

**Golder Associates Ltd.**

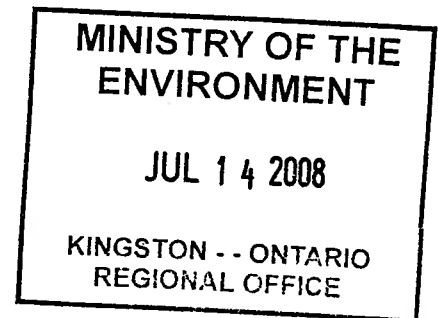
32 Steacie Drive  
Kanata, Ontario, Canada K2K 2A9  
Telephone 613-592-9600  
Fax 613-592-9601



**REPORT ON**



**CATEGORY 3 PERMIT TO TAKE WATER APPLICATION  
FINDLAY CREEK VILLAGE SUBDIVISION SITE  
FUTURE STAGES  
OTTAWA, (GLOUCESTER), ONTARIO**



Submitted to:

Ontario Ministry of the Environment  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario  
M4V 1L5

**DISTRIBUTION:**

- 1 copy - Ontario Ministry of the Environment
- 2 copies - Findlay Creek Co-Tenancy
- 2 copies - Golder Associates Ltd.

July 2008

07-1122-0277



**Golder Associates Ltd.**

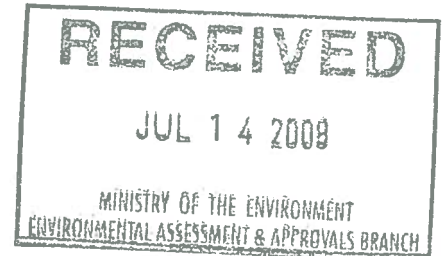
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July 8, 2008

07-1122-0277

Ontario Ministry of the Environment  
Permit to Take Water  
Director, Environmental Assessment and Approvals Branch  
2 St. Clair Avenue West, Floor 12A  
Toronto, ON  
M4V 1L5



Attention: Permit to Take Water Director

**RE: CATEGORY 3 PERMIT TO TAKE WATER APPLICATION  
FINDLAY CREEK VILLAGE SUBDIVISION SITE  
FUTURE STAGES  
OTTAWA (GLOUCESTER), ONTARIO**

Dear Director,

Golder Associates Ltd. (Golder Associates) was retained by Findlay Creek Co-Tenancy (Findlay Creek Properties Ltd. and 1374537 Ontario Limited), to provide consulting services in support of obtaining a new Permit to Take Water (PTTW) for water taking associated with temporary water control in future stages of the Findlay Creek Village Development located in Ottawa (Gloucester), Ontario.

The Findlay Creek development is located on a parcel of land between Highway 31 (Bank Street) and Albion Road, and the northern extent of the development is located approximately 0.65 kilometres south of Leitrim Road in Ottawa, Ontario. The site slopes gently towards the east, with major features including the Provincially Significant Leitrim Wetland (PSW) to the west and southwest of the existing and future development area and Findlay Creek to the south, flowing in an easterly direction. Surrounding land uses are predominantly rural in nature, and include both residential and commercial buildings. The first and second stages of the Findlay Creek development are under construction in the northeast and central portions of the site (identified as Stage 1 and Stage 2, Phases 1A and 1B on Figure 1).

**PERMIT TO TAKE WATER APPLICATION**

Because temporary control of water influx activities at the site would extend for a period in excess of 30 consecutive days, the PTTW application for the water taking associated with temporary water control at the site would be classified as a **Category 3 Groundwater Taking**.



A Category 3 PTTW application requires the following documentation:

- A completed Application Form and Schedule 1 Water Conservation Form;
- Information required by conditions of previous PTTW;
- A technical study completed by a Qualified Person; and,
- Payment of an application fee of \$3,000.

The following sections provide the required documentation that comprises a complete Category 3 PTTW application.

### **Application Package**

The completed PTTW Application Form and Schedule 1 Water Conservation Form are provided in **Attachment 1**. A technical study in support of the Category 3 PTTW application completed by Golder Associates is provided in **Attachment 2**. As per the application form requirements, the following items have also been included:

- A 1:10,000 map showing all existing and proposed water taking locations with sources corresponding to the source name provided on the application form (see **Figure 1**);
- Proof of clients legal name (with the completed application form in **Attachment 1**);
- A description of how, where and when all water is obtained, stored, transferred, used and returned to the environment (see text below); and,
- A description of how the water taking needs (rates, amounts and time periods) were determined (see text below).

### **Description of Water Taking, Water Use and Return to the Environment**

Water taking will be required for temporary water control, primarily groundwater influx from the upper bedrock zones during site servicing in the future stages located in the western, central, northeastern and southeastern parts of Findlay Creek Village, as shown on **Figure 1**. Groundwater control requirements are expected to be greater in the central, northeastern and southeastern stages where sewer trenches will extend into the upper bedrock. The area indicated on Figure 1 as the northwestern future stage is only the proposed watermain connection from the development to Leitrim Road. Although secondary in nature, the PTTW will also cover control of groundwater from more permeable zones in the overburden (if any such zones are encountered), and control of surface water if any isolated accumulation occurs locally due to site grading, precipitation events, etc. within the future development areas in the immediate of ongoing trenching activities.

The construction is proposed at times during the overall period of September 1, 2008 to September 1, 2018, in order to have site servicing available in advance of future stages of development. For servicing of previous phases at the site, groundwater control has typically taken place over a four (4) to five (5) month period in the winter/spring and in the fall, and the results of a monitoring program that has been ongoing continuously since the fall of 2003 has shown no adverse effects to the long-term groundwater levels within the Leitrim PSW. Therefore, temporary groundwater control for the future stages is planned to be conducted for similar durations throughout the winter/spring and fall.

Excavations will be made along the Service Trench alignment (shown on Figure 1) to allow for the installation of the required services. The open portion of the Service Trench would typically be limited to a maximum of 15 metres long and 4 metres wide. The depth of the excavations will vary along the alignment, but the maximum depth will be approximately 8 metres. The average Service Trench dimensions will be approximately 9 metres long, 3 metres wide and 4 metres deep. Water entering the excavation will be pumped using a submersible pump(s).

It is proposed that water pumped from the service trenches for the current permit be discharged into the storm sewer system, and then into the stormwater management pond where adequate removal of suspended solids can be achieved prior to returning to the environment via Findlay Creek. Water pumped from an existing or proposed ditch or other surface water features within the development area would be similarly discharged.

### **Determination of Water Taking Needs**

The groundwater pumping requirements for the future stages are expected to be similar to historical pumping requirements, which generally consisted of continuous pumping at a rate on the order of 1,000,000 litres per day (L/day) for four (4) to five (5) months with peaks for several days at pumping rates of approximately 10,000,000 L/day to 18,000,000 L/day. In order to facilitate the construction process under the permit, and in view of the need to achieve the required groundwater control in order to successfully carry out the servicing construction, it is considered appropriate to apply for the upper end of the range of expected inflows historically observed with deeper trenching into the bedrock. Therefore, a pumping rate of 17,020,800 L/day (equivalent to 2,600 Imperial gallons per minute or 11,820 litres per minute; L/min) is requested for the current permit.

A technical study in support of the PTTW application is provided in **Attachment 2**. An assessment of the potential impacts to identified receptors in the vicinity of the site is provided within the technical report.

**Information Required Under the Existing Permit to Take Water**

A PTTW (Number 0816-7E7L9S) was issued by the Ontario Ministry of the Environment (MOE) on May 2, 2008 for control of surface water drainage in order to complete the construction of the Findlay Creek Extension. This permit, which expires on November 30, 2008, allows for pumping at a maximum rate of 32,400,000 L/day (equivalent to 22,500 L/min), although as described in the application document the expected water taking requirements are far lower.

A second PTTW (Number 1446-76SP2H) was issued by the MOE for the dewatering of trenches associated with site servicing in Stage 2, Phases 1A, 1B and 2A. This permit expires on September 30, 2008 and allows for a dewatering rate of 17,020,800 L/day.

