Glengarry Golf & Country Club
Irrigation Water Supply and Storage Assessment

May 2002

RJB File No. PO01112

Prepared for:
Glengarry Golf & Country Club Ltd.
20511 McCormick Road
Alexandria, Ontario
K0C 1A0

Prepared By:
Burnside Golf Services
A Division of R. J. Burnside & Associates Limited
1272 Wellington Street
Ottawa, Ontario
K1Y 3A7

Burnside Golf Services
A DIVISION OF R. J. BURNSIDE & ASSOCIATES LIMITED
SECURING PERMITS AND APPROVALS FOR THE GOLF INDUSTRY

May 9, 2002

Raisin River Conservation Authority
P.O. Box 429
Cornwall, Ontario
K6H 5T2

Attention: **Mr. John Meek**
Planner

Re: **Glengarry Golf & Country Club**
Permit To Take Water Application
Irrigation Water Supply and Storage Assessment
BGS File No.: PO01112

Dear Mr. Meek,

Further to conversations with yourself and others at the Raisin River Conservation Authority in January of this year, we have prepared this report for your review in support of the Permit To Take Water application made by the Glengarry Golf & Country Club. As we discussed, in their cursory review of the application, the Ministry of the Environment requested letters of confirmation of discussions with other concerned agencies such as the RRCA, MNR and DFO regarding their possible concerns about the proposed water taking and storage facilities. → TWP OF NORTH GLENGARRY SHOULD ALSO BE CONSULTED!

This report was prepared to address the Authority's concerns regarding the new storage pond on the golf course and the proposed water taking from the Delisle River for the purposes of turf irrigation. Further, it is requested that the Authority provide comment, to the extent possible, on the potential MNR and DFO concerns not fully addressed by this report.
→ THESE AGENCIES SHOULD PROVIDE THEIR OWN COMMENTS!

The following information is provided in this report::

- site background and existing conditions,
- existing water supply and withdrawal for irrigation,
- irrigation and water conservation practices,
- proposed water supply, withdrawal and storage,
- analysis of historical Delisle River flow and local precipitation data,
- assessment of Delisle River and storage pond supply,
- golf course irrigation supply and demand sustainability analysis,
- conclusions and recommendations.

We trust that this report addresses the Authority's concerns. Please contact the undersigned if you have any questions, comments or suggestions.

Yours truly,

Burnside Golf Services
A Division of R. J. Burnside & Associates Limited

Jeremy Blair, P.Eng.
Water Resources Engineer
JB:mm C:\My Documents\Projects\PO01112\corresp\2002\0509MeekCover.wpd

attach.

c. Mr. Ian McKay, Manager, Glengarry Golf & Country Club
Mr. Nicolas Murphy, Permit To Take Water Coordinator, MOE Kingston

Table of Contents

List of Figures

List of Appendices

1.0 Background, Present and Proposed Conditions

1.1 Site Location

The Glengarry Golf & Country Club is located on McCormick Road in the Town of Alexandria. The golf course was established in 1961, originally as a 9-hole facility. The course was expanded to 18 holes in the 1980's. The Garry River, the Delisle River and the Marcoux Municipal Drain flow through the property. The approximate location of the property is shown on Figure 1.

1.2 Present Irrigation Supply

At present, water for irrigation of the golf course is pumped "on-demand" from the Garry River. The golf club has a Permit To Take Water for this operation (refer to MOE No. 89-P-4005 in Appendix 1).

As per an MNR directive put in place in the 1980's, the golf course is not permitted to draw water from the river when its flow drops below 30 L/s. This threshold is maintained by an "electronic eye" sensor installed in a notched weir located at a nearby culvert opening. The sensor continuously measures the flow and transmits information to the pump station. The pumps will not function if the sensor detects that the river flow is less than 30 L/s.

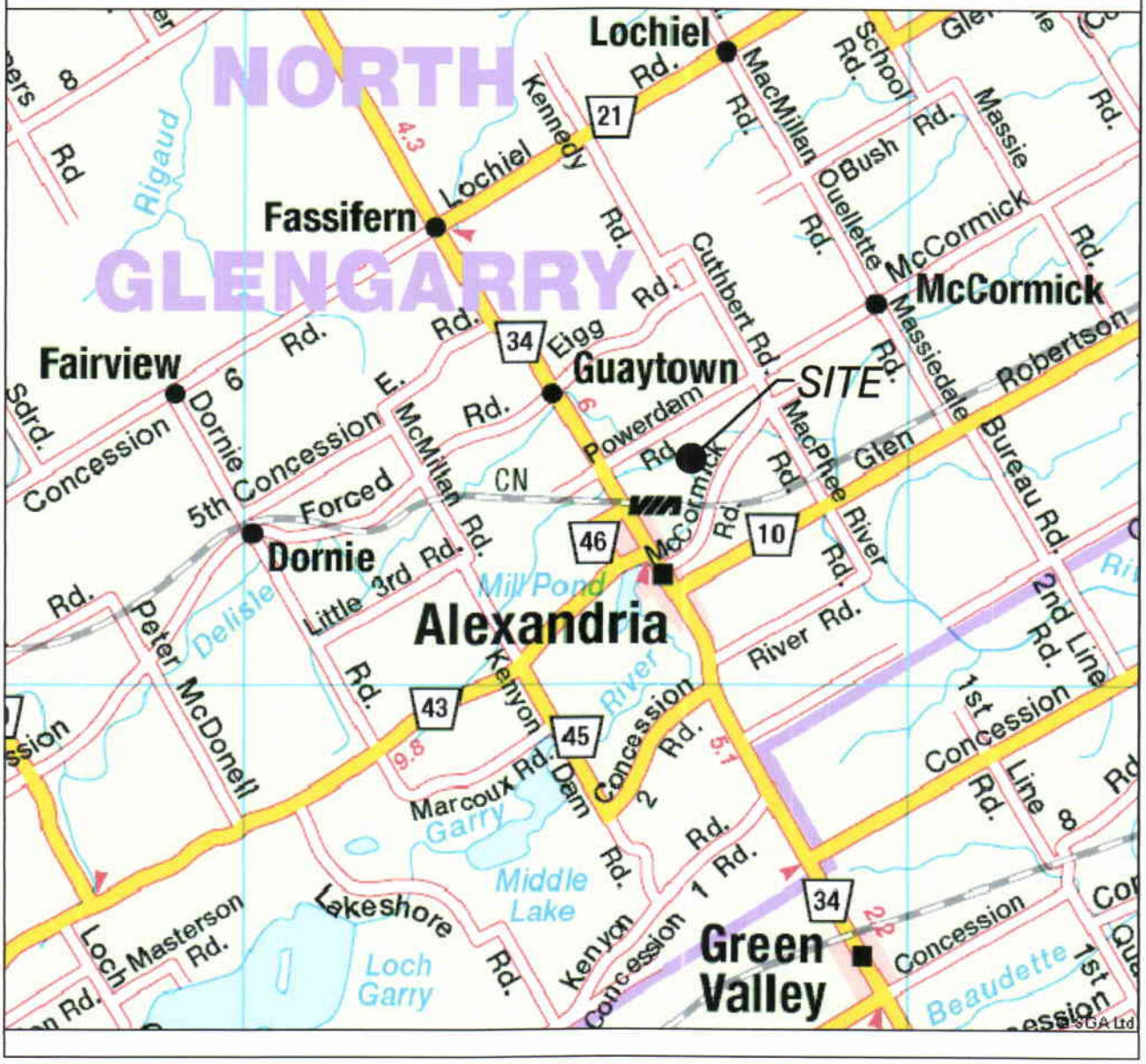
In July 2001, the flow in the Garry River at the golf course was reduced to a trickle, most likely due to the extreme drought experienced in the region in 2001, which effectively left the golf course without an irrigation supply for the remainder of the season. In reaction to this situation, the golf club constructed a dug-out storage pond approximately 50 metres south of the Marcoux Drain and about 150 metres south-west of the Delisle River. The approximate dimensions of the pond are 45 m x 45 m x 3.5 m deep, with an estimated storage volume of 6140 m^3 (1.35 million Imperial gallons).

1.3 Proposed Irrigation Supplemental Supply and Storage

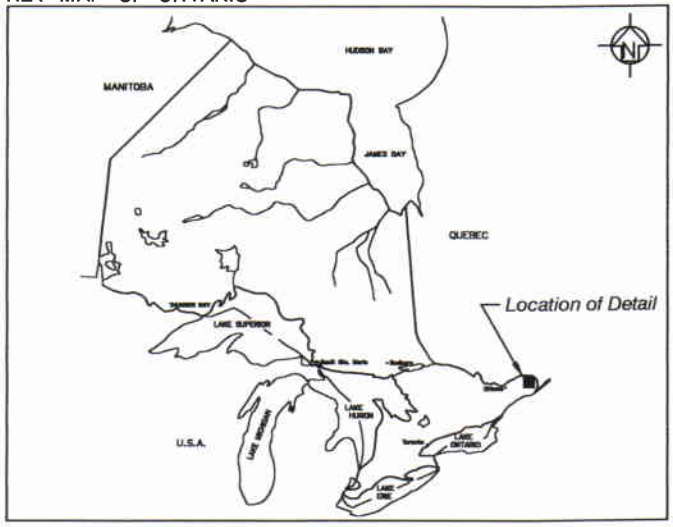
The golf course proposes to install a pump (approx. 600 Igpm) at the pond capable of irrigating the golf course during periods when water cannot be pumped from the Garry River (i.e. to provide secondary, "back-up" supply). The pond will be fed primarily by site runoff during snow melt and large precipitation events. If needed, and if available, water will be pumped to the pond from the Garry River between irrigation cycles.

