



**Niagara Irrigation Study, Phase 2
Management Technical
Memorandum**

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Project No. 1611 10576
December 2007

**NIAGARA IRRIGATION STUDY, PHASE 2
MANAGEMENT TECHNICAL MEMORANDUM**

Table of Contents

1.0 BACKGROUND AND INTRODUCTION	1.1
1.1 PROJECT BACKGROUND	1.1
1.2 PROJECT INTRODUCTION.....	1.1
1.2.1 Project Study Area	1.1
1.2.2 Project Scope.....	1.2
1.3 STUDY METHODOLOGY	1.2

2.0 EXISTING NIAGARA-ON-THE-LAKE MANAGEMENT STRUCTURE	2.1
2.1 OVERVIEW.....	2.1
2.2 MANAGEMENT AND FINANCING STRUCTURE.....	2.1

3.0 MANAGEMENT STRUCTURE ALTERNATIVES	3.1
3.1 SINGLE MUNICIPAL AUTHORITY	3.1
3.1.1 Overview	3.1
3.1.2 Advantages	3.2
3.1.3 Disadvantages	3.2
3.2 COLLECTIVE MUNICIPAL BOARD	3.3
3.2.1 Overview	3.3
3.2.2 Advantages	3.3
3.2.3 Disadvantages	3.3
3.3 GROWERS' ORGANIZATION	3.4
3.3.1 Overview	3.4
3.3.2 Advantages	3.4
3.3.3 Disadvantages	3.4
3.4 PRIVATE COMPANY	3.5
3.4.1 Advantages	3.5
3.4.2 Disadvantages	3.5
3.5 IRRIGATION DISTRICT	3.6
3.5.1 Advantages	3.6
3.5.2 Disadvantages	3.6
3.6 INDIVIDUAL	3.6
3.6.1 Advantages	3.6
3.6.2 Disadvantages	3.7

4.0 COMPARATIVE EVALUATION OF MANAGEMENT ALTERNATIVES	4.1
4.1 EVALUATION MATRIX.....	4.1
4.2 PRELIMINARY PREFERRED MANAGEMENT STRUCTURE	4.1
4.2.1 Discussion.....	4.1
4.2.2 Summary of Recommendations.....	4.3

NIAGARA IRRIGATION STUDY, PHASE 2 MANAGEMENT TECHNICAL MEMORANDUM

Table of Contents

List of Tables

Table 1:	NOTL Operational Irrigation Fees as revised March 26, 2007	2.2
Table 2:	Comparative Evaluation Matrix of the Alternative Management Structures.....	4.2

1.0 Background and Introduction

1.1 PROJECT BACKGROUND

This Management Technical Memorandum (Tech Memo) has been prepared as part of the Niagara Irrigation Feasibility Study, Phase 2. As part of this project, an *Engineering Report* detailing alternative concepts for the pipe and open channel irrigation systems for areas below the escarpment, and the bench areas was submitted to the Region of Niagara. This memorandum provides a discussion on the available structures to manage the irrigation system providing the advantages and disadvantages of each wherever applicable. A suitable management structure can potentially contribute towards the successful operation and maintenance of a well designed and constructed irrigation infrastructure and would ensure the long-term success of the system.

Prior to this report and as part of the Phase 1 Feasibility Study, extensive review of information was carried out to collect information pertaining to management structures of existing irrigation systems throughout North America. Discussion of these irrigation management structures have been incorporated into this report for the different alternatives proposed.

1.2 PROJECT INTRODUCTION

1.2.1 Project Study Area

The northern portion of the Region comprises of five municipalities, namely, Niagara-on-the-Lake (NOTL), St. Catharines, Lincoln, Grimsby, and Pelham. These areas are very fertile and produce high quality tender fruits, grapes, vegetables, nursery stock and flowers. Together, these areas total to about 23,000 hectares, and generate revenues estimated at 1.8 billion dollars per year. Moreover with the enhancement of irrigation, there is considerable potential for the production of high value crop production in the Region resulting in further increase in revenues.

As part of this project, the following areas below the escarpment have been considered for providing pipe or channel irrigation:

- NOTL
- Lincoln
- St. Catharines

For the purpose of this project, and in the deliverables prepared prior to this memo, these areas have been grouped as follows:

- West District Zone A (Lincoln and St. Catharines)
- East District (NOTL)

In order to ensure consistency, this grouping of areas has been maintained for considerations of management structure. Based on the terms of the submitted proposal, a pipe or open channel distribution system has not been considered for the Pelham area and other areas above the escarpment. Although it may be possible for these areas to have individual grower irrigation systems, it would not be practical for these individual systems to be managed by an overall authority. Therefore, it is expected that these areas above the escarpment will be individually managed by the growers themselves.