Monitoring data, including groundwater elevations and available pumping rates, collected under the existing permits are provided in the accompanying Groundwater Monitoring Report (Golder, 2008).

**Closure**

We trust this application and supporting material is satisfactory. Should you require any clarification or additional materials, please do not hesitate to contact the undersigned.

Yours truly,

**GOLDER ASSOCIATES LTD.**



Andrea Catley, M.A.Sc  
Environmental Consultant



Paul Smolkin, P.Eng.  
Principal

AC/JPAO/PAS/th

N:\Active\2007\1122 - Environmental\07-1122-0277 Findlay Creek PTTW\lrr rpt 08July8 Category 3 Application Letter.doc

**Attachments:**

Figure 1 - Site Plan

Attachment 1 - Completed Application Form, Proof of Legal Name and Schedule 1 Water Conservation Form

Attachment 2 - Technical Study in Support of a Category 3 Permit to Take Water Application

**Accompanying Document:**

**Golder Associates Ltd., April 2008. Groundwater Monitoring Report – Environmental  
Monitoring Program, October 2003 to March 2008, Findlay Creek  
Village, Ottawa, Ontario (Project No. 03-1120-846(1040)).**

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**ATTACHMENT 1**

**APPLICATION FORM, PROOF OF LEGAL NAME  
AND WATER CONSERVATION FORM**



Ontario  
Ministry of the Environment

RECEIVED

JUL 14 2008

## Application for Permit to Take Water

Ce formulaire est disponible en français

### For Office Use Only

Reference Number	Payment Received	Date (y/m/d)	Initials
4635 - 79FNDT	\$ 3000	08/07/11	KT

MINISTRY OF THE ENVIRONMENT  
ENVIRONMENTAL ASSESSMENT & APPROVALS BRANCH

### General Information and Instructions

#### General

Information requested in this form is collected under the authority of the *Ontario Water Resources Act*, R.S.O. 1990 (OWRA) and the *Environmental Bill of Rights*, C. 28, Statutes of Ontario, 1993, (EBR) and will be used to evaluate applications for a Permit to Take Water as required by Section 34 (OWRA).

#### Instructions:

- Applicants are responsible for ensuring that they complete the most recent application form.** When completing this form, please refer to the "Guide to Permit to Take Water Application Form" (referred to as the Guide). Application forms and supporting documentation are available from your local Regional or District Office of the Ministry of the Environment, and in the "Publications" section of the Ministry of the Environment website at <http://www.ene.gov.on.ca/envision/gp/index.htm>.
- Questions regarding completion and submission of this application should be directed to local Regional Office of the Ministry of the Environment. Contact information for these offices is available in the Guide or on the Ministry of the Environment website at <http://www.ene.gov.on.ca/envision/org/op.htm>
- This form must be completed with respect to all the requirements of the Guide for it to be considered an application for approval. **Incomplete applications will be returned to the applicant.**
- A complete application consists of:
  - a completed, signed application form
  - all required supporting information identified in this form and the Guide, and
  - a certified cheque or money order, in Canadian funds, made payable to the **Ontario Minister of Finance** for the application fee when required. Payment may also be made by Visa, MasterCard or American Express,

The Ministry may require additional information during the technical review of any application initially accepted as complete.

- The original application, along with supporting information and the application fee should be sent to:

Ministry of the Environment,  
Attention: Permit to Take Water  
Director, Environmental Assessment and Approvals Branch,  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario, M4V 1L5

- Information contained in this application form is not considered confidential and will be made available to the public upon request. Information submitted as supporting information may be claimed as confidential but will be subject to the *Freedom of Information and Protection of Privacy Act* (FOIPPA) and the EBR. If you do not claim confidentiality at the time of submitting the information, the Ministry of the Environment may make the information available to the public without further notice to you. If you are identifying confidential material, please indicate why you believe the information is confidential.

### 1. Permit Administration

Please indicate if this is an application for a:

- ☒ New Permit  
☐ Amendment to Permit (attach a photocopy of permit)  
☐ Renewal of Permit (attach a photocopy of permit)

### 2. Classification

Classification	Fee Required	No Fee Required
<input type="checkbox"/> Category 1	<input type="checkbox"/> \$750	<input type="checkbox"/> Reason _____
<input type="checkbox"/> Category 2	<input type="checkbox"/> \$750	<input type="checkbox"/> Reason _____
<input checked="" type="checkbox"/> Category 3	<input checked="" type="checkbox"/> \$3,000	<input type="checkbox"/> Reason _____



### 3. Applicant Information

Applicant Name <i>(legal name of individual or organization as evidenced by legal documents such as a copy of Driver's Licence or Master Business Licence)</i> Findlay Creek Properties Ltd. and 1374537 Ontario Limited		Business Identification Number 1364468 and 1374537	
Business Name <i>(the name under which the entity is operating or trading if different from the Applicant Name - also referred to as trade name)</i>			
Applicant Type: <input checked="" type="checkbox"/> Corporation <input type="checkbox"/> Individual <input type="checkbox"/> Partnership <input type="checkbox"/> Sole Proprietor		<input type="checkbox"/> Federal Government <input type="checkbox"/> Municipal Government <input type="checkbox"/> Provincial Government <input type="checkbox"/> Other <i>(describe):</i>	
		North American Industry Classification System (NAICS) Code 2   3   7   2   1   0	

### 4. Applicant Physical Address

Civic Address - Street information <i>(street number/name/type/direction/unit/suite/emergency 911 location number and street)</i> 237 Somerset Street West				
Municipality/Unorganized Township Ottawa	County/District Ottawa	Province/State ON	Country Canada	Postal Code K2P 0J3
Telephone Number <i>(including area code)</i> 613-238-2040		Fax Number <i>(including area code)</i>		E-mail Address pdufresne@tartanland.on.ca

### 5. Applicant Mailing Address

Same as Applicant Physical Address? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <i>If no, complete below</i>			
Civic Address - Street information <i>(street number/name/type/direction/unit/suite/emergency 911 location number and street/P.O.Box/Rural Route Number)</i>			
Municipality	Province/State	Country	Postal Code

### 6. Project Technical Information Contact

Same as Applicant? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If no, complete below</i>			
Name Andrea Catley		Company Golder Associates Ltd.	
Address Information:			
Same as Applicant Mailing Address? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <i>If no, please provide technical information contact mailing address below</i>			
Civic Address - Street information <i>(street number/name/type/direction/unit/suite/emergency 911 location number and street/P.O.Box/Rural Route Number)</i> 32 Steacie Drive			
Municipality Kanata	Province/State Ontario	Country Canada	Postal Code K2K 2A9
Telephone Number <i>(including area code &amp; extension)</i> 613-592-9600 ext. 4222		Fax Number <i>(including area code)</i> 613-592-9601	
		E-mail Address acatley@golder.com	

**7. Source Information – Note: Source Information must be provided separately for each source. Please complete and submit multiple copies of this Source Information section (pages 3 and 4 of this form) if your application includes more than one source.**