The golf course also proposes to install a small pump (100 Igpm) at the Delisle River to potentially enable the replenishment of the pond when the Garry River flow is low.

Figure 2 identifies the locations of the present water taking from the Garry River, the proposed water taking from the Delisle River and the new dugout pond.



KEY MAP OF ONTARIO



MAP REFERENCE:
ONTARIO TRANSPORTATION MAP SERIES

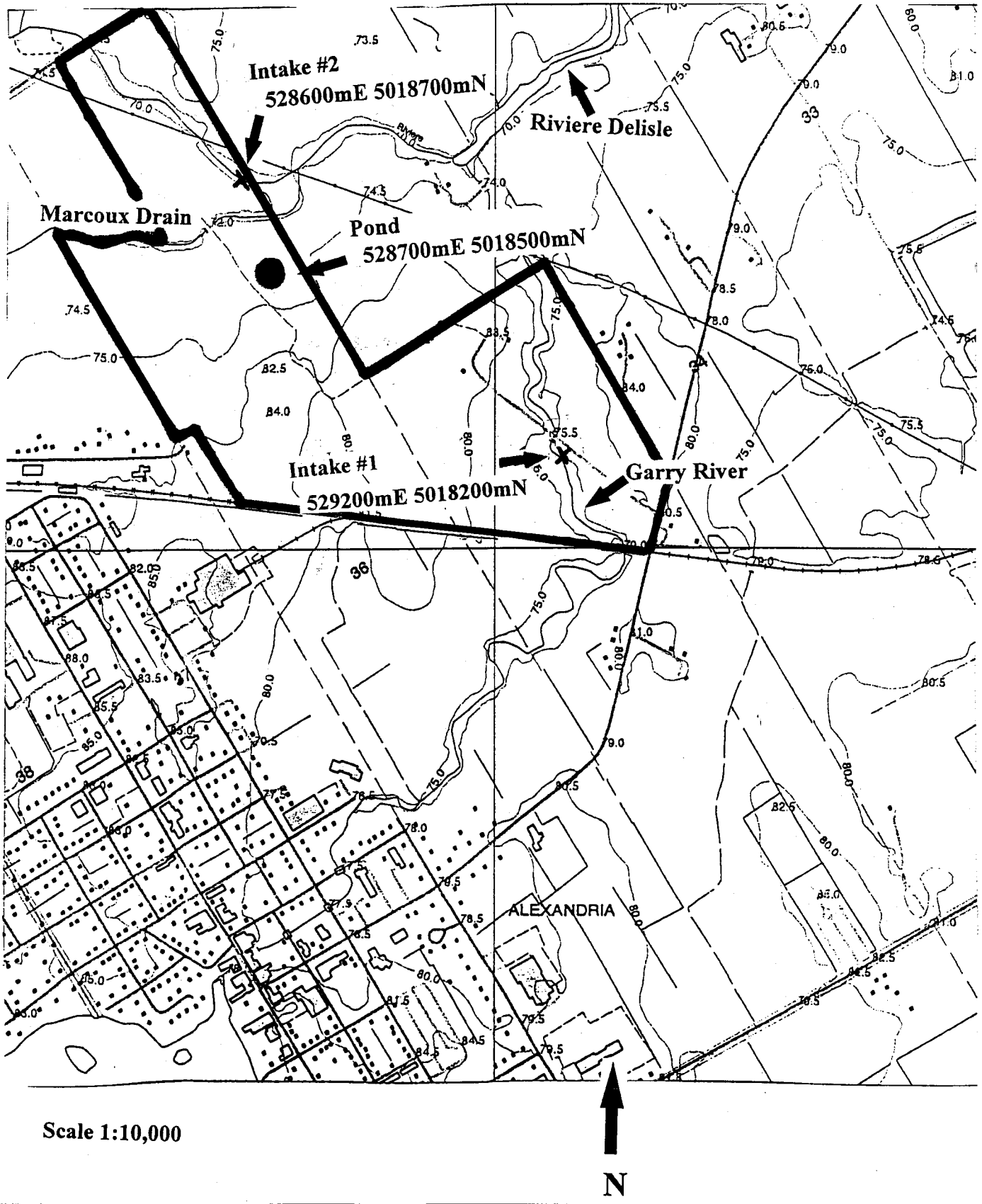
SITE LOCATION

GLENGARRY GOLF & COUNTRY CLUB

Burnside Golf Services
A DIVISION OF R.J. BURNSIDE & ASSOCIATES LIMITED
ENGINEERS – HYDROGEOLOGISTS – ENVIRONMENTAL CONSULTANTS
1272 WELLINGTON STREET, OTTAWA, ONTARIO K1Y 1A7
TELEPHONE: 613-563-0276 FAX: 613-563-3377

FIGURE 1
MAY/02

PO01112FIG1.DWG



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DATE FEB. 2002 SCALE N.T.S. JOB No P001112

GLENGARRY GOLF & COUNTRY CLUB

SITE PLAN

FIGURE 2

2.0 Irrigation and Water Conservation Practices

2.1 Irrigation Regime

Irrigation on the golf course is limited to the fairways, tees and greens. Due to the differences in grass type and height and underlying soils, the turf water demands vary on these areas. approximate areas and weekly turf demand volumes for the fairways, tees and greens are as follows:

(i)	Fairways:	38 acres (15.4 ha)	x 0.75 inches/week	= 2934 m^3 (645,480 gal) /wk
(ii)	Tees:	1 acre (0.4 ha)	x 1.25 inch/week	= 127 m^3 (27,940 gal) /wk
(iii)	Greens:	1 acre (0.4 ha)	x 1.5 inches/week	= 152 m^3 (33,440 gal) /wk

Based on the above, the average turf demand to maintain its health is 3213 m^3 (706,860 gal) or 0.78 inches (19.8 mm) per week. The turf demand is met by precipitation and irrigation. During seasons with higher than normal amounts of rainfall the need for irrigation to meet the turf demand is obviously reduced. During seasons with lower than normal amounts of rainfall then the health of the turf will rely more heavily on irrigation. The typical watering schedule employed at the golf course is as follows:

(i)	Fairways:	once a week
(ii)	Tees:	every 3rd day
(iii)	Greens:	every 2nd day

2.2 Water Conservation Practices

During times of drought and limited water supply, the superintendent may be unable to provide the turf with its optimal water supply and subsequently irrigation is reduced to areas of high priority only (i.e., the greens receive priority over the tees and fairways). During previous drought periods, the golf course has temporarily ceased irrigation of the tees and fairways and has reduced the frequency of the irrigation of greens to once per week. Extended periods of reduced or suspended watering will ultimately jeopardize the health of the turf. However, the turf can survive through short-term drought periods.

To minimize its reliance on natural water supplies the golf course utilizes many water conservation practices to reduce irrigation demands, including:

- Wetting agents are used to retain moisture on the turf and soil to essentially increase the normal coverage and benefit of the irrigation water.
- Irrigation is limited to the tees greens and fairways - the areas of rough are not watered.
- Irrigation occurs after sunset or before sunrise to minimize evaporation losses.

- The turf consists of drought resistant grasses that are hardier and require less water than common grasses.
- Drainage tiles are directed to the storage pond where possible, to promote re-circulation of runoff water.

3.0 Assessment of Delisle River and Storage Pond Supply

As described in Section 1.0 above, the golf course is proposing to improve its water management system by introducing storage (new pond) and a supplemental supply (Delisle River) to its existing supply (Garry River). The sustainability of the Delisle River as an irrigation supply to the golf course was assessed, as requested by the Conservation Authority. Although it is proposed that the Garry River will be the primary irrigation source for the golf course, for the purposes of analyzing the Delisle River as a supply, it was assumed that the Garry River will not provide an irrigation source.

3.1 Water Budget Model

A spreadsheet based water budget model was created to perform the assessment. Based primarily on historical local precipitation and river flow data, the model assesses on a continuous, daily basis the available water supplies, volumes of taking, irrigation demand, pond evaporation losses, remaining storage and missed or reduced irrigation days. The following inputs were used in the model:

- historical daily precipitation data collected from Environment Canada AES Cornwall Station No. 6101901, January 1985 through October 1995;
- historical daily Delisle River flow data collected from Water Survey of Canada Station 02MC0281 "Riviere Delisle near Alexandria", Lat: 45 19 37 N, Long: 74 38 39 W, D.A. = 85.4 km^2, January 1985 through October 1995;
- average monthly pond evaporation rates taken from 1994 MOEE Stormwater Management Planning and Design Manual;
- typical irrigation volumes/cycles provided by golf course superintendent.