1.2.2 Project Scope

The scope of this Management Tech Memo is to evaluate alternative concepts for providing a management structure for irrigation systems for the areas below the escarpment. Based on discussions at the Technical Advisory Committee (TAC) Meeting No.4, it is clear that selection of a preferred management structure would require greater involvement of the stakeholders than the mandate of this project. Therefore, this tech memo has been prepared with an objective to present the prevalent management structure alternatives for owning, operating and managing a water distribution infrastructure along with a list of the advantages and disadvantages of each. A comparative evaluation of the proposed alternatives is presented in Section 4.0, and presents a matrix appraising each alternative against a host of criteria. In Section 4.0, we have also identified a preliminary selection of the preferred management structure based on the Consultant Team's interpretation of the needs of the various stakeholders. This is not intended to be prescriptive in nature and does not replace vigorous debate by the stakeholders themselves. We feel that this report could be a valuable tool to aid the stakeholders in making an informed decision.

It should be noted that the discussion of the advantages and disadvantages of the various management structures is general in nature to assist in the evaluation of the preferred strategy for this project. This discussion is based on our experience and research in the applications of the various types of governance models. The review does not address all the legal ramifications of the various alternatives which are beyond the scope of this assignment. NO LEGAL INTERPRETATIONS SHOULD BE INFERRED BY THIS TECHNICAL MEMO.

1.3 STUDY METHODOLOGY

A management structure is only applicable to communal irrigation infrastructures; therefore a management structure for the solutions for the areas above the escarpment, where communal

**NIAGARA IRRIGATION STUDY, PHASE 2
MANAGEMENT TECHNICAL MEMORANDUM**

Background and Introduction
December 2007

systems are not proposed, is not practical. The existing Niagara-on-the-Lake irrigation infrastructure has a management set up which comprises of the NOTL Irrigation Committee with representation from the farming community and the Town of NOTL. Some additional details regarding the existing NOTL management setup are presented in Section 2.0. Lincoln and St. Catharines, which comprise West District Zone A, do not currently have a communal irrigation structure.

While a suitable management structure would need to be in place for the proposed irrigation system for the West District Zone A, it was considered appropriate to also evaluate the existing management system for NOTL. The financing of the operation and management of the system will have to be decided upon by the chosen management structure. NOTL presents an example of how funds can be collected for operation and capital expenditures in Section 2.2. The method of funding – whether by municipal tax, user shares, or privately collected fees – would be the decision of the management structure with input by the users as applicable in the structure itself.

It should be noted that no one structure may be suitable in and of itself, and it may be beneficial to enact a structure that is a combination of two or more of the structures mentioned below, as has been done in NOTL.

2.0 Existing Niagara-On-The-Lake Management Structure

2.1 OVERVIEW

The Town of Niagara-on-the-Lake (Town) is one of the most important high value crop areas of Canada. Most of the land in NOTL is under tender fruit, grape, greenhouse, or nursery production. Some of the farms located close to the east and north edges of the Town obtain irrigation water from the Niagara River (downstream of OPG hydro generation plants) or Lake Ontario. Most irrigators, however, participate in an irrigation scheme managed and operated by the Public Works Department of the Town. This Municipal Irrigation System supplies water to the municipal drains at several locations near the southern edge of the town. The supplied irrigation water is then distributed by gravity through the drainage system to the participants. The individual farmers are responsible for extracting water from these streams and drains and distributing it within their farms.

The NOTL Municipal Irrigation System operates from mid-May until mid-September, providing irrigation water through municipal drains to approximately 3,235 ha (8,000 acres) of irrigated land. The current maximum system capacity is 15,000 USGPM (82,000 m³/day or 800 acre-inches/day), using the Welland Canal, Niagara River and OPG facilities as sources.

2.2 MANAGEMENT AND FINANCING STRUCTURE

The NOTL Municipal Irrigation System is an initiative of the growers and the Town and is owned by the Department of Public Works of the Town. An Irrigation Advisory Committee comprising of growers and Town officials oversees the operation of the system and advises the Town's Council on issues related to the development and operation of the system. The Director of Public Works is responsible for the system. In this way, the system is a combination of a Municipal Authority and a Grower's Organization as described below. In 2002, the new dedicated position of "Irrigation / Drainage Superintendent" was created within the Public Works Department to manage the Municipal Irrigation System.