<b>Number of Water Taking Sources Included in this Application (do not include domestic uses that do not require a permit)</b>			
Total Number of Wells 0	Total Number of Lake Intakes 0	Total Number of Ponds 1	Total Number of Watercourse Intakes 0
<b>Source Location Information (if multiple sources are included in application, provide information for each source)</b>			
Civic Address - Street information (street number/name/type/direction/unit/suite/emergency 911 location number and street)			
Lot 18, 19 and 20	Concession IV	Part	Reference Plan
Municipality/Unorganised Township Ottawa	County/District Ottawa	Original Geographic Township Gloucester	
<b>Geographic (GPS) Coordinates (to be provided in Datum NAD83)</b>			
Method of Collection from OBM	Accuracy Estimate 50 m	UTM Zone 18	Easting 452680
			Northing 5018400
Is the Applicant the owner of the site where water taking will occur? <b>UTMs are for centroid of site, taking location will move around the site along the service trench alignment shown on Figure 1.</b>			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If no, attach the owner's name, address and a signed letter granting consent for the applicant to access the water taking location			
Is the site where water taking will occur located in an area of development control as defined by the <i>Niagara Escarpment Planning &amp; Development Act</i> ?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Is the site where water taking will occur located on the Oak Ridges Moraine Conservation Area as defined by the Oak Ridges Moraine Conservation Plan (a regulation made under the <i>Oak Ridges Moraine Conservation Act</i> )?			
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Are you aware of any complaints or impacts resulting from water takings at the site?			
<input type="checkbox"/> Yes If yes, please describe: _____ <input checked="" type="checkbox"/> No			
Will water from the site be packaged in a container (bottled water, tanks)?			
<input type="checkbox"/> Yes If yes, what size of containers? <input type="checkbox"/> greater than 20 litres <input type="checkbox"/> 20 litres or less <input checked="" type="checkbox"/> No			
Are wells located within 500 m of the site where water taking will occur?			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No if no, what is the distance to the nearest well? _____			
Is municipal water available to all dwellings within 500m of the site where water taking will occur?			
<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Unknown			
Estimated start date of water taking September 1, 2008	Water taking to extend for a period of: 10 <input type="checkbox"/> days <input type="checkbox"/> weeks <input type="checkbox"/> months <input checked="" type="checkbox"/> years <input type="checkbox"/> indefinite		
Is activity subject to the <i>Environmental Assessment Act</i> ?			
<input type="checkbox"/> Yes if yes, please attach approval or Notice of Completion <input checked="" type="checkbox"/> No			
If yes, did the project receive any Part II Orders / Bump-Up requests?			
<input type="checkbox"/> Yes if yes, what was the date of the Minister's Decision? _____ <input type="checkbox"/> Decision pending <input checked="" type="checkbox"/> No			
List any public consultation/notification that has occurred related to the proposed water taking (i.e., public hearings, notification of First Nations, etc.)			
N.A.			

☐ **Watercourse** - please complete this table if applying to take water from a watercourse (i.e., stream, municipal ditch, open drain, etc.)

Watercourse Name	Tributary to
Does flow in the watercourse stop at any time during the year?	
<input type="checkbox"/> Yes if yes, during which months? _____ For what period of time? _____ <input type="checkbox"/> No	
Do you move/relocate the water intake (pump)?	
<input type="checkbox"/> Yes if yes, please provide primary and secondary locations on attached map <input type="checkbox"/> No	





☐ **Well** - please complete this table if applying to take water from a well (includes sumps for mines and quarries)

Well Name / Identifier	Water Well Record Number	If not available, provide name of property owner at time of well construction
Has the well been deepened?		
<input type="checkbox"/> Yes if yes, what was the date of deepening? _____ <input type="checkbox"/> No		
Type of Well: <input type="checkbox"/> Drilled <input type="checkbox"/> Bored <input type="checkbox"/> Dug <input type="checkbox"/> Driven or Jetted (sandpoints/wellpoints)		
If 'Driven or Jetted', provide the following:		
Total number of sandpoints/wellpoints: _____		
Number of interconnected sandpoint/wellpoint systems: _____		
Can you measure the depth to water in this well?		
<input type="checkbox"/> Yes if yes, what is the depth to static water level? _____ Date Measured: _____ <input checked="" type="checkbox"/> No		
Has a pumping test been done?		
<input type="checkbox"/> Yes if yes, please attach report <input checked="" type="checkbox"/> No		

☐ **Lake** - please complete this table if applying to take water from a lake

Lake Name
-----------

☒ **Pond/Reservoir** - please complete this table if applying to take water from a pond/reservoir

Pond Name / Identifier				
Service Trench				
Was the pond constructed (man made)?				
<input checked="" type="checkbox"/> Yes if yes, please provide date of construction <u>between September 2008 to September 2018 (temporary)</u> <input type="checkbox"/> No				
Pond Size				
Average Length	Average Width	Average Depth of Water	Maximum Depth of Water	Approximate Volume of Pond
9 m	3 m	2 m	8 m	54 m <sup>3</sup> (average) 480 m <sup>3</sup> (worst-case)
Pond Type				
Select the diagram that most accurately resembles your pond:				
				
<input type="checkbox"/> online	<input type="checkbox"/> by-pass	<input type="checkbox"/> connected	<input checked="" type="checkbox"/> dugout	
Source of pond water (select all that apply)				
<input checked="" type="checkbox"/> Seepage / springs / groundwater				
<input checked="" type="checkbox"/> Surface water runoff (including tile drains, does not include watercourse or open channel)				
<input type="checkbox"/> Pumped water (if water is pumped into a pond, complete section information for source from which water is pumped - i.e., well, lake or watercourse)				
<input type="checkbox"/> Flowing water (watercourse, open drains, ditches, etc.)				
If "flowing water",				
1. Does water flow into the pond (inflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a structure to regulate the inflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____
2. Does water flow out of the pond (outflow)?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	
If yes, is there a control structure to regulate the outflow?		<input type="checkbox"/> Yes	<input type="checkbox"/> No	If yes, describe: _____

## **8. Public Consultation / Environmental Bill of Rights (EBR) Requirements**

Is this application for water taking to extend for a period of less than one year?		
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If no, this application may be subject to posting and/or public consultation requirements under the Environmental Bill of Rights. For more information, please refer to the Guide.
Is this application for agricultural use or aquaculture?		
<input type="checkbox"/> Yes	<input checked="" type="checkbox"/> No	If no, this application may be subject to posting and/or public consultation requirements under the Environmental Bill of Rights. For more information, please refer to the Guide.

## 9. Water Taking Volumes

Purpose Options for Water Taking	
	Purpose
Agriculture	irrigation of (includes frost protection): field and pasture crops; fruit orchard; market garden/flowers; nursery; sod farm; tender fruits; tobacco, other (must specify)
Commercial	aquaculture, bottled water, golf course irrigation, mall/business; snowmaking, other (must specify)
Dewatering	pits and quarries; construction; other (must specify)
Industrial	aggregate washing, brewing/soft drinks, cooling water, food processing, manufacturing; pipeline testing; power generation; other (must specify)
Institutional	school, hospital, other (must specify)
Recreation	aesthetic, fish pond, wetland, other (must specify)
Remediation	groundwater; other (must specify)
Water Supply	campground, communal, municipal, other (must specify)
Miscellaneous	dam/reservoir, heat pump, wildlife conservation, pumping test, other (must specify)

### **Water Source Information – Table A (Units in Litres)**

[illegible]

**10. Attachments**

The following must be attached for all applications (Category 1, 2 and 3) to be complete:

- ☒ **Map Requirements**  
On a 1:10 000 OBM (Ontario Base Map) (1:50 000 only acceptable in locations where 1:10 000 is not obtainable), mark and label:
  - all existing and proposed water taking locations with sources corresponding with source name
  - all of the following features within 500m of each source: existing wells (indicate use of existing well, springs, watercourses, wetlands, water bodies, property lines, locations and name of property owners, nearest road intersection, dwellings).
- ☒ Describe in detail how, where and when all water is obtained, stored, transferred, used and returned to the environment (if applicable). Details must include the source of all water takings (and corresponding source name if applicable), purpose of the water taking, period of water taking, and maximum quantity requested (see Guide for further instruction).  
Note: If your application is subject to posting on the Environmental Bill of Rights (EBR) Registry, this description will be used to create the Proposal Notice. The ministry may change the wording as required, to meet the EBR posting requirements.
- ☒ Describe how water taking needs (rates, amounts and time periods) were determined. Provide all relevant information and calculations to demonstrate the water takings requested are warranted. Calculation worksheets are available. Refer to Appendix E of the Guide.
- ☒ Attach completed water conservation Schedule 1.

The following must be attached for all Category 2 applications:

- ☐ Completed Schedule 2 and/or Schedule 3 signed by a Qualified Person.

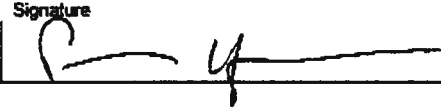
The following must be attached for all Category 3 applications:

- ☒ Golder Associates Report 07-1122-0277: "Hydrogeological Evaluation in Support of an Application for a PTTW, Study Future Stages, Findlay Creek Village Subdivision, Ottawa (Gloucester), Ontario, July 2008".