Water Taking Threshold in Delisle

The model takes into account a reasonable water taking threshold for water taking from the Delisle River. It is proposed that a maximum of 10% of the river flow will be pumped from the Delisle River. The proposed pumping rate is 100 imperial gal/min (or 7.6 L/s). Therefore the river flow must be at least 76 L/s for water taking to occur. The limiting of water taking to 10% of the river flow is the typical threshold applied on many rivers and creeks in Ontario.

Runoff To Pond

WAS A PERMIT OBTAINED FOR THIS NEW POND?

The water budget model also estimates the daily runoff to the new dugout pond based on the precipitation data, its catchment area, the general soil and vegetative conditions, and the typical seasonal runoff coefficients for those conditions. Printouts of input and output from the model are attached in Appendix 2.

3.2 Precipitation, Delisle Flow and Pond Capture

Key environmental statistics were gleaned from the model and from analysis of the historical data. These include:

- local precipitation characteristics,
- Delisle River flow characteristics,
- expected daily and annual water withdrawals from the Delisle River,
- expected annual runoff and precipitation volume collected by storage pond.

Precipitation Characteristics

Below are the local precipitation characteristics based on data gathered at the Cornwall station between January 1985 and October 1995:

- mean annual precipitation = 982 mm
- lowest annual precipitation on record = 831 mm (1987)
- highest annual precipitation on record = 1099 mm (1990)
- mean summer precipitation = 356 mm (summer: Jun. 1st to Sep. 30th)
- lowest summer precipitation on record = 276 mm (1991)
- highest summer precipitation on record = 469 mm (1986)

Delisle River Flow Characteristics

Below are the Delisle River flow characteristics based on data compiled at the "Riviere Delisle near Alexandria" station between January 1985 and December 1995. The station is located immediately upstream from the golf course.

- maximum daily flow on record = 23.8 m^3/s
- minimum daily flow on record = 0.001 m^3/s
- mean annual flow = 1.029 m^3/s
- median annual flow = 0.340 m^3/s
- mean summer flow = 0.251 m^3/s (summer: Jun. 1st to Sep. 30th)
- median summer flow = 0.099 m^3/s
- mean annual discharge = 32.3 million m^3
- minimum annual discharge = 18.5 million m^3
- mean summer discharge = 2.5 million m^3
- minimum summer discharge = 0.5 million m^3

Water Withdrawals from Delisle River

The ability of the Delisle River to provide a sustainable irrigation supply, based on a historical period of record (1985-95), was analysed by the water budget model. The expected maximum daily volume pumped from the Delisle as well as the expected range and average number of days and total volume withdrawn are provided below. *(Note that, as stated previously, this analysis was based on the hypothetical condition that water is not withdrawn from the Garry River in order to assess the Delisle River. Therefore, the following water withdrawal numbers are "worst-case".)*

- maximum daily volume = 657 m^3 (144,460 imp. gal)
- average daily volume = 360 m^3 (79,200 imp. gal)
- average days per year = 122 days
- average volume per year = 44,000 m^3 (9.7 million gal)
- range of days per year = 80 to 160 days
- range of annual volume = 28,000 to 58,000 m^3 (6.1 to 12.7 million gal)
- % of minimum annual discharge = 0.2 %
  (44,000 m^3 ÷ 2.5 million m^3)
- % of minimum summer discharge = 8.8 % (assuming all withdrawals occur between Jun. 1st and Sep. 30th)
  (44,000 m^3 ÷ 0.5 million m^3)

The above analysis indicates that the Delisle River has an adequate supply (discharge) to support withdrawals by the Glengarry Golf Club. In a worst case scenario, which assumes no withdrawals from the Garry River, the golf club may withdraw as much as 8.8% of the river's summer discharge. During most years the actual withdrawals will be much less than this percentage.

Annual Runoff and Precipitation Volume Collected by Storage Pond

The storage pond has been located at a low point on the site and is expected to collect runoff from a watershed of about 10 hectares. Where possible, tile and swale drainage systems in the golf course will be directed to the pond. Using the historical daily precipitation data and some general assumptions of the runoff characteristics of the property, the water budget model calculated and tracked the expected runoff and direct precipitation volumes captured by the pond each year during the period of record (1985-95). Note that, for these calculation purposes, the model assumed the pond was being drawn upon for irrigation and also accounted for times when the pond is full to avoid over-estimation and also assumes that the pond is the only source of irrigation.

- average volume collected per year = 9200 m^3 (2.0 million gal)
- range of annual volume collected = 5100 to 12,700 m^3 (1.1 million to 2.8 million gal)

3.3 Sustainability of Irrigation Supply

The sustainability of the irrigation supply from a turf management perspective was assessed to demonstrate the reasonableness of the proposal. As stated in Section 2.0 above, the weekly turf demand is 19.8 mm or 706,860 gal (3213 m^3). Assuming the growing season is May through October (26 weeks), the annual turf demand is 83,500 m^3 (18.4 million gal).

First, an "irrigation demand calculation" routine was run with the water budget model to assess the portion of the turf demand typically satisfied by rainfall and the amount compensated by irrigation. This routine assumed an unlimited supply would be available so that the golf course would not experience any "missed irrigation days" (i.e. turf requires water but none is available) or "reduced irrigation days" (i.e. turf watering limited to tees and greens when supplies low). The tracking of "missed and reduced irrigation days" is a method to assess the sustainability of the system. The "irrigation demand" routine yielded the following results:

- wet condition (1986): 33,283 m^3 rainfall, 50,217 m^3 irrigation
- average condition (1992): 26,478 m^3 rainfall, 57,022 m^3 irrigation
- dry condition (1991): 22,520 m^3 rainfall, 60,980 m^3 irrigation

(Note that daily rainfall volumes in excess of the daily irrigation requirement were not included in these totals.)

Second, the model was run under "water budget" mode to assess how the system performs under the condition where the supply is contingent on the availability of water in the Delisle and storage volume *(once again, to be conservative the supply from the Garry River was not included)*. The number of missed irrigation days (i.e. turf required water but none was available) and reduced irrigation days (i.e. turf watering limited to tees and greens when supplies low) were tracked to assess the sustainability of the system. The following results were obtained:

- wet condition (1986): 50,217 m^3 irrig., 33,283 m^3 rainfall, zero missed irrig. days
- average condition (1992): 57,022 m^3 irrig., 26,478 m^3 rainfall, zero missed irrig. days
- dry condition (1991): 30,786 m^3 irrig., 17,900 m^3 rainfall, 29 missed irrig. days, 64 reduced irrigation days

The Delisle River flow data from the summer of 1991 ("dry" year) was analysed to interpret the reason for the lack of water supply. From the end of June to mid-October the river flow was less than 76 L/s, the minimum flow required to allow pumping. At times the flow was as low as 1 L/s, which perhaps indicates extreme drought, the flow was mechanically stopped upstream, or that the flow measuring device experienced a temporary malfunction.

This analysis demonstrated that proposed water management system for the irrigation of the golf course is feasible.

4.0 Summary and Conclusions

The Glengarry Golf & Country Club is presently permitted to pump water from the Garry River to irrigate its turf. The golf club has constructed a 1.35 million gallon storage pond on-site. The golf club also proposes to install an intake structure and pump facility at the Delisle River capable of pumping 100 Igpm (7.6 L/s) to the storage pond.

NO PERMITS OBTAINED

The golf club will continue to use its water taking system at the Garry River as permitted and proposes to supplement this supply with pond storage and with secondary pumping, if necessary and available, from the Delisle River. The proposed additions to the water management system - pond storage and supplementary pumping from the Delisle River - will reduce the golf club's reliance on water supply from the Garry River during periods of low flow in an environmentally responsible manner.

5.0 Recommendations

It is requested that the Raisin River Conservation Authority forward a letter to the Ministry of the Environment stating that the Authority has no concerns with the proposed water taking and storage of water provided that the appropriate permits for the installation and/or construction of the water taking and storage works are obtained by the proponent from the Authority.

AUTHORITY HAS MANY CONCERNS !

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

PERMIT TO TAKE WATER
Number 89-P-4005

Notice of Terms and Conditions
Section 100, Ontario Water Resources Act, R.S.O. 1990

Pursuant to Section 34 of the Ontario Water Resources Act, R.S.O. 1990 permission is hereby granted

TO: Glengarry Golf & Country Club
St. Paul Street East
P.O. Box 400
Alexandria, Ontario
K0C 1A0

for the taking of water for irrigation of a golf course from the Garry River fronting Lot 35, Concession II, Township of Lochiel. **The rate of taking shall not exceed** 1125 litres per minute, **or** 400,000 litres **per day.**

248 GAL/MIN

The water taking shall be in accordance with the application dated June 28, 1994, **and signed by** Richard Bellefeuille and the letter dated August 8, 1994 from Morris McCormick to Mr. Ted Reeyes, Ministry of Environment and Energy.

