14.0 Conclusions

The review and analysis of the available data has lead to the following conclusion:

General

- The following main clusters of existing and potential irrigated lands in the Niagara Region were identified:
    - West Irrigation District, Zone A – good tender fruit and grape lands of St. Catharines and Lincoln below the Escarpment
    - West Irrigation District, Zone B - good grape lands of Lincoln and Grimsby above the Escarpment
    - East Irrigation District – mainly coinciding with rural areas of Niagara-on-the-Lake
    - South Irrigation District – good tender fruit lands of Pelham
- There is currently approximately 23,000 acres of land used for the production of high value crops (tender fruit, grapes, greenhouse and nursery products). This is approximately 40% of the good tender fruit and grape land of the Niagara Region. There is, therefore, significant room for growth of high value crops in the Region. Difficulties in accessing irrigation water may be one of the constraints that is preventing the expansion of high value agricultural production in the region.
- Any regional irrigation project is likely to require substantial financial support from the government.

West District – Zone A

- The servicing of the irrigation areas of Zone A by two systems, one servicing the East side and one servicing the West side, is recommended due to its cost advantage.
- The recommended infrastructure for the West Irrigation District – Zone A will depend on the available funds for the irrigation project, as follows:
    - If funding of **$45 million** is available, we recommend two pipeline distribution system as shown in Figure 14-1. This solution will provide long-term secure and trouble free water for irrigation of the West District and will no doubt enhance and expand agricultural activities in the area. The pipeline systems can be easily upgraded to provide a minimum pressure of 30 to 50 p.s.i., sufficient to supply low pressure sprinkler and drip systems without additional on-farm pumping. There are five potential water sources for the East System. The costs of these alternative sources appear to be very close to each

other, while some have major non-financial implications. The final choice between these alternative sources will require further investigations and consultations.

- If available funding is limited to approximately **$30 to 35 million**, we recommend a pipeline distribution system for the West side with an intake in Lake Ontario (**Alternative 9A**) and an open channel distribution system for the East Side supplied form Lake Moodie (**Alternative 4B**) or Twelve Mile Creek (**Alternative 5B**), as shown in Figure 14-2. This alternative will provide the full benefits of a pipeline irrigation system to the West side and acceptable irrigation servicing to the East side.

- If available funding is substantially **less than $30 million** a centralized irrigation supply and distribution system would become unfeasible. Low cost solutions may be available for irrigating the lands that are close to major water sources (Twelve Mile Creek or Lake Ontario). A program of assistance to implement Off Stream Reservoir solution may be provided; however, due to the limited funding this may only be adopted by a small percentage of the growers who are able to self-finance a substantial portion of the costs.

- The construction of off-stream reservoirs as a general solution for the West Irrigation District may be more costly than the other irrigation solutions, especially if the cost of land is taken into account. However, if ponds already exist, they can be utilized as balancing reservoirs, hence reducing the peak demands of the distribution systems. Furthermore, ponds may be the preferred solution for isolated irrigated pockets, limiting the distribution systems to large clusters of irrigated lands. This may substantially reduce the total cost of the system. In particular, the lands in the south-east portion of the West Irrigation District may be best serviced by off-stream reservoirs, limiting the distribution system to northern portions of this area. These possibilities will need to be investigated in more detail in order to finalize the optimum combination of the alternatives, and take advantage of the existing infrastructure.

West District – Zone B

- The environmental viability of Alternative 10, Supply from Groundwater Wells, will need to be assessed by a groundwater study. The study should investigate the maximum capacity of the aquifers under the target irrigation areas that can be safely utilized without adversely impacting the existing wells and the environmental resources of the Escapement.

- **Alternative 10, Supply from Groundwater Wells**, is the recommended alternative, conditional upon the results of the above-mentioned groundwater study. If the groundwater study does not support the adoption of this alternative, **Alternative 11, Supply from Off-Stream Reservoirs**, would become the recommended alternative. However, even a partial implementation of the groundwater wells (Alternative 10) with off-stream reservoirs (Alternative 11) is likely to substantially reduce the cost of the off-stream reservoirs. It is, therefore, critical to determine the safe excess capacity of the aquifers for irrigation purposes, and utilize it in the overall solution.