**11. Statement/Signature of Applicant**

I, the undersigned, hereby declare that to the best of my knowledge:

- The information contained herein and the information submitted in support of this application is complete and accurate in every way and I am aware of the penalties against providing false information.
- The Project Technical Information Contact identified in Section 6 if this form is authorized to act on my behalf for the purpose of obtaining this approval.

Print Name	Signature	Date (yyyy/mm/dd)
Pierre Dufresne		2008/06/23

**Ontario**

Ministry of the Environment

**Application for Permit to Take Water**

Ce formulaire est disponible en français

For Office Use Only			
Reference Number	Payment Received	Date (y/m/d)	Initials
4635-79FNDT	\$ 3000.00	08/07/11	KT

**12. Payment Information**

Application Category		Amount Enclosed	
<input type="checkbox"/> Category 1 (\$750)	<input type="checkbox"/> Category 2 (\$750) <input checked="" type="checkbox"/> Category 3 (\$3000)	\$ 3000.00	<input type="checkbox"/> no fee required
Method of Payment			
<input type="checkbox"/> Certified Cheque <input type="checkbox"/> Money Order <input type="checkbox"/> VISA <input type="checkbox"/> MasterCard <input checked="" type="checkbox"/> American Express			
Credit Card Information (if paying by VISA, MasterCard or American Express)*			
Name on Card (please print)		Credit Card Number	Expiry Date (yy/mm)
Pierre Dufrane		3733 745 316 92000	03/12
Cardholder Signature		Date (y/m/d)	
P ———— u		2008/06/23	

\*NOTE: credit card accepted for payments UNDER \$10,000.00 only.

# Appendix E

## Schedule for Water Conservation Measures

### Schedule 1 – Implementation of Water Conservation in accordance with Best Management Practices and Standards for the Relevant Sector

#### General Information and Instructions

##### Section 1: General Information

Information on this Schedule is collected under the authority of the *Ontario Water Resources Act, R.S.O. 1990* (OWRA), and the new *Environmental Bill of Rights, C. 28. Statutes of Ontario, 1993*, and will be used to evaluate applications for a Permit to Take Water as required by Section 34 (OWRA).

##### Instructions:

1. This Schedule forms part of the Permit to Take Water application form and is subject to all provisions and instructions where applicable.
2. All questions of Section 2 of this Schedule must be answered for this Schedule to be considered complete.

##### Purpose:

The purpose of this Schedule is to allow persons applying for a permit required by the Ministry to document in the application all water conservation measures and practices that are currently being undertaken or that is anticipated to be undertaken for the duration of the permit.

Persons applying for a permit are encouraged to take all reasonable and practical measures to conserve water and to be up to date with sector-specific best management practices and standards for water conservation (i.e. whether you are currently implementing or anticipate implementing water conservation best water management standards and practices relevant to your sector).

Various sector associations publish information on best practices that may be useful in determining practices and standards for water conservation. Examples of these sector-specific associations include the following:

- **Municipal Sector** – Ontario Water Works Association
- **Agricultural Sector** – Ontario Ministry of Agriculture (Fact Sheets and Guides on Best Management Practices containing information on efficient irrigation systems, staggering irrigation schedules and preparing Environmental Farm Plans)
- **Other Sectors** – For information on up-to-date best management practices and measures for water conservation, contact your relevant sector association.

Please note that this schedule may not be directly applicable to certain takings, such as pumping tests, instream uses, site dewatering and certain industrial processes. In these cases, consideration must be given to the fate of the water or system design requirements.

##### Section 2: Water Conservation Best Management Practices and Standards

Use this section of the Schedule to indicate what conservation measures and practices you are currently implementing or anticipate implementing. Where relevant, additional information can be attached as an appendix to this Schedule.

State your goals for reducing the use, loss or waste of water or for increasing the efficiency of water use (e.g., litres per day per unit of production or litres per day per capita for the residential sector).

## Schedule 1 continued

Check off which of the following water conservation best management measures and practices that you have implemented or will implement for the duration of the permit:

	Implemented	To be Implemented
Water Use Audit	<input type="checkbox"/>	N/A <input type="checkbox"/>
Universal metering of all users (municipalities)	<input type="checkbox"/>	N/A <input type="checkbox"/>
Water Efficient Fixtures/Equipment/Technology	<input type="checkbox"/>	N/A <input type="checkbox"/>
Develop and Implement an Overall Water Conservation and Efficiency Program	<input type="checkbox"/>	N/A <input type="checkbox"/>
Leak Detection/Loss Prevention/Control Program	<input type="checkbox"/>	N/A <input type="checkbox"/>
Public/Employee Information/Education/Outreach	<input type="checkbox"/>	N/A <input type="checkbox"/>
Landscaping techniques/Site and Urban Design Principles	<input type="checkbox"/>	N/A <input type="checkbox"/>
Water Efficient production processes/practices (e.g. re-use of water)	<input type="checkbox"/>	N/A <input type="checkbox"/>
Economic Incentives/Cost-Share/Full Costing recovery/tax credits/rebate programs	<input type="checkbox"/>	N/A <input type="checkbox"/>

Other (please specify): \_\_\_\_\_

Of the measures and practices checked off above, provide specific details of the best management practices applied or to be applied including equipment (e.g. pump specification), processes, such as water used for industrial production and/or irrigation system(s), current and proposed technology, approach, processes and procedures:

Groundwater is to be pumped for control during construction. Construction will be completed as quickly as possible and no more water than necessary will be pumped. The pumped water will be returned to the same drainage system shortly after the taking.

For the above measures and practices, list information relevant for your sector and/or other sources of information used in determining water conservation and efficiency management practices and measures:

List dates of when the best management measures and practices were or will be applied for the duration of the permit:

Identify any approval or certification that you have received for implementing water conservation and efficiency best management practices, e.g. Environmental Farm Plan, Audubon Cooperative Sanctuary Program for Golf Courses:





1374537

# CERTIFICATE

**This is to certify that these articles are effective on**

# CERTIFICAT

Ceci certifie que les présents statuts entrent en vigueur le

**OCTÓBER 27. OCTOBRE, 1999**

Prof. D. L. Linn

**Director / Directeur**  
**Business Corporations Act / Loi sur les sociétés par actions**

## ARTICLES OF INCORPORATION STATUTS CONSTITUTIFS

**Form 1  
Business  
Corporations  
Act**

• **Formule  
numéro 1  
Loi sur les  
compagnies**

1. The name of the corporation is: *Dénomination sociale de la compagnie.*

[illegible]

- 2. The address of the registered office is:** *Adresse du siège social:*

400-331 Cooper Street

(Street & Number or R.R. Number & if Multi-Office Building give Room No.)  
(Rue et numéro ou numéro de la R.R. et, s'il s'agit d'édifice à bureaux, numéro du bureau)

**Ottawa, Ontario**

(Name of Municipality or Post Office)  
(Nom de la municipalité ou du bureau de poste)

**K 2 P 0 G 5**  
(Postal Code / Code postal)

3. Number (or minimum and maximum number) of directors is: *Nombre (ou nombres minimal et maximal) d'administrateurs:*

Minimum 1 - Maximum 5

4. The first director(s) is/are:

**First Name, initials and surname**  
**Prénom, initiales et nom de famille**

**Premier(s) administrateur(s):**

**Address for service, giving Street & No. or R.R. No., Municipality and Postal Code**  
**Donnée: Rue, y compris la rue et le numéro, le numéro de la R.R., ou le nom de la municipalité et le code postal**

**Resident  
Canadian  
State  
Yes or No  
Resident  
Canadian  
Out/No**

**Wesley M. Nicol**

94 Ralph St. Ottawa, Ontario, K1S 5J4

**yes**

# Findlay Creek Co-Tenancy

June 11, 2007

Ministry of the Environment  
Attention: Permit to Take Water  
Director, Environmental Assessment and Approvals Branch  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario  
M4V 1L6

Re: Permit to Take Water

The purpose of this letter is to authorize Bruce Duffman to sign and act on the  
general behalf of Findlay Creek Properties Ltd. in relation to the Permit to  
Take Water application at Lot 18 and 20, Commission 5 and  
Lot 20, Commission 5 (L.S.).