You are hereby notified that this Permit is issued to you subject to the following Definitions, General Conditions, Special Conditions and Schedule "A".

DEFINITIONS

1. (a) **"Director" means a Director, Section 34, Ontario Water Resources Act, R.S.O. 1990.**

   (b) **"Ministry" means Ontario Ministry of Environment and Energy.**

   (c) **"Permit" means this entire Permit to Take Water including its schedules, if any, issued in accordance with Section 34 of the Ontario Water Resources Act, R.S.O. 1990.**

   (d) **"Permit Holder" means** Glengarry Golf & Country Club.

GENERAL CONDITIONS

2. **This Permit shall be kept available** at the Glengarry Golf and Country Club Offices **for inspection by Ministry staff at all times.**

3. 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 time periods as the Director may specify;
   (c) To return to the Director records made pursuant to clause 3(b) at such times or with such frequency as the Director may specify; and
   (d) To keep records made pursuant to clause 3(b) available for inspection until such time as they are returned to the Director pursuant to clause 3(c).

4. The Permit Holder shall immediately notify the Director of any complaint arising from the taking of water authorized under this Permit and shall report any action which has been taken or is proposed with regard to such complaint.

5. 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 carried 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 functions of the stream.

6. For Ground-Water Takings, if the taking of water is forecast to cause any negative impact, or is observed to cause any negative impact to other water supplies obtained from any adequate sources that were in use prior to initial issuance of a Permit for this water taking, the Permit Holder shall take such action necessary to make available to those 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 shall reduce the rate and amount of taking to prevent the forecast negative impact or alleviate the observed negative impact. Pending permanent restoration of the affected supplies, the Permit Holder shall provide, to those affected, temporary water supplies adequate to meet their normal requirements, or shall compensate such persons for their reasonable costs of so doing.

7. Prior to the taking of water under the authority of this Permit to Take Water, the Permit Holder shall ensure that the works complies with Section 52 of the Ontario Water Resources Act, R.S.O. 1990.

8. Prior to the taking of water under the authority of this Permit to Take Water, the Permit Holder shall ensure that the discharge complies with Section 53 of the Ontario Water Resources Act, R.S.O. 1993.

9. 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 and 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 change. The Permit Holder shall not assign his rights under this Permit to another person without the written consent of the Director.

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

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

12. The Permit Holder must forthwith, upon presentation of credentials, permit Ministry personnel, or a Ministry authorized representative(s) to carry out any and all inspections authorized by Section 15, 16 or 17 of the Ontario Water Resources Act, R.S.O. 1990, Section 156, 157 or 158 of the Environmental Protection Act, R.S.O. 1990 of Section 19 or 20 of the Pesticides Act, R.S.O. 1990.

SPECIAL CONDITIONS

13. Records with respect to the measurement and reporting criteria defined under General Condition 3(d) listed above shall be kept by the Permit Holder at the Glengarry Golf & Country Club offices until this Ministry requests them to be submitted or states otherwise.

14. During periods of water taking and at all times, a minimum river flow of 30 litres per second shall be maintained below the dam.

15. The equipment described in the letter dated August 8, 1994 from Morris McCormick to Mr. Ted Reeves, Ministry of Environment and Energy shall be installed and used at the site.

16. This Permit expires on September 30, 2004.

The reason for the imposition of Special Condition 13 is to establish a record of water taking.

The reason for the imposition of Special Conditions 14 and 15 is to attempt to prevent interference that may be caused as a result of the water taking authorized by this Permit.

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, R.S.O. 1990, Chapter 0.40, provides that the Notice requiring the hearing shall state:

1. The portions of the Permit or 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.

The Notice should also 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.

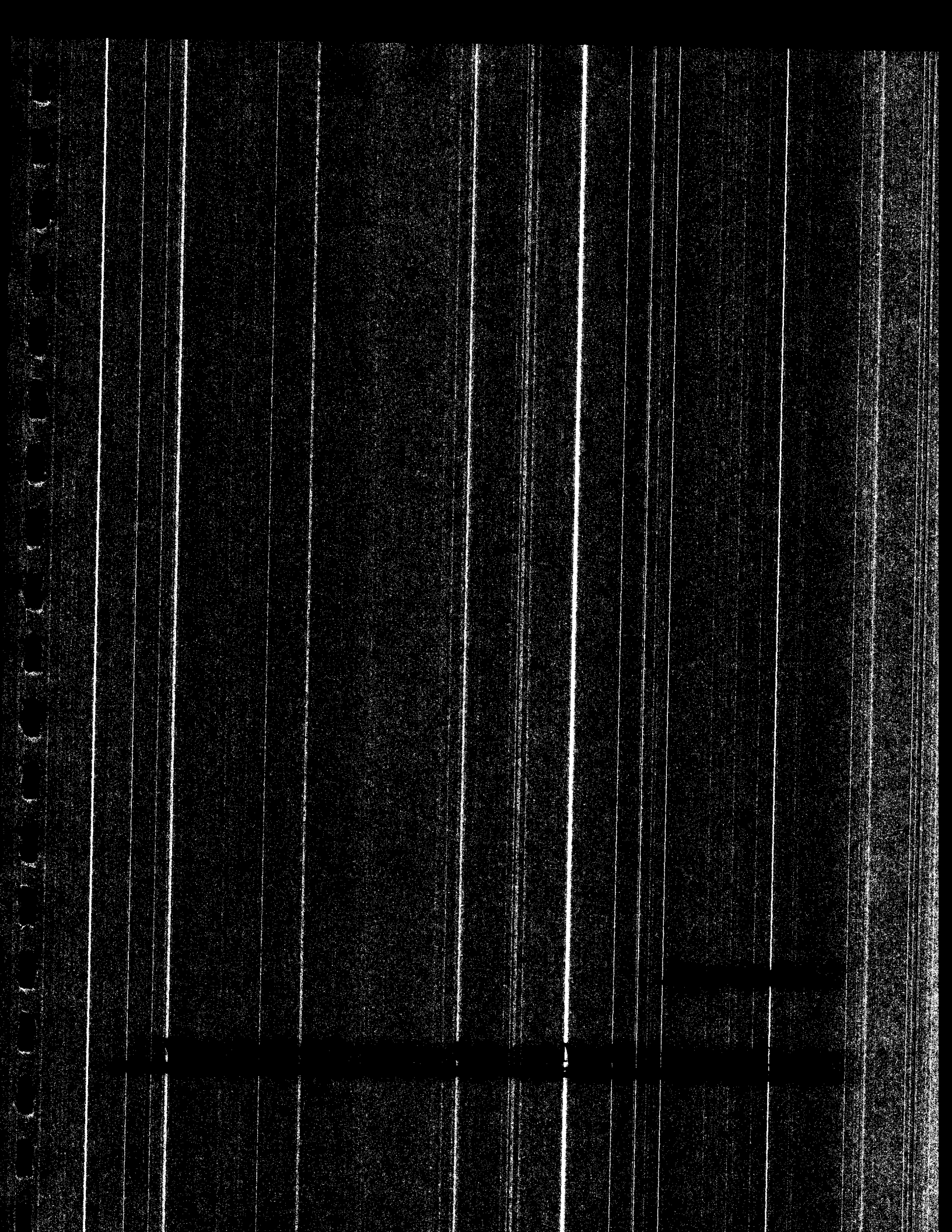
This notice must be served upon:

The Secretary **Environmental Appeal Board** **112 St. Clair Avenue West** **Suite 502** **TORONTO, Ontario** **M4V 1N3**	**AND**	**The Director** **Section 34, Ontario Water Resources Act** **Ministry of Environment and Energy** **133 Dalton Avenue, Box 820** **KINGSTON, Ontario** **K7L 4X6**

Dated at Kingston this 20th day of September, 1994.

Director
Section 34, Ontario Water Resources Act
Ministry of Environment and Energy.