The direct costs of the system are in principle repaid by the system beneficiaries - the growers using the irrigation water - through a municipal tax based on the acreage under irrigation. However, the Town has also been supporting the program by indirect financial contributions and by providing office and support infrastructure and staff for the management of the system.

The rates paid by the users of the Municipal Irrigation System have capital and operations components. Any new participant in the system pays a "catch-up" payment similar to the cumulative capital contributions made over the years by the original participants.

Various stages of the development of the system infrastructure have taken advantage of different assistance programs to partly finance the investments (i.e. current ABL expansion).

NIAGARA IRRIGATION STUDY, PHASE 2
MANAGEMENT TECHNICAL MEMORANDUM

Existing Niagara-On-The-Lake Management Structure

December 2007

The Canada-Ontario Water Supply Expansion Program (COWSEP) has partially funded expansions in the Town in the past.

Operating costs are charged on a per season basis using a decreasing rate per acre for larger parcels. These costs are intended to cover electricity, routine maintenance, breakdowns, and staffing, etc. In addition, an availability charge of 30% of the applicable fee is levied on growers who are not using the system but want to keep open their option to access the Town's irrigation through the season. Table 1 presents the 2007 operational irrigation fees collected by the Town from various users utilizing irrigation water through the infrastructure provided by the Town.

Table 1: NOTL Operational Irrigation Fees as revised March 26, 2007

1 to 5 Acres	\$120.00 Minimum
5.1 Acres to 20 Acres	\$240.00 Minimum
20.1 Acres and Over	\$12.00 Per Acre
Golf Courses	\$30.00 Per Acre
Greenhouses	\$0.012 Per Square Foot Plus \$15.60 Per Acre For Nursery Stock
Nursery Stock	\$15.60 Per Acre (Minimum \$480.00)
Irrigating Directly From:	
• Lake Ontario • Niagara River • Welland Canal	
To Guarantee Access to Town Irrigation System without Penalty	30% X (Applicable Rate)
To Be Paid Prior to Irrigating from the Town's Municipal Irrigation Systems(s)	Balance Of 70% X (Applicable Rate)

3.0 Management Structure Alternatives

Based on a review of available literature, and our own experience, the commonly used management structures for irrigation infrastructure fall under one of the following main categories:

- Single Municipal Authority
- Collective Municipal Board
- Growers' Organization/Corporation
- Private Company
- Irrigation District
- Individual Management

Each of these structures is described briefly below. Wherever applicable, advantages and disadvantages of each management structure are also listed. There is also the potential for the preferred alternative to be a combination of two or more of the alternatives listed.

3.1 SINGLE MUNICIPAL AUTHORITY

3.1.1 Overview

Under this form of management, one Municipality owns and operates the irrigation system, the management is entirely within the existing authority provided under the Municipal Act.

Although, this type of a set up is applicable to NOTL, the West District Zone A, which covers two separate lower tier municipalities, the Town of Lincoln, and the City of St. Catharines could not use this model directly for a combined system. Each municipality could, in theory, own and operate the irrigation system assets within their respective jurisdiction, but this is considered too fragmented to be workable. In deciding the structure of governance, representation from both of the municipalities would need to be considered based on an arrangement that is mutually agreeable. This is more inline with the Collective Municipal Board option that is described in the subsequent section.

Alternatively, under a single municipal model, the Region of Niagara could assume responsibility for the irrigation system(s), own the assets and manage the operations. The management structure in this case would include representatives from the benefiting municipalities.

As in the NOTL system, it is expected that at least one fulltime employee would need to be employed to act as superintendent, and manage the day-to-day operation of the system. The Municipality would supply infrastructure and support staff for this individual, all under the budget given to irrigation on a fiscal basis.

It should be noted that the NOTL system is a municipally owned system, however decision making and funding come from the Irrigation Committee, which acts similarly to a Growers Organization.

