# Alexandria Water Supply

## Preliminary Engineering Report

### Under the Provisions of the Class EA Process

June 2003
FINAL REPORT

The Thompson Rosemount Group Inc.

## Executive Summary

The source water supply for the Town of Alexandria has been periodically problematic both from a quality and quantity perspective since the Town's founding. The Garry River system, the current water supply source, has proven to be susceptible to water shortages and quality problems. With the upgrading of the Water Treatment Plant in 1989 and the more recent addition of a PAC system, the treated water quality has been consistently good. However, periodic water shortages persist, largely due to the limitations of the source water supply, the upper Garry River system. The problem is somewhat exacerbated by land uses around Loch Garry and Middle Lake along with increasing demand.

A number of alternative solutions were examined under the Class Environmental Assessment process including: do nothing, water reduction strategy, groundwater source, creating reservoir storage in or adjacent to the existing river system, four possible water supply feeder mains from other watersheds in the area, and modification of the existing Garry River System Operational Plan. The alternatives were examined with respect to their cost, technical feasibility and their impacts on the natural, social and economic environment.

These analyses yielded two preferred alternatives: a long term alternative involving a pipeline to the St. Lawrence River; and an immediate term alternative involving modifications to the Garry River System Operational Plan. Concurrently, the municipality is encouraged to continue good water conservation strategies to effectively manage the limited resource.

At an estimated cost of $2.1 million, the immediate term alternative requires modifications to the Watershed Management (Operational) Plan to achieve a target water level of 88.3 m in Middle Lake, integrating the existing Raisin Region Conservation Authority level monitoring system, channel improvements, erosion control, structural modifications to the Mill Pond Dam, and limited private property flood and shoreline protection. Some of this work is required regardless of the adjustment to the target operating level and may be phased as financial resources dictate.

Of the two solutions, modifying the watershed management plan for the Garry River system was determined to be the most affordable way of affecting an increase in water supply security for the Town of Alexandria in the immediate term. This is not a long term solution, however, combined with effective water conservation and provided that annual precipitation does not further diminish, this alternative may be sustainable for many years.

The water supply capability of Middle Lake is finite and is a function of meteorological conditions and water demand. As the water demand of the Town of Alexandria increases and particularly in years of low precipitation, the sustainability of the water supply will be at risk. The recommended long-term strategy is therefore a pipeline to the St. Lawrence River. A pipeline may also provide a solution for other communities in North Glengarry including Maxville and Apple Hill. The capital cost of the long term pipeline alternative is estimated at approximately $11.7 million.

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# 1.0 Introduction

## 1.1 Background to Study

Since 1954, the Town of Alexandria has obtained its water supply from the Garry River System. The Garry River system drains approximately 34 km$^2$ of land into the Delisle River just east of Alexandria. The lakes are relatively shallow (i.e. less than 3 m maximum depth) with the water entering the lakes being a combination of runoff and groundwater discharge (spring). There are conflicting reports on the magnitude of groundwater discharge into the system, however it appears based on the watershed configuration to be significant component of the total flow. The raw water quality at the water treatment plant has proven at times to be of poor quality and has resulted in significant quantities of suspended solids and bacteria. At times, bacterial contamination has been sufficient to require beach closings on the Mill Pond Reservoir. Furthermore, growth in the Town, both residential and industrial, increased water demand to the point where it exceeded the limits of the existing Permit to Take Water on several occasions in the period up to 1995. Water conservation strategies implemented by the PUC and the largest single water user, Consoltex, have resulted in significant water demand reductions since 1995.

## 1.2 Study Objective

The concerns regarding water quality and availability initiated this study with following primary objective:

> **To determine the most effective method to provide the Town of Alexandria with a sufficient and reliable water supply source of adequate quality which requires a conventional level of treatment to meet Ontario Drinking Water Objectives.**

In order to understand this statement, there are some terms used in the above statement that must be clarified:

*Most effective methodology* – the best methodology that can pass technical and public scrutiny with respect to cost, environmental impacts (natural, social and economical) and operational efficiency.
*Sufficient* – adequate quantity of water to provide for future growth
*Reliable* – able to provide water supply during drought or other adverse conditions without significant operational changes or water level changes beyond current ranges.
*Adequate quality which requires a conventional level of treatment* – treatment requirements should not exceed the treatment capabilities of the existing Alexandria Water Treatment Plant.

## 1.3 Description of the Study Area

As previously mentioned, the Garry River system is a 34 km$^2$ watershed that is located for the most part, directly west of the Town of Alexandria in Eastern Ontario approximately 45 km northeast of Cornwall and 90 km southeast of Ottawa. The watershed is mostly mixed forest with some agricultural land and residential areas. Drawing C.01 (attached) shows a photo mosaic of the area. The lakes, with surface areas at normal operating levels, are as follows:

- Loch Garry, surface area: 370 ha
- Middle Lake, surface area: 78 ha
- Mill Pond, surface area: 25 ha,

The lakes are connected by the Garry River, which has been altered over the years by humans to permit more efficient flow from the lakes. The river is typically from 4m to 10m in width and less than 2 m in depth. There are significant wetland areas on all three of the lakes and the river, with Middle Lake having the majority of the class one wetland area.

## 1.4 Funding Sources

This project has brought different ministries of the Ontario provincial government and the local municipal government together with the objective of providing a water supply solution for the Town of Alexandria while maintaining the natural environmental integrity of the Garry River Watershed. A partnership was formed between the Ministries of the Environment and Natural Resources, the Raisin Region Conservation Authority (RRCA) and the Township of North Glengarry towards this goal. The project costs were borne by the partnership in the following percentages:

| | |
|---|---|
| Ministry of the Environment: | 27.9% |
| (RRCA) Ministry of Natural Resources: | 22.7% |
| Township of North Glengarry: | 49.4% |

The provincial funding has provided the Township with the opportunity to complete this comprehensive analysis of the problem and determine the most viable solution for the future.

## 1.5 Class Environmental Assessment Process

The Class Environmental Assessment (EA) process is designed to provide a simplified yet comprehensive methodology to address the environmental assessment of similar projects (i.e. water supply projects) across the Province. The reasoning for the simplification is to allow Municipalities to complete projects that may have environmental impacts without always have the large expense of individually investigating each possible impact. Rather, all potentially impacted persons or agencies are notified and their input is solicited with the goal of narrowing the scope of any review process. Figure 1.1 shows the Class Environmental Assessment Planning and Design flow chart. For reference, this report and the associated public consultations will satisfy the requirements of Phase 2 of the project as the preferred alternatives have been identified and recommended.

## 1.6 Environmental Inventory

Completing an environmental inventory of the different alternatives is essential in the assessment of the viability of each alternative for provision of a sustainable water supply for the Town of Alexandria. Figure 4.2 shows the potential for impact of each of the alternatives that have been evaluated for this project. Since the "Do Nothing" and "Water

Reduction Initiative" alternatives are essentially the same as how Alexandria currently operates their water system, there are not anticipated to be any further environmental impacts associated with their implementation.

### 1.6.1 Natural Environment

The natural environment consists of the air, soil and water including all living matter regardless of its interaction or impact on humans. This may include changes in climate, habitat, geology and hydrogeology among a vast variety of other issues. Agencies that are consulted in order to assess the inventory of the natural environment include:

- Ministry of Natural Resources
- Raisin Region Conservation Authority
- South Nation Conservation Authority
- Federal Department of Fisheries and Oceans

The land around Alexandria consists of agricultural, forest and wetland areas. The impacts on the natural environment of increasing the water taking potential of the Town depend on the:

- Water source and capacity,
- Construction methodology for any capital works and,
- Sensitivity of native species and geology

These issues are examined for each alternative to determine if there will be any significant impact on the natural environment resulting from the implementation of any of the alternatives.

### 1.6.2 Social Environment

The social environment is considered to be how the construction and operation of the alternatives will affect the human population living around or visiting the area. Examples of these effects include:

- noise
- dust
- aesthetics
- loss of use
- quality of life/user experience
- inconvenience

These issues are somewhat subjective and will depend somewhat on the tolerance of the persons involved, however it is reasonable to assume that if the impacts exist that they should be considered in the evaluation of each alternative.

### 1.6.3 Economic Environment

The economic environment is defined in the context of this report as the benefits and costs of the proposed alternatives relative to the economic impact on the human population. Examples of possible impacts include:

- Employment creation or loss
- Cost of alternatives (capital and operating)

- Loss of economic use (agricultural land)
- Opportunity of economic gain (development)

Economic environment issues may be directly related to the alternatives or may be indirectly related in that the alternative may open up areas for development or industry to grow. Therefore, their analysis forms an important component of the alternative evaluation process.

All of the projects with the exception of the do nothing, water reduction strategy and the modified Garry River Management Plan will include a construction component that will result in an economic benefit for the local construction community. Furthermore, all of the alternatives with the exception of the do nothing will result in an increased available capacity of water for consumption within the community. If this is coupled with improved sewage treatment capacity, then the current development restriction could be lifted and there would most likely be improved economic conditions resulting from this work.

The economic impacts on the residents of North Glengarry of all of the alternatives, where there will be further costs associated with their implementation, will be a significant issue in the selection of the preferred alternative. As there may be little or no upper tier government funding for the preferred alternative, the Township will need to recoup the costs from the residents of the municipality. The Township has the means through the provisions of *The Municipal Act* to recoup these costs, however on large capital projects the costs can be prohibitively expensive to residents and businesses depending on the methodology of assessing the costs to each ratepayer. It is beyond the scope of this document to detail the methodology for cost recovery, however it is important to note that the economic impact for all capital projects will ultimately be borne by ratepayers within the Town of Alexandria and the Township of North Glengarry.

## 1.7 Public Consultation

Public consultation is a very important component of the EA process as it provides the public and agencies with an opportunity for input into the study. As well, it provides the Township, the RRCA and their consultant with important information of the history of a project and what issues are important to the residents so they can be addressed in the project documentation. This project requires two levels of public consultation, one to direct the project scope, the working committee, and one for public input, public information centres.

### *1.7.1 Working Committee*

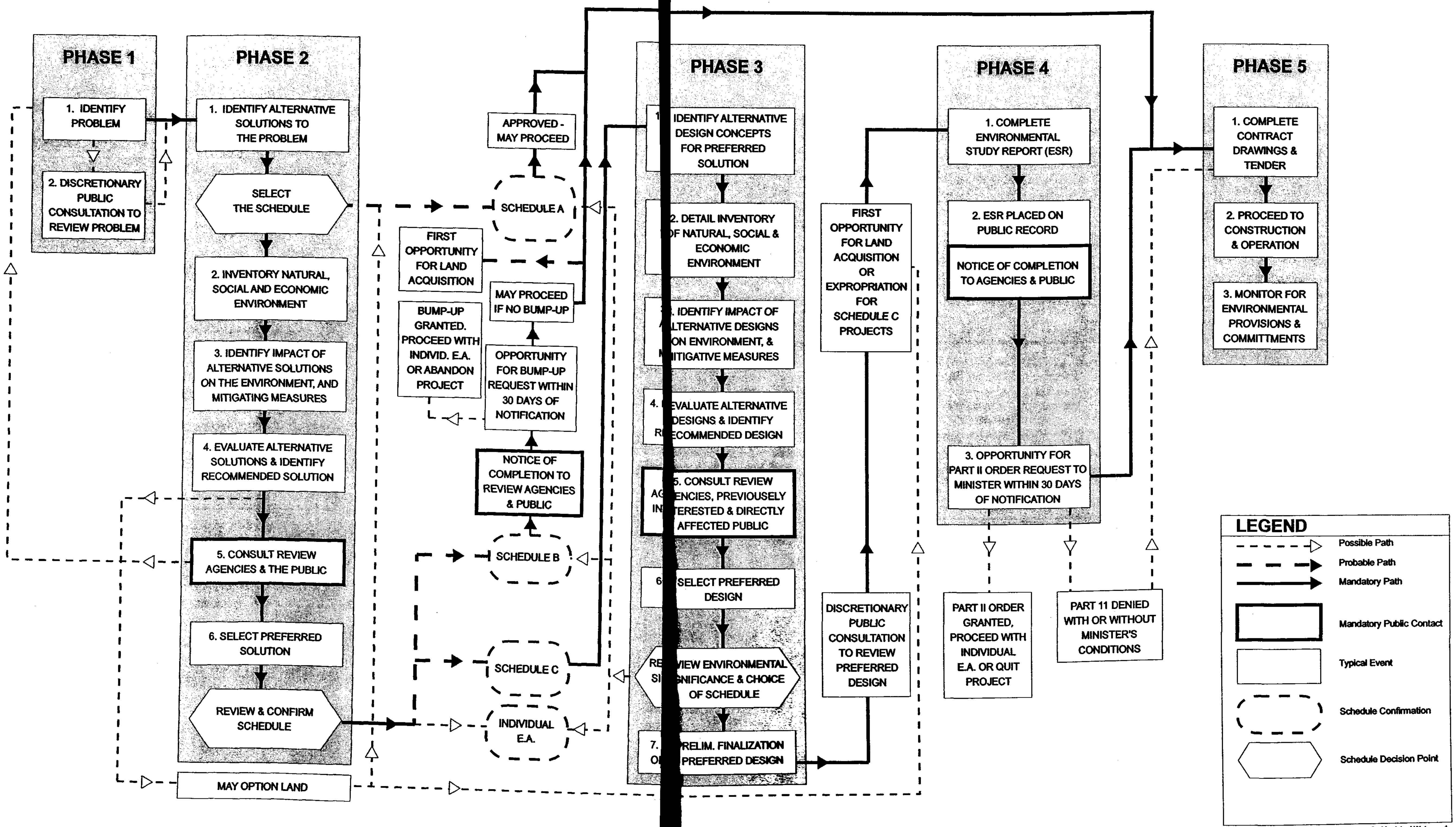
A working committee was formed at the start of the project to solicit input and decision making into the process to ensure that the Class Environmental Assessment is carried out in accordance with Provincial requirements. The working committee was made up of:

- North Glengarry Council – Bill Franklin, Councilor (Mayor - 2000 election)
- North Glengarry Public Utilities Commission – Luc Poirier
- Raisin Region Conservation Authority – Roger Houde, P.Eng., Andy Code
- The Thompson Rosemount Group – Bill Knight, P.Eng., James Witherspoon, P.Eng.

The working committee met together five times during the Phase 1 and 2 process to assist the consultant in the completion of their tasks by bringing their individual experiences to the table. This process is crucial to ensure that the technical, social, economic, and environmental issues are addressed in the process. The meeting records of the working committee meetings are presented in Appendix H.

### *1.7.2 Public Information Centre*

A Public Information Centre (PIC) was held on November 14, 2002, after the final review of the draft report by the working committee and Township Council. A copy of the Phase 2 Notice and other pertinent documents are provided in Appendix H.



Adapted from: Planning and Design Process for Municipal Water and Waste Water Projects, Municipal Engineers Association

THOMPSON ROSEMOUNT GROUP INC.
consulting engineers
CORNWALL KINGSTON FERGUS OTTAWA

# ALEXANDRIA WATER SUPPLY ENVIRONMENTAL ASSESSME NT

## Class Environmental Assessment Process Flow Chart for Municipal Water and Wastewater Projects in Ontario

| | |
|---|---|
| scale | NTS |
| date | June 2003 |
| drawn | KW |
| job no. | 985194 |
| drawing no. | FIGURE 1.1 |

# 2.0 Review of Existing Data

## 2.1 Existing Studies and Reports

The previous studies and reports that are relevant to this project and have been reviewed as part of this project are displayed in Appendix A. This section details the history of the Garry River System and water supply over the last 50 years since it became the main water supply for the Town of Alexandria.

## 2.2 Garry River System Management Chronology

The Garry River system has been drastically changed by human intervention since the first settlement of Glengarry County. Originally the entire system would most likely have been a wetland with a stream running through it and some rapids close to the Town of Alexandria. It is now a river with three man-made reservoirs that is used for water supply, recreational uses and is a habitat for many species of plants and animal life.

The following chronology displays the history of the Alexandria Water Supply and the Garry River System.

1869 Donald Alexander McDonald obtained approval to supplement the water supply in the Garry System by erecting a dam that is currently known as the Kenyon Dam. This dam and the dam at Mill Pond were designed solely to provide power to the Grist Mill in Alexandria.

Early 1900's Water supply is provided from the Delisle River.

1946 Study was undertaken by N.B. MacRostie Consulting Engineer to improve the water supply from the Delisle River for a design population 2400. Three options were analysed:

- Creating a reservoir below the pump house on the Delisle.
- Increasing the capacity of the reservoir.
- Using Loch Garry and Black Lake (Middle Lake) as a new source supply.

The recommended solution was to use Loch Garry and Black Lake as a new source of water supply. The recommended solution included a new dam on Middle Lake and damming Loch Garry.

1950 The Mill Pond in Alexandria is drained and dredged and the new water plant was constructed in its present location.

1950's Test drilling for well supplies was completed with unfavourable results (anecdotal).


Photo 1: Excavation of New Water Treatment Plant


Photo 2: Excavation of Mill Pond


Photo 3: Excavated Mill Pond

1954 Water supply for Alexandria is changed from the Delisle River to the Garry River System due to pollution and lack of dry weather flow.

1955 Preliminary report by H.R. Farley Consulting Engineer to improve the water quality from the Garry River System. Two solutions were proposed:

- Build a pipeline from Middle Lake to the water treatment plant in Alexandria to avoid the swamp between Middle Lake and Mill Pond.
- Excavate a large open channel between Middle Lake and Mill Pond to avoid water stagnation.

1956 Report and specification by H.R. Farley Consulting Engineer to improve water supply for Alexandria by improving the Kenyon Dam, constructing a new check dam at the east-end of Loch Garry and excavating a channel from Loch Garry through Middle Lake to Mill Pond. It is unclear what happened with this project as drawings dated July 1956 show a pipe line alignment from an intake crib in Loch Garry to Mill Pond.

1957 Report by Coode, Binnie & Preece Consulting Engineers on the Garry River System water supply recommending that:

- A dam is constructed at the outlet of Loch Garry.
- The channel between Loch Garry and Middle Lake is improved.

- Kenyon Dam is well-maintained and the level of Middle Lake is carefully and effectively controlled.
- A pipe line should be installed from Kenyon Dam to Mill Pond to bypass the swamp channels located upstream of Mill Pond.

Photo 4: Kenyon Dam Failure (circa 1950)

1960 Summary Report by J.L. Richards & Associates Ltd. on improvements to the water supply and previous studies. This document much like an Environmental Study Report addressed the pros and cons of the options and the effect of the options on adjacent landowners. The terms of reference for this document were to:

- To study and report on means of constructing a dam to control the level of Loch Garry.
- To study and report on means of providing an improved channel from Loch Garry to the Middle Lake.
- To provide cost estimates for both projects.

1961 J.L. Richards & Associates Ltd. Supplementary Report to determine what could improve the quality and quantity of the Alexandria Water Supply. Issues that were reviewed included:

- If a diversion ditch from Fraser's Rapids to Mill Pond would improve water quality. Conclusion was that no significant improvement would be achieved by excavating a diversion ditch.
- If raising the Kenyon Dam would be an effective method of providing additional storage to the Town. Conclusion was that additional storage was best achieved by controlling Loch Garry rather than by raising Kenyon Dam.

1965 Report by J.L. Richards & Associates Ltd. to discuss a proposed dam and channel project to maintain the water supply from Loch Garry. The goal would be to maintain the water level in the lake during the spring to provide adequate storage for late summer droughts. The design flow for this project was approximately 2,050 $m^3/d$. Under average conditions, the water level in the lake would fall 30 cm from

May 31st to September 1st. During a dry year, the water level in the lake would be expected to fall 50 cm.

1966 Report by the Ontario Water Resources Commission on the Alexandria Water Supply to assess the water quality in the system. This report dealt with the organic growth in the system and its effect on quality from a taste and odour standpoint. Recommendations from this report were:

- Consideration should be given to installing taste and odour control at the water treatment plant. A pilot plant study should be completed before any installation is finalised.
- The proposed plan to construct a dam to control levels in Loch Garry should be implemented.
- Either establishment of a pipeline or dredged channel from Fraser's Rapids to Reservoir Lake (Mill Pond) would improve the quality of water entering the water plant.

1978 Ministry of the Environment Report recommends doubling of Alexandria Water Treatment Plant capacity to 9,400 $m^3$/day.

1978 Lascelles Seguin Tremblay Engineering Limited authored a report on the expansion of the water supply for the Town of Alexandria. Recommendations for expansion provided for an average day flow of 5340 $m^3$/day with a maximum of 8014 $m^3$/day.

1980 Raisin River Conservation Authority commissioned McNeely Engineering and Proctor & Redfern Ltd. to complete the Garry River Water Management Report. The report objective was to develop a water management plan for water supply and flood control purposes. Major recommendations included:

- Raising water level in Loch Garry from 88.8 m to 89.1 m.
- Rehabilitate Alexandria Dam.
- Raise Kenyon Dam and maintain Middle Lake level at 87.9 m.
- Raise Loch Garry Dam and increase Lake operating level to 89.1 m.

1989 McNeely Engineering updated the 1980 Garry River Management Report. Results of the study included:

- Reliable water supply available is 46 L/s (3,974 $m^3$/d) with no modifications to water levels or sewage treatment plant operation. Yield could be increased to 65 L/s (5,616 $m^3$/d) under a modified sewage discharge regime.
- If Loch Garry were raised to a level of 89.1 (current average level) the reliable yield could be increased to 64 L/s (5,530 $m^3$/d) under normal conditions and 82 L/s (7,085 $m^3$/d) under a modified sewage discharge regime.
- The reliable yield is based on the three worst years on record, 1930-1932.
- Average year maximum water supply is 199 L/s.

1992 Paul Wisner & Associates Ltd. completed a report to update the Garry River watershed modelling and assessment of proposed change to the summer operating level of Middle Lake. Report recommendations were:

- To revise the Garry River Floodplain mapping based on the revised hydrologic and hydraulic models.
- To evaluate the hydraulic capacity of the outlet channel of Mill Pond.
- That optimisation of the operating rules and procedures of the dams could further maximise the use of the three lakes in the system.

1995 Raisin Region Conservation Authority prepared an operational manual for the Garry River system. This document detailed the operating norms and problems with the system.

## 2.3 Digital Topographic Mapping

The Thompson Rosemount Group commissioned The Base Mapping Company Ltd. to complete digital topographic mapping of the Garry River Watershed in order to evaluate both the existing conditions and alternatives for the project solution. This mapping has been provided in digital and photographic form. The mapping was created using aerial photography and ground control data obtained in 1999 using Global Positioning System (GPS) and the 6-degree NAD83 correction.

## 2.4 Stream Gauge and Meteorological Data

The historical record of rainfall and river flows in the Garry River watershed are important in the analysis of the limitations of the existing watershed to provide adequate water supply for the Town of Alexandria.

### Stream Gauge Data

The Raisin Region Conservation Authority (RRCA) has managed the Garry and Delisle Rivers. For this project, 10 years of flow data have been analyzed to determine the high and low limits of both rivers. The detailed data on the Garry River is displayed in Appendix B.

### Meteorological Data

There is no weather station within the either the Garry or the Delisle River watershed, however there is a weather station located in Dalhousie Mills. The weather data from this station is included in Appendix B. This data has been collected since 1968. The RRCA gauging stations on the Garry System that have rain gauges will be used in the future to collect this data for use in the management of the lake system.

The historical low year for precipitation used for calculation of the reliable yield on the Garry System was the period from April 1930 to April 1932, when the total precipitation for that period was 1341 mm or 670mm per year. Furthermore, during that year the total evaporation was 1132mm or 566mm per year. Therefore over that period, the total net precipitation was 209 mm. In comparison, for the years 1968 to 2000, the minimum annual rainfall during this period was 803.5mm in 1974 or 20% more rainfall than the worst year on record. Table 2.1 displays the average precipitation by month for the period from 1968 to 2000.

Table 2.1: Average Precipitation 1968-2000 (mm)

| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Average | 89.5 | 71.8 | 77.7 | 83.2 | 82.6 | 91.6 | 95.2 | 91.1 | 99.1 | 83.2 | 91.7 | 92.4 |
| Maximum | 159.3 | 143.5 | 129.4 | 190.6 | 167.4 | 199.4 | 194.8 | 172.6 | 191 | 175.4 | 151.6 | 163.9 |
| Minimum | 27.1 | 15.0 | 32.0 | 23.2 | 28.7 | 34.2 | 28.2 | 24 | 27 | 31.8 | 41.9 | 43.3 |
| Historical Worst Year 1931 | 57 | 29 | 39 | 65 | 63 | 66 | 36 | 10 | 100 | 44 | 54 | 58 |

*For design purposes, we have utilized the worst case evaporation condition to estimate potential evapotranspiration for the watershed.*

## 2.5 Garry River System Operation Plan

The Garry River watershed drains approximately 34 km² of predominantly forest and scrub land. The Raisin Region Conservation Authority in conjunction with the Alexandria PUC has operated the dams in the Garry River system since 1977. The three dams that control the outflow from Loch Garry, Middle Lake and Mill Pond are operated for water supply, recreational use and flood control. Table 2.2 displays the current target operating levels for the three dams. Figures 2.1, 2.2 and 2.3 display the water level fluctuations in the three Garry River Reservoirs in the past ten years. Appendix B displays the annual level variations by year compared to the daily rainfall for all of the lakes.

Table 2.2: Garry System Operating Levels

| Control Structure | Current Operation Plan Target Level | 100 yr Flood Level | 1990-2000 | | | | |
|---|---|---|---|---|---|---|---|
| | | | Median Level | Average Level | Standard Deviation | Maximum Level | Minimum Level |
| Loch Garry Dam | 89.10 | 89.56 | 88.97 | 88.97 | 0.20 m | 89.40 | 88.32 |
| Kenyon Dam | 87.90 | 88.44 | 87.93 | 87.93 | 0.18 m | 88.45 | 87.28 |
| Alexandria Dam | 81.45 (Lower Limit)<br>81.60 (Normal)<br>81.65 (Upper Limit) | 82.05 | 81.61 | 81.60 | 0.08 m | 81.90 | 81.32 |

The RRCA uses the following criteria for controlling levels in the three lakes in the Garry River system:

- Operate dams in accordance with Ministry of Natural Resources Flood Forecasting reports to release water in advance of potential flood event.
- Maintain minimum 30 L/s flow through Alexandria Dam at all times to comply with Alexandria Permit to take Water.
- Retain as much water upstream of the Alexandria Dam as possible for water supply of the Town of Alexandria.
- React to complaints of high water levels by residents upstream of the Alexandria, Kenyon and Loch Garry Dams.

Appendix C contains the current operational plan utilized by the RRCA. The system has operated well over the years, however there have been periods where high and low water

Figure 2.1: Loch Garry Dam Historical Water Levels

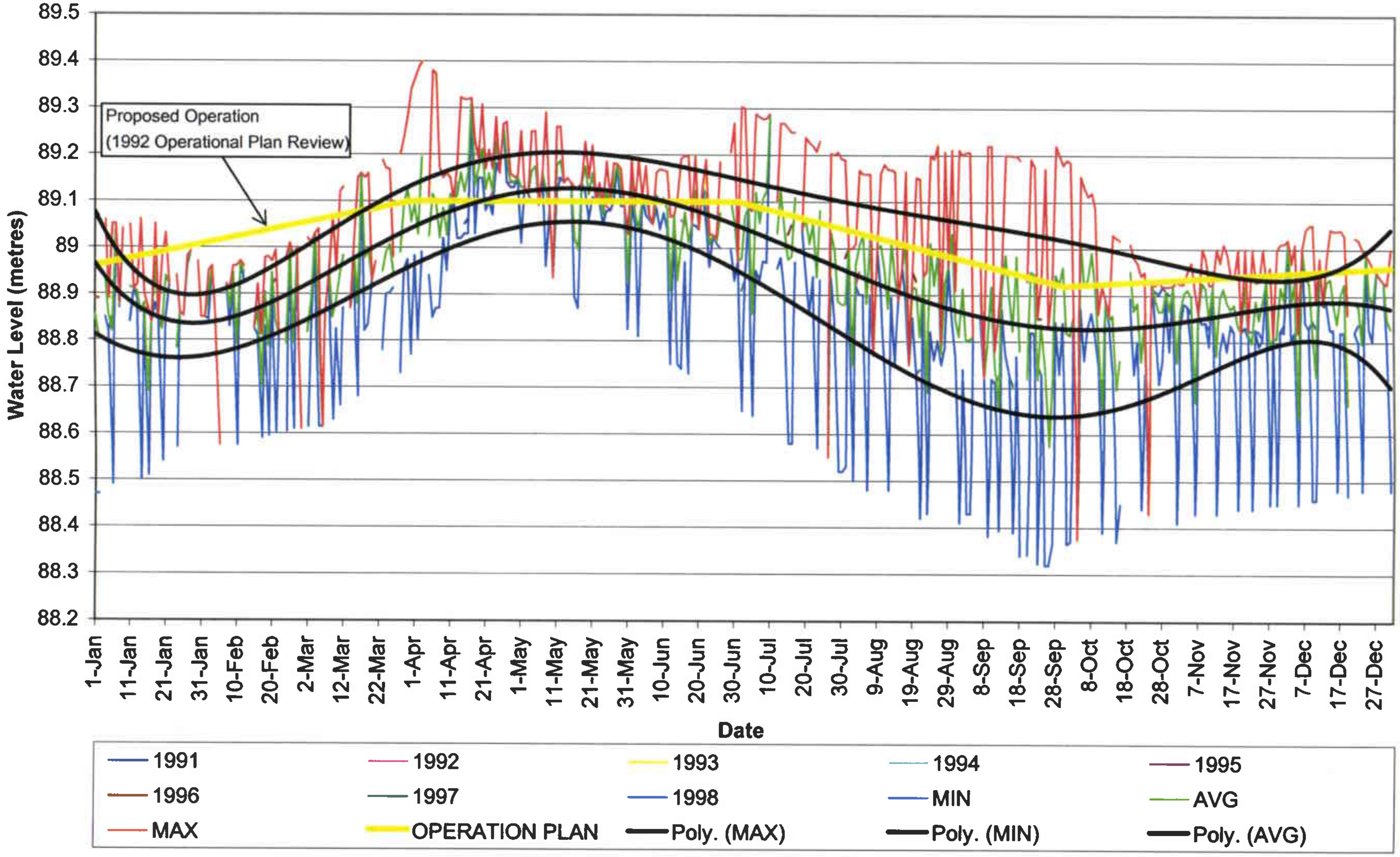
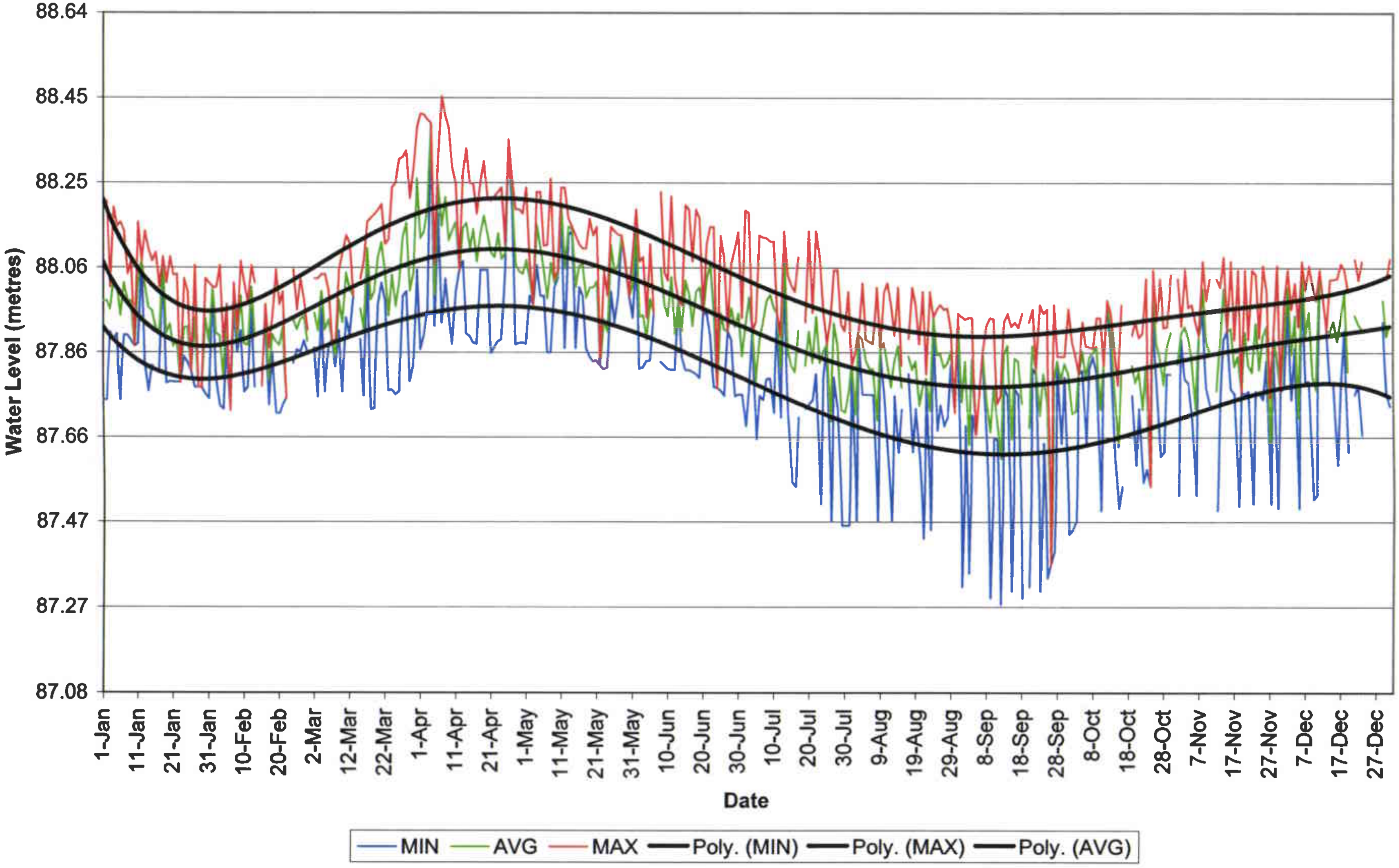
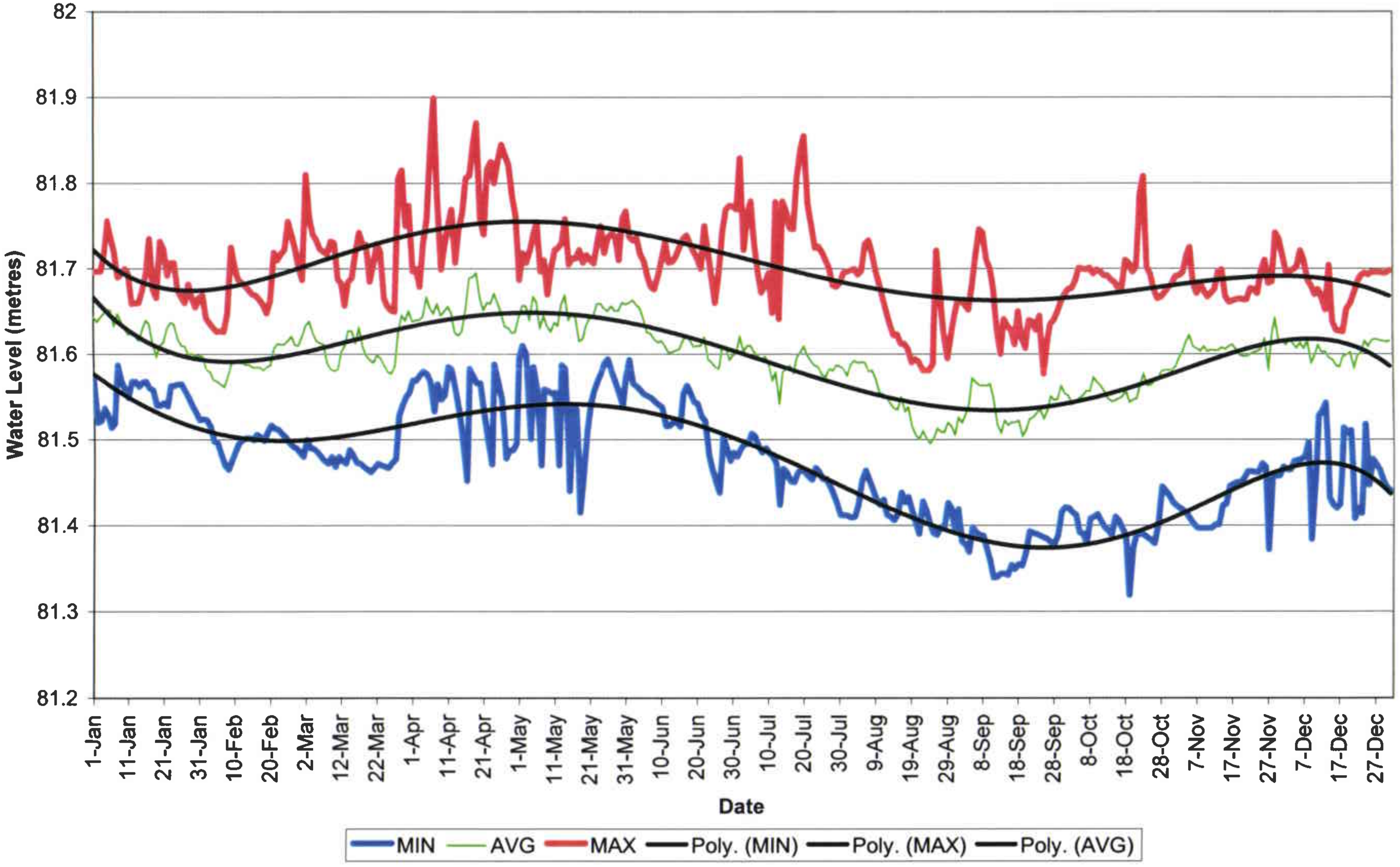


Figure 2.2: Middle Lake Dam Historical Water Levels



## Figure 2.3: Alexandria Dam Historical Water Levels



levels have resulted in complaints and a reduction in the water available for the Town of Alexandria.

## 2.6 Update Structural Assessment of Dam

The last assessment of the three dams in the Garry River system was completed in 1979. MSTA completed a update of the assessment as part of this project. This assessment was provided to the Township of North Glengarry and the Raisin River Conservation Authority under separate cover.

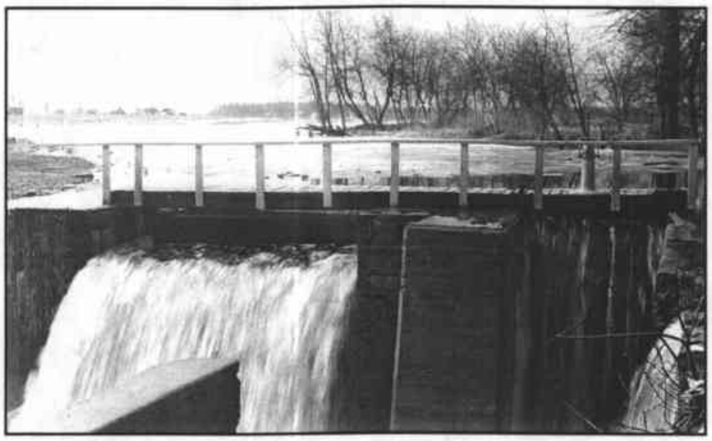


Photo 5: Alexandria Dam during spring freshet

## 2.7 Alexandria Water and Sewage Operations

### Water Treatment

The existing water treatment plant is a conventional process using coagulation, flocculation, sedimentation, filtration and chlorine disinfection. Activated carbon in powder form is utilized to control taste and odour problems. The rated plant capacity based on the Certificate of Approval is 8,014 $m^3/d$. The Certificate of Approval for the Water Treatment Plant is presented in Appendix D.

### Sewage Treatment

The existing sewage treatment facility consists of an aerated lagoon followed by facultative lagoons prior to discharge into the Delisle River east of the Town of Alexandria. The current (theoretical) capacity of the wastewater treatment plant is 6,500 $m^3/day$. The Town's Permit to Take Water (Appendix D) specifies that a minimum of 2,600 $m^3/d$ (30 L/s) must be provided through the Garry River System as dilution water for the treated sanitary effluent. The Receiving Stream Impact Assessment completed, as part of the Sewage Environmental Study Report concluded that it is not practical to reduce the dilution flow. Besides the positive contribution to the sewage treatment process at the discharge on the

Delisle River, the dilution flow is used by the Glengarry Golf Club for irrigation and it sustains the aquatic habitat along this reach of the Garry River.

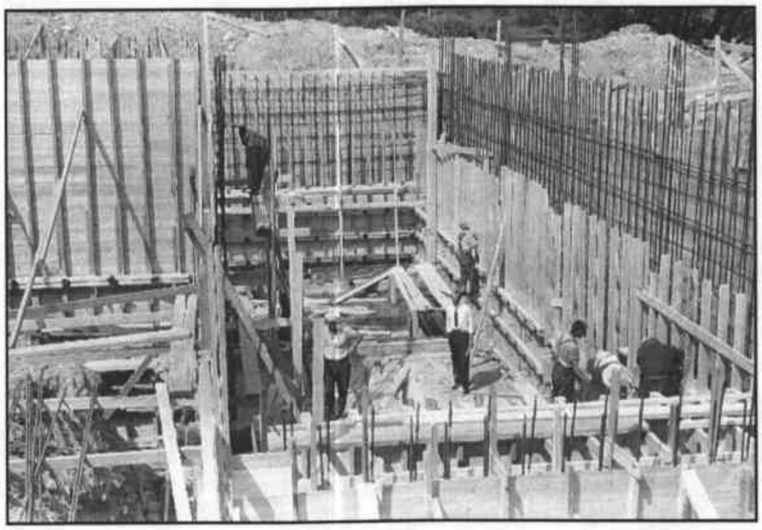


Photo 6: Alexandria Water Plant under construction (circa 1950)

# 3.0 Problem Definition

The Town of Alexandria has had an ongoing problem with its source water supply since the original settlement days and the current Garry River System source is no exception. A review of historical data has shown that a combination of high water demand in Alexandria, varying meteorological conditions, and problems managing the water supply due to landowner constraints on the operation of Loch Garry and Middle Lake have resulted in serious water restrictions in the Town of Alexandria from time to time. Furthermore, a development restriction imposed by the Ontario Ministry of Municipal Affairs and Housing relating to the sewage treatment system has recently limited the growth of the Town.

To be able to benefit from growth and a safe and reliable water supply, Alexandria must secure a sustainable water supply that is capable of providing adequate water for current and future needs. The water supply must be able to meet variations in current and future consumer demands.

## 3.1 History of Issues

The water supply in Alexandria has been a problem for the past two decades due to:

- Consumer demand exceeding the water taking permit (65 L/sec);
- Lack of consistent water supply during peak demand periods from the Garry River system and;
- Low water levels and thick ice in Mill Pond resulting in high raw water turbidity and the risk of freezing.

Furthermore, there are issues that have arisen as a result of fluctuating levels in the three lakes:

- Low levels reduce the recreational uses of Loch Garry and Middle Lake,
- High levels result in complaints and potential property damage, and
- Possible relationships between fish kills and low levels in the Lakes.

## 3.2 Existing Water Supply

The existing water supply for Alexandria comes from Alexandria Lake (Mill Pond) which in turn is fed by the upstream lakes. The current water supply is constrained by four factors:

1) Water levels in Alexandria Lake (Mill Pond),
2) MOE Permit to Take Water,
3) Natural Conditions (Precipitation, Evaporation) and,
4) Shoreline Land Usage on Middle Lake and Loch Garry.

Water levels in Mill Pond fluctuate 0.5 m or more. Low levels in the Lake or increased ice thickness result in increase turbidity in the raw water supply to the Town. The elevated turbidity increases the operational requirements to maintain treated water quality within drinking water (ODWO) parameters. The Alexandria Dam settings and the inflow to the lake from upstream control the water levels in Mill Pond.

## 3.4 Water Demand Forecasting

The most crucial piece of data that must be determined in order to find an acceptable solution to the problem is the quantity of potable water that Alexandria requires during the design period. The design period for projects of this type is typically 20 years, however a longer-term solution may be warranted depending on the analysis of the alternative solutions.

### *3.4.1 Current Water Demand Characteristics*

Alexandria has undertaken several water reduction initiatives in the past few years such as leak detection, water audits and metering with the objective of complying with the water-taking permit. These initiatives have resulted in significant water reduction of approximately 35%. Figure 3.1 illustrates the water demand characteristics in the Town over the past five years. The current consumption of approximately 3,500 $m^3$/day (average day) appears to be the minimum that is achievable given the current population and commercial establishments. With the exception of Consoltex, other water reduction initiatives will likely only provide moderate results (unless very aggressive). Consoltex has the potential to reduce their consumption significantly by implementing new process technologies, however they are relatively costly. Consequently, it is assumed that any growth in the municipality will result in a corresponding increase in water consumption.

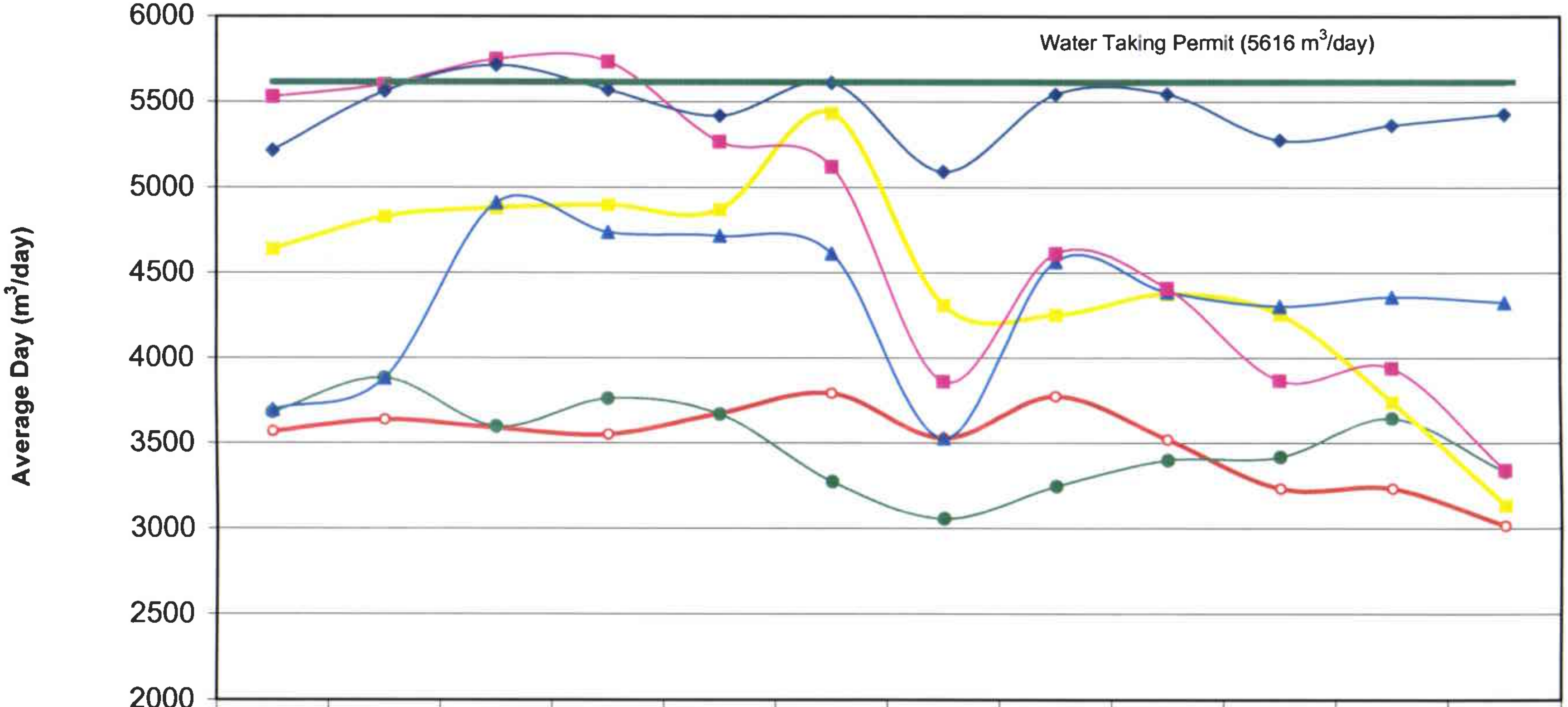
### *3.4.2 Future Water Demand*

Typically, water supply sources are designed for longer term than the treatment infrastructure. The design water demand should be selected taking the long-term design period into consideration to ensure that the recommended project solution will be effective for the municipality. Figure 3.2 illustrates the different water demand options. The limiting water demand criteria are the 20-year demand forecast and existing plant capacity of the water treatment plant.

***20 years of 1% growth - 4,270 $m^3$/day (50 L/s)***

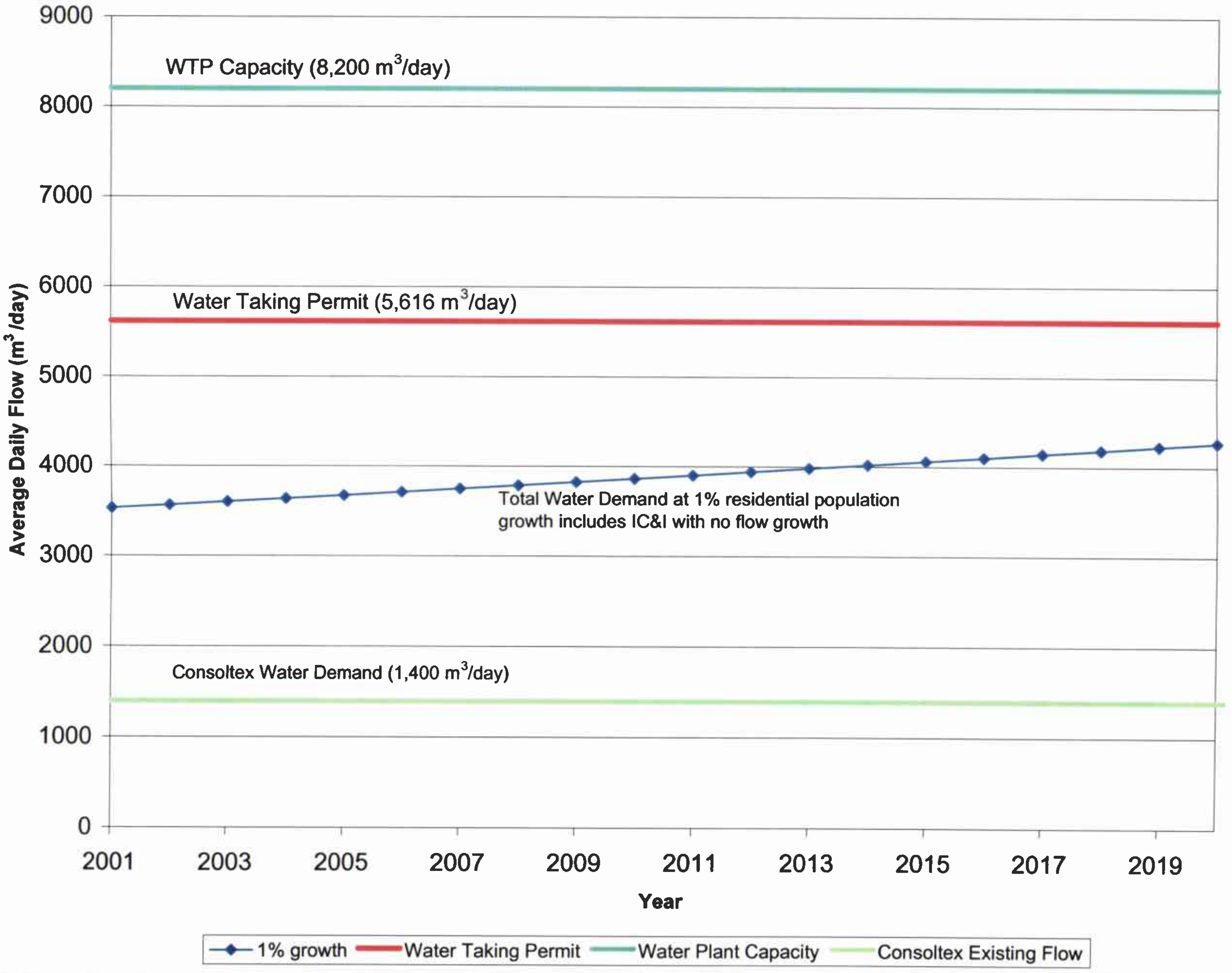
The Alexandria Sewage Treatment Project Environmental Study Report (November 23, 1998) defined the growth in Alexandria as 1% for population and 1% for industrial, commercial and institutional growth with the exception of Consoltex. This alternative assumes that Consoltex will neither increase nor decrease their water consumption, which currently account for up to 40% of the average daily water demand in Alexandria. The projected future water demand for this option will be 4,270 $m^3$/day at the end of the 20 year design period using 1999 as a base year. Consequently, both the projected average (4,270 $m^3$/day) and maximum (4,911 $m^3$/d)day water demand will not be in excess of the water-taking permit (5,616 $m^3$/d) at the end of the design period.

## Figure 3.1: Alexandria Historical Water Use Data



| | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1999 | 3568 | 3637 | 3587 | 3550 | 3673 | 3791 | 3528 | 3773 | 3519 | 3232 | 3232 | 3015 |
| 1998 | 3680 | 3881 | 3598 | 3761 | 3668 | 3272 | 3056 | 3245 | 3399 | 3418 | 3644 | 3332 |
| 1997 | 4637 | 4827 | 4879 | 4896 | 4870 | 5432 | 4310 | 4252 | 4374 | 4254 | 3740 | 3136 |
| 1996 | 3695 | 3879 | 4910 | 4738 | 4715 | 4612 | 3527 | 4565 | 4386 | 4303 | 4356 | 4324 |
| 1995 | 5529 | 5601 | 5748 | 5733 | 5266 | 5120 | 3860 | 4612 | 4409 | 3865 | 3939 | 3341 |
| 1994 | 5215 | 5559 | 5713 | 5569 | 5417 | 5611 | 5092 | 5543 | 5545 | 5275 | 5361 | 5426 |
| water taking permit | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 | 5616 |

Figure 3.2: Future Water Demand



***Alternative: Existing Water Plant Capacity - 8,200 $m^3$/day (95 L/s)***

The existing water plant has capacity of 8,200 $m^3$/day which will support a population of approximately 4,200 and an equivalent Industrial, Commercial and Institutional (IC&I) demand component based on 1999 consumption data. The advantage of designing the water supply solution for this option is that the infrastructure for treating the water is in place and this option would allow for maximum usage of the treatment facility. Based on flow forecasting, this option would likely be fully utilized well past the 20-year design period. Consequently, the incremental cost of designing a solution to meet demands beyond the 20 year period must be considered to ensure that any capital cost is efficient versus having to replace the entire system in 20 years.

## 3.5 System Storage Requirements

It is important to understand the magnitude of the impact of one day, one month and one year of water demand has on the levels in the three lakes. The calculation has been simplified by assuming that there is no inflow into the system during discharge.

Table 3.1 illustrates the estimated impact on the water level in the each of the three lakes based on the 20 year design maximum day water demand and dilution water requirements.

Table 3.1: Impact of Water demand on Water Storage

| | Loch Garry | Middle Lake | Mill Pond |
|---|---|---|---|
| Daily Maximum Demand – 6,862 $m^3$ | 0.2 cm | 0.9 cm | 3 cm |
| Monthly Maximum Demand – 205,860 $m^3$ | 6 cm | 28 cm | 82 cm |
| Annual Maximum Demand – 2,504,630 $m^3$ | 68 cm | Not possible | Not Possible |

In determining the volume of storage that is needed to ensure that Alexandria will have a water supply during a period of drought, the following criteria must be defined:

1) the minimum precipitation distribution (design precipitation),
2) critical water levels,

From there, we can determine the required storage volume.

To simplify the issue of what is a drought, with respect to this watershed, you have to consider a water balance of the system (See Figure 3.3). We will assume the following for the water balance:

- The groundwater inflow to Loch Garry is insignificant. This is very conservative.
- only 10% of rainfall that falls on the watershed outside of the limits of the lake surface area will be available for use by the water treatment plant or for dilution.
- The discharge from Alexandria Dam can be maintained at 30 L/s (2,592 $m^3$/d).

Using the above assumptions, we have calculated that the net precipitation (actual precipitation minus evaporation) required to ensure that there is no loss of storage (i.e. water levels do not change). The net precipitation required on the watershed that has been estimated to ensure no loss in storage is 28 mm per month or 335 mm/yr. During months where the net precipitation is less than 28 mm there will be a loss of storage and conversely there will be a gain in storage when the net precipitation is greater than 28 mm. Since 1968, the longest period of net loss in storage was six months and during that period 335.6 mm either evaporated or was discharged from the watershed based on projected flows and potential evaporation. This value is used as the primary constraint for the calculation of the storage required to reduce the occurrence of critical water supply problems.

For the purposes of this study, the worst case scenario occurs when:

- spring water levels in the lakes are at their normal operating levels at the beginning of a drought condition, and
- the drought condition is represented by the lowest precipitation and highest evaporation year in the past 32 years.

The design volume is the volume of water that is required to ensure that during the worst case scenario, the water demand. Assuming that at the end of the drought water levels would to be at the lower limit of their average operating range, then an additional volume of 1.32 million m$^3$ would be required to permit extraction of the projected 20 year water demand and dilution water. Table 3.2 illustrates the amount of storage required for different future conditions.

Water levels become critical when they fall below or exceed the target range for an extended period of time. Figures 2.1, 2.2 and 2.3 display the upper and lower ranges based on ten years of data as a trendline. These ranges are not meant as definitive limits because situations do arise where they will need to be modified by the operator responsible for the dam system.

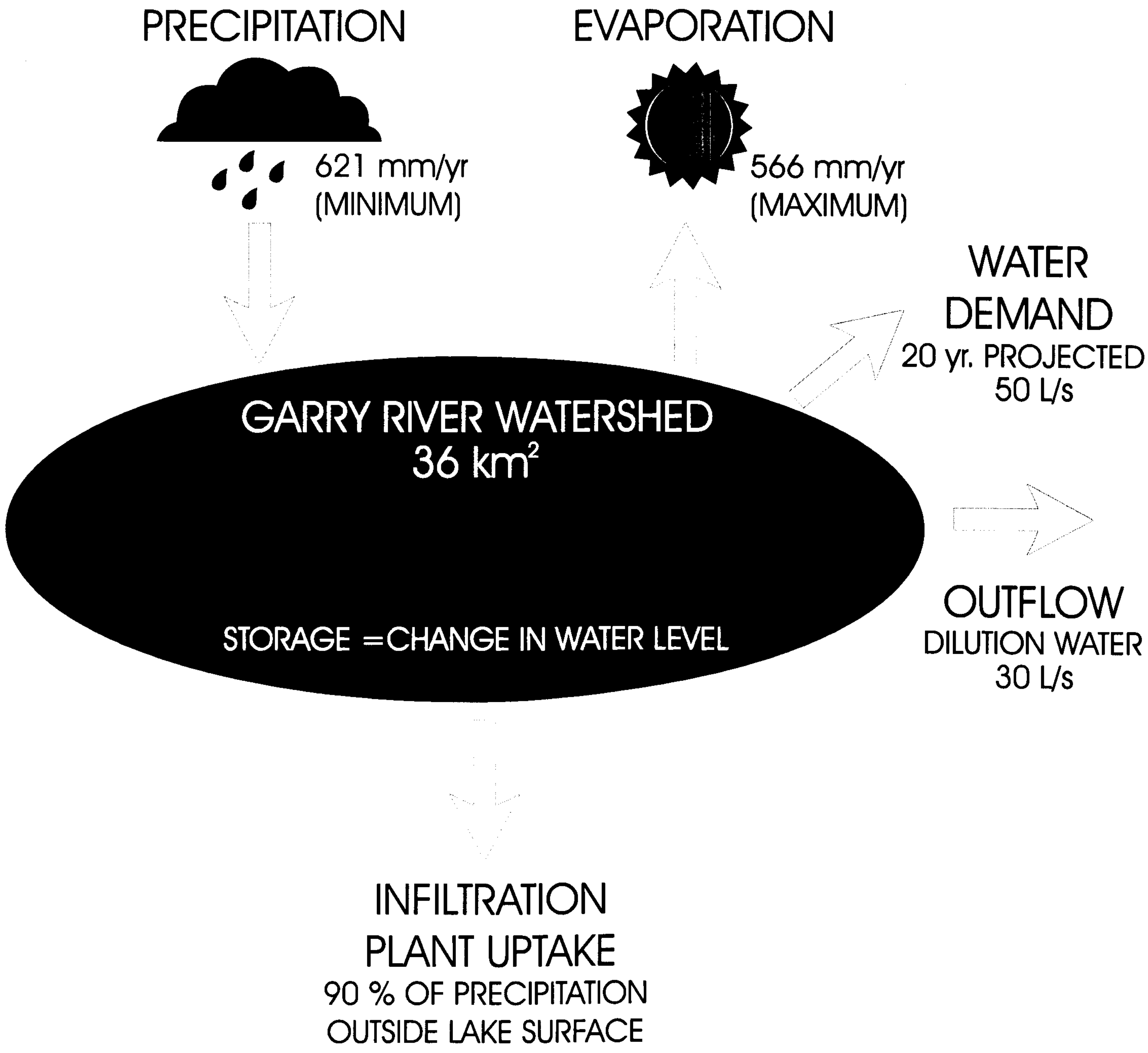
Continued communication between the operating authority (RRCA) and the Alexandria Water System operators is required to ensure that water restrictions can be implemented before there are adverse impacts on water levels in the system. Recreational and wildlife habitat issues will need to be considered in the determination of the critical water levels. As a larger database of information is compiled, the range of acceptable water levels can be more definitively determined.

Table 3.2: Garry River Storage Requirements

| **Scenario** | **2000** | **2010** | **2020** | **WTP Capacity** |
|---|---|---|---|---|
| Water Demand from Mill Pond (WTP + Dilution) | 6,088 m$^3$/d<br>(70 L/s) | 6,456 m$^3$/d<br>(74.7 L/s) | 6,862 m$^3$/d<br>(79.4 L/s) | 8,200 m$^3$/d<br>(95 L/s) |
| Storage Required | 1,307,000 m$^3$ | 1,311,000 m$^3$ | 1,320,000 m$^3$ | 1,350,000 m$^3$ |

## 3.6 Summary of Issues

- The current water supply is inconsistent and has had problems sustaining municipal needs for both drinking water and dilution water for sewage treatment.
- Water supply problem was a contributing factor to the current development freeze in Alexandria.



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consulting engineers
CORNWALL KINGSTON

The ROSEMOUNT Group

# HYDROLOGIC CYCLE (DESIGN CONDITIONS)

# ALEXANDRIA WATER SUPPLY ENVIRONMENTAL ASSESSMENT

| | |
|---|---|
| scale | NTS |
| date | OCTOBER 2000 |
| drawn by | CNB |
| job no. | 995176 |
| drawing no. | FIG 3.3 |

- Recreational demands on the Garry River system, particularly Loch Garry have resulted in demands for consistent water level control in the upper lakes.
- Future water demand will be 4,270 $m^3$/day average plus dilution water for sewage treatment during the 20-year horizon.
- The minimum storage that is required above current storage to permit water levels to remain within their current lower operating limits for all three lakes is 1.32 million $m^3$.

## 3.7 Statement of Problem

Alexandria intermittently has problems sustaining a reliable water supply during dry summer months due to the lack of flow from the upstream reservoir system. Alexandria requires a long-term sustainable water supply that will protect the existing population and commerce while permitting the Town to grow without undue restrictions.

# 4.0 DESCRIPTION OF ALTERNATIVES

In order to effectively determine the preferred alternative(s) to the problem, a full range of possible alternatives must be evaluated based on a reasonable group of criteria and constraints. We have developed a range of alternatives based on the solutions available within the geographic and environmental confines of Alexandria and the surrounding area. The alternatives that have been generated are displayed schematically on Figure 4.1. The potential environmental impacts are illustrated in Figure 4.2.

## 4.1 Preliminary Design Screening Criteria

To narrow the scope of the project to the most reasonable set of solutions for analysis, we completed an initial screening. The criteria were established based on the project objectives and our experience in similar projects.

These preliminary design screening criteria are stated as follows:

1) Comprehensive solution to water supply problem is required;
2) Solution must serve existing population base as well as to accommodate future growth of 1%, compounded annually for a design period of 20 years;
3) Solution must ensure equivalent raw water quality as is currently treated by the Water Treatment Plant;
4) Capital and operating cost must be affordable with respect to local means;
5) Natural, social and economical environment must not be significantly impaired by the solution (see Figure 4.2) ;
6) Solution must meet all applicable Provincial and Federal regulatory requirements.