THIS IS A TRUE COPY OF THE
ORIGINAL PERMIT MAILED ON
SEP 27 1994
(Signed)



POND CAPTURE CALCULATION ROUTINE

Water Budget/ Irrigation Demand Calculations

Golf Course: Glengarry G & CC

Irrigation Area: 16.20 ha 40.0 acres

Years of Records to Evaluate: 11

Daily Turf Requirement

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	
0.000	0.000	0.000	0.000	2.830	2.830	2.830	2.830	2.830	2.830	0.000	0.000	mm/day
0	0	0	0	100,847	100,847	100,847	100,847	100,847	100,847	0	0	Igal/day
0	0	0	0	121,112	121,112	121,112	121,112	121,112	121,112	0	0	US g/day
0	0	0	0	458	458	458	458	458	458	0	0	m^3/day

Water Supply — Use flow equation 1 - 4 =on, Use precip equation 0 =on: 1

		Minimum Percent of flow %	Minimum Pump (L/s)	Maximum Pump (L/s)	Maximum Percent of flow %	Threshold Flow (L/s)
1	3 pump system	---	---	---	---	---
2	% of flow with threshold				---	
3	% of flow greater than threshold				---	
4	% of flow greater than threshold (Variable %)					

3 Pump System	Pump Rate l/s	IGPM	Usgpm	Pumping Rate %	Threshold Flow m^/s	ft^3/s	Threshold Level at Gauge m^/s	ft^3/s
Supply at Threshold 1	0.000	0.0	0.0	0.0%	0.076	2.68	0.076	2.68
Supply at Threshold 2	0.000	0.0	0.0	0.0%	0.076	2.68	0.076	2.68
Supply at Threshold 3	0.000	0.0	0.0	0.0%	0.076	2.68	0.076	2.68

Well Supply	L/s	IGPM	Usgpm
Well Supply Rate		0.0	0.0

Reduced Irrigation 1=on, 0=off: 0

	Pond Threshold %	Irrigation Reduction %
	50.00%	69.60%
	25.00%	39.20%
	10.00%	8.80%

	Precip Water Taking Equation	Variables a	Variables b	Variables c
1	Straight Line			---
2	Polynomial			
3	Logarithmic			---
4	Power			---
5	Exponential			---

Choose Equation Type: 2

Initial Abstraction (mm):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0

Storage Data:

Location	Max Active Drawdown (m)	Pond Area (ha)	Side Slopes h:v	Active Capacity (m^3)	Active Capacity (MIG)
Pond 1	3.50	0.203		6,138	1.350

Ponds full May = 1: 2
Continuous modeling = 2
(if changed, re-run macro)

Direct Runoff From Site

Impervious Runoff Area (excluding Ponds) (ha): 0.00 ha 0.00 acres
Impervious Runoff Coefficient: 100%
Pervious Runoff Area (ha): 9.90 ha 24.45 acres
Pervious Runoff Coefficient (%)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40.0%	40.0%	40.0%	30.0%	20.0%	10.0%	5.0%	5.0%	5.0%	20.0%	30.0%	40.0%

Areal reduction factor: 100%

Evaporation Rates (mm/day)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00	0.00	0.00	2.59	3.95	4.61	4.74	3.81	2.61	1.55	0.00	0.00

Baseflow Requirement (L/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Waste Water Supply (L/s) — Waste Water Supply Adjustment Factor: 20%

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Irrigation Rate

	Areas (sq m)	Irrigation Rat in/week	Irrigation Ra mm/day	Weighted Average	Reduced Level 1 Irrigation Rat in/week	Reduced Level 1 Irrigation Ra mm/day	Reduced Level 1 Weighted Average	Reduced Level 2 Irrigation Ra in/week	Reduced Level 2 Irrigation Rat mm/day	Reduced Level 2 Weighted Average	Reduced Level 3 Irrigation Ra in/week	Reduced Level 3 Irrigation Ra mm/day	Reduced Level 3 Weighted Average
Tees	4000	1.25	4.536	0.112	1.25	4.536	0.112	1.25	4.536	0.112	1.25	4.536	0.112
Greens	4000	1.50	5.443	0.135	1.50	5.443	0.135	1.50	5.443	0.135	1.50	5.443	0.135
Fairways	152000	0.75	2.721	2.560	0.50	1.814	1.707	0.25	0.907	0.853	0.00	0.000	0.000
Rough	0	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
0.00%													
Total	161600			2.807			1.954			1.100			0.247
					Reduced Level		69.6%	Reduced Level		39.2%	Reduced Level		8.8%

POND CAPTURE CALCULATION ROUTINE

Burnside Golf Services

Glengarry G & C

Summary of Historical Water Taking

		Average	Max	Min	Percentile 10	20	30	40	50	60	70	80	90
River	Jan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	Mar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Apr	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Taking	May	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Jun	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Days	Jul	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Aug	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sep	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Oct	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent	Jan	68.8%	100.0%	38.2%	48.7%	51.8%	60.4%	61.5%	67.2%	69.7%	73.9%	85.2%	100.0%
	Feb	93.4%	100.0%	64.6%	83.3%	85.7%	94.4%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pond	Mar	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Apr	99.3%	99.7%	98.7%	98.9%	99.1%	99.2%	99.3%	99.4%	99.4%	99.4%	99.5%	99.5%
Volume	May	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Jun	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Remaining	Jul	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Aug	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Sep	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Oct	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Nov	4.1%	21.1%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.9%	7.0%	7.3%	8.7%
	Dec	29.8%	47.0%	0.0%	13.2%	22.4%	23.8%	26.6%	31.3%	38.7%	40.4%	41.6%	42.9%
Total Supplies	m^3	9,169	12,742	5,239	5,504	8,274	8,292	9,237	9,450	9,656	9,817	11,212	11,435
Total Demands	m^3	9,727	10,550	8,980	9,034	9,041	9,290	9,411	9,921	10,080	10,147	10,161	10,380
Missed Irr Days	days	114.8	132.5	97.4	106.6	108.5	108.6	113.8	115.3	117.7	118.5	121.0	123.4
R.I.D.1	days	0.0	0	0	0	0	0	0	0	0	0	0	0
R.I.D.2	days	0.0	0	0	0	0	0	0	0	0	0	0	0
R.I.D.3	days	0.0	0	0	0	0	0	0	0	0	0	0	0

		Volume (m^3)			Percentile			Percent of Total Supply			Percentile		
		Average	Max	Min	10	50	90	Average	Max	Min	10	50	90
Precip on Pond	m^3	1,547	1,848	1,050	1,143	1,563	1,846	17.3%	21.8%	14.5%	14.8%	17.0%	19.6%
Pervious Runoff	m^3	7,622	10,896	4,096	4,454	7,674	9,655	82.7%	85.5%	78.2%	80.4%	83.0%	85.2%
Impervious Runoff	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Waste Water	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Stream Supply	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Well Supply	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Irrigation Area	16.20	ha	Impervious Area	0	ha
Well Pump Rate	0.000	L/s	Pond Area	0.203	ha
Pervious Runoff Area	9.9	ha	Pond Depth	3.500	m
Pervious Coefficient	20.0%		Pond Volume	6,138	m^3
Years of Historical Data	11		Reduction factor:	100%	

Flow Threshold — 3 pump system

Pump Rate l/s	Threshold Flow m^/s	Pumping Rate %
0.000	0.076	0.000
0.00	0.076	0.000
0.00	0.076	0.000

Daily Irrigation Requirement

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
mm/day	0.000	0.000	0.000	0.000	2.830	2.830	2.830	2.830	2.830	2.830	0.000	0.000
Igpd	0	0	0	0	100,847	100,847	100,847	100,847	100,847	100,847	0	0
Usgpd	0	0	0	0	121,112	121,112	121,112	121,112	121,112	121,112	0	0
m^3/day	0.0	0.0	0.0	0.0	458.5	458.5	458.5	458.5	458.5	458.5	0.0	0.0

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Initial Abstraction (mm):	2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0
Evaporation (mm/day)	0.00	0.00	0.00	2.59	3.95	4.61	4.74	3.81	2.61	1.55	0.00	0.00
Baseflow (L/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Waste Water Supply (L/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Irrigation Rate

	Areas (sq m)	Irrigation in/week	Irrigation mm/day	Weighted Average
Tees	4,000	1.250	4.536	0.112
Greens	4,000	1.500	5.443	0.135
Fairways	152,000	0.750	2.721	2.560
Rough	0	0.000	0.000	0.000
Total	161,600			2.807

Burnside Golf Services *Glengarry G & CC*

	Year	1 1985	2 1986	3 1987	4 1988	5 1989	6 1990	7 1991	8 1992	9 1993	10 1994	11 1995
River Water Taking Days	Jan	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0
	Apr	0	0	0	0	0	0	0	0	0	0	0
	May	0	0	0	0	0	0	0	0	0	0	0
	Jun	0	0	0	0	0	0	0	0	0	0	0
	Jul	0	0	0	0	0	0	0	0	0	0	0
	Aug	0	0	0	0	0	0	0	0	0	0	0
	Sep	0	0	0	0	0	0	0	0	0	0	0
	Oct	0	0	0	0	0	0	0	0	0	0	0
	Nov	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0
Percent Pond Volume Remaining	Jan	100%	85%	67%	49%	70%	62%	100%	38%	52%	74%	60%
	Feb	100%	100%	100%	65%	94%	83%	100%	86%	100%	100%	100%
	Mar	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Apr	99%	99%	99%	100%	99%	100%	99%	99%	100%	99%	99%
	May	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Jun	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Jul	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Aug	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Sep	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Oct	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
	Nov	0%	7%	0%	9%	1%	0%	0%	0%	7%	21%	0%
	Dec	39%	22%	27%	47%	43%	24%	13%	40%	42%	31%	0%
Active Pond Balance Dec 31	6138	5,228	4,127	2,990	4,281	3,775	6,138	2,343	3,180	4,535	3,537	0
Total Water Taking Supply	m^3	9,237	9,450	8,274	11,212	9,656	12,742	5,239	9,817	11,435	8,292	5,504
Total Water Taking Demand	m^3	10147	10550	9411	9921	10161	10380	9034	8980	10080	9290	9041
Missed Irrigation Days	Days	114	97	115	118	109	109	123	121	107	118	132
Threshold 1 Reduced Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Threshold 2 Reduced Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Threshold 3 Reduced Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Precip Collected in Pond	m^3	1563	1848	1504	1654	1643	1846	1143	1537	1780	1454	1050
		16.93%	19.56%	18.17%	14.76%	17.01%	14.49%	21.82%	15.66%	15.56%	17.53%	19.08%
Pervious Runoff collected by Pond	m^3	7674	7602	6771	9557	8013	10896	4096	8280	9655	6839	4454
		83.07%	80.44%	81.83%	85.24%	82.99%	85.51%	78.18%	84.34%	84.44%	82.47%	80.92%
Impervious Runoff collected by Pond	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Waste Water Supplied	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Stream Taking	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Well Supply	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Evaporation	m^3	611	735	596	577	654	656	550	564	637	621	523
Base Flow	m^3	0	0	0	0	0	0	0	0	0	0	0
Irrigation	m^3	9536	9815	8815	9344	9508	9724	8484	8416	9443	8670	8518