3.1.2 Advantages

- Municipal administration and operation offers advantages such as the ability to enact bylaws that could require universal use of the system, set uniform and fair water rates, require operator monitoring, define minimum acceptable water-efficiency standards, and enforce good operating practices.
- The work of the system manager can be combined with other tasks (i.e. drainage), and the larger management infrastructure of the Municipality (offices, support staff, vehicles) can be utilized. This eliminates a substantial management cost for the irrigation scheme.
- Municipalities are more likely to be responsive to the expectations of senior governments.
- Municipalities have ready access to the types of information and know-how needed to make successful applications for water taking permits and other approvals.
- Municipalities may be more likely to facilitate expansion of production into new areas.

3.1.3 Disadvantages

- The Municipality must shoulder the responsibility of collecting funds and policing the use of the system.
- The capital cost of the scheme could be added to the Municipality's obligations and might reduce the debt financing capacity for other projects.
- There is a perception that Municipalities tend to have more delays in the infrastructure maintenance and upgrade process.
- The Municipality would be responsible for any safety or environmental upgrades that could be required in future.

3.2 COLLECTIVE MUNICIPAL BOARD

3.2.1 Overview

Within Ontario, this form of management has typically been used for various regional water schemes that service multiple jurisdictions with treated drinking water. Examples include the Union Water Board in Essex County and the Lake Huron and Elgin Water Boards serving the City of London and surrounding municipalities. Assets are owned by the Board and decisions are made by a governing body that usually includes representation from each of the member municipalities. Many of these Boards were historically created by the Province when transferring assets from former provincial agencies (such as WRC or OCWA) to the constituent municipalities.

Although we are not aware of any Municipal Boards within Ontario strictly for irrigation, the use of Irrigation Districts in Alberta (see below) is a close parallel to this structure.

A collective municipal board could be an option for the West District Zone A, which comprises of two municipalities, Lincoln and St. Catharines.

3.2.2 Advantages

- The Board shares many advantages of a Single Municipal Model with the ability to enact bylaws to set rates, require operator monitoring, define minimum acceptable water-efficiency standards, and enforce good operating practices.
- Depending on the setup, the Board can own the asset and obtain the necessary financing without reducing the debt financing capacity of the individual member municipalities.
- The work of the system manager can be combined with other tasks at one of the member municipalities at reduced cost. Transfer pricing would need to be set up to ensure that other Board members share in this cost.
- Member municipalities have ready access to the types of information and know-how needed to make successful applications for water taking permits and other approvals.

3.2.3 Disadvantages

- Forming a Board of member municipalities is a considerable undertaking that may require legislative amendments at various levels of government.
- The Board often has limited decision making powers and for major issues relies on the decisions made at the council of each of the Board representatives, thereby introducing the potential for delays.

- Once set up with the constituent members, there typically is no simple mechanism to add new areas or member municipalities to the Board.

3.3 GROWERS' ORGANIZATION

3.3.1 Overview

Under this management alternative, the growers form a legal entity that may own and/or operate the irrigation system. Each participant of the irrigation system will be a shareholder of the entity, his share being in proportion to the area to be serviced by the irrigation system. The legal entity so formed obtains the financing for the capital cost to construct the irrigation system. Once the infrastructure is commissioned, the legal entity manages and administers the project, charging the shareholders (farmers) for the capital and operation and maintenance charges on a regular periodic basis and also paying off the principal and interest on the loans received.

The Leamington Area Drip Irrigation Association (LADIA) is an example of a grower initiative that has spearheaded improvements in irrigation infrastructure and the management of this infrastructure. LADIA is a legal corporation which manages and administers the irrigation system, charging farmers (shareholders) for capital and operating costs on a monthly or annual basis, to pay off principal and interest for loans received.

3.3.2 Advantages

- The growers themselves make up a corporation and therefore directly and exclusively have a say in the decisions the corporation makes. It will allow the users to have maximum control over the irrigation system.
- Each participant having shares in the ownership of the infrastructure in proportion to their usage seems to be a logical model. Such a system would allow future expansion of the irrigated land by new landowners buying additional shares and hence providing the funding for system expansion.
- In addition to allowing the growers to share certain costs, a larger corporation can have a stronger position than individual property owners in negotiating loans for the communal system.
- Grower cooperatives tend to work faster in delivering maintenance and infrastructure upgrades.

3.3.3 Disadvantages

- The real cost of the operation of the system will be larger than the financial cost, since considerable efforts by the shareholders could be put into voluntarily carrying out the tasks of the organization without being financially compensated.