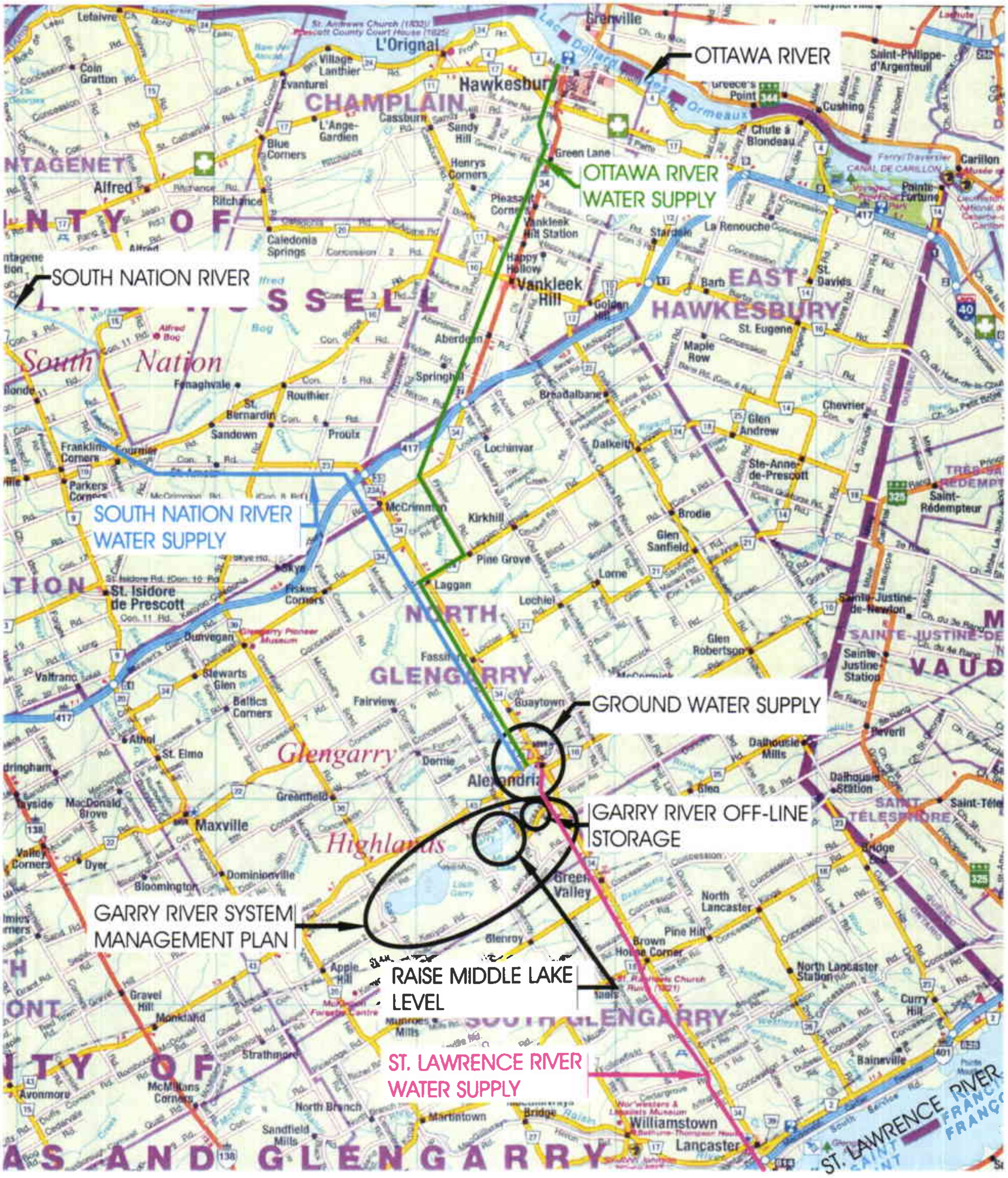
Alternative solutions were evaluated against the screening criteria to determine acceptability for further evaluation.

## 4.2 Alternative A: Do Nothing

The "Do Nothing" alternative is an essential alternative as it defines the limitations of the existing system and provides a check to ensure that the other solutions are better than leaving well enough alone.

**Alternative Definition**

- Operate the water and wastewater plants as currently operated.
- Management of the Garry River dams would be continued in accordance with the current operational plan.
- Development restriction associated with water supply would continue.
- Maximum water demand would be the lesser of the water taking permit or the flow of the Garry River less the required base-flow downstream.



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consulting engineers
CORNWALL KINGSTON

The THOMPSON ROSEMOUNT Group

## ALEXANDRIA WATER SUPPLY ENVIRONMENTAL ASSESSMENT

PROJECT ALTERNATIVES

| | |
|---|---|
| scale | N.T.S. |
| date | JULY 2000 |
| drawn | CNB |
| job no. | 995176 |
| drawing no. | FIGURE 4.1 |

| **Figure 4.2: Environmental Effects of Alternatives** | Alternatives | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A - Do Nothing | B - Water Reduction Strategy | C - Full Groundwater Source | C1 - Partial Groundwater Source | D - Delisle River Source | E - Ottawa River Source | E - South Nation River Source | F - St. Lawrence River Source | G - Increase Middle Lake Storage | H - Garry System Off-Line Reservoir | I - Modify River Operational Plan |
| **AESTHETICS** | | | | | | | | | | | |
| removal of vegetation or landscape features | | | 🟨 | 🟨 | 🟥 | 🟨 | 🟨 | 🟨 | 🟨 | 🟥 | 🟨 |
| change of compatibility with landscape | | | | | 🟥 | 🟨 | 🟨 | 🟨 | 🟨 | 🟥 | 🟨 |
| residents, non-residents, tourists exposed to new view | | | | | 🟥 | 🟨 | 🟨 | 🟨 | | 🟥 | |
| **AGRICULTURE** | | | | | | | | | | | |
| removal of productive farmland | | | 🟥 | 🟥 | 🟥 | 🟨 | 🟨 | 🟨 | | 🟥 | |
| disruption of field access from public roads | | | 🟨 | 🟨 | | 🟨 | 🟨 | 🟨 | | 🟨 | |
| disruption of tile and surface drains | | | | | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 |
| change in water quality | | | 🟥 | 🟥 | 🟨 | | | | 🟨 | | 🟨 |
| change in water quantity | | | 🟥 | 🟥 | 🟥 | | | | 🟨 | 🟨 | 🟨 |
| change in crop yield | | | 🟩 | 🟩 | 🟩 | | | | 🟨 | 🟩 | 🟨 |
| reduced viability due to land loss | | | 🟥 | 🟥 | 🟥 | | | | | 🟥 | |
| effects of chemical, bacteria, noise,dust on crops, livestock and people | | | | | | | | | | | |
| **CLIMATIC EFFECTS** | | | | | | | | | | | |
| vegetation removal or snow accumulation, windscreening and shade on adjacent buildings and activities | | | | | | | | | | | |
| change in air quality | | | | | | | | | | | |
| **ECONOMIC AND SOCIAL EFFECTS** | | | | | | | | | | | |
| change to tax base | | | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 |
| change in employment opportunities | | | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | | 🟩 | |
| change in quality of life | | | 🟩 | 🟩 | 🟨 | 🟩 | 🟩 | 🟩 | 🟨 | 🟨 | 🟨 |
| change in tax rate or cost of service | | | 🟥 | 🟥 | 🟥 | 🟥 | 🟥 | 🟥 | | 🟥 | |
| **FISH, AQUATIC WILDLIFE AND VEGETATION** | | | | | | | | | | | |
| change or removal of existing habitat including food and shelter | | | 🟩 | 🟩 | 🟥 | | | | 🟥 | 🟥 | 🟨 |
| change in water quality | | | | | 🟨 | | | | 🟨 | 🟨 | 🟨 |
| change in water temperature | | | | | 🟨 | | | | 🟨 | 🟨 | 🟨 |
| effects of timing of construction activities on spawning and breeding periods | | | | | 🟨 | 🟨 | 🟨 | 🟨 | | 🟨 | |
| lowering of water table | | | 🟥 | 🟥 | | 🟨 | 🟨 | 🟨 | | | |
| production of new habitat | | | | | 🟩 | | | | 🟨 | 🟩 | 🟨 |
| collecton of fish and organisms on intake screens | | | | | | 🟨 | 🟨 | 🟨 | | | |
| **GROUNDWATER** | | | | | | | | | | | |
| change in quality | | | 🟥 | 🟥 | | | | | | | |
| change in quantity | | | 🟥 | 🟥 | | | | | | | |
| interference with flows or levels | | | 🟥 | 🟥 | 🟨 | 🟨 | 🟨 | 🟨 | | 🟨 | |
| **HERITAGE RESOURCES** | | | | | | | | | | | |
| disruption and/or destruction of sites and structures having significant archaelogical, historical, architectural or economic values | | | | | 🟨 | | | | | 🟨 | |
| **PUBLIC HEALTH** | | | | | | | | | | | |
| effects on water quality | | | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 |
| effects on air pollutants | | | | | | | | | | | |
| effects on existing subsurface sewage disposal systems | | | 🟨 | 🟨 | 🟨 | | | | 🟨 | 🟨 | 🟨 |
| effects on 'quality of life' e.g. reduced water restrictions | | | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 |
| **NOISE AND VIBRATION** | | | | | | | | | | | |
| changes in existing noise and vibration levels | | | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | | | |
| **RECREATION** | | | | | | | | | | | |
| effects of accessibility changes | | | | | 🟨 | | | | | 🟨 | |
| disruption during construction | | | | | | 🟨 | 🟨 | 🟨 | | | |
| effects on layout or operations | | | | | 🟩 | 🟨 | 🟨 | 🟨 | | 🟩 | |
| effects on quality of user experience due to environmental changes | | | | | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟩 | 🟨 |

Improvement 🟩
less severe impact 🟨
more severe impact 🟥
no forseeable impact ☐

## Figure 4.2: Environmental Effects of Alternatives

| | Alternatives | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | A - Do Nothing | B - Water Reduction Strategy | C - Full Groundwater Source | C1 - Partial Groundwater Source | D - Delisle River Source | E - Ottawa River Source | E - South Nation River Source | F - St. Lawrence River Source | G - Increase Middle Lake Storage | H - Garry System Off-Line Reservoir | I - Modify River Operational Plan |
| **RESIDENTIAL, COMMERCIAL, INDUSTRIAL, INSTITUTIONAL** | | | | | | | | | | | |
| temporary disruption during construction | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | ⬜ | ⬜ | ⬜ |
| safety & movement patterns of pedestrian traffic | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | ⬜ | ⬜ | ⬜ |
| financial and social effects of relocation or removal of homes, businesses and institutions | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ |
| change in use or layout due to property loss | ⬜ | ⬜ | 🟥 | 🟥 | 🟥 | 🟨 | 🟨 | 🟨 | 🟨 | 🟥 | 🟨 |
| change in property value | ⬜ | ⬜ | 🟥 | 🟥 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 |
| improved sewage collection and water treatment | ⬜ | ⬜ | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 | 🟩 |
| reduction in water quantity and quality due to drawdown in private wells | ⬜ | ⬜ | 🟥 | 🟥 | ⬜ | 🟨 | 🟨 | 🟨 | ⬜ | ⬜ | ⬜ |
| effects on insurance rates via fire protection | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| **SOIL AND GEOLOGY** | | | | | | | | | | | |
| erosion or compaction during construction | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | ⬜ | 🟨 | ⬜ |
| deposition of sediment on adjacent properties | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | ⬜ | 🟨 | ⬜ |
| contamination of soils | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| mixing of topsoil with subsoil | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| scarring of unique landforms | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ |
| **SURFACE DRAINAGE** | | | | | | | | | | | |
| diversion and/or channelization of watercourses | ⬜ | ⬜ | ⬜ | ⬜ | 🟥 | ⬜ | ⬜ | ⬜ | 🟨 | 🟥 | 🟨 |
| effects on floodplain | ⬜ | ⬜ | ⬜ | ⬜ | 🟥 | ⬜ | ⬜ | ⬜ | 🟥 | ⬜ | 🟨 |
| contamination of surface watercourse | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 |
| sedimentation and turbidity of adjacent water bodies due to construction activities | ⬜ | ⬜ | ⬜ | ⬜ | 🟥 | ⬜ | ⬜ | ⬜ | ⬜ | 🟥 | ⬜ |
| "ponding" effects on adjacent properties due to natural drainage disruption | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | ⬜ | ⬜ | ⬜ |
| increased surface runoff | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| decreased surface water quality | ⬜ | ⬜ | ⬜ | ⬜ | 🟩 | ⬜ | ⬜ | ⬜ | 🟩 | 🟩 | 🟩 |
| decreased surface drainage | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 |
| **TERRESTRIAL VEGETATION AND WILDLIFE** | | | | | | | | | | | |
| mortality/stress of vegetation due to sediment deposition, construction equipment movement or changes in soil moisture | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 |
| conditions resulting in reduction and/or deterioration of wildlife habitat | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 |
| changes in vegetative composition as a result of environmental changes | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 |
| removal or disturbance of significant trees and/or ground flora | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | 🟥 | 🟨 | 🟨 |
| new or increased exposure of trees leading to increased loss of habitat for wildlife | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ |
| effect on wildlife habitat | ⬜ | ⬜ | ⬜ | ⬜ | 🟨 | ⬜ | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 |
| effect of contaminants on vegetation and wildlife | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ | ⬜ |
| **UTILITIES** | | | | | | | | | | | |
| effects on other utilities, e.g., relocations | ⬜ | ⬜ | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 | 🟨 |

| | |
|---|---|
| Improvement | 🟩 |
| less severe impact | 🟨 |
| more severe impact | 🟥 |
| no forseeable impact | ⬜ |

## 4.3 Alternative B: Water Reduction Strategy

This alternative does not provide for any additional water supply to be procured; however it proposes more efficient use of the existing water supply. To be effective, the water reduction strategy needs to be sustainable.

**Alternative Definition**

- Implement an aggressive program of water audits, toilet replacement subsidy, and public education program. Some of the typical reduction initiatives options have already been implemented by the PUC.
- Increase water rates substantially and move towards the elimination of the declining block rate structure. The declining block rate structure does not encourage large volume users to implement water reduction initiatives. Reflecting the "real" cost of producing water in the rate structure will have an impact on the pay-back analysis associated with reduction initiatives. High water rates may also have a negative impact on economic development. A thorough consultation with potentially effected large volume water users should be undertaken before embarking on this alternative.
- Consoltex has completed preliminary investigations into a water reduction initiative that may reduce their consumption by approximately 1,000 m$^3$/day (30% of current water treatment plant production). No further implementation is proposed.
- Water reduction within the rest of the Town would not likely be more than 10% (350 m$^3$/day existing flow) and only if there is complete participation.
- Estimated Project Cost: $215,000. (See Appendix E for the preliminary cost estimate).

## 4.4 Alternative C and C1: Groundwater Source (Full and Partial)

This alternative provides for either partial or complete replacement of the current water supply with a groundwater source. The preliminary investigations associated with this alternative included anecdotal information received from water haulers and data from MOE well records for the area.

**Alternative Definition**

- To change to a groundwater source with well fields near the town using the existing water plant or to supplement the existing surface water source with groundwater. New well fields would be found and raw water would be conveyed to the water treatment plant to increase the volume of the treated water available.
- Well records in the immediate area around Alexandria show production rates that vary from 8 to 230 Lpm.
- Historical data shows that both the Town and Consoltex have investigated a groundwater supply in the past and have found it not to be practical.
- Sustained high-yield groundwater extraction may result in hard water, potentially hydrogen sulphide and other minerals.
- Variability of groundwater supply suggests that there is not likely an adequate long-term water supply.
- Anecdotal evidence of groundwater quantity has shown potential for shortages. Large scale extraction for municipal use may have significant negative effects on the rural community in North Glengarry.

- Estimated Project Cost: $2.5 million to $4.8 million (See Appendix E for the preliminary cost estimates) excluding land acquisition costs (wellhead protection zone).

### 4.4.1 Natural Environment

A groundwater supply in this area would likely be drawn from the bedrock aquifer. The interconnection of the surficial and bedrock aquifer has not been reviewed and therefore cannot be ruled out until hydrogeological investigations are completed. If there is connectivity between the two aquifers, there may be long-term effects of the groundwater extraction on surface water in the area. There would be impacts on the native plant and animal species associated with any change in the surface water quantity or quality. The impact would need to be mitigated by detailed hydrogeological investigations to delineate the area of influence of proposed production wells and the preferred methodologies to reduce any impacts.

Restrictions on land development for well head protection zones may have a beneficial impact on the natural environment by allowing existing lands that are cultivated or otherwise used by humans to be returned to the natural land inventory. This may provide additional habitat for native plant and animal species.

There would be some minor impacts associated with the construction of the wells, pumping station(s) and the raw water feeder main. These impacts would include noise, vibration, dust, and erosion. These could be mitigated by standard construction housekeeping practices and an aggressive schedule to limit the length of the construction period.

### 4.4.2 Social Environment

The social impacts on the groundwater source will initially be the results of construction work to install the wells, pumping station(s) and feeder main. These impacts will consist of dust, noise, inconvenience and temporary loss of use or access to areas in and around the Town. A coordinated construction plan and proper management of pollution will mitigate these impacts somewhat.

Once the system is complete and in operation, the social impacts will be more abstract in the form of concerns for water quality due to the recent situation in Walkerton, Ontario where the groundwater source became contaminated and people died as a result of *E. coli* infection. Public education and proper utility management to maintain public confidence in the water supply can deal with these impacts.

### 4.4.3 Economic Environment

Both of these options will result in impacts associated with the capital and operating costs of the system. These costs will vary depending on the number of wells that are found to be necessary to provide adequate capacity for the Town.

The economic impact that will have the most effect relative to other alternatives will be the land requirements for wellhead protection. The detailed hydrogeological investigation will require an area around the well(s) that will be delineated as a wellhead protection zone(s). This zone(s) will have restrictions regarding land use to protect the groundwater recharge zones from contamination and/or reduction in recharge rates. This may result in agricultural and/or future residential or industrial lands that are being taken out of inventory for use. There will be economic effects associated with loss of production capacity, tax revenue, employment and development revenue. These are difficult to assess until the lands that are defined as the wellhead protection zone(s) are determined. Consideration would have to be made during the next phase based on the cost/benefit analysis of different well locations with regards to the economic effects.

The effects of large-scale groundwater extraction on adjacent wells may have an economic impact on agricultural properties in the area. These impacts may necessitate the drilling of new wells be to replace shallow wells or they may require lands outside of the current service area to be connected to the water distribution system. These possibilities would result in an economic impact on the residents that were affected.

## 4.5 Alternative D: Delisle River Water Source

This alternative would provide additional water supply to supplement the supply from the Garry System. The Delisle River was the water supply up until 1954 and at that time it was determined that the Delisle had inadequate capacity for the future. Only through a drastic change in design approach can the Delisle River provide a sustainable water supply to Alexandria. Analyses that were undertaken for this alternative were a review of the watershed and anecdotal evidence on flow fluctuations.

### Alternative Definition

- Controlling flow and creating a substantial reservoir in the Delisle River using the existing or a new dam to provide adequate sustainable flow to service Alexandria.
- Low lift pumping station and raw watermain would be required to get the water from the Delisle River to the existing treatment facility.
- Ability to take water from two watersheds rather than one may not improve the reliability of the overall supply, since both watersheds are geographically in close proximity and suffer the same precipitation variations.
- High cost of capital upgrades (reservoir excavation, low lift pumping, raw watermain, and new control dam structure).
- Prime agricultural land covers the preferred siting for storage. Secondary storage areas are limited to upstream near the hamlet of Greenfield and have less than three months storage by constructing one control structure (see figure 4.3)
- Environmental impacts of changing river flow regime may be significant.
- Garry River system was determined in the 1940's to be a better water source than the Delisle.
- Cost and political issues associated with land acquisition for storage will be contentious.
- Estimated Construction Cost: $8.2 million (See Appendix E for the preliminary cost estimates) excluding land acquisition costs.

### 4.5.1 Natural Environment Inventory

The construction of a new dam and reservoir in the Delisle river basin would have significant impacts on the natural environment. The change in the river's flow regime may result in changes in the species that live in the River. Furthermore, the alternative reservoir zones as currently defined, (see Figure 4.3) would result in a significant wetland area being turned into a shallow lake, which would affect the ecology in those areas. However, since the river is periodically dry in the summer, the provision of a reservoir and control structure would provide a consistent base flow year-round. This would allow for some species that currently cannot survive in the river to be viable. It will be difficult to mitigate the impacts of the reservoir since a change in the ecology of the river is a function of the volume of water in the river and its residence time.

The impacts of the dam and reservoir construction, pumping station and raw water feeder main would be significant due to the large volume of excavation that would be required for the dam and reservoir construction. Conventional methods of dust control, noise and erosion control would be required. Furthermore, the timing of the construction in the River would have to be coordinated with aquatic habitat specialists to avoid conflicts with spawning seasons. As well, a detailed erosion and sediment control plan would be required to mitigate any long-term downstream impacts of sediment discharges.

### 4.5.2 Social Environment

The Delisle River source alternative will require significant modification to the Delisle River through the construction of a dam and reservoir. There will be both beneficial and detrimental social impacts of this project. The beneficial impacts would be increased recreational uses of the waterway around the reservoir for fishing and potentially boating. Conversely, the detrimental effects would be:

- the loss of land for other uses (recreational and agricultural),
- potential expropriation of private land for the reservoir area and access,
- fragmentation of the river due to dam construction and subsequent impacts on recreational uses and,
- loss of quality of life for residents adjacent to the river system.

The construction of the Delisle River will require large volumes of concrete and earth to be moved in and out of the preferred reservoir site. This will impact residents and visitors near the site and along the haul routes to and from the site due to noise, dust and traffic. Furthermore, along the feeder main route between the reservoir and the water treatment plant, there would be some impacts associated with noise, dust, traffic and inconvenience. All of the construction impacts to the social environment can be mitigated somewhat by the implementation of good construction operational practices and public relations.

### 4.5.3 Economic Environment

The economic impacts that will be limited to the capital and operating costs of the system plus the loss of use of land for the footprint of the reservoir. Based on our analysis of alternative reservoir locations, there will be minimal economic impacts associated with the reservoir as most of the sites are low-lying and do not appear to form part of the actively farmed inventory of land in the area.

## 4.6 Alternative E: Ottawa River/South Nation Pipeline

These alternatives are stand-alone solutions that permit a long-term good quality water supply. The analyses that were completed on this alternative included preliminary sizing and cost analysis of alternative routes.

**Alternative Definition**

- Install a raw water intake and raw watermain from Ottawa River or the South Nation River to the Alexandria Water Treatment Plant.
- An intake and low lift pumping station would be located at the water source and pump untreated water to the Alexandria water treatment plant.
- Choice of South Nation vs. Ottawa River would require analysis of possible intake sites. Ottawa River is most likely better quality of water, while the South Nation is closer and land acquisition would be less costly.
- Estimated Construction Cost: $12.2 million to $17.1 million excluding land acquisition costs. (See Appendix E for the preliminary cost estimates).
- Capital cost is very high.
- Land acquisition at the water source would be required.
- Political boundary crossing negotiations may be difficult.
- Environmental impact of intake and watermain during construction would be an issue.
- Water quality in South Nation River is more variable than the Ottawa River or St. Lawrence River.
- Length of raw watermain would be 25 to 36 km ±.

### *4.6.1 Natural Environment*

Once these alternatives are constructed, there would be very little impact to the natural environment as they majority of the installation would be underground and would not affect existing local ecosystems.

Each of these alternatives would include the following components that may result in impacts to the natural environment during construction:

- Raw water intake into the river,
- Low-lift pumping station and,
- Raw water feeder main.

The raw water intake may have the most significant impact on the natural environment by disturbing the river bottom and fish habitat. However, technologies such as directional boring may assist in mitigating these issues by reducing the disturbance to the river bottom. Regardless of the type of construction methodology utilized, an erosion control and sediment management plan consisting of silt curtains will be required. Additionally, construction timing should be coordinated to avoid conflicts with spawning periods in the preferred stretch of river.

The low lift pumping stations will likely be located near the river shoreline and the excavation for the wet-well and building may impact on shoreline habitat, slope stability and sedimentation in the river. Incorporating a site selection process that includes consultation with MNR biologists to determine the constraints of site construction can mitigate any issues for the pumping station site. Furthermore, an erosion control and sediment management plan will be required for the construction.

Each of these alternatives, the length of raw water feeder main is quite extensive. Therefore, there will be a variety of impacts that may have an effect on the natural environment:

- Stream and marsh crossings – effects on habitat, vegetation
- Surplus excavation material – site geology and interception of groundwater flow
- Removal of trees from feeder main alignment – destruction of vegetation
- Noise, dust – effects on habitat, vegetation, water and air quality

Some of these impacts will be minor and can be mitigated using prudent and efficient construction practices, however there will be some impacts that cannot be mitigated completely due to the nature of open cut pipe installation. A comprehensive pollution and sediment management plan implemented by the contractor will keep any impacts to a minimum.

### 4.6.2 Social Environment

All of these alternatives will have similar social impacts. The principal long-term social impacts would be loss of shoreline property use for residential and recreational uses. Furthermore, noise associated with the pumping of the raw water to Alexandria would impact properties adjacent to the low-lift pumping station.

During construction, there would be impacts associated with noise, dust, traffic and inconvenience. Again, this can be mitigated somewhat by an appropriate construction pollution management plan and good public relations.

### 4.6.3 Economic Environment

Beyond the significant capital and operating costs that would be associated with this alternative, other economic impacts would be mostly associated with the loss of shoreline property for the low-lift pumping station and intake. The feeder main would be designed to follow existing road allowances where feasible to avoid having to acquire additional land or easements.

There may be another benefit associated with this alternative which would be to provide small communities along the proposed feeder main alignment with raw water that could be treated and used as a municipal water supply. The raw water could be sold to the intermediate communities to assist in reducing the economic impact on the Township of North Glengarry and specifically the Town of Alexandria ratepayers.

## 4.7 Alternative F: St. Lawrence River Pipeline

This alternative is a stand-alone solution that will permit a long-term good quality water supply. The analyses that were completed on this alternative included preliminary sizing and cost analysis of alternative routes.

**Alternative Definition**

- Install a raw water intake and watermain from the St. Lawrence River to the Alexandria Water Treatment Plant.
- An intake and low lift pumping station would be located at the water source and pump untreated water to the Alexandria water treatment plant.
- Estimated Construction Cost: $11.7 million excluding land acquisition costs. (See Appendix E for the preliminary cost estimates).
- Provides a secure and adequate water supply.
- Capital cost is very high.
- Political boundary crossing negotiations may be challenging.
- Environmental impact of intake and watermain during construction could be significant.
- Length of raw watermain would be 23 km ±.

### *4.7.1 Natural Environment*

Once this alternative are constructed, there would be very little impact to the natural environment as they majority of the installation would be underground and would not affect existing local ecosystems.

This alternative would include the following components that may result in impacts to the natural environment during construction:

- Raw water intake into the river,
- Low-lift pumping station and,
- Raw water feeder main.

The raw water intake may have the most significant impact on the natural environment by disturbing the river bottom and fish habitat. However, technologies such as directional boring may assist in mitigating these issues by reducing the disturbance to the river bottom. Regardless of the type of construction methodology utilized, an erosion control and sediment management plan consisting of silt curtains will be required. Additionally, construction timing should be coordinated to avoid conflicts with spawning periods in the preferred stretch of river.

The low lift pumping stations will likely be located near the river shoreline and the excavation for the wet-well and building may impact on shoreline habitat, slope stability and sedimentation in the river. Incorporating a site selection process that includes consultation with MNR biologists to determine the constraints of site construction can mitigate any issues for the pumping station site. Furthermore, an erosion control and sediment management plan will be required for the construction.

For this alternative, the length of raw water feeder main is quite extensive. Therefore, there will be a variety of impacts that may have an effect on the natural environment:

- Stream and marsh crossings – effects on habitat, vegetation.
- Surplus excavation material – site geology and interception of groundwater flow.
- Removal of trees from feeder main alignment – destruction of vegetation.
- Noise, dust – effects on habitat, vegetation, water and air quality.

Some of these impacts will be minor and can be mitigated using prudent and efficient construction practices, however there will be some impacts that cannot be mitigated completely due to the nature of open cut pipe installation. A comprehensive pollution and sediment management plan implemented by the contractor will keep any impacts to a minimum.

### *4.7.2 Social Environment*

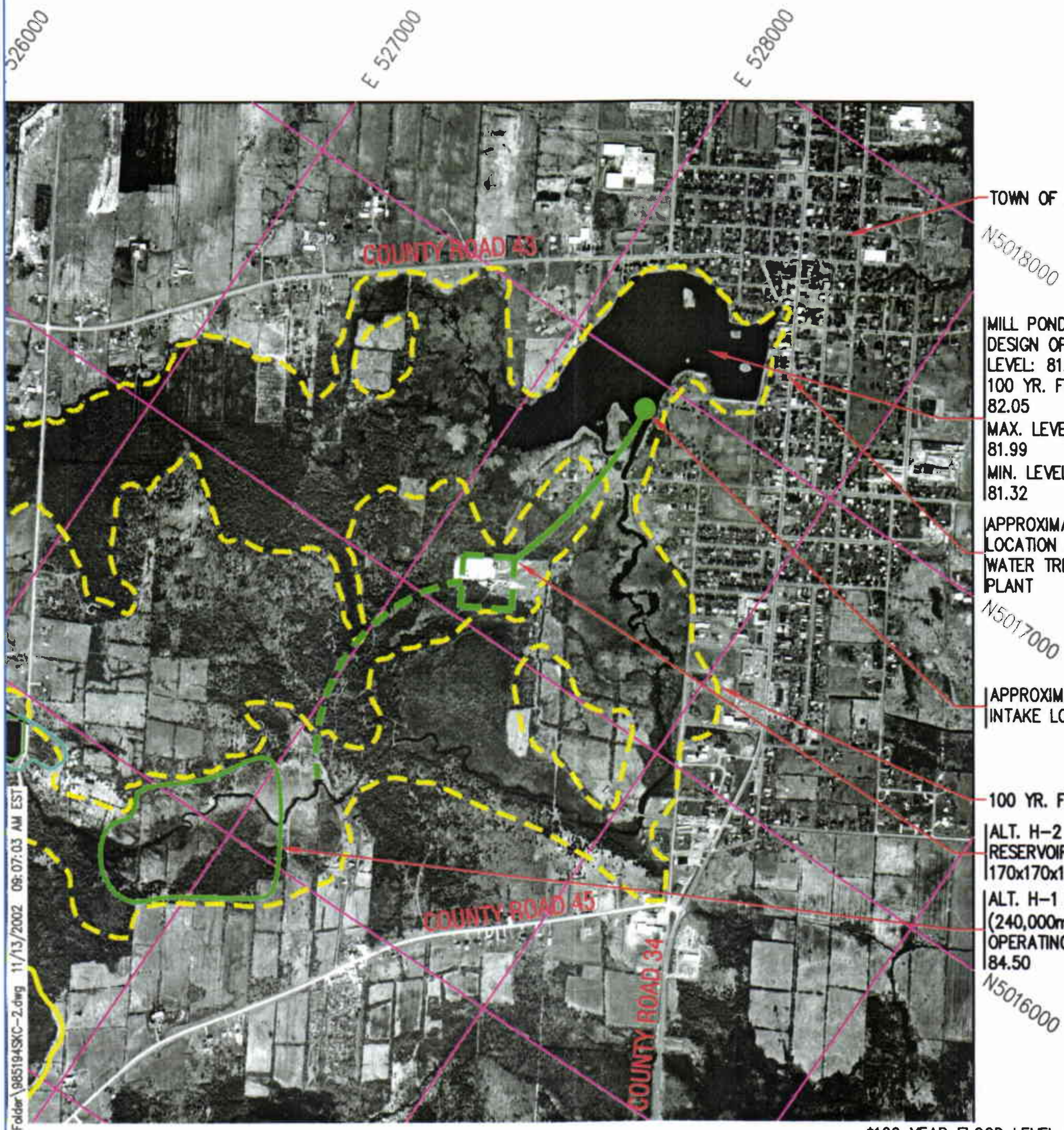
This alternative will have similar social impacts to other pipeline alternatives. The principal long-term social impacts would be loss of shoreline property use for residential and recreational uses. Furthermore, noise associated with the pumping of the raw water to Alexandria would impact properties adjacent to the low-lift pumping station.

During construction, there would be impacts associated with noise, dust, traffic and inconvenience. Again, this can be mitigated somewhat by an appropriate construction pollution management plan and good public relations.

### *4.7.3 Economic Environment*

Beyond the significant capital and operating costs that would be associated with this alternative, other economic impacts would be associated with the loss of shoreline property for the low-lift pumping station and intake. The feeder main would be designed to follow existing road allowances where feasible to avoid having to acquire additional land or easements.

There may be another benefit associated with this alternative which would be to provide small communities along the proposed feeder main alignment with raw water that could be treated and used as a municipal water supply. The raw water could be sold to the intermediate communities to assist in reducing the economic impact on the Township of North Glengarry and specifically the Town of Alexandria ratepayers.



TOWN OF ALEXANDRIA

MILL POND
DESIGN OPERATING LEVEL: 81.60
100 YR. FLOOD LEVEL: 82.05
MAX. LEVEL (1900–99): 81.99
MIN. LEVEL (1990–99): 81.32

APPROXIMATE LOCATION OF EXISTING WATER TREATMENT PLANT

APPROXIMATE WATER INTAKE LOCATION

100 YR. FLOOD LEVEL*

ALT. H–2 RESERVOIR
170x170x18m

ALT. H–1 RESERVOIR
(240,000m x2.5m)
OPERATING* LEVEL: 84.50

*100 YEAR FLOOD LEVEL BASED ON PUBLIC INFORMATION FLOOD RISK MAP (100 YEAR M.N.R. FLOODPLAIN DRAWING, DATED 1989)

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**The THOMPSON ROSEMOUNT GROUP INC.**
architect & consulting engineers
CORNWALL KINGSTON FERGUS

The THOMPSON ROSEMOUNT Group

ALEXANDRIA WATER SUPPLY STUDY

MIDDLE LAKE STORAGE RESERVOIR ALTERNATIVES
H–1 AND H–2

| | |
|---|---|
| scale | 1:20,000 |
| date | 13/11/02 |
| drawn | K.W. |
| job no. | 985194 |
| drawing no. | |

FIG. 4.4

## 4.8 Alternative G: Increase Storage Volume in Middle Lake

This alternative would significantly increase the storage volume of Middle Lake. Analyses that were completed for this option included review of digital mapping to determine attainable storage volumes, the current operational plan, occupied lands around Middle Lake, and sensitive environment areas close to Middle Lake.

**Alternative Definition**

- Construct dikes, modify the Middle Lake dam and channels to increase the storage capacity of the Lake.
- Kenyon Dam would have to be upgraded to maintain higher water levels.
- Improvement of the hydraulic cross-section of outlet from Kenyon Dam and Mill Pond will be required to permit flood flows to be discharged from the system efficiently.
- Dredging around intake in Mill Pond will be required to clear 50 years of sedimented material (est. 1m - 1.8m). This applies to all solutions that will maintain the existing water treatment plant intake.
- Estimated Construction Cost: $6.34 million excluding land acquisition costs. (See Appendix E for the preliminary cost estimate).
- Relatively high cost alternative to achieve significant volume.
- No need to further improve water collection or treatment infrastructure.
- Will result in change within the Middle Lake wetland habitat. Environmental impacts would likely be significant to Lost Lake due to the high level.
- Expropriation/purchase of land would be required to permit additional flooding.
- Raising Middle Lake water level to the 100 year flood level (88.44 m) thus raising volume by 1.8 million $m^3$ (262 days design including dilution water).
- 1:100 year flood line will need to be re-mapped.

### 4.8.1 Natural Environment

The construction that would be associated with this project would involve significant earthwork to raise the Kenyon Dam and other areas as necessary to permit the higher water level. Drawing C.01 displays this alternative on an aerial photograph mosaic of the area.

The environmental impact of this alternative is significant in that large volumes of fill will be required to raise the berms around the dam. Furthermore, the improvements to the hydraulic cross-section of the Kenyon Dam and Alexandria Dam outlet channels will impact on aquatic and terrestrial species habitat. Alternative designs will be considered to mitigate the impact of this work. During construction, the contractor will be required to protect the Garry River from impacts of sediment discharge. This will include silt fencing, silt curtains in the river and erosion control blankets to prevent scouring of the new berms and channel until vegetation can be established.

The ongoing impacts to the natural environment of raising the levels of Middle Lake may be as follows:

- Change in wetland species distribution due to increased open water and corresponding reduction in marsh areas.
- Improvement of the year round fish habitat.

- Reduction in downstream turbidity due to increased sedimentation in Middle Lake.
- Increase in algal bloom due to water stagnation in the reservoir.

Furthermore, Lost Lake, a fen located northwest of Middle Lake, is considered based on anecdotal evidence from local naturalists to have some species that fall into the category of Vulnerable Threatened or Endangered (VTE) and an ecosystem that is unique to the area. There is concern that raising the water levels will impact on the ecosystem. A biological assessment would need to be completed to determine the impact of raising water levels in both Middle and Lost Lake.

The raising of the water level in Middle Lake by 54 cm would result in seasonal flooding of a Class 1 wetland in an Environmental Protection Area, which would be difficult to justify to the public and Ministry of Natural Resources.

Channelization of the Garry River and modifications to the Mill Pond outlet to permit efficient discharge of flood flows through the system may have an impact on habitat through the Town and downstream into the Delisle River. The current Garry River alignment through the Town has been modified in the past and therefore the impact may be minimal, due to previous channelization work. Construction impacts of the channelization work would consist of noise, dust and sediments. An integrated pollution and sediment management plan would be required to mitigate any impacts to the natural environment.

As discussed above, the dredging of sediments in an area extending around the intake will be required for all solutions that will retain the current intake structure. The environmental impacts of the dredging will be an impact on the aquatic habitat in Mill Pond. This will need to be completed at a time of year that will minimize the impacts on aquatic species. Furthermore, care will need to be taken to limit the external impacts of this work associated with disposal of the excavated sediments and implementation of a sediment management plan during construction.

### *4.8.2 Social Environment*

The social impacts of this alternative will be mostly limited to residents that own shoreline property on Middle Lake. There will be less usable land due to flooding from higher levels in the Lake. This may result in a reduced quality of life to those residents. Flood-proofing properties and buildings to maximize the land that can be utilized by the residents and avoiding any property damage could mitigate the reduced quality of life. Furthermore, the implementation of more stringent development restrictions would avoid having to use municipal funds to flood-proof any further properties beyond the existing residences.

The overall increase in the water level in Middle Lake will result in a more consistent depth to allow for recreational uses of the lake for boating and fishing.

### *4.8.3 Economic Environment*

Permanently raising Middle Lake would have a significant on the landowners that own property on the shore of Middle Lake. Valuation and fair compensation would have to be established for the affected property owners.

As with all other alternatives, the ratepayers in Alexandria would be impacted by the capital costs associated with this project.

## 4.9 Alternative H-1: Upper Garry River On-Line Storage Reservoir (Lake)

This alternative involves the construction of an on-line storage reservoir in the form of a lake located between Middle Lake and Mill Pond as illustrated on Figure 4.4. The volume of storage is proposed at 575,355 $m^3$ which, in conjunction with the additional storage created through Alternative I, meets the predicted demand. This on-line reservoir would be regulated in a similar fashion to Middle Lake and Mill Pond and would capture a portion of the high spring runoff flows and major rainfall events. When required to meet water demand, the water in the reservoir would be drawn down through a control structure (dam) and allowed to flow at a higher rate into the system.

The proposed lake will be approximately 24 ha (59 ac) in area and 2.5m (8.2 ft) deep. The preliminary cost estimate is provided in Appendix E.

### 4.9.1 Definition

The components and operational issues are discussed below:

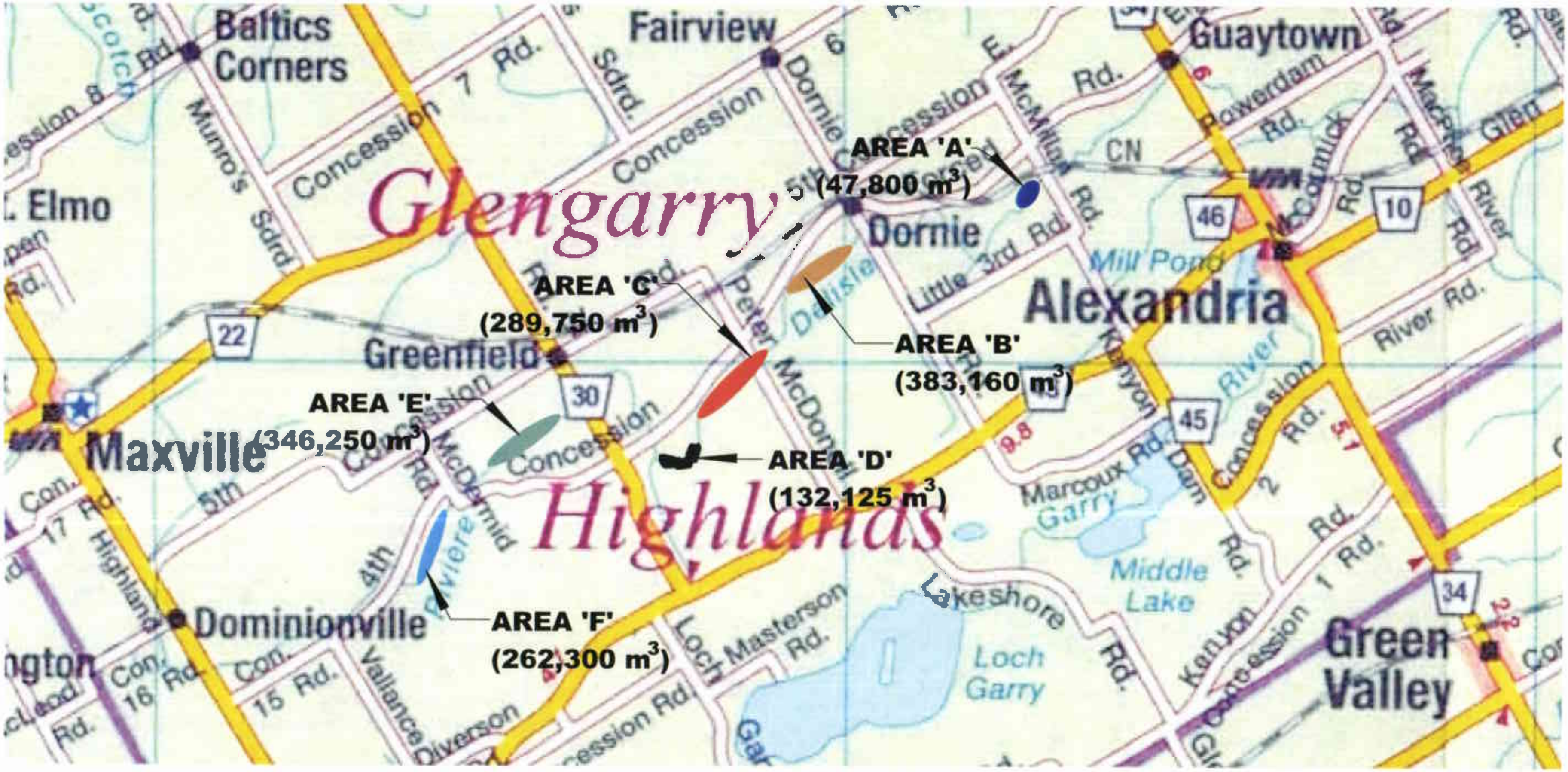
- An on-line storage reservoir would be constructed in the Garry River System to capture a portion of the spring freshet volume and then release the water back into the system during low flow periods. The reservoir would take the form of a lake.

- An outlet control structure would be constructed at the downstream limit of the lake to regulate the flow of water into the Garry River. A dike would be required around the eastern limit of the lake to contain the water. The hydraulic gradient is sufficient to accommodate gravity flow and hence pumping is not required.

- A sufficient area of land will be required to accommodate the lake and related works.

- The estimated cost (Class D) is approximately $5.83 million excluding land acquisition costs. (See Appendix E for preliminary cost estimates).

- The proposed storage volume is 600,000 $m^3$ which includes an allowance for evapotranspiration losses of 59,000 $m^3$ during worst case conditions as discussed earlier in the report.



M.S. THOMPSON & ASSOCIATES LTD.
consulting engineers
CORNWALL KINGSTON

The THOMPSON ROSEMOUNT Group

ALEXANDRIA WATER SUPPLY
ENVIRONMENTAL ASSESSMENT

ALTERNATIVE DELISLE RIVER RESERVOIR
STORAGE AREAS

| | |
|---|---|
| scale | N.T.S. |
| date | JULY 2000 |
| drawn | CNB |
| job no. | 995176 |
| drawing no. | FIGURE 4.3 |

### 4.9.2 Natural and Social Environment

Natural and Social Environmental impacts include:

- The land in the area of the proposed lake is designated in the North Glengarry Official Plan as Wetland and is classified as a provincially significant Class 1 Wetland. Any alteration to this environment will require extensive studies to evaluate the potential impacts and develop mitigation measures if achievable. It is beyond the scope of this study to determine the specific impacts on the wetland that would result from a lake development on the proposed site.

- The Garry River is fish habitat along this reach and any work in the water or affecting the water will likely result in a HADD (hazardous alteration, disruption, or destruction) to fish habitat as define in the Fisheries Act.

- The land in the area of the proposed lake is within the 1:100 year floodplain. This alternative will impact the floodplain and the associated impacts will have to be assessed.

- Land acquisition will be significant and may be disruptive to the current landowners and their operations. Some farm land will be removed from inventory.

- The impacts associated with the construction of the related works (excluding the quarry) can generally be mitigated by a comprehensive pollution control plan and coordination of forces to minimize impacts on traffic and residents adjacent to the work.

- Raw water quality will not be improved with this alternative. The natural environment of the Lake will evolve quickly to reflect the natural environment of the existing lakes including dense aquatic vegetation and algae formation.

### 4.9.3 Economic Environment

The preliminary capital cost estimate is presented in Appendix E. This alternative is estimated to cost approximately $5,831,000 excluding GST. This estimate does not include the cost of environmental impacts mitigation or land costs.

## 4.10 Alternative H-2: Upper Garry River Off-Line Water Storage Reservoir

This alternative involves the construction of an off-line storage reservoir in the form of a quarry located between Middle Lake and Mill Pond as illustrated on Figure 4.4. The volume of storage is proposed at 524,000 $m^3$ which, in conjunction with the additional storage created through Alternative I, meets the predicted demand. This off-line reservoir would be configured to be able to capture the high spring runoff flows and major rainfall events. When required to meet water demand, the water in the reservoir would be pumped back into the system at the west end of Mill Pond.

The proposed quarry which will be approximately 2.89 ha (7.1 ac) in area and 19m (62 ft) deep, may provide revenue from the sale of crushed rock. The preliminary cost estimate is presented in Appendix E.

### 4.10.1 Definition

The components and operational issues are discussed below:

- An off-line storage reservoir would be constructed adjacent to the Garry River System to capture a portion of the spring freshet volume and then release the water back into the system during low flow periods. The reservoir would take the form of a rock quarry and the expectation is that the extracted rock would be sold commercially. Logistically there are issues to be resolved. Until the quarry is fully mined, it will not be available for water storage, and if the rock were removed immediately, it would have to be stockpiled on site for future crushing, screening, and sale.

- An inlet structure would be constructed in the Garry River downstream of Frasier Rapids. The structure would divert a portion of the flow to an inlet channel that would be constructed between the inlet structure and the reservoir.

- A pumping station would be required to lift the water to the west end of Mill Pond through an outlet pipe.

- An electrical supply and access road from County Road 45 to the quarry site are included.

- A sufficient area of land will be required to accommodate the quarry, related operations and the rock stockpile.

- The estimated cost (Class D) is approximately $7.9 million excluding land acquisition costs. (See Appendix E for preliminary cost estimates).

- The proposed storage volume is 524,000 $m^3$ which includes an allowance for evapo-transpiration losses of 7,400 $m^3$ during worst case conditions as discussed earlier in the report.

### 4.10.2 Natural and Social Environment

Natural and Social Environment impacts include:

- Quarries require a specific approval under the Aggregate Resources Act, RSO. The process is lengthy, typically in excess of 5 years, if achievable. An amendment to the North Glengarry Official Plan (OPA) will be required if a quarry is developed. If the aggregate is not used commercially then an OPA and quarry license may not be required. While the proposed site is presently designated Rural, all of the requisite studies and supporting documentation will have to be submitted as part of the application.

- The most significant potential environmental impact will be associated with hydrogeology and hydrology. It is beyond the scope of this study to determine the specific impacts on the groundwater regime that would result from a reservoir on the proposed site. Impacts associated with exfiltration from the reservoir and groundwater table suppression during sustained drawdown in the reservoir will have to be assessed.

- The potential environmental impact associated with periodically diverting significant volumes of water from the Garry River system will have to be assessed.

- Traffic, and dust and noise are also potential environmental impacts that will have to be evaluated as part of the quarry licensing process.

- There are numerous quarries in the immediate area and hence demonstrating a demand for an additional aggregate source may be difficult and may generate objections to the OPA and licence application.

- The impacts associated with the construction of the related works (excluding the quarry) can generally be mitigated by a comprehensive pollution control plan and coordination of forces to minimize impacts on traffic and residents adjacent to the work.

- Raw water quality will be improved moderately with this alternative. The natural environment of the Lake will not evolve to reflect the natural environment of the existing lakes due to the depth of water. Dense aquatic vegetation and algae formation will likely be limited to the shallow near shore areas of the quarry.

### 4.10.3 Economic Environment

The preliminary capital cost estimate is presented in Appendix E. This alternative is estimated to cost approximately $7,930,000 excluding GST. This estimate does not include the cost of environmental impacts mitigation or the cost of land acquisition. Provided that the quarried rock (mud) is sold on site to a quarry operator, there is potential revenue from the sale of crushed rock which is estimated at $1.00 per tonne. Crushing, screening and delivery are costs that will accrue to the operator of the site. The net capital cost would then be approximately $6,930,000.

## 4.11 Alternative H-3: Convert an Existing Quarry for Reservoir Storage

This alternative involves the acquisition of an existing quarry in the immediate area. The volume of storage will be a function of the available quarry volume. This off-line reservoir would be configured to capture groundwater and major rainfall events. It may be necessary to pump the storage water to the quarry depending on the location and gradient. When required to meet water demand, the water in the reservoir would be pumped back into the system at the west end of Mill Pond.

While there are several active quarries in North Glengarry, there are no quarries adjacent to the Garry River system. It is beyond the scope of this report to investigate the potential to acquire an existing quarry. The environmental impacts will be similar to Alternative H-2 however an existing quarry may have addressed some of the impacts through the licensing procedure. Anecdotal information provided by a quarry operator suggests that groundwater is not abundant in the vicinity and that very little pumping is required to maintain a "dry" working area.

Some issues to be addressed include:

- Quarry acquisition will be required,
- Reservoir raw water quality is suitable,
- Hydrogeological/hydrological impact will have to be assessed,
- Depending on the size of the existing quarry, additional mining may be required to the target achieve volume,
- Capital cost is a function of the selected site and environmental issues.

## 4.12 Alternative I: Modify Middle Lake Operational Plan

The "Garry River Operation Plan" (Appendix C) would be modified to increase the (recent) normal target water level from 87.9 m to 88.3 m, providing approximately 975,000 $m^3$ of additional storage during some periods of each year. While this is less storage volume than the target value of 1,320,000 $m^3$, it may provide an effective interim target or short term strategy. For example, if, over the last 32 years, the Town of Alexandria had required the 20 year projected demand, 4,270 $m^3/d$ (50 L/s) plus 2,592 $m^3/d$ (30 L/s) for dilution and the target water level in Middle Lake was 88.3 m, then there would have been 7 years where the water had fallen below the design lower limits for the system. Conversely, if the water level were to remain at 87.9 m under this previous scenario, the water levels in the lakes would have fallen below the design lower limits in 22 of the 32 years.

This alternative may not result in any changes to the historical high water level (88.44 m ASL) in Middle Lake and typically the historical low water level would be higher. The average annual water level would also increase. The analyses that were considered in the evaluation of this alternative included review of the current operational plan and evaluation of historical annual flow patterns.

### Alternative Definition

- Modify operational plan to retain more water in the Garry River system throughout the year. The revised plan would document operational guidelines and reporting requirements, while allowing for operator flexibility during extreme conditions (high or low flows).
- Improvement of the hydraulic cross-section of the outlet channels from Mill Pond and Middle Lake may be required to permit flood flows to be discharged from the system more efficiently.

- Middle Lake target level would need to be raised from 87.9 to 88.3 to provide an additional 975,000 m$^3$ of storage (75% of design storage, see Section 3.5).
- With an operating level of 88.3 m in the spring based on historical averages, the water level would be expected to decline to 87.6 m during design demand conditions.
- Implementation of the Operation Plan will require the operation of level, rainfall and flow gauges sending real-time data to a remote operator so that the water levels can be monitored on a constant basis. An on-call operator can be notified of any significant changes. The RRCA has already implemented most of the components of this plan as part of their ongoing operation and maintenance of the system.
- Estimated Cost: $2.08 million (See Appendix E for preliminary cost estimate).
- Water levels in Loch Garry and Mill Pond would fluctuate over the current range. For example, the design for the Loch Garry reservoir predicts a 30-50 cm fluctuation from May 31st to September 1st annually.
- The wetland habitat may be impacted by the seasonal changes in water levels.
- Outlet channel system would be designed to maintain existing 100 year flood line on Middle Lake.

### 4.12.1 Natural Environment

Modifying the Garry River Operational Plan would result in the level in Middle Lake at the high operating range for longer periods compared with current operation. This may have some impacts on the habitat in the area, however the levels would not be in excess of the levels experienced in the past ten years. Lake levels would be maintained below the level where the Lost Lake fen would be impacted.

The following is extracted from the Middle Lake Wetland Assessment (February 2002) conducted by Don Cuddy to determine the impacts and mitigative measures relative to the Wetland on Middle Lake. The full report is provided in Appendix F.

> ### *5.0 Conclusions and Recommendations*
>
> ### *5.1 Conclusions*
>
> *Increasing the design operating level for Middle Lake by 40 cm is expected to have several effects on the wetland:*
>
> *- There will be minor changes to the wetland boundary, particularly in areas where the wetland boundary abuts or is near the current lakeshore.*
>
> *- It is anticipated that there will be some dieback of trees in portions of swamp forest, and replacement by shrub thickets.*
>
> *- There will be short-term impacts on the marsh/open water portions of he wetland, with the amount of cattail marsh being reduced and the amount of open water marsh being increased. Judging by what has happened in the past, this will be relatively short lived due to high nutrient levels in the lake.*

*- A portion of East fen will likely experience some inundation. If prolonged or extensive, this could have adverse impacts on the fen community (possible replacement by cattail marsh) and rare species (most notably Eastern Prairie Fringed-orchid).*

## *5.2 Recommendations*

### *5.2.1 Design Operating Level*

*Plant communities and plant and wildlife species have evolved to take advantage of natural forces, including water level changes associated with the change of seasons (spring highs, late summer/early fall lows). Any change in this regime, other than sporadic events resulting in unusual but short-term extremes, is deleterious to many species and communities. When water levels are artificially regulated, impacts can be mitigated but not eliminated by simulating natural cycles. Water levels in Middle Lake are already carefully controlled. In a year with normal rainfall, evaporation and water use contribute to summer and fall lows, conditions that are beneficial to a wide range of wildlife. However, this is not a stated objective of water level management for the lake. It is recommended that the objectives for water level management in the lake and specifically the "design operating level" include an objective for simulating naturally lower late summer-early fall levels.*

### *5.2.2 Baseline Water Level Mapping*

*Determining the potential impacts of a relatively minor water level increase in Middle Lake has been hampered by a lack of water level benchmarks for Lost Lake and the fen area. Establishing benchmarks that are accurate to within +/- 5 cm would be extremely valuable for predicting impacts and monitoring change. Ideally, these would be established within each of the fen areas, on the shore of Lost Lake and elsewhere as needed (such as along the main channel between Loch Garry dam and Middle Lake).*

### *5.2. 3 Monitoring*

*If the proposal to increase average water levels in Middle Lake is acted upon, the following monitoring activities are recommended.*

***5.2.3.1 Changes in boundaries of wetland and wetland communities:*** *While it is expected that there will be changes in both wetland boundary (minor) and wetland communities, these may occur slowly, with gradual dieback of trees and shrubs over a number of years. Aerial photography and follow-up surveys of vegetation can be used to monitor these changes.*

***5.2.3.2 Fens:*** *The area of open and treed fen vegetation extending for about 1 km east-northeast of Lost Lake should be monitored periodically (at least every five years) for changes. Of particular concern would be the invasion and expansion of cattails at the east end of this area.*

***5.2.3.3 Eastern Prairie Fringed-orchid:*** *This species should be watched closely for changes in number of plants and vigour. If possible in 2002, the fen area should be thoroughly surveyed to locate and document the status of all plants that can be found. This* *work should be done during the flowering period for the species (second and third weeks of July). Because of the variability in flowering of this species, the difficulty in identifying non-flowering individuals and the potential for dormant individuals, it would be advisable to subtlety mark all individuals found. This work should be repeated for two more years and thereafter the plants can be checked on a less frequent basis, preferably at least every five years.*

*5.2.3.4* ***Bird and Amphibian Populations:*** *A volunteer for the Bird Studies Canada Great Lakes Marsh Monitoring Program (MMP) established a monitoring route along the Garry River through Middle Lake Marsh in 1995. Unfortunately, the route was not maintained and no data were collected in subsequent years. Despite this the poles marking the stations are still in place. It is recommended that the feasibility of resurrecting the route be investigated.*

### *5.3 Additional Planning/Management Considerations*

*- While beyond the scope of this work, consideration should be given to developing/furthering programs that would reduce the nutrient inflow to the wetland.*

*- There is a short dam or dyke west of Lakeshore Road that separates the Middle Lake wetland from an arm of Loch Garry wetland. When observed in October 2001, it appeared to be preventing the flow of water from Loch Garry eastward into the Lost Lake area. It is possible that before the Loch Garry Dam was constructed the Lost Lake/fen area of the wetland drained both east and west. Knowing more about the surface drainage of this area before Loch Garry and Kenyon dams were constructed could improve our understanding of hydrology of the fen area.*

*- There is considerable rural housing development in the area. The impact of wells and septic systems on ground water is rarely considered when rural development is approved. Ground water is an unquantified but clearly important contributor to the hydrology of the fen area and the wetland as a whole. Vegetation in the southeast arm of the wetland suggests that there may be significant groundwater movement into this area as well.*

*- Several ponds have been dug on private land northwest of Lost Lake. These are presumably fed by groundwater and could potentially have some effect on the hydrology of the area. Consideration should be given to regulating/controlling the construction of ponds.*

*Improvements to the hydraulic cross-section of the outlet channels will require excavation of the existing channels and potentially the construction of new spillways to permit high flows to be discharged through an optimized flow channel. There will be impacts to the aquatic and terrestrial habitats that will need to be mitigated during construction. The contractor will be required to control silt using silt curtains and fencing during construction and complete the work during the proper season to have the least impact on the habitat and resident species. This methodology will be detailed in Phase 3 of the EA process if this alternative is determined to be the preferred solution.*

*As discussed above, the dredging of sediments in an area extending around the intake will be required for all solutions that will retain the current intake structure. The environmental*

> *impacts of the dredging will be an impact on the aquatic habitat in Mill Pond. This will need to be completed at a time of year that will minimize the impacts on aquatic species. Furthermore, care will need to be taken to limit the external impacts of this work associated with disposal of the excavated sediments and implementation of a sediment management plan during construction.*

The following is extracted from the Middle Lake Fish Habitat Assessment conducted by Michele Lavictoire, ESG International, to determine the impacts and mitigative measures relative to fish habitat on Middle Lake. The full report is provided in Appendix G.

*Fish Habitat Assessment – ESG International , Oct. 2001*

- *No net negative impact to habitat is expected*
- *Raising normal operating levels will alter/relocate terrestrial and aquatic wetland habitat*
- *A net improvement to fish habitat is predicted with deeper water*
- *Channels could be dredged in the new wetland marsh area to improve fish access*
- *Downstream erosion measures if required will not negatively impact the fish habitat*

### 4.12.2 Social Environment

There will be minimal social impacts of modifying the Garry River System Operation Plan as the current maximum levels will be maintained and only the control will be increased to maximize the available storage in the system. There may be some minor impacts on low-lying properties associated with sustained periods of higher levels in Middle Lake. This can be mitigated by flood-proofing properties that may be affected.

### 4.12.3 Economic Environment

There will be limited economic impacts of this alternative. Landowners adjacent to the three lakes are currently affected by restrictions on development due to the 1:100-year floodplain. The higher levels in Middle Lake during the year may increase the potential for recreational uses in that Lake as well as fish habitat. The preliminary capital cost estimate is presented in Appendix E. This alternative is estimated to cost approximately $2,081,606 for channel improvements and erosion control measures which can be phased.

# 5.0 EVALUATION OF ALTERNATIVE SOLUTIONS

## 5.1 Alternative A – Do Nothing

- Does not provide a single comprehensive solution.
- Does not address future municipal growth.
- Water quality is impaired during low level periods due to high turbidity.
- Cost of maintaining status quo is within local means.
- Natural, social and economic environment would not be impacted by a major capital project.
- No approvals required.
- A comprehensive contingency plan is required if this alternative prevails. It is only a matter of time until a condition occurs requiring an emergency supply (hauled water) and/or water rationing.

This alternative does not meet the project requirements and should be rejected.

## 5.2 Alternative B – Water Reduction Strategy

- Does not provide a single comprehensive solution.
- Does not solve problem with sustainable water supply from Mill Pond.
- A substantial reduction could be achieved if a major water user (Consoltex) implemented a significant water reduction program involving new technologies.
- No adverse or beneficial impact on water quality.
- No adverse impact on the environment.
- No approvals required.

This alternative does not address long-term demands of the Town without a significant Consoltex water reduction. Even so, the problem with a consistent water supply from the Garry River system will still be an issue in the long-term. A less aggressive program of water reduction strategies may improve the effectiveness of the preferred solution, consequently, this alternative should form part of all solutions and is therefore considered part of the demand determination portion of this study.

## 5.3 Alternative C – Groundwater Supply

- May provide a comprehensive solution to the problem.
- May be able to accommodate future growth if adequate water supplies are available.
- Water Quality may require additional treatment due to hardness and sulphides, which will affect operating costs. Overall, groundwater quality may be worse than the current water supply.
- Capital cost may increase significantly depending on location of sustainable groundwater source.
- Natural environment will be affected by the increased demand on limited groundwater resources.

- Social and economic environment may be affected by loss of agricultural land to wellhead protection zones and lower groundwater levels for rural water users.

A groundwater-based solution is not a preferred solution due to potential impacts on the rural residents and apparent variability of the groundwater source in the area. Given recent groundwater studies in the region, a groundwater source of this magnitude is not practical. This solution will be rejected on the basis that groundwater alone would not form a viable long-term solution.

### 5.4 Alternative D – Delisle River Water Supply

- Does not provide a comprehensive solution to the problem.
- Could not address future water demand because the Delisle is dry for a period each year.
- Water quality would be degraded compared to the Garry River system due to agricultural runoff and low flow (high turbidity).
- Cost would be significant relative to the additional water that would be available.
- Natural environmental impacts would be significant.
- It would be difficult to secure approval to re-route a significant portion of the Delisle River flow.

This alternative appears technically feasible to supplement the flow in the Garry System only and could not serve as a replacement water supply. Therefore, this alternative is not considered a viable comprehensive solution.

### 5.5 Alternative E – Ottawa River/South Nation Raw Water Supply Main

- Does provide a comprehensive solution.
- Will serve existing and future population base.
- Ottawa River quality would be similar and the South Nation River water quality would be diminished relative to the existing water supply.
- Cost may be beyond municipal means without subsidy.
- Natural, social and economic environment would be affected by solution in the short-term due to construction.
- Jurisdictional issues will result from the numerous municipal boundaries that must be crossed.

This alternative has similar benefits as the St. Lawrence River Alternative, however, a longer raw water supply main would be required. Consequently, the cost would be higher without any added benefit. Furthermore, the South Nation River, although closer than the Ottawa River has a significantly smaller watershed and there may be restrictions on water taking from that river in the short and long-term. In addition, the South Nation River water quality is relatively poor. Therefore this alternative should be investigated no further.

### 5.6 Alternative F – St. Lawrence River Raw Water Supply Main

- Does provide a comprehensive solution.

- Will serve existing and future population base.
- Water quality would be better than the existing water supply.
- The St. Lawrence River is in the same watershed as the Garry River system.
- Cost may be beyond municipal means without subsidy.
- Natural, social and economic environment would be affected by this alternative in the short-term due to construction.
- Jurisdictional issues will result from the adjacent municipal boundary that must be crossed.

This alternative is viable due to the essentially unlimited water supply and relatively straightforward technical issues. Consequently, this alternative should be examined further to determine the economic and environmental implications of this solution.

## 5.7 Alternative G – Increase Storage Volume in Middle Lake

- Could form part of a comprehensive solution.
- May be capable of providing adequate flow for the projected 20 year demand.
- This alternative may provide improved water quality due to increased depth of flow and reduced turbidity.
- Outlet channel improvements will have environmental impacts that will need to be mitigated.
- Significant purchase of land and/or restriction on contiguous development would be required to ensure that the water reservoir level fluctuation could be secured.
- Cost may be beyond current municipal means without subsidy.
- Natural environment particularly around Lost Lake may be significantly affected by long-term change in water levels.
- Alternative would be difficult to meet all regulatory requirements. MNR approval would be difficult to secure due to significant impact on the Class 1 Wetland.
- 1:100 year flood plain would need to be re-mapped.

There are serious environmental issues that preclude this alternative from being considered as the preferred solution.

## 5.8 Alternative H-1: Upper Garry River On-Line Storage Reservoir (Lake)

- May provide a comprehensive solution.
- Could serve existing population and population growth.
- Would provide equivalent water quality if stagnation could be controlled.
- Cost may be beyond municipal means without subsidy. Cost of land would be variable depending on site location.
- Natural environmental issues may be significant during construction and due to the loss of land for other uses.

This alternative may provide an acceptable solution from a technical standpoint, however the cost and potential environmental impacts make this alternative impractical. This alternative is a more expensive version of the Middle Lake alternative (Alternative G). The primary advantage of this alternative is that on-line storage permits better control of water levels in the lakes by redirecting flood flows into the reservoir, thereby reducing flood flows into Mill Pond.

It is unlikely that this alternative, constructing a new lake, is achievable given the impacts that are predicted relative to the natural environment in a Class 1 Wetland. Additionally, as a long term strategy, this alternative has two significant shortcomings:

- There is no surplus capacity to accommodate other communities in North Glengarry such as Maxville and Apple Hill, and

- The watershed has a finite hydrologic capacity. In recent years, meteorological conditions have become more extreme with significantly less than normal precipitation in some years. The total design water demand (6,862 $m^3$/day) exceeded the total net precipitation in the watershed in 1999. Water management today is important but in the long term the watershed may not meet the demand of the community irrespective of water management. Other demands on the available hydrologic capacity have to be considered as well including the natural flow in the Garry River and Delisle River.