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Pond Capture Calculation Routine

IRRIGATION ~ DEMAND CALCULATION ROUTING

Water Budget/ Irrigation Demand Calculations

Golf Course Glengarry G & CC

Irrigation Area: 16.20 ha 40.0 acres

Years of Records to Evaluate 11

Daily Turf Requirement

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	
0.000	0.000	0.000	0.000	2.830	2.830	2.830	2.830	2.830	2.830	0.000	0.000	mm/day
0	0	0	0	100,847	100,847	100,847	100,847	100,847	100,847	0	0	Igal/day
0	0	0	0	121,112	121,112	121,112	121,112	121,112	121,112	0	0	US g/day
0	0	0	0	458	458	458	458	458	458	0	0	m^3/day

Water Supply — Use flow equation 1 - 4 =on, Use precip equation 0 =on: 1

		Minimum Percent of flow %	Minimum Pump (L/s)	Maximum Pump (L/s)	Maximum Percent of flow %	Threshold Flow (L/s)
1	3 pump system	---	---	---	---	---
2	% of flow with threshold				---	
3	% of flow greater than threshold				---	
4	% of flow greater than threshold (Variable %)					

3 Pump System	Pump Rate l/s	IGPM	Usgpm	Pumping Rate %	Threshold Flow m^/s	ft^3/s	Threshold Level at Gauge m^/s	ft^3/s
Supply at Threshold 1	3.800	50.2	60.2	10.0%	0.038	1.34	0.038	1.34
Supply at Threshold 2	7.600	100.3	120.5	10.0%	0.076	2.68	0.076	2.68
Supply at Threshold 3	7.600	100.3	120.5	10.0%	0.076	2.68	0.076	2.68
Well Supply	L/s	IGPM	Usgpm					
Well Supply Rate	15.200	200.6	240.9					

Reduced Irrigation 1=on, 0=off: 1

Pond Threshold %	Irrigation Reduction %
50.00%	69.60%
25.00%	39.20%
10.00%	8.80%

	Precip Water Taking Equation	Variables a	Variables b	Variables c
1	Straight Line			---
2	Polynomial			
3	Logarithmic			---
4	Power			---
5	Exponential			---

Choose Equation Type: 2

Initial Abstraction (mm):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0

Storage Data:

Location	Max Active Drawdown (m)	Pond Area (ha)	Side Slopes h:v	Active Capacity (m^3)	Active Capacity (MIG)
Pond 1	3.50	0.203		6,138	1.350

Ponds full May = 1: 2
Continuous modeling = 2
(if changed, re-run macro)

Direct Runoff From Site

Impervious Runoff Area (excluding Ponds) (ha): 0.00 ha 0.00 acres
Impervious Runoff Coefficient: 100%
Pervious Runoff Area (ha): 9.90 ha 24.45 acres

Pervious Runoff Coefficient (%)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40.0%	40.0%	40.0%	30.0%	20.0%	10.0%	5.0%	5.0%	5.0%	20.0%	30.0%	40.0%

Areal reduction factor: 100%

Evaporation Rates (mm/day)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00	0.00	0.00	2.59	3.95	4.61	4.74	3.81	2.61	1.55	0.00	0.00

Baseflow Requirement (L/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Waste Water Supply (L/s) — Waste Water Supply Adjustment Factor: 20%

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Irrigation Rate

	Areas (sq m)	Irrigation Rat in/week	Irrigation Ra mm/day	Weighted Average	Reduced Level 1: Irrigation Rat in/week	Irrigation Ra mm/day	Weighted Average	Reduced Level 2: Irrigation Ra in/week	Irrigation Rat mm/day	Weighted Average	Reduced Level 3: Irrigation Ra in/week	Irrigation Ra mm/day	Weighted Average
Tees	4000	1.25	4.536	0.112	1.25	4.536	0.112	1.25	4.536	0.112	1.25	4.536	0.112
Greens	4000	1.50	5.443	0.135	1.50	5.443	0.135	1.50	5.443	0.135	1.50	5.443	0.135
Fairways	152000	0.75	2.721	2.560	0.50	1.814	1.707	0.25	0.907	0.853	0.00	0.000	0.000
Rough	0	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
0.00%													
Total	161600			2.807			1.954			1.100			0.247
					Reduced Level		69.6%	Reduced Level		39.2%	Reduced Level		8.8%

IRRIGATION DEMAND CALCULATION ROUTING

Burnside Golf Services

Glengarry G & C

Summary of Historical Water Taking

		Average	Max	Min	Percentile 10	20	30	40	50	60	70	80	90
River	Jan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	Mar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Apr	21.4	25.0	17.0	18.0	19.0	19.0	21.0	22.0	23.0	23.0	24.0	24.0
Taking	May	24.5	27.0	21.0	22.0	24.0	24.0	24.0	25.0	25.0	25.0	26.0	26.0
	Jun	23.6	28.0	17.0	22.0	22.0	23.0	23.0	24.0	24.0	25.0	26.0	26.0
Days	Jul	20.8	27.0	4.0	12.0	17.0	22.0	23.0	24.0	24.0	25.0	25.0	26.0
	Aug	13.9	25.0	0.0	1.0	5.0	6.0	12.0	18.0	19.0	20.0	22.0	25.0
	Sep	10.3	21.0	0.0	0.0	0.0	4.0	8.0	10.0	14.0	17.0	18.0	21.0
	Oct	19.4	25.0	7.0	8.0	19.0	20.0	21.0	21.0	22.0	22.0	23.0	25.0
	Nov	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent	Jan	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Feb	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pond	Mar	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Apr	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Volume	May	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Jun	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Remaining	Jul	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Aug	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Sep	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Oct	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Nov	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Dec	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Supplies	m^3	58,760	67,052	51,695	54,988	56,524	57,514	58,342	58,500	59,067	59,809	60,412	62,458
Total Demands	m^3	58,760	67,052	51,695	54,988	56,524	57,514	58,342	58,500	59,067	59,809	60,412	62,458
Missed Irr Days	days	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
R.I.D.1	days	0.0	0	0	0	0	0	0	0	0	0	0	0
R.I.D.2	days	0.0	0	0	0	0	0	0	0	0	0	0	0
R.I.D.3	days	0.0	0	0	0	0	0	0	0	0	0	0	0

		Volume (m^3)			Percentile			Percent of Total Supply			Percentile		
		Average	Max	Min	10	50	90	Average	Max	Min	10	50	90
Precip on Pond	m^3	444	549	320	387	431	508	0.8%	1.1%	0.5%	0.6%	0.7%	0.9%
Pervious Runoff	m^3	0	1	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Impervious Runoff	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Waste Water	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Stream Supply	m^3	43,341	56,900	24,432	31,317	48,641	54,096	74.3%	98.9%	41.9%	52.4%	80.7%	97.3%
Well Supply	m^3	14,975	33,479	0	1,176	12,636	29,348	25.0%	57.4%	0.0%	2.0%	18.8%	47.0%

Irrigation Area	16.20	ha	Impervious Area	0	ha	
Well Pump Rate	15.200	L/s	Pond Area	0.203	ha	
Pervious Runoff Area	9.9	ha	Pond Depth	3.500	m	
Pervious Coefficient	20.0%		Pond Volume	6,138	m^3	
Years of Historical Data	11		Reduction factor:	100%		

Flow Threshold — 3 pump system

Pump Rate l/s	Threshold Flow m^/s	Pumping Rate %
3.800	0.038	10.000
7.60	0.076	10.000
7.60	0.076	10.000

Pond Threshold %	Irrigation Reduction %
50.0%	69.6%
25.0%	39.2%
10.0%	8.8%

Daily Irrigation Requirement

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
mm/day	0.000	0.000	0.000	0.000	2.830	2.830	2.830	2.830	2.830	2.830	0.000	0.000
Igpd	0	0	0	0	100,847	100,847	100,847	100,847	100,847	100,847	0	0
Usgpd	0	0	0	0	121,112	121,112	121,112	121,112	121,112	121,112	0	0
m^3/day	0.0	0.0	0.0	0.0	458.5	458.5	458.5	458.5	458.5	458.5	0.0	0.0

