifying the positive outcomes:
 - What legislation, policies and programs were instated and what was their intent
 - What changes occurred on the ground in response to these policies and programs

- What were the circumstances (i.e., with respect to barriers and incentives provided by regulatory, scientific, biophysical, economic and social conditions) surrounding these positive outcomes
- *One further question was asked under this section: What consensus was achieved and common language arrived at? This seems to be a central question to the entire process.*
- Identifying the negative outcomes:
 - What recommendations were put forward but never implemented (and why)
 - What barriers were identified
 - What were the circumstances (i.e., with respect to barriers and incentives provided by regulatory, scientific, biophysical, economic and social conditions) surrounding these negative outcomes
- Were there any complementary or antagonistic initiatives (of industry, NGOs, etc. separate from government activities) that may or may not have been anticipated, that influenced the results of government policies and programs implemented?
- Reviewing the circumstances of today: What is different and what is the same, particularly with respect to the original context and circumstances as identified above?

Pages 31-50 of the report contain “A retrospective assessment of the P management strategy implementation.” Discussions were held with over 30 people who had been involved with the development and implementation of the phosphorus load reduction plan [i.e., the “Canadian Federal/Provincial Phosphorus Load Reduction Plan for the Great Lakes (1985)"] to get their perspectives on how the plan was developed and implemented and its outcomes: what went right, what went wrong, what was accomplished, and what has changed in today’s context that would affect similar processes. Meetings were held either in small groups or on a one-to-one basis. The table on the following page lists participants in the discussion on phosphorus management processes.

Name	Current agency	Agency during SWEEP	SWEEP group	Role (i.e. manager /researcher)	Time period*	On Farm	Drainage Network	Lake
TAP								
Don Lobb	Consultant	Ecologistics/Farmer	TAP, PWS, CIB	researcher/farmer	1,2,3	x		
Jim Myslik	Retired	OMAF	TAP	researcher				
Jack Rigby	Farmer	SWORAC/farmer	TAP, LS II	farmer		x		
Bruce Shillinglaw	Farmer	Farmer	TAP (2nd Chair)	farmer		x		
Art Bennett	Retired	Farmer	TAP (1st Chair)	farmer		?		
Herb Norry	Retired	Herb Norry & Assoc	TAP (Sec.)	consultant				
Murray Miller	Retired	UofG Dept Soil Sci	TAP	researcher				
CIB								
Bruce Bowman,	retired	AAFC London	GreenPlan	researcher				
Jim Arnold	OMAF	InfoResults	CIB; FLEA	manager/coordinator				
Helen Lammers-Helps	independent	AAFC	CIB	tech/SCA		x		
Bruce MacDonald	SRG +	AAFC Ottawa		researcher				
TED								
Dave Charlton	Stantec	ESP	TED	consultant		x		
Jane Sadler Richards	Cordner Science	Ecologistics	TED; PWS	SCA/consultant		x	x	
Kevin McKague	OMAF	Ecologistics	TED; PWS	SCA/consultant/researcher		x	x	
Greg Wall	SRG	AAFC	PWS	researcher		x	x	
Don King	SRG	Beak	PWS	technician		x	x	
PWS								
Elizabeth Snell	Snell & Cecil Env	Lands Directorate	na	researcher		x		
David Cressman	Retired	Beak/Ecologistics	PWS	consultant		x	x	
Greg Wall	SRG	AAFC	PWS	researcher		x	x	
Trevor Dickinson	Retired	UofG LRS	na	researcher		x	x	
SEE ,FLEA								
Jim White	Retired	InfoResults	FLEA	evaluation				
Glenn Fox	UofG	UofG	SEE	researcher		x		
T2000, extension, incentives								
Adam Hayes	OMAF	OMAF	T2000	Soil Cons. Advisor (SCA)		x		
Doug Aspinal	OMAF	OMAF	T2000	SCA		x		
Chris Attema	OCA	OMAF	T2000	SCA		x		
Harold Rudy	OSCIA	OMAF	T2000	SCA		x		
Brent Kennedy	OMAF	OMAF	T2000	SCA		x		
Peter Johnson	OMAF	OMAF	T2000	SCA		x		
Anne Verhallen	OMAF	OMAF	T2000	SCA		x		
Chris Brown	OMAF	OMAF	T2000	SCA		x		
Keith Reid	AAFC	OMAF	T2000	SCA		x		
Jack Kyle	OMAF	OMAF	T2000	SCA		x		
Andy Graham	OSCIA	OMAF	T2000	SCA		x		
Management								
Galen Driver	Retired	Prov Co-chair	Prov Co-chair	Working Committee				
Peter Roberts	OMAF	OMAF	T2000	SCA		x		
Michael Hicknell	Retired	Ag Canada	TAP, Admin; Cor	Management				
Monitoring & Co-existing Programs								
Craig Merkley	UTRCA	UTRCA				x	x	
Tom Prout	ABCA	UTRCA/ABCA				x	x	
Tracey Ryan	GRCA	GRCA				x	x	