### Alternative H-2: Upper Garry River Off-Line Storage Reservoir

- May provide a comprehensive solution
- Could serve existing population and population growth.
- Would provide equivalent water quality if stagnation could be controlled.
- Cost may be beyond municipal means without subsidy. Cost of land would be variable depending on site location.
- Natural environmental issues may be significant during construction and due to the loss of land for other uses.

This alternative may provide an acceptable solution from a technical standpoint, however the cost and potential environmental impacts make this alternative less attractive. This alternative is a more expensive version of the Middle Lake alternative (Alternative G). The primary advantage of this alternative is that off-line storage permits better control of water levels in the lakes by redirecting flood flows into the reservoir, thereby reducing flood flows into Mill Pond.

This alternative, constructing a new reservoir, is likely achievable however, natural environmental impacts including hydrogeology will have to be evaluated in more detail and the limited demand for more quarried rock will have to be factored into the evaluation. As a long term strategy, this alternative has two significant shortcomings:

- There is no surplus capacity to accommodate other communities in North Glengarry such as Maxville and Apple Hill, and

- The watershed has a finite hydrologic capacity. In recent years, meteorological conditions have become more extreme with significantly less than normal precipitation in some years. The total design water demand (6,862 $m^3$/day) exceeded the total net precipitation in the watershed in 1999. Water management today is important but in the long term the watershed will not meet the demand of the community irrespective of water management. Other demands on the available hydrologic capacity have to be considered as well including the natural flow in the Garry River and Delisle River.

### Alternative H-3: Convert an Existing Quarry for Reservoir Storage

- May provide a comprehensive solution.
- Could serve existing population and population growth.
- Would provide equivalent water quality if stagnation could be minimised.
- Cost may be beyond municipal means without subsidy. Cost of quarry acquisition would be variable depending on selected site.
- Natural environmental issues may be significant during construction and due to the loss of land for other uses.
- May have significant hydrogeological impact.

This alternative may provide an acceptable solution from a technical standpoint, however the cost and potential environmental impacts may make this alternative impractical. In addition, regional groundwater limitations make this alternative unattractive. Limited data is available upon which to support a detailed evaluation.

There is no indication that a quarry in the immediate area is available for acquisition. As a long term strategy, this alternative has two significant shortcomings:

- There is no surplus capacity to accommodate other communities in North Glengarry such as Maxville and Apple Hill, and

- The watershed has a finite hydrologic capacity. In recent years, meteorological conditions have become more extreme with significantly less than normal precipitation in some years. The total design water demand (6,862 $m^3$/day) exceeded the total net precipitation in the watershed in 1999. Water management today is important but in the long term the watershed will not meet the demand of the community irrespective of water management. Other demands on the available hydrologic capacity have to be considered as well including the natural flow in the Garry River and Delisle River.

## 5.9 Alternative I – Modify Middle Lake Operational Plan

- Does not provide a long-term comprehensive solution.
- May provide approximately 75% of the long-term design flow/storage requirement.
- May be capable of providing adequate flow for the projected 20 year demand based on historical meteorological conditions. Severe droughts will remain to be problematic.
- Outlet channel improvements will have environmental impacts that will need to be mitigated.
- Would provide equivalent water quality.

- Cost may be within municipal means. Capital cost is relatively modest and there is virtually no impact on annual operating costs.
- Social impacts may be significant with respect to some properties adjacent to Middle Lake. Mitigation should be achievable.
- Environmental impacts in terms of habitat and ecosystems are both positive and negative in the short-term due to higher levels sustained for longer periods of time. Further assessment may be necessary.

This alternative may provide a technically achievable, affordable short-term (less than 20 year) solution, provided that:

- meteorological conditions remain relatively constant,
- a water efficiency strategy is advanced and maintained,
- social and environmental issues can be mitigated.

## 5.10 Project Class Environmental Assessment Schedule

Table 5.1 displays the schedule of each of the alternatives in accordance with the Class Environmental Assessment Act.

Table 5.1: Class EA Schedule for Project Alternatives

| Alternative | Project Type | Class EA Schedule |
|---|---|---|
| A – Do Nothing | No change in operation or water source | Sched. A |
| B – Water Reduction Initiative | Change to system operation | Sched. A |
| C –Groundwater Source | New Water Source | Sched. C |
| D – Delisle River Water Source | New Water Source by Constructing Storage | Sched. C |
| E – Ottawa/South Nation River Pipeline | New Water Source | Sched. C |
| F – St. Lawrence River Raw Pipeline | New Water Source | Sched. C |
| G – Increase Storage in Middle Lake | Construct Additional Storage | Sched. C |
| H – Construct Water Storage Reservoir | Construct Additional Storage | Sched. C |
| I– Modify Garry River System Operational Plan | Modify River Operational Plan | Sched. B |

Schedule A projects have minimal environmental (social, economic and natural) impacts and are approved in terms of the Environmental Assessment Act.

Schedule B projects have limited impacts that require some form of mitigation. Public consultation is less rigorous and essentially involves a screening process. The Class EA process for Schedule B projects concludes with the Phase 1 & 2 Report and a Preliminary Engineering Report. A Public Notice of Project is issued.

Schedule C projects require an extensive public consultation process and the completion of an Environmental Study Report.

## 5.11 Summary of Alternatives

A summary of the alternatives can be found in Table 5.2. Based on the preliminary design screening criteria the following alternatives have been selected as the preferred alternatives requiring further analysis:

### Alternative F: St. Lawrence River Pipeline

This alternative will provide a long-term solution to the water supply problem. It is not economically viable at this time without considerable financial assistance given the enormous capital cost estimated at $11.7 million.

### Alternative I: Modify the Garry River System Operation Plan

This alternative, although not meeting the long-term design projection for water demand, provides an affordable interim solution at an estimated capital cost of $3.51 million which can be phased over several years.

# Table 5.2: Summary of Alternatives

| Alternative | Description | Capital Cost | First Year Operating Cost | 20-Year Life Cycle Cost | Comprehensive Achievable Solution | Capacity for Growth | Improved Raw Water Quality | Affordable without Assistance | Natural Environment Impact | Social Environment Impact | Economic Environment Impact | Provincial/Federal Approvals Feasible | Preferred Alternative | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A | Do Nothing | na | na | na | N | N | N | Y | N | Y | Y | Y | No | Not a Viable Solution |
| B | Water Reduction Strategy | na | na | na | N | N | N | Y | N | N | Y | Y | Yes | Not a Viable Solution |
| C1 | Full Groundwater Source | na | na | na | N | N | N | N | Y | Y | Y | ? | No | Insufficient Groundwater; Not a Viable Solution |
| C2 | Partial Groundwater Source | na | na | na | N | N | N | N | Y | Y | Y | ? | No | Insufficient Groundwater; Not a Viable Solution |
| D | Ottawa River Pipeline | $17,121,748 | $54,585 | $18,474,546 | N | N | N | N | Y | Y | Y | N | No | Excessive Cost; Not a Viable Solution |
| E | St. Lawrence River Pipeline | $11,732,772 | $65,340 | $13,352,114 | N | Y | Y | N | Y | N | Y | ? | Yes | Viable. Opportunity for All-North Glengarry System. |
| F | Delisle River Reservoir | $10,163,251 | na | na | Y | Y | Y | N | Y | N | Y | Y | No | Not Viable. Insufficient water. Land Acquisition, Environmental Impacts not factored in Costs. |
| G | Expand Middle Lake Reservoir | $6,518,763 | $13,620 | $6,856,312 | N | Y | N | N | Y | Y | Y | N | No | Not Viable. Land Acquisition, Environmental Impacts not factored in Costs. |
| H1 | Upper Garry River On-Line Reservoir | $7,841,512 | $6,810 | $8,010,286 | N | Y | N | N | Y | Y | Y | N | No | Not Viable. Land Acquisition, Environmental Imapcts not factored in Costs. |
| H2 | Upper Garry River Off-Line Reservoir | $8,193,154 | $19,760 | $8,682,873 | N | Y | Y | N | Y | Y | Y | ? | No | Viable. Land Acquisition, Hydrogeological Impacts, Sale of Rock not factored in Costs. |
| H3 | Other Reservoirs | na | na | na | N | Y | Y | N | Y | Y | Y | N | No | Further evaluation required to determine viability. |
| I | Modify Middle Lake Operational Plan | $2,081,606 | $6,810 | $2,250,381 | Y | Y | N | Y | Y | Y | N | Y | Yes | Interim Solution with Conditional Approval from Approval Agencies. |

Notes:

Land Acquisition costs will be considerable for some Alternatives and are not included.
Environmental Impacts and related compensation will be considerable for some Alternatives and are not included.
Life Cycle costs include energy and inflation at 2.0% per annum.

# 6.0 CONCLUSIONS AND RECOMMENDATIONS

## 6.1 Conclusions

The Town of Alexandria has derived its source of water for the municipal water supply from Alexandria Lake (Mill Pond) and the upper Garry River System since 1954. Prior to that (and since the early 1900's), the Town water supply was derived from the Delisle River. Various dams have been constructed on the upper Garry River System, thus artificially creating three lakes. The Middle Lake dam (Kenyon Dam), originally constructed in 1869 and the Alexandria dam (Mill Pond Dam), constructed in circa 1840 regulated water supply to the grist mill in Alexandria.

Increased water demand and climatological (annual precipitation) conditions have contributed to near critical source water shortages for the Town of Alexandria in the recent past. In addition, development around Loch Garry and, to a lesser extent, Middle Lake has constrained the operational practices of the Raisin Region Conservation Authority with respect to controlling lake water levels for reservoir storage.

From the data, it is clear that during the spring runoff and high rainfall periods throughout each year, there is an abundance of water - unfortunately, there is not an abundance of storage and hence the surplus water is released from the Lakes to the Garry River, eventually discharging to the Delisle River during spring freshets and major rain events.

Over the years, residential development has been permitted to take place around Loch Garry and to a lesser extent Middle Lake. That residential development has somewhat limited the operational practices of the Conservation Authority including the target water levels in order to reduce the risk of flooding homes and properties. Without the constraints associated with development, the operational practices and particular the target water level(s) could be adjusted on Loch Garry to increase storage volumes without any significant environmental impacts. The lake system could then be operated as a reservoir system as opposed to a recreational lake system.

This report has evaluated a range of alternatives intended to sustain a water supply for Alexandria including:

- Water reduction strategy,
- Groundwater source,
- Delisle River source,
- St. Lawrence River source,
- Ottawa River/South Nation River source,
- Increased storage in Loch Garry, Middle Lake, Mill Pond,
- Other storage, and
- Modify Garry River System Operational Plan.

Operational Plan modifications and continued monitoring and regulation of reservoir (lake) levels using data acquired from the recently modernized gauging system will provide

Alexandria with adequate source water supply for the immediate future. The costs associated with this alternative are reasonable in comparison with the other alternatives. Natural environmental impacts are likely negligible and in fact, benefits in the form of a more sustainable fish habitat and increased shoreline littoral zone will occur.

The lake system has a finite capacity that fluctuates with meteorological conditions (precipitation). On a long-term basis, Alexandria will need another source water supply to sustain growth and economic viability. The water quality in the lake system will continue to deteriorate as aquatic growth and sediments impact the lakes. The long-term solution should be a pipeline from the St. Lawrence River. Ultimately, other communities and development along the proposed corridor (County Road No. 34) will share in the cost of this infrastructure.

## 6.2 Recommendations

The recommendations that have been formulated from the Environmental Assessment Process are detailed below.

Short-term Strategy

The preferred alternative is a modification of the Garry River Operational Plan as it relates to Middle Lake and associated remedial measures to increase the utilization of Middle Lake for water supply storage.

- The 1:100 year flood level of 88.44 remains unchanged for Middle Lake.
- The target operating level for Middle Lake will be 88.3m. Refer to drawing C.01 which illustrates the levels and their respective flood areas.
- Official Plan and Zoning By-law amendments may be required to preclude development around Middle Lake within the existing 1:100 year flood plain and in low lying areas adjacent to the flood plain and outlet channel.
- Property acquisition and/or property protection may be required adjacent to Middle Lake and the outlet channel where development has taken place within the 1:100 year flood plain and where higher operating levels increase the risk of flood damage.
- It may be necessary to raise some land and provide shoreline erosion protection for properties near the east end of Middle Lake. Improvements to the outlet channel including erosion protection will also be required.
- The data acquisition and level monitoring system maintained and operated by the Raisin Region Conservation Authority has been upgraded and is adequate.

Generally, the high water level that is associated with the 1:100 year storm event should not change. Similarly, the Operational Plan should be modified such that the high water levels associated with the spring runoff and significant rainfall events do not exceed historical high water levels. The normal target level, however, be higher by 0.4 to 0.5m in order to provide additional water supply storage.

Long-term Strategy

The water supply capability of Middle Lake is finite and is a function of meteorological conditions and water demand. As the water demand of the Town of Alexandria increases and particularly in years of low precipitation, the sustainability of the water supply will be at risk. The recommended long-term strategy is therefore a pipeline to the St. Lawrence River.

Related Issues

- A comprehensive water reduction strategy should be developed, implemented and maintained.
- A public education program to increase the public's understanding of the water supply issues is recommended.
- Continued maintenance of the waterworks should be a priority to reduce water losses in the distribution system and to minimize operational water uses.
- An aggressive water rate structure will encourage conservation and may encourage large water users such as Consoltex to examine their own water use practices further.

## 6.3 Class EA Process – "Part II Order" Procedure

If members of the public, interest groups and government agencies feel that a project warrants the special evaluation of an individual environmental assessment, they may request this in writing to the Minister of the Environment. The Minister determines whether a Part II Order is warranted. If the Part II Order is granted, the project cannot proceed until the objection is removed or an individual environmental assessment has been completed. However, if the Part II Order is denied, the Minister's decision is final.

The preliminary analysis of this project would slot the immediate term preferred alternative as a schedule B project, with the long-term preferred alternative being a schedule C project. For the immediate term preferred alternative, a person/party with a concern regarding the process should bring it to the attention of the proponent during the 30-day review period following the publication of this Preliminary Engineering Report (PER) and the Notice of Completion.

The public and government agencies will be provided with the opportunity to voice their concerns and questions regarding this project and its results during the 30-day review period following the publication of this PER and the Notice of Completion. The proponent and their consultant will make every reasonable attempt to address any concerns brought forward.

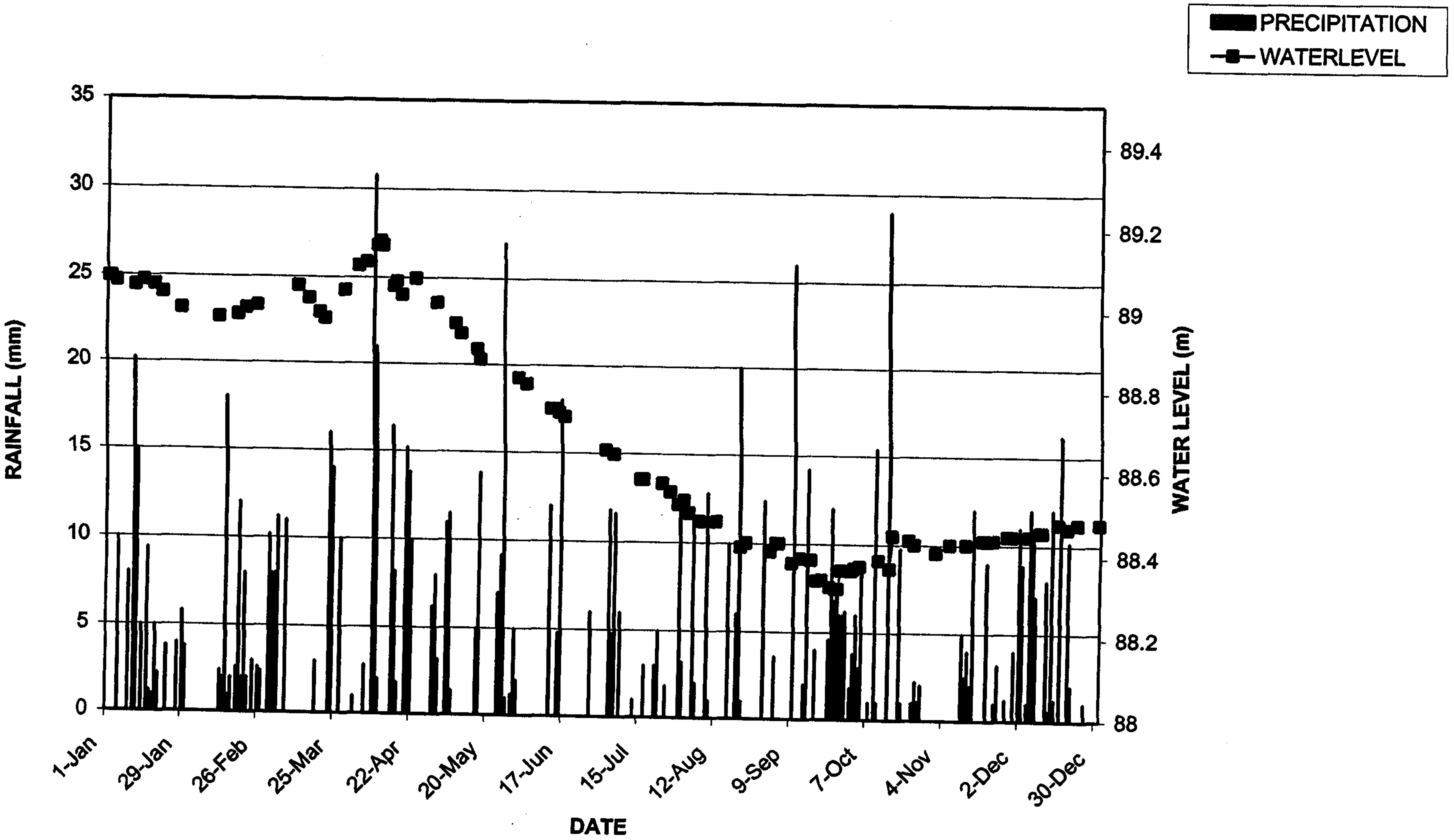
# Appendix A
# Bibliography of Background Studies

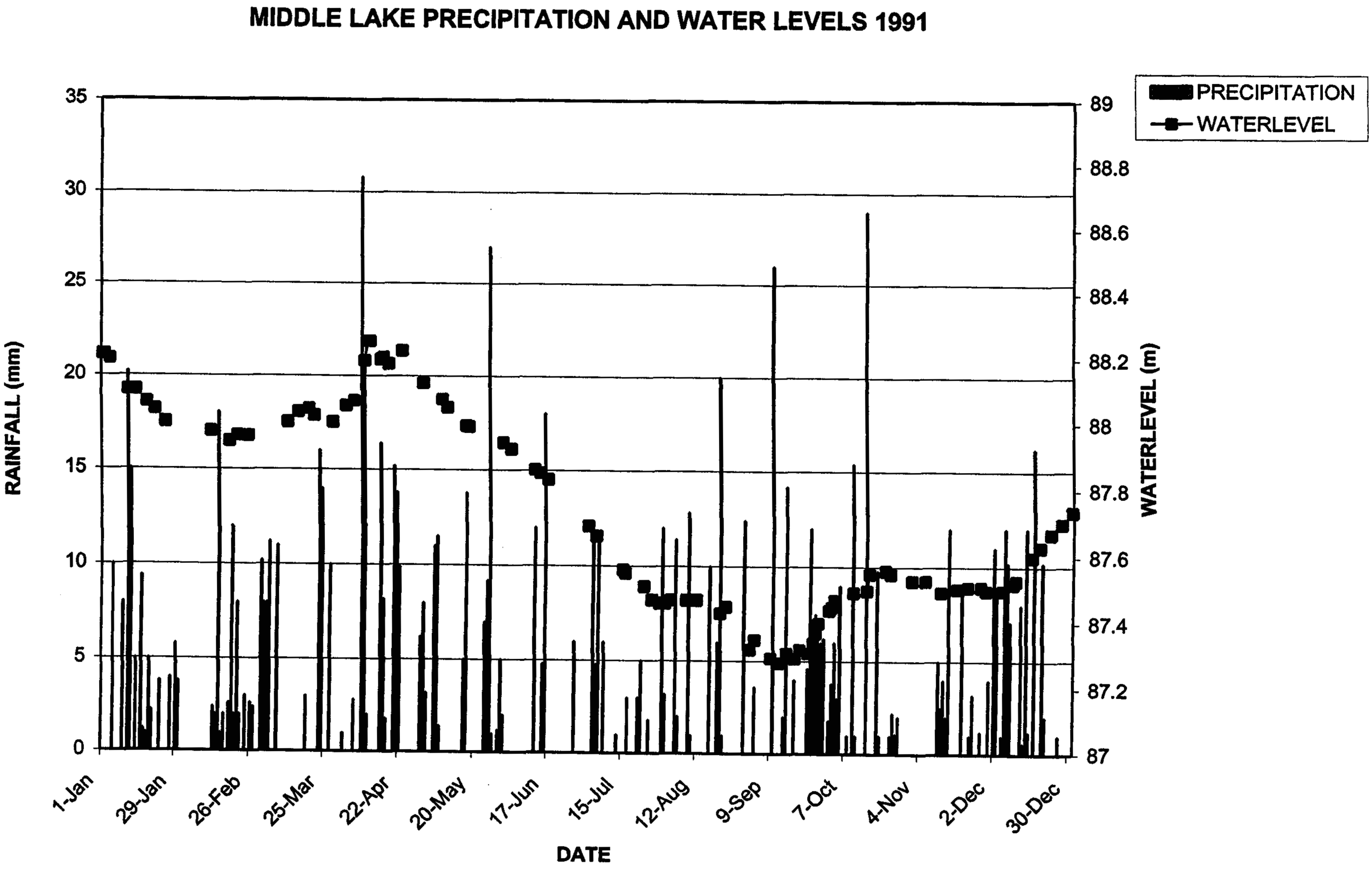
| Year | Document Type | Document Name | Author | Description |
|---|---|---|---|---|
| 1946 | Report | Report on Alexandria Water Supply | N.B. MacRostie, Consulting Engineer | Report to analyse three options for water supply - recommended using Loch Garry and Black Lake as new source of supply |
| 1949 | Letter | Update of 1946 Report | N.B. MacRostie, Consulting Engineer | Update of previous report on options for water supply |
| 1955 | Report | Report on Improvement to Water Supply - Town of Alexandria | H.R. Farley, Consulting Engineer | Preliminary Design Report |
| 1956 | Plans & Specs | Alexandria Water Improvement Project | S.E. & H.R. Farley, P.E.O. | Plan and Specs for Loch Garry Dam and Channel Project |
| 1956 | Specification | Alexandria Water Improvement Project | S.E. & H.R. Farley, P.E.O. | Specifications for Loch Garry Improvements |
| 1956 | Specification | Alexandria Water Improvement Project - Revised | S.E. & H.R. Farley, P.E.O. | Specifications for Loch Garry Improvements - Revised |
| 1956 | Plan and Profile | Plan and Profile of Proposed Pipe Line - Alexandria Water Improvement Project - Township of Kenyon | S.E. & H.R. Farley, P.E.O. | Proposed Pipe Line Design to by-pass |
| 1958 | Proposal | Proposal for the Improvement of the Water Supply of the Town of Alexandria | Coode, Binnie & Preece, Consulting Engineers | Proposal for Loch Garry Dam Work |
| 1960 | Report | Report on Improvements to Water Supply | J.L. Richards & Assoc. | Report on Loch Garry Dam |
| 1961 | Report | Supplementary Report on Improvements to Water Supply - Alexandria, Ontario | J.L. Richards & Assoc. | Report to improve quality and quantity of water supplied to Alexandria |
| 1961 | Report | Fire Protection Report on the Town of Alexandria | Canadian Underwriters' Associatior | Fire Protection Report |
| 1965 | Specification | Contract for Sanitary Sewer and Water Main Construction on Dominion Street Extension | J.L. Richards & Assoc. | Contract for Watermain and Sewer Work |
| 1965 | Report | Report on Loch Garry Reservoir Project - Glengarry County, Ontario | J.L. Richards & Assoc. | Report on Loch Garry Dam Design and Recommendations |
| 1966 | Report | A Water Supply Investigation for the Town of Alexandria | The Ontario Water Resources Commission | Detailed assessment of Garry River System |
| 1971 | Map | Garry River Forest Property - Soils Mar | MNR | Soils Map - Basic |
| 1973 | Report | Report on Operation of New Alexandria Filtration Plani | Ghislain E. Seguin & Associates Ltd. | Analysis of WTP operation |
| 1976 | Partial Report | Recommendations of MOE Inspections | Ministry of the Environment, Eastern Region | Recommendations for work on Water system |
| 1977 | Letter | Water Treatment Plant Modifications | Ghislain E. Seguin & Associates Ltd. | Recommendations for doubling of WTP Capacity |
| 1978 | Meeting Record | Meeting between MOE, Alexandria, Consultant regarding funding | Bruno Massie, Mayor (Chairman) | Meeting regarding the need for plant expansion and funding |
| 1978 | Terms of Ref | Garry River Watershed Management Study - Draft | Raisin River Conservation Authority | Terms of Reference for watershed management project |
| 1979 | Letter | Letter to MOE Approvals Branch Regarding WTP Expansion | Lascelles Seguin Tremblay Engineering Ltd. | Confirmation of telephone conversation |
| 1979 | Letter | Letter regarding water supply requirements for Consoltex | Consolidated Textiles Ltd. | Letter regarding limit of 300,000 gal per day and quality problems associated with municipal supply |
| 1979 | Report | Geotechnical Investigation Garry River Dams | Golder Associates | Geotechnical Report on Dam Condition |
| 1980 | Dam Rating Curve | Alexandria Dam Rating Curve - Garry River Water Management Report | McNeely Engineering Ltd. | Part of 1980 Water Management Report |
| 1980 | Letter | Re: Alexandria Mill Pond Water Levels | Raisin River Conservation Authority | Confirmation of telephone conversation regarding flood rights on Mill Pond |
| 1981 | Application | Proposed Addition to the Water Treatment Plant | Lascelles Seguin Engineering Ltd. | MOE Application and Cost Breakdowr |
| 1981 | Report | Geotechnical Investigation Alexandria Dam | Golder Associates | Geotechnical Report on Dam Condition |

| | | | |
|---|---|---|---|
| 1981 Letter | Re: Lionel Rozon complaints regarding Mill Pond Water Levels | Bergeron, Follon & Filion (Barristers - Solicitors) | Lawyers letter regarding drainage complaints on Mill Pond |
| 1981 Letter | Re: Alexandria Mill Pond Water Levels | Bergeron, Follon & Filion (Barristers - Solicitors) | Re: Rozon Litigation |
| 1983 Letter | Re: Garry River System, Water Elevations and Dam Operations | Raisin River Conservation Authority | Letter regarding the uncertainty of the PUC on how to operate the system. Reference is made to 1980 Watershed Management Report |
| 1984 Report | Garry River Water Management Report ~ 1980 (Revised 1984) | McNeely Engineering Ltd./Proctor & Redfern Ltd. | Comprehensive report of Garry River System |
| 1988 Letter | Re: Addendum to report on upgrading the sewage works of the Town of Alexandria to PWQO | Raisin River Conservation Authority | Critique of J.L. Richards Report |
| 1992 Report | Update of Garry River Watershed Modelling and Assessment of Proposed Change to the Summer Operating Level of Middle Lake | Paul Wisner & Associates Inc. | Watershed modelling including stage-storage-discharge charts for Lake System |
| 1995 Manual | Garry River System | Raisin River Conservation Authority | Compilation: O&M Manual, Water Consumption Data, Dam Inspection Reports, 1992 Operational Plan Review, General Correspondance, Media Articles |
| 1998 Report | Alexandria Water Treatment System Compliance Inspection Report | Ministry of the Environment, Eastern Region | Inspection report detailing system operation including Copy of C of A |

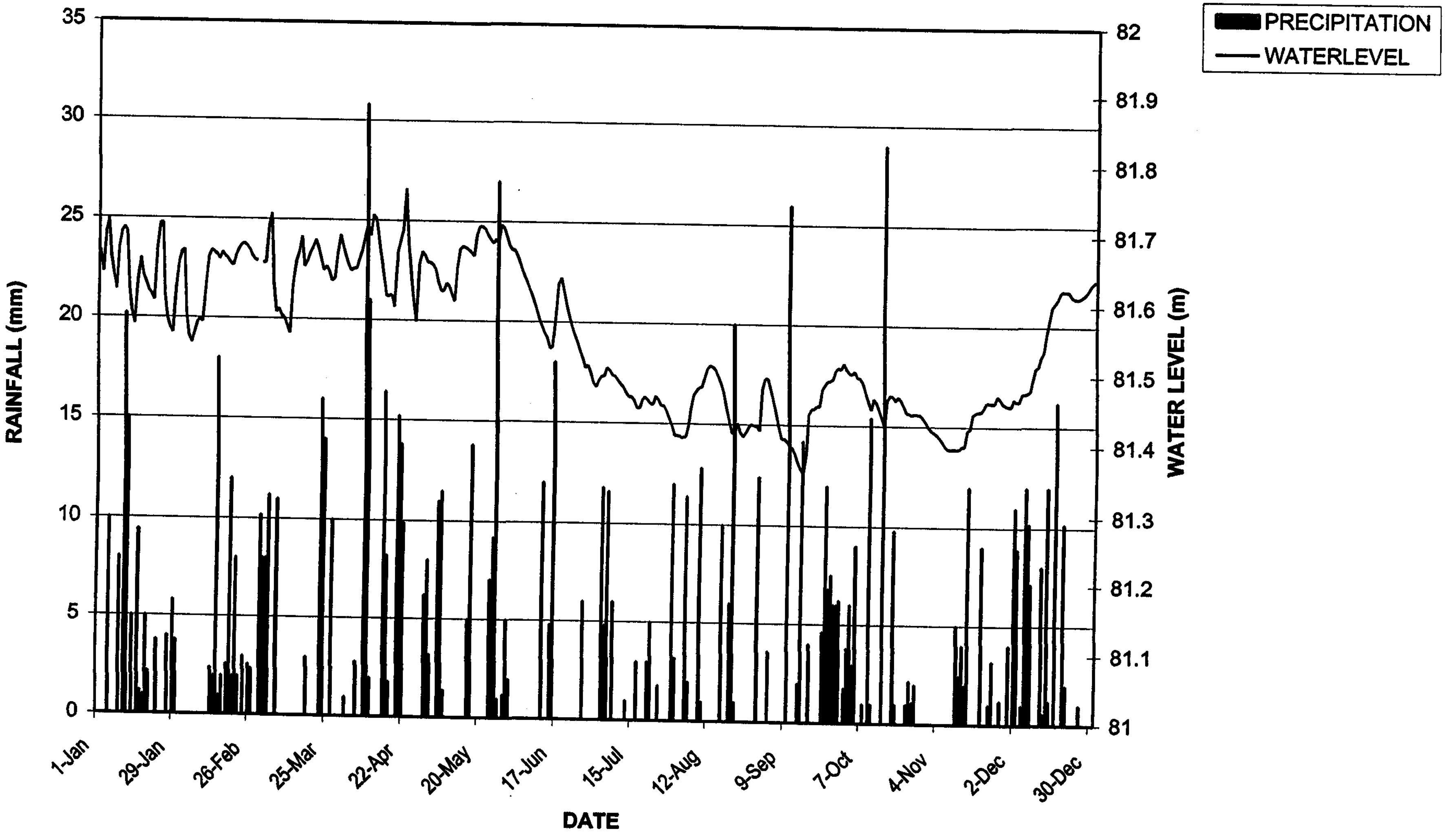
# Appendix B:
# Garry River System Stream Flow and Precipitation Data

## LOCH GARRY PRECIPITATION AND WATER LEVELS 1991

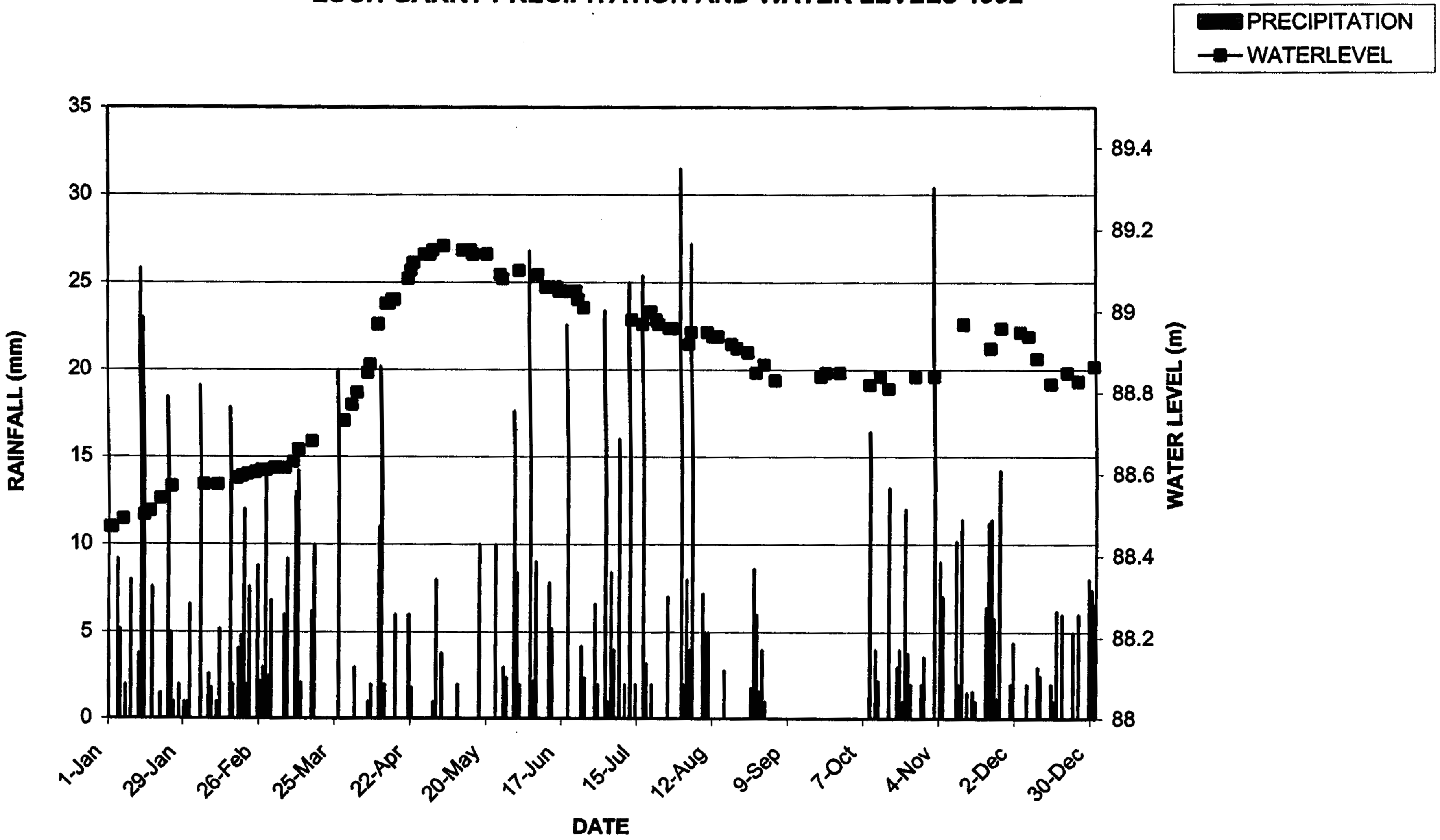


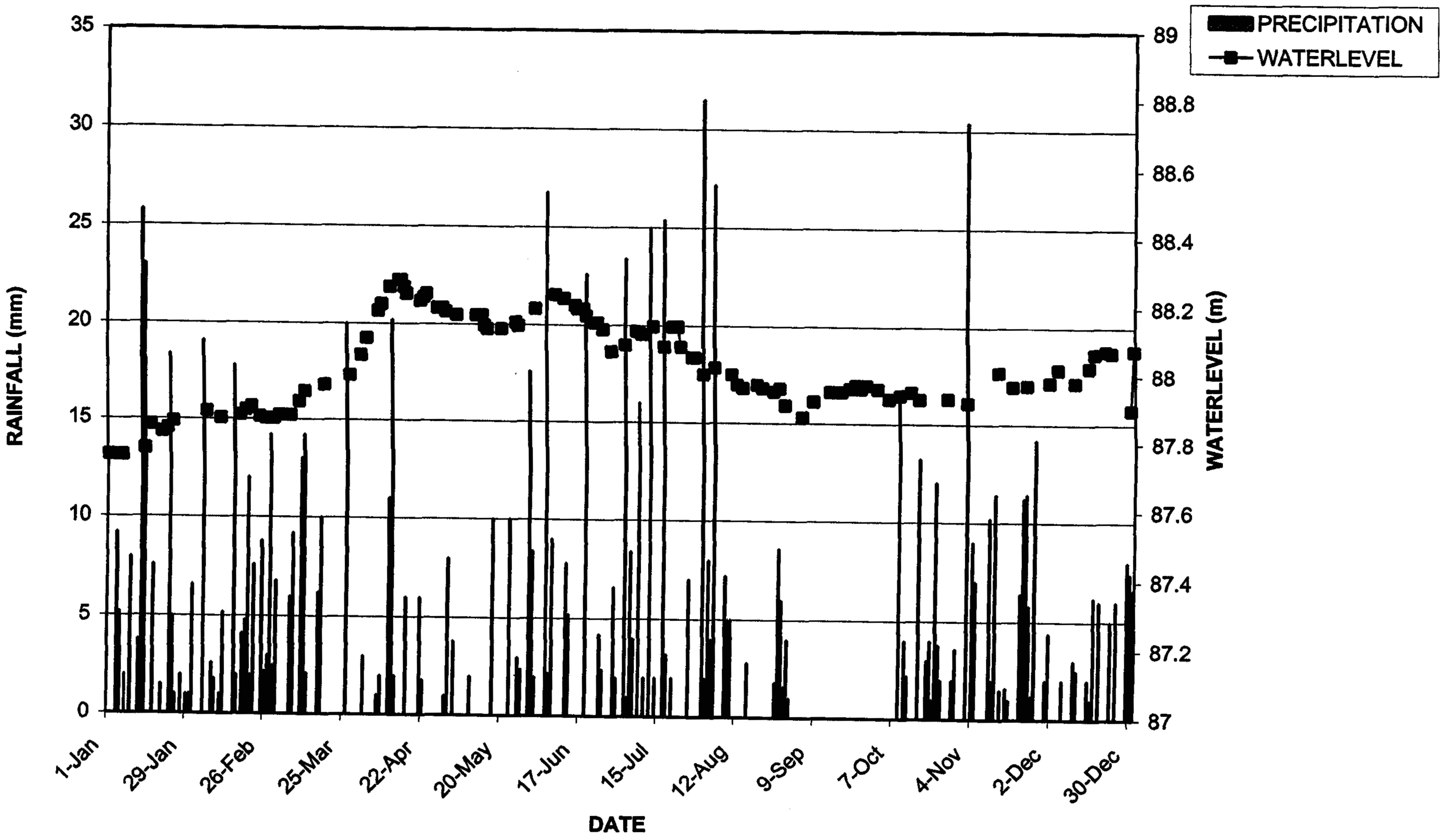

MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1991
PRECIPITATION
WATERLEVEL
RAINFALL (mm)
35
30
25
20
15
10
5
0
WATERLEVEL (m)
89
88.8
88.6
88.4
88.2
88
87.8
87.6
87.4
87.2
87
1-Jan
29-Jan
26-Feb
25-Mar
22-Apr
20-May
17-Jun
15-Jul
12-Aug
9-Sep
7-Oct
4-Nov
2-Dec
30-Dec
DATE

# ALEXANDRIA LAKE RAIN AND WATER LEVEL 1991



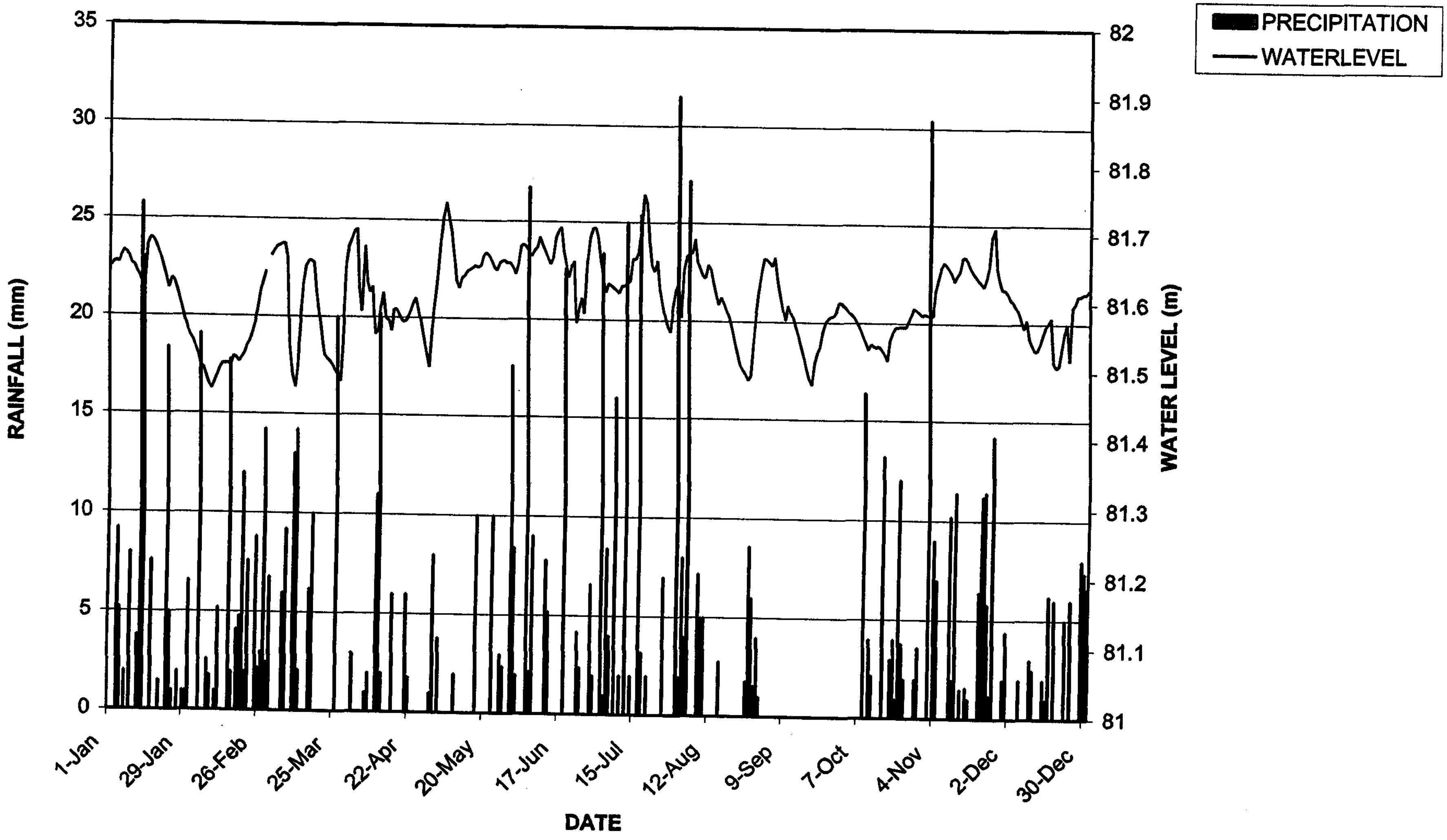
## LOCH GARRY PRECIPITATION AND WATER LEVELS 1992

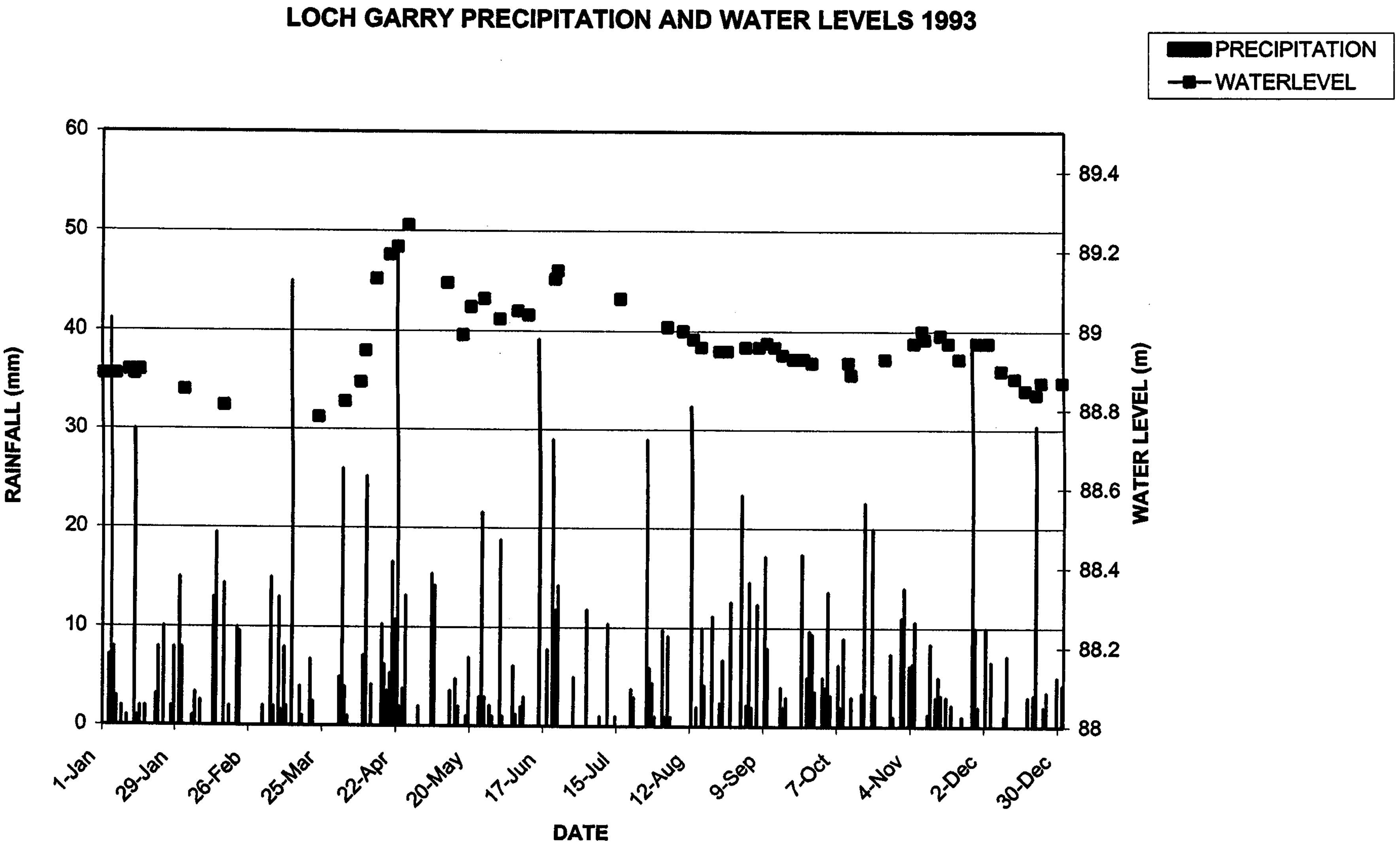




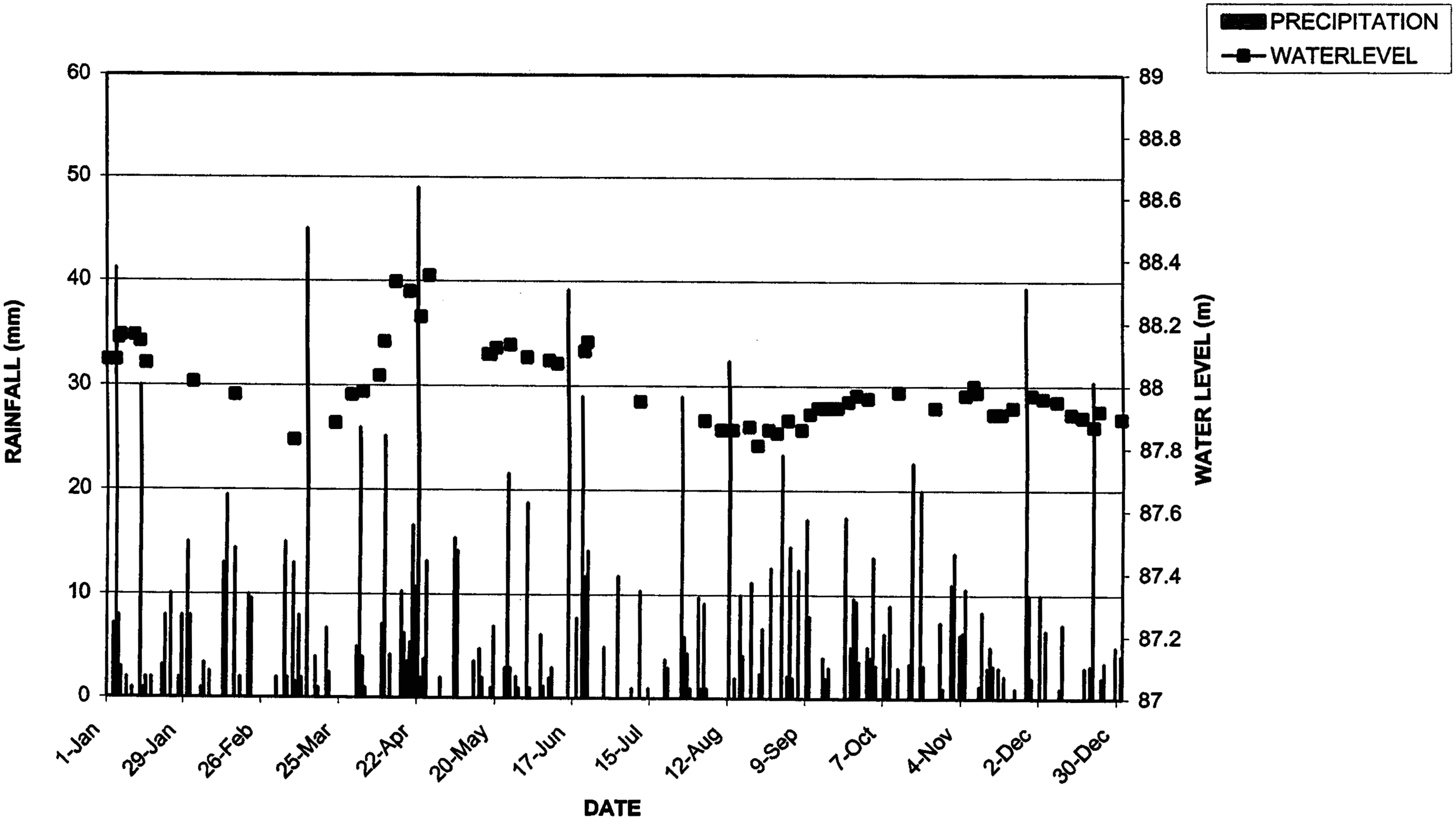
MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1992

# ALEXANDRIA LAKE RAIN AND WATER LEVEL 1992

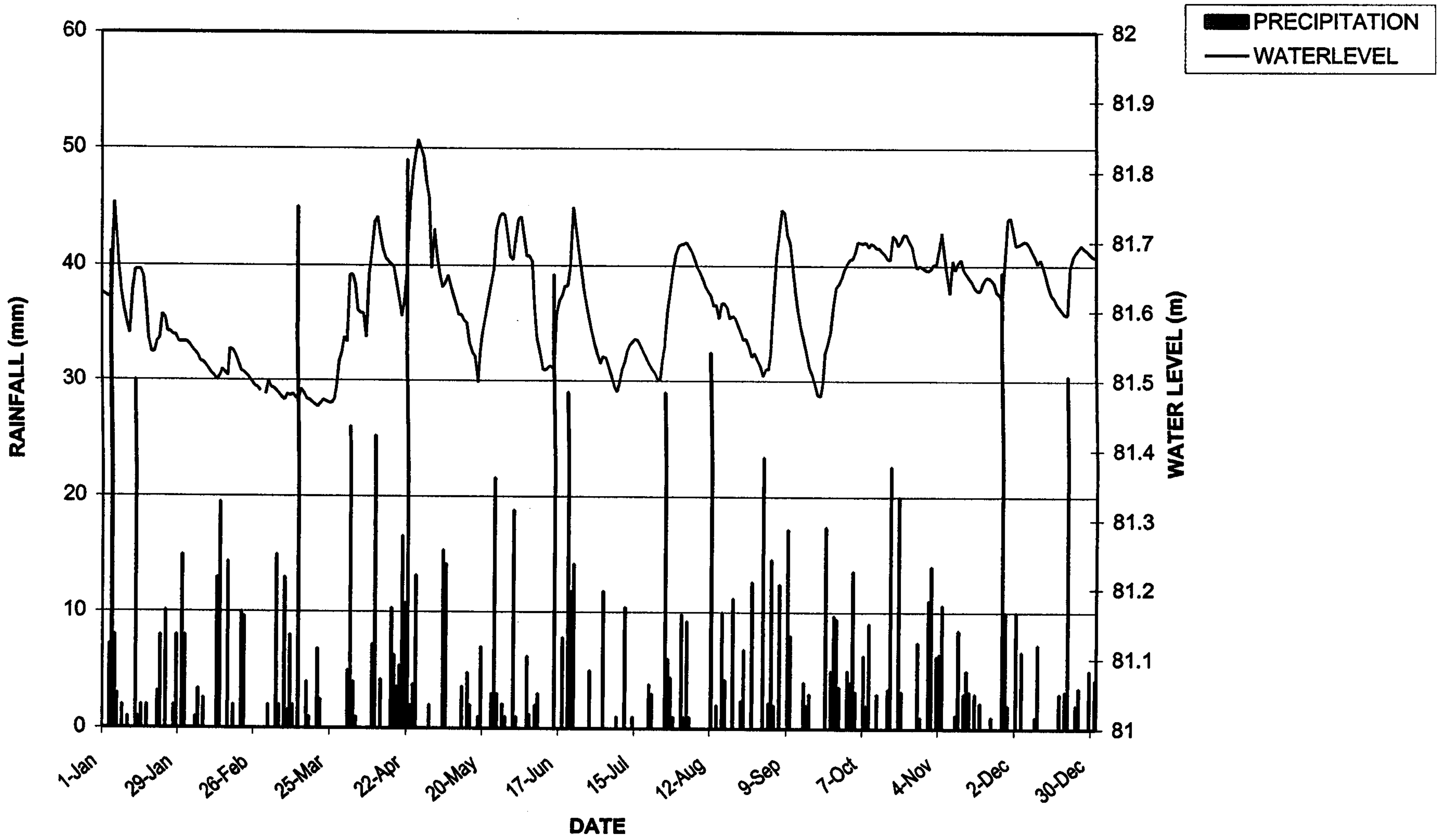


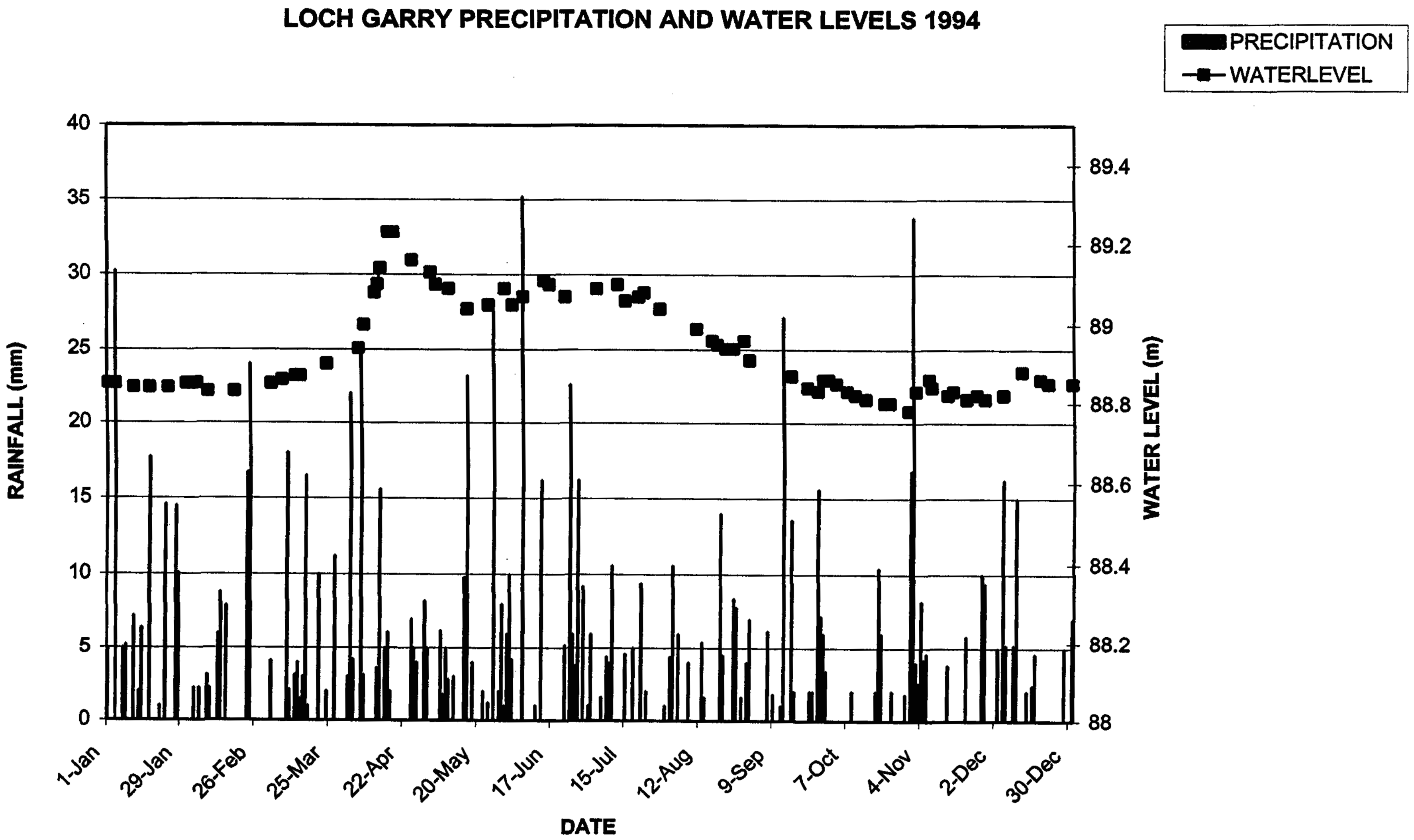

LOCH GARRY PRECIPITATION AND WATER LEVELS 1993
PRECIPITATION
WATERLEVEL
RAINFALL (mm)
WATER LEVEL (m)
60
50
40
30
20
10
0
89.4
89.2
89
88.8
88.6
88.4
88.2
88
1-Jan
29-Jan
26-Feb
25-Mar
22-Apr
20-May
17-Jun
15-Jul
12-Aug
9-Sep
7-Oct
4-Nov
2-Dec
30-Dec
DATE

## MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1993



## ALEXANDRIA LAKE RAIN AND WATER LEVEL 1993




LOCH GARRY PRECIPITATION AND WATER LEVELS 1994
PRECIPITATION
WATERLEVEL
RAINFALL (mm)
40
35
30
25
20
15
10
5
0
WATER LEVEL (m)
89.4
89.2
89
88.8
88.6
88.4
88.2
88
1-Jan
29-Jan
26-Feb
25-Mar
22-Apr
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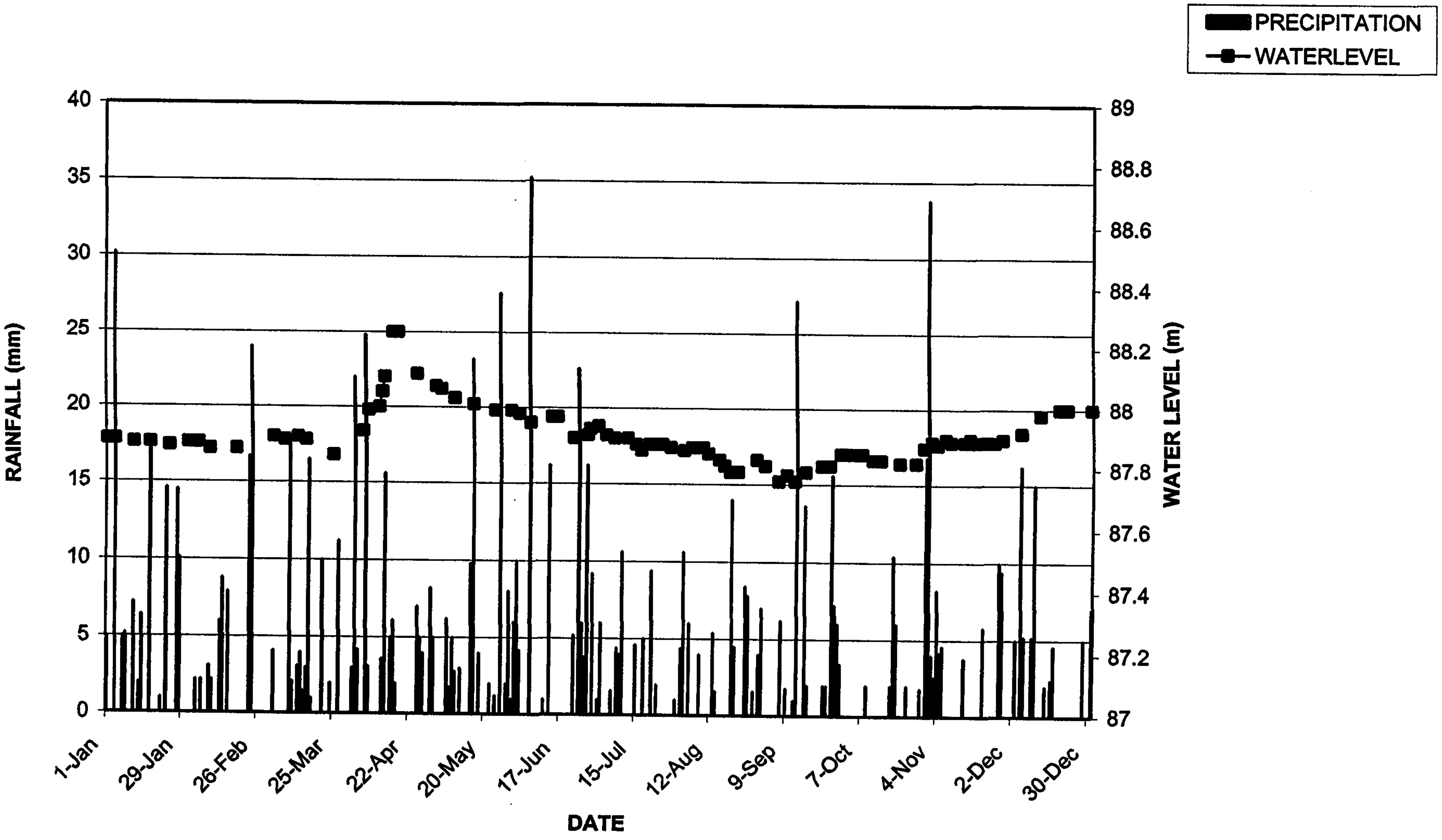
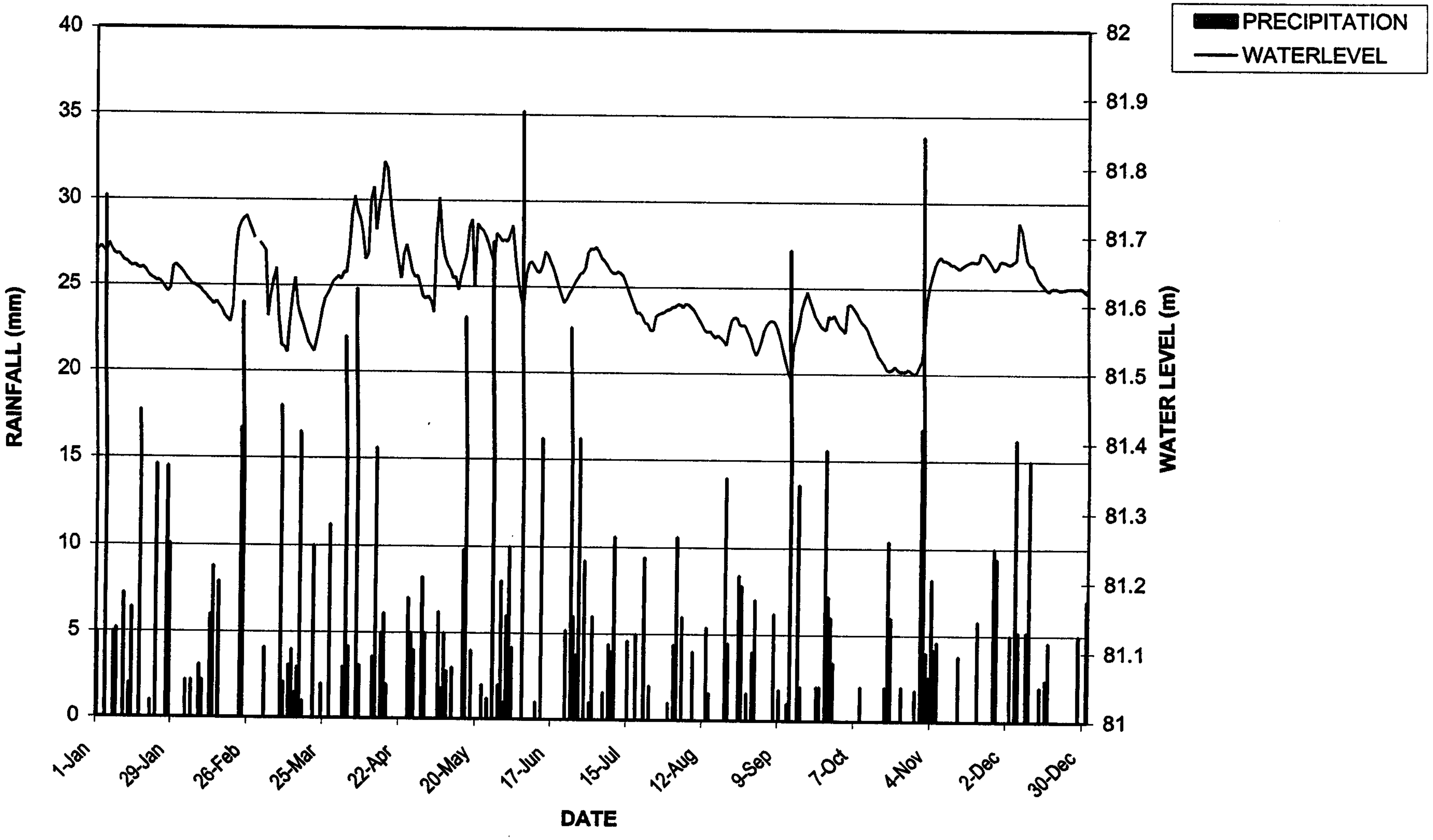
30-Dec
DATE