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Initial Abstraction (mm):	2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0
Evaporation (mm/day)	0.00	0.00	0.00	2.59	3.95	4.61	4.74	3.81	2.61	1.55	0.00	0.00
Baseflow (L/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Waste Water Supply (L/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Irrigation Rate | Reduced Level 1 | 69.6% Reduced Level 2 | 39.2% Reduced Level 3 | 8.8%

	Areas (sq m)	Irrigation in/week	Irrigation mm/day	Weighted Average	Irrigation in/week	Irrigation mm/day	Weighted Average	Irrigation in/week	Irrigation mm/day	Weighted Average	Irrigation in/week	Irrigation mm/day	Weighted Average
Tees	4,000	1.250	4.536	0.112	1.250	4.536	0.112	1.250	4.536	0.112	1.250	4.536	0.112
Greens	4,000	1.500	5.443	0.135	1.500	5.443	0.135	1.500	5.443	0.135	1.500	5.443	0.135
Fairways	152,000	0.750	2.721	2.560	0.500	1.814	1.707	0.250	0.907	0.853	0.000	0.000	0.000
Rough	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	161,600			2.807			1.954			1.100			0.247

Burnside Golf Services Glengarry G & CC

		1	2	3	4	5	6	7	8	9	10	11
	Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
River Water Taking Days	Jan	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0
	Apr	23	24	22	18	24	19	21	23	17	19	25
	May	25	21	26	26	22	24	24	25	25	24	27
	Jun	23	22	25	17	24	23	26	28	24	22	26
	Jul	26	22	24	17	12	24	4	25	23	27	25
	Aug	1	22	20	12	0	25	6	25	19	5	18
	Sep	4	21	18	8	0	14	0	21	17	0	10
	Oct	22	22	23	21	7	21	19	25	20	8	25
	Nov	0	0	0	0	0	0	0	0	0	0	0
	Dec	0	0	0	0	0	0	0	0	0	0	0
Percent Pond Volume Remaining	Jan	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Feb	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Mar	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Apr	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	May	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Jun	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Jul	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Aug	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Sep	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Oct	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Nov	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Dec	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Active Pond Balance Dec 31	6138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138
Total Water Taking Supply	m^3	59,809	51,695	57,514	60,412	58,342	54,988	62,458	58,500	56,524	59,067	67,052
Total Water Taking Demand	m^3	59809	51695	57514	60412	58342	54988	62458	58500	56524	59067	67052
Missed Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Threshold 1 Reduced Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Threshold 2 Reduced Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Threshold 3 Reduced Irrigation Days	Days	0	0	0	0	0	0	0	0	0	0	0
Precip Collected in Pond	m^3	423	549	455	427	431	508	387	425	487	474	320
		0.71%	1.06%	0.79%	0.71%	0.74%	0.92%	0.62%	0.73%	0.86%	0.80%	0.48%
Pervious Runoff collected by Pond	m^3	1	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Impervious Runoff collected by Pond	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Waste Water Supplied	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Stream Taking	m^3	36879	51146	52521	39300	24432	48794	32722	56900	48641	31317	54096
		61.66%	98.94%	91.32%	65.05%	41.88%	88.73%	52.39%	97.26%	86.05%	53.02%	80.68%
Well Supply	m^3	22507	0	4538	20685	33479	5687	29348	1176	7396	27276	12636
		37.63%	0.00%	7.89%	34.24%	57.39%	10.34%	46.99%	2.01%	13.08%	46.18%	18.85%
Evaporation	m^3	1478	1478	1478	1478	1478	1478	1478	1478	1478	1478	1478
Base Flow	m^3	0	0	0	0	0	0	0	0	0	0	0
Irrigation	m^3	58331	50217	56036	58934	56864	53510	60980	57022	55046	57589	65574

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IRRIGATION DEMAND CALCULATION ROUTINE

IRRIGATION SUSTAINABILITY CALCULATION ROUTINE

Water Budget/ Irrigation Demand Calculations

Golf Course Glengarry G & CC

Irrigation Area: 16.20 ha 40.0 acres **Years of Records to Evaluate** 11

Daily Turf Requirement

Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	
0.000	0.000	0.000	0.000	2.830	2.830	2.830	2.830	2.830	2.830	0.000	0.000	mm/day
0	0	0	0	100,847	100,847	100,847	100,847	100,847	100,847	0	0	Igal/day
0	0	0	0	121,112	121,112	121,112	121,112	121,112	121,112	0	0	US g/day
0	0	0	0	458	458	458	458	458	458	0	0	m^3/day

Water Supply Use flow equation 1 - 4 =on, Use precip equation 0 =on: 1

		Minimum Percent of flow %	Minimum Pump (L/s)	Maximum Pump (L/s)	Maximum Percent of flow %	Threshold Flow (L/s)
1	3 pump system	---------	---------	---------	---------	---------
2	% of flow with threshold				-------	
3	% of flow greater than threshold				-------	
4	% of flow greater than threshold (Variable %)					

3 Pump System	Pump Rate l/s	IGPM	Usgpm	Pumping Rate %	Threshold Flow m^/s	ft^3/s	Threshold Level at Gauge m^/s	ft^3/s
Supply at Threshold 1	7.600	100.3	120.5	10.0%	0.076	2.68	0.076	2.68
Supply at Threshold 2	7.600	100.3	120.5	10.0%	0.076	2.68	0.076	2.68
Supply at Threshold 3	7.600	100.3	120.5	10.0%	0.076	2.68	0.076	2.68
Well Supply	L/s	IGPM	Usgpm					
Well Supply Rate		0.0	0.0					

Reduced Irrigation 1=on, 0=off: 1

Pond *Threshold* %	Irrigation *Reduction* %
50.00%	69.60%
25.00%	39.20%
10.00%	8.80%

	Precip Water Taking Equation	Variables a	Variables b	Variables c
1	Straight Line			---------
2	Polynomial			
3	Logarithmic			---------
4	Power			---------
5	Exponential			---------

Choose Equation Type: 2

Initial Abstraction (mm):

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0

Storage Data:

Location	Max Active Drawdown (m)	Pond Area (ha)	Side Slopes h:v	Active Capacity (m^3)	Active Capacity (MIG)
Pond 1	3.50	0.203		6,138	1.350

Ponds full May = 1: 2
Continuous modeling = 2
(if changed, re-run macro)

Direct Runoff From Site

Impervious Runoff Area (excluding Ponds) (ha): 0.00 ha 0.00 acres
Impervious Runoff Coefficient: 100%
Pervious Runoff Area (ha): 9.90 ha 24.45 acres

Pervious Runoff Coefficient (%)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
40.0%	40.0%	40.0%	30.0%	20.0%	10.0%	5.0%	5.0%	5.0%	20.0%	30.0%	40.0%

Areal reduction factor: 100%

Evaporation Rates (mm/day)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.00	0.00	0.00	2.59	3.95	4.61	4.74	3.81	2.61	1.55	0.00	0.00

Baseflow Requirement (L/s)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Waste Water Supply (L/s) **Waste Water Supply Adjustment Factor** 20%

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Irrigation Rate

	Areas (sq m)	Reduced Level 1 Irrigation Rat in/week	Reduced Level 1 rigation Ra mm/day	Reduced Level 1 Weighted Average	Reduced Level 2 Irrigation Rat in/week	Reduced Level 2 rigation Ra mm/day	Reduced Level 2 Weighted Average	Reduced Level 3 rigation Ra in/week	Reduced Level 3 rrigation Rat mm/day	Reduced Level 3 Weighted Average	Reduced Level 3 igation Ra in/week	Reduced Level 3 rigation Ra mm/day	Reduced Level 3 Weighted Average
Tees	4000	1.25	4.536	0.112	1.25	4.536	0.112	1.25	4.536	0.112	1.25	4.536	0.112
Greens	4000	1.50	5.443	0.135	1.50	5.443	0.135	1.50	5.443	0.135	1.50	5.443	0.135
Fairways	152000	0.75	2.721	2.560	0.50	1.814	1.707	0.25	0.907	0.853	0.00	0.000	0.000
Rough	0	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000	0.00	0.000	0.000
0.00%													
Total	161600			2.807			1.954			1.100			0.247
				Reduced Level			69.6%		Reduced Level	39.2%		Reduced Level	8.8%