Please do not hesitate to contact the applicant Bruce Duffman at (416) 298-  
2410 should there be any questions or concerns.

Yours faithfully,  
Bruce Duffman

Bruce Duffman  
Director, Environmental Assessment and Approvals Branch

Yours faithfully,  
Bruce Duffman

Bruce Duffman  
Director, Environmental Assessment and Approvals Branch

**ATTACHMENT 2**

**TECHNICAL STUDY IN SUPPORT OF  
A CATEGORY 3 PERMIT TO TAKE WATER APPLICATION**

**Golder Associates Ltd.**

32 Streacie Drive  
Kanata, Ontario, Canada K2K 2A9  
Telephone 613-592-9600  
Fax 613-592-9601



**REPORT ON**

**HYDROGEOLOGICAL EVALUATION  
IN SUPPORT OF AN APPLICATION FOR  
A PERMIT TO TAKE WATER  
FUTURE STAGES  
FINDLAY CREEK VILLAGE SUBDIVISION  
OTTAWA (GLOUCESTER), ONTARIO**

Submitted to:

Ministry of Environment  
Permit To Take Water  
Environment Assessment and Approvals Branch  
2 St. Clair Avenue West, Floor 12A  
Toronto, Ontario  
M4V 1L5

Attention: Director

**DISTRIBUTION:**

1 copy - Ontario Ministry of the Environment  
2 copies - Findlay Creek Co-Tenancy  
2 copies - Golder Associates Ltd.

July 2008

07-1122-0277



## TABLE OF CONTENTS

SECTION	PAGE
1.0 INTRODUCTION .....	1
2.0 REGIONAL SETTING .....	2
2.1 Site Description .....	2
2.2 Site Geology .....	2
2.3 Hydrostratigraphy .....	2
2.3.1 Overburden .....	3
2.3.2 Bedrock .....	3
2.4 Groundwater Flow .....	3
3.0 PROPOSED TEMPORARY GROUNDWATER CONTROL .....	4
3.1 Proposed Locations and Durations of Water Taking .....	4
3.2 Proposed Rates of Water Taking .....	5
4.0 AREA OF INFLUENCE FOR PROPOSED TEMPORARY GROUNDWATER CONTROL .....	7
4.1 Effects of Previous Groundwater Control Events .....	7
4.2 Area of Influence .....	8
4.3 Anticipated Drawdowns .....	9
5.0 RECEPTOR IDENTIFICATION .....	11
5.1 Water Supply Wells .....	11
5.2 Sensitive Areas and Surface Water Features .....	11
6.0 ASSESSMENT OF POTENTIAL IMPACTS .....	12
6.1 Potential Impacts to Existing Groundwater Users .....	12
6.2 Potential Impacts to Sensitive Areas and Surface Water Features .....	12
6.3 Potential Impacts Related to Contamination Sources .....	13
6.4 Potential Impacts to Structures .....	14
7.0 MONITORING PROGRAM .....	15
8.0 LIMITATIONS AND USE OF REPORT .....	16
REFERENCES .....	17

In Order  
Following  
Page 17

### LIST OF TABLES

- TABLE 1 - Drawdown Observed in July 2006  
TABLE 2 - Potential Sources of Contamination within the Area of Influence

### LIST OF FIGURES

- FIGURE 1 - Key Plan  
FIGURE 2 - Site Plan  
FIGURE 3 - East-West Section A-A'

FIGURE 4 - Area of Influence and MOE-Listed Water Wells

FIGURE 5 - Distance-Drawdown Curve Based on July 2006 Data

**ACCOMPANYING DOCUMENT**

Golder Associates Ltd., April 2008. Groundwater Monitoring Report – Environmental Monitoring Program, October 2003 to March 2008, Findlay Creek Village, Ottawa, Ontario (Project No. 03-1120-846(1040)).



## 1.0 INTRODUCTION

Golder Associates Ltd. (Golder Associates) is submitting this report in support of an application for a Permit to Take Water (PTTW) for temporary groundwater control during site servicing installation in future stages of the Findlay Creek Village development. The permit is being submitted on behalf of Findlay Creek Co-Tenancy (Findlay Creek Properties Ltd. and 1374537 Ontario Limited), the owners of the Findlay Creek Village development. IBI Group (IBI) is providing municipal design consulting services on this project.

Trunk servicing and residential site servicing are planned to be constructed in the area of the Findlay Creek Village development, Ottawa (Gloucester), Ontario. The general location of the Findlay Creek Village development is shown on Figure 1. As illustrated on Figure 2, there are five (5) future stages for the future development at the site: the southwestern future stage, the northwestern future stage, the central future stage, the northeastern future stage, and the southeastern future stage. It is noted that the central future stage and the northwestern future stage represent servicing connection corridors to the southwestern future stage and Leitrim Road, respectively, and not an area of future residential development.

Stage 1 and Stage 2 of the Findlay Creek development are under construction in the northeast and central portions of the site (see Figure 2). Temporary groundwater control during construction of Stage 1 was completed under previous PTTWs, and temporary groundwater control during construction of Stage 2, Phases 1A, 1B and 2A is being conducted under PTTW No. 1446-7G5P2H issued by the Ontario Ministry of the Environment (MOE) on February 22, 2008.

This report should be read in conjunction with the Groundwater Monitoring Report, dated April 2008 (Golder, 2008a), which describes the environmental monitoring program conducted at the site from October 2003 to March 2008.



## **2.0 REGIONAL SETTING**

### **2.1 Site Description**

The site is located in the City of Ottawa, Ontario. The site slopes gently towards the east, with major features including the Provincially Significant Leitrim Wetland (PSW) to the west and southwest of the existing development and Findlay Creek to the south, flowing in an easterly direction. Surrounding land uses are predominantly rural in nature and include both residential and commercial buildings. The general land uses and features of this application are shown on Figure 2.

One parcel of land in the southeastern future stage, identified as “PWGSC Lands” on Figure 2, is not currently owned by the applicant. Water taking from this area will only occur if the applicant is successful in purchasing these properties.

### **2.2 Site Geology**

Geological conditions in the area of the site are known from the results of site-specific subsurface investigations, as well as published information and MOE water well records. In the western and central portions of the Findlay Creek Village lands there is a significant thickness of fine-grained overburden (silty sand, sandy silt) overlying glacial till. The overburden in the eastern part of the development lands is predominantly glacial till. In the southwest portion within the PSW there is a layer of peat/organic soil overlying the fine-grained soils. The thickness of overburden decreases towards the east as the elevation of the dolomite bedrock rises, as illustrated in the east-west cross-section shown on Figure 3 (cross-section location is shown on Figure 2). In the southeast part of the site adjacent to Bank Street, the bedrock is within about 2 metres (m) to 4 m of ground surface, whereas in the western future stage, the overburden thickness ranges from approximately 10 m to 15 m.

Bedrock underlying the Leitrim residential development area has been shown through investigation to consist of dolomite of the Oxford Formation. The Oxford Formation consists mainly of thin to thickly bedded dolomite with shaley interbeds.

### **2.3 Hydrostratigraphy**

The hydrostratigraphy of the site is described in the following subsections.

### **2.3.1 Overburden**

Completion of MOE water well records is required for all drilled wells. However, many wells completed in overburden are constructed by methods other than drilling (i.e., excavation) and records are not generally kept for all overburden dug wells. This makes it difficult to interpret the occurrence, extent and use of overburden aquifers in the area.

An overburden aquifer may be associated with the glacial till if it is mainly comprised of coarse grained materials, which is not the case in the area of this site. Most drillers bypass the till and complete wells in bedrock to avoid having to screen the well, and to increase available drawdown. This is particularly true if the bedrock in the area is known to be capable of producing water in adequate quantity and of acceptable quality. Although the glacial till may be used infrequently, the principal aquifer for water supply within the area of this site are water bearing zones within the bedrock.