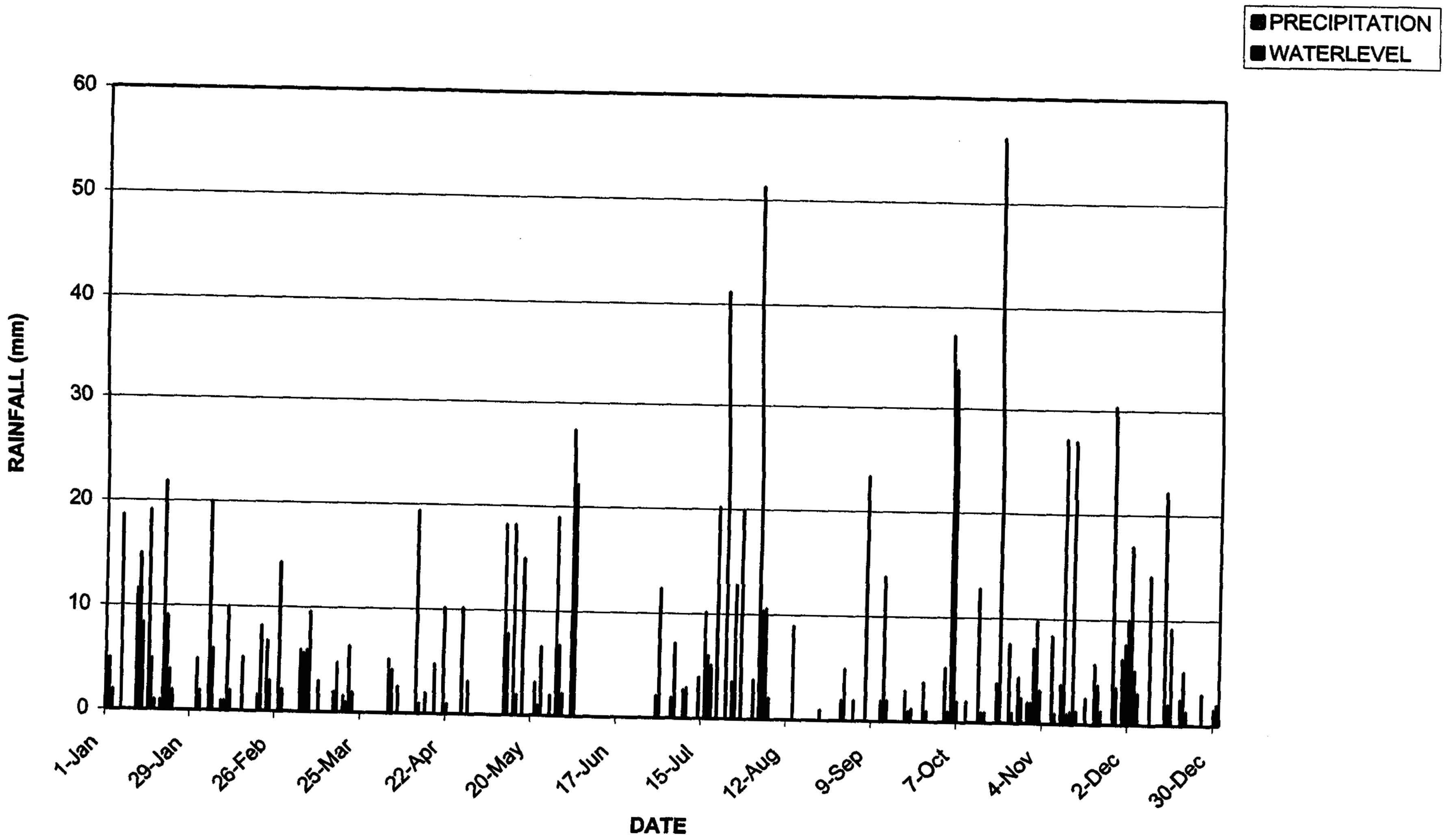
## MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1994



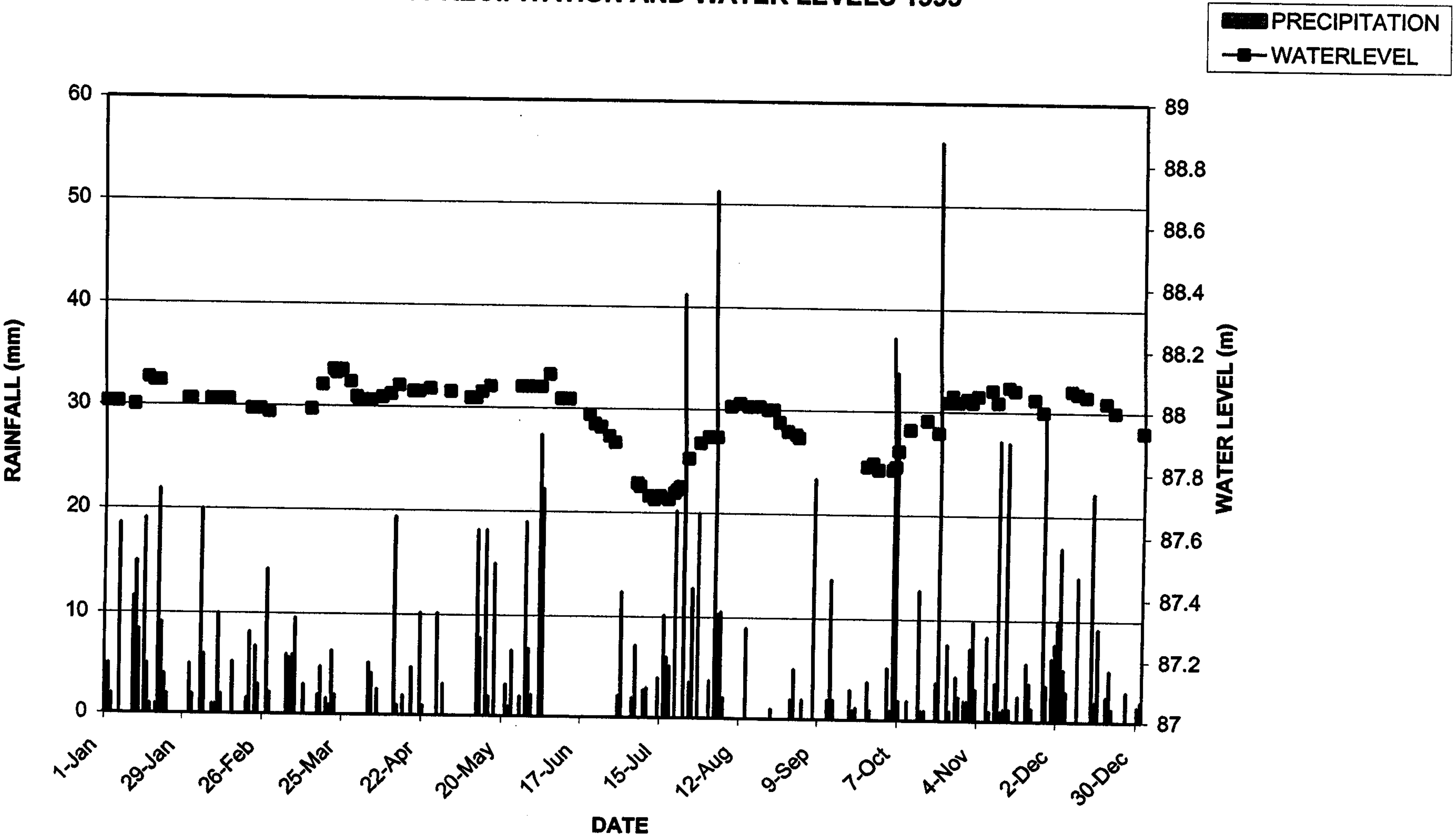
## ALEXANDRIA LAKE RAIN AND WATER LEVEL 1994



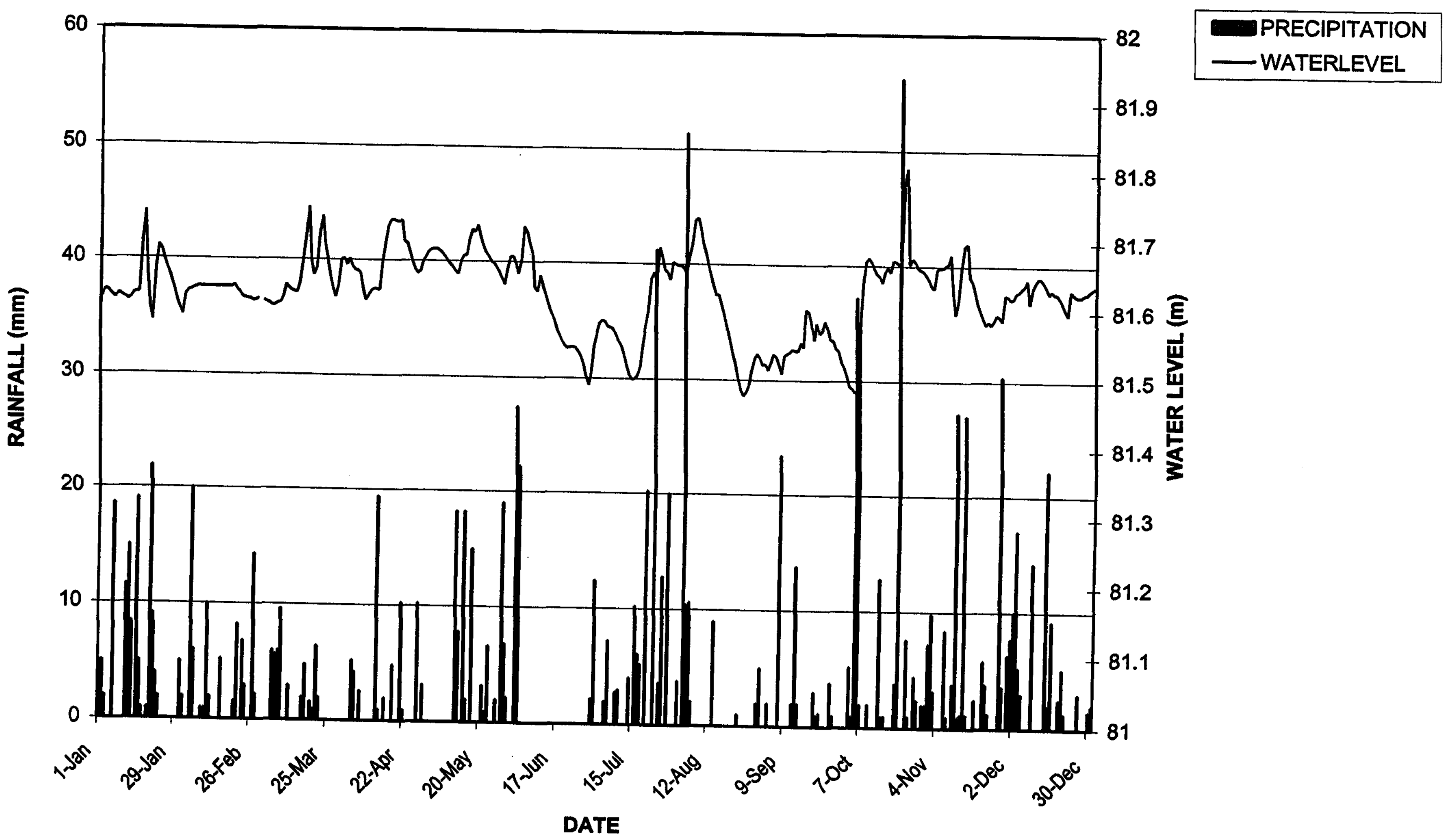
## LOCH GARRY PRECIPITATION AND WATER LEVELS 1995



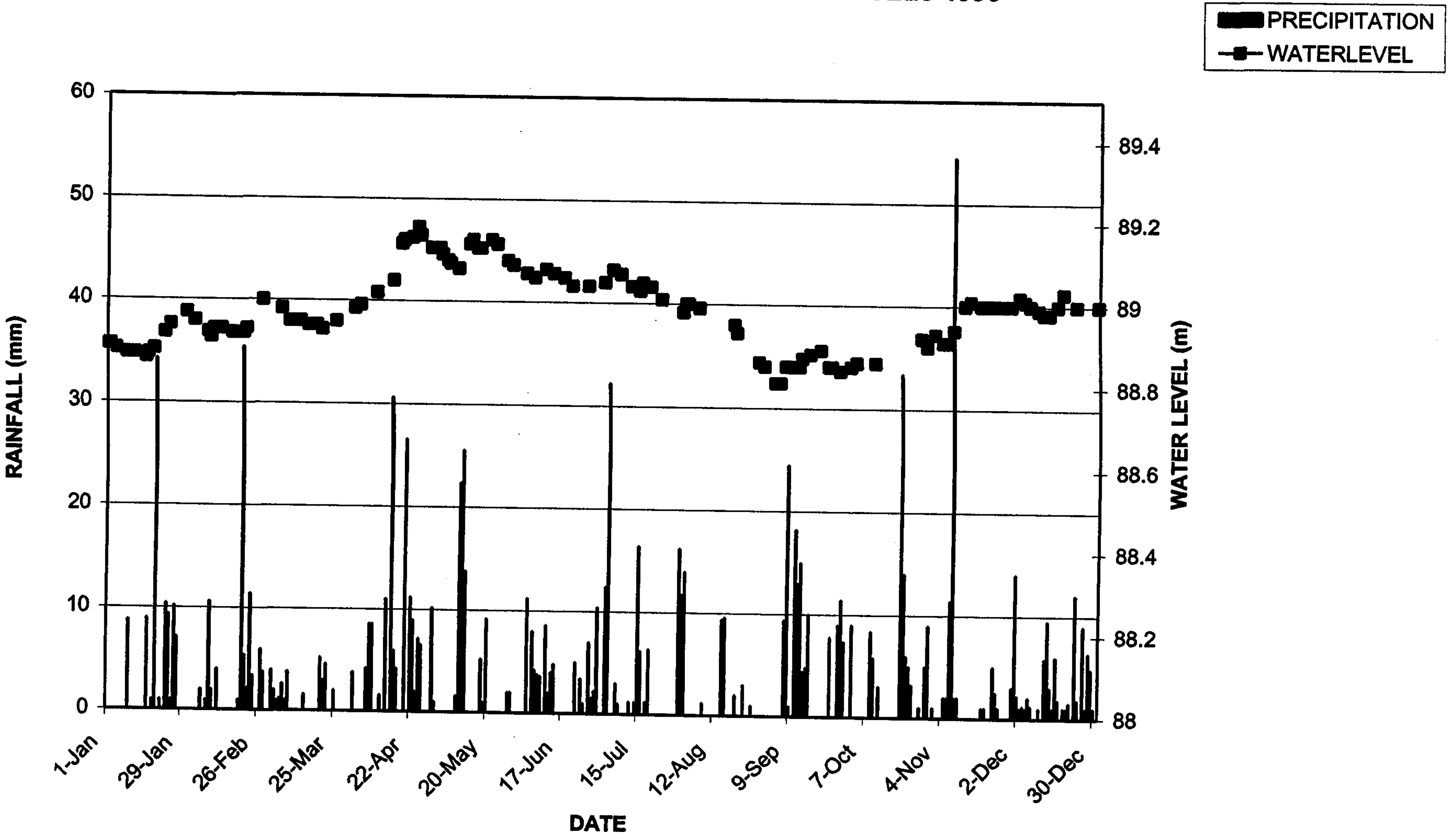
# MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1995



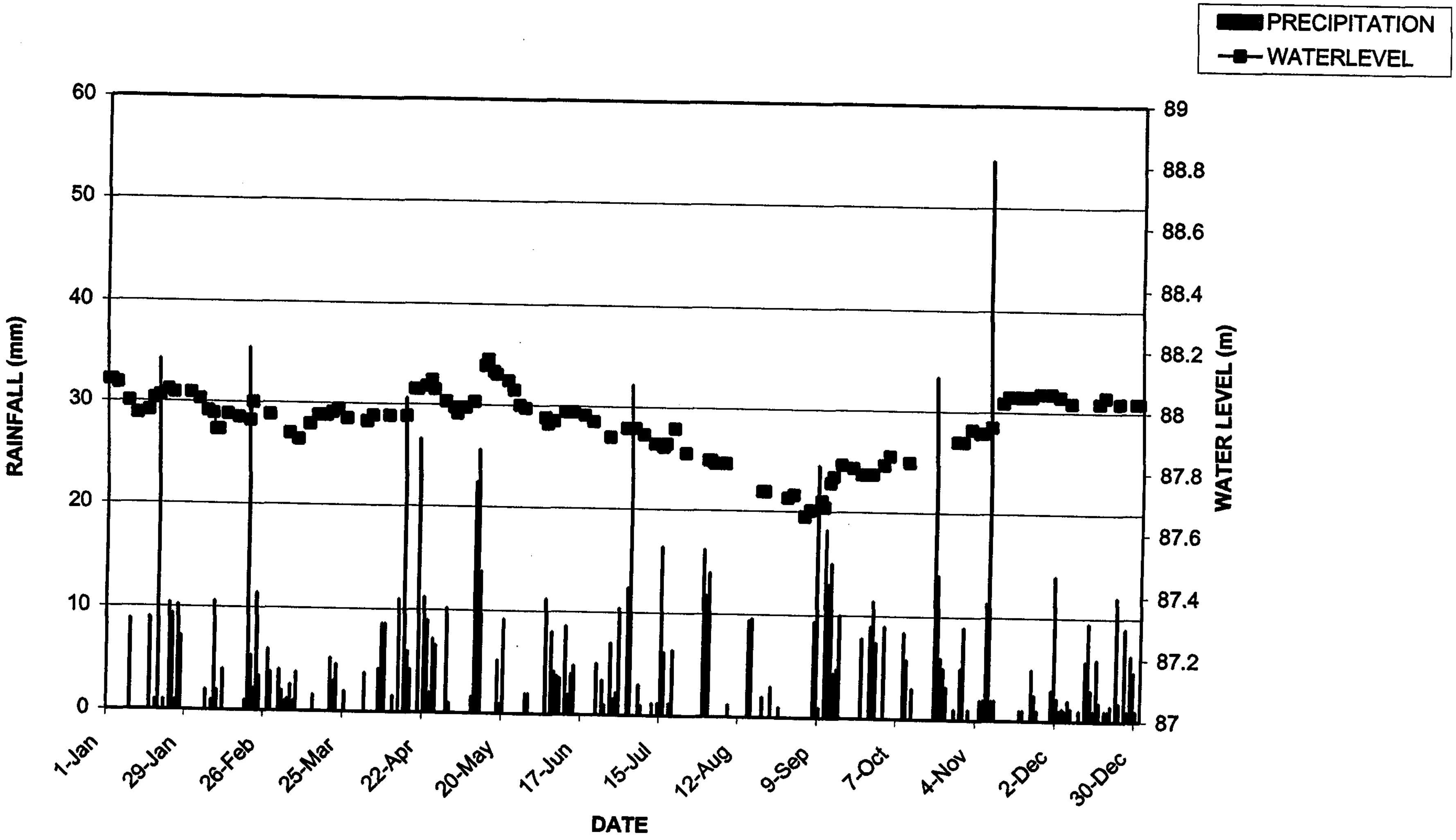
## ALEXANDRIA LAKE RAIN AND WATER LEVEL 1995



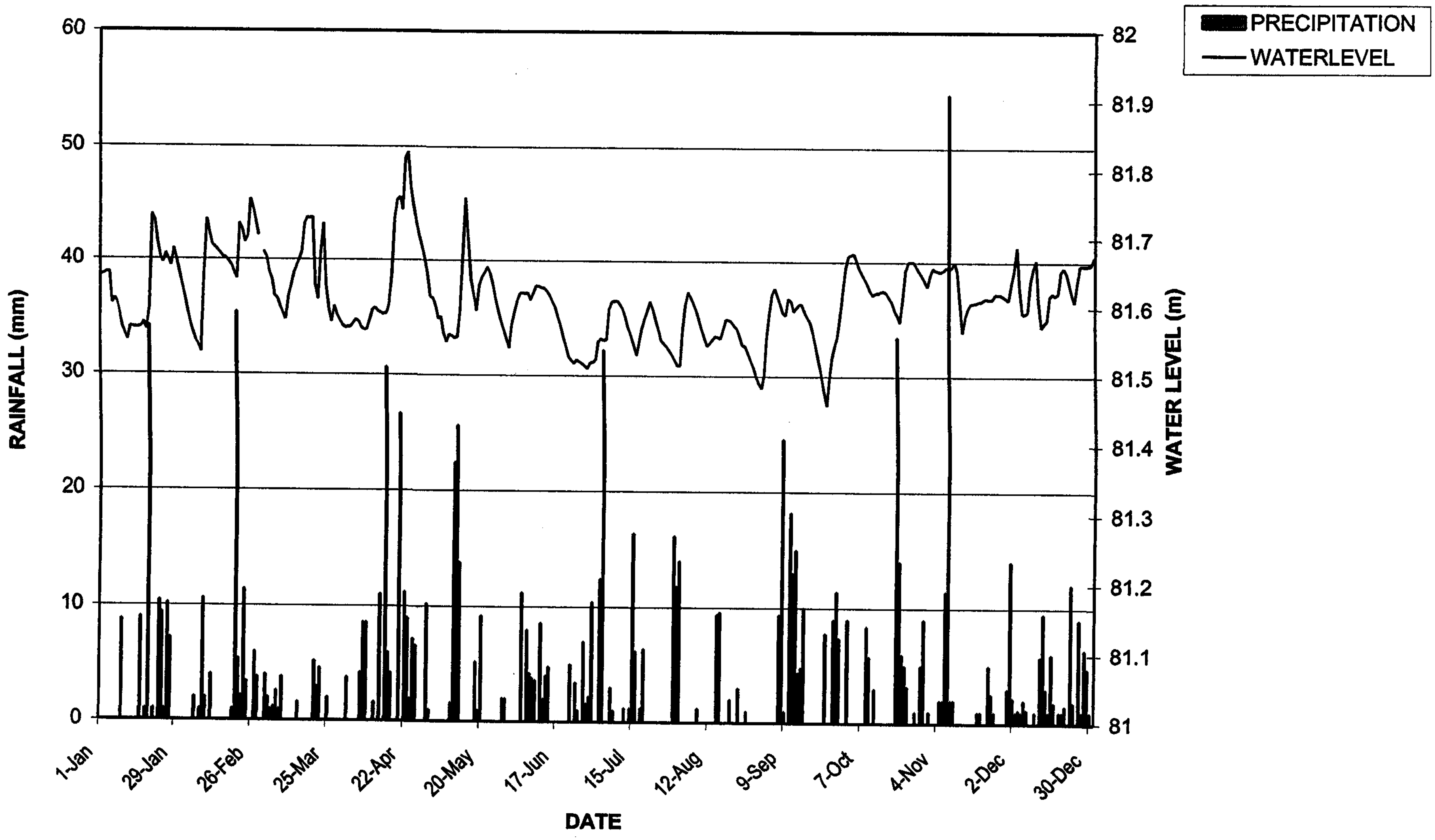
# LOCH GARRY PRECIPITATION AND WATER LEVELS 1996



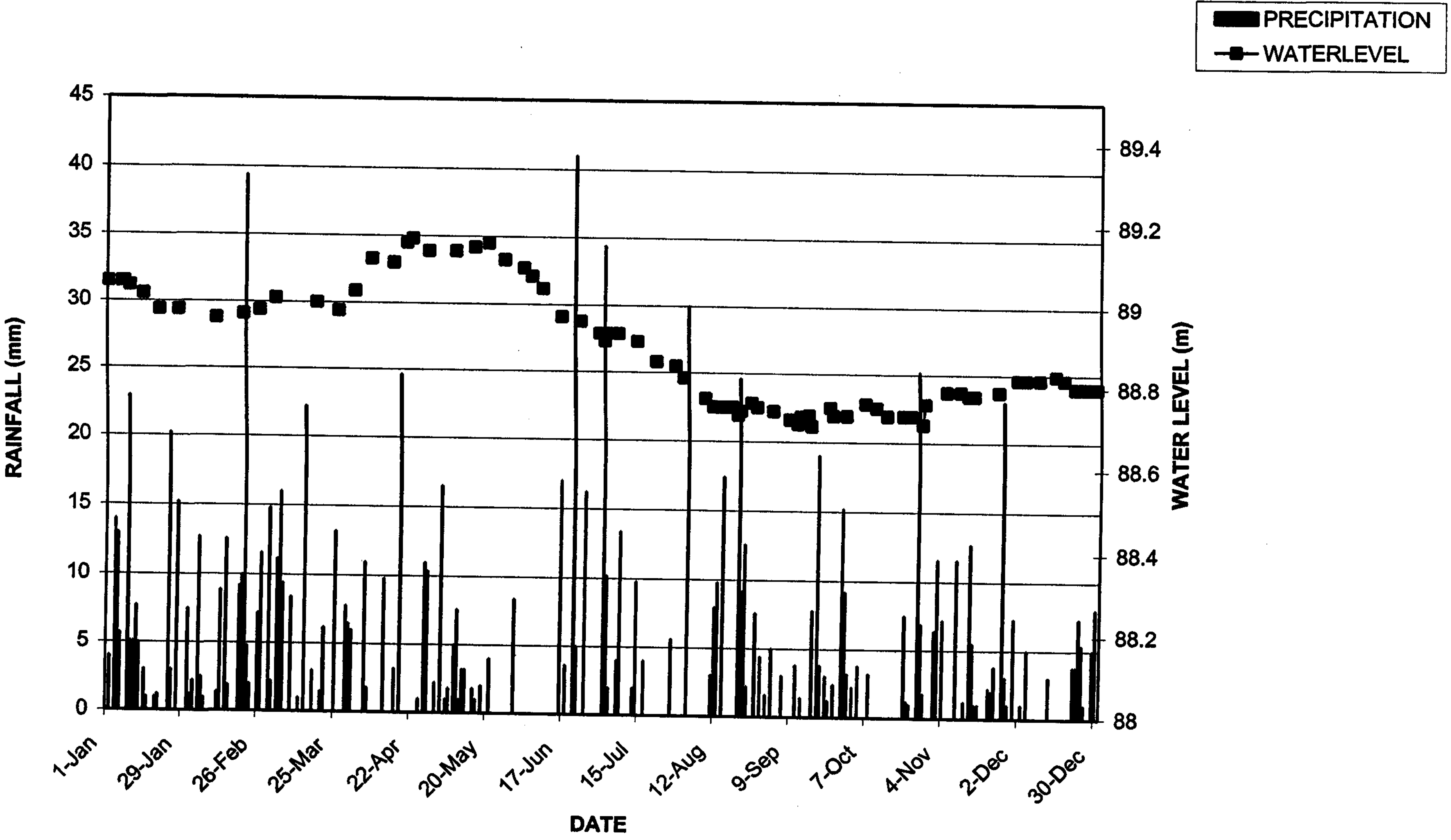
# MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1996



## ALEXANDRIA LAKE RAIN AND WATER LEVEL 1996



# LOCH GARRY PRECIPITATION AND WATER LEVELS 1997



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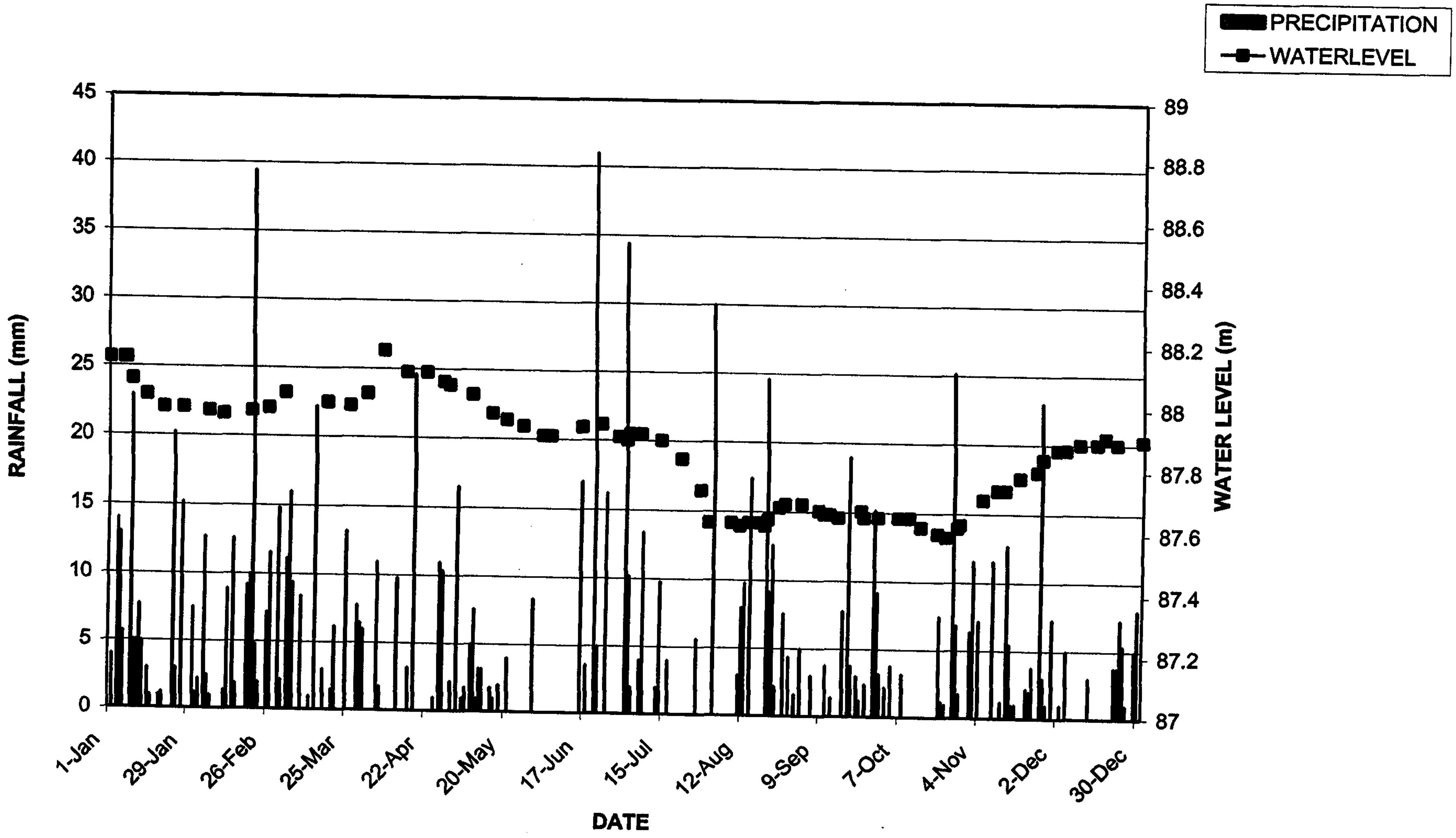
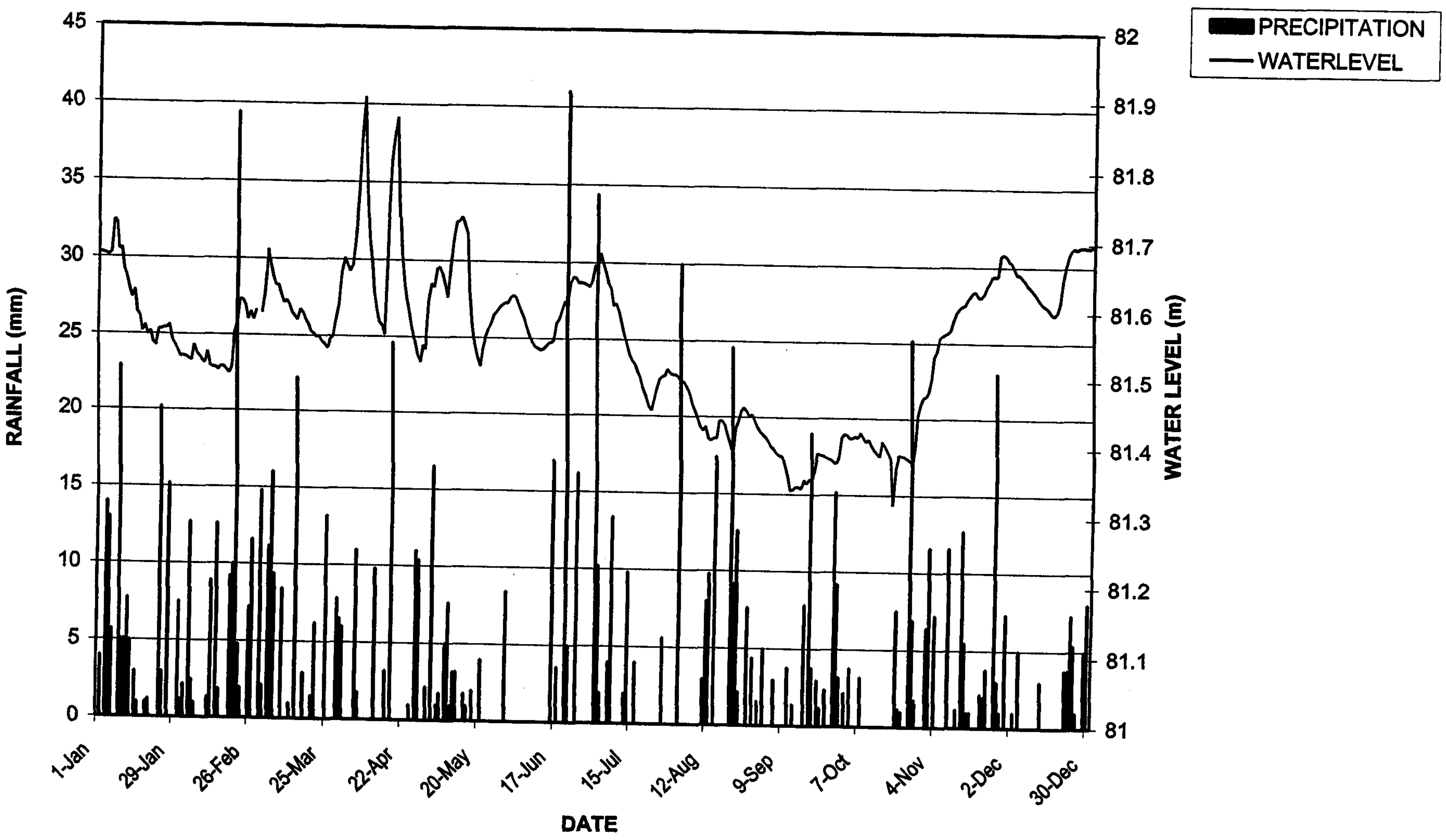
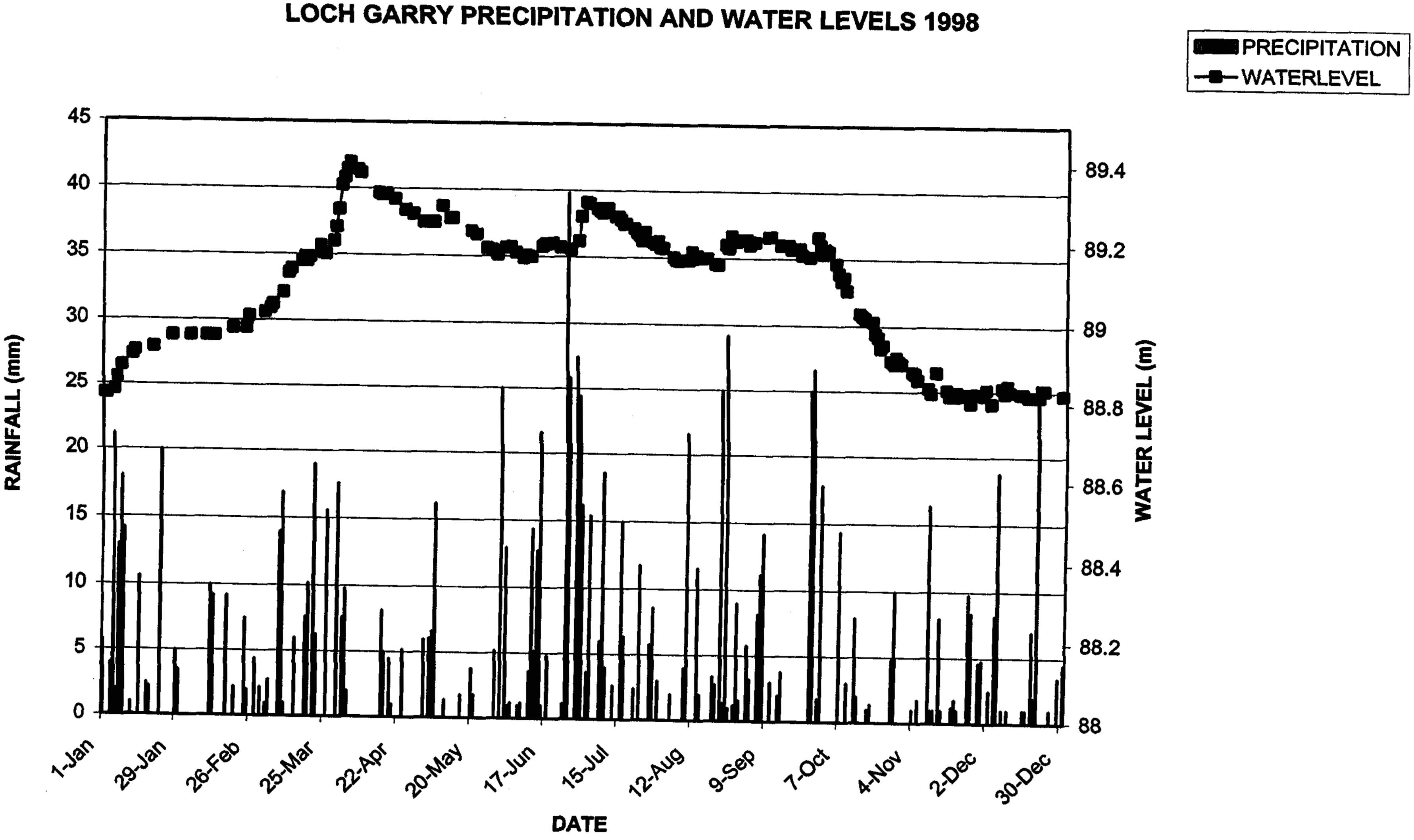


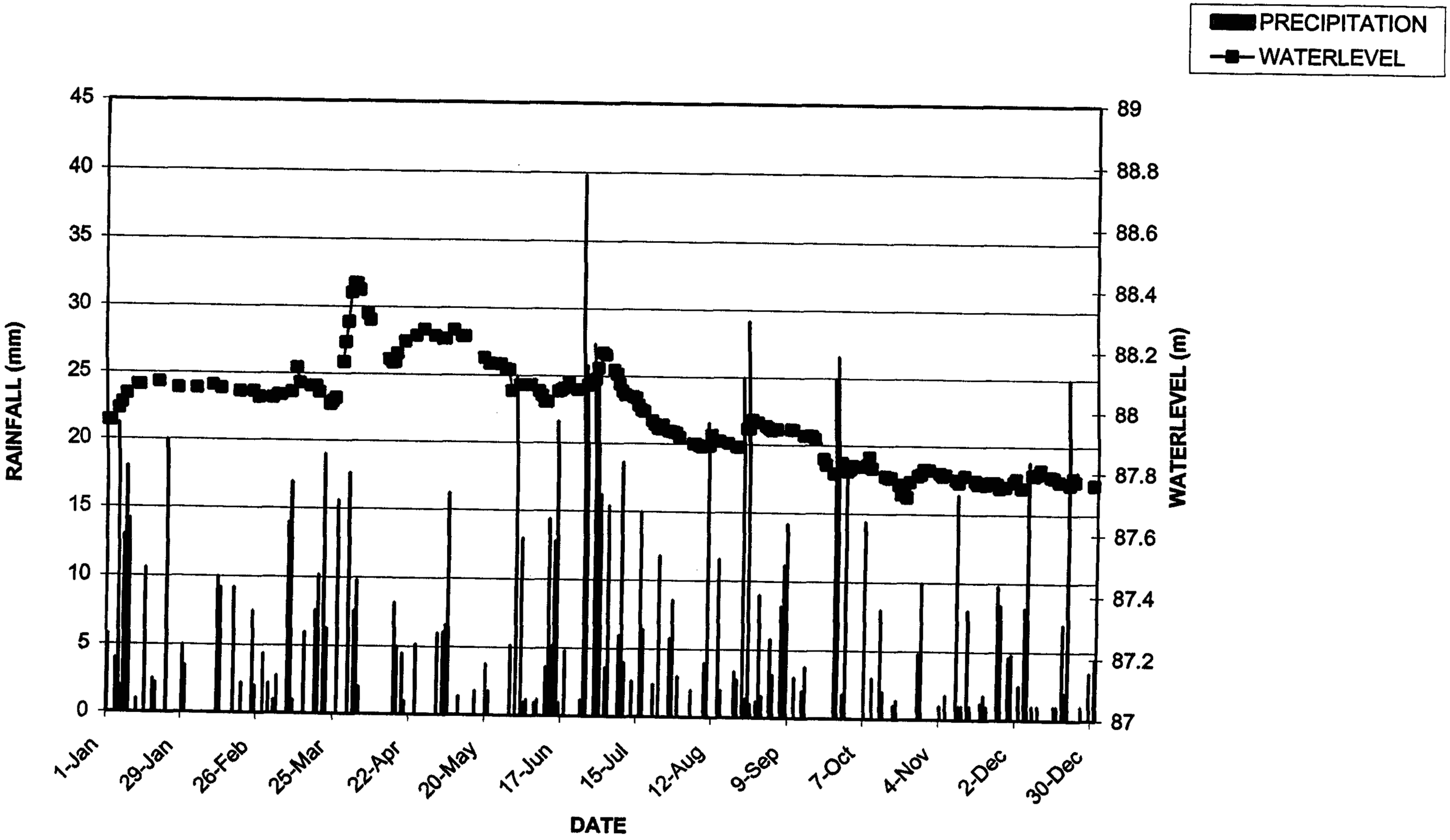
# ALEXANDRIA LAKE RAIN AND WATER LEVEL 1997





LOCH GARRY PRECIPITATION AND WATER LEVELS 1998

## MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1998



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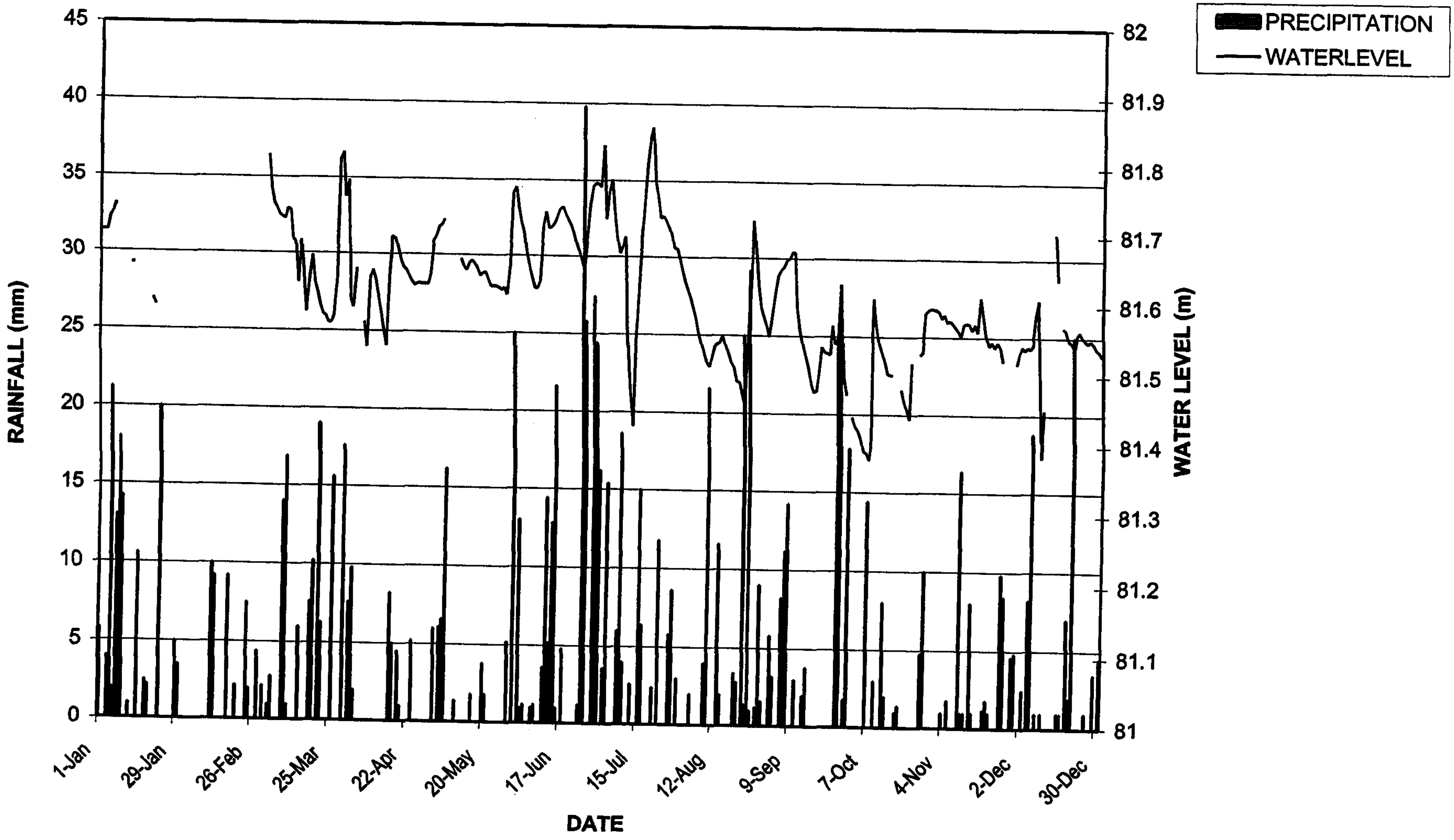
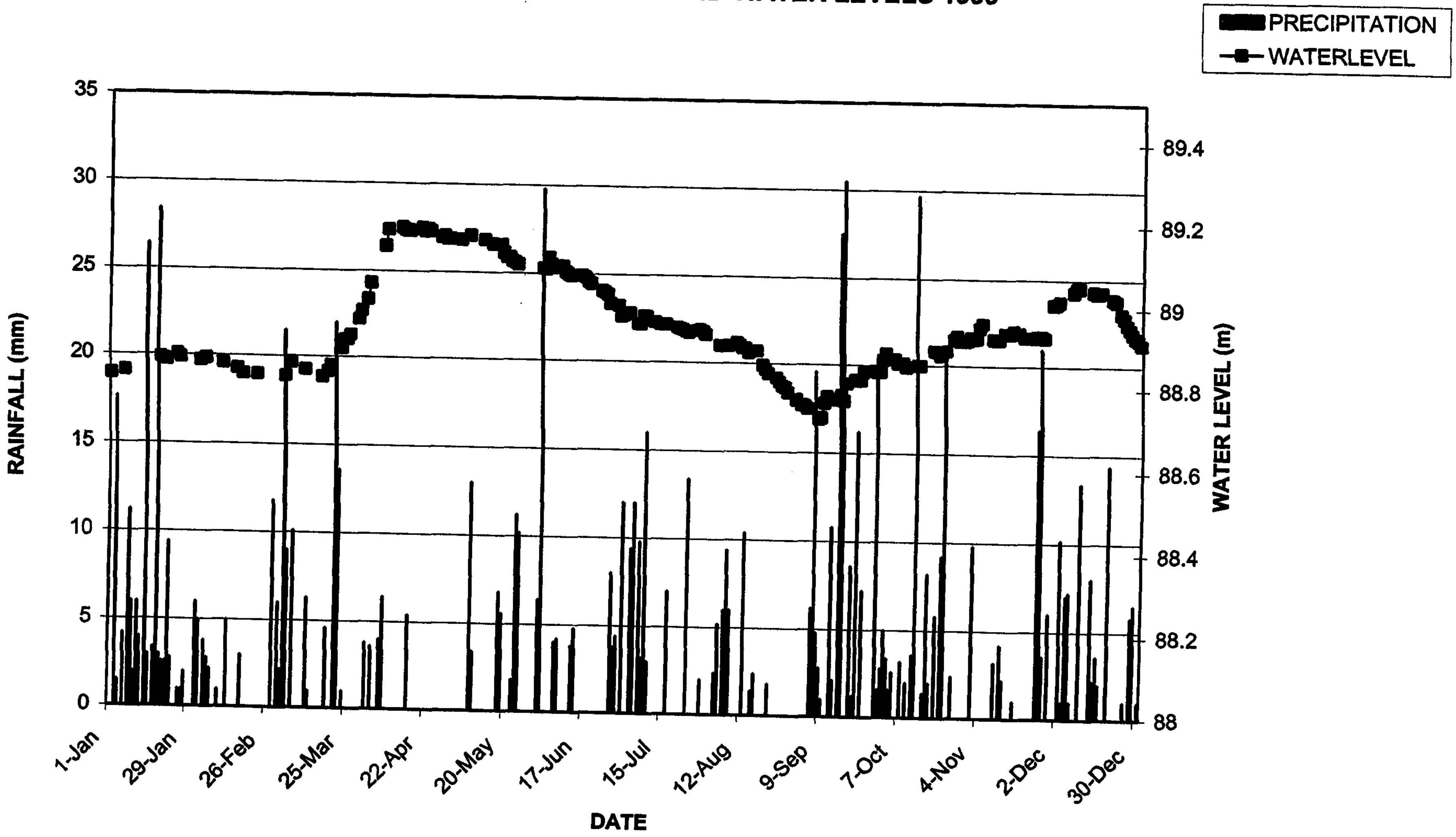
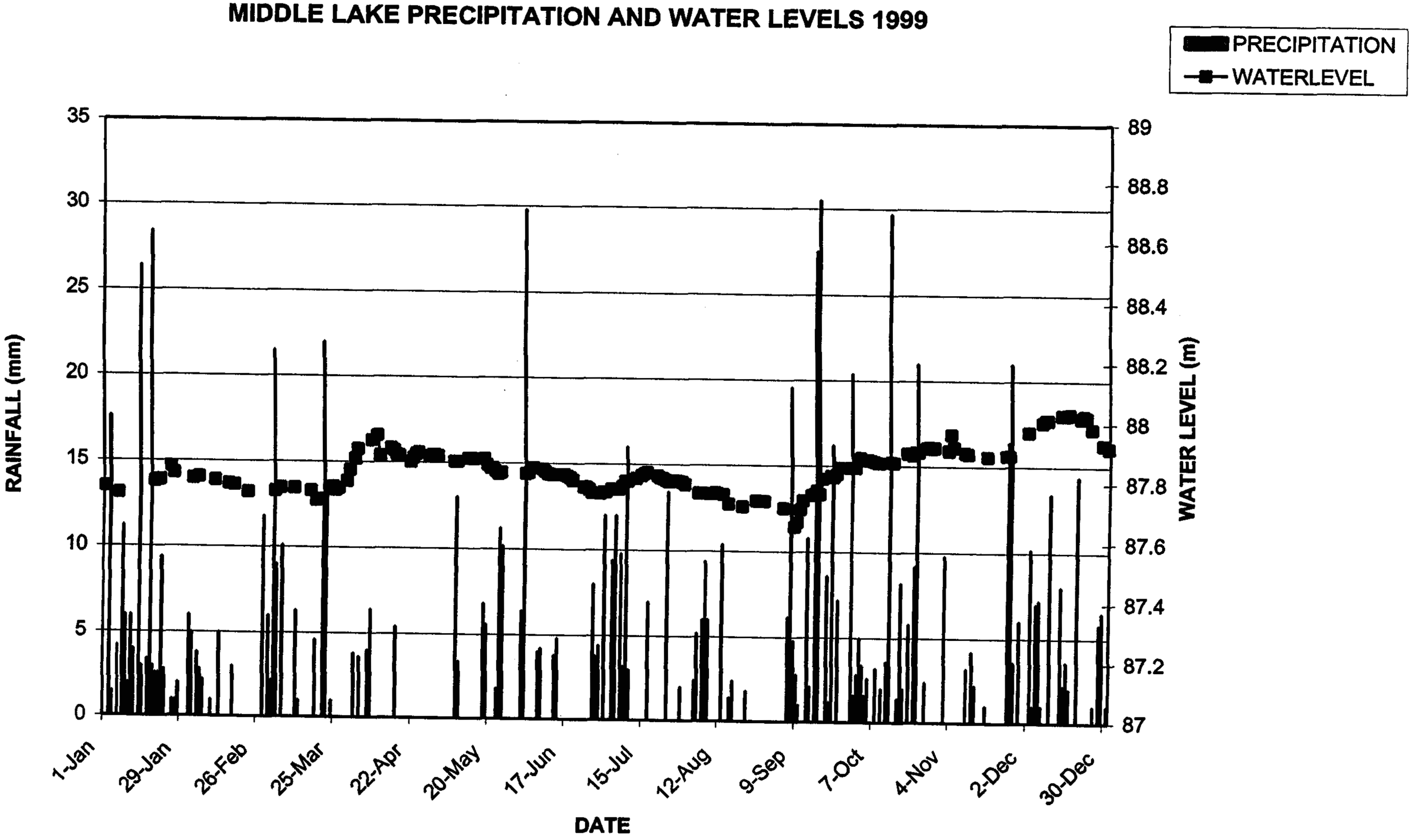


# LOCH GARRY PRECIPITATION AND WATER LEVELS 1999




MIDDLE LAKE PRECIPITATION AND WATER LEVELS 1999
PRECIPITATION
WATERLEVEL
RAINFALL (mm)
35
30
25
20
15
10
5
0
WATER LEVEL (m)
89
88.8
88.6
88.4
88.2
88
87.8
87.6
87.4
87.2
87
1-Jan
29-Jan
26-Feb
25-Mar
22-Apr
20-May
17-Jun
15-Jul
12-Aug
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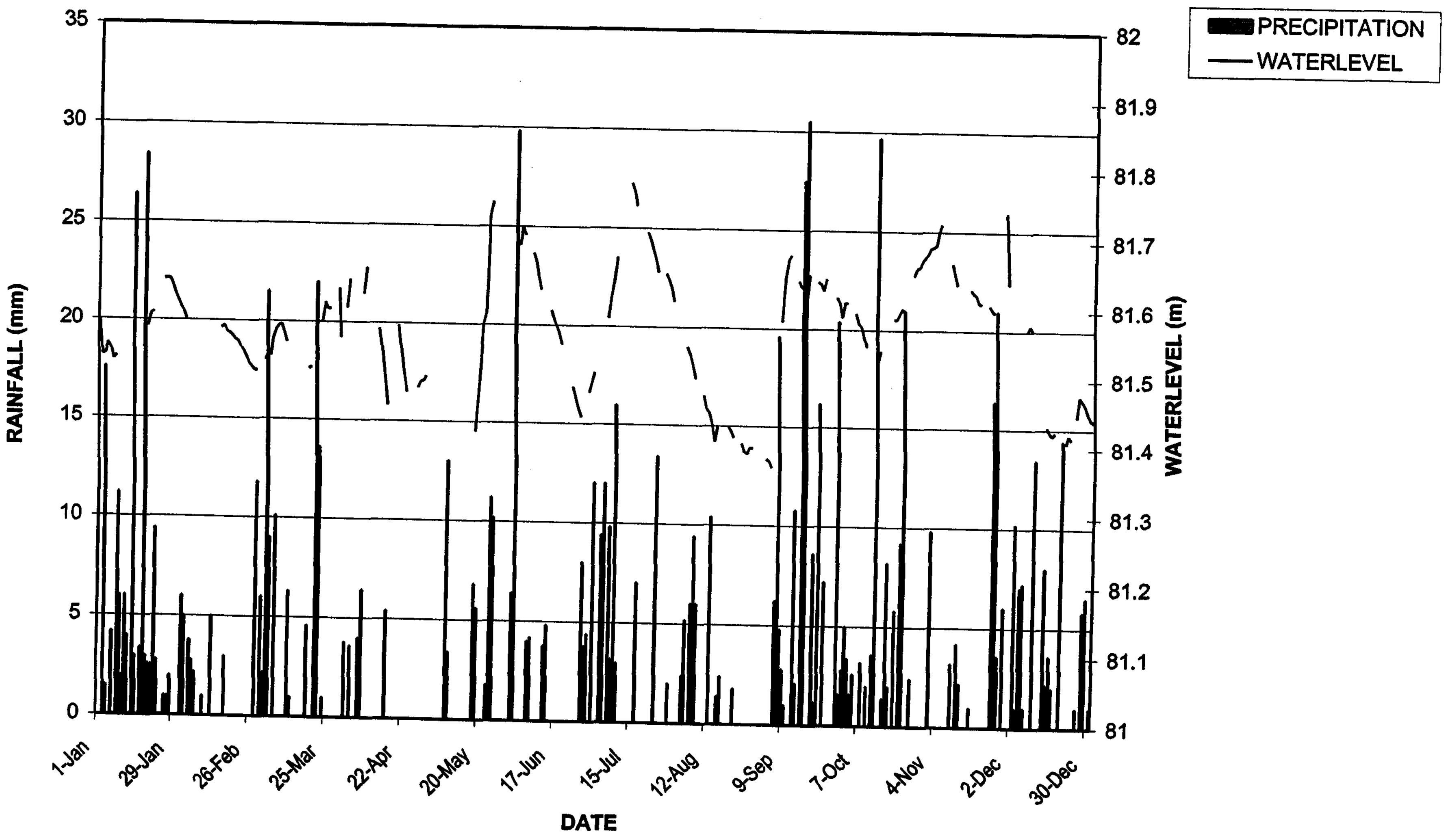
4-Nov
2-Dec
30-Dec
DATE

## ALEXANDRIA LAKE RAIN AND WATER LEVEL 1999



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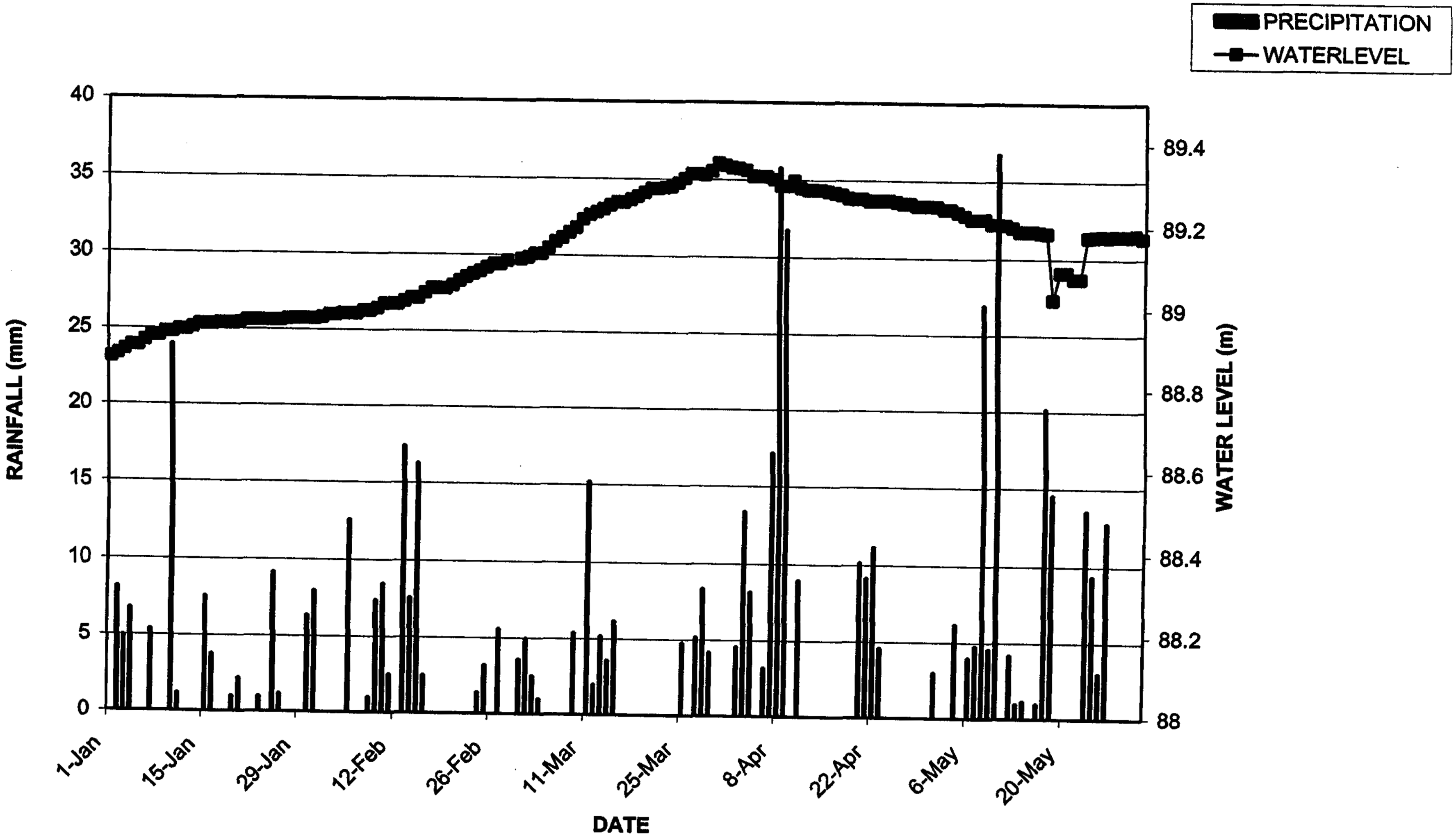
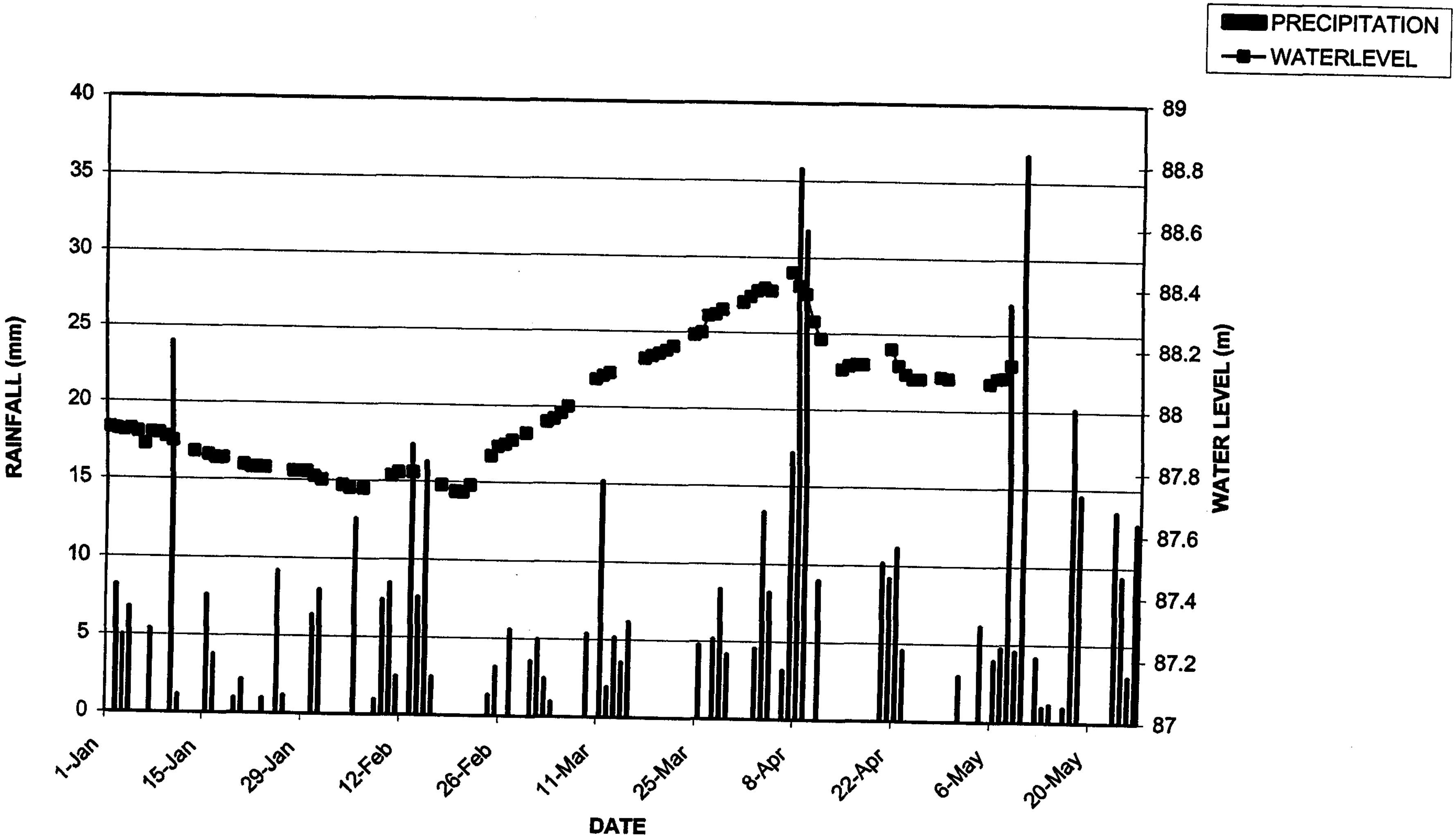
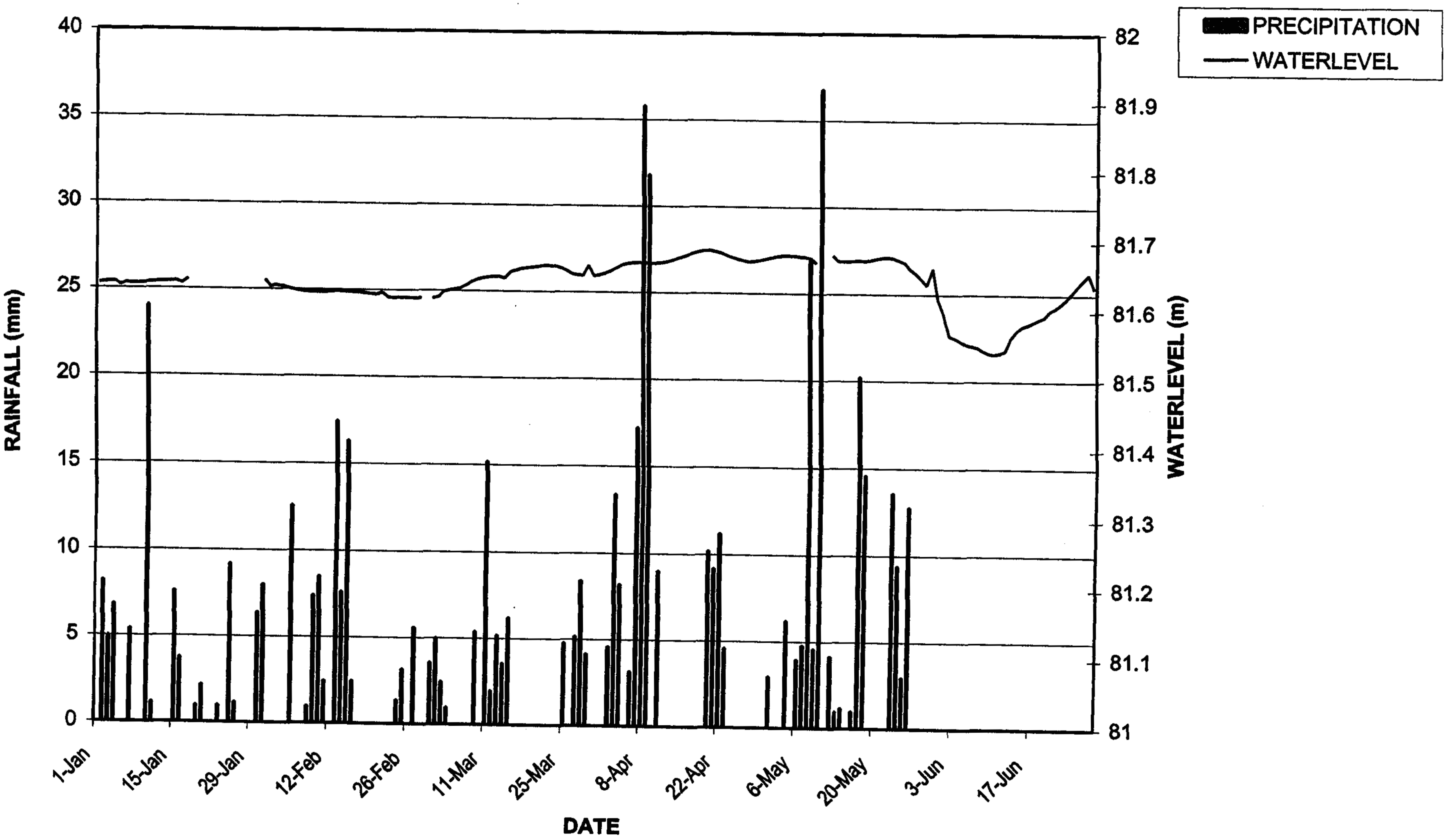


# MIDDLE LAKE PRECIPITATION AND WATER LEVELS 2000



## ALEXANDRIA LAKE RAIN AND WATER LEVEL 2000



# Appendix C:
# RRCA Garry River System Operational Plan

Raisin
Region
Conservation
Authority

# Operation Manual for the Garry River System

January 1995

# OPERATION MANUAL FOR THE GARRY RIVER SYSTEM

## The Garry River Watershed

The Garry River flows through the Town of Alexandria and drains approximately 34 km$^2$ at its outlet to the Delisle River. The watershed is dominated by 3 lakes which form the main water supply for the Town of Alexandria. The lakes are impounded by 3 dams which regulate water levels and flows in the Garry River System. The river gradient is quite flat, and relatively sluggish flow conditions prevail (see Figures 1 & 2).