- Transmission from large bodies of water to Zone B is not feasible.

East District

- The recommended infrastructure for the East Irrigation District will depend on the available funds for the irrigation project, as follows:

    - If funding of **$45 million** is available, we recommend a pipeline distribution system with supplies from Welland Canal – upstream of Lock 2 (**Alternative 3E**, Figure 10-7) or Niagara River (**Alternative 8**, Figure 10-10), or a combination of the two. This solution will provide long-term secure and trouble free water for irrigation of the East District and will no doubt enhance and expand agricultural activities in the area. The pipeline system can be easily upgraded to provide a minimum pressure of 30 to 50 p.s.i., sufficient to supply low pressure sprinkler and drip systems without additional on-farm pumping.

    - If available funding is limited to approximately **$20 million**, we recommend full servicing of the existing open channel irrigation distribution network using a gravity feeder pipeline. The source of the system can be Welland Canal – upstream of Lock 3 (**Alternative 3A**, Figure 10-1), upstream of Lock 6 (**Alternative 3C**, Figure 10-3) or outlet of OPG Tunnels (**Alternative 7A**, **Figure 10-5**). In addition to extending the irrigation service to the south-west area, these alternatives will increase the water available in the existing ditches, and prevent shortage during periods of high demand. They may also ensure minimum flows in streams with critical or important fish habitats.

    - If available funding is limited to approximately **$6 million**, we recommend the construction of a gravity feeder pipeline to extend irrigation servicing to the south-west area of the NOTL. The source of the gravity pipeline can be Welland Canal – upstream of Lock 3 (**Alternative 3B**, Figure 10-2), upstream of Lock 6 (**Alternative 3D**, Figure 10-4) or outlet of OPG Tunnels (**Alternative 7B**, Figure 10-6). In addition to the construction of the new gravity main, certain improvements in the existing systems would be included in these alternatives.

South District

- The environmental viability of Alternative 10, Supply from Groundwater Wells, will need to be assessed by a groundwater study. The study should investigate the maximum capacity of the aquifers under the target irrigation areas that can be safely utilized without adversely impacting the existing wells and the environmental resource of the Escapement. The utilization of the existing inactive municipal wells for irrigation purposes should also be considered by this study.

- **Alternative 10, Supply from Groundwater Wells**, is the recommended alternative, conditional upon the results of the above-mentioned groundwater study. If the groundwater study does not support the adoption of this alternative, **Alternative 11, Supply from Off-**

Stream Reservoirs, would become the recommended alternative. However, even a partial implementation of the groundwater wells (Alternative 10) with off-stream reservoirs (Alternative 11) is likely to substantially reduce the cost of the off-stream reservoirs. It is, therefore, critical to determine the safe excess capacity of the aquifers for irrigation purposes, and utilize it in the overall solution.

- Transmission from large bodies of water to South Irrigation District may not be feasible unless the size of the irrigated lands is substantially increased.

Management

- The success of the NOTL seems to have made management by municipal authority the preferred management choice of the growers. This is supported by the fact that the municipalities of the Region are well organized and capable of managing the systems, and have a history of productive collaboration with the growers. However, the final choice of the management system will depend on the final choice of the irrigation infrastructure and further consultation with the municipal authorities and growers.

- There will have to be a move toward proper irrigation scheduling in the region. An extensive training program is recommended prior to the completion of the construction phase. Also additional research may be warranted to generate irrigation information specific to the Niagara Region and the target crops. This will ensure that technologies that have been successfully used elsewhere are properly tailored to the climatic, soil and crop conditions of the Niagara Region.

Financing

- National Water Supply Extension Program (NWSEP) is expected to be initiated in Ontario in the immediate future. This program may partly fund on-farm improvements (such as construction of wells), smaller components of the regional infrastructures (such as improvements to the existing systems in Niagara-on-the-Lake) and subsequent studies related to the overall irrigation solutions for the region.

- Funding of at the levels that would allow the implementation of an overall regional irrigation project is not available at the present time. However, discussions at senior government levels may be initiated based on this report.