- The shareholders do not have direct contact and regular ties to higher levels of government, therefore applying for funding may be less successful.
- Generally cooperatives do not have workspace and existing staff support and maintenance equipment to assist in the maintenance and upgrades of the irrigation infrastructure.
- Grower cooperatives work well in rural areas where there is little existing capacity on the part of municipal governments. This is generally not the situation in the Region of Niagara.

3.4 PRIVATE COMPANY

A private company may own and/or operate the irrigation system. A primary objective of such a company is to produce profit. This will minimize the time and resource allocation by the farmers or the Municipality. The operation may be very efficient, since the operator has strong incentive in achieving high efficiency. However, the cost to the users is likely to be higher than the other management alternatives, since the management company will expect compensation for their efforts (there is no incentive for voluntary work) and profit for their investment and risks. Also, the growers would have minimal control over the affairs of the irrigation system. The nature of the system lends itself to management by an authority that has close ties to the community, and is accountable to the public.

3.4.1 Advantages

- Quick and efficient decision making.
- Efficient utilization of water, minimum losses.
- Minimize the time contribution of farmers for regular decision making.
- Municipal Governments only task is policy setting and regulation.

3.4.2 Disadvantages

- Potentially greater cost to farm owners.
- Minimum farmer contribution in decision making.
- No close ties to the farming community.
- Municipal Governments could have little control over rates.
- This structure may be difficult to reverse.

3.5 IRRIGATION DISTRICT

An irrigation district acts similar to a collective municipal board described above with an elected board of members, who are responsible for managing the irrigation district. The irrigation district however maintains and manages the irrigation system alone. Irrigation districts are a common management structure in Alberta, and are created according to the Irrigation Districts Act. An irrigation council is created in accordance with the Irrigation Districts Act to oversee the district activities. The purpose of the Act is to provide for the formation, dissolution, and governance of irrigation districts to ensure that the management and delivery of water occurs in an efficient manner and provides for the needs of the users.

This system may not be applicable to this project, since most Irrigation Districts in Alberta are much larger, and therefore can afford the infrastructure necessary to manage the system (i.e. full-time staff and equipment).

In addition to the advantages and disadvantages listed for the collective municipal boards, irrigation districts could have the following additional advantages/disadvantages.

3.5.1 Advantages

- Focus on irrigation only.

3.5.2 Disadvantages

- The irrigation district typically includes larger areas in order to be financially viable, as smaller areas comprising an irrigation district may not be able to afford the necessary infrastructure to manage the system.

3.6 INDIVIDUAL

This type of management system does not involve a formal organization. Each individual user will manage his or her own irrigation system. There may be cooperation between a number of users, but the scope of the cooperation is limited unless it is developed into a formal organization. It is generally applicable to the smaller systems at farm level or a communal effort by a few neighbors. Therefore, this option is only being considered for the management of separate source alternatives such as those recommended for the West District Zone B and South District.

3.6.1 Advantages

- Very economical, no formal management setup required.
- Ideally suited for separate source alternatives.

3.6.2 Disadvantages

- No formal setup for dispute resolution.
- It is not applicable to large communal infrastructure facilities for lack of a formal organizational structure required for streamlined operation.
- Individuals may lack a cohesive vision for future.
- Growers will be required to upfront costs for any new infrastructure themselves.
- Growers need to provide their time and effort to manage the day to day affairs.

4.0 Comparative Evaluation of Management Alternatives

4.1 EVALUATION MATRIX

This section presents a comparative evaluation of the alternative management structures discussed in Section 3.0. A list of criteria was generated and each alternative was appraised against these criteria. Table 2 presents a comparative evaluation matrix.

4.2 PRELIMINARY PREFERRED MANAGEMENT STRUCTURE

4.2.1 Discussion

Originally it was anticipated that the TAC would be in a position to debate the merits of the various management structures and identify the preferred alternative or combination of alternatives for further consideration. Given time constraints, the Consultant Team was asked to present a preliminary preferred alternative based on their understanding of the stakeholders' requirements. This is expected to facilitate dialogue amongst the stakeholders, prior to identification of the next steps in setting up the necessary management structure.

Of the range of alternatives identified, a **Single Municipal Authority** scores the highest. The municipal authority has the advantage of size and expertise with the planning and implementation of large infrastructure projects. However, it lacks a close understanding of the market forces that influence growers in their irrigation decisions. The growers, in contrast, are very attune to the short and long term influences of the seasons and market forces on their livelihood, but are inexperienced in the wide range of tasks needed for the planning, permitting, design, construction, operation, maintenance and oversight of an infrastructure undertaking of this scale. The preferred alternative would therefore be a combination that includes the best of a Single Municipal Authority and a Growers Organization.