### Loch Garry

At the headwaters of the Garry River is Loch Garry, approximately 3.8 km$^2$ in area, which drains about 16 km$^2$ of the watershed. Loch Garry is a shallow, groundwater-fed lake situated in a swampy, organic soil area. The lake varies approximately between 1 and 5 metres in depth and drains through 2 km of swampy river into Middle Lake. Prior to the construction of Loch Garry Dam, Loch Garry existed nearly in its present form. The dam raises the water level only approximately 0.6 metres above the natural state.

### Middle Lake

Middle Lake is a small, shallow lake that has been formed by the construction of Kenyon Dam at its easterly end. The depth of the lake varies between 1 and 1.5 metres. Approximately $^2/_3$ of this lake is bulrush marsh. Middle Lake drains through nearly 3 km of river into Alexandria Lake.

### Alexandria Lake (Mill Pond)

Alexandria Lake was created for the water supply of Priest's Mill in 1819. The lake is small, shallow and weedy. The water intake for the Town's water filtration plant is located in this Lake. The lake is about 1.5 metres deep and has an extensive marsh at the west end. Alexandria Lake drains through 1.5 km of river through the Town, through a golf course and into the Delisle River.

### Water Level and Flow Regulation

The three control dams on the Garry River are operated primarily for flood control and water supply purposes. During the spring freshet, stoplogs are removed as required on the two lower dams (Alexandria Dam & Kenyon Dam) to prevent flooding conditions. This practice is not required for Loch Garry as the lake is drawn down prior spring freshet. As the spring flows decrease, the stoplogs are replaced in order to maintain the lakes at their normal operating levels.

During the dry summer and early fall, stoplogs are removed for short periods of time at Loch Garry Dam and/or Kenyon Dam in order to sustain the level of Alexandria Lake. A slot in one of the logs at Alexandria Dam allows a flow of 30 l/s which helps dilute the effluent discharged from wastewater treatment lagoons into the Delisle River downstream.

**Loch Garry Dam**

The Loch Garry Dam was constructed in 1967 to improve the water supply for the Town of Alexandria by creating a larger controlled reservoir in Loch Garry. In 1984 the Loch Garry Dam was reconstructed and raised and an emergency spillway was added to protect against overtopping and to obtain additional water supply storage.

Dam: Top of Sill: 87.546 m
Top of Dam: ~~90.00 m~~ 90.30
Opening: 2.438 m
Logs: 10 (150 mm x 150 mm x 2.700 mm)
1 (125 mm x 150 mm x 2.700 mm)
(bottom log recessed 50 mm)
89.121 m
Normal Lake Level: 89.10 m (88.80 m before 1992)
100 Yr Lake Level: 89.56 m (revised in 1992)

Spillway: Top of Sill: 89.44 m
Top of Spillway: 90.30 m
Opening: 7.50 m

**Kenyon Dam**

The Kenyon Dam was originally constructed prior to 1936 and was reconstructed and raised in 1982 to protect against overtopping.

Top of Sill: 87.036 m
Top of Dam: 89.00 m
Spillway Opening: 2 x 2.5 m
Logs: 2 x 6 (200 mm x 200 mm x 2950 mm)
elevation 88.236 m
Normal Lake Level: 87.90 m
100 Yr Lake Level: 88.44 m (revised in 1992)

## Alexandria Dam

The Alexandria Dam is reported to have been constructed in 1819 for water supply for Priest's Mill. Both the Old Mill and the dam have been declared Heritage structures. The dam was reconstructed in 1981 to prevent further deterioration and reflected its heritage nature.

The dam is an earth-fill structure with masonry control works, which has been repaired with concrete in the past. The earth embankment portions have been faced on the lake side with concrete walls, and the masonry control structure has been faced over a considerable area with concrete. The dam has two stoplog spillways.

| | | |
|---|---|---|
| Dam: | Top of Sill: | 80.50 m |
| | Top of Dam: | 81.86 m |
| | Opening: | 3.60 m |
| | Logs: | 5 (200 mm x 200 mm x 4100 mm)<br>1 (75 mm x 200 mm x 4100 mm)<br>elevation 81.645 |
| | Normal Lake Level: | 81.60 m |
| | 100 Yr Lake Level: | 82.05 m (revised in 1992) |
| Spillway: | Top of Sill: | 81.11 m |
| | Top of Spillway: | 81.86 m |
| | Opening: | 1.45 m |
| | Logs: | ?<br>elevation 81.645 |

See figures 3, 4 & 5 for diagrams. Photographs are found in the appendix.

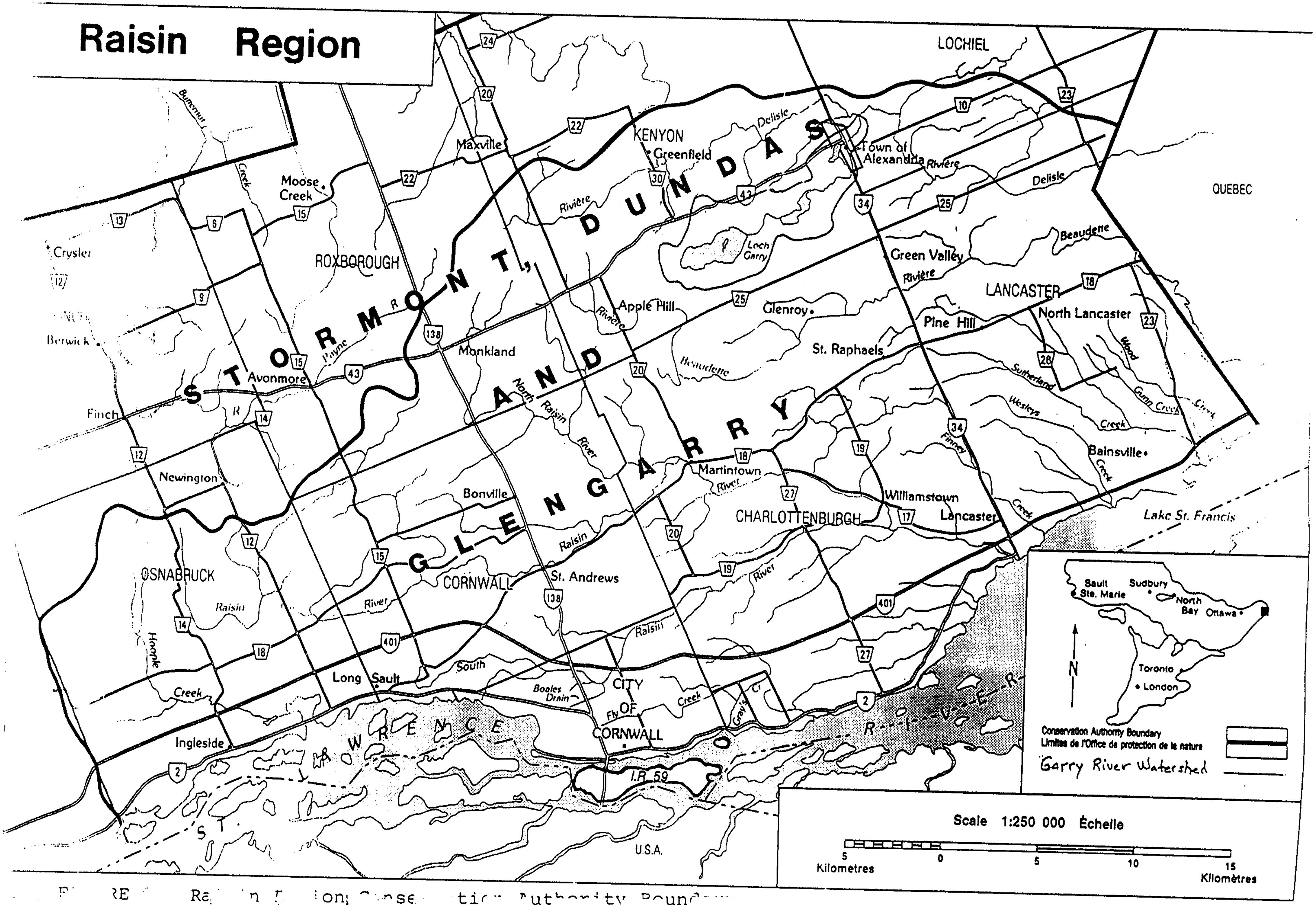


FIGURE Raisin Region Conservation Authority Boundary

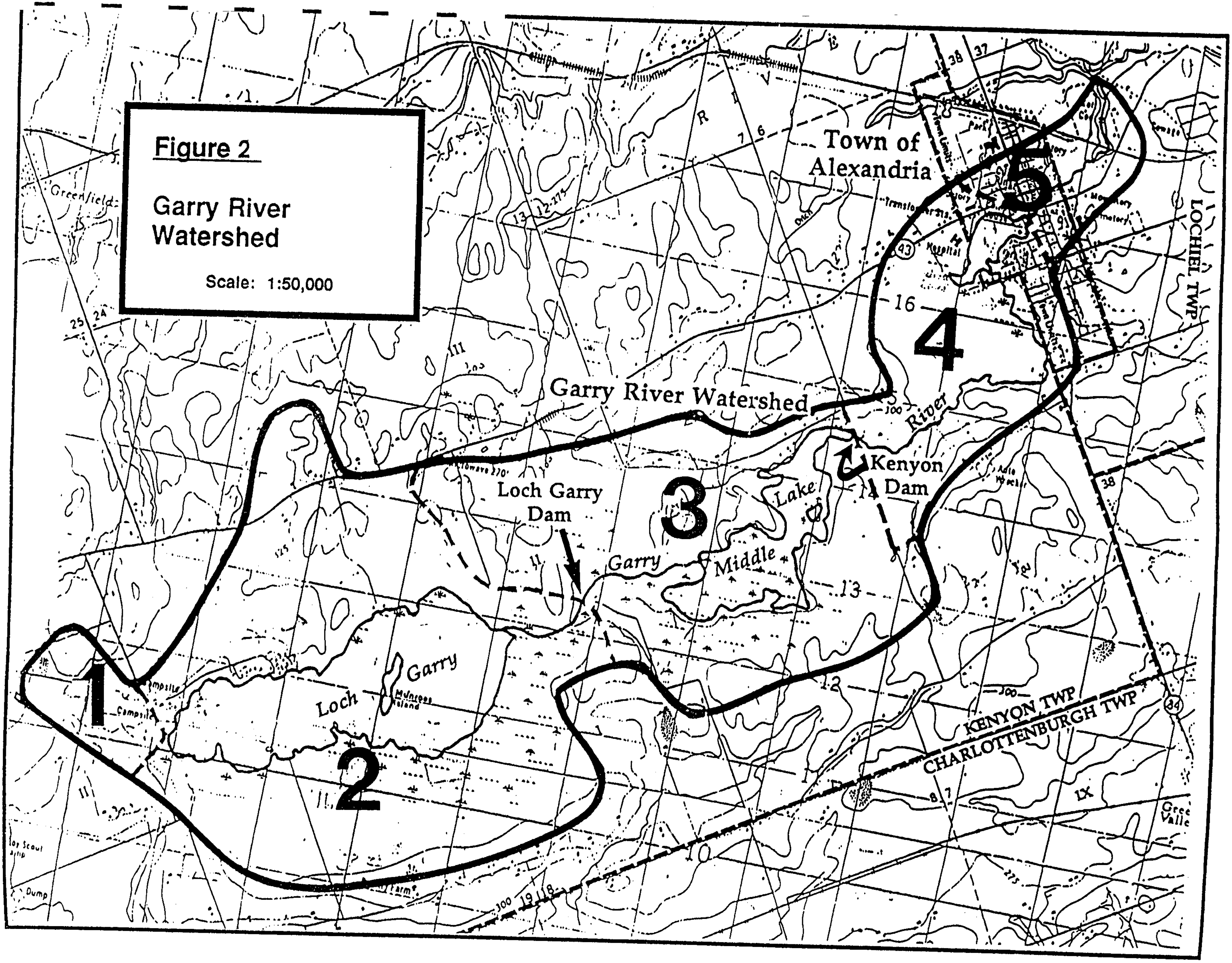
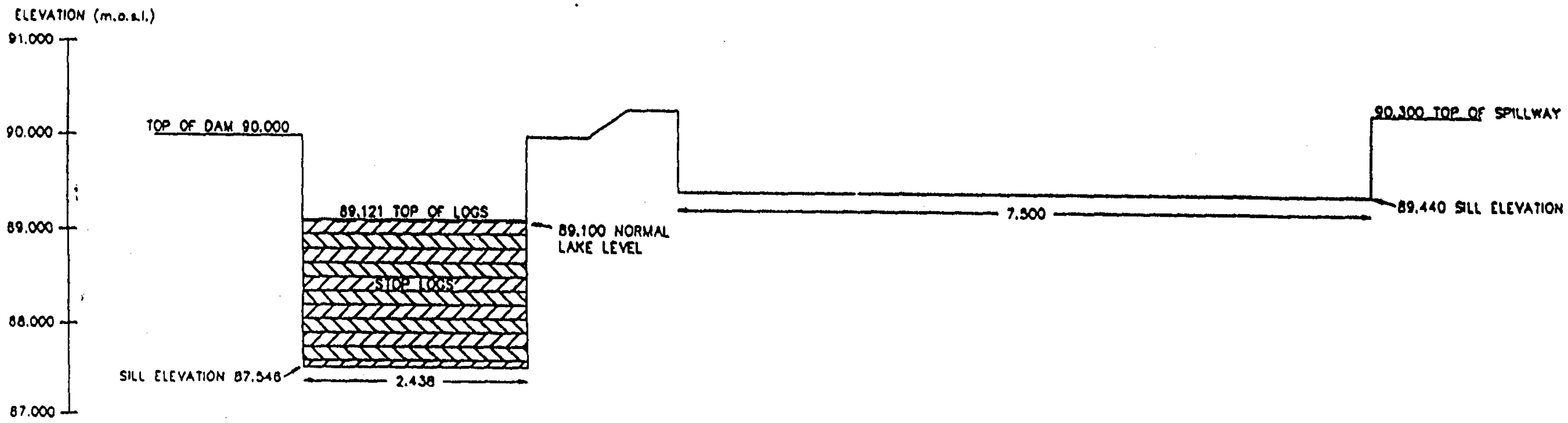


**Figure 2**

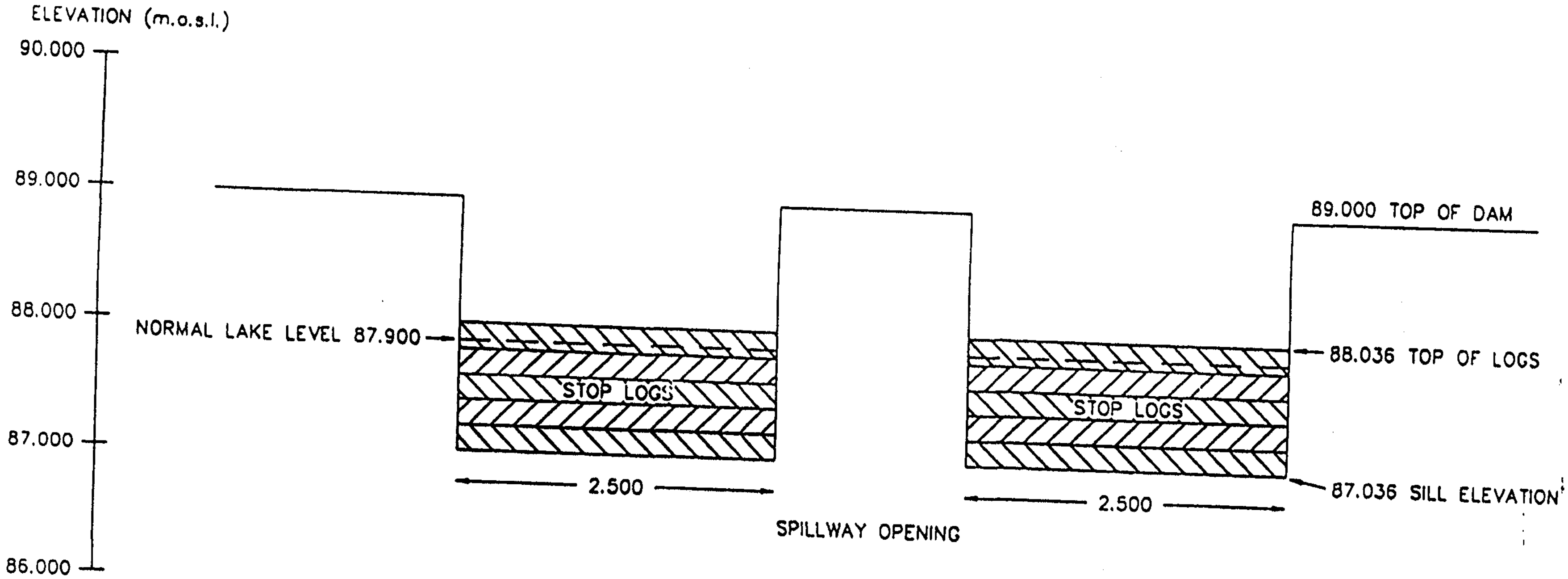
Garry River Watershed

Scale: 1:50,000



PAUL WISNER &
ASSOCIATES INC.
Water Resources and
Environmental Consultants
Ottawa · Toronto

Figure 3 Loch Garry Dam



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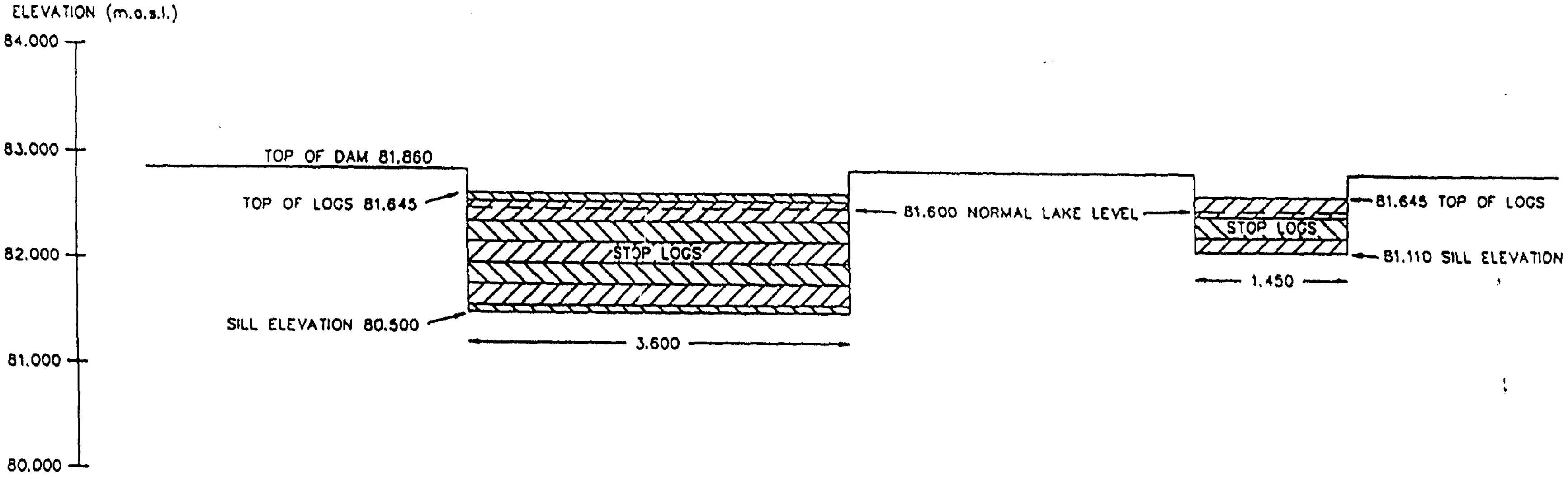
ASSOCIATES INC.
Water Resources and
Environmental Consultants
Ottawa · Toronto

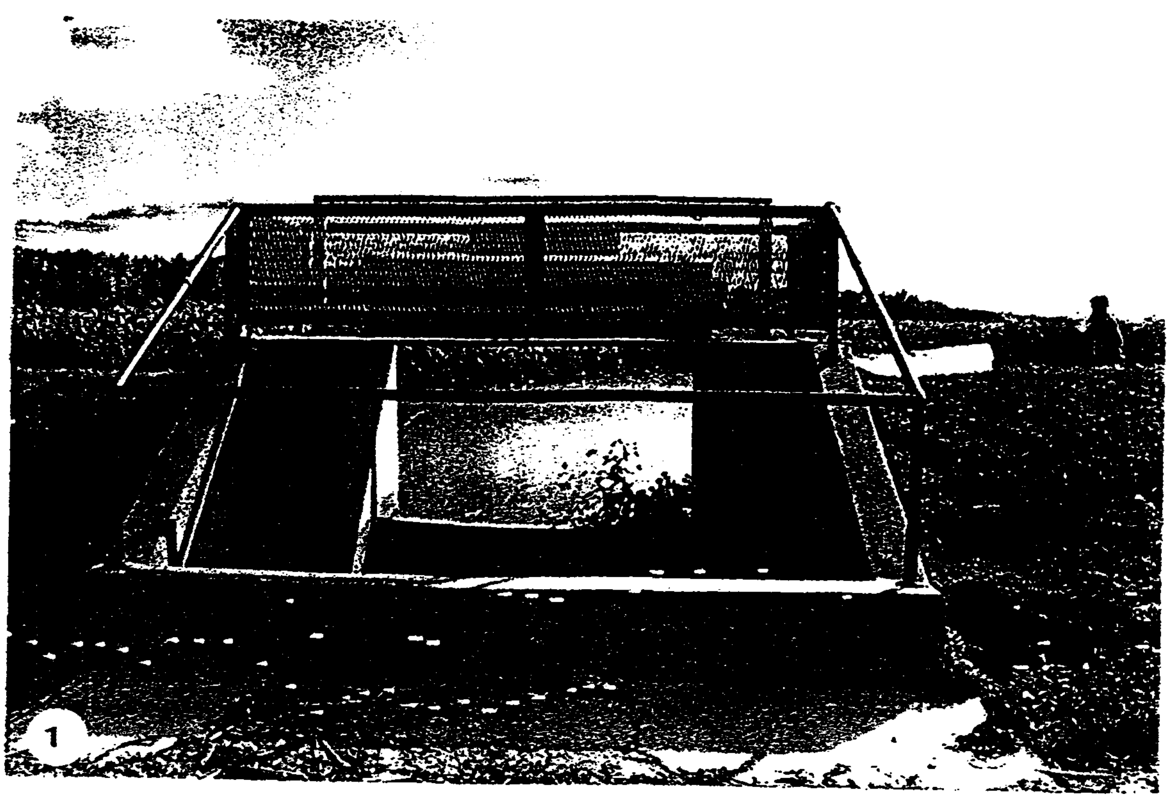
Figure 4 Kenyon Dam



PAUL WISNER &
ASSOCIATES INC.
Water Resources and
Environmental Consultants
Ottawa · Toronto

Figure 5 Alexandria Dam

1



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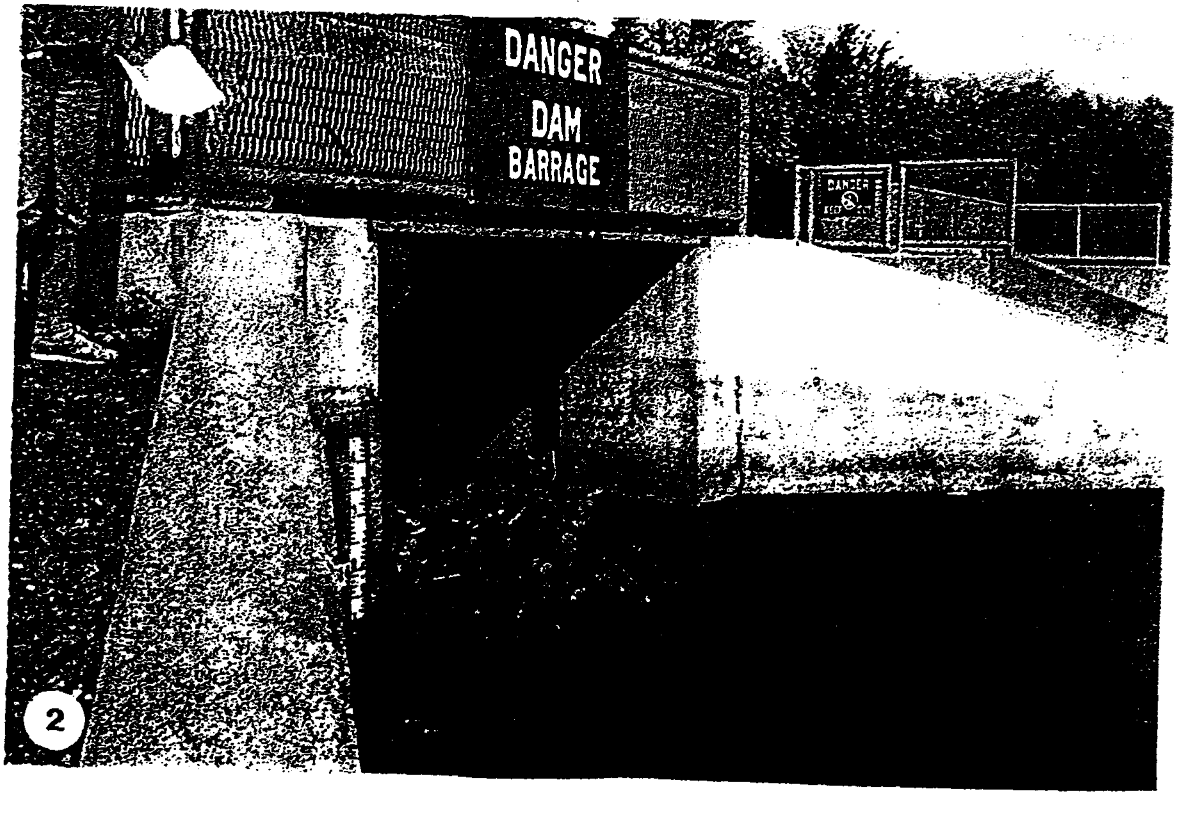

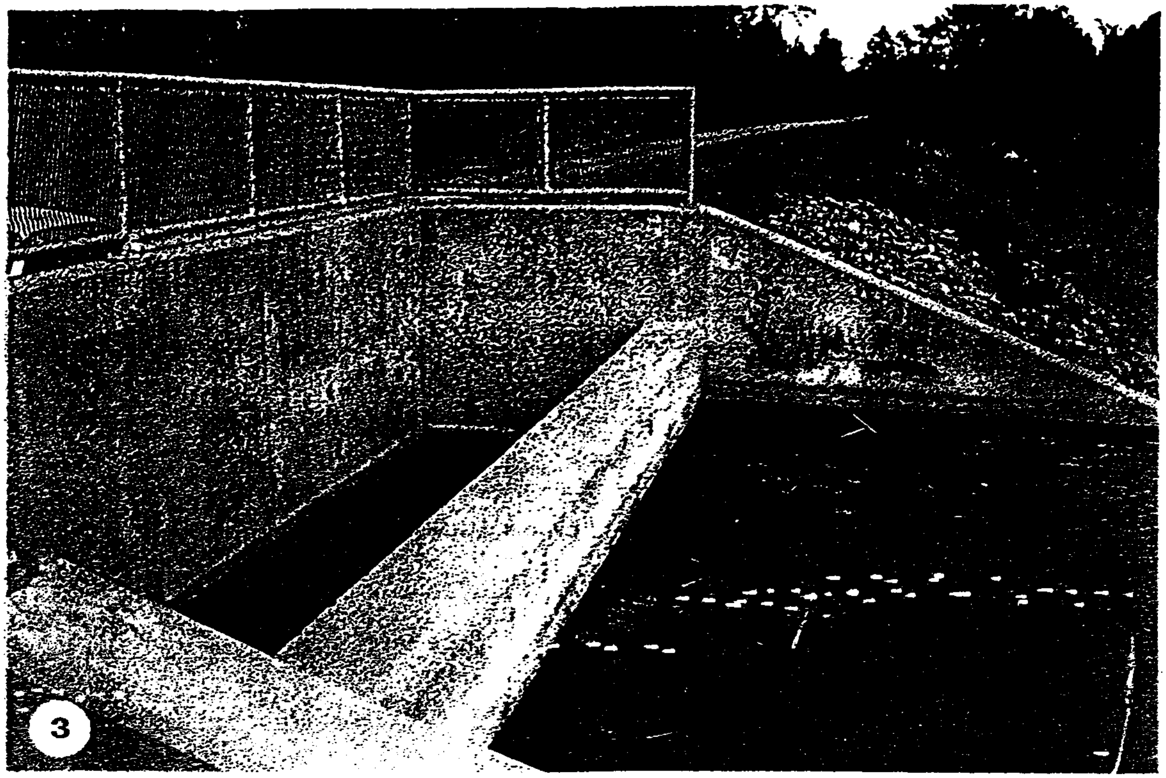

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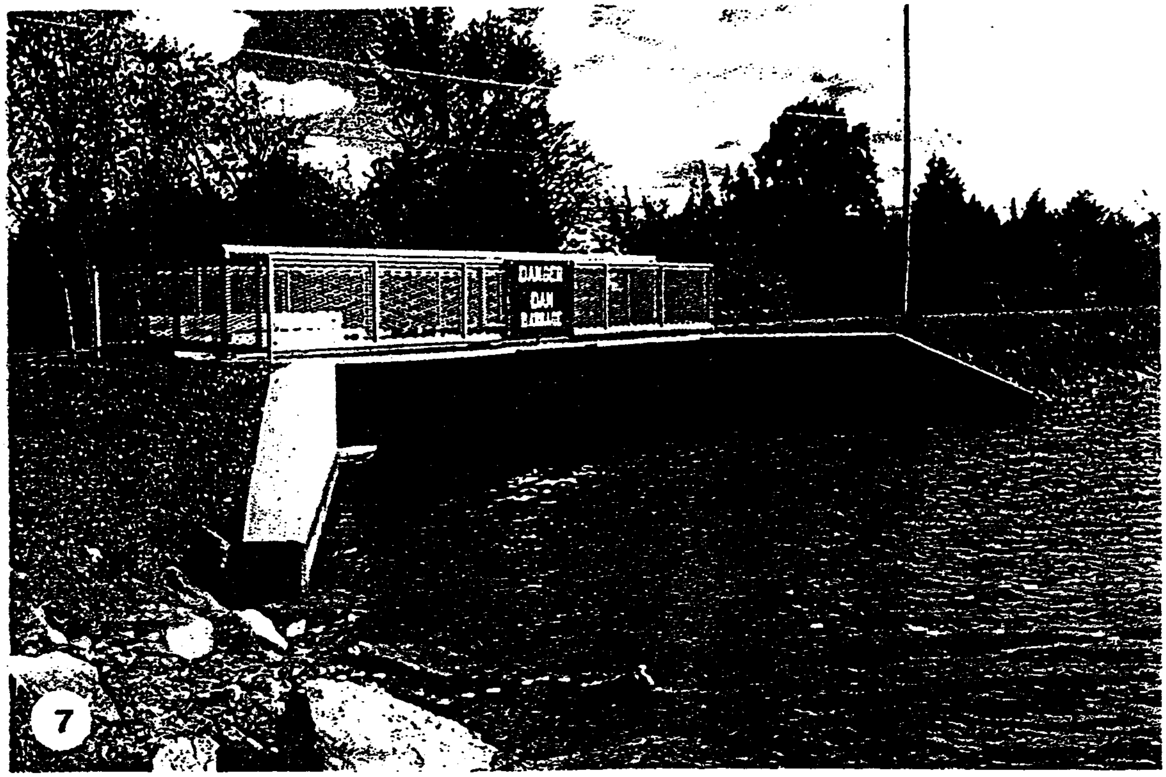

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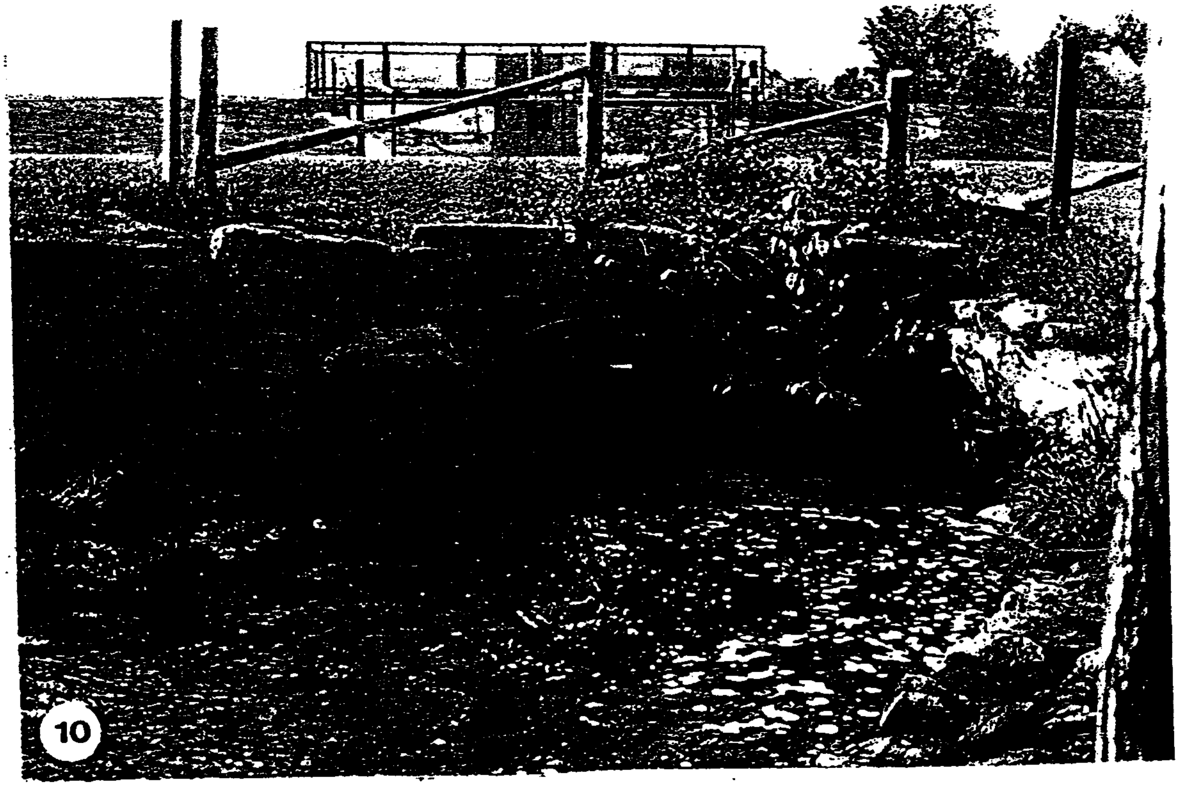

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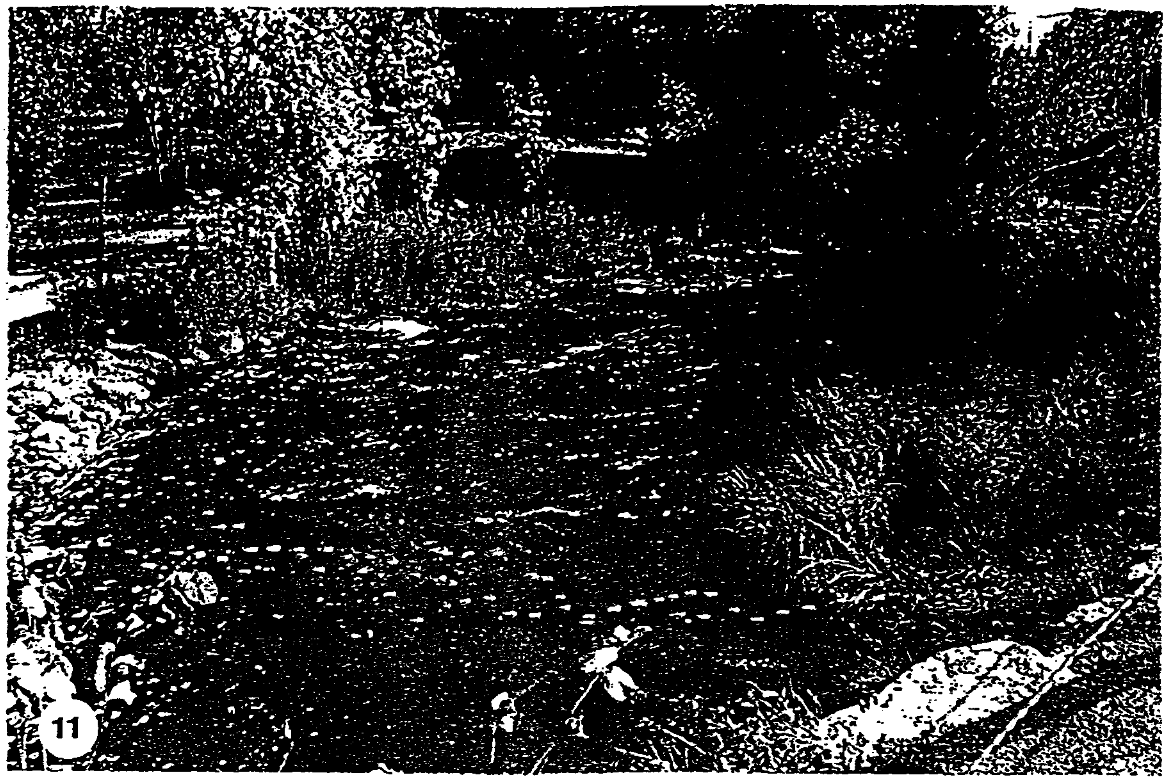

11

12

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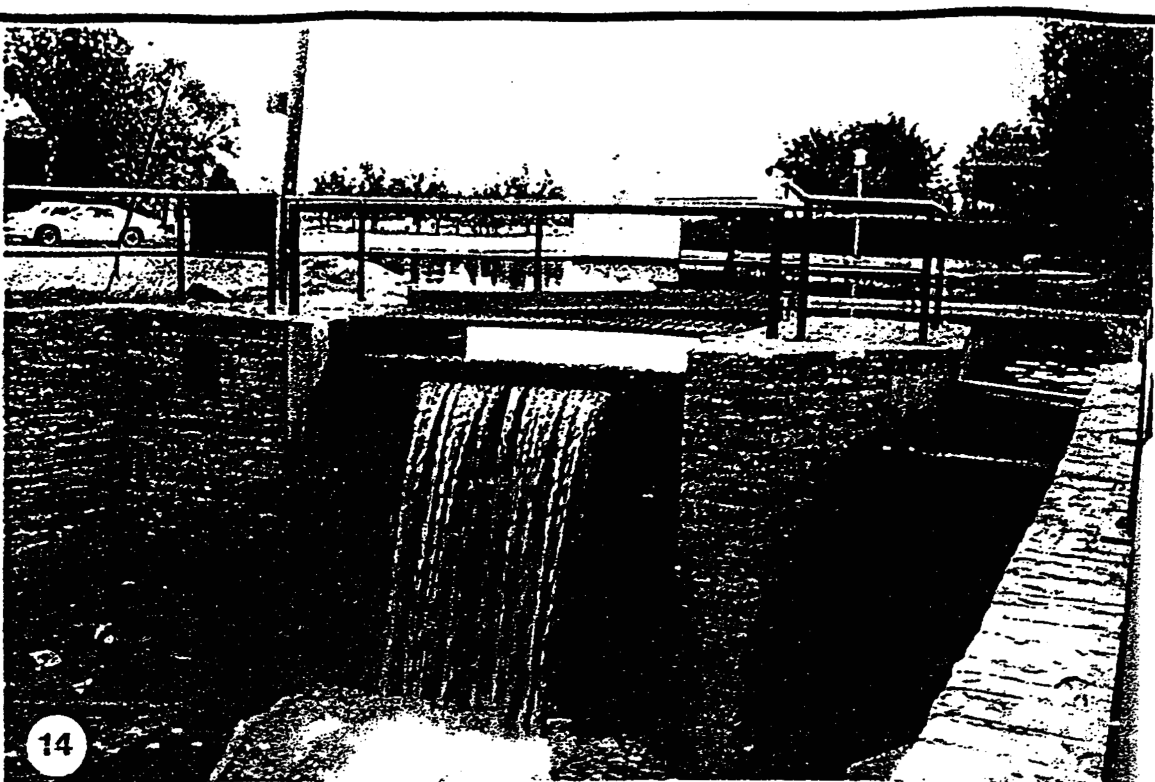
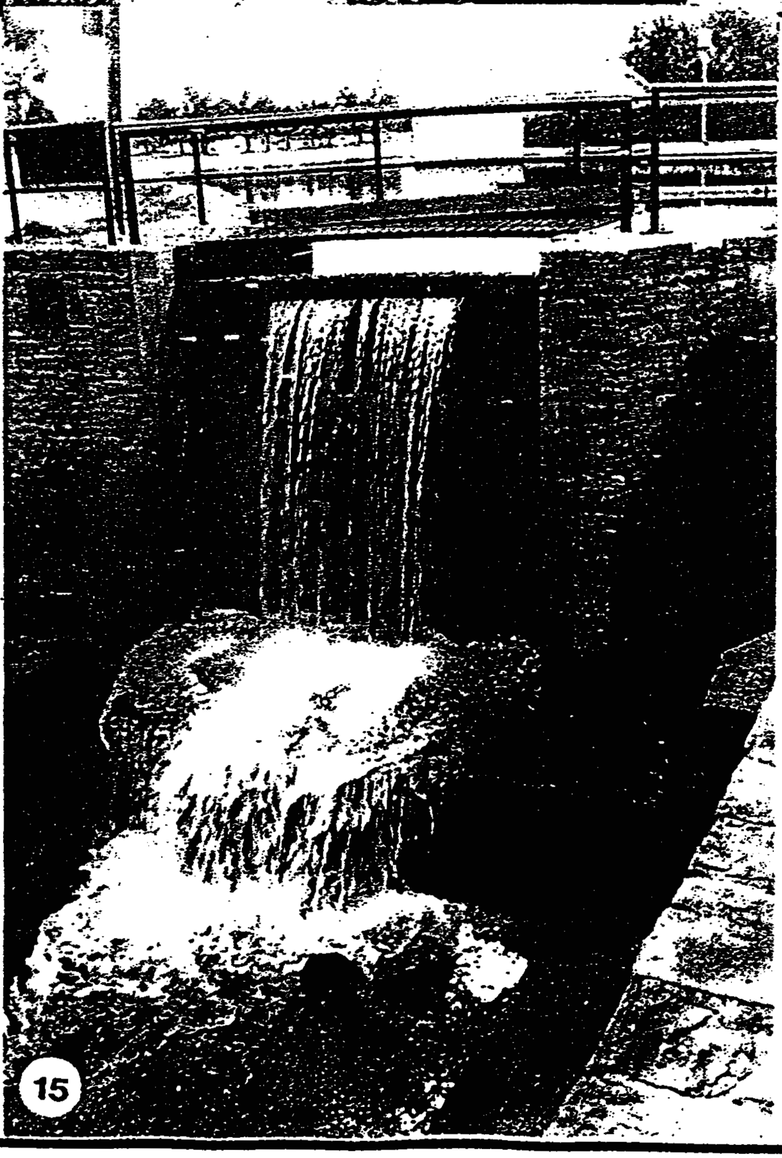


14



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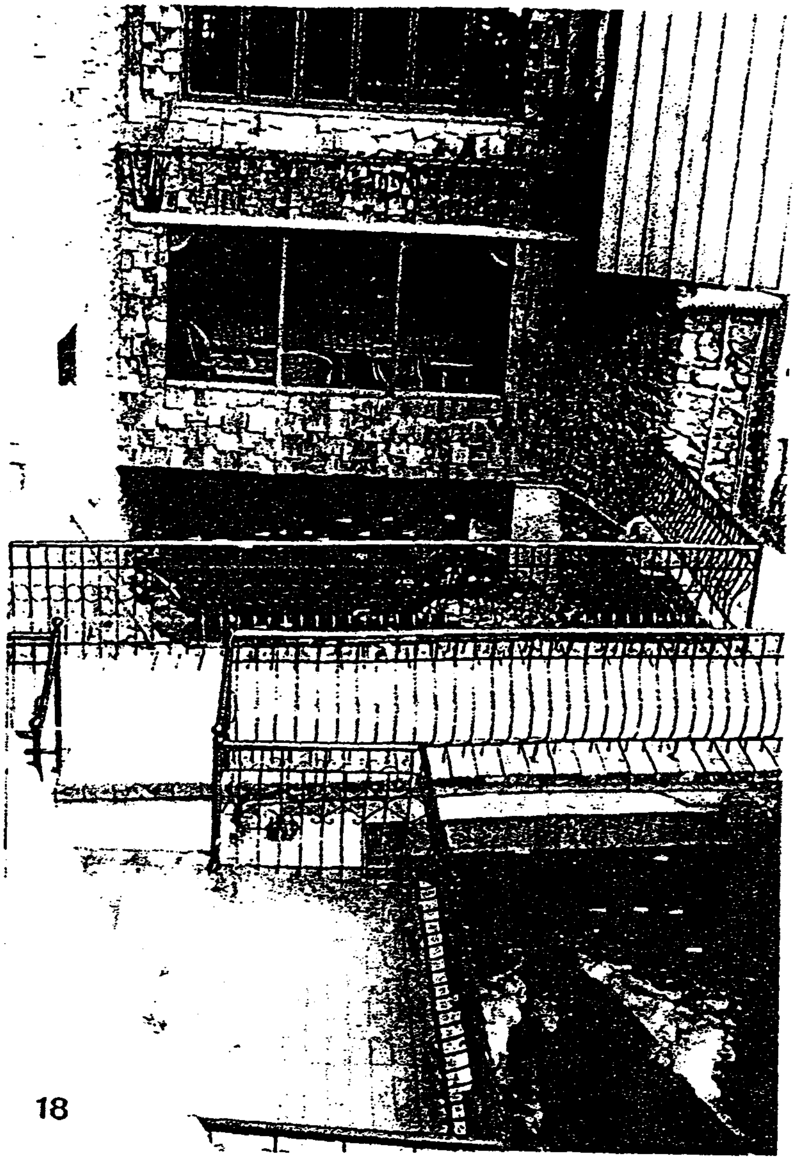


18

## GENERAL INFORMATION

No comments

## LOCATION

If you are not able to estimate the UTM Zone and co-ordinates from 1:10000 or 1:20000 maps please estimate the latitude and longitude from 1:50000 series topographical maps. Please provide the map sheet name and number in the latter case.

## DAM COMPONENTS - OUTLET WORKS

Some MNR dams are equipped with large slide valves usually located on the downstream face of the dam adjacent to the stoplog controlled outlet. These should be noted under other as should the situation where the outflow is by means of a weir.

## PHYSICAL DIMENSIONS

**Dam Height:** Is defined as the difference in elevation between the original streambed and the top of the deck or spillwall of a dam.

**Maximum head:** Is defined as the depth of water that can be retained behind the dam before water starts to flow over the dam or spillway.

**Total length of dam:** Is defined as the straight line distance measured along the dam from bank to bank of the river.

**Spillway length:** Is defined as the length of the portion or portions of the dam where water can flow over or through the dam. Spillway length includes the stoplog openings in the dam.

**Number of gates(number of stoplog openings):**The majority of MNR dams utilize stoplogs as the means to control water levels and to discharge water downstream. For some Conservation Authority dams steel gates, typical tainter gates, are used to control water levels. The number of gates is defined as the number of stoplog controlled openings in a dam.

**Total gate width:** Is defined as the sum of the widths of all the gates openings in a dam.

**Reservoir drainage area:** Is defined as the area of the watershed in kilometers squared which is controlled by the dam. This can also be stated as that portion of the watershed from which all runoff must pass through or over the dam.

**Reservoir surface area:** Is defined as the surface area in hectares of the lake formed by the dam.

**Reservoir volume:** Is defined as the surface area of the reservoir in hectares multiplied by the maximum head stored in the reservoir in meters divided by two. Division by two is necessary to permit the averaging of the depths in the reservoir due to sloping shorelines. Prior to carrying out any analyses on the reservoir a more detailed calculation of actual reservoir volume would be undertaken.

## DAM PURPOSE

Categories are self explanatory. Please keep in mind that the number of dams which support navigation are limited and are usually associated with navigation locks or inter-provincial watercourses such as the Ottawa River or the English and Winnipeg River systems.

## COST

Please indicate the year of construction only. The estimated replacement cost should be developed in conjunction with your regional engineering office.

## ROUTINE MAINTENANCE & OPERATION

To estimate the actual cost of operating your dam(s) it will be necessary for you to determine how often the site is visited for the purpose of removing or replacing stoplogs, the cost of any repairs or replacements(e.g. stoplogs) and the number of man-days associated with each operation. Typically it will require a minimum of two staff plus transportation and other support costs to perform each log removal or replacement operation. An average annual salary for MNR is $45,000.00 plus 22% benefits which translates into a man-day cost of $211.15.

Remember, when you calculate the annual cost of operation to consider the cost to read water levels, paint handrails, access road maintenance and any other cost that is incurred to permit operation and maintenance of the dam(s).

## MAJOR MAINTENANCE

Please make this list as inclusive as possible. It should include works for which the price may or may not be known. What is important is knowing what works were performed with respect to each dam.

## CLASSIFICATION

This is an opinion based on your observation and knowledge of the dam in question. It should be discussed with your regional engineering staff as should the tabular listing of what should be done and when.

## CONSEQUENCES OF FAILURE

Consequences of failure are not limited to downstream but must consider the reservoir and the area upstream of the reservoir that would be impacted if the dam failed. This is of particular importance when considering whether a dam would or should be replaced if it did in fact fail. Similarly, it is critical that details of the consequences be provided. These details add critical information to the dam inventory and to the future decision making process.

Where "other" is selected please identify the consequence in order that it can be added to the inventory document.

## CONSEQUENCE CATEGORY

This is the main determining factor in whether action should be taken to address the condition of a dam. The correct determination of the consequence category is critical. It is a subjective assessment of the risk that is presented by the structure in its present condition. This "risk" is composed of the physical condition of the dam and the population or assets which would be negatively impacted should the dam fail. For example, if a Provincial Highway were located downstream from a dam which could wash out should the dam fail. This would likely result in the dam being classed as a high or very high consequence dam. If a regional, township or municipal road exists downstream of a dam that could wash out this would likely result in the dam being classed as a high consequence category dam. In both of these instances the classification results primarily from the risk of loss of life and is higher for the highway due to the likelihood of more traffic in most cases. Each situation must be addressed on its own merits but it would be very helpful if you could include a short description as to why you classified the dam in the stated consequence category. Please discuss this with your engineering staff if you are not comfortable with your assessment.

## DECOMMISSIONING AND ABANDONMENT

This is also an item wherein it is essential to look at upstream impacts in making the determination with respect to abandonment or decommissioning. Please identify any dam that you believe can be abandoned, decommissioned or have its operation changed (e.g. lower lake level to minimize the number of stoplog movements and thereby lower the cost of operation). As well, please identify any possible **opportunities for transferring operation, operation and maintenance or ownership of the dam.** If these latter opportunities are present please identify the prospective taker. Afield has been added to the attached spreadsheet to address this item.

## FUTURE CONSIDERATIONS

Please discuss the cost of completing any of the sections with your regional engineering office. It is that office which will in all likelihood will work with your office to collect the information or gather it on your behalf.

## ADDITIONAL COMMENTS

Please provide any special comments or concerns that you are aware of relating to each of your dams. These extra items of information will help to identify concerns, clarify existing conditions or make engineering staff aware of issues that were not requested but which are important in the overall assessment of your MNR dams by this undertaking.

# Appendix D:
# Town of Alexandria Permit to Take Water and Certificate of Approval For Water Treatment Plant

Ministry of the Environment
Ministère de l'Environnement
Ontario

Alexandria

**CERTIFICATE OF APPROVAL**
**MUNICIPAL WATER**
**NUMBER 7-1802-90-916**

**WHEREAS**

Public Utilities Commission
of the Town of Alexandria
90 Main Street S.
Alexandria, Ontario
K0C 1A0

*has applied in accordance with Section 23 of the Ontario Water Resources Act for approval of:*

a change in operation of the Alexandria Filtration Plant in the Town of Alexandria, as follows:

- use of poly-aluminum silicate sulphate (PASS) as a coagulation agent replacing, on a temporary, permanent or seasonal basis, other coagulants and coagulation aids previously approved for use at the filtration plant, utilizing the existing chemical storage and feed facilities,

all in accordance with the application for approval dated December 4, 1990.

*This is to certify that after due enquiry the proposed works have been approved under Section 23 of the Ontario Water Resources Act.*

*DATED AT TORONTO this 4th day of November 1991.*

W. Gregson, P. Eng.
Director
Section 23
Ontario Water Resources Act

MT/pm

Attn:L. Poirier, General Manager, Alexandria PUC
cc:B. Ward, MOE SE, Reg. Dir.

Ministry of Environment and Energy
Ministère de l'Environnement et de l'Énergie
Ontario

## AMENDMENT TO CERTIFICATE OF APPROVAL
## WATER
## NUMBER 7-0324-81-826

Page 1 of 2

RECEIVED
MAY 13 1995
CORPORATION OF THE TOWN OF ALEXANDRIA
Per.

## NOTICE

Public Utilities Commission of
Town of Alexandria
Box 700, 90 Main St. S.
Alexandria, Ontario
K0C 1A0

*You are hereby notified that Certificate of Approval No. 7-0324-81-826 issued on May 27, 1982 has been amended to include the following works:*

one (1) new raw water flow meter totalizer and a recorder
one (1) new residual chlorine analyzer and a recorder
replacement of the existing treated water flow meter totalizer and a recorder with a new totalizer and a recorder,

all in accordance with the application dated April 3, 1995 and May 27, 1995.

*In accordance with Section 100 of the Ontario Water Resources Act, R.S.O. 1990, Chapter 0.40, as amended, you may by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 101 of the Ontario Water Resources Act, provides that the Notice requiring the hearing shall state:*

1. The portions of the approval or each term or condition in the approval in respect of which the hearing is required, and;
2. The grounds on which you intend to rely at the hearing in relation to each portion appealed.

*The Notice should also include:*

3. The name of the appellant;
4. The address of the appellant;
5. The Certificate of Approval number;
6. The date of the Certificate of Approval;
7. The name of the Director;
8. The municipality within which the water works are located;

*And the Notice should be signed and dated by the appellant.*

*This Notice must be served upon:*

The Secretary,
Environmental Appeal Board,
112 St. Clair Avenue West,
Suite 502,
Toronto, Ontario.
M4V 1N3

AND

The Director,
Section 52, *Ontario Water Resources Act*,
Ministry of Environment and Energy.
250 Davisville Avenue, 3rd Floor,
Toronto, Ontario.
M4S 1H2

*The above noted water works are approved under Section 52 of the Ontario Water Resources Act.*

*DATED AT TORONTO this* 10th *day of* May 1995

*THIS IS A TRUE COPY OF*
*THE ORIGINAL NOTICE OF AMENDMENT*
*SIGNED BY*
*D. CARR, P. ENG.*

*MAILED ON* MAY 11 1995

*BY*

RM/pm
cc L. Poirier, Clerk, Town of Alexandria ✓
District Manager, MOEE Cornwall District Office
Summa Eng. Ltd.

Ministry
of the
Environment
Ontario

Certificate No. 7-0324-81-826

# Certificate of Approval
## (Water)

**Whereas** TOWN OF ALEXANDRIA

has applied in accordance with Section 23 of the Ontario Water Resources Act for approval of:-

an expansion of the existing water treatment plant (Phase I) serving the Town of Alexandria to increase the plant capacity from 6,182 $m^3$/day to 8,014 $m^3$/day consisting of the following:

- construction of two (2) flocculation settling basins (No.3 and No.4), each basin 10.00 m long x 3.65 m wide x 4.6 m SWD including installation of settling tubes placed at 60° angle and covering a total area of approx. 45 $m^2$;
- construction of two (2) mixed media filters with the total surface area of approx. 22 $m^2$;
- construction of a 273 $m^3$ capacity clear well adjacent to the existing well to increase total storage capacity from 1,080 $m^3$ to 1,362 $m^3$;
- construction of an 8.84 m wide x 24.08 m long x 6.7 m high two storey building adjacent to the existing building;
- installation of one (1) high lift, vertical turbine type pump capable of pumping the water up to 60 L/s at 49 m TDH;
- installation of one (1) backwash, vertical turbine type pump capable of delivering 113.6 L/s against 9 m TDH;
- installation of one (1) 9 $m^3$ capacity liquid alum storage tank including feed system;
- installation of one (1) activated carbon feed system having a capacity of 9.3 x $10^{-3}m^3$/hr;
- installation of one (1) lime feeder having a capacity of 12.7 x $10^{-3}m^3$/hr;
- relocation of the existing chlorine room with all associated equipment and piping;
- installation of all control and metering equipment to monitor and control filters No.3 and No.4 and to update existing equipment servicing filters No.1 and No.2, raw water and plant effluent flow facilities;

....2

**Now therefore** this is to certify that after due enquiry the said proposed works have been approved under Section 23 of the Ontario Water Resources Act.

DATED AT TORONTO this 27th day of May 19 82

Ministry
of the
Environment
Ontario

Certificate No. 7-0324-81-826
(Continued)

# Certificate of Approval
## (Water)

- 2 -

**Whereas**

of

has applied in accordance with Section 23 of the Ontario Water Resources Act for approval of:-

together with all interconnecting piping, associated valves, appurtenances, electrical, lighting, heating and ventilation systems, all in accordance with the plans and specifications prepared by Lascelles Seguin Engineering Limited, Consulting Engineers, at a total estimated cost, including engineering and contingencies, of SEVEN HUNDRED THIRTY FIVE THOUSAND SEVEN HUNDRED AND NINETY DOLLARS ($735,790.00).

THIS IS [illegible]
[illegible]
ON 27/5/82

**Now therefore** this is to certify that after due enquiry the said proposed works have been approved under Section 23 of the Ontario Water Resources Act.

DATED AT TORONTO this 27th day of May 19 82

- [illegible]
- [illegible]
- [illegible]
- RD
- LB

16 March 1992

MAR [illegible] 1992
CORNWALL

Mr. Poirier
Alexandria Public Utilities Commission
90 Main Street South
ALEXANDRIA, Ontario
K0C 1A0

Dear Mr. Poirier:

Re: Amendment of Permit to Take Water No. 88-P-4006
Alexandria Mill Lake, Town of Alexandria

Enclosed please find Permit to Take Water Number 88-P-4006 which authorizes the withdrawal of water from Alexandria Mill Lake, Town of Alexandria.

The Permit has been issued in accordance with the procedures and amounts stated on the application portion of the Permit and is subject to the General Terms and Conditions of issuance as well as those Special Conditions which may be stated on the Permit or the attached Notice.

If changes in the rate, amount or method of water taking are proposed, an application must be submitted to and approved by this Ministry prior to the commencement of the changes. The attached application form must be used to request an amendment to the Permit.

The Permit is valid until March 31, 2002. A renewal application must be submitted to this office at least one month prior to that date to avoid cancellation of the Permit.

Compliance with the terms and conditions of the Permit is the responsibility of the permittee. Any person taking water under the authority of this Permit must be familiar with the Terms and Conditions.

Ministry of the Environment
Ministère de l'Environnement
Ontario

# Notice Avis

To:
Destinataire:

TO: Mr. Poirier
Alexandria Public Utilities Commission
90 Main Street South
Alexandria, Ontario
K0C 1A0

[illegible]

(Signed)

Pursuant to Section 61 of the Ontario Water Resources Act, you are hereby notified that Permit to Take Water Number 88-P-4006 has been issued to you subject to the following Special Conditions. These Special Conditions are in addition to the General Terms and Conditions noted on the reverse side of the Permit.

1) The taking shall not interfere with the minimum flow requirements for the Garry River.

   Under a standing agreement between the Ministry of the Environment and the Raisin Region Conservation Authority a minimum flow of 30 litres per second must be provided over the dam at all times.

2) An operating procedure shall be drafted between the Commission and the Conservation Authority to ensure a minimum flow requirement of 30 litres per second is maintained at all times.

   A copy of this operating procedure shall be sent to the Ministry of the Environment.

The reason for the imposition of these conditions is as follows:

1) To ensure sufficient water is available downstream of Alexandria for other uses including sufficient flow to achieve proper assimilation of municipal sewage treatment lagoon effluent.

You may, by written notice served upon me and the Environmental Appeal Board within 15 days after receipt of this Notice, require a hearing by the Board. Section 63 of the Ontario Water Resources Act, R.S.O. 1980, C361, as amended, provides that the Notice requiring the hearing shall state:

1) The portion of each Term or Condition in the Permit in respect of which the hearing is required, and;
2) The grounds on which you intend to rely at the hearing in relation to each portion appealed,

In addition to these statutory requirements, the Notice should include:

3) The name of the appellant;
4) The address of the appellant;
5) The Permit number;
6) The date of the Permit;
7) The name of the Director;
8) The municipality within which the taking is located;

and the Notice should be signed and dated by the appellant.