IRRIGATION SUSTAINABILITY CALCULATION ROUTINE

Burnside Golf Services

Glengarry G & CC — Summary of Historical Water Taking

		Average	Max	Min	Percentile 10	20	30	40	50	60	70	80	90
River	Jan	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Feb	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Water	Mar	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Apr	21.4	25.0	17.0	18.0	19.0	19.0	21.0	22.0	23.0	23.0	24.0	24.0
Taking	May	24.5	27.0	21.0	22.0	24.0	24.0	24.0	25.0	25.0	25.0	26.0	26.0
	Jun	22.5	28.0	15.0	19.0	22.0	22.0	22.0	23.0	23.0	24.0	24.0	25.0
Days	Jul	16.7	26.0	0.0	7.0	11.0	14.0	15.0	20.0	22.0	22.0	23.0	24.0
	Aug	8.9	22.0	0.0	0.0	0.0	1.0	2.0	6.0	14.0	15.0	18.0	20.0
	Sep	7.3	21.0	0.0	0.0	0.0	0.0	0.0	3.0	4.0	16.0	17.0	19.0
	Oct	19.3	26.0	1.0	5.0	16.0	22.0	22.0	23.0	23.0	24.0	25.0	25.0
	Nov	1.5	7.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.0	7.0
	Dec	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Percent	Jan	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Feb	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Pond	Mar	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Apr	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Volume	May	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Jun	85.6%	100.0%	25.2%	37.2%	79.3%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Remaining	Jul	55.2%	100.0%	0.0%	6.0%	32.3%	38.3%	47.0%	51.9%	64.5%	83.2%	83.6%	100.0%
	Aug	30.4%	100.0%	0.0%	0.0%	0.0%	4.3%	4.5%	5.2%	42.4%	43.9%	65.8%	68.0%
	Sep	17.4%	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	1.1%	5.2%	6.4%	9.5%	69.2%
	Oct	41.8%	100.0%	0.0%	0.0%	0.0%	0.0%	0.6%	30.8%	36.2%	92.2%	100.0%	100.0%
	Nov	86.2%	100.0%	22.4%	26.9%	98.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
	Dec	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Total Supplies	m^3	45,798	58,500	31,040	32,023	32,834	41,333	45,402	49,335	51,042	51,695	54,982	55,589
Total Demands	m^3	45,798	58,500	31,040	32,023	32,834	41,333	45,402	49,335	51,042	51,695	54,982	55,589
Missed Irr Days	days	10.0	30.3	0.0	0.0	0.0	0.0	0.0	0.0	5.5	17.3	27.8	29.2
R.I.D.1	days	9.4	28	0	0	7	7	7	8	11	11	11	13
R.I.D.2	days	5.7	12	0	0	4	5	5	6	6	7	7	11
R.I.D.3	days	18.6	50	0	0	0	5	7	19	22	23	38	41

		Volume (m^3) Average	Max	Min	Percentile 10	50	90	Percent of Total Supply Average	Max	Min	Percentile 10	50	90
Precip on Pond	m^3	749	1,029	549	550	755	978	1.8%	3.3%	1.0%	1.0%	1.7%	2.4%
Pervious Runoff	m^3	988	2,278	0	284	759	1,994	2.6%	7.3%	0.0%	0.5%	1.5%	5.6%
Impervious Runoff	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Waste Water	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Stream Supply	m^3	44,062	57,638	27,734	30,189	47,897	54,321	96%	99%	89.3%	91.9%	97.0%	98.5%
Well Supply	m^3	0	0	0	0	0	0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Irrigation Area	16.20	ha	Impervious Area	0	ha	
Well Pump Rate	0.000	L/s	Pond Area	0.203	ha	
Pervious Runoff Area	9.9	ha	Pond Depth	3.500	m	
Pervious Coefficient	20.0%		Pond Volume	6,138	m^3	
Years of Historical Data	11		Reduction factor:	100%		

Flow Threshold — 3 pump system

Pump Rate l/s	Threshold Flow m^/s	Pumping Rate %	Pond Threshold %	Irrigation Reduction %
7.600	0.076	10.000	50.0%	69.6%
7.60	0.076	10.000	25.0%	39.2%
7.60	0.076	10.000	10.0%	8.8%

Daily Irrigation Requirement

	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec
mm/day	0.000	0.000	0.000	0.000	2.830	2.830	2.830	2.830	2.830	2.830	0.000	0.000
Igpd	0	0	0	0	100,847	100,847	100,847	100,847	100,847	100,847	0	0
Usgpd	0	0	0	0	121,112	121,112	121,112	121,112	121,112	121,112	0	0
m^3/day	0.0	0.0	0.0	0.0	458.5	458.5	458.5	458.5	458.5	458.5	0.0	0.0

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Initial Abstraction (mm):	2.0	2.0	2.0	2.0	5.0	5.0	5.0	5.0	5.0	5.0	2.0	2.0
Evaporation (mm/day)	0.00	0.00	0.00	2.59	3.95	4.61	4.74	3.81	2.61	1.55	0.00	0.00
Baseflow (L/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Waste Water Supply (L/s)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Peak Irrigation Rate — Reduced Level 1 — 69.6% Reduced Level 2 — 39.2% Reduced Level 3 — 8.8%

	Areas (sq m)	Irrigation in/week	Irrigation mm/day	Weighted Average	Irrigation in/week	Irrigation mm/day	Weighted Average	Irrigation in/week	Irrigation mm/day	Weighted Average	Irrigation in/week	Irrigation mm/day	Weighted Average
Tees	4,000	1.250	4.536	0.112	1.250	4.536	0.112	1.250	4.536	0.112	1.250	4.536	0.112
Greens	4,000	1.500	5.443	0.135	1.500	5.443	0.135	1.500	5.443	0.135	1.500	5.443	0.135
Fairways	152,000	0.750	2.721	2.560	0.500	1.814	1.707	0.250	0.907	0.853	0.000	0.000	0.000
Rough	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	161,600			2.807			1.954			1.100			0.247

Burnside Golf Services Glengarry G & CC

		1	2	3	4	5	6	7	8	9	10	11
	Year	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
River Water Taking Days	Jan	0	0	0	0	0	0	0	0	0	0	0
	Feb	0	0	0	0	0	0	0	0	0	0	0
	Mar	0	0	0	0	0	0	0	0	0	0	0
	Apr	23	24	22	18	24	19	21	23	17	19	25
	May	25	21	26	26	22	24	24	25	25	24	27
	Jun	23	22	25	15	24	23	19	28	24	22	22
	Jul	14	22	24	11	7	22	0	23	15	20	26
	Aug	0	22	15	6	0	20	0	18	2	1	14
	Sep	4	21	16	0	0	3	0	19	17	0	0
	Oct	23	22	23	24	5	25	16	25	22	1	26
	Nov	0	0	0	0	7	0	2	0	0	7	0
	Dec	0	0	0	0	0	0	0	0	0	0	0
Percent Pond Volume Remaining	Jan	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Feb	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Mar	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Apr	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	May	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
	Jun	100%	100%	100%	25%	100%	100%	37%	100%	100%	100%	79%
	Jul	47%	100%	100%	32%	6%	65%	0%	83%	38%	52%	84%
	Aug	0%	100%	44%	5%	0%	68%	0%	66%	5%	4%	42%
	Sep	0%	100%	10%	1%	0%	6%	0%	69%	5%	0%	0%
	Oct	36%	100%	100%	1%	0%	31%	0%	100%	92%	0%	0%
	Nov	100%	100%	100%	100%	22%	100%	99%	100%	100%	27%	100%
	Dec	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Active Pond Balance Dec 31	6138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138	6,138
Total Water Taking Supply	m^3	41,333	51,695	54,982	45,402	31,040	51,042	32,023	58,500	49,335	32,834	55,589
Total Water Taking Demand	m^3	41333	51695	54982	45402	31040	51042	32023	58500	49335	32834	55589
Missed Irrigation Days	Days	17	0	0	0	28	0	29	0	0	30	5
Threshold 1 Reduced Irrigation Days	Days	11	0	8	28	13	7	7	0	11	7	11
Threshold 2 Reduced Irrigation Days	Days	5	0	6	11	5	6	7	0	12	7	4
Threshold 3 Reduced Irrigation Days	Days	23	0	0	22	41	5	50	0	7	38	19
Precip Collected in Pond	m^3	845	549	597	978	1029	752	755	568	814	800	550
		2.04%	1.06%	1.09%	2.15%	3.31%	1.47%	2.36%	0.97%	1.65%	2.44%	0.99%
Pervious Runoff collected by Pond	m^3	1118	0	284	1994	2278	759	948	294	624	1845	718
		2.71%	0.00%	0.52%	4.39%	7.34%	1.49%	2.96%	0.50%	1.26%	5.62%	1.29%
Impervious Runoff collected by Pond	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Waste Water Supplied	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Stream Taking	m^3	39370	51146	54102	42430	27734	49531	30320	57638	47897	30189	54321
		95.25%	98.94%	98.40%	93.45%	89.35%	97.04%	94.68%	98.53%	97.09%	91.94%	97.72%
Well Supply	m^3	0	0	0	0	0	0	0	0	0	0	0
		0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Evaporation	m^3	1375	1478	1478	1478	1311	1478	1237	1478	1478	1345	1452
Base Flow	m^3	0	0	0	0	0	0	0	0	0	0	0
Irrigation	m^3	39958	50217	53504	43924	29730	49564	30786	57022	47857	31489	54137

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IRRIGATION SUSTAINABILITY CALCULATION ROUTINE