### **2.3.2 Bedrock**

The main aquifer in the area of the site consists of water bearing zones at varying depths within the dolomite bedrock that is present to the west of the Gloucester Fault. The Oxford Formation dolomite is known for its favourable water bearing characteristics.

## **2.4 Groundwater Flow**

Groundwater is transmitted under natural conditions or under the influence of pumping wells, primarily through permeable layers of surficial deposits and through networks of fractures in bedrock (bedding planes, joints and faults).

In the overburden, groundwater flows onto the Findlay Creek Village development from a sand and gravel ridge to the southwest, and from the topographically higher lands to the north towards Findlay Creek in the southeast. Groundwater flow across the development lands is generally eastward or north-eastward in the overburden. Regional groundwater flow in the bedrock is known from previous studies to also be eastward. The interpolated groundwater level contours and flow direction in the overburden from August 24, 1998 are illustrated in Figure 3 of the accompanying Groundwater Monitoring Report (Golder, 2008a).

### **3.0 PROPOSED TEMPORARY GROUNDWATER CONTROL**

#### **3.1 Proposed Locations and Durations of Water Taking**

Future stages of the development, and associated servicing installations, are planned for the southwestern, northwestern, central, southeastern and northeastern future stages of the site, as illustrated in Figure 2. The anticipated timelines for development of the future stages are highly dependant on market conditions and house sales, such that servicing needs are to be completed sufficiently in advance so that lots are available as needed for advance sales and for construction. The general timeline for development of the future stages is from September 1, 2008 to September 1, 2018, and the currently estimated construction dates for each stage are shown on Figure 2.

Trunk servicing and residential site servicing will be installed in the future stages of the proposed development. This construction will involve the excavation of trenches through overburden, as well as some excavation through the upper few metres of bedrock. In areas where the excavation will extend below the groundwater table and into the upper bedrock, temporary groundwater control by pumping along the alignment will be required to complete the construction. Due to the higher elevation and thicker overburden in the southwestern and northwestern future stages, excavation in bedrock is not anticipated in these areas.

Previous future stages of trunk servicing construction and residential site servicing have been completed on the site under several PTTWs from 2003 to 2006 as described in the table below and illustrated on Figure 2 of the accompanying Groundwater Monitoring Report (Golder, 2008a). Due to the highly permeable and fractured nature of the upper bedrock, temporary groundwater control has been required when the service installations extended into the upper portion of bedrock. Groundwater control requirements in trenches completed in overburden have typically been much smaller and have not required a PTTW. Groundwater control has typically taken place over a four (4) to five (5) month period in the winter/spring and in the fall, and has not been shown to cause adverse effects to the long-term groundwater levels within the Leitrim Wetland, as described in the accompanying Groundwater Monitoring Report (Golder, 2008a). Therefore, temporary groundwater control for the future stages is planned to be conducted for similar durations throughout the winter/spring and fall.

Excavations will be made along the Service Trench alignment (shown on Figure 2) to allow for the installation of the required services. The open portion of the Service Trench would typically be limited to a maximum of 15 metres long and 4 metres wide. The depth of the excavations will vary along the alignment, but the maximum depth will be approximately 8 metres. The average Service Trench dimensions will be approximately 9 metres long, 3 metres wide and 4 metres deep. Water entering the excavation will be pumped using a submersible pump.

<b>Trench Section</b>	<b>Period of Groundwater Control</b>	<b>Permit No.</b>	<b>Maximum Allowable Pumping Rate</b>
Findlay Creek Drive (Bank Street to Long Point Circle)	January 2003 – May 2003	03-P-4001	6,456,240 L/day
Findlay Creek Drive (Long Point Circle to Kelly Farm Drive)	January 2004 – April 2004	04-P-4004	10,476,984 L/day
Kelly Farm Drive (Findlay Creek Drive to north end)	January 2005 – May 2005	5246-66JMCD	13,747,380 L/day
Findlay Creek Drive west of Kelly Farm Drive and Deep trunk storm sewer to SWMP	September 2005 – November 2006	3860-6G9PVQ	51,580,800 L/day

Historically, groundwater pumped from the excavations has been discharged in one of three manners: to a settling pond, then to Findlay Creek (prior to October 2006); to the storm sewer system and Stormwater Management Pond (SWMP) (following its completion in October 2006); or to a settling pond, then into the wetland fringe (in early 2006) to encourage recharge in the wetland fringe as required. It is proposed that water pumped from the service trenches for the current permit be discharged into the storm sewer system, and then into the SWMP, where adequate removal of suspended solids can be achieved.

### **3.2 Proposed Rates of Water Taking**

The proposed pumping rate is based on historical pumping data at the site. Pumping rates used during the excavation of the deep trunk storm sewer are available from September 7, 2005 to August 8, 2006 and are shown on Figure 14 of the accompanying Groundwater Monitoring Report (Golder, 2008a). Typically, the pumping rates during this period were on the order of 1,000,000 litres per day (L/day) with peaks for several days up to 10,000,000 L/day and 18,000,000 L/day in July 2006. These rates were found to be sufficient to effectively facilitate groundwater control in the sewer excavations. Note that the peak pumping rates during this period are only about one-third of the maximum allowable pumping rate (51,580,800 L/day). This is fairly typical of construction pumping requirements compared to the maximum allowable pumping rate and total duration of pumping. A conservatively high maximum pumping rate is requested in an attempt to ensure that the trench can be initially pumped hard enough to quickly lower the water levels; a lower pumping rate is then needed to maintain the lowered water levels to complete the construction.

In order to facilitate the construction process under the permit, and in view of the need to achieve the required groundwater control in order to successfully carry out the sewer construction, it is considered appropriate to apply for the upper end of the range of expected inflows historically observed with deeper trenching. Therefore, a pumping rate of 17,020,800 L/day (equivalent to

2,600 Imperial gallons per minute or 11,820 litre per minute; L/min) is requested for the current permit.

## **4.0 AREA OF INFLUENCE FOR PROPOSED TEMPORARY GROUNDWATER CONTROL**

### **4.1 Effects of Previous Groundwater Control Events**

Previous site servicing and trunk sewer installations at the site have resulted in temporary groundwater level drawdown at some of the groundwater monitors installed under the approved Environmental Management Plan (EMP) (CCL/IBI Group and Golder Associates, 2003 and 2005). Groundwater level monitoring using dataloggers has been continuous at these monitors since October 2003. In addition, two of the monitors were equipped with dataloggers in 1998. Groundwater elevations from October 2003 to March 2008 for all sixteen (16) monitors, whose locations are given in Figure 2, are presented in Figures 7 through 13 of the accompanying Groundwater Monitoring Report (Golder, 2008a).

The proposed pumping rate of 17,020,800 L/day is close to the maximum pumping rate observed in July 2006; therefore, drawdowns observed at the groundwater monitors during this period were tabulated (see Table 1) and used as a basis for calculating the radius of influence of the proposed temporary groundwater control measures. Note that July 2006 corresponds to a period of close to average monthly precipitation based on precipitation records from the Ottawa Airport Station measured by Environment Canada (see Figures 7 to 13 of the accompanying Groundwater Monitoring Report (Golder, 2008a)).

In July 2006, six (6) to seven (7) pumps were operational along the deep trunk sewer servicing area. The approximate geographical centre (i.e., centroid) of the pumping locations was established (see Figure 4) and the distance to each monitor from this point was measured (see Table 1). Drawdowns were estimated based on the minimum elevation observed in July 2006 subtracted from the average elevation of the monitors from baseline monitoring ("baseline" monitoring refers to monitoring in 1998) and pre-berm monitoring ("pre-berm" monitoring refers to monitoring from October to December 2003). Baseline and pre-berm conditions represent natural background groundwater levels in the wetland at the monitor locations prior to development and prior to construction of the berm, respectively. The Wetland Berm, built around the northern and eastern edges of the PSW in early 2004, is a component of the approved external stormwater management system that separates the wetland regime from the development area drainage.