This Notice should be served upon:

| | |
|---|---|
| The Secretary<br>Environmental Appeal Board<br>112 St. Clair Ave. West<br>5th Floor<br>Toronto, Ontario<br>M4V 1N3 | The Director<br>Section 20, OWRA<br>Ministry of the Environment<br>133 Dalton Avenue, Box 820<br>Kingston, Ontario<br>K7L 4X6 |

Dated at Kingston this 18th day of March, 1992.

Director
Section 20, OWRA
Ministry of the Environment

88P4006

Ministry of the Environment
Ontario

# Application for Permit to Take W ter

The Ontario Water Resources Act, Section

**Please Print in Block Letters**

*Ce formulaire est également disponible en fran*

Name of Applicant: Alexandria Public Utilities Commission

Mailing Address: 90 Main Street South

City, Town... Etc. / Prov.: Alexandria, Ontario

Telephone: Area 613 Number 525 3 8 6

Postal Code: K0C 1A0

## Application Particulars

Please read instructions
(Permit to Take Water Program Information Sheet)

MAR 18 1992

**A. Source of Water**

1. Well: How many? ______ Spring: How many? ______
2. Lake, Stream or River / Name: Alexandria Mill Lake
3. Pond: How many? ______ Type: ☐ Dugout ☐ By-Pass ☐ On-Stream ☐ Pit or Q
4. Other: Type of Source ______
5. Date of construction of source? D M Y ______
6. Date of installation of water taking equipment? D M Y ______

**B. Location of Taking:** Alexandria
(Lot, Concession, Township and County or Region or District; or City, Town or Village with Street and Number)

**C. Location of Water Use:** Same as B ☒ or: ______
(Lot, Concession, Township and County or Region or District; or City, Town or Village with Street and Number)

**D. Purpose of Taking:** ☐ Irrigation ☐ Commercial ☐ Industrial ☒ Municipal ☐ Public Supply ☐ Recreat

☐ Other: ______

**E. Period of Water Taking (Complete 1 or 2)**

1. Taking to commence on D M Y ______ and to extend for a period of ______ (Days, Weeks, Months, Years)
2. Seasonal taking to extend from D M Y ______ to D M ______ each year for ______ Years

88P4006

**F. Request Amount of Taking from Each Source**

| | SOURCE 1 | SOURCE 2 | SOURCE 3 |
|---|---|---|---|
| 1. Source Name or Description | | | |
| 2. Maximum Amount Taken in One Minute | 3,900 | | |
| 3. Maximum Amount Taken in One Day | 5,616,000 | | |
| 4. Number of Hours of Taking in One Day Maximum | 24 | | |
| Average | | | |
| 5. Maximum Number of Days of Taking in One Year | 365 | | |

State Units Used (check one)

☐ Imperial Gallons Per Minute or Day
☐ U.S. Gallons Per Minute or Day
☒ Litres Per Minute or Day

**G. Submit a diagram of the area of water use in the space provided on the reverse side of this form**
(Diagram instructions and example are shown on the information sheet)

The Applicant agrees to indemnify and save harmless the Crown in right of the Province of Ontario and its officers, employees, agents, and contractors from and again all damages, loss, costs, claims, suits, injuries, demands, actions, and proceedings resulting from or in any manner connected with any act or omission of the applicant any of its officers, employees, agents or contractors and relating to this Application and any Permit, Renewal Permit, or terms and conditions of a Permit, issued in respon to this Application.

I understand that it is the policy of the Director in issuing a Permit to Take Water to impose the General Terms and Conditions appearing on the reverse side of this Applicatio There are no special circumstances or reasons why the Director should not impose such terms and conditions in issuing the Permit I am applying for. (Note. Cross o the previous sentence if it is not applicable to you and enclose with your Application a letter to the Director setting out such reasons and special circumstances.)

Date: 04 12 91 (D M Y)

Status of Agent or Official of Applicant: General Manager

Signature of Applicant or of Authorized Officer or Agent

(For Office Use Only)

## Permit to Take Water

Permit Expires: 31 03 2002 (D M Y)

Permit Number: 88P4006

Pursuant to Section 20 of the Ontario Water Resources Act, permission is hereby granted for the taking of water in accordance with the above Application, subject to th General Terms and Conditions which appear overleaf, and subject to the Special Conditions and amendments to the Application Particulars, as follows:

Special Conditions on the attached Notice.

Measurement and reporting under General Terms and Conditions

2 Clause (b) and (c) to be submitted yearly.

### Notice of Terms and Conditions

The Ontario Water Resources Act, Section 21

Take notice that in issuing this Permit to Take Water, I have imposed terms and conditions pertaining to the taking of water and to the results of the taking. The terms and condition have been designed to allow for the development of water resources for beneficial purposes while providing reasonable protection to existing water uses and to public interests in water

You may appeal the terms and conditions by giving written notice to the Director of the Ministry at the appropriate Region Office (see Information sheet), and to th Environmental Appeal Board, 112 St. Clair Avenue West, Toronto, Ontario M4V 1N3, within fifteen days after service of this Notice. In the event of an appeal the term and conditions of the Permit, as issued, would remain in effect until the appeal has been finalized.

18 03 92

# General Terms and Conditions

These terms and conditions have been designed to allow for the development of water resources for beneficial purposes while providing reasonable protection to othe water uses and to public interests in water.

1. **Permit**

   This Permit shall be kept available at all times for inspection.

2. **Measurement and Reporting of Water Taking**

   The Director may, from time to time, where a situation of interference or anticipated interference with water supplies exists, or in a situation requiring information on water takings for purposes of water resource inventory and planning, give written notice to the Permit holder to undertake any of the following actions.

   The Permit holder shall comply with any such notice:

   (a) To establish and maintain a system for the measurement of the quantities of water taken;

   (b) To operate such a system and to record measurements of the quantities of water taken on forms provided by the Director, with such frequency or for such u periods as the Director may specify;

   (c) To return to the Director records made pursuant to clause 2 (b) at such times or with such frequency as the Director may specify;

   (d) To keep records made pursuant to clause 2 (b) available for inspection until such time as they are returned to the Director pursuant to clause 2 (c).

3. **Interference with Other Water Supplies**

   The Permit holder shall immediately notify the Director of any complaint arising from the taking of water authorized by this Permit and shall report upon any action w has been taken or is proposed with regard to such complaint.

   For Surface-Water Takings, the taking of water (including the taking of water into storage and the subsequent or simultaneous withdrawal from storage) shall be car out in such a manner that streamflow is not stopped and is not reduced to a rate that will cause interference with downstream uses of water or with the natural function of the stream.

   For Ground-Water Takings, if the taking of water is forecast to interfere seriously, or is observed to interfere seriously with other water supplies obtained from adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit holder shall take such action as will make available to th affected a supply of water equivalent in quantity and quality to their normal takings, or shall compensate such persons for their reasonable costs of so doing, or s reduce the rate and amount of taking so as to prevent the forecast interference or alleviate the observed interference. Pending permanent restoration of the affec supplies, the Permit holder shall provide to those affected temporary water supplies adequate to meet their normal requirements, or shall compensate such persons f their reasonable costs of so doing.

4. **Reporting of Changes**

   The Permit holder shall report to the Director any changes of address or telephone number, or change of ownership of the property for which this Permit is issued shall report to the Director any changes in the general conditions of water taking from those described in the Permit application within thirty days of any such chan

   The Permit holder shall not assign his rights under this Permit to another person without the written consent of the Director.

5. **Expiry**

   No water may be taken under authority of this Permit after the expiry date shown on the face of this Permit, unless the Permit is renewed, or after the expiry date sh on any renewal of this Permit.

6. **Liability**

   This Permit does not release the permittee from any legal liability or obligation and remains in force subject to all limitations, requirements, and liabilities imposed l law. This Permit shall not be construed as estopping or limiting any legal claims or rights of action that any person, including the Crown in right of Ontario or any agen thereof, has or may have against the permittee, its officers, employees, agents, and contractors.

7. **Inspection**

   It is a condition of this permit that the permittee must forthwith on request permit provincial officers to carry out inspections authorized by section 10, 10a or 10b o Ontario Water Resources Act, section 126, 126a or 127 of the Environmental Protection Act or section 18 or 19a of the Pesticides Act of any place, other than any roc actually used as a dwelling, to which the permit relates.

## DIAGRAM OF LOCATION OF WATER TAKING

88-P-4006

88P4006

THIS IS A TRUE COPY OF THE ORIGINAL PERMIT ISSUED ON

MAR 18 1992

(Signed)

# Appendix E:
# Preliminary Cost Estimates for Alternative Solutions

Job No. 985194

Town of Alexandria
Water Supply Planning Study

# Preliminary Cost Estimate

## Alternative B: Reduce Water Consumption

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | | [illegible] |
|---|---|---|---|---|---|---|
| *RESIDENTIAL WATER REDUCTION STRATEGY* | | | | | | |
| Public Education Campaign - Bulk Mailings | LS | $600 | 3 | $1,800 | | include eye-catching brochures in water bills (compile from other sources) |
| Public Education Campaign - School Programs | LS | $200 | 4 | $800 | | Assemble package for schools presented by PUC staff |
| Change Rate Structure to Increasing Block Rate | LS | $500 | 1 | $500 | | *Not popular and not very effective for residential users* |
| Leak Detection and Correction Program | LS | $50,000 | 1 | $50,000 | | $10,000 study plus $40,000 in repairs |
| Toilet Replacement Subsidy Program | EA | $50 | 1200 | $60,000 | | Assuming two flushs per day per toilet savings would be 0.4 L/s (0.6%) |
| Lawn Watering Restrictions and Enforcement | LS | $0 | 1 | $0 | | instruct by-law enforcement officers to issue warnings for all infractions |
| Subtotal | | | | | $113,100 | |
| *IC&I WATER REDUCTION STRATEGY* | | | | | | |
| Consoltex | LS | | | $0 | | |
| Industrial - Production | EA | $5,000 | 2 | $10,000 | | |
| Commercial - Retail | EA | $50 | 50 | $2,500 | | Toilet replacement subsidy |
| Commercial - High water use business | EA | $1,500 | 10 | $15,000 | | |
| Institutional - Non-residential | EA | $500 | 5 | $2,500 | | Toilet replacement subsidy, water audit |
| Institutional - residential | EA | $1,500 | 4 | $6,000 | | Toilet replacement subsidy, water audit |
| Subtotal | | | | | $36,000 | |
| [illegible] | | | | | $149,100 | |
| *ADMINISTRATIVE* | | | | | | |
| Engineering | LS | $40,000 | 1 | $25,000 | | Design of Water Conservation Strategy |
| Project Ongoing Maintenance | LS/yr | $40,000 | 1 | $40,000 | | New PUC position to manage program |
| Negotiation with MOE | LS | | | $0 | | |
| Subtotal | | | | | $65,000 | |
| [illegible] | | | | | **$214,100** | |
| **Upper Tier Government Funding** | LS | | 1 | $0 | $0 | |
| Total [illegible] to North Glengarry | | | | | **$214,100** | plus GST |

# Preliminary Cost Estimate

## Alternative C: New Groundwater Source for Town

| | | | | | | |
|---|---|---|---|---|---|---|
| *HYDROGEOLOGICAL ASSESSMENT* | | | | | | |
| Assessment of existing wells | EA | $225 | 60 | $13,500 | | Laboratory Testing |
| Installation of test wells | EA | $5,000 | 40 | $200,000 | | Drilling Fees (Variable depending on depth to aquifer) |
| Assessment of test wells | EA | $10,000 | 40 | $400,000 | | Engineering fees |
| Land use restrictions on well head protection zone | LS | $250,000 | 1 | $250,000 | | Implement planning restrictions or acquire land for well head protection |
| | | | | | $863,500 | |
| *WELL FIELD INFRASTRUCTURE* | | | | | | |
| Production well construction | EA | $10,000 | 25 | $250,000 | | Drilling of well and development of aquifer |
| well pumping system submersibles | EA | $10,000 | 25 | $250,000 | | Supply and installation of submersible well pumps (up to 250 Lpm) |
| Low-lift pumping station incl. storage | LS | $500,000 | 1 | $500,000 | | Low-lift pumping station to treatment plant c/w storage |
| Raw water forcemain | LM | $350 | 4000 | $1,400,000 | | Raw water forcemain (250 to 400mm) including reinstatement |
| | | | | | $2,400,000 | |
| *MODIFICATIONS TO EXISTING DISTRIBUTION* | | | | | | |
| Connection to existing water plant | EA | $50,000 | 1 | $50,000 | | Connections and modifications to inlet to WTP (allowance) |
| Modification of plant operating manual | EA | $5,000 | 1 | $5,000 | | New O&M Manual for system operation |
| | | | | | $55,000 | |
| *ADDITIONAL CONSTRUCTION COSTS* | | | | | | |
| Mobilization/Demobilization (5%) | LS | $165,925 | 1 | $165,925 | | 5% of construction cost |
| Contingency (15%) | LS | $522,664 | 1 | $522,664 | | 15% contingency item |
| Bonding (0.8%) | LS | $31,617 | 1 | $31,617 | | 0.8% of construction cost |
| | | | | | $720,205 | |
| | | | | | $4,038,705 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $706,773 | 1 | $706,773 | | |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | C of A application fee for technical review |
| | | | | | $716,773 | |
| Land Acquisition | ha | $0 | 1 | $0 | $0 | |
| | | | | | **$4,755,479** | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | |
| | | | | | **$4,755,479** | plus GST |

## Preliminary Cost Estimate

### Alternative C-1: Supplement Existing Water Supply with Groundwater

| | | | | | | |
|---|---|---|---|---|---|---|
| *HYDROGEOLOGICAL ASSESSMENT* | | | | | | |
| Assessment of existing wells | EA | $225 | 30 | $6,750 | | Laboratory Testing |
| Installation of test wells | EA | $4,000 | 16 | $64,000 | | Drilling Fees (Variable depending on depth to aquifer) |
| Assessment of test wells | EA | $5,000 | 16 | $80,000 | | Engineering fees |
| Land use restrictions on well head protection zone | LS | $150,000 | 1 | $150,000 | | Implement planning restrictions or acquire land for well head protection |
| [illegible] | | | | | $300,750 | |
| *WELL FIELD INFRASTRUCTURE* | | | | | | |
| Production well construction | EA | $10,000 | 8 | $80,000 | | Drilling of well and development of aquifer |
| well pumping system submersibles | EA | $10,000 | 8 | $80,000 | | Supply and installation of submersible well pumps (up to 250 Lpm) |
| Low-lift pumping station incl. storage | LS | $200,000 | 1 | $200,000 | | Low-lift pumping station to treatment plant c/w storage |
| Raw water forcemain | LM | $350 | 3000 | $1,050,000 | | Raw water forcemain (250 to 400mm) including reinstatement |
| [illegible] | | | | | $1,410,000 | |
| *MODIFICATIONS TO EXISTING DISTRIBUTION* | | | | | | |
| Connection to existing water plant | EA | $50,000 | 1 | $50,000 | | Connections and modifications to inlet to WTP (allowance) |
| Modification of plant operating manual | EA | $2,000 | 1 | $2,000 | | New O&M Manual for system operation |
| [illegible] | | | | | $52,000 | |
| *ADDITIONAL CONSTRUCTION COSTS* | | | | | | |
| Mobilization/Demobilization (5%) | LS | $88,138 | 1 | $88,138 | | 5% of construction cost |
| Contingency (15%) | LS | $277,633 | 1 | $277,633 | | 15% contingency item |
| Bonding (0.8%) | LS | $17,028 | 1 | $17,028 | | 0.8% of construction cost |
| [illegible] | | | | | $382,799 | |
| [illegible] | | | | | $2,145,549 | |
| *ADMINISTRATIVE* | | | | | | |
| Engineering design, inspection, geotechnical | LS | $375,471 | 1 | $375,471 | | |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| [illegible] | | | | | $385,471 | |
| Land Acquisition | ha | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | **$2,531,020** | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | **$2,531,020** | plus GST |

# Preliminary Cost Estimate

## Alternative D: New Delisle River Water Source

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|
| *WATER STORAGE* | | | | | | |
| Excavation of Reservoir Area | m3 | $6 | 478950 | $2,873,700 | | Excavate Reservoir area to maximize storage |
| Control Structure | LS | $1,000,000 | 1 | $1,000,000 | | Dam crossing the Delisle (Estimate) |
| Pumping Station | LS | $500,000 | 1 | $500,000 | | Estimate based on previous projects |
| Raw water forcemain | LM | $250 | 8600 | $2,150,000 | | Open cut pipe installation (pipe size of 300 to 400mm) |
| [illegible] | | | | | $6,523,700 | |
| REINSTATEMENT | | | | | | |
| Rural Alignment | LM | $50 | 6100 | $305,000 | | Seeding and reinstatement to rural cross-section standard |
| Urban Alignment | LM | $150 | 2500 | $375,000 | | Sodding and reinstatement to urban cross-section standard |
| [illegible] | | | | | $680,000 | |
| MODIFICATIONS TO EXISTING DISTRIBUTION | | | | | | |
| Connections to the existing WTP | EA | $50,000 | 1 | $50,000 | | |
| [illegible] | | | | | $50,000 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $362,685 | 1 | $362,685 | | 5% of construction cost |
| Contingency (15%) | LS | $1,142,458 | 1 | $1,142,458 | | 15% contingency item |
| Bonding (0.8%) | LS | $70,071 | 1 | $70,071 | | 0.8% of construction cost |
| [illegible] | | | | | $1,575,213 | |
| [illegible] | | | | | $8,828,913 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $1,324,337 | 1 | $1,324,337 | | Typical Percentage of Construction cost |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| [illegible] | | | | | $1,334,337 | |
| Land Acquisition | ha | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | **$10,163,251** | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | Unknown |
| [illegible] | | | | | **$10,163,251** | plus GST |

# Preliminary Cost Estimate

## Alternative E: New South Nation River Water Source

| | | | | | | |
|---|---|---|---|---|---|---|
| *RAW WATER INTAKE AND MAIN* | | | | | | |
| Raw water intake | LM | $750 | 200 | $150,000 | | Raw water intake pipe and structure into the Ottawa River |
| Low lift pumping station | LS | $750,000 | 1 | $750,000 | | Pumping station and wet-well |
| Raw Watermain | LM | $250 | 25000 | $6,250,000 | | 400-450mm pipe installed |
| | | | | | $7,150,000 | |
| REINSTATEMENT | | | | | | |
| Rural Alignment | LM | $50 | 22500 | $1,125,000 | | Seeding and reinstatement to rural cross-section standard |
| Urban Alignment | LM | $150 | 2500 | $375,000 | | Sodding and reinstatement to urban cross-section standard |
| | | | | | $1,500,000 | |
| MODIFICATIONS TO EXISTING DISTRIBUTION | | | | | | |
| Connections to the existing WTP | LS | $50,000 | 1 | $50,000 | | |
| | | | | | $50,000 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $435,000 | 1 | $435,000 | | 5% of construction cost |
| Contingency (15%) | LS | $1,370,250 | 1 | $1,370,250 | | 15% contingency item |
| Bonding (0.8%) | LS | $84,042 | 1 | $84,042 | | 0.8% of construction cost |
| | | | | | $1,889,292 | |
| | | | | | $10,589,292 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $1,588,394 | 1 | $1,588,394 | | |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| | | | | | $1,598,394 | |
| Land Acquisition | ha | $0 | 1 | $0 | $0 | |
| | | | | | $12,187,686 | |
| Upper Tier Government Funding | LS | $0 | 1 | $0 | $0 | |
| | | | | | $12,187,686 | plus GST |

# Preliminary Cost Estimate

## Alternative E: New Ottawa River Water Source

| | | | | | | |
|---|---|---|---|---|---|---|
| *RAW WATER INTAKE AND MAIN* | | | | | | |
| Raw water intake | LM | $750 | 500 | $375,000 | | Raw water intake pipe and structure into the Ottawa River |
| Low lift pumping station | LS | $750,000 | 1 | $750,000 | | Pumping station and wet-well |
| Raw Watermain | LM | $250 | 36000 | $9,000,000 | | 400-450mm pipe installed |
| [illegible] | | | | | $10,125,000 | |
| REINSTATEMENT | | | | | | |
| Rural Alignment | LM | $50 | 33500 | $1,675,000 | | Seeding and reinstatement to rural cross-section standard |
| Urban Alignment | LM | $150 | 2500 | $375,000 | | Sodding and reinstatement to urban cross-section standard |
| [illegible] | | | | | $2,050,000 | |
| MODIFICATIONS TO EXISTING DISTRIBUTION | | | | | | |
| Connections to the existing WTP | LS | $50,000 | 1 | $50,000 | | |
| [illegible] | | | | | $50,000 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $611,250 | 1 | $611,250 | | 5% of construction cost |
| Contingency (15%) | LS | $1,925,438 | 1 | $1,925,438 | | 15% contingency item |
| Bonding (0.8%) | LS | $118,094 | 1 | $118,094 | | 0.8% of construction cost |
| [illegible] | | | | | $2,654,781 | |
| [illegible] | | | | | $14,879,781 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $2,231,967 | 1 | $2,231,967 | | |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| [illegible] | | | | | $2,241,967 | |
| Land Acquisition | ha | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | $17,121,748 | |
| Upper Tier Government Funding | LS | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | $17,121,748 | plus GST |

## Preliminary Cost Estimate

### Alternative F: New St. Lawrence River Water Source

|  |  | [illegible] | [illegible] | [illegible] |  | [illegible] |
|---|---|---|---|---|---|---|
| *RAW WATER INTAKE AND MAIN* |  |  |  |  |  |  |
| Raw water intake | LM | $750 | 500 | $375,000 |  | Raw water intake pipe and structure into the St. Lawrence River |
| Low lift pumping station | LS | $750,000 | 1 | $750,000 |  | Pumping station and wet-well |
| Raw Watermain | LM | $250 | 23000 | $5,750,000 |  | 400-450mm pipe installed |
| [illegible] |  |  |  |  | $6,875,000 |  |
| REINSTATEMENT |  |  |  |  |  |  |
| Rural Alignment | LM | $50 | 20000 | $1,000,000 |  | Seeding and reinstatement to rural cross-section standard |
| Urban Alignment | LM | $150 | 3000 | $450,000 |  | Sodding and reinstatement to urban cross-section standard |
| [illegible] |  |  |  |  | $1,450,000 |  |
| MODIFICATIONS TO EXISTING DISTRIBUTION |  |  |  |  |  |  |
| Connections to the existing WTP | LS | $50,000 | 1 | $50,000 |  |  |
| [illegible] |  |  |  |  | $50,000 |  |
| ADDITIONAL CONSTRUCTION COSTS |  |  |  |  |  |  |
| Mobilization/Demobilization (5%) | LS | $418,750 | 1 | $418,750 |  | 5% of construction cost |
| Contingency (15%) | LS | $1,319,063 | 1 | $1,319,063 |  | 15% contingency item |
| Bonding (0.8%) | LS | $80,903 | 1 | $80,903 |  | 0.8% of construction cost |
| [illegible] |  |  |  |  | $1,818,715 |  |
| [illegible] |  |  |  |  | $10,193,715 |  |
| ADMINISTRATIVE |  |  |  |  |  |  |
| Engineering design, inspection, geotechnical | LS | $1,529,057 | 1 | $1,529,057 |  |  |
| Approval Fees | LS | $10,000 | 1 | $10,000 |  | Allowance |
| [illegible] |  |  |  |  | $1,539,057 |  |
| Land Acquisition | ha | $0 | 1 | $0 | $0 |  |
| [illegible] |  |  |  |  | $11,732,772 |  |
| Upper Tier Government Funding | LS | $0 | 1 | $0 | $0 |  |
| [illegible] |  |  |  |  | $11,732,772 | plus GST |

# Preliminary Cost Estimate

## Alternative G: Expand Middle Lake Storage Reservoir

| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
|---|---|---|---|---|---|---|
| *WATER STORAGE* | | | | | | |
| Increase Earth Dam Height | m | $1,500 | 1200 | $1,800,000 | | increase dam height to 89.54 |
| Flood Proofing of Lots | EA | $35,000 | 10 | $350,000 | | shoreline protection, septic system upgrade, site work, foundation protection |
| Upgrade Kenyon Dam | LS | $500,000 | 1 | $500,000 | | stabilize dike adjacent to dam structure |
| Channel downstream of Middle Lake | LM | $500 | 1500 | $750,000 | | Channelization, shoreline protection |
| Channel downstream of Mill Pond | LM | $1,500 | 700 | $1,050,000 | | Channelization, shoreline protection |
| Mill Pond Dam upgrades | LS | $200,000 | 1 | $200,000 | | improve hydraulics of outlet between Kenyon Dam and Mill Pond |
| [illegible] | | | | | $4,650,000 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $232,500 | 1 | $232,500 | | 5% of construction cost |
| Contingency (15%) | LS | $732,375 | 1 | $732,375 | | 15% contingency item |
| Bonding (0.8%) | LS | $44,919 | 1 | $44,919 | | 0.8% of construction cost |
| [illegible] | | | | | $1,009,794 | |
| [illegible] | | | | | $5,659,794 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $848,969 | 1 | $848,969 | | |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| [illegible] | | | | | $858,969 | |
| Land Acquisition | ha | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | $6,518,763 | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | $6,518,763 | plus GST |

## Preliminary Cost Estimate

### Alternative H-1: Upper Garry River On-Line Reservoir

| Description | Unit | Unit Cost | Quantity | Total Cost | | Comments |
|---|---|---|---|---|---|---|
| *WATER STORAGE* | | | | | | |
| Excavation of Reservoir | $m^3$ | $7.50 | 500000 | $3,750,000 | | excavation of reservoir |
| Build dikes | m | $1,500 | 980 | $1,470,000 | | use imported clay and excavated material to construct dikes |
| Control Structure | LS | $300,000 | 1 | $300,000 | | intake structure to control water level in the reservoir |
| Access Road | m | $125 | 600 | $75,000 | | Access road from Country Road 45 to the control structure |
| Subtotal | | | | | $5,595,000 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $279,750 | 1 | $279,750 | | 5% of construction cost |
| Contingency (15%) | LS | $881,213 | 1 | $881,213 | | 15% contingency item |
| Bonding (0.8%) | LS | $54,048 | 1 | $54,048 | | 0.8% of construction cost |
| Subtotal | | | | | $1,215,010 | |
| Construction Subtotal | | | | | $6,810,010 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $1,021,502 | 1 | $1,021,502 | | Hydrogeology, wetland impact, related studies, engineering |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| Subtotal | | | | | $1,031,502 | |
| Land Acquisition | ha | $0 | 110 | $0 | $0 | land acquisition |
| Total Project Cost | | | | | $7,841,512 | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | Unknown |
| **Revenue from sale of crushed rock** | LS | $0 | 1 | $0 | $0 | Nil |
| Total Project Cost to North Glengarry | | | | | $7,841,512 | plus GST |

# Preliminary Cost Estimate

## Alternative H-2: Upper Garry River Off-line Reservoir

| Description | Unit | Unit Cost | Quantity | Total Cost | | Comments |
|---|---|---|---|---|---|---|
| *WATER STORAGE* | | | | | | |
| Excavation of Reservoir | $m^3$ | $7.50 | 549000 | $4,117,500 | | excavation of reservoir and stockpile rock, overburden |
| Intake Channel | m | $60 | 1000 | $60,000 | | channel from Garry River to reservoir |
| Intake Structure | LS | $150,000 | 1 | $150,000 | | intake structure and berms to divert water into channel |
| Pumping Station | LS | $500,000 | 1 | $500,000 | | low-lift pumping station to divert water into Mill Pond |
| Electric Supply | m | $90 | 1200 | $108,000 | | electrical supply, transformer to pumping station, controls |
| Outlet Pipe | m | $250 | 750 | $187,500 | | from pumping station to WTP |
| Connect to WTP | m | $500 | 600 | $300,000 | | pipe, restoration (urban) and structure to WTP |
| Access Road | m | $125 | 1500 | $187,500 | | access road from County Road 45 to pumping station, quarry site |
| Access Road Crossing Garry River | LS | $200,000 | 1 | $200,000 | | crossing Garry River requires 2m navigation clearance |
| Subtotal | | | | | $5,810,500 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $290,525 | 1 | $290,525 | | 5% of construction cost |
| Contingency (15%) | LS | $915,154 | 1 | $915,154 | | 15% contingency item |
| Bonding (0.8%) | LS | $56,129 | 1 | $56,129 | | 0.8% of construction cost |
| Subtotal | | | | | $1,261,808 | |
| Construction Subtotal | | | | | $7,072,308 | |
| ADMINISTRATIVE | | | | | | |
| Planning, Design, EA | LS | $1,060,846 | 1 | $1,060,846 | | OPA, Quarry EA, hydrogeology, traffic impacts, related studies, engineering |
| Approval Fees, Quarry Licence Fee, Rehab | LS | $60,000 | 1 | $60,000 | | Allowance |
| Subtotal | | | | | $1,120,846 | |
| Land Acquisition | ha | $0 | 50 | $0 | $0 | additional land for stockpiling rock, buffers |
| Total Project Cost | | | | | $8,193,154 | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | Unknown |
| **Revenue from sale of crushed rock** | LS | $0 | 1 | $0 | $0 | $1 per tonne as muck at 2t per $m^3$. Crushing, screening, delivery extra |
| Total Project Cost to North Glengarry | | | | | $8,193,154 | plus GST |

## Preliminary Cost Estimate

### Alternative I: Middle Lake Operational Plan

| [illegible] | | | | | | |
|---|---|---|---|---|---|---|
| LABOUR AND EQUIPMENT | | | | | | |
| Flood Proofing/Shoreline protection of Lots | EA | $5,000 | 6 | $30,000 | | allowance for protection works below the 1:100 year flood line |
| Kenyon Dam stabilization | LS | $25,000 | 1 | $25,000 | | stabilize dike adjacent to dam structure |
| Channel downstream of Middle Lake | LM | $350 | 500 | $175,000 | | Channelization, shoreline protection |
| Channel downstream of Mill Pond | LM | $1,500 | 700 | $1,050,000 | | Channelization, shoreline protection |
| Mill Pond Dam upgrades | LS | $200,000 | 1 | $200,000 | | improve hydraulics of outlet between Kenyon Dam and Mill Pond |
| [illegible] | | | | | $1,480,000 | |
| ADDITIONAL CONSTRUCTION COSTS | | | | | | |
| Mobilization/Demobilization (5%) | LS | $74,000 | 1 | $74,000 | | 5% of construction cost |
| Contingency (15%) | LS | $233,100 | 1 | $233,100 | | 15% contingency item |
| Bonding (0.8%) | LS | $14,297 | 1 | $14,297 | | 0.8% of construction cost |
| [illegible] | | | | | $321,397 | |
| [illegible] | | | | | $1,801,397 | |
| ADMINISTRATIVE | | | | | | |
| Engineering design, inspection, geotechnical | LS | $270,210 | 1 | $270,210 | | Update Operational Plan |
| Approval Fees | LS | $10,000 | 1 | $10,000 | | Allowance |
| [illegible] | | | | | $280,210 | |
| Land Acquisition | ha | $0 | 50 | $0 | $0 | additional land for stockpiling rock, buffers |
| [illegible] | | | | | $2,081,606 | |
| **Upper Tier Government Funding** | LS | $0 | 1 | $0 | $0 | |
| [illegible] | | | | | $2,081,606 | plus GST |

# Appendix F:
# Middle Lake Wetland Assessment February 2002, Don Cuddy

# Middle Lake Wetland

## Assessment of Environmental Concerns Related to Preferred Alternative for Improving Town of Alexandria Water Supply

Report prepared for
The Thompson Rosemount Group Inc.
1345 Rosemount Avenue
Cornwall, ON K6J 3E5

by
Don Cuddy
2395 Harlowe Road, R.R. 1
Arden, ON K0H 1B0

February 2002
(Reprinted with minor corrections September 2002)

## Acknowledgements

Bill Knight of The Thompson Rosemount Group Inc. arranged for this work to be undertaken and provided information to the author. Anne Bendig of the Ontario Ministry of Natural Resources, Kemptville District made her files on Garry River Wetland available and provided airphoto coverage for the Middle Lake section of the wetland. The Township of North Glengarry funded the work.

Over the past few years several people have contributed information regarding the significance of the Garry River/Middle Lake area. Notable among these are Bob Graham, who first discovered the Eastern Prairie Fringed-orchid and other species in the wetland and provided other valuable information about the area, and Dr. Paul Catling who confirmed the presence of the Eastern Prairie Fringed-orchid and provided other information garnered from his visits to the Garry River/Lost Lake fen complex. To these, and to those un-named individuals who have shared time with me in this interesting wetland, I extend my sincere thanks.

## Contents

## 1.0 Introduction

Middle Lake is one of three "lakes" associated with the Garry River watershed. Like Alexandria Lake (also known as the Mill Pond), which is located downstream, Middle Lake is artificial, having been created by a dam constructed during the 19th century. The third lake on the system, Loch Garry, which is located immediately upstream from Middle Lake, is a natural water body, although since 1967 it has also been controlled by a dam. All three water bodies have extensive wetlands associated with them. These wetlands are collectively considered to be provincially significant under Ontario's wetland evaluation system.

Since 1954 the Town of Alexandria has drawn its water supply from the Garry River system, specifically from the Mill Pond. The dams controlling the Mill Pond (Alexandria Dam) and Middle Lake (Kenyon Dam) were maintained and operated to ensure the Town's water supply. Despite this, the Town continued to have difficulties with its water supply, with both quantity and quality being issues at various times. In 1967 a dam was constructed at Lakeshore Road to raise the level of Loch Garry, and a ditch was dredged to replace the natural river channel between Loch Garry and Middle Lake. According to the Raisin Region Conservation Authority's Operation Manual for the Garry River System (RRCA 1995), the Loch Garry dam was raised in 1984 and the Kenyon dam was reconstructed and raised in 1982. The present design operating levels are 89.1 m a.s.l. for Loch Garry and 87.9 m a.s.l. for Middle Lake.

Despite these improvements and a number of conservation measures, the Town continues to have difficulties ensuring an adequate water supply. A study of the issue by M.S. Thompson and Associates, Consulting Engineers resulted in a Class Environmental Assessment, in late 2000, which recommended a short term (15-20 year) solution that would result in the design operation level of Middle Lake being raised by approximately 40 cm, to 88.3 m a.s.l. along with a number of downstream channel improvements. Several agencies and individuals have expressed concerns about the potential environmental impacts of this water level increase. The Ontario Ministry of Natural Resources had specific concerns about the impact on the provincially significant wetland. Moreover, the Ministry was concerned about the relative paucity of data on the wetland, including the accuracy of current wetland boundary mapping. The evaluation of the wetland was done in the early 1980's (1983-84) using the first edition of the wetland evaluation system, which had much less stringent data standards than the current 3rd edition. The lack of accurate boundary mapping and wetland community typing would make it difficult to assess potential impacts and to monitor changes if the water level is raised.

During the summer of 2001, the author was asked by the Kemptville MNR office to review the draft Class Environmental Assessment and recommend additional studies that could be used to better assess potential impacts. This review resulted in a proposal for additional work. The Thompson-Rosemount Group and the Township of North Glengarry subsequently authorized the author of this report to proceed with the work as proposed. The report documents the findings of this work.

## 2.0 Wetland Boundary

### 2.1 Methods

Over the course of five days in October, 2001 most of the wetland boundary was walked or observed from adjacent roads or from the lake. The >50% wetland vegetation rule endorsed by the Ontario Wetland Evaluation System was used to determine the boundary in the field. The boundary was marked on mylar overlays of 1:10,000 airphotos taken in 1991. Where the boundary was not clearly evident on the airphotos its position was recorded using a hand-held GPS receiver (Garmin model 12XL). A total of approximately 200 positions were taken. These positions were later transferred to the airphoto overlays using the UTM coordinate grid taken from the 1:10,000 Ontario Base Map (OBM) sheets provided by the Ministry of Natural Resources. The grid on these maps used the NAD27 datum projection so the GPS receiver was set to this datum. To convert to the more accurate NAD83 projection, it is necessary to add approximately 30 metres to the easting values and 123 metres to the northing values of recorded NAD27 positions. This correction factor was measured, under good signal receiving conditions, in the trail-head parking lot south of Lost Lake and should be accurate to within +/- 5m.

When the boundary was walked, notes were kept on wetland and adjacent plant communities and on the transition between wetland and upland. In particular, an effort was made to note areas where the projected increase in water level would be likely to significantly alter the wetland boundary (by inundating upland vegetation).

The current wetland boundary was transferred from the airphoto overlays to a mylar overlay of the 1:10,000 OBM composite for Middle Lake. Features needed to register the overlay to the OBM map(s) were added, including the 1km UTM grid. It is anticipated that this overlay will be used by OMNR to prepare a digital file of the revised wetland boundary.

### 2.2 2001 Wetland Boundary

While for the most part the current wetland boundary is well defined on the ground it is not always easy to interpret from airphotos. Upland cedar-dominated coniferous forest is often found immediately adjacent to mixed and coniferous swamp in which cedar may be dominant or co-dominant. A copy of the new boundary map appears as Map 1 at the back of this report. Comparison of the wetland boundary as mapped in 2001 with that of the 1983-84 wetland evaluation shows some significant inconsistencies. In particular, at the southeast end of the wetland the 1983-84 evaluation included some large areas of upland hardwood forest within the wetland. It also excluded significant portions of the wetland.

### 2.3 Anticipated Changes to Wetland Boundary

A 40cm increase in water level in the wetland will not result in the inundation of large upland areas. However, there are several locations where the slope of the land back from the wetland is so gradual that there could be a significant boundary change (i.e. more than a few metres). Areas along the boundary noted as having a very gradual slope are shown on Map 3 but have not been mapped in detail. For most of these, it is difficult to predict the consequences of a 40 cm increase in the water level in Middle Lake as they are at considerable distance from the lake, at locations where most of the time the wetland water table is already higher than the lake level. Those in the southeast corner of the wetland are currently further influenced by beaver dams that keep the water level in this part of the wetland higher than that of the lake.

Boundary areas most likely to be impacted by a water level increase in the lake are identified on Map 3 with sequential numbers. These are associated with gently sloped boundary areas where the wetland boundary is near the lakeshore. They are concentrated around the two large points of upland land that extend into the wetland from the north. Briefly, these are:

> B1: The south tip of this point (which is more correctly described as an island within the wetland) tapers gently into the wetland and a small area could be impacted. It is identified as a concern because it was noted in October, 2001 that trees on the end of the point were being used as roosts by large numbers of migrating birds. However, since there are several hectares of forest on the point, the loss of a few trees should not be considered significant.
>
> B2: Much of this point has only a metre or so of shrubby marsh buffer between it and open water, and in some areas the shore is directly exposed to open water (and resulting erosion). Around much of the point, the shoreline is sufficiently high that a 40 cm water level increase will have little effect on the boundary. However, near the base of the point on the east side there are areas of very gradual transition between wetland and upland. This was a part of boundary that was difficult to map. In fact, an argument could be made for extending a very narrow band of wetland across the north end of the wetland, thus making the point an island. Figure 12, (photo 01-1209 in Appendix E) shows a forested portion of the wetland boundary that is likely to be impacted by an increase in water level.
>
> B3: Middle Lake is separated from a large easterly arm of the wetland by a peninsula of upland that extends down from the north and continues as several "islands" in the wetland. Only one of these islands was mapped as such on the wetland boundary map. The others are too small and were mapped as upland if separated from it by only a metre or two, or as wetland if separated by greater distances. The southern tip of the peninsula has a very gentle slope and, as currently mapped, includes two tiny upland areas which are separated by narrow wetland troughs from the upland peninsula and each other. An increase in the water level of Middle Lake may well result in further inundation of this area and related vegetation and boundary changes.

In several areas around the wetland, trees have been planted down to the wetland boundary. These are mostly white spruce. While all such plantations noted are separated from the current open water area by an expanse of marsh and/or swamp forest it is possible that portions may be affected by even a small boundary shift (increase in water table).

## 3.0 Wetland Communities

### 3.1 Methods

The wetland was examined, and insofar as possible characterized in field notes, from the boundary, from several traverses through swamp and fen areas and from canoe. Many areas of cattail marsh and wet shrub thicket are practically impenetrable so field observations were heavily augmented by interpretation of 1991 airphotos. A follow-up trip was made in February 2002, when it was possible to check several areas on ice that could not be accessed in October. Community lines were drawn on airphoto overlays and later transferred to a mylar map.

Communities were characterized following the Ontario Wetland Evaluation Manual (OMNR, 1994). This system emphasizes structural characteristics and mapable units, and does not easily permit the portrayal or characterization of transitional vegetation.

Comparison of airphotos taken in 1945, 1971, 1978, 1991 and an airphoto mosaic compiled from airphotos taken in 1999 together with field observations in the fall of 2001 show that the distribution and extent of marsh and aquatic vegetation has varied considerably over the past 50+ years. While it would have been preferable to use the most recent photography (1999) for the community mapping, the mosaic was not sufficiently sharp to permit identification of communities. Contact prints of the 1991 MNR photos were readily available and were used instead.

### 3.2 2001 Wetland Vegetation Communities

Table 1 identifies 25 communities found during the field surveys. These include excellent representation of three of the four major wetland types recognized by the Ontario Wetland Evaluation System -- swamp, marsh and fen. Map 2 illustrates the distribution of these communities in the wetland.

The condition of the vegetation communities is variable. Swamps appear to be rather young and many contain numerous dead trees.

#### 3.2.1 Swamps

There are a variety of mixed, coniferous and deciduous forested swamps in the wetland. All appear to be rather young. This is likely due to past flooding (through increasing the level of Kenyon dam) and, in some areas, logging. The 1945 airphotos reveal several areas that appear to have been recently clearcut. The abundance of tall shrub thicket swamps is also related to past water level increases. The frequency of dead trees indicates that they once supported swamp forests.

## Table 1: 2001 Wetland Vegetation Communities

| Map Code | Vegetation Forms | Community Type/Dominant Species |
|---|---|---|
| **Swamp** | | |
| mS1 | m, ts, ls, gc, m | Mixed swamp: *Thuja occidentalis, Larix laricina, Fraxinus nigra* |
| mS2 | m, ts, ls, gc, m | Mixed swamp: *Thuja occidentalis, Fraxinus nigrum, Acer rubrum, Ulmus americana, Abies balsamea, Betula lutea,* |
| hS3 | h, ts, ls, gc, m | Deciduous swamp: *Fraxinus nigra, Ulmus americana,* |
| hS4 | h, ts, ls, gc, m | Deciduous swamp: *Acer rubrum/A. saccharinum, Fraxinus rubra* |
| cS5 | c, ts, ls, gc, m | Coniferous swamp: *Larix laricina* |
| cS6 | c, ts, ls, gc, m | Coniferous swamp: *Thuja occidentalis, Larix laricina,* |
| tS7 | ts, ls, gc, m | Thicket swamp: *Alnus rugosa, Cornus stolonifera, Carex spp.,* |
| tS8 | ts, ls, gc, m | Thicket swamp: *Salix spp., Cornus stolonifera, Phalaris arundinacea, Carex spp.* |
| tS9 | ts, ls, gc, | Thicket swamp: *Salix spp., Betula pumila, Cornus stolonifera, Myrica gale, Chamaedaphne calyculata, Ilex verticillata, Thelypteris palustris* (transitional to tsF3 but more nutrient-rich, often with *Typha* and *Phragmites*) |
| TtS10 | c, dc, dh, ts, ls, gc, | Treed thicket swamp: *Thuja occidentalis, Larix laricina, Salix spp., Betula pumila, Cornus stolonifera, Myrica gale, Chamaedaphne calyculata, Ilex verticillata, Thelypteris palustris, Rhamnus alnifolius* (treed thicket swamp) |
| **Marsh** | | |
| uW1 | u | Open water: "unvegetated" – less than 10% vegetation cover, usually scattered submerged and/or floating aquatics |
| suW2 | su | Submerged aquatics: *Chara sp., Potamogeton sp.* |
| suW3 | su | Submerged aquatics: *Potamogeton gramineus, Potamogeton spp., Myriophyllum spp., Ceratophyllum demersum, Elodea canadensis,* |
| fW4 | f, su | Floating aquatics: *Nuphar variegatum, Nymphaea odorata* |
| reM5 | re, ff, gc | *Cattail marsh: Typha angustifolia, Lemna minor* |
| reM6 | re | Reedgrass Marsh: *Phragmites australis* (all patches noted are too small to map) |
| neM7 | ne, re, gc, | Marsh fringe: *Decodon verticillatus, Lythrum salicaria, Carex spp., Phalaris arundinacea, Osmunda regalis* |
| neM8 | ls, ne | Shrub-rich marsh: *Carex spp., Myrica gale, Lythrum salicaria, Chamaedaphne calyculata, Phalaris arundinacea, Typha angustifolia, Phragmites australis, Spiraea alba* (transitional to tS7,8 or lsF2, tsF3; includes patches of "meadow marsh"). |
| neM9 | ne | Emergent marsh: *Equisetum fluviatile, Sparganium eurycarpum* |
| neM10 | ne | Wild Rice marsh: *Zizania aquatilis* |
| **Fen** | | |
| gF1 | gc, m, ls | Graminoid fen: *Carex lasiocarpa, Menyanthes trifoliata, Muhlenbergia glomerata, Thelypteris palustris, Thalictrum pubescens, Sarracenia purpurea, Aster borealis, Cladium mariscoides* |
| lsF2 | ls, gc, m | Low shrub fen: *Chamaedaphne calyculata, Cornus stolonifera, Myrica gale Carex lasiocarpa, Larix laricina, Thuja occidentalis, Picea mariana, Ledum groenlandicum, Rhamnus alnifolius* |
| tsF3 | c, ts, ls, gc, m | Tall shrub fen: *Betula pumila, Cornus stolonifera, Myrica gale, Chamaedaphne calyculata, Eupatorium maculatum, Ilex verticillata, Thelypteris palustris, Rhamnus alnifolius* |
| TlsF4 | c, ts, ls, gc, m | Treed low shrub fen: *Carex lasiocarpa, Chamaedaphne calyculata, Larix laricina, Thuja occidentalis, Picea mariana, Ledum groenlandicum, Rhamnus alnifolius* |
| pF5 | c, ts, ls, gc,m | Patterned fen: *Larix laricina, Thuja occidentalis, Carex lasiocarpa, Chamaedaphne calyculata, Picea mariana, Ledum groenlandicum, Rhamnus alnifolius* |

Much of the swamp forest is mixed conifer-hardwood, a forest type that is common in eastern Ontario. Of greater interest are stands of cedar, tamarack (or larch), and mixed cedar-tamarack. While by no means rare in eastern Ontario, these are of interest because they often support a number of uncommon plants, including several orchid species. The cedar and mixed cedar-tamarack forests associated with the fen complex east of Lost Lake appear to be of the greatest significance. There is also some rather rich, cedar-dominated, swamp in the east arm of the wetland.

In several parts of the wetland pure, young black ash stands were noted. Because of past forestry practices and the economic value of black ash, there are few mature stands in eastern Ontario. In general, black ash stands should be protected and allowed to mature.

### 3.2.2 Marsh

Cattail marsh is abundant in the wetland, and varies from dense monotypic stands covering many hectares to complex interspersions with other marsh communities. Cattails are also present to various degrees in many of the tall shrub communities found in drier portions of the wetland. Examination of airphotos taken over the last 55+ years shows that the amount of open water versus cattail marsh has varied over time, presumably in response to increases in water levels. It appears that an increase in water level is followed by a reduction in the amount of cattail stands, and corresponding increase in the area of open water and 'floating' marsh (dominated by water lilies and submersed plants). However, over time the cattails re-invade. The lesson from this is that any perceived benefit from increasing water levels to increase the amount of open water is short term. (Marsh management agencies such as Ducks Unlimited utilize periodic drawdowns lasting for a year or more to re-start the process – this is not a technique compatible with the water management objectives for the Garry River system.)

Areas of sedge-dominated marsh are frequent but are rarely found in sufficiently large stands to permit mapping. Some of the photographs in Appendix E illustrate how sedge marsh occurs in pockets and edges. For mapping purposes, these sedge marshes were grouped with the shrub-rich marsh community which forms a narrow band or fringe along much of the shoreline. Water willow (*Decodon verticillatus*) is frequent in many of the wetter marsh communities, often forming a fringe between sedge or cattail marsh and open water marsh communities. It is also found in flowage areas through the marsh and through shrub thickets.

Open water marsh communities are also abundant, both as large expanses and interspersed with cattail stands and other marsh vegetation.

### 3.2.3 Fen

The fens located north and east of Lost Lake were mapped as bog and marsh when the wetland was evaluated in the early 1980's. While they share some characteristics with bogs (including many species), and are often confused with them, fens are very different ecosystems. Fens are characterized by relatively stable water levels and low nutrient, circum-neutral to basic waters, and are typically fed by ground water emanating from carbonate-rich bedrock or overburden. Characteristic species that distinguish fens from bogs include white cedar (as both tree and shrub forms), several shrubs such as alder-leaved buckthorn (*Rhamnus alnifolius*), sedges – particularly *Carex lasiocarpa* – and various mosses. Fens are the rarest wetland type in southern Ontario. They support several rare species and are especially sensitive to changes in hydrology.

The fen complex found in the Middle Lake wetland covers about 30 ha and includes four areas of more or less open (non-forested) fen separated and surrounded by cedar and larch forest. For reference here and later in this report the open fen areas have been named West Fen (WF), North Fen (NF), East Fen (EF) and South Fen (SF), and have been designated as such on Map 3. Additionally, the shrubby open vegetation mat that surrounds Lost Lake has been mapped as fen. It may be more accurately described as "poor fen", a designation used for wetland types that are intermediate between bogs and fens. The term "graminoid" is frequently used to describe non-shrubby fens that are dominated by sedges and grasses. This fen complex has been called Lost Lake fen(s) and Garry River fen(s). The names refer to the same site.

West Fen is a rather shrubby opening slightly more than 1 ha in size. It has abundant cedar and larch growing on shrubby hummocks and averaging about 2 m in height. In the swales or slacks between hummocks, *Carex lasiocarpa* dominates. It is largely surrounded by cedar dominated mixed swamp forest. In older airphotos (1945, 1971), this fen appears to be larger and more open.

North Fen is "patterned", with alternating bands of cedar-larch forest and shrub-rich graminoid fen. It covers about 1 ha, and grades into more or less closed cedar-larch swamp forest on all sides.

East Fen is larger, with about 3 ha of open graminoid and low shrub fen surrounded by treed and tall shrub fen communities covering an additional several ha. Diffuse drainage from the west (Lost Lake) and the north comes together in this area to form a permanent stream flowing to the south. Southward, this stream forms the boundary between the fen and cattail marsh.

South Fen lies south of the shrubby diffuse drainage area through which Lost Lake drains. At the east end, it has some of the most open (non-shrubby) graminoid fen found in the complex. Westward it becomes progressively more treed, with patterning similar to North Fen, but with larger openings. Together, this fen area covers about 4 ha.

These four areas of open fen can be clearly identified on airphotos dating back to 1945, the oldest available. While there have been some changes over the past 55 years, such as tree and shrub invasion of West fen and a reduction in the area of North fen by succession to conifer swamp, compared with changes elsewhere in the wetland the fen area has been remarkable for its stability. It does appear that East fen does not extend as far south and east as it did in 1945. The border between cattail marsh and fen has shifted northward by about 100 m east of the drainage channel.

## 3.3 Potential Threats from Water Level Increases

A 40 cm increase in water level would be expected to have a significant impact on wetland communities. However, the actual water levels that are maintained through the year will be largely weather dependent -- in wet years or seasons, water levels will be maintained at or near the design level (88.3 m a.s.l.), in dry years or seasons, it will drop considerably below this. The water level increase that is proposed can be expected to favour open water marsh over cattail marsh in the short term. Unless nutrient loading of Middle Lake can be reduced, cattails can be expected to re-advance into the lake. Thus impacts to the marsh should be relatively short term (several years). Any change in the relative and absolute amount of marsh and open water communities will affect wildlife populations. Breeding and migratory birds are likely to be impacted. For example, late summer/fall migrating shore birds which feed on mudflats could loose this food source if the lake is maintained at a higher level.

Some areas of swamp forest can be expected to experience dieback of trees with a resulting increase in thicket swamp.

There is potential for significant impact on the fen area northeast of Lost Lake. The West and North fens are not expected to be inundated, and to some extent may benefit from a slightly higher water table (by slowing tree and tall shrub invasion through what appears to be natural succession). The South fen appears to be intermediate in elevation and will probably not be adversely impacted, although it should be monitored closely. The East fen is at greatest risk as it appears to be at about the same elevation as Middle Lake and portions could be inundated by water backing up the drainage channel that runs through it. There are two aspects to this. A simple increase in water level is of less concern, especially if it is seasonal and/or varies from year to year. Of greater concern is the nutrient transfer that could occur from waters backing up from the lake and the subsequent invasion of the fen by cattails. Currently, there is a rather sharp line between fen and cattail marsh in the open fen portion of East fen (see location C4 on Map 3 and Figure 4 in Appendix E). Much of this boundary follows the drainage channel and appears to be maintained by sheetflow of low nutrient water over and through the fen from the west. This water drains into the drainage channel and is carried southward to the lake. The area east of the drainage channel lacks the hydraulic head of low nutrient ground water and receives much of its water from the lake during periods of high water level. These nutrient-rich waters promote the growth of cattails. An increase in the water level in Middle Lake could alter the current hydrological regime, which maintains the fen west of the drainage channel, so that water flowing east could be backed up or could seek a different route. All of this is somewhat speculative – and a more detailed hydrological may be warranted. The head of water flowing from the west may be sufficiently strong to maintain current flows and nutrient levels, and a small increase in water levels could be beneficial as long as it is not accompanied by an increase in nutrient levels. Nonetheless, this area has been identified as the most significant part of the wetland and, therefore, that most likely to be adversely impacted by any increase in the water level in Middle Lake.

## 4.0 Significant Species

### 4.1 Methods

Fieldwork for this report was conducted in October, at a time when it is difficult to recognize many species. Accordingly, information on rare species has come from a combination of sources, including other people familiar with the area, as well as a number of field trips by the author to the wetland and vicinity in previous years, particularly the summer of 2000. A thorough survey of the wetland, concentrating on the fen area, at various times during the growing season, could be expected to reveal additional species. The wetland is situated in a part of Ontario where several species of eastern affinities that are rare in the province have been documented in recent years. Species such as Massachusetts fern (*Thelypteris simulata*) and Spotted Turtle, which have been found in nearby wetlands such as Alfred Bog are to be watched for.

### 4.2 Documented Species

The following species documented as occurring in the Middle Lake Wetland are considered to be significant. The sources used to determine significance levels are:

> National: Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Environment Canada website:
> http://www.speciesatrisk.gc.ca/Species/English/SearchRequest.cfm
>
> Provincial (Ontario): Natural Heritage Information Centre (NHIC), Ontario Ministry of Natural Resources website: http://www.mnr.gov.on.ca/MNR/nhic/nhic.html
>
> Regional (eastern Ontario - vascular plants only): Cuddy, 1991

#### 4.2.1 Eastern Prairie Fringed-orchid

The Eastern Prairie Fringed-orchid (*Platanthera leucophaea*) is a species of wet prairies and fens. Its current range includes several eastern and mid-western states in the USA and southern Ontario in Canada. The species is listed as Federally Threatened in the United States and a species of Special Concern in Canada (COSEWIC). The Canadian (and Ontario) status is under review. A status report update (Brownell and Catling 2000) recommends a national status of Threatened, but current COSEWIC-IUCN guidelines would support a Canadian status of Endangered. It is not known when COSEWIC will complete its review and assign a new status. It is reasonably safe to say that the new status will be at least "threatened", and could be "endangered". Canada (and therefore Ontario) has a very high conservation responsibility for the species as more than 50% of the known global population occurs in Ontario.

The Eastern Prairie Fringed-orchid was discovered by Bob Graham in the fen complex east of Lost Lake in July 2000. Graham reported his discovery to Don Cuddy (the author of this report) who relayed the information to Brownell and Catling, who at the time were updating the status report on the species. Dr. Catling subsequently investigated and confirmed the presence of the species in the fen. Appendix C provides a summary of the sequence of events that resulted in the confirmation of this species in the Garry River fen. Catling is an expert on orchids and his confirmation of the species in the fen should be considered completely reliable. He has since been back to the fen area and has seen additional occurrences.

Discussions with Dr. Catling indicate that Eastern Prairie Fringed-orchid appears to be thinly distributed throughout the open fen areas. The locations of these occurrences have not been precisely documented (e.g. using GPS) but they occur in most if not all of the four open fen areas discussed in the previous section. Dr. Catling also recalls seeing plant(s) near (within about 50 m) of the drainage channel that drains East Fen.

The Eastern Prairie Fringed-orchid is notoriously difficult to accurately inventory. While striking in flower, it is difficult to recognize when not in bloom and it flowers irregularly. The number of blooming plants can vary by tenfold or more from year to year. Any single count of the number of plants can therefore only be treated as a minimum of the actual population.

Garry River Fen has the most easterly occurrence of Eastern Prairie Fringed-orchid in Ontario, and possibly the most easterly extant occurrence within the species' range. It is an important site for this nationally significant species.

### 4.2.2 Tall White Bog-Orchid

Despite this and some other common names it is known by, the Tall White Bog-orchid (*Platanthera dilatata*) is not a species of bogs. It occurs in open, wet calcareous areas and in Ontario is largely restricted to fens. It is not uncommon in some parts of the boreal forest but is rare in southern Ontario and is found in only a few fens in eastern Ontario. It is therefore considered regionally significant.

Tall White Bog-orchid was found by Bob Graham in the Garry River fen in July 2000. Dr. Paul Catling confirmed its presence a few days later, noting about 30 flowering plants in the small portion of the fen that he visited.

### 4.2.3 Ebony Bog-haunter

The Ebony Bog-haunter (*Williamsonia fletcheri*) is a medium sized black-bodied dragonfly that inhabits bogs in northeastern North America. It was first reported in Ontario at Alfred Bog in the early 1980's and later was found at Mer Bleue Bog near Ottawa. More recently it has been found in several more northerly bogs in Ontario. The NHIC lists the species as "G3G4 S1S3". The S1S3 designation reflects the suspicion that the species has been overlooked, and is more common in northern bogs that current records indicate. The Ebony Bog-haunter emerges early, in May, before most other dragonflies. This, plus the habitat it uses could contribute to it being overlooked. Nonetheless it is definitely very rare in southern Ontario, and the NHIC considers it to be a provincially significant species.

Dr. Paul Catling has found the Ebony Bog-haunter in the Garry River fen complex. There are no details on its frequency or distribution.

### 4.2.4 Green-striped Darner

The Green-striped Darner (*Aeshna verticalis*) is a large dragonfly, which closely resembles the more common Canada Darner (*A. canadensis*). It occurs in marshes and other open wetlands of northeastern North America. It is listed by the NHIC as "G5S2", indicating that it is very rare in Ontario.

Dr. Paul Catling has found the Green-striped Darner in the Garry River fen complex. There are no further details on its frequency. Darners are strong fliers and the species could range widely over the marshy parts of Middle Lake wetland as well as the open fen areas.

### 4.2.5 Other Species

Several other species found in the fen area are uncommon to rare in eastern Ontario. These species are mentioned only briefly because they are either not regionally or provincially rare, or because there is no accepted authority for assigning regional rarity.

The Bog Copper (*Lycaena epixanthe*) is a small butterfly whose larvae feed on cranberries. It is restricted in southern Ontario to bogs and fens that support significant populations of wild cranberries (*Vaccinium oxycoccus* and/or *V. macrocarpon*). Dr. Paul Catling reports that the species is common in the open fen area.

Several additional orchid species are found in the fen and in other open parts of the wetland (such as the unopened road allowance between Kenyon Con. 1 and Con. 2, west of Kenyon Dam Road). These include Rose Pogonia (*Pogonia ophioglossoides*), Grass Pink (*Calopogon tuberosus*) and Yellow Lady's-slipper (*Cypripedium calceolus*). While these are not considered to be regionally or provincially rare, populations can be very local.

Other characteristic fen species such as Seaside Arrowgrass (*Triglochin maritimum*) are similarly restricted in their distribution due to the paucity of fen habitat in southern Ontario, and particularly southeastern Ontario.

## 4.3 Potential Threats from Water Level Increases

Most of the significant species are concentrated in the fen complex north and east of Lost Lake. The same concerns expressed above in section 3.3 apply to species using the fen communities.

Of particular concern is the potential for periodic inundation of parts or all of East fen, where the Prairie Eastern Fringed-orchid has been documented. Periodic inundation (such as might be associated with a flood event) should not be of concern as the species is adapted to fluctuation water levels, and can apparently survive for a year or more in a dormant state. Prolonged or frequent inundation could be a problem however. Also, inundation of the fen by lake waters could increase nutrient levels and result in cattail invasion.

## 5.0 Conclusions and Recommendations

### 5.1 Conclusions

Increasing the design operating level for Middle Lake by 40 cm is expected to have several effects on the wetland:

- There will be minor changes to the wetland boundary, particularly in areas where the wetland boundary abuts or is near the current lakeshore.

- It is anticipated that there will be some dieback of trees in portions of swamp forest, and replacement by shrub thickets.

- There will be short-term impacts on the marsh/open water portions of he wetland, with the amount of cattail marsh being reduced and the amount of open water marsh being increased. Judging by what has happened in the past, this will be relatively short lived due to high nutrient levels in the lake.

- A portion of East fen will likely experience some inundation. If prolonged or extensive, this could have adverse impacts on the fen community (possible replacement by cattail marsh) and rare species (most notably Eastern Prairie Fringed-orchid).

### 5.2 Recommendations

### 5.2.1 Design Operating Level

Plant communities and plant and wildlife species have evolved to take advantage of natural forces, including water level changes associated with the change of seasons (spring highs, late summer/early fall lows). Any change in this regime, other than sporadic events resulting in unusual but short-term extremes, is deleterious to many species and communities. When water levels are artificially regulated, impacts can be mitigated but not eliminated by simulating natural cycles. Water levels in Middle Lake are already carefully controlled. In a year with normal rainfall, evaporation and water use contribute to summer and fall lows, conditions that are beneficial to a wide range of wildlife. However, this is not a stated objective of water level management for the lake. It is recommended that the objectives for water level management in the lake and specifically the "design operating level" include an objective for simulating naturally lower late summer-early fall levels.

### 5.2.2 Baseline Water Level Mapping

Determining the potential impacts of a relatively minor water level increase in Middle Lake has been hampered by a lack of water level benchmarks for Lost Lake and the fen area. Establishing benchmarks that are accurate to within +/- 5 cm would be extremely valuable for predicting impacts and monitoring change. Ideally, these would be established within each of the fen areas, on the shore of Lost Lake and elsewhere as needed (such as along the main channel between Loch Garry dam and Middle Lake).

### 5.2. 3 Monitoring

If the proposal to increase average water levels in Middle Lake is acted upon, the following monitoring activities are recommended.

**5.2.3.1 Changes in boundaries of wetland and wetland communities**: While it is expected that there will be changes in both wetland boundary (minor) and wetland communities, these may occur slowly, with gradual dieback of trees and shrubs over a number of years. Aerial photography and follow-up surveys of vegetation can be used to monitor these changes.

**5.2.3.2 Fens**: The area of open and treed fen vegetation extending for about 1 km east-northeast of Lost Lake should be monitored periodically (at least every five years) for changes. Of particular concern would be the invasion and expansion of cattails at the east end of this area.

**5.2.3.3 Eastern Prairie Fringed-orchid**: This species should be watched closely for changes in number of plants and vigour. If possible in 2002, the fen area should be thoroughly surveyed to locate and document the status of all plants that can be found. This work should be done during the flowering period for the species (second and third weeks of July). Because of the variability in flowering of this species, the difficulty in identifying non-flowering individuals and the potential for dormant individuals, it would be advisable to subtlety mark all individuals found. This work should be repeated for two more years and thereafter the plants can be checked on a less frequent basis, preferably at least every five years.

**5.2.3.4 Bird and Amphibian Populations**: A volunteer for the Bird Studies Canada Great Lakes Marsh Monitoring Program (MMP) established a monitoring route along the Garry River through Middle Lake Marsh in 1995. Unfortunately, the route was not maintained and no data were collected in subsequent years. Despite this the poles marking the stations are still in place. It is recommended that the feasibility of resurrecting the route be investigated.

### 5.3 Additional Planning/Management Considerations

- While beyond the scope of this work, consideration could be given to developing/furthering programs that would reduce the nutrient inflow to the wetland.

- There is a short dam or dyke west of Lakeshore Road that separates the Middle Lake wetland from an arm of Loch Garry wetland. When observed in October 2001, it appeared to be preventing the flow of water from Loch Garry eastward into the Lost Lake area. It is possible that before the Loch Garry Dam was constructed the Lost Lake/fen area of the wetland drained both east and west. Knowing more about the surface drainage of this area before Loch Garry and Kenyon dams were constructed could improve our understanding of hydrology of the fen area.

- There is considerable rural housing development in the area. The impact of wells and septic systems on ground water is rarely considered when rural development is approved. Ground water is an unquantified but clearly important contributor to the hydrology of the fen area and the wetland as a whole. Vegetation in the southeast arm of the wetland suggests that there may be significant groundwater movement into this area as well.

- Several ponds have been dug on private land northwest of Lost Lake. These are presumably fed by groundwater and could potentially have some effect on the hydrology of the area. Consideration should be given to regulating/controlling the construction of ponds.

## References

Brownell, V.R. and P.M. Catling, 2000. Status Report Update for the Eastern Prairie Fringed-orchid (*Platanthera leucophaea*). Report prepared for the Ontario Ministry of Natural Resources.

Cuddy, D.G., 1991. Vascular Plants of Eastern Ontario. (revised draft 2.0). Ontario Ministry of Natural Resources.

M.S. Thompson & Associates Ltd., 2000. Alexandria Water Supply Class Environmental Assessment Phase One & Two Report. December 7th, 2000 Draft.

Ontario Ministry of Natural Resources, 1994. Ontario Wetland Evaluation System, Southern Manual. 3rd Edition, March 1993, revised May, 1994.

Raisin Region Conservation Authority, 1995. Operation Manual for the Garry River System. January, 1995.