It is noted that the current structure for the NOTL system is a combination of these two short-listed alternatives and has served their stakeholders well. Having the assets owned and controlled by the Municipality has provided for certainty of outcomes and likely facilitated additional funding that would not have been possible by the growers alone. Having strong and active input from the users through the Irrigation Committee has allowed management to be responsive to the needs of the growers and act quicker than might have been the case under a typical municipal structure.

Table 2 Comparative Evaluation Matrix of the Alternative Management Structures

MANAGEMENT STRUCTURE ALTERNATIVE	CRITERIA													
	Ability to Enact Bylaws	Responsiveness to Senior Governments	Ability to Apply for Funding	Ability to Facilitate Expansions and Upgrades	Willingness to Establish Fair Rates	Capability for Dispute Resolution	Grower Participation	Potential for Quick and Efficient Decision Making	Ability to Deal with Regulatory/Environmental Issues	Potential for Efficient Utilization of Water	Vision for Future	Suitability for a Communal System	Access to latest Know-How	Overall Score
Single Municipal Authority	3	3	3	3	3	3	1	2	3	2	3	3	3	35
Collective Municipal Board	2	3	3	2	3	2	1	1	3	2	3	3	3	31
Irrigation District	2	2	2	3	3	3	2	2	3	2	3	3	2	32
Grower’s Organization	2	2	2	2	2	2	3	3	2	2	3	3	2	30
Private Company	1	1	2	3	1	1	1	3	1	3	2	3	2	24
Individual Effort	1	1	1	2	N/A	1	3	3	1	1	1	1	1	17

- 1 Lowest Potential
- 2 Medium Potential
- 3 Highest Potential
- N/A Not Applicable

Recent developments with the NOTL system have indicated that it may be time for a change. In response to grower needs, the Irrigation Committee has been attempting to upgrade and expand the system, while taking advantage of the opportunity of some grant funding from the Federal COWSEP program. This proposal is facing issues due to unresolved environmental concerns from agencies in the operation and maintenance of the system. This tech memo is not the format to address either the merits of the proposed expansion or the agency's concerns, but it is worth noting that the implementation of a relatively minor upgrade has lead to uncertainty and risk. The growers, through the Irrigation Committee, are now uncertain of the timing or implementation of the proposed upgrades. As the owner of the system, the NOTL is responsible for compliance with environmental regulations which carries the risk of both current compliance and future changes to these regulations.

As noted in the previous tech memo, the implementation of an irrigation system of this scale will attract attention and concern from many stakeholders. Some of these issues are unique to the Niagara Peninsula due to the US - Canada Joint Commission and the regulatory regime surrounding use of water for navigation (Welland Canal) and hydroelectricity (OPG). Within this context, it is suggested that the Region of Niagara should be the primary agency for implementation and management of the overall system. It is anticipated that having the senior regional government directly involved will provide the greatest opportunity for a smooth implementation. Details of how this may be enacted are provided in the next section.

4.2.2 Summary of Recommendations

The following are a summary of the recommended aspects of the Preliminary Preferred Management Structure:

- A hybrid alternative combining the best of the **Single Municipal Authority** and **Growers Organization** is recommended.
- The Region of Niagara acts as the primary agency for implementation of the irrigation system, including application for funding, environmental approvals and ownership of the assets.
- The Region of Niagara enters into discussion with the NOTL to transfer the assets and responsibility of their exiting system into the region within the Department of Public Works, or other suitable existing department.
- The existing NOTL Irrigation Committee is appointed as a standing committee within the Region of Niagara to oversee the planning and operations of the East District.
- Representatives from the growers within Town of Lincoln and St Catharines are invited to form a similar irrigation Committee to oversee the planning and operations of the West District Zone A.

- Planning, implementation, operation and upgrades to the two irrigation systems would be separate given the distinctly different nature of the two systems, however this should be under a common framework and management structure as far as is practical.

Note a direct parallel to the proposed approach is the current system for bulk drinking water supplies to City of London, which are managed by one team of staff seconded from the City, but who work with two separate Water Service Boards comprising of the member municipalities for the two source pipelines (Lake Huron and Elgin). More details on this City of London arrangement can be provided if required.

--- STANTEC CONSULTING LTD. ---