Monitors BH03-7 and BH03-9 are the closest monitors to the fen areas identified in the eastern portion of the PSW, and were installed to monitor groundwater levels in the overburden and bedrock near these more sensitive areas. The remaining monitors were installed to monitor groundwater levels in the PSW fringe area close to the residential subdivision (BH97-2, BH03-8, BH03-10) and in the area along the Findlay Creek Extension (BH03-1 to BH03-6). Although all monitors were included in determining the expected radius of influence, it is important to note

that the PSW is the most sensitive potential receptor. As such, it is considered appropriate to regard the potential drawdown from groundwater control at this receptor as being the most significant.

As shown in Table 1, the largest drawdowns in July 2006 were observed at monitors BH03-10A and BH03-10B. This is expected because these monitors are located closest to the pumping and outside of the PSW and berm. The next largest drawdowns were observed at monitors BH97-2A and BH97-2B, which are the next closest monitors to the pumping. Bedrock monitor BH03-8A experienced a moderate drawdown of 1.2 m, while the overburden monitor at the same location experienced an increase in water level.

In July 2006, the maximum groundwater drawdown observed in the overburden and bedrock monitors at BH03-7 and BH03-9 ranged from 0.3 m to 0.6 m and 0.3 m to 0.9 m, respectively (Table 1). Monitors BH03-7 and BH03-9 are located approximately 700 m and 800 m from the geographical centre of the various pumps, respectively. Overburden monitors BH03-1 through BH03-6 experienced nil to small drawdowns (ranging from 0.0 m to 0.7 m).

#### **4.2 Area of Influence**

The data from Table 1 was used to create a distance-drawdown graph as shown in Figure 5A. When the x-axis (approximate distance from the centroid of the pumping locations) is logarithmic, as shown in Figure 5A, the distance-drawdown relationship can be fairly accurately represented by a straight line. When converted to a non-logarithmic scale, the relationship is shown on Figure 5B. The drawdown curve for a pumping rate of approximately half of the proposed maximum pumping rate (8,510,400 L/day) has also been plotted on Figures 5A and 5B for reference. Figure 5B shows that the expected drawdown at 1,000 m from the centroid of the pumping locations, for the proposed pumping rate, is approximately 0.5 m, and that at 1,700 m, the groundwater levels should be unaffected by the pumping (i.e., zero drawdown).

The difference in the drawdown observed in the overburden and bedrock for paired monitors is equal to or less than 0.3 m, except for monitor BH03-8, where the difference is 1.6 m. This is likely indicative of a hydraulic connection between the overburden and the bedrock, as discussed in Section 2.4 of the accompanying Groundwater Monitoring Report (Golder, 2008a). As such, the same distance-drawdown curve, given in Figures 5A and 5B, is used to represent drawdown in overburden and bedrock.

Monitors BH03-7A, BH03-7B and BH03-9B, located near the PSW fen areas, were found to experience significantly less temporary drawdown than predicted by the distance-drawdown curve, as evidenced by their position above the curve on Figure 5B. As such, a potential radius of influence of 1,000 m for the site servicing installation has been assumed for the purposes of this PTTW application. This radius of influence estimate, which corresponds to an expected

temporary drawdown of approximately 0.5 m, is conservatively based on a worst-case scenario of deep excavation through near-surface bedrock, in order to consider the upper end of the range of expected inflows. The potential area of influence for the future stages is shown on Figure 4.

The servicing in the northwestern future stage will only extend 2.5 metres into the overburden along the side of Albion Road. Since Albion Road has been built up above the original grade, it is expected that the excavation will only extend 1.0 to 1.5 metres below the original grade and that only minor groundwater pumping will be required. Should a small amount of groundwater pumping be required in this area, the radius of influence would be very small and certainly much smaller than 1,000 m and would almost certainly not extend beyond the 1,000 m radius of influence measured from the edge of the southwestern future stage (which extends at least 150 m beyond the edge of the northwestern future stage as shown in Figure 4).

### 4.3 Anticipated Drawdowns

The distance-drawdown curve (Figure 5B) was used to estimate potential temporary drawdowns associated with the proposed groundwater control activities from servicing the future stages, as shown in the table below. This table represents the worst-case scenario as the distances given are the minimum possible distances from the monitors to the boundaries of the future stages. Since actual groundwater control activities will likely occur closer to the interior of the future stages, this provides an overestimate of potential drawdown.

Development Future stage	Minimum Distance to Monitor		Anticipated Drawdown			
	BH03-7A/B	BH03-9A/B	BH03-7A	BH03-7B	BH03-9A	BH03-9B
Southwestern	550	400	<0.60	<0.60	0.60	<0.60
Northwestern	1200	1300	negligible	negligible	negligible	negligible
Central	850	700	<0.35	<0.35	0.90	<0.90
Southeastern	200	300	<1.20	<1.20	1.90	<1.90
Northeastern	1050	1000	<0.25	<0.25	0.50	<0.50

As noted in Section 4.2, monitors BH03-7A, BH03-7B and BH03-9B experienced significantly less drawdown in July 2006 than predicted by the distance-drawdown curve. For monitors BH03-7A and BH03-7B, the observed drawdown was less than half of the predicted drawdown (Figure 5B). Therefore, anticipated drawdowns for these monitors, shown in the above table, were calculated to be less than half of the value derived from the distance-drawdown curve (Figure 5B).

As described in Section 4.2, temporary groundwater control is unlikely to be required in the shallow excavation in the northwestern future stage. However, if groundwater pumping were required, the small volume of water to be pumped and distance to monitors BH03-7 and BH03-9 are not expected to cause drawdown at these monitors (nor in any other areas of the PSW).



The anticipated temporary drawdowns estimated for pumping within the southwestern future stage are likely significantly overestimated since service installations in the southwestern stage are expected to be conducted entirely in overburden materials and pumping requirements are expected to be small (the data in the above table assumes deep excavation through near-surface bedrock). This expectation for the southwestern future stage is supported by water level monitoring during the fall of 2007 when servicing was installed in Stage 2, Phase 1A; this servicing was entirely within the silty overburden soils, and required minimal pumping to complete. The anticipated drawdowns predicted for groundwater control activities associated with the southeastern future stage are likely an overestimate as well, since the distance-drawdown curve was derived based on deeper trunk sewer servicing across the southeastern future stage and the future installations in this stage will consist of shallower residential servicing.

If variations in overburden groundwater levels are short-term in nature, impacts to vegetative communities within the fen are not expected to occur. Once pumping stopped following previous historical groundwater control events, overburden and bedrock groundwater levels were observed to quickly recover to pre-pumping levels (i.e., within hours to a few days). The observations in 2006 and 2007 by biologists conducting the photomonitoring in these areas of the PSW (Golder, 2008b) have not indicated adverse effects. As mentioned in Section 3.2, the groundwater pumping requirements for the future stages are expected to be similar to historical pumping requirements (i.e., continuous pumping at a rate on the order of 1,000,000 L/day for four (4) to five (5) months with peaks for several days with pumping rates of approximately 10,000,000 L/day to 18,000,000 L/day).

## **5.0 RECEPTOR IDENTIFICATION**

### **5.1 Water Supply Wells**

MOE water well records indicate 101 wells within 1,000 m of the future development stages. The well locations and the extent of City's municipal water service within the area of interest are shown on Figure 4. Ninety four (94) of these wells are located in areas that are serviced by the City's municipal water supply (Bank Street, Analdea Drive, Quinn Road, Fenton Road, Leitrim Road and Del Zotto Avenue, and the west end portion of Blais Road). It is understood that all buildings in proximity to these municipally-serviced areas use municipal water.

Of the remaining seven (7) wells located within 1,000 m of the future stages, five (5) wells are considered to be in error since there is no development at or in proximity to these locations. These wells consist of records 1510830 and 1512009 on the west side of Albion Road, record 1528501 located south of the future stages, and records 1517463 and 152823 on the east side on Bank Street.

The remaining two (2) wells (records 1501815 and 1501812) are located along Albion Road near residential dwellings. Based on the MOE well record database, assessed on May 13, 2008, both wells are used for domestic purposes and were drilled in the 1960s. The wells range in depth from 13.4 m to 28.3 m and the static water levels ranged from 3 metres below ground surface (mbgs) to 5.2 mbgs at the time of construction.