## Maps and Aerial Photographs Consulted

### Maps

1:50,000 NTS: National Topographic Series Sheet 31G/07, Edition 6, published in 1983, based upon 1979 aerial photography. UTM datum used – NAD27. Energy Mines and Resources, Canada

1:10,000 OBM: Ontario Base Map sheets: 10-18-5200-50100 and 10-18-5250-5100. UTM 6° projection, based upon a control meridian of 75° west and NAD27. Ontario Ministry of Natural Resources.

Orthophoto Moasic: Provided by Thompson Rosemount Group, based upon airphotos taken in 1999.

### Airphotos

1945: Energy Mines and Resources Canada, A9563-62-66; photography taken October 17 or 19, 1945. 9" contact prints, scale (measured) ~ 1:16,000 (probably intended to be 1:15,840 or 4" = 1 mile).

1971: Ontario Ministry of Natural Resources, 1.71-4511 63-214-218; photography taken when trees were in full leaf (summer, 1971); nominal scale 1:15, 840 (4" = 1 mile).

1978: Ontario Ministry of Natural Resources, 78-4519 192-162-167, 78-4520 146-132-137; photography taken in summer 1978, scale 1:10,000.

1991: Ontario Ministry of Natural Resources, 91-4517 4-213-214, 91-4518 4-59-65, 91-4518 5-92-96; photography taken in summer 1991, scale 1:10,000.

# Appendices

## Appendix A: Vascular Plant Species Recorded in Middle Lake Wetland

(* = non-native species, # = species reported by other competent botanist(s). Most species recorded were observed during field work in the month of October, 2001; as such, and because of the nature and purpose of the field work, the list is very incomplete.)

| | |
|---|---|
| Abies balsamea | Balsam Fir |
| Acer rubrum | Red Maple |
| Acer saccharinum | Silver Maple |
| Alisma plantago-aquatica | Water Plantain |
| Alnus rugosa | Speckled Alder |
| Anacharis canadensis | Canada Water-weed |
| Andromeda glaucophylla | Bog Rosemary |
| Aralia nudicaulis | Wild Sarsaparilla |
| Arisaema triphyllum | Jack-in-the –pulpit |
| Aster borealis | Rush Aster |
| Aster lanceolatus | Panicled Aster |
| Aster umbellatus | Flat-topped White Aster |
| Athyrium filix-femina | Lady Fern |
| Betula lutea | Yellow Birch |
| Betula papyrifera | White Birch |
| Betula pumila | Birch |
| Bidens sp. | Beggarticks |
| Calamagrostis canadensis | Canada Bluejoint |
| Calopogon tuberosus | Grass Pink |
| Caltha palustris | Marsh-Marigold |
| Carex spp. | Sedge |
| Carex crinita | Sedge |
| Carex intumescens | Sedge |
| Carex lacustris | Sedge |
| Carex lasiocarpa | Sedge |
| Carex stricta | Sedge |
| Ceratophyllum demersum | Common Coontail |
| Chamaedaphne calyculata | Leatherleaf |
| Chelone glabra | Turtlehead |
| Cladium mariscoides | Twig-rush |
| Clematis virginiana | Virgin's-bower |
| Clintonia borealis | Blue-bead-lily |
| Coptis trifolia | Goldthread |
| Cornus canadensis | Bunchberry |
| Cornus racemosa | Red-panicle Dogwood |
| Cornus stolonifera | Red-osier Dogwood |
| Cuscuta gonovii | Swamp Dodder |
| Cypripedium calceolus | Yellow Lady-slipper |
| Decodon verticillatus | Water-Willow |
| Dryopteris cristata | Crested Wood Fern |
| Dulichium arundinaceum | Three-way Sedge |
| Epilobium ciliatum | Sticky Willow-herb |
| Epipactis helleborine* | Helleborine |
| Equisetum fluviatile | Water Horsetail |
| Eupatorium maculatum | Spotted Joe-pye-weed |
| Euthamia graminifolia | Grass-leaved Goldenrod |
| Fragaria virginiana | Strawberry |
| Fraxinus nigra | Black Ash |
| Fraxinus pennsylvanica | Red Ash |
| Galium spp. | Bedstraw |
| Galium palustre | Marsh Bedstraw |
| Galium triflorum | Fragrant Bedstraw |
| Gaultheria hispidula | Creeping Snowberry |
| Geum sp. | Avens |
| Hydrocharis morsus-ranae* | Frog's-bit |
| Ilex verticillata | Winterberry |
| Iris versicolor | Wild Iris |
| Juncus canadensis | Rush |
| Juncus effusus | Soft Rush |
| Juncus sp. | Rush |
| Larix laricina | Larch |
| Lathyrus palustris | Marsh Pea |
| Ledum groenlandicum | Labrador Tea |
| Lemna minor | Common Duckweed |
| Linnaea borealis | Twinflower |
| Liparis loeselii | Loesel's Twayblade |
| Lonicera oblongifolia | Swamp Fly-honeysuckle |
| Lonicera villosa | Mountain Fly-honeysuckle |
| Lycopus americanus | American Water-horebound |
| Lysimachia ciliata | Fringed Loosestrife |
| Lysimachia terrestris | Swamp Loosestrife |
| Lythrum salicaria* | Purple Loosestrife |
| Maianthemuem canadense | Canada Mayflower |
| Menyanthes trifoliata | Buckbean |
| Muhlenbergia glomerata | Muhly |
| Myrica gale | Sweet Gale |
| Myriophyllum sp. | Water-milfoil |
| Myriophyllum spicatum* | Eurasian Water-milfoil |
| Najas flexilis | Bushy Naiad |
| Nuphar variegatum | Bullhead-Lily |
| Nymphaea odorata | Fragrant White Water-lily |
| Onoclea sensibilis | Sensitive Fern |
| Orthilia secunda | One-sided Pyrola |
| Osmunda regalis | Royal Fern |
| Phalaris arundinacea | Reed Canary Grass |
| Phragmites australis | Common Reed Grass |
| Picea mariana | Black Spruce |
| Pinus strobus | White Pine |
| Platanthera dilatata# | Tall White Bog Orchid |
| Platanthera leucophaea# | Eastern Prairie Fringed-orchid |
| Pogonia ophioglossoides | Rose Pogonia |
| Populus balsamifera | Balsam Poplar |
| Populus tremuloides | Aspen Poplar |
| Potamogeton spp. | Pondweed |
| Potamogeton gramineus | Variable-leaved Pondweed |
| Potentilla palustris | Marsh Cinquefoil |

| | |
|---|---|
| Pyrola asarifolia | Pink Pyrola |
| Quercus macrocarpa | Bur Oak |
| Rhamnus alnifolius | Alder-leaved Buckthorn |
| Rhus radicans | Poison Ivy |
| Rhynchospora alba | White Beak Rush |
| Rubus pubescens | Dwarf Raspberry |
| Rubus strigosus | Wild Red Raspberry |
| Sagittaria latifolia | Broad-leaved Arrowhead |
| Salix spp. | willow |
| Salix bebbiana | Beaked Willow |
| Salix candida | Hoary Willow |
| Salix discolor | Pussy Willow |
| Salix petiolaris | Slender Willow |
| Sarracenia purpurea | Pitcher-plant |
| Smilacina stellata | False Soloman's Seal |
| Smilacina trifolia | Three-leaved False Soloman's Seal |
| Solanum dulcamara* | Nightshade |
| Solidago rugosa | Rough Goldenrod |
| Solidago uliginosa | Bog Goldenrod |
| Sparganium eurycarpum | Giant Bur-reed |
| Spiraea alba | Meadowsweet |
| Thalictrum pubescens | Tall Meadow-rue |
| Thelypteris palustris | Marsh Fern |
| Thuja occidentalis | Eastern White Cedar |
| Triadenum fraseri | Marsh St. John's-wort |
| Trientalis borealis | Starflower |
| Triglochin maritimum | Seaside Arrowgrass |
| Typha angustifolia | Narrow-leaved Cattail |
| Typha latifolia | Broad-leaved Cattail |
| Ulmus americana | White Elm |
| Urtica dioica* | Stinging Nettle |
| Utricularia intermedia | Flat-leaved Bladderwort |
| Utricularia vulgaris | Common Bladderwort |
| Vaccinium macrocarpon | Large Cranberry |
| Vaccinium oxycoccos | Small Cranberry |
| Viburnum lentago | Nannyberry |
| Viburnum recognitum | Southern Arrowhead |
| Viola blanda | Sweet White Violet |
| Vitis riparia | Frost Grape |
| Zanthoxylum americanum | Prickly Ash |
| Zizania aquatica | Wild Rice |

## Appendix B: Wildlife Species Observed in Middle Lake Wetland, October 2001

(Note, this list should not be considered indicative of the diversity of wildlife species which use Middle Lake wetland. It records only those species observed incidentally while conducting fieldwork in the wetland in October, 2001)

### Mammals

River Otter
Muskrat
Beaver
Moose (tracks)
White-tailed deer (tracks)

### Birds

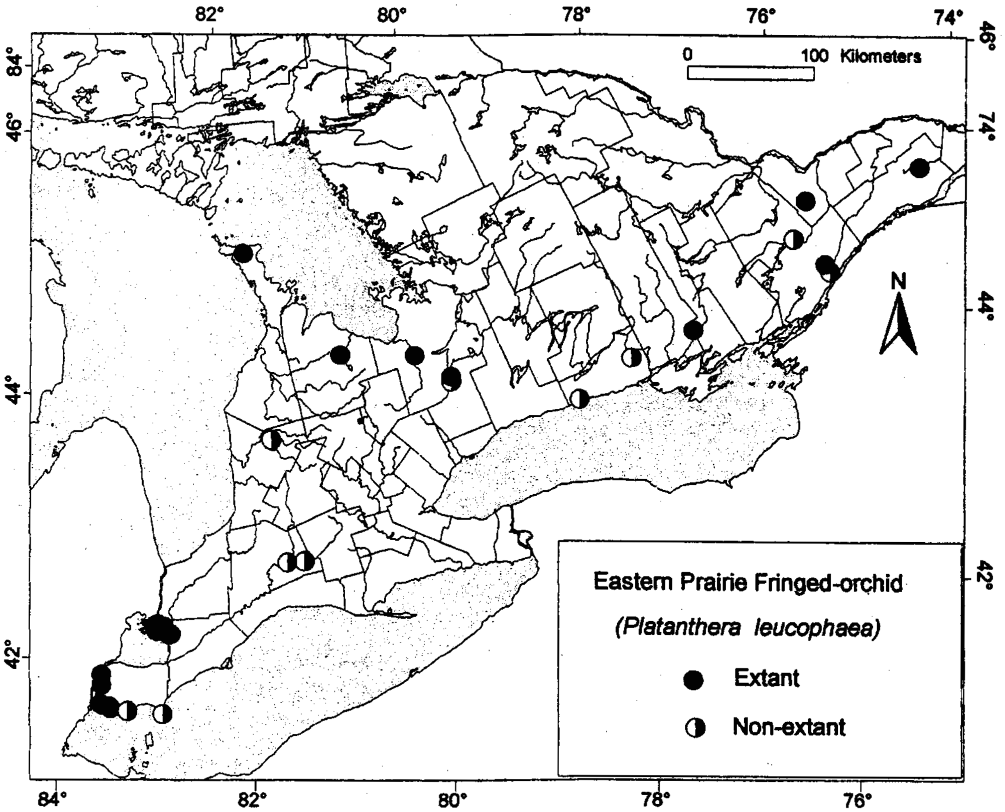
American Bittern
Canada Goose
Wood Duck
Red-winged Blackbird
Common Grackle
Sharpshin Hawk
Chickadee
(shorebirds – two species, not identified)
(ducks – mixed flocks – too far away to identify species)

## Appendix C: Status of Eastern Prairie Fringed-Orchid in Ontario and Garry River Fens

The following are excerpts taken directly from Brownell and Catling, 2000: Status Report Update for the Eastern Prairie Fringed-orchid (*Platanthera leucophaea*)

### C-1: Distribution of the Eastern Prairie Fringed-orchid (*Platanthera leucophaea*) in Ontario

Figure 2. Map of southern Ontario showing locations of *Platanthera leucophaea*. Dots show populations believed to be currently existing and half-dots show populations that are not extant. A population was considered no longer extant if :1) not seen or reported for over 20 years; or 2) known to be destroyed by urbanization , conversion to agriculture, loss due to succession etc.; or 3) not seen in the 1990s despite at least 4 searches during the flowering period.



## C-2: Notes on new populations discovered since 1984

1. Garry River Fen

The orchid was found in a medium size fen located east of Loch Garry in the United Counties of Stormont-Dundas-Glengarry. This is the first report for *Platanthera leucophaea* in this county, however its discovery there was anticipated by Brownell (1984). The fen is about 50 acres in extent and is dominated by *Carex lasiocarpa* with 2 or 3 more open areas of 1-3 acres. The open areas occur in both strips and as small patches scattered amongst clumps of cedar. *Platanthera leucophaea* occurs in sections dominated by *Carex lasiocarpa* and *Menyanthes trifoliata.* Three plants were originally discovered by Bob Graham, a local trapper on July 8, 2000 and reported to Don Cuddy, OMNR, Kemptville[1]. On July 24th, two plants were seen by P. Catling confirming the original identification. The two plants seen were approximately 200 m apart - one on the east side and one of the north side of the fen and were thought to be the same ones seen by B.Graham as evidenced by trampling around the plants. A stream area with *Decodon verticillata, Typha* sp. and dense cedar divides the fen to the south and to the east it changes abruptly to *Typha.* The *Carex lasiocarpa* dominated area is approximately 50 acres in extent. Only about 1/10th of it was surveyed for the orchid by P. Catling.

The site has *Triglochin maritima* scattered throughout it and thousands of *Pogonia ophioglossoides* (about 2000 seen). *Vaccinium oxycoccus* is frequent but inconspicuous and over 250 Bog Copper butterflies were seen. About 30 plants of *Platanthera dilatata* were noted and pitcher plants and sundews were widespread.
This site is believed to be owned by either the township or county municipality, however this should be confirmed.

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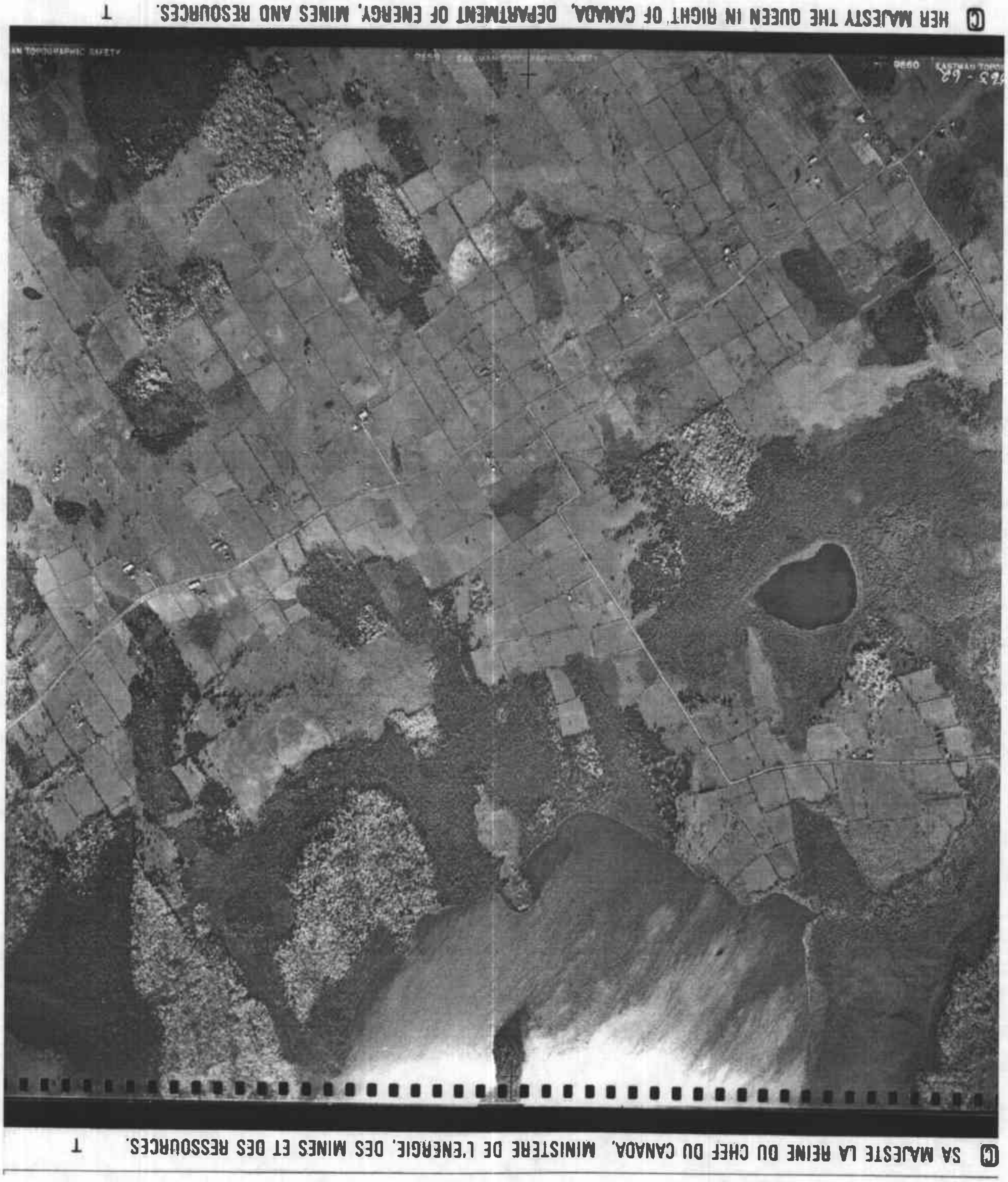
[1] Bob Graham returned to the fen several days later and found another small patch of plants. He also noted the presence of *Platanthera dilatata.* His findings have been reported to the Natural Heritage Information Centre.

## Appendix D: Comparison of 1945 and later Aerial Photographs

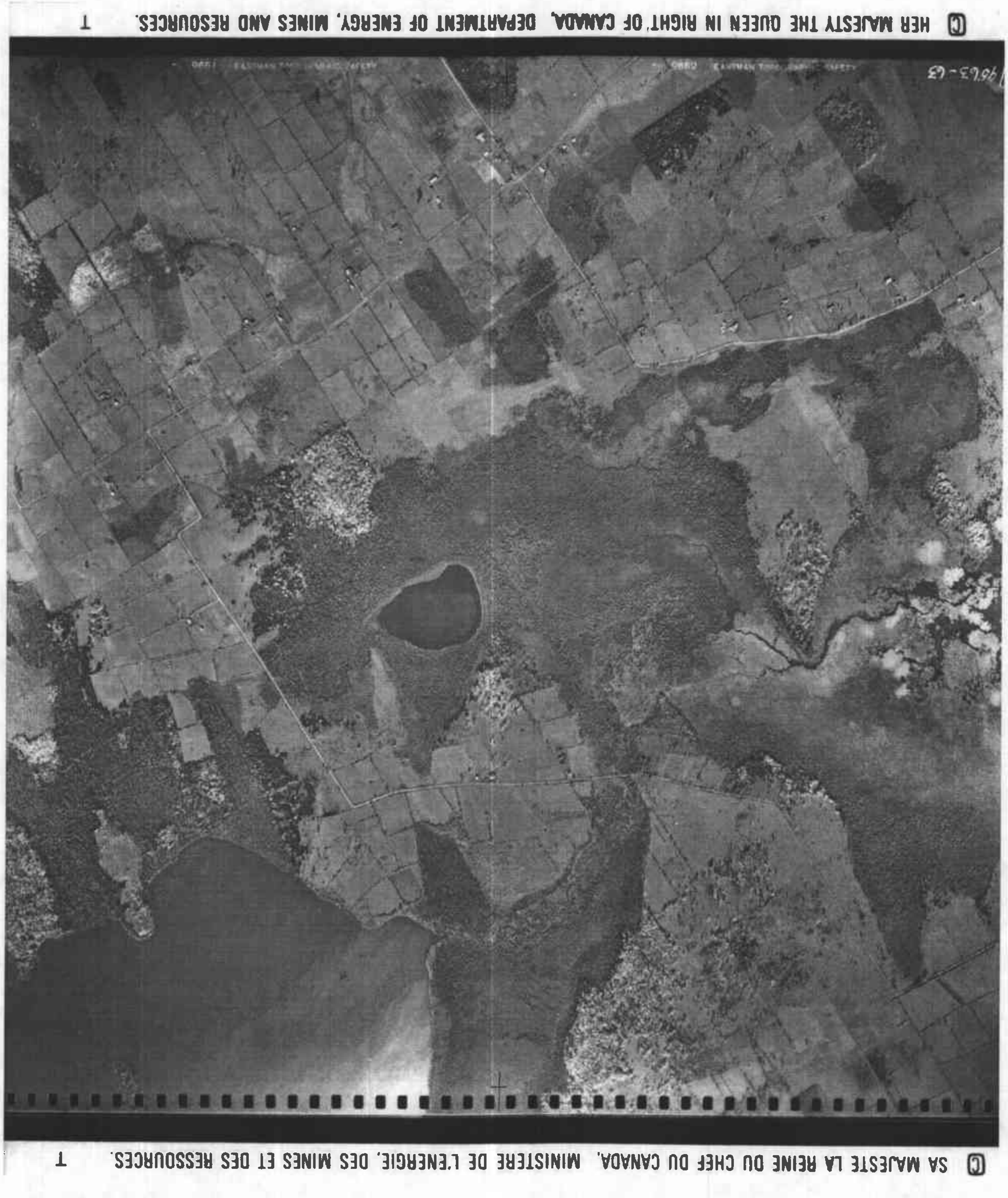
The oldest aerial photographic coverage that could be found for Middle Lake wetland dates from 1945. Contact prints of the five photographs required to provide stereographic coverage for the wetland were acquired from Energy Mines and Resources Canada. These were scanned and are included in the report for reference. The original contact prints have been submitted to the client separately.

While not as sharp as later airphotos, the 1945 photographs are of interest as they reveal several features about the wetland and surrounding landscape. Notable among these are:

- The absense of non-farm housing in the countryside in 1945.
- Much less upland forest on the landscape in 1945 than at present.
- Evidence of clearcut logging in some swamp portions of Middle Lake wetland in 1945; these areas are visible in more recent airphotos as areas of younger forest.
- Potential fen (or bog) vegetation in wetland adjacent to Loch Garry (this appears less distinctive in recent airphotos and may have been lost as a result of construction of Loch Garry dam in 1967 but it should be investigated).
- Open and patterned fen areas east of Lost Lake were clearly present in 1945 as was the open fen mat around Lost Lake.
- Much more open water/open water marsh in 1945 than in 1971 but about the same amount as in 1991.



EMR Aerial Photograph A9563-62 October, 1945



EMR Aerial Photograph A9563-63 October 1945

EMR Aerial Photograph A9563-64 October, 1945

EMR Aerial Photograph A9563-65 October, 1945

EMR Aerial Photograph A9563-66 October, 1945

## Appendix E: Photographs 2001-2002

The following pages contain 12 photographs selected from the approximately 60 photographs taken during fieldwork. The photographs were scanned for inclusion in the report. All original photographs have been submitted to the client. The locations where the photographs were taken are shown on Map 3.

Photographs are numbered using the following format: 01-1203, where 01 is the year (2001), 12 is the film roll number and 03 is the frame number on the roll.

**Figure 1:** Photo 01-1135 Large area of open graminoid fen, dominated by Carex lasiocarpa; east end of South Fen (Photographed from 524939 5013169, looking south)

**Figure 2:** Photo 01-1125 Shrub-rich fen (tall shrub fen); West Fen (Photographed from 524350 5013325, looking northeast)

**Figure 3:** Photo 01-1130 Shoreline poor fen; west end of Lost Lake (Photographed from 524053 5012953, looking north)

**Figure 4:** Photo 02-0111 Eastern boundary between fen and cattail marsh; cattail marsh on left, low shrub fen on right, water course divides the two communities. (Photographed from 525241 5013109, looking south)

**Figure 5:** Photo 01-1137; Dredged channel below Loch Garry Dam with abundant wild rice. (Photographed from 524847 5012434, looking east)

**Figure 6:** Photo 01-1208 Middle Lake shoreline vegetation, with abundant water willow backed by shrub thickets. (Photographed from 526475 5014017, looking southeast)

**Figure 7**: Photo 01-1206 Middle Lake, north shore, showing sparse aquatics and shoreline marsh/shrub thicket vegetation. (Photographed from 526475 5014017, looking east)

**Figure 8:** Photo 01-1228 Mosaic of open water, cattail marsh, sedge marsh, low shrub thickets and water willow. (Photographed from 526872 5013792, looking southeast)

**Figure 9:** Photo 01-1218 Open water marsh (floating aquatics) in embayment in cattail marsh. (Photographed from 526199 5012967, looking south)

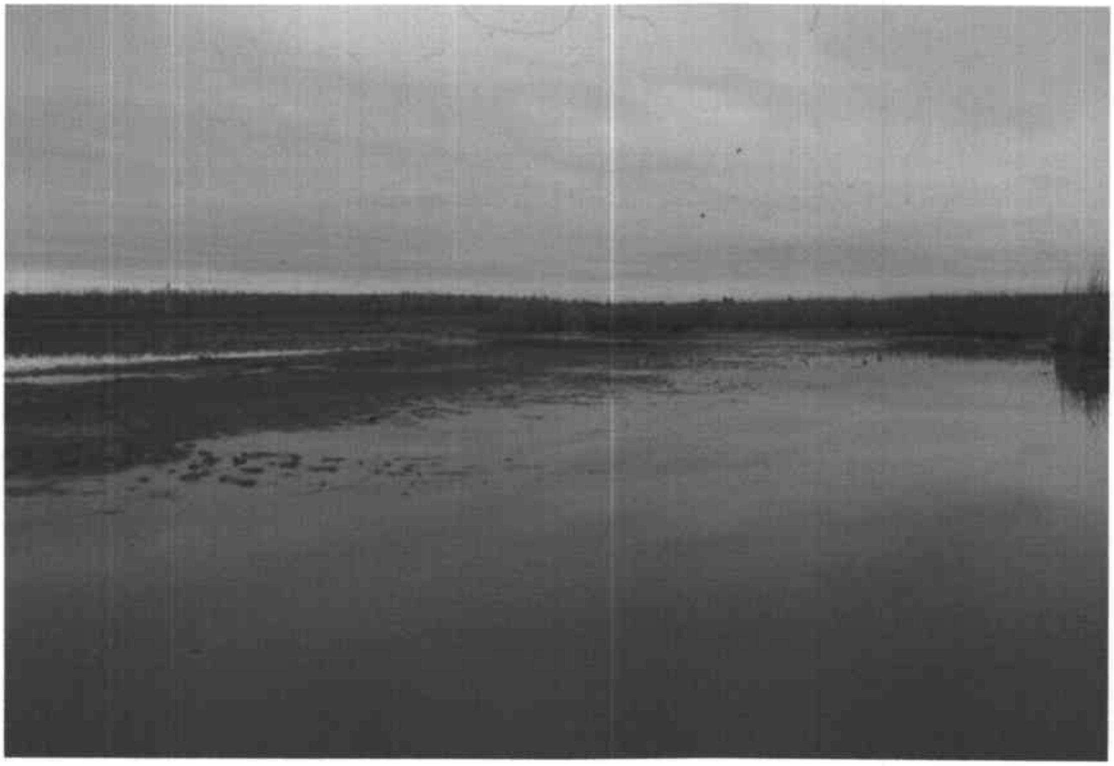


**Figure 10:** Photo 01-1221 Mudflat with feeding shorebirds. (Photographed from 526374 5012951, looking east).

**Figure 11:** Cattail marsh, with shrub-rich shore fringe along southwestern edge of large "island" in wetland. (Photographed from 525514 5012845, looking north)

**Figure 12:** Example of subtle wetland boundary in forest; mixed swamp forest on right, upland forest on left. (Photographed from approximately 526450 5013950, looking east).

# Appendix G:
# Middle Lake Fish Habitat Assessment – October 2001
## Michele Lavictoire, ESG International

ESG INTERNATIONAL

ESG INTERNATIONAL 1725 St. Laurent Boulevard, Suite 219, Ottawa, Ontario Canada K1G 3V4 Voice (613) 248-1196 Fax (613) 248-1198 Internet *www.esg.net*

October 16, 2001

Mayor Bill Franklin
Township of North Glengarry
90 Main Street South
P.O. Box 700
Alexandria, ON
K0C 2K0
(613) 525-1110

Dear Mayor Franklin:

**RE: Middle Lake – Fish Habitat Assessment**

We have completed a fish habitat assessment for Middle Lake and its tributaries from Kenyon Dam Road to Mill Pond. The purpose of this fish habitat assessment is to identify the fish habitats that will be potentially affected by an increase in water level in Middle Lake, to recommend mitigation measures as required and to anticipate net impacts after implementation of the mitigation measures. Water levels in Loch Gary, Middle Lake and Mill Pond are regulated by dams at the outlet of each lake. The Township of North Glengarry is proposing to increase the normal operating water level of Middle Lake from 87.9 m to 88.3 m by adjusting the operation procedures for Kenyon Dam (Middle Lake). This increase in water level is expected to provide additional water to the Town of Alexandria's water supply. The fish habitat issues that would evolve from possible channel erosion protection measures downstream of Kenyon Dam are also provided.

This letter report is divided into the following four sections: project description, site environment, environmental effects and proposed mitigation measures, and conclusions.

### *Project Description*

The Township of North Glengarry proposes to increase the normal operating water level in Middle Lake from 87.9 m to 88.3 m. This water level increase is required in order to secure additional water for the Town of Alexandria. The increase in water supply will affect the fish habitat through alterations and the loss of portions of a cattail marsh wetland located around Middle Lake and its tributaries. As a result of the proposed increase in water level at Middle Lake there may also be a periodic increase of flow through the Garry River immediately downstream of the Kenyon Dam, in order to reduce flooding risk in Middle Lake.

The Ministry of Natural Resources and the Department of Fisheries and Oceans have agreed that the fish data from Loch Garry and the Garry River along with anecdotal information is sufficient to determine the fish species of Middle Lake (see table 1). The fish species that are listed in

Table 1 are all warm-water fish species and are primarily warm-water forage fish. The abundance of the sport fish populations are unknown.

**Table 1 Fish Species that may occur in Mill Pond**

| Common Name | Latin Name |
|---|---|
| American eel | *Anguilla rostrata* |
| blacknose shiner | *Notropis heterolepis* |
| brook stickleback | *Culaea inconstans* |
| brown bullhead | *Ictalurus nebulosus* |
| central mudminnow | *Umbra limi* |
| common shiner | *Notropis cornutus* |
| creek chub | *Semotilus atromaculatus* |
| fathead minnow | *Pimephales promelas* |
| finescale dace | *Chrosomus neogaeus* |
| golden shiner | *Notemigonus crysoleucas* |
| Iowa darter | *Etheostoma exile* |
| Johny darter | *Etheostoma nigrum* |
| largemouth bass | *Micropterus salmoides* |
| Logperch | *Percina caprodes* |
| Muskellunge | *Esox masquinongy* |
| Northern pike | *Esox lucius* |
| Northern redbelly dace | *Chrosomus eos* |
| Pumpkinseed | *Lepomis gibbosus* |
| Rock bass | *Amplobites rupestris* |
| tadpole madtom | *Noturus gyrinus* |
| threespine stickleback | *Gasterosteus aculeatus* |
| yellow perch | *Perca flavescens* |
| white sucker | *Catostomus commersoni* |

The above information is a compilation from Ministry of Natural Resources, Anne Bendig, the Raisin Region Conservation Authority, Andy Code and of field observations by ESG International staff.

### *Site Environment*

General Area

Middle Lake has a surface area of approximately 7.3 km$^2$ with depths varying between 1.0 and 1.5 m (McNeeley Ltd. and Proctor & Redfern Ltd. 1984). Middle Lake is the second lake in the Garry River system. The other two lakes are Loch Garry (the headwaters) and Mill Pond (located in the Town of Alexandria). The Garry River flows into the Delisle River northeast of the town of Alexandria. Middle Lake is separated from Loch Garry by approximately 1.7 km and from Mill Pond by approximately 3.6 km of river. Migration between the lakes is restricted by the control dams which are located at the downstream end of each lake. The area is underlain by limestone and shall bedrock (McNeeley Ltd. and Proctor & Redfern Ltd. 1984), which is exposed along several stretches of river from Kenyon Dam Road and continuing downstream. Middle Lake is susceptible to winter fish kills as a result of low oxygen concentration (McNeeley Ltd.and Proctor & Redfern Ltd. 1984, pers. comm. Andy Code, Raisin Region Conservation Authority).

## Study Area

The study area is divided into four sections which are referred to on Figure 1.

### *Garry River from Lakeshore Road heading East (section 1)*

This section of the project area begins immediately east of Lakeshore Road and continues 0.8 km downstream, approximately half way to Middle Lake. This section of the river is channelized and followed a relatively straight path through the cattail and grass marsh (Photo 2). The percentage of cattails increased further downstream. The low flow channel width of the area varied from 2.7 m to 3.6 m and the wetted width extended from 3.7 m to over 10.0 m upstream of the beaver dam. The majority of the 10.2 m wide beaver dam was vegetated with the exception of approximately 2.1 m (Photo 1). This would suggest that the 2.1 m portion of the beaver dam is susceptible to blowouts and as such may not represent a permanent barrier to fish. The average water depth was 37.7 cm and varied from 11.3 cm to 67.5 cm. A dead brown bullhead (total length of 11.3 cm) and schools of forage fish were observed upstream of the beaver dam. The riparian vegetation in this area consisted of reed grass, joe-pye-weed, sensitive fern, willow, arrowhead, tamarack, royal fern, ostrich fern and other grasses. Within the channel the amount of aquatic vegetation varied and consisted of coontail, lily pads and pondweeds. The substrate consisted of muck. Currently there is limited accessibility of the adjacent wetland to fish.

The current channel will be lost in the flooding of Middle Lake. This area will become shallow lake type habitat and the wetland habitat that is currently not accessible to fish will become accessible.

### *Meandering channel to Middle Lake's Western Wetland (section 2)*

This section continues downstream from section 1 for approximately 0.8 km to Middle Lake. The channel exhibited complex meandering through a cattail marsh until it reaches Middle Lake. Some areas of this section of the river were intermittent. The inlet to Middle Lake is difficult to distinguish during this time of year, however, by traveling through channels in canoe and using airphoto interpretation, it was determined that fish can access Middle Lake from this tributary. Within the channels that were accessible by canoe many fish were observed including yellow perch. Although the cattail marsh contained some channels, the majority of the marsh area was not accessible to fish. The limited access to the wetland appeared to restrict the availability of the area for Northern pike and muskellunge spawning as well as nursery and feeding habitats for all fish species. The aquatic vegetation consisted of lily pads, sedges, cattails, coontail, and pondweeds. An osprey was observed feeding over the western cattail marsh. Within the wetland, the aquatic vegetation varied from little to 100% cover and over 70% of the water column.

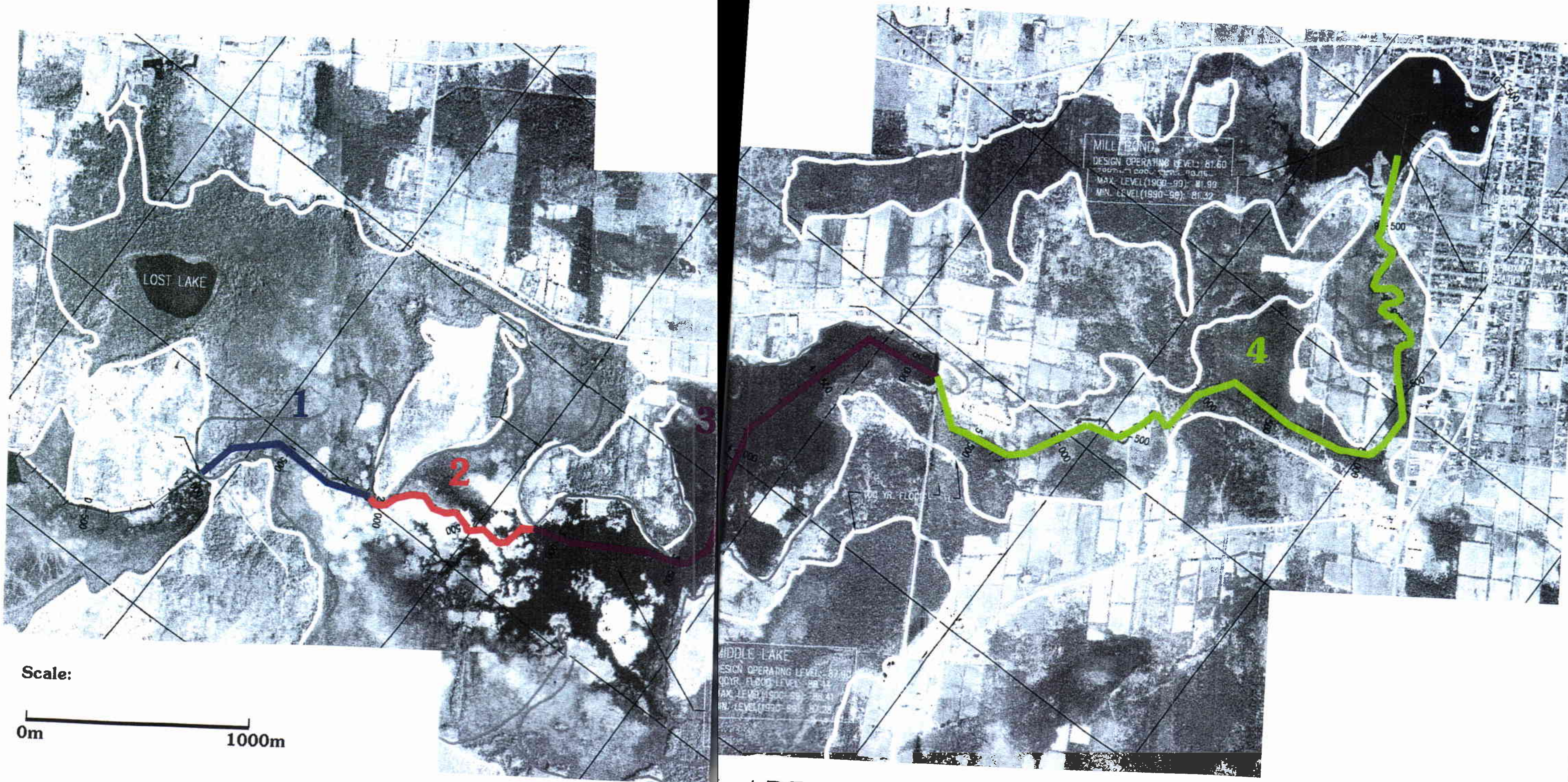


FIGURE 1: PROJECT AREA AND SECTION LOCATIONS

*Middle Lake (section 3)*

Immediately to the east of the western cattail marsh was a large area covered in stumps, both submerged and emergent. This area provides excellent structure and nursery habitat for largemouth bass (Photo 3). The stumps area was primarily located throughout the western half of the lake. The remaining sections of the lake, with the exception of the eastern extremity, contained large beds of *Chara sp.* which covered over 70% of the water column. Along the edges of the *Chara sp.* beds and eastern section of the lake near the dam several fish species were observed including pumpkinseed and yellow perch. The eastern section of the lake near the dam did not contain many aquatic plants. The water depths on this western side of the lake were quite variable during the September 16, 2001 field survey, and many areas contained less than 45 cm of water. The substrate consisted of muck and the water temperature was 18° C. Other cattails marsh wetlands found within the lake were smaller however they provide similar fish habitat and vegetation as the western wetland (Photo 4).

The increase in the water table will result in flooding of the wetlands on the northwest and southwest sides of Middle Lake. The majority of these wetlands consist of cattail marsh wetlands and are not currently accessible to fish. There is approximately 4.8 $km^2$ of fish accessible wetlands that will be altered. However, the increase in the water table will also create new access to wetlands east of Lost Lake and to the southeast of Middle Lake and will also increase the amount of lake fish habitat available. Lost Lake is located in the northwest corner of the wetland on the western side of Middle Lake and is isolated from the Garry River system.

*Garry River between Middle Lake and Mill Pond (section 4)*

This is section of the river is approximately 3.9 km long and extends from Kenyon Dam Road to Mill Pond. The upstream portion of this section may receive periodic increased flows in order to minimize the risk of flooding in Middle Lake during years with high storm events. There are two main aquatic habitat types located within this section: fast flowing shallow runs and deep glide habitats. The majority of this section, including within the cattail marsh areas, had hard substrate dominated by bedrock (Photo 5, 6 & 7).

Immediately downstream of the Kenyon Dam Road the stream was a shallow fast flowing run with extensive bedrock and little aquatic vegetation. At the downstream end of the Kenyon Dam Road culvert was a pool which contained the following species: young-of-the-year largemouth bass, pumpkinseed, yellow perch and what appeared to be a Northern pike. These fish were trapped between the culvert and a dammed section of the river consisting of cinder blocks and next to a water intake pipe. Higher water levels would allow downstream movement of the fish over this dammed section. This portion of the stream is confined. The average depth was 5-6 cm and the average channel width was 7.2 m. The average wetted was 4.7 m. The aquatic vegetation was limited to brown algae. The bank vegetation consisted of basswood, white cedar, ash, bur oak, red-osier dogwood, stinging nettle, joe-pye-weed and spotted touch-me-not. In the majority of the area the substrate consisted entirely of bedrock, some gravel and cobble was also observed. Live fresh water mussels were noted as well as an absence of zebra mussels.

Downstream of the above area the channel splits into a confined wetland dominated by swamp loosestrife. There were no fish barriers in this area. The water temperature was 19° C on

September 22, 2001. The substrate continued to be dominated by bedrock however large boulders, cobbles and some fine sediment deposits were also observed. The aquatic vegetation consisted of *Elodea,* lily pads, pondweeds and native milfoil. Several schools of unidentified fish were observed. Large amount of small woody debris was present and was the result of beaver activities. Further downstream the river became unconfined and the riparian vegetation consisted of swamp loosestrife, willow, reeds and the occasional broad-leaved cattail. The riparian habitat varied from being dominated with shrubs, to being dominated with reeds or cattails. Other riparian vegetation species included joe-pye-weed, common burdock, and purple loosestrife. In some areas there is evidence of cattle grazing and fencing was present. Fish accessibility of the wetland habitats varied with the type of dominant vegetation as there were very few channels from which the fish can gain access. Areas with higher densities of willow and alder may be more readily available to Northern pike and muskellunge during spawning. The majority of the wetland area provides poor nursery and feeding habitat due to the lack of side channels. This area was a glide with an average water depth of 67.2 cm that varied from 40.0-124.0 cm. The channel width varied from 6.7 m to 8.8 m and the wetted width from 6.3-7.8 m.

Downstream of the above wetland a small shallow area over bedrock was encountered. This area provided various habitats including run, riffle, pool and steps. This confined area of faster flowing shallow water is the result of the beaver dam located immediately upstream. There was very little aquatic vegetation and the substrate was dominated by 80% bedrock and the remaining substrate was equally composed of boulders, gravel, cobble and large cobble. The wetted width averaged 7.1 m and the channel width 7.5 m. The average water depth was 12 cm, with average pool and riffle depths of 50 cm and the average riffle depth was 5.8 cm, respectively. The pool habitat was 2-3 m long and the riffle habitat approximately 10 m.

Downstream of the above area the habitat returned to that of a deep glide with depths over 1.0 m. The wetted width was over 8 m and river followed a complex meandering path through wetland habitats. The riparian vegetation varied between willow/alder swamp and cattail marsh. Other riparian species included swamp loosestrife. The aquatic vegetation consisted of *Valisneria sp.*, pondweed, lily pads, milfoil, and aquatic sedges. Within the Town of Alexandria the riparian habitat was primarily a cattail marsh which provided few channels for fish access. The wide wetted width in this area contains extensive aquatic vegetation (pondweeds, lily pads and *Elodea sp.*).

There were a several beaver dams located throughout section 4 of the river and although they modified the type of fish habitat they do not present a permanent barrier to fish movement. However, many beaver dams prevented upstream fish migration during the September 21, 2001 field visit. The various bridges that span the river did not provide fish barriers however they do cause the accumulation of small woody debris and should be maintained (Photo 5). The entire section provides spawning, nursery and feeding habitats and a large number of fish species were observed. The amount of Northern pike and muskellunge spawning habitat varied with the accessibility to the adjacent wetlands. Although the increase in water level in Middle Lake may result in a periodic increase in flows to this section of the river (section 4), this is not considered to be a significant impact as these will be short-term impacts that occur during years with high storm events.

### *Environmental Effects and Proposed Mitigation Measures*

Potential fish habitat impacts that may occur as a result of the increase in water levels include disruption of aquatic habitat utilized for spawning and nursery habitats. This disruption will be the result of loss of cattail marsh and grass wetlands from flooding and an increase in water flow through the Garry River downstream of Kenyon Dam Road. An estimated 4.8 $km^2$ of fish habitat will be altered from wetland habitat to lake habitat. Following the proposed increase in water level new areas of the wetland will become available to fish. Should this area be smaller than what was previously accessible, channels through the wetland could be created.

The technique that will be used to increase the water levels of Middle Lake will simply be to allow the lake to rise naturally following the spring runoff and then to reduce the current draw down level in order to maintain a higher operating level. Therefore the water increase will not be subjected to timing constraints.

### *Screening Conclusions*

The increase water level to Middle Lake will result in the loss of wetland habitat and of the channel habitat from Lakeshore Road to Middle Lake. The area of wetlands, primarily cattail marsh, that is currently available to fish habitat is approximately 4.8 $km^2$. The amount of shallow lake habitat will be increased by 4.8 $km^2$ and wetland habitat that is not currently accessible will be available as a result of the increase in water levels. Some of the new wetland areas east of Lost Lake appear to contain more reeds and willow species than the current cattail marsh and will result in greater access than the present cattail marsh. Aquatic vegetation such as the pondweeds and lily pads will be eliminated along the outer edge of their current range. However these species will relocate to new areas and will likely become available to fish during the following season. A positive impact that may be associated with the increase in water level includes an increase in oxygen concentration in Middle Lake. Middle Lake is currently susceptible to fish kills during the winter as a result of low oxygen concentrations. By increasing the water level in the lake, the numbers of fish kills may be reduced.

We expect that there will be a net improvement in fish habitat since the lake habitat will increase, the wetland habitat will be replaced and the lake depth will increase which will result in an increase in oxygen levels. However, if compensation becomes necessary then fish access could be further increased by minor dredging to create channels through the new wetland area increasing fish access.

As a result of the expected increase flow through the Garry River immediately downstream of the Kenyon Dam Road, the client has also asked that impacts on fish habitat be reviewed in terms of possible erosion control measures. Although the impacts can not be estimated without knowing the extent and type of erosion control measures that will be used, it is not anticipated that section 1 would be negatively impacted by erosion control measures. This section currently provides little fish cover as the bottom type is dominated by bedrock and there is no aquatic vegetation within the channel. The introduction of such material as rip rap may provide new cover habitat for fish such as rock bass and pumpkinseed. Erosion control measure construction should follow the timing constraints for warm-water fisheries (no construction between March 15 and June 30).

Please call me at 347-3199 if you have any questions or require additional information to complete your review of the proposed water level increase in Middle Lake.

Yours Sincerely,
**ESG International Inc.**

MLavictoire

Michelle Lavictoire
Biologist

\eng\middlelakefish

***References***

McNeely and Protor. 1984. Garry River Water Management Report 1980 – Revised 1984. Prepared by McNeely Engineering Ltd. And Proctor & Redfern Ltd. Prepared for Raisin Region Conservation Authority.

Thomspon Rosemount Group. 2000. Drawing No. C.01 from the Alexandria Water Supply Study. Prepared for the Township of North Glengarry.

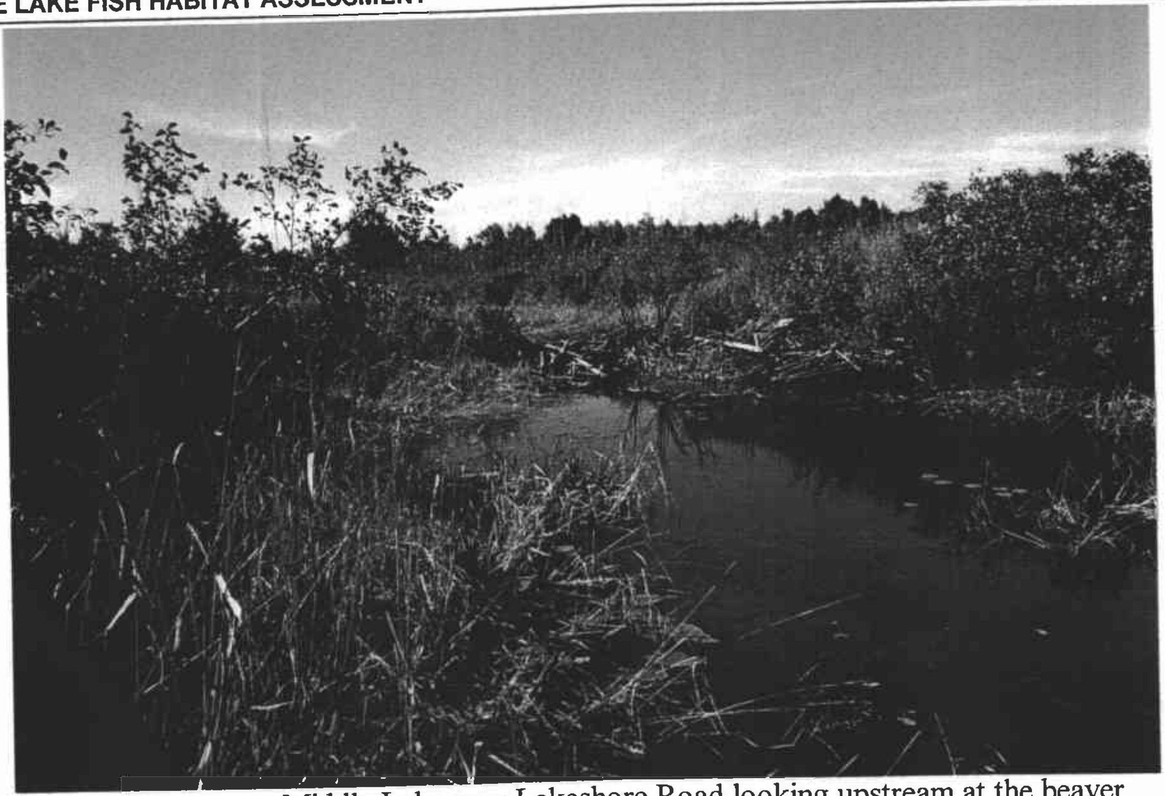


Photo 1 Tributary to Middle Lake near Lakeshore Road looking upstream at the beaver pond in section 1.

Photo 2. Tributary to Middle Lake looking downstream near the end of section 1.

Photo 3 Looking at the western end of Middle Lake, shows the edge of the western

Photo 4 Looking at the southern shore of Middle Lake at a small wetland.

Photo 5 Meandering reach of the Garry River between Middle Lake and Mill Pond

Photo 6. Confined portion of the Garry River between Middle Lake and Mill Pond (section 4).

Photo 7 Garry River downstream of Kenyon Dam Road (section 1).

# Appendix H
# Project Working Committee Meeting Records

## Township of North Glengarry
## Class Environmental Assessment
## Water Supply for the Town of Alexandria

# NOTICE OF COMPLETION

The Township of North Glengarry with the assistance of the Raisin Region Conservation Authority has completed a Preliminary Engineering Report for the Town of Alexandria Water Supply under the provisions of the Municipal Class EA.

The Town of Alexandria in the Township of North Glengarry has a history of water supply problems associated with periodic shortages. The primary objective of the Environmental Assessment process is to identify and examine alternative solutions that would provide the Town with a safe sustainable potable water supply. The Township has concluded that the preferred short-term strategy involves modifications to the Garry River System Operational Plan. Specifically, the target operating level for Middle Lake will be increased during periods of each year in order to store available water for use by the Town.

The above project is being planned under **Schedule B** of the **Municipal Class Environmental Assessment.** Subject to comments received as a result of this Notice, and the receipt of necessary approvals, the Township of North Glengarry intends to proceed with the implementation of this project.

**The project documentation is available for review at the Township of North Glengarry, 90 Main Street South, Alexandria, Ontario, K0C 1A0, Telephone: 525-1110.**

Interested persons should provide written comment to the municipality on the proposal within 30 days from the date of this Notice. Comment should be directed to the Clerk, Township of North Glengarry.

If concerns arise regarding this project, which cannot be resolved in discussions with the municipality, a person or party may request that the Minister of the Environment make an order for the project to comply with Part II of the Environmental Assessment Act (referred to as a Part II Order), which addresses individual environmental assessments. Requests must be received by the Minister at the address below within 30 calendar days of this Notice. A copy of the request must also be sent to the Township Clerk. If there is no "request" received by September 8, 2003, the project implementation will proceed as presented in the planning documentation.

Minister of the Environment
135 St. Clair Avenue, 10th Floor
Toronto, Ontario, M4V 1P5

This notice issued August 6, 2003 by the Clerk, Township of North Glengarry.

# Township of North Glengarry
# Class Environmental Assessment
# Phase 2 Notice
# Water Supply for the Town of Alexandria

## Public Comment Invited

The Township of North Glengarry with the assistance of the Waterworks Committee and the Raisin Region Conservation Authority is conducting an Environmental Assessment for the Town of Alexandria Water Supply.

The Town of Alexandria in the Township of North Glengarry has a history of water supply problems associated with periodic shortages. The primary objective of the Environmental Assessment process is to identify and examine alternative solutions that would provide the Town with a safe sustainable potable water supply. The Township is now evaluating alternatives available for the residents of Alexandria to address the water supply problem. Raising the water level in Middle Lake and constructing reservoir storage are some of the alternatives being considered.

In accordance with the requirements for projects under the Municipal Class Environmental Assessment process, the Township is making preliminary study material available for public review.

**On the 14th day of November 2002, between the hours of 2:00 – 4:00pm and 7:00 – 9:00pm, the public is invited to attend a public open house and presentation at the municipal office in Alexandria. Presentations will be conducted at 2:00pm and at 7:00pm. The Township's consultants for the project will be available to discuss issues and concerns with members of the public.**

Further information is available by contacting the Township Office, or the consultant's office: The Thompson Rosemount Group Inc., 1345 Rosemount Avenue, Cornwall, Ontario, K6J 3E5, telephone number (613) 933-5602; attention Mr. Bill Knight, P.Eng., Vice-President.

This notice issued the 5th day of November, 2002.

Mayor Bill Franklin
Township of North Glengarry
90 Main Street South
Alexandria, Ontario K0C 1A0
Telephone: 525-1110

[illegible]

# Township of North Glengarry Water Supply Study
# Class Environmental Assessment
# Phase 2 Public Consultation
# Participant Sign-in Sheet

| No. | Name | Address | Phone |
|---|---|---|---|
| | | 3462 A Kenyon Dam Rd. | 5254105 |
| | Franz Oeschger | 3462A Kenyon Dam Rd | 5254105 |
| | M. SMITH | Box 255<br>RR3 Alexandria Ont. | 525-~~525~~ 4368 |
| | Chris McDonell | Cameron | 5251110 |
| | G. SMITH | RR#3 ALEXANDRIA ON | 525-4368 |
| | Julie Akkermans | COUNCIL | 5272149 |
| | Sebastian Nussbaumer | RR4 Alexandria | 525-4742 |
| | William Hagar | Councillor | 874-2612 |
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PLEASE SIGN IN

The THOMPSON ROSEMOUNT Group

# Township of North Glengarry Water Supply Study
# Class Environmental Assessment
# Phase 2 Public Consultation
# Participant Sign-in Sheet

| No. | Name | Address | Phone |
|---|---|---|---|
|  | John & Michele Wilbrod | RR3 Alexandria | 525-3203 |
|  |  |  |  |
|  | BOB GRAHAM | R.R.#1, MAXVILLE, ONT. K0C1T0 | 527-3376 |
|  | J W Graham | BOX 609 ALEXANDRIA ONT | 525-1687 |
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**PLEASE SIGN IN**

The THOMPSON ROSEMOUNT Group

## Alexandria Water Supply Study

**The Corporation of the Township of North Glengarry**

**The Raisin Region Conservation Authority**

**Ontario Ministry of the Environment**

**The Thompson Rosemount Group Inc.**

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## Steering Committee

- Township of North Glengarry – Mayor Bill Franklin
- Township of North Glengarry – Morris McCormick (originally Luc Poirier)
- Raisin Region Conservation Authority – Roger Houde
- Raisin Region Conservation Authority – John Meek (originally Andy Code)
- Thompson Rosemount Group – Bill Knight
- Thompson Rosemount Group – Jamie Witherspoon

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## Background – Problem Statement

- Permit to take Water from Garry system is limited to 65 L/s (5,616 $m^3$/d)
- PTTW was periodically exceeded in the 1990's - currently under the limit
- WTP rated capacity is 95 L/s (8,208 $m^3$/d)
- Minimum Flow to Garry River is 30 L/s
- Periodic water supply shortages especially in recent years have necessitated rationing
- Water shortages impact health, safety and community growth
- There is no effective emergency contingency available
- Development Controls associated with STP are potentially linked to the water supply

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## Background – Problem Statement

- Low lake water levels contribute to deteriorated water quality
- Low water levels in the winter are associated with fish kills in the lakes
- Low water levels in the winter increase the risk of freezing the channels between the lakes and blocking the flow of water to Alexandria

## Study Purpose

**To determine the most cost effective alternative that will provide the Town of Alexandria with a sufficient and reliable water supply of adequate quality.**

***Most cost effective alternative*** **– the best alternative that can pass technical and public scrutiny with respect to environmental impacts (natural, social and economic) and operational considerations consistent with the EA Process.**

***Sufficient*** **– adequate quantity of water including provision for future growth.**

***Reliable*** **– able to provide water supply during drought or other adverse conditions without significant operational changes or depletion of the source.**

***Adequate quality*** **– extraordinary treatment processes beyond the existing WTP should not be required.**

## Study Methodology - Overview

- **Data Collection**
  - **Aerial photography and topographic survey of study area,**
  - **Condition survey of structures,**
  - **Stream gauge data (Garry and Delisle),**
  - **Meteorological data (Garry and Delisle),**
  - **Lake level (dam) data,**
  - **Existing reports,**
  - **Existing maps, wetland delineation, floodline mapping,**
  - **Existing Operational Plan prepared by RRCA for Alexandria,**
  - **Land use (zoning) data, population data,**
  - **Water consumption, sewage discharge data.**

## Study Methodology - Overview

**Alternatives Examined**

- **A – Do Nothing**
- **B – Water Reduction Strategy**
- **C1 – Full Groundwater Source**
- **C2 – Partial Groundwater Source**
- **D – Delisle River Source**
- **E – Ottawa River Source**
- **F – St. Lawrence River Source**
- **G – Increase Middle Lake Storage**
- **H – Garry System Reservoir**
- **I - Modify Operational Plan**

## Historical Perspective

- **1869 a dam was erected at the site of the Kenyon Dam. This dam and the previously constructed Mill Pond dam were designed solely to provide power to the Grist Mill in Alexandria.**
- **Since the early 1900's Alexandria's water supply had been provided from the Delisle River.**
- **By the 1940's the Delisle water supply for Alexandria was polluted and lacked dry weather flow. Test drilling for well supplies was completed with unfavourable results (anecdotal).**
- **1946 Study by N.B. MacRostie Consulting Engineer to improve the Alexandria water supply from the Delisle River for a design population 2400 analysed: creating a reservoir below the pump house on the Delisle, increasing the capacity of the existing reservoir, and using Loch Garry and Black Lake (Middle Lake) as a new supply source. The recommended solution was to use Loch Garry and Black Lake as a new source of water supply. The recommended solution included a replacement dam on Middle Lake and a new dam at Loch Garry.**
- **1950 Mill Pond in Alexandria was drained and dredged and the new water plant was constructed in its present location.**
- **Circa 1950 the Kenyon Dam failed.**
- **1954 Alexandria water supply is changed from the Delisle to the Garry system.**

## Historical Perspective

Alexandria Water Supply Study

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## Historical Perspective

Alexandria Water Supply Study

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## Historical Perspective

Alexandria Water Supply Study

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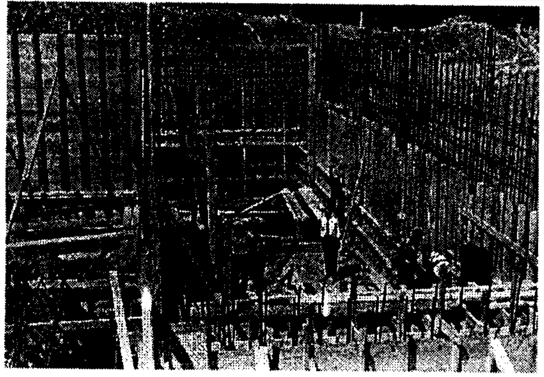
## Historical Perspective

- 1955 report by H.R. Farley Consulting Engineer to improve the water quality from the Garry River System, two solutions were proposed: build a pipeline from Middle Lake to the water treatment plant in Alexandria to avoid the swamp between Middle Lake and Mill Pond, and excavate a large open channel between Middle Lake and Mill Pond to avoid water stagnation.
- 1956 H.R. Farley Consulting Engineer prepared specifications to improve the Kenyon Dam, construct a new check dam at the east-end of Loch Garry and excavate a channel from Loch Garry through Middle Lake to Mill Pond. It is unclear what happened with this project as drawings dated July 1956 show a pipeline alignment from an intake crib in Loch Garry to Mill Pond.
- 1957 report by Leede, Binnie & Preece Consulting Engineers on the Garry River System water supply recommended that: a dam be constructed at the outlet of Loch Garry, the channel between Loch Garry and Middle Lake be improved, the Kenyon Dam be well-maintained, the level of Middle Lake be carefully and effectively controlled, and a pipeline be installed from Kenyon Dam to Mill Pond to bypass the swamp channels located upstream of Mill Pond.
- 1960 report by J.L. Richards & Associates Ltd. examined previous studies and much like an Environmental Study Report addressed the pros and cons of the options and the costs of constructing a dam at Loch Garry and a channel from Loch Garry to Middle Lake.

Alexandria Water Supply Study

## Historical Perspective



Alexandria Water Supply Study

## Historical Perspective

Alexandria Water Supply Study

## Historical Perspective

- 1961 supplementary report by J.L. Richards & Associates Ltd. to determine means of improving the quality and quantity of the Alexandria Water Supply. Issues that were reviewed included: a diversion ditch from Fraser's Rapids to Mill Pond to improve water quality (It was concluded that no significant improvement would be achieved by excavating a diversion ditch), and raising the Kenyon Dam to provide additional storage to the Town (It was concluded that additional storage was best achieved by controlling Loch Garry rather than by raising Kenyon Dam).
- 1965 report by J.L. Richards & Associates Ltd. discussed a proposed dam and channel project to utilize the water supply from Loch Garry. The goal would be to maintain the water level in the lake during the spring to provide adequate storage for late summer droughts. The design flow for this project was approximately 2,050 m3/d. Under average conditions, the water level in the lake would fall 30 cm from May 31st to September 1st. During a dry year, the water level in the lake would be expected to fall 50 cm.
- 1966 Report by the OWRC to assess water quality of the Alexandria water supply. This report dealt with the organic growth in the system and its effect on quality from a taste and odour standpoint. Recommendations were: install taste and odour control equipment at the water treatment plant, the proposed plan to construct a dam to control levels in Loch Garry should be implemented, either construct a pipeline or dredge a channel from Fraser's Rapids to Mill Pond to improve the quality of the water entering the water plant.

Alexandria Water Supply Study

## Historical Perspective

- 1978 Ministry of the Environment Report recommends doubling of Alexandria Water Treatment Plant capacity to 9,400 m3/day.
- 1978 preliminary design report Lascelles Seguin Tremblay Engineering Limited discussed the expansion of the Water Treatment Plant for an average day flow of 5340 m3 and a maximum day flow of 8014 m3.
- 1980 Raisin River Conservation Authority commissioned McNeely Engineering and Proctor & Redfern Ltd. to complete the Garry River Water Management Report. The report objective was to develop a water management plan for water supply and flood control purposes and to set the 1:100 year flood elevation. Recommendations included:
  - raise the operating water level in Loch Garry from 88.8 m to 89.1 m.,
  - rehabilitate Alexandria Dam,
  - raise Kenyon Dam and maintain Middle Lake level at 87.9 m.

Alexandria Water Supply Study

## Historical Perspective

- 1989 McNeely Engineering updated the 1980 Garry River Management Report. The study concluded that:
  - the reliable water supply available is 46 L/s (3,974 m3/d) with no modifications to water levels or sewage treatment plant operation,
  - Water taking could be increased to 65 L/s (5,616 m3/d) under a modified sewage discharge regime,
  - If Lock Garry were raised to a level of 89.1 (current average level) the reliable water supply available could be increased to 64 L/s (5,530 m3/d) under normal conditions and 82 L/s (7,085 m3/d) under a modified sewage discharge regime,
  - The reliable yield is based on the three worst years on record, 1930-1932,
  - Average year maximum water supply is 199 L/s.

## Historical Perspective

- 1992 Paul Wisner & Associates Ltd. completed a report to update the Garry River watershed modelling and assessment of proposed change to the summer operating level of Middle Lake. Report recommendations were:
  - updated Garry River Floodplain mapping based on revised hydrologic and hydraulic models,
  - revised hydraulic capacity of the outlet channel of Mill Pond,
  - Adjustments to the operating rules and procedures for the dams could further optimize the available water in the three lakes for Alexandria.
- 1995 Raisin Region Conservation Authority prepared an operational manual for the Garry River system. This document defines the operating procedures for the system.