* code for time period: 1= preSWEEP, 2=SWEEP, 3=post-SWEEP

The SRG report should be reviewed for a compilation of the comments made by the participants.

A Collaborative Approach to Review Canadian Legislation, Policy and Programs Related to Phosphorus Loading into Lake Erie: Engagement Plan for Collaborating Agencies (Environment Canada/Intersol)

This document serves as guidance on how agencies at different levels of government that manage and administer programs to limit phosphorus loadings to the Great Lakes can engage and collaborate on a review of the existing framework of legislation, policies and programs related to phosphorus loading into Lake Erie. The report assesses the framework of legislation, policies and programs that are currently in place to manage phosphorus concentrations and loadings into Lake Erie, and it identifies the agencies and experts that need to be engaged in the review of legislation, policies and programs. It identifies legislation, policy and program options that may not be currently implemented and identifies experts to engage on ideas for new policy development. It also identifies and evaluates options for engaging different players to conduct a review of legislation, policies and programs.

List of Potential Agencies and Groups to Consult

International:	International Joint Commission
Bi-national:	Lake Erie Fisheries Commission Great lakes Commissions Great Lakes-St. Lawrence Cities Initiative (GLSLCI) (http://www.gslcities.org/)
Federal Government:	Environment Canada Fisheries and Oceans Canada Agriculture and Agri-Food Canada Transport Canada Parks Canada
Ontario Government:	Ministry of the Environment Ministry of Natural Resources Ministry of Agriculture and Food Ministry of Rural Affairs Ministry of Municipal Affairs Ministry of Infrastructure Ministry of Culture and Tourism
Aboriginal Peoples:	Chiefs of Ontario Union of Ontario Indians Métis Nation of Ontario Six Nations of the Grand River Walpole Island First Nation Association of Iroquois and Allied Indians [Note: There are 14 FNs in the Lake Erie Basin, but not all of them are interested in the lake or in nutrients.]
Other Organizations:	Conservation Ontario Conservation Authorities
Municipalities:	Association of Municipalities of Ontario Rural Ontario Municipal Association
Not-for Profit Organizations:	Canadian Environmental Law Association Environmental Defense Pollution Probe Ecojustice Waterkeepers Canada Ducks Unlimited Nature Conservancy Canada Ontario Nature Ontario Federation of Anglers and Hunters

Fresh Water Future Canada

Individuals and other:

- Farmers (e.g., see The Soil Resource Group report for AAFC)
- Innovative Farmers Association of Ontario (www.ifao.com) (The mission of IFAO is to facilitate a forum to identify innovative agricultural ideas and to transfer new information. Formed in 1986.)
- Crop Advisors (*N.B. They need to be the focus of extension delivery in future programs according to The Soil Resource Group*).
- Bonnefield Financial (i.e., a national farmland investment manager and property management firm – they don't operate farms but producers must agree to strict code of farming best practices to “protect and enhance sustainability. (Ref. Tom Eisenhauer, Bonnefield CBC Interview on As It Happens, July 19, 2013)
- Ontario Soil and Crop Improvement Association (www.ontariosoilcrop.org)
- See FarmSmart conference (last one held on January 17, 2014). The FarmSmart organization was started in 1998 as a conference only event geared to help educate farmers on new topics that might assist them to develop their farming operations. The FarmSmart philosophy is to attract all producers, whether the farm focus and interest is cropping and nutrient management or livestock production (see hscia.wordpress.com for more information).
- Ontario Cattlemen's Association
- Soil and Water Conservation Society (Ontario Chapter) (swcs-canada.org)

Academics/Experts:

Based on discussion with Interagency Steering Committee.