### **5.2 Sensitive Areas and Surface Water Features**

The Leitrim PSW is located to the south of the western future stage and to the west of the southeastern future stage. It is a Class 1 wetland.

## **6.0 ASSESSMENT OF POTENTIAL IMPACTS**

### **6.1 Potential Impacts to Existing Groundwater Users**

The only two potential groundwater users within the area of influence are located 900 m to 1,000 m from the southwestern future stage and 1,500 m to 1,600 m from the southeastern future stage. At these distances from the proposed excavation, a temporary drawdown of approximately 0.5 m and 0.1 m would be expected based on groundwater control for a deep excavation through near-surface bedrock in the southwestern and southeastern future stages, respectively. The available drawdown of these wells ranges from approximately 8.2 m to 25.3 m; therefore, a temporary drawdown of 0.1 m to 0.5 m would be inconsequential. Moreover, in the southwestern future stage, excavation through bedrock is not anticipated and drawdown associated with the shallow servicing in this area, if any, should be considerably less than the drawdown associated with deeper servicing in bedrock.

Given the shallow nature of the proposed servicing in the southwestern future stage, the distance from the proposed excavation, and the abundant available drawdown of the two domestic wells, the wells should not be adversely affected by temporary groundwater control activities at the site.

### **6.2 Potential Impacts to Sensitive Areas and Surface Water Features**

As mentioned in Section 4.3, overburden and bedrock groundwater levels have been found to quickly recover to pre-pumping levels once groundwater pumping has ceased. The observations in 2006 and 2007 by biologists conducting photomonitoring in the PSW areas have not indicated adverse effects due to groundwater control activities (Golder, 2008b). Since the proposed groundwater taking regime is similar to historical groundwater pumping durations and rates, it is anticipated that the proposed pumping will not impact the function of the Leitrim PSW. If water taking is required within the overburden or to control surface water, they are not expected to impact the function of the PSW. In addition, no adverse long-term changes in water quantity or quality are expected due to the proposed temporary groundwater control activities.

It is possible that the piezometric level in the bedrock beneath the eastern fringe of the PSW could be temporarily lowered by pumping from trench excavations in the bedrock in the future stages. Any such lowering will be for short duration and is expected to potentially have only limited temporary effects on the overlying groundwater table in the overburden, and consequently not have adverse effects on the PSW vegetation in the fringe area.

### 6.3 Potential Impacts Related to Contamination Sources

A search of the City of Ottawa's Historical Land Use Inventory (HLUI) revealed 56 potential sources of contamination within 1,000 m of the proposed site servicing installations, as listed in Table 2. Of these potential sources, 37 are associated with industries that began in the 1990s or later (the approximate year(s) of operation are indicated in Table 2). Due to the age of these industries, contamination is unlikely. Of the remaining 19 potential sources of contamination, 13 potential sources are located cross-gradient or downgradient of the site (either along Bank Street, Fenton Road, Southclark Place or Leirrim Road). Note the northeast to easterly groundwater overburden flow direction shown in Figure 3 of the accompanying Groundwater Monitoring Report (Golder, 2008a). Given the location of these industries, it is not likely that the temporary pumping for construction will induce migration of potential contamination from these industries.

The remaining six (6) potential sources are located in proximity to Del Zotto Avenue (i.e., potentially upgradient of the site) and within 1,000 m of the northwestern and southwestern future stages. One of these sources consists of a former special waste compound and former municipal landfill. There are two contaminated groundwater plumes that originate from this area: the Municipal Waste Plume (MWP) and the Special Waste Plume (SWP). According to Franz Environmental Inc. (Franz, 2003), the chemical compounds originating from these plumes are within the shallow and deep capture zones of a remediation system along Del Zotto Avenue, with the exception of 1,4-dioxane.

Monitoring conducted by Transport Canada in 2006 has indicated that the 1,4-dioxane plume has migrated approximately 300 m east of Albion Road. 1,4-dioxane was detected in wells to the east of Albion Road with screened intervals ranging from 3.0 mbgs to 14.7 mbgs. The highest concentration of 1,4-dioxane measured during the sampling events in 2003 to 2006 was more than 1,700 times less than the site-specific risk-based criterion established during the Area Wide Risk Assessment (Franz, 2003) and Supplemental Risk Assessment (Franz, 2002). Despite the high solubility of 1,4-dioxane, the migration of the contaminant plume due to temporary groundwater pumping is considered unlikely to be affected due to the shallow nature of the proposed servicing (in overburden) anticipated for the northwestern and southwestern future stages in comparison to the depth of the groundwater plume. In addition, the low concentrations of 1, 4-dioxane reduces any risk associated with potential migration.

Of the five (5) remaining potential sources, four (4) are located along Del Zotto Avenue and one (1) is located between Quinn Road and Del Zotto Avenue. No known subsurface contamination is associated with any of these potential sources; however, if contamination were present it would not be expected to be affected by the temporary pumping associated with servicing in the northwestern and southwestern future stages.

#### **6.4 Potential Impacts to Structures**

There are no deposits of sensitive clays identified within the predicted radius of influence. Therefore, no impacts to structures are anticipated.

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## **7.0 MONITORING PROGRAM**

A groundwater monitoring program is currently in place at the Leitrim PSW; this component of the approved EMP currently entails hourly measurement and logging of groundwater levels at sixteen (16) wells in and around the PSW. The logged results are currently downloaded and reviewed on a monthly basis; PTTWs issued to date for specific water takings/servicing have specified groundwater monitoring requirements and more frequent downloading and review during periods of pumping.

The groundwater monitoring obligations under the approved EMP are limited to monthly review of groundwater monitoring results from monitors 97-2, 03-7, 03-8, 03-9 and 03-10 for 12 months following the completion of the external storm system, and monthly review of groundwater monitoring results from monitors 03-1, 03-2, 03-3, 03-4, 03-5 and 03-6 for 3 months following the completion of the Findlay Creek Extension. The future groundwater monitoring program at the Leitrim PSW will be reassessed once the obligations under the approved EMP are fulfilled, with the current plans being to transfer the wells and monitoring to South Nation Conservation (SNC). These groundwater monitors are available during servicing of the future stages for water level monitoring, as required. The groundwater monitoring program will be carried out by an external consultant or by SNC, who will communicate as required with the contractor, the developer and the MOE.

## 8.0 LIMITATIONS AND USE OF REPORT

This report was prepared for the exclusive use of Findlay Creek Co-Tenancy. The report, which specifically includes all tables, figures and appendices, is based on data gathered by Golder Associates Ltd., and information provided to Golder Associates Ltd. by others. The information provided by others has not been independently verified or otherwise examined by Golder Associates Ltd. to determine the accuracy or completeness. Golder Associates Ltd. has relied in good faith on this information and does not accept responsibility for any deficiency, misstatements, or inaccuracies contained in the information as a result of omissions, misinterpretation or fraudulent acts.

The services performed as described in this report were conducted in a manner consistent with that level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made, or actions taken based on this report.

### GOLDER ASSOCIATES LTD.



Andrea Catley, M.A.Sc.  
Environmental Consultant



Paul Smolkin, P.Eng.  
Principal

AC/JPAO/PAS/th

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## REFERENCES

Cumming Cockburn Ltd. and Golder Associates Ltd., March 2003. Environmental Management Plan, Leitrim External Storm System, City of Ottawa (CCL Project No. 3247-MU-03).

Franz Environmental Inc., August 2002. Former Gloucester Landfill – Supplemental Risk Assessment for Proposed Future Growth Area East of Albion Road.

Franz Environmental Inc., July 2003. Former Gloucester Landfill – Area Wide Risk Assessment.

Golder Associates Ltd., April 2008(a). Groundwater Monitoring Report – Environmental Monitoring Program, October 2003 to March 2008, Findlay Creek Village, Ottawa, Ontario (Project No. 03-1120-846(1040)).

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Ontario Ministry of Natural Resources. 2006. Ontario Base Map data.



TABLE 1: DRAWDOWN OBSERVED IN JULY 2006