## Water Demand Forecast

- Recent average day demand is 3,500 m³/d (770,000 gal/d) although demand exceeded 5,000 m³/d during early 1990's
- Future (20 year) average day demand forecast is 4,270 m³/d (50 L/s or 940,000 gal/d)
- Total demand (with dilution flow 30 L/s) is forecast at 6,862 m³/d
- Based on worst case conditions (Dalhousie Mills weather datafrom 1968), 1,260,000 m³ of additional water (storage) is required to meet Total Demand and evapotranspiration losses

## Alternative A – Do Nothing

- Does not provide a solution to the problem

## Alternative B – Water Reduction Strategy

***Reduce water consumption (demand) in Alexandria***

- Does not provide a long term solution to the problem
- Previous water reduction initiatives have successfully lowered consumption to typical levels
- With the exception of Consoltex, there is limited opportunity to further reduce consumption
- Future demand needs to be accommodated
- Raw water quality is not improved

## Alternative C1 & C2 – Groundwater Source

***Establish groundwater wells to augment the water supply***

- Variability of groundwater supply does not support an adequate long-term water supply
- Historical data shows that both the Town and Consoltex have investigated a groundwater supply in the past and have found it not to be practical. More recent studies (Maxville, EWRMS) provide supporting data
- Large scale extraction for municipal use may have significant negative effects on the rural community in North Glengarry

## Alternative D – Delisle River Source

***Create a reservoir in the Delisle River using the existing or a new dam with low lift pumping station and raw watermain***

- Ability to take water from two watersheds may not improve the reliability of the overall supply, since both watersheds are geographically in close proximity and suffer the same precipitation variations
- Prime agricultural land covers the preferred site for storage
- Environmental impacts of changing river flow regime will be significant
- Poor water quality; Garry River system was determined in the 1940's to be a better water source than the Delisle

## Alternative E – Ottawa River Source

***Construct a raw watermain from the Ottawa River with low lift pumping station and intake***

- Construction cost is very high ($17 m)
- Land acquisition at the water source would be required
- Political/watershed boundary crossings may be difficult
- Environmental impact of intake and watermain during construction would be significant
- Could provide a solution for all North Glengarry

## Alternative F – St. Lawrence River Source

***Construct a raw watermain from the St. Lawrence River with low lift pumping station and intake***

- **Construction cost is very high ($12 m)**
- **Land acquisition at the water source would be required**
- **Political boundary crossings may be difficult**
- **Environmental impact of intake and watermain during construction would be significant**
- **Could provide a solution for all North Glengarry**
- **Raw water quality is improved**

## Alternative G – Increase Middle Lake Volume

***Excavate Middle Lake and channel for a greater storage volume, raising water level to the 100 year flood level (88.44 m), increasing volume by 1.8 million $m^3$ (262 days design including dilution water).***

- **Construction cost is high ($6.3 m)**
- **Will result in HADD to fish habitat under Fisheries Act**
- **Environmental impacts to Class 1 Wetland would be significant including loss of Lost Lake due to the higher levels**
- **1:100 year flood line would need to be re-mapped**
- **Land acquisition would be required to permit additional flooding**
- **Raw water quality is not improved**

## Alternative H – Construct a Reservoir

***Excavate a Reservoir along the channel between Middle Lake and Mill Pond***

- **Construction cost is high ($13.9 m)**
- **Will result in HADD to fish habitat under Fisheries Act**
- **Environmental impacts to Class 1 Wetland would be significant**
- **Land acquisition would be required to permit additional flooding**
- **Raw water quality is not improved**
- **Meteorological data does not always support required volume**
- **1:100 year floodline will be impacted**

## Alternative I – Modify Operational Plan

***Modify the Operational Plan for Middle Lake (87.9 to 88.3 m); Loch Garry and Mill Pond remain the same***

- **Construction cost is low**
- **Will not result in HADD to fish habitat under Fisheries Act (ESG International, Oct. 2001)**
- **Environmental impacts to Class 1 Wetland would not be significant due to the higher levels (Cuddy, Feb. 2002)**
- **Limited property impacts, shoreline remediation**
- **Raw water quality is not improved**
- **Does not provide a long term solution**

## Alternative I – Modify Operational Plan

### *Fish Habitat Assessment – ESG International, Oct. 2001*

- **No net negative impact to habitat is expected**
- **Raising normal operating levels will alter/relocate terrestrial and aquatic wetland habitat**
- **A net improvement to fish habitat is predicted with deeper water**
- **Channels could be dredged in the new wetland marsh area to improve fish access**
- **Downstream erosion measures if required will not negatively impact the fish habitat**

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## Alternative I – Modify Operational Plan

### *Middle Lake Wetland Assessment – Cuddy, Feb. 2002*

- There will be minor changes to the wetland boundary, particularly in areas where it abuts or is near the current lakeshore
- There will be some dieback of trees in portions of swamp forest, and replacement by shrub thickets
- There will be short-term impacts on the marsh/open water portions of the wetland, with the amount of cattail marsh being reduced and the amount of open water marsh being increased. Judging by what has happened in the past, this will be relatively short lived due to high nutrient levels in the lake
- A portion of East fen will likely experience some inundation. If prolonged or extensive, this could have adverse impacts on the fen community (possible replacement by cattail marsh) and rare species (most notably Eastern Prairie Fringed-orchid)

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## Summary of Alternatives

| Alternative | Description | Estimated Construction Cost | Screening Criteria |  |  |  |  |  |  |  |  | Comments |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
|  |  |  | [illegible] Solution | [illegible] for Growth | [illegible] Raw Water Quality | [illegible] Cost | [illegible] Environment Impact | [illegible] Environment Impact | [illegible] Environment Impact | [illegible] Approvals Feasible | [illegible] Alternative |  |
| A | Do Nothing | $0 | N | N | N | Y | N | Y | Y | Y | No | No change in operation or water supply |
| B | Water Reduction Strategy | $216,000 | N | N | N | Y | N | N | Y | Y | No | Not a comprehensive solution as stand alone |
| C | Groundwater Source | $4,800,000 | N | N | Y | Y | Y | Y | Y | ? | No | Water quantity is dubious/environmental impact potential |
| D | Delisle Water Source | $6,200,000 | N | N | N | Y | Y | Y | Y | N | No | Sustainable water quantity is not available |
| E | Ottawa River Source | $17,100,000 | N | Y | Y | N | Y | N | Y | ? | No | Cost is unreasonably high |
| F | St. Lawrence River Source | $11,700,000 | Y | Y | Y | N | Y | N | Y | Y | Yes | Cost is high, but overall solution is viable |
| G | Construct Middle Lake Storage | $8,340,000 | N | Y | N | Y | Y | Y | Y | N | No | Solution is not feasible due to environmental impact potential |
| H | Garry River Storage Reservoir | $12,870,000 | N | Y | N | N | Y | Y | Y | N | No | Cost is high/Environmental impact potential |
| I | Modify Garry River System Operational Plan | $20,000 | Y | Y | N | Y | Y | Y | N | Y | Yes | Solution is feasible/Environmental impact potential/Politically sensitive |

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## Summary of Recommendations – Short Term

- **Modify the Garry River Operational Plan as it relates to Middle Lake and associated remedial measures to increase the utilization of Middle Lake for water supply storage.**
- **The 1:100 year flood level of 88.44 remains unchanged for Middle Lake. Official Plan Amendments may be required to preclude development around Middle Lake within the 1:100 year flood plain**
- **MNR recommends a target operating level for Middle Lake of 88.2 m and wetland habitat monitoring**
- **Raise some land and provide shoreline erosion protection for properties near the east end of Middle Lake**
- **Provide some seasonal variation in water levels if possible**
- **Minimize nutrient loadings to the lake from septic systems and adjacent land**

## Summary of Recommendations – Long Term

- The water supply capability of Middle Lake is finite and is a function of meteorological conditions and water demand. As the water demand of the Town of Alexandria increases and particularly in years of low precipitation, the sustainability of the water supply will be at risk. The recommended long-term strategy is therefore a pipeline to the St. Lawrence River
- A pipeline may also provide a solution for all of North Glengarry

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## Next Phase

- Committee/Council resolution endorsing the Draft Report
- Public consultation including agency circulation
- Finalize the ESR Document with Public Input
- File with MOE

**Corporation of the Township of North Glengarry**
*90 Main Street South*
*P.O. Box 700*
*Alexandria, ON K0C 1A0*
*Tel: (613) 525-1110*
*Fax: (613) 525-1649*

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*www.northglengarry.com*

January 28, 2003

The Thompson Rosemont Group Inc.
1345 Rosemont Avenue
CORNWALL, Ontario
K6J 3P5

Attention: Bill Knight

Dear Bill:

At the last Waterworks Committee meeting of January 15, 2003 the Committee made the following recommendations to Council;

a) accepting the Alexandria Water Supply Study as completed.
b) the letter received from Lenora Corey be included in the Alexandria Water Study.
c) agreed to accept and forward to Mrs. Corey, the letter drafted by Bill Knight and to include this letter as part of the study.

The minutes and the recommendations of the Waterworks committee meeting were approved and adopted at Council meeting of Monday January 27, 2003.

Bill, on behalf of the Waterworks Committee could you please forward a copy of the letter that you have prepared to Mrs. Corey.

Please find enclosed herewith the Waterworks Committee minutes of January 15, 2003.

If you need additional information or clarification to any of the above do not hesitate to call the undersigned.

Yours truly,

Robert Boisvenue

Robert Boisvenue
Deputy Clerk/Adm.

# Welcome: Alexandria Water Supply Study

## The Corporation of the Township of North Glengarry

## The Raisin Region Conservation Authority

Funding Assistance:
Ministry of Natural Resources
Ministry of the Environment

**The Thompson Rosemount Group Inc.**

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# Historical Perspective

1869 - Dam was erected at the site of the Kenyon Dam. This dam and the previously constructed Mill Pond dam were designed solely to provide power to the Grist Mill in Alexandria.

Early 1900's - Alexandria's water supply provided from the Delisle River.

1940's - Delisle water supply was polluted and lacked dry weather flow. Test drilling for well supplies was completed with unfavourable results (anecdotal).

1946 - Study to improve the Alexandria water supply from the Delisle River for a design population 2400. Recommended solution was to use Loch Garry and Black Lake as a new source of water supply.

1950 - Mill Pond in Alexandria was drained and dredged and the new water plant was constructed in its present location.

Circa 1950 the Kenyon Dam failed.

1954 - Alexandria water supply is changed from the Delisle to the Garry system.

1955 - report by H.R. Farley Consulting Engineer to improve the water quality from the Garry River System, two solutions were proposed: build a pipeline from Middle Lake to the water treatment plant in Alexandria to avoid the swamp between Middle Lake and Mill Pond, and excavate a large open channel between Middle Lake and Mill Pond to avoid water stagnation.

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# Background – Problem Statement

- Permit to take Water from Garry system limited to 65 L/s (5,616 m³/d)
- PTTW periodically exceeded in the 1990's - currently under the limit
- WTP rated capacity is 95 L/s (8,208 m³/d)
- Minimum Flow to Garry River is 30 L/s
- Periodic water supply shortages especially in recent years have necessitated rationing
- Water shortages impact health, safety and community growth
- There is no effective emergency contingency available
- Development Controls associated with STP are potentially linked to the water supply
- Low lake water levels contribute to deteriorated water quality
- Low water levels in the winter are associated with fish kills
- Low water levels in the winter increase the risk of freezing the channels between the lakes and blocking the flow of water to Alexandria

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# Historical Perspective

## Historical Perspective

**1956 - H.R. Farley Consulting Engineer prepared specifications to improve the Kenyon Dam, construct a new check dam at the east-end of Loch Garry and excavate a channel from Loch Garry through Middle Lake to Mill Pond. It is unclear what happened with this project as drawings dated July 1956 show a pipeline alignment from an intake crib in Loch Garry to Mill Pond.**

**1957 - report by Coode, Binnie & Preece Consulting Engineers on the Garry River System water supply recommended that: a dam be constructed at the outlet of Loch Garry, the channel between Loch Garry and Middle Lake be improved, the Kenyon Dam be well-maintained, the level of Middle Lake be carefully and effectively controlled, and a pipeline be installed from Kenyon Dam to Mill Pond to bypass the swamp channels located upstream of Mill Pond.**

**1960 - report by J.L. Richards & Associates Ltd. (JLR) examined previous studies and much like an Environmental Study Report addressed the pros and cons of the options and the costs of constructing a dam at Loch Garry and a channel from Loch Garry to Middle Lake.**

**1961 - supplementary report by JLR to determine means of improving the quality and quantity of the Alexandria Water Supply. Issues that were reviewed included: a diversion ditch from Fraser's Rapids to Mill Pond to improve water quality (it was concluded that no significant improvement would be achieved by excavating a diversion ditch), and raising the Kenyon Dam to provide additional storage to the Town (it was concluded that additional storage was best achieved by controlling Loch Garry rather than by raising Kenyon Dam).**

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## Historical Perspective

**1965 - report by JLR discussed a proposed dam and channel project to utilize the water supply from Loch Garry. The goal would be to maintain the water level in the lake during the spring to provide adequate storage for late summer droughts. The design flow for this project was approximately 2,050 $m^3/d$. Under average conditions, the water level in the lake would fall 30 cm from May 31st to September 1st. During a dry year, the water level in the lake would be expected to fall 50 cm.**

**1966 - Report by the OWRC to assess water quality of the Alexandria water supply. This report dealt with the organic growth in the system and its effect on quality from a taste and odour standpoint. Recommendations were: install taste and odour control equipment at the water treatment plant, the proposed plan to construct a dam to control levels in Loch Garry should be implemented, either construct a pipeline or dredge a channel from Fraser's Rapids to Mill Pond to improve the quality of the water entering the water plant.**

**1978 - Ministry of the Environment Report recommends doubling of Alexandria Water Treatment Plant capacity to 9,400 $m^3$/day.**

**1978 - preliminary design report Lascelles Seguin Trembley Engineering Limited discussed the expansion of the Water Treatment Plant for an average day flow of 5,340 $m^3$ and a maximum day flow of 8014 $m^3$.**

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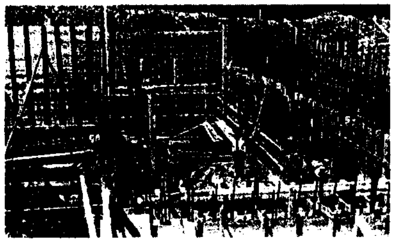
## Historical Perspective



---

## Historical Perspective

**1980 - RRCA commissioned McNeely Engineering and Procter & Redfern Ltd. to complete the Garry River Water Management Report. The report objective was to develop a water management plan for water supply and flood control purposes and to set the 1:100 year flood elevation. Recommendations included:**

- **raise the operating water level in Loch Garry from 88.8 m to 89.1 m.,**
- **rehabilitate Alexandria Dam,**
- **raise Kenyon Dam and maintain Middle Lake level at 87.9 m.**

**1989 - McNeely Engineering updated the 1980 Garry River Management Report. The study concluded that:**

- **reliable water supply available is 46 L/s (3,974 $m^3/d$) with no modifications to water levels or sewage treatment plant operation,**
- **Water taking could be increased to 65 L/s (5,616 $m^3/d$) under a modified sewage discharge regime,**
- **If Loch Garry were raised to a level of 89.1 (current average level) the reliable water supply available could be increased to 64 L/s (5,530 $m^3/d$) under normal conditions and 82 L/s (7,085 $m^3/d$) under a modified sewage discharge regime,**
- **The reliable yield is based on the three worst years on record, 1930-1932,**
- **Average year maximum water supply is 199 L/s.**

## Historical Perspective

- 1992 - Paul Wisner & Associates Ltd. completed a report to update the Garry River watershed modelling and assessment of proposed change to the summer operating level of Middle Lake. Report recommendations were:
  - updated Garry River Floodplain mapping based on revised hydrologic and hydraulic models,
  - revised hydraulic capacity of the outlet channel of Mill Pond,
  - Adjustments to the operating rules and procedures for the dams could further optimize the available water in the three lakes for Alexandria.
- 1995 - RRCA prepared an operational manual for the Garry River system. This document defines the operating procedures for the system.

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## Water Demand Forecast

- Recent average day demand is 3,500 m³/d (770,000 gal/d) although demand exceeded 5,000 m³/d during early 1990's
- Future (20 year) average day demand forecast is 4,270 m³/d (50 L/s or 940,000 gal/d)
- Total demand (with dilution flow 30 L/s) is forecast at 6,862 m³/d
- Based on worst case conditions (Dalhousie Mills weather data from 1968), up to 1,260,000 m³ of additional water (storage) is required to meet Total Demand and system evapo-transpiration losses

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## Study Purpose

**To determine the most cost effective alternative that will provide the Town of Alexandria with a sufficient and reliable water supply of adequate quality.**

***Most cost effective alternative*** **– the best alternative that can pass technical and public scrutiny with respect to environmental impacts (natural, social and economic) and operational considerations consistent with the EA Process.**

***Sufficient*** **– adequate quantity of water including provision for future growth.**

***Reliable*** **– able to provide water supply during drought or other adverse conditions without significant operational changes or depletion of the source.**

***Adequate quality*** **– extraordinary treatment processes beyond the existing WTP should not be required.**

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## Data Collection

- Aerial photography and topographic survey of study area,
- Condition survey of structures,
- Stream gauge data (Garry and Delisle),
- Meteorological data (Garry and Delisle),
- Lake level (dam) data,
- Existing reports,
- Existing maps, wetland delineation, floodline mapping,
- Existing Operational Plan prepared by RRCA for Alexandria,
- Land use (zoning) data, population data,
- Water consumption, sewage discharge data.

## Alternatives Examined

- A – Do Nothing
- B – Water Reduction Strategy
- C1 – Full Groundwater Source
- C2 – Partial Groundwater Source
- D – Ottawa River Pipeline
- E – St. Lawrence River Pipeline
- F – Delisle River Reservoir
- G – Expand Middle Lake Storage Reservoir
- H1 – Upper Garry River On-Line Reservoir
- H2 – Upper Garry River Off-Line Reservoir
- H3 – Other Reservoirs
- I - Modify Middle Lake Operational Plan

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## Alternative A – Do Nothing

- Does not provide a solution to the problem

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## Alternative B – Water Reduction Strategy

***Reduce water consumption (demand) in Alexandria***

- Previous water reduction initiatives (meters, rates, leak detection) have successfully lowered consumption to typical levels
- With the exception of Consoltex, there is limited opportunity to further reduce consumption
- Future demand needs to be accommodated
- Does not provide a long term solution to the problem
- Raw water quality is not improved

---

## Alternative C1 & C2 – Groundwater Source

***Establish groundwater wells to augment the water supply***

- Historical data shows that both the Town and Consoltex have investigated a groundwater supply in the past and have found it not to be practical. More recent studies (Maxville, EOWRMS) provide supporting data
- Large scale extraction for municipal use may have significant negative effects on the rural community in North Glengarry
- Variability of groundwater supply does not support an adequate long-term water supply

## Alternative D – Ottawa River Pipeline

***Construct a raw water transmission main from the Ottawa River with low lift pumping station and intake***

- **Land acquisition at the water source would be required**
- **Political/watershed boundary crossings may be difficult**
- **Environmental impact of intake and watermain during construction would require mitigation**
- **Could provide a solution for all North Glengarry**
- **Estimated at $17.1 M Capital cost and $18.5 M Life Cycle Cost**

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## Alternative E – St. Lawrence River Pipeline

***Construct a raw water transmission main from the St. Lawrence River with low lift pumping station and intake***

- **Land acquisition at the water source would be required**
- **Political boundary crossings may be difficult**
- **Environmental impact of intake and watermain during construction would require mitigation**
- **Could provide a solution for all North Glengarry**
- **Raw water quality is improved**
- **Estimated at $11.7 M Capital cost and $12.8 M Life Cycle Cost**

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## Alternative F – Delisle River Reservoir

***Create a reservoir in the Delisle River using the existing or a new dam with low lift pumping station and raw watermain***

- **Both watersheds are geographically close and suffer the same precipitation variations**
- **Prime agricultural land covers the preferred site for storage**
- **Significant environmental impacts of changing river flow regime**
- **Poor water quality; Garry River system was determined in the 1940's to be a better water source than the Delisle**
- **Capital cost is estimated at $10.2 M excl. considerable land, environmental compensation costs**

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## Alternative G pan i le a e torage Reservoir

***Raise Middle Lake water level to the 1:100 year flood level (88.44), construct dam, dikes, channel to capture more spring runoff***

- **Will result in HADD to fish habitat under Fisheries Act**
- **Environmental impacts to Class 1 Wetland would be significant including loss of Lost Lake due to the higher levels**
- **1:100 year flood line will be increased effecting land**
- **Land acquisition would be required to permit additional flooding**
- **Raw water quality is not improved**
- **Estimated at $6.5 M Capital cost and $6.9 M Life Cycle Cost, excl. considerable land, environmental compensation costs**

## Alternative H1 – Upper Garry River On-Line Reservoir

***Construct a 516,000 m³ Reservoir along the channel between Middle Lake and Mill Pond upstream of Frasier Rapids to capture more spring runoff***

- **Will result in HADD to fish habitat under Fisheries Act**
- **Environmental impacts to Class 1 Wetland would be significant**
- **Land acquisition would be required to permit additional flooding**
- **Raw water quality is not improved**
- **Meteorological data does not always support required volume**
- **Estimated at $7.8 M Capital cost and $8 M Life Cycle Cost, excl. considerable land, environmental compensation costs**

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## Alternative H3 – Other Reservoirs

***Convert an existing Quarry for storage of some spring runoff from Garry System***

- **Quarry acquisition would be required**
- **Reservoir raw water quality is suitable**
- **Hydrogeological/hydrological impact will have to be assessed**
- **Depending on the size of existing quarry, additional mining may be required to the target achieve volume**
- **Capital cost is a function of the selected site, environmental issues**

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## Alternative H2 – Upper Garry River Off-Line Reservoir

***Construct a 516,000 m³ Reservoir between Middle Lake and Mill Pond outside wetland to capture more spring runoff***

- **Land acquisition would be required**
- **Reservoir raw water quality is suitable**
- **Hydrogeological/hydrological impact will have to be assessed**
- **Meteorological data does not always support required volume**
- **Estimated at $8.2 M Capital cost and $8.7 M Life Cycle Cost, excl. land, hydrogeological impacts, cost recovery from sale of aggregate**

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## Alternative I – Modify Middle Lake Operational Plan

***Modify the Operational Plan for Middle Lake (87.9 to 88.3 m); Loch Garry and Mill Pond remain the same***

- **Will not result in HADD to fish habitat under Fisheries Act (ESG International, Oct. 2001)**
- **Environmental impacts to Class 1 Wetland would not be significant due to the higher levels (Cuddy, Feb. 2002)**
- **Limited property impacts, shoreline remediation, channel work**
- **Raw water quality is not improved**
- **Provides partial solution (up to 990,000 m³ storage)**
- **Estimated at $2.1 M Capital cost and $2.3 M Life Cycle Cost**

## Alternative I – Modify Middle Lake Operational Plan

***Fish Habitat Assessment – ESG International, Oct. 2001***

- **No net negative impact to habitat is expected**
- **Raising normal operating levels will alter/relocate terrestrial and aquatic wetland habitat**
- **A net improvement to fish habitat is predicted with deeper water**
- **Channels could be dredged in the new wetland marsh area to improve fish access**
- **Downstream erosion measures if required will not negatively impact the fish habitat**

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## Summary of Alternatives

| Alternative | Description | Capital Cost | First Year Operating Cost | 20-Year Life Cycle Cost | Pros and Cons |
|---|---|---|---|---|---|
| Alternative A | Do Nothing | na | na | na | Not a Viable Solution |
| Alternative B | Water Reduction Strategy | na | na | na | Not a Viable Solution |
| Alternative C1 | Full Groundwater Source | na | na | na | Insufficient Groundwater; Not a Viable Solution |
| Alternative C2 | Partial Groundwater Source | na | na | na | Insufficient Groundwater; Not a Viable Solution |
| Alternative D | Ottawa River Pipeline | $17,121,748 | $64,686 | $16,474,546 | Excessive Cost; Not a Viable Solution |
| Alternative E | St. Lawrence River Pipeline | $11,732,772 | $44,810 | $12,845,791 | Viable. Opportunity for All-North Glengarry System. |
| Alternative F | Delisle River Reservoir | $10,163,251 | na | na | Not Viable. Insufficient water. Land Acquisition, Environmental Impacts not factored in Costs. |
| Alternative G | Expand Middle Lake Reservoir | $6,519,768 | $19,820 | $6,856,312 | Not Viable. Land Acquisition, Environmental Impacts not factored in Costs. |
| Alternative H1 | Upper Garry River On-Line Reservoir | $7,841,812 | $8,810 | $8,010,286 | Not Viable. Land Acquisition, Environmental Impacts not factored in Costs. |
| Alternative H2 | Upper Garry River Off-Line Reservoir | $8,183,154 | $16,760 | $9,662,873 | Viable. Land Acquisition, Hydrogeological Impacts, Sale of Rock not factored in Costs. |
| Alternative H3 | Other Reservoirs | na | na | na | Further evaluation required to determine viability. |
| Alternative I | Modify Middle Lake Operational Plan | $2,081,806 | $6,810 | $2,250,381 | Interim Solution with Conditional Approval from Approval Agencies. |

Notes:
Land Acquisition costs will be considerable for some Alternatives and are not included.
Environmental impacts and related compensation will be considerable for some Alternatives and are not included.
Life Cycle costs include energy and inflation at 2.0% per annum.

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## Alternative I – Modify Middle Lake Operational Plan

***Middle Lake Wetland Assessment – Cuddy, Feb. 2002***

- **There will be minor changes to the wetland boundary, particularly in areas where it abuts or is near the current lakeshore. Monitoring is recommended**
- **There will be some dieback of trees in portions of swamp forest, and replacement by shrub thickets**
- **There will be short-term impacts on the marsh/open water portions of the wetland, with the amount of cattail marsh being reduced and the amount of open water marsh being increased. Judging by what has happened in the past, this will be relatively short lived due to high nutrient levels in the lake**
- **A portion of East Fen will likely experience some inundation. If prolonged or extensive, this could have adverse impacts on the fen community (possible replacement by cattail marsh) and rare species (most notably Eastern Prairie Fringed-orchid)**

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## Summary of Recommendations – Short Term Strategy

**ALTERNATIVE I – MIDDLE LAKE OPERATIONAL PLAN**

- **Modify the Garry River Operational Plan as it relates to Middle Lake to increase the capability for water supply storage.**
- **The 1:100 year flood level of 88.44 remains unchanged for Middle Lake. Official Plan Amendments may be required to preclude development around Middle Lake**
- **Raise some land and provide shoreline erosion protection for properties near the east end of Middle Lake**
- **Provide channel stabilization, shoreline protection downstream of Kenyon Dam and Mill Pond Dam, upgrades to Mill Pond Dam**
- **Provide some seasonal variation in water levels if possible**
- **Minimize nutrient loadings to the lake from septic systems and adjacent land**
- **Conduct wetland monitoring as recommended**

## Summary of Recommendations – Long Term Strategy

- The Long Term Strategy is still uncertain.  Several Alternatives have potential however further evaluation is recommended.
- The availability of funding assistance is essential to the implementation of any of the relatively high cost long term alternatives.
- A solution for all of North Glengarry may influence the selection of the preferred Long Term Strategy.

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## Next Phase

- Public consultation including agency circulation
- Finalize the Water Supply Study and EA Document with Public Input
- File with MOE

# Water Supply!

*Alexandria Water Supply Study*
*Public Consultation Newsletter*

Large Print Version Available at Township Office

February 2001
Volume 1, Issue 1

***Highlights:***

- ***Current Water Supply is not secure and sustainable.***
- ***Preferred (Short Term) Alternative is to modify the Operational Plan.***
- ***The Long Term Alternative is a pipeline to the St. Lawrence River.***
- ***Project Costs not covered by Provincial Grants will need to be recovered from business and residents in the community.***

## Alexandria Water Supply Planning Study

The purpose of the study is to:

***To develop a strategy for securing a sufficient, reliable, adequate quality water supply for Alexandria to meet short and long term needs.***

The Town of Alexandria has derived its source of water for the municipal water supply from Alexandria Lake (Mill Pond) and the upper Garry River System since 1954. Prior to that (and since the early 1900's), the Town water supply was derived from the Delisle River. Various dams have been constructed on the upper Garry River System , thus artificially creating three lakes. The Middle Lake dam (Kenyon Dam), constructed in 1869 and the Alexandria dam (Mill Pond Dam), constructed around 1840 regulated water supply to the grist mill in Alexandria.

## What is the Problem?

Increased water demand and climatalogical (annual precipitation) conditions have contributed to near critical source water shortages for the Town of Alexandria in the recent past. In addition, development around Loch Garry and, to a lesser extent, Middle Lake has constrained the operational practices of the Raisin Region Conservation Authority with respect to controlling lake water levels.

Since 1954, the Town of Alexandria has obtained its water supply from the Garry River System. The Garry River system drains approximately 34 km$^2$ of land into the Delisle River just east of Alexandria. The lakes are relatively shallow (i.e. less than 3 m maximum depth) with the water entering the lakes being a combination of runoff and groundwater discharge (spring). The raw water at the water treatment plant has proven at times to be of poor quality and contains significant quantities of suspended solids and bacteria. Bacterial contamination has been sufficient to require beach closings on the Alexandria Lake. Furthermore, growth in the Town, both residential and industrial, increased water demand to the point where it exceeded the limits of the Permit to Take Water up to 1995. Water conservation strategies implemented by the PUC and the largest single water user, Consoltex, have resulted in significant water demand reductions since 1995. Periodic water shortages persist, largely due to the limitations of the source water supply, the upper Garry River system.

## Alexandria Water Demand

Water demand is divided into three different primary uses: residential, Industrial, Commercial and Institutional (IC&I), and unaccounted uses. In Alexandria, IC&I use makes up 60% of the total water consumption with residential and unaccounted for water making up the balance of the water consumed. Leak detection surveys are conducted periodically by the PUC. Based on historical records it is estimated that on average the residents in Alexandria use about 440 litres of water per person per day. This is slightly higher than the national average of 390 L/person/day, but twice as much as most European Countries. A 1989 study comparing typical municipal water prices throughout the world indicated that on average Canadians were paying 36 cents for every 1000 litres of water used ...

## Alexandria Water Demand cont'd

compared to 66 cents in the UK, 78 cents in Sweden, 97 cents in Belgium and $1.47 in Australia. Consider for a moment the great contribution water makes to our quality of life – indeed to life itself. Most of us rely on municipal water service, and our health depends on the quality of water supplied. We need to pay realistic rates for water services, which are sufficient to cover their true cost. The projected water demand growth in Alexandria is forecast to be 1% compounded annually. This number is important to determine the size of water supply infrastructure for at least 20 years.▲

## Do Water Meters Improve Water Efficiency?

*Adapted from Ontario Pipeline December 2000 (Ken Sharratt)*

Do water meters work? This has long been an important and contentious issue and remains so. As of 1996, in Southern Ontario, approximately 33% or 86 municipalities representing 1.3 million people had not installed water meters.

Residential per capita water use is consistently lower for metered municipalities for all size ranges. In Southern Ontario, residential water use in metered municipalities was 253 litres per capita per day (lpcd) compared with 345 lpcd for non-metered municipalities, a 27% difference! In conclusion, meters work as far as residential water use is concerned. Usage is about 30% lower for small and medium sized municipalities such as Alexandria.▲

## Description of Preferred Alternative

**Short Term Strategy**
The preferred alternative is a modification of the Garry River Operational Plan as it relates to Middle Lake, and associated remedial measures to increase the utilization of Middle Lake for water supply storage.

The 1:100 year flood level remains unchanged for Middle Lake at 88.44m.
The target operating level will be 88.3m compared to 87.8m.
Official Plan and Zoning By-law amendments may be required to preclude development around Middle Lake within the 1:100 year flood plain and in low lying areas adjacent to the flood plain and outlet channel.
It may be necessary to raise some land and provide shoreline erosion protection for properties near the east end of Middle Lake.
Improvements to the outlet channel including erosion protection will also be required.

**Long Term Strategy**
The sustainability of the water supply will be at risk with increasing water demand. Hence, the long-term strategy is a pipeline to the St. Lawrence River.

## Public Consultation: March 14th, 2001

This project will have an impact on all ratepayers that currently are serviced by Municipal Water Supply in Alexandria. A Public Information Centre is being held on the following date where you will have the opportunity review the project in detail, ask questions and voice your opinion on the project.

**Date: Wednesday, March 14th, 2001**

**Time: 2 p.m. to 4 p.m. and 6 p.m. to 8 p.m.**

**Location: Township Hall, Main St.**

Come to the Public Information Centre and Have your Say into the Future of Water Supply in Your Community!

## Water Conservation

By following the three golden rules for wise use of water – reduce, repair, retrofit – you can cut your water use nearly in half.

- Reduce – by making small changes to water use habits and by installing water saving devices.
- Repair – regularly check toilets, pipes and faucets for leaks and fix immediately.
- Retrofit – adapt or replace an older less water efficient fixture or appliance with one of the many water saving devices now on the market.

## Project Contacts

**Township**
Mayor Bill Franklin
Luc Poirier
PHONE:
(613) 525-1110

**Conservation Authority**
Roger Houde, P.Eng.
Andy Code
PHONE:
(613) 938-3611

**Consultant**
**M.S. Thompson & Associates Ltd.**
*Project Director*
Bill Knight, P.Eng.
*Project Engineer*
James Witherspoon, P.Eng.
PHONE:
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E-MAIL: mail@trg.ca

**Public Information Centre**
**March 14th, 2001**
**2 – 4 pm and 6 – 8 pm**
**Township Hall**
**Main St.**

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# MEETING RECORD

**Project:** Alexandria Water Management Study
Project No: 985194
Meeting:
Date: July 31, 2001
Location: Township of North Glengarry Office, Alexandria
Present: Bill Franklin, Mayor, North Glengarry (NG) FAX 525-1649
Jean-Marc Lalonde, M.P. P., Glengarry – Prescott – Russell FAX 613-446-6605
Helen Jennings, Executive Assistant to Jean-Marc Lalonde
Leo Poirier, Clerk, NG
Morris McCormick, P.Eng., Manager, Water/Wastewater NG
Andy Code, Raisin Region Conservation Authority (RRCA) FAX 938-3221
Kerry Coleman, Area Manager, MNR FAX 613-258-3920
Anne Bendig, Biologist, MNR
Scott Smithers, Biologist, MNR
Bob Dunn, P.Eng., Acting Area Manager, Cornwall, MOE FAX 933-6402
Rhéal Delaquis, Abatement Officer, Cornwall, MOE
Bill Knight, P.Eng., The Thompson Rosemount Group (TRG)

**Item** **DISCUSSION** **ACTION BY**

1. Introductions by Mayor Bill Franklin
2. Overview by Bill Knight of Garry River system history, problem definition, review of alternatives, and the preferred alternative. This proposal does not involve an Official Plan amendment for Alexandria to expand the Town limit or drastically modify land uses. There is no application proposed to increase the Permit to Take Water currently limited to 65 L/sec for water supply. In addition, the Town of Alexandria has implemented several water reduction initiatives to reduce the average daily demand by approximately 30% to 3,509 $m^3$/day (1999), which is well below the Permit to Take Water limit of 5,616 $m^3$/day. In spite of these efforts, there continues to be a serious risk of water shortages that will affect the entire Town. The purpose of the Study is to examine alternatives which will increase the security of the water supply and lessen the risk of emergency water shortages resulting from the fluctuating meteorological conditions. The Middle Lake alternative achieves this by adding more storage.

Salient Points:

- The Upper Garry System is a regulated water course and has been since the late 1800's with control structures at the outlet of each of Loch Garry, Middle Lake, and Mill Pond for the purpose of providing water to the Town.
- The target operating water levels at the control structures have been

adjusted over the years by the RRCA and the PUC on behalf of the Town most recently in 1995. The water levels also fluctuate as a function of precipitation.
- The current target operating water levels are 89.10 m in Loch Garry, 87.90 m in Middle Lake, and 81.60 m in Mill Pond. The proposed target operating water level is 88.30 m in Middle Lake with no changes proposed for Loch Garry or Mill Pond.
- Periodic water shortages particularly in recent years have resulted in rationing and have threatened the operation of businesses and the quality of life of the residents of the community. A disaster has been averted to date by water rationing and timely rainfalls.

3. Review progress since meeting of March 27, 2001.
   - Anne Bendig submitted a letter dated May 8, 2001, which essentially provided comments on the Draft Phase 2 Environmental Study Report and some guidance with respect to issues of concern to the MNR. It also listed names of qualified individuals to undertake a wetland inventory and assessment.
   - Comments have not been provided by the Wetland Committee. AB indicated that the Committee members may be able to provide insight into similar undertakings elsewhere in the Province. It is not necessary to await their input.
   - Official comments have not been received from Richard VanIngen, DFO with respect to fisheries concerns. Andy Code indicated that, in discussions with RVI, it was indicated that a permit is required for in-water and shoreline work including erosion protection and alterations to dams. It is unclear whether or not a fisheries survey will be required. The raising of the target water level will not likely constitute a HADD of Fish Habitat.
   - The ESR document must have due regard for the Provincial Policy Statement (Section 3 Planning Act, 1996) which is currently in the public consultation phase of the 5 year review process.
   - Bill Knight has attempted unsuccessfully to contact Vivian Brownell regarding the recommended wetland inventory and assessment. Subsequently Rob Snetsinger was contacted and asked to submit a letter proposal to undertake the work recommended by MNR.

4. Action Items:
   - It was agreed that Don Cuddy would be contacted by Anne Bendig to review the scope of work and by Bill Knight to review the scope of work, confirm availability and establish cost. He is recommended as the most qualified individual to undertake the required work (terrestrial) stated in points 7 and 8 of the AB letter of May 8 attached. He has some direct experience in the area of Middle Lake. Specific issues of concern are the fen, and any other rare and endangered species that may be impacted. It may be necessary to enlist the assistance of a hydrogeologist or hydrologist regarding the impact of a change in water level on the fen.
   - MNR and RRCA will contact R-VI to discuss the fisheries issue so that a clear direction in terms of further studies (if required) can be established. MNR and RRCA will share available fisheries data from Loch Garry with DFO to

facilitate the process.

- BK will prepare a schedule for the balance of the project.
- Mayor Franklin will arrange a meeting with the Minister of the Environment and the Minister of Natural Resources to expedite the approval process as soon as the report is finalized.
- Jean Marc Lalonde, M.P.P., will facilitate meeting arrangements and funding applications if required.

NEXT MEETING to be Confirmed:
**September 4, 2001 at 9:30 AM at the Township of North Glengarry.**

**DISTRIBUTION:** Client, Attendees

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## Supplementary – Removing Sediment from Mill Pond

The issue is the deteriorating water quality in Mill Pond.

- Escherichia coli (E coli) is reported at 850 in the vicinity of Island Park,
- Weed growth is extreme,
- The Water Treatment Plant intake is submerged in the silt deposition.

1. The Township will be inspecting the WTP intake and crib to ascertain the extent of the work that must be undertaken. Some minor clearing of the intake may be completed at that time.
2. The Township is considering having sediment removed from a large portion of the lake using suction equipment perhaps Norman Wright from Perth. Similar work has been done on other waterways. With a definite need to remove sediment around the intake, there will be an economy of scale to suction a larger area of the lake. Mill Pond was dredged in 1950 at the time Alexandria was converting from the Delisle River to the Garry system for its water supply.
3. MNR will speak to DFO about the potential impact on fisheries. It may be necessary to conduct an inventory. The work likely be considered a HADD (Harmful Alteration, Disruption or Destruction of Fish Habitat) and will require a permit.
4. There are 7 homes on Lochiel Street Island that are on private sewage systems. They may be contributing to the water quality issue and will be further investigated by the Township.

**Supplementary – Permit to Take Water (PTTW)**

The issue is the provision in the current PTTW that requires the spilling of not less than 30 L/sec over the Mill Pond Dam. At the time that the permit was issued, it was considered necessary to provide this flow for dilution of the Wastewater Treatment Facility discharge into the Delisle River.

1. The Town of Alexandria desperately needs the water. A near emergency condition exists resulting from lack of rainfall and depleting reserves in the upper Garry system.
2. An Emergency Water Management Plan has been implemented. Water rationing has been implement in the Town. Lawn watering is prohibited. Without a significant and sustained rainfall the situation will continue to worsen.
3. The Glengarry Golf Club has a PTTW, which allows them to take water above the dilution flow of 30 L/sec. If the flow in the Garry River is less than 30 L/sec at the Golf Club intake, then the Golf Club is not entitled to take any water. The Golf Club has made an application to take water from the Delisle River at the north end of the course.
4. Based on the Emergency Water Management Plan, the Township will reduce the dilution flow over the dam to increase storage in the lakes. An emergency application to amend the PTTW will be issued to MOE. Other permits to take water will have to be considered in the amending application along with the cumulative effects.

The Thompson Rosemount Group

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# MEETING RECORD

**Project:** Alexandria Water Management Study
**Project No:** 985194
**Meeting:**
**Date:** September 4, 2001
**Location:** Township of North Glengarry Office, Alexandria
**Present:** Bill Franklin, Mayor, North Glengarry (NG) FAX 525-1649
Leo Poirier, Clerk, NG
Morris McCormick, P.Eng., Manager, Water/Wastewater NG
Helen Jennings, Executive Assistant to Jean-Marc Lalonde FAX 613-446-6605
Roger Houde, P.Eng., Raisin Region Conservation Authority (RRCA)
Andy Code, (RRCA) FAX 938-3221
Richard VanIngen, Fisheries and Oceans Canada (DFO) FAX 925-2245
Anne Bendig, Biologist, MNR FAX 613-258-3920
Scott Smithers, Biologist, MNR
Rhéal Delaquis, Abatement Officer, Cornwall, MOE FAX 933-6402
Bill Knight, P.Eng., The Thompson Rosemount Group (TRG)

**Item** **DISCUSSION** **ACTION BY**

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1. Introductions by Mayor Bill Franklin
2. Review progress since meeting of July 31, 2001.
   - Don Cuddy submitted a proposal and scope of work to complete a Wetland Evaluation with particular emphasis on the Fen. John St. Marseille, P.Eng., Hydrogeologist, TRG, will accompany Don for part of 1 day to assist in the evaluation of the proposed water level adjustment on the groundwater regime. Mayor Franklin will bring the matter to Council for approval of the budget. AB indicated that MNR was satisfied that the scope of work proposed by Don Cuddy would meet their requirements.
   - Michelle Lavictoire, ESG International submitted a proposal and scope of work to complete a Fisheries Inventory and Habitat Assessment. It was agreed by MNR and DFO that a fisheries inventory was not required. Available survey data for Loch Garry (upstream of Middle Lake) and the Garry River (downstream of Mill Pond) along with anecdotal information would be representative. On that basis BK would contact ESG for a revised scope of work and budget. Mayor Franklin will bring the matter to Council for approval of the budget.

NEXT MEETING to be Determined

**DISTRIBUTION:** Client, Attendees

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**Supplementary – Removing Sediment from Mill Pond**

1. The Township will be inspecting the WTP intake and crib to ascertain the extent of the work that must be undertaken on September 5. Some minor clearing of the intake may be completed at that time. This work is not part of the Alexandria Water Management Study.
2. The Township is considering having sediment removed from a portion of the lake using suction equipment perhaps Norman Wright from Perth. The area of concern may extend from the inlet channel (at Lochiel Street) to the WTP intake and general area approximately 300 m in length.
3. Michelle Lavictoire, ESG International submitted a proposal and scope of work to complete a Fisheries Inventory and Habitat Assessment. It was agreed by MNR and DFO that a fisheries inventory was not required. Available survey data for Loch Garry (upstream of Middle Lake) and the Garry River (downstream of Mill Pond) along with anecdotal information would be representative. The survey should identify aquatic vegetation and fish habitat in the area of concern, the impact that may accrue, and mitigative measures (compensation). On that basis BK would contact ESG for a revised scope of work and budget. Mayor Franklin will bring the matter to Council for approval of the budget.
4. The Township may, subsequent to the Fisheries Assessment, submit an application to the RRCA for approval to remove sediment. The RRCA will process the application as an agent of the DFO. RVI noted that many applications for dredging around water intakes and marina basins are processed routinely by DFO and that this should be similar. RVI noted that the area should be "reasonable" and relevant to the water intake issue.

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# MEETING RECORD

**Project:** Alexandria Water Management Study
**Project No:** 985194
**Meeting:**
**Date:** July 17, 2002
**Location:** Township of North Glengarry Office, Alexandria
**Present:** Bill Franklin, Mayor, North Glengarry (NG)
Morris McCormick, P.Eng., Manager, Waterworks Dept. NG
Roger Houde, P.Eng., Raisin Region Conservation Authority (RRCA)
John Meek, (RRCA)
Richard VanIngen, Fisheries and Oceans Canada (DFO)
Anne Bendig, Biologist, MNR
Chris Burns, Biologist, MNR
Don Cuddy, Biologist, Consultant
Michelle Lavictoire, Biologist, ESG International Inc.
Bill Knight, P.Eng., The Thompson Rosemount Group Inc. (TRG)

**Item** **DISCUSSION** **ACTION BY**

1. Introductions by Mayor Bill Franklin

2. Presentation by Michelle Lavictoire
   0ML presented her report Middle Lake – Fish Habitat Assessment dated October 16, 2001.
   - The assessment concludes that there will be no lasting negative impacts on the fish habitat associated with the proposal to increase average water levels in Middle Lake and that there may be some net enhancements associated with the deeper water.

3. Presentation by Don Cuddy
   - DC presented his report Middle Lake Wetland –Assessment for Environmental Concerns Related to Preferred Alternative for Improving Town of Alexandria Water Supply Draft dated February 2002.
   - The assessment concludes that there will be short term impacts on the wetland associated with the proposal to increase average water levels in Middle Lake however, there should not be any lasting impacts provided that the operating plan accommodates a mid summer lowering of water levels to simulate natural conditions. Water level cycles (including deep draw downs up to 2 years) can be helpful to all species.
   - Monitoring of wetland boundary changes, water levels relative to the fen,

and the propagation of some rare plant species such as the eastern prairie fringed orchid is recommended. Transects through wetland and sedge areas could be established and monitored periodically (every 5 to 10 years).

- Nutrient levels in the lake are a more significant concern than water levels.
- The most notable plant species are found in the fen areas and not the wetland fringes.

4. Comment by (RVI): Fish kills have been associated with abnormally low water levels at the beginning of the winter. Winter fish kills can be reduced by increasing the water level in the fall before winter freeze up. This should be included in the Operational Plan.

5. Comment by RH: The current water level in Middle Lake is 88.1 m and was as high as 88.3 m recently and through much of the spring.

6. Comment by BK: A base flow of not less than 30 L/sec over the Mill Pond dam must be maintained in accordance with the Permit to Take Water. Alexandria's PTTW is limited to 65 L/sec. (5,616 $m^3$/d). The WTP is rated at 8,200 $m^3$/d.

7. The reports as presented by Michelle and Don were accepted by all. It was agreed that the next steps would involve:
   - MNR and DFO would provide official comments to the reports and the Draft ESR. AB RVI
   - ? The development of an Operational Plan (Draft for review by all) to be prepared by the RRCA, RH
   - Some shoreline erosion protection near the Kenyon Dam should be undertaken before winter 2002 to facilitate a fall water level increase. An access road may have to be raised. The RRCA will prepare the permit applications for the Township and provide a budget estimate for the work, RH
   - A Council meeting followed by a public meeting is required to seek approval to implement the recommendations. TRG will prepare the presentation material and the Township will determine the appropriate dates for meetings, BK MM
   - Improvements to the channel downstream of the Kenyon Dam will not be implemented in the initial phase. Given that the outlet capacity is fixed by the Kenyon Dam Road culvert, downstream channel work may not be required. It will be monitored by the RRCA. RH

8. Operating regime recommendations include:
   - Spring runoff capture is required for the water supply,
   - Middle to late summer water level draw down is desirable for wetland speicies,
   - Late fall runoff capture is required to sustain the winter water supply and provide deeper water for the fishery.

9. Other Notes:
   - The topo mapping in the Draft ESR should be corrected in the area of the Kenyon Dam. The floodplain and 88.3 m target water level should not

extend downstream.

- TRG will confirm the existing volume of Middle Lake at 87.9 m and the volume increases associated with water level increases in 0.1 m increments to 88.3 m.
- MNR may be able to provide some funding assistance for a monitoring program especially for "species at risk" such as the eastern prairie fringed orchid.

NEXT MEETING to be Determined by the Township.

**DISTRIBUTION:** Client, Attendees

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# MEETING RECORD

**Project:** Alexandria Water Management Study
**Project No:** 985194
**Meeting:**
**Date:** October 24, 2002
**Location:** Township of North Glengarry Office, Alexandria
**Present:** Bill Franklin, Mayor, North Glengarry (NG)
William Hagen, Deputy Mayor, NG
Morris McCormick, P.Eng., Manager Waterworks Dept., NG
Bill Knight, P.Eng., The Thompson Rosemount Group Inc. (TRG)

**Item** **DISCUSSION** **ACTION BY**

1. Meeting Record of July 17, 2002 approved.

2. Correspondence from MNR – Burns August 6, 2002, correspondence from MNR – Bendig October 7, 2002, and correspondence from DFO – Van Ingen August 7, 2002 was filed with the Committee.

Shoreline Work: RRCA has inspected the properties on Middle Lake, met with some property owners and is preparing an application to MNR on behalf of one owner (Farrell) for shoreline alteration. Downstream erosion protection continues to be a strong recommendation by RRCA relative to Alternative I (and others).
Council Presentation see Item 3.
Lake Volumes: A table (which will be incorporated into the final report) was presented which relates lake volumes to surface water elevations.
Operational Plan Modifications: RRCA will prepare a new operational plan for Middle Lake for review by the Township, MNR, and the public provided that Council adopts Alternative I after the public consultation.
Species at Risk Funding: The Township will pursue funding from MNR for monitoring provided that the Council adopts Alternative I after the public consultation.

3. Waterworks Committee Presentation: TRG presented a summary of the Draft Report dated December 2000 along with the Cuddy Report and the ESG International Report to the Committee (Township Council members) on September 4, 2002. The Committee adopted the report in principle with a request to include an additional alternative as brought forward by Morris McCormick being an off-line quarry-type reservoir to be located near Mill Pond.

4. Other Correspondence: It was generally agreed by Committee members that the reservoir alternative that the Waterworks Committee asked to be included is

a new alternative and that it would be evaluated and presented to the public consistent with the other alternatives.

5. Alternatives H1 and H2 (new): A preliminary evaluation was presented to the Committee and reviewed. At was agreed that revisions would be circulated to Committee members for comment before the public meeting. It was also recommended that one further reservoir alternative be considered that being (H-3) an existing quarry in the area with a pipeline connection to Alexandria. Raising the water level upstream of Lochiel Street was discussed. Limited elevation is available without risking overtopping and/or basement flooding. It would also require similar evaluations as were conducted for Alternative I.

6. Schedule to Completion: The Final Report will be completed and presented after the Public Meeting which is scheduled for November 14, 2002. Presentations at 2:00 pm and 7:00 pm will be followed by open house format (2:00 to 4:00 and 7:00 to 9:00). The PowerPoint presentation material will be circulated to the Committee for review before the public meeting. Display boards will also be prepared. BK will prepare the Notice which will be submitted to the Glengarry News (2 issues) by Leo Poirier. BK

The Final Notice will follow the completion of the Final Report and will include a circulation to agencies.

7. Other Business: Shoreline protection downstream of Kenyon Dam and Mill Pond Dam should be incorporated in the recommendations associated with Alternative I (and others) involving upstream storage.

**DISTRIBUTION:** Client, Attendees

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**M.S. Thompson & Associates Ltd.**

Ministry of Natural Resources
Postal Bag 2002
Kemptville, Ontario
K0G 1J0

February 22, 2001

Attn: Anne Bendig, Biologist

Re: Alexandria Water Supply Study,
Garry River System

Dear Anne:

On behalf of the Steering Committee for the Alexandria Water Supply Project, we are forwarding one (1) copy of the DRAFT *Alexandria Water Supply Class Environmental Assessment Phase 1 & 2 Report* dated December 7, 2000 for your review and comment. Our intention at this stage is to conduct pre-consultation with the Ministry of Natural Resources and the Fisheries and Oceans Canada prior to the official mandatory public consultation associated with Phase 2 of the Class EA Process for municipal projects.

We thank you for agreeing to meet with us to review the DRAFT Report and in particular the preferred alternative for securing the water supply for the Town of Alexandria. The meeting has been set for **Tuesday March 27, 2001 at 10:00 AM in the Cornwall Office of the Raisin Region Conservation Authority.**

The preferred alternative as described in the Report includes:

> *a long term alternative involving a pipeline to the St. Lawrence River; and an immediate term alternative involving modifications to the Garry River System Operational Plan. Concurrently, the municipality is encouraged to continue a water reduction strategy to more efficiently manage the limited resource.*

Modifications to the Garry River System Operational Plan include:

- *The 1:100 year flood level of 88.44 remains unchanged for Middle Lake.*
- *The target operating level for Middle Lake will be 88.3m. Refer to drawing C.01 which illustrates the levels and their respective flood areas.*
- *Official Plan and Zoning By-law amendments may be required to preclude development around Middle Lake within the 1:100 year flood plain and in low lying areas adjacent to the flood plain and outlet channel.*
- *Property acquisition and/or property protection may be required adjacent to Middle Lake and the outlet channel where development has taken place within the 1:100 year flood plain and where higher operating levels increase the risk of flood damage.*
- *It may be necessary to raise some land and provide shoreline erosion protection for properties near the east end of Middle Lake. Improvements to the outlet channel including erosion protection will also be required.*

- *The data acquisition and level monitoring system maintained and operated by the Raisin Region Conservation Authority has been upgraded and is adequate.*

The Steering Committee recognizes that there will be impacts on the natural environment associated with this proposal. We also believe that there can be significant benefits to the natural environment. And of course reducing the risk of a serious water shortage for Alexandria is critical.

In addition to reviewing the report with you, the Committee is interested in exploring a partnership opportunity that will secure the water supply for Alexandria and at the same time increase the long term protection and enhancement of the wetland perhaps in the public domain.

We look forward to our meeting. If there are any questions regarding the foregoing, please contact the undersigned.

Sincerely,

**The Thompson Rosemount Group**

William A. Knight, P. Eng.
Senior Municipal Engineer

c. Bill Franklin, Mayor, Township of North Glengarry
Roger Houde, P. Eng., General Manager, RRCA

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Postal Bag 2002
Concession Rd.
Kemptville, ON
K0G 1J0

September 10, 2002

Bill Knight
Thompson Rosemount Group Inc.
1345 Rosemount Ave.
Cornwall, On.
K6J 3E5

Dear Bill,

Subject: **Alexandria Water Management Study**

Listed below are my comments following the review of Michelle Lavictoire's report –Fish Habitat Assessment ESG International Inc. dated October 16, 2001 and Don Cuddy's report – Middle Lake Wetland – Assessmenr for Environmental Concerns Related to Preferred Alternative for Improving Town of Alexandria Water Supply Draft dated February 2002 and the minutes of the July 17 meeting at the Township of North Glengarry office:

1) It is understood that the Township of North Glengarry proposes to increase the normal operating level in Middle Lake from 87.9 m ASL to 88.3 m ASL without any structural modifications to the existing dams or outflows.
2) An Operational Plan will be developed that will include a mid summer lowering of water levels to simulate natural conditions. This will reduce impacts on the wetland and the fen as recommended by Don Cuddy. MNR will have the opportunity to review the Operational Plan and comment on it.
3) To ensure that this change in the operational plan is not negatively impacting on the wetland or the fen, the township will ensure that transects will be set up in the fen to monitor changes in wetland species, wetland boundary changes and the presence of rare species such as the white fringed orchid. These transects will be monitored once every 5 years. MNR will try and provide some funding assistance for "species at risk" monitoring.
4) There will be no changes made to the channel downstream of Kenyon dam.
5) The landowners that require shoreline erosion protection near the Kenyon dam will be advised to apply for work permits from MNR before conducting the work.
6) The township will continue to seek a long term solution for their water shortage problem as recommended in the Environmental Assessment.

If the above is implemented, MNR will support this project if we are in support of the new Operational plan following its review.

If you have any questions regarding the above, please contact me.

Yours truly,

Anne Bendig
Biologist
Kemptville District

| | |
|---|---|
| Tel. | 613-258-8303 |
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| e-mail: | anne.bendig@mnr.gov.on.ca |

Postal Bag 2002
Concession Rd.
Kemptville, ON
K0G 1J0

May 8, 2001

Bill Knight
M.S. Thompson & Assoc. Ltd.
1345 Rosemount Ave.
Cornwall, ON
K6J 3E5

Subject: Alexandria Water Supply Study, Garry River System

Dear Mr. Knight,

I am sorry for the delay in responding with my comments but I have been waiting for our Provincial wetland committee to comment on this proposal. I have not yet received their comments but I will list the Kemptville District concerns and forward the committees concerns once I receive them. Listed below are the Districts concerns following a review of the DRAFT Alexandria Water Supply Class Environmental Assessment Phase 1&2 Report and the meeting that occurred March 27, 2001 to discuss the report.

1) The MNR has a interest with respect to the impact of the proposed works on wetland and other natural features. While we recognize that the undertaking is being carried out under the Environmental Assessment Act, we note that intent of the Provincial Policy Statement should be considered as part of the EA process. This is stated on page 11 of the Provincial Policy Statement. In this regard we are concerned with any proposed site alteration in Provincially Significant Wetlands south and east of the Canadian Shield. Site alteration is defined as filling, grading and excavation that would change the landform and natural vegetative characteristics of the site and in our opinion corresponds to the work you are proposing in terms of channelization and shoreline stabilization. This type of work would require filling which is site alteration. Since this work would occur in a Provincially Significant wetland(Loch Gary Wetland), this would be a contrary to the intent of provincial policies in wetlands. We ask that these impacts be clearly identified and reflected in the weightings of the considerations which determine your preferred solution.
2) Modifying the Garry River Operational Plan would require approval under the Lakes and Rivers Improvement Act since channelization would be required below the dam and some modifications to the dams.
3) Page 7 – Indicates that MNR is supplying 22.7% of funding source. Should this not be the Raisin Region CA instead?

4) Figure 4.2 Environmental effects of alternatives. I do not agree how the various options were rated for fish, aquatic, wildlife and vegetation or terrestrial vegetation and wildlife. I need to know the criteria used to determine whether an impact was considered less severe, more severe, no impact etc.
5) Page 40 and 42 – Ottawa River and St. Lawrence River water pipeline – should also include impact on wetland crossings and wildlife habitat in addition to stream crossings and fish habitat.
6) Page 43 – Alternative G: Increase Storage Volume in Middle Lake. Must also consider the long-term impacts and changes to habitat.
7) Page 48 - Alternative I: Modify Middle Lake Operational Plan. Report states that "wetland habitat may be impacted by the seasonal changes in water levels". This would require a detailed inventory of the wetland species presently occurring in the area that would be affected by the increased water levels to determine the extent of the impact. In addition, the boundary of the wetland in this location would also have to be verified since this wetland was evaluated in 1984 and the boundary may have changed since that time. This would have to be done by a consultant that has been certified in MNR's Version 3 Wetland Evaluation Course and established expertise in identifying vulnerable, threatened and endangered species such as Vivian Brownell, Ron Huizer at Jacques Whitford, Don Cuddy, Dan Brunton or Rob Snetsinger at Ecological Services.
8) Additional evaluation is required to determine if this option (Modify Middle Lake Operational plan) would impact on Lost Lake Fen. The location of the new flooded area is not adequate since groundwater will be impacted by this proposal and possibly affect the fen.
9) Page 48 – predicts that a 30-50 cm fluctuation from May 31 to September 1 annually. This could impact fish spawning and the success of egg development.
10) Page 53 – 5.9 Under evaluation of Modify Middle Lake Operational Plan do not agree with statement " environmental impacts in terms of habitat and ecosystems are both positive and negative in the short term due to higher levels sustained for longer periods of time". Further assessment is required before a statement like this can be made.
11) Table 5.1 page 53. This table shows that Alternative I is schedule C in this table and on page 58 it says it is schedule B.
12) Page 57 under conclusions – do not agree with the following statement under the option of modifying Garry River System Operational Plan – "Natural environmental impacts are likely negligible and in fact, benefits in the form of a more sustainable fish habitat and increased shoreline littoral zone will occur."
13) In relation to the option of building a pipeline to the St. Lawrence River it should be noted that the Great Lakes Charter must be considered. In terms of the Great Lakes Charter, Ontario committed to provide prior notification and to consult with Great Lakes States and Quebec on any proposal for a diversion (ie. out of the Great Lakes – St. Lawrence R. basin upstream of Trois Rivieres Quebec or between Great Lakes watersheds) or consumptive use (ie. that portion of a water taking that evaporates or is incorporated into products – this is estimated under the Charter as 10-15% of the withdrawal for a municipal water use) that exceeds 19 million litres per day average in any 30 day period.

If you have any questions concerning the above, please do not hesitate to call me.

Yours truly,

Anne Bendig
Biologist
Kemptville District

| | |
|---|---|
| Tel. | 613-258-8303 |
| Fax | 613-258-3920 |
| e-mail: | anne.bendig@mnr.gov.on.ca |

cc. Andy Code, RRCA
Richard Van Ingen, DFO

Filename: c/oldpc99/ Environmental Assessments/ Letter to Bill Knight re EA for Town of Alexandria water supply.

THOMPSON ROSEMOUNT Group

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January 29, 2003

Lenore Corey
19896 Marcoux Road
Alexandria, Ontario
K0C 1A0

Re: Alexandria Water Supply Study,
Middle Lake Alternative

Dear Mrs. Corey:

On behalf of the Steering Committee for the Alexandria Water Supply Project, we are responding to your letter of December 1, 2002 addressed to Mr. Morris McCormick in an effort to provide clarification.

The Township has been conducting an Environmental Assessment to examine alternatives that would secure an adequate water supply for the Town of Alexandria for the next 20 years. The process has been completed and the preferred immediate-term alternative as described in the draft Environmental Study Report is:

- *Modify the Garry River Operational Plan as it relates to Middle Lake to increase the capability for water supply storage. The target operating level for Middle Lake will be 88.3m geodetic datum,*
- *The 1:100 year flood level of 88.44 remains unchanged for Middle Lake. Official Plan Amendments may be required to preclude development around Middle Lake,*
- *Raise some land and provide shoreline erosion protection for properties near the east end of Middle Lake,*
- *Provide channel stabilization, shoreline protection downstream of Kenyon Dam and Mill Pond Dam, upgrades to Mill Pond Dam,*
- *Provide some seasonal variation in water levels if possible,*
- *Minimize nutrient loadings to the lake from septic systems and adjacent land,*
- *Conduct wetland monitoring as recommended.*

While the long-term alternative has not been confirmed, it may involve a pipeline to the St. Lawrence River, however, due to the substantial capital cost, it is not achievable in the foreseeable future.

Presently, the Raisin Region Conservation Authority (RRCA) operates the Garry River System control structures (Loch Garry Dam, Kenyon Dam, Mill Pond Dam) under an Operational Plan that was adopted in 1990. The target operating level in the existing Operational Plan is 87.9m geodetic datum. The proposed target operating level is 88.3m which is 0.4m (15.6 inches) higher than the current target operating level. The target operating level is the level at which the operating authority attempts to stabilize the system subject to available precipitation and runoff. Clearly, the water level in the lakes outside the spring runoff period is largely a function of rainfall and historically the levels decline throughout the late spring and summer.

Normally during the spring runoff or during periods of extreme rainfall, the operating level in Middle Lake has been above 87.9m and often (almost every spring) at or above 88.3m for a period of time until the water level can be reduced to 87.9m by discharging through the dam. If there is an abundance of spring runoff, the lake level may not achieve 87.9m until late spring. Managing the runoff rate to control flow in the Garry River and to balance the levels in all three lakes is effectively undertaken by the RRCA using sophisticated monitoring equipment along with a Provincial meteorological and flood forecast system.

Capturing and retaining some of the spring runoff for a longer period of time is the objective of the modifications to the Operational Plan. This alternative will provide some additional water for the Town of Alexandria especially for abnormally dry summers. Under the revised Operational Plan, the Middle Lake target level will be 88.3m and, provided that there is sufficient runoff, we expect to achieve that level each spring. As water is used by Alexandria or evaporates from the lakes, the level will decline as it has historically throughout the summer.

A detailed Operational Plan is being prepared by the RRCA to reflect the modifications described above.

If there are any questions regarding the foregoing, please contact the undersigned.

Sincerely,

**Thompson Rosemount Group**

William A. Knight, P. Eng.
V.P., Municipal Department

c. Bill Franklin, Mayor, Township of North Glengarry
Roger Houde, P. Eng., General Manager, RRCA

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Alexandria, Ont.
December 1st, 2002

Mr Morris McCormick,
Alexandria Town Council.

Dear Sir:-

Re: The Raising of the level
of Middle Lake

This is further to our telephone conversation of Nov. 28th 2002

As home owners backing on Middle Lake, we were surprised to find out about the decision to raise the level of the lake.

As we now know, a notice in the Glengarry news told of a meeting that would take place to discuss this issue. Unfortunately we did not purchase the local paper that week and so we were completely unaware of what was going on.

One of our neighbours happened to see the notice and attended the meeting. Upon calling said neighbour he told us that it was already "Fait accompli". We wonder why we, the approximate dozen or so home owners backing on the lake were not notified. Of what interest would the average home owner in Alexandria have regarding Middle Lake? Probably most of them don't even know it exists.

For the first time in the eleven years we have lived on Marcoux Road we were not able to walk on the lower portion of our property due to flooding. We put it down to the heavy spring precipitation. Now we read that the level will be raised a further 16 inches, (man the life boats),

Upon calling city council we were given conflicting information. What is going on?

Would the council please have the courtesy to inform all home owners on Middle Lake of exactly how the flooding will effect the shoreline in the future.

Thank you for your consideration.

Yours truly,
Lenore Corey

Lenore Corey
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Alexandria, Ont K0C 1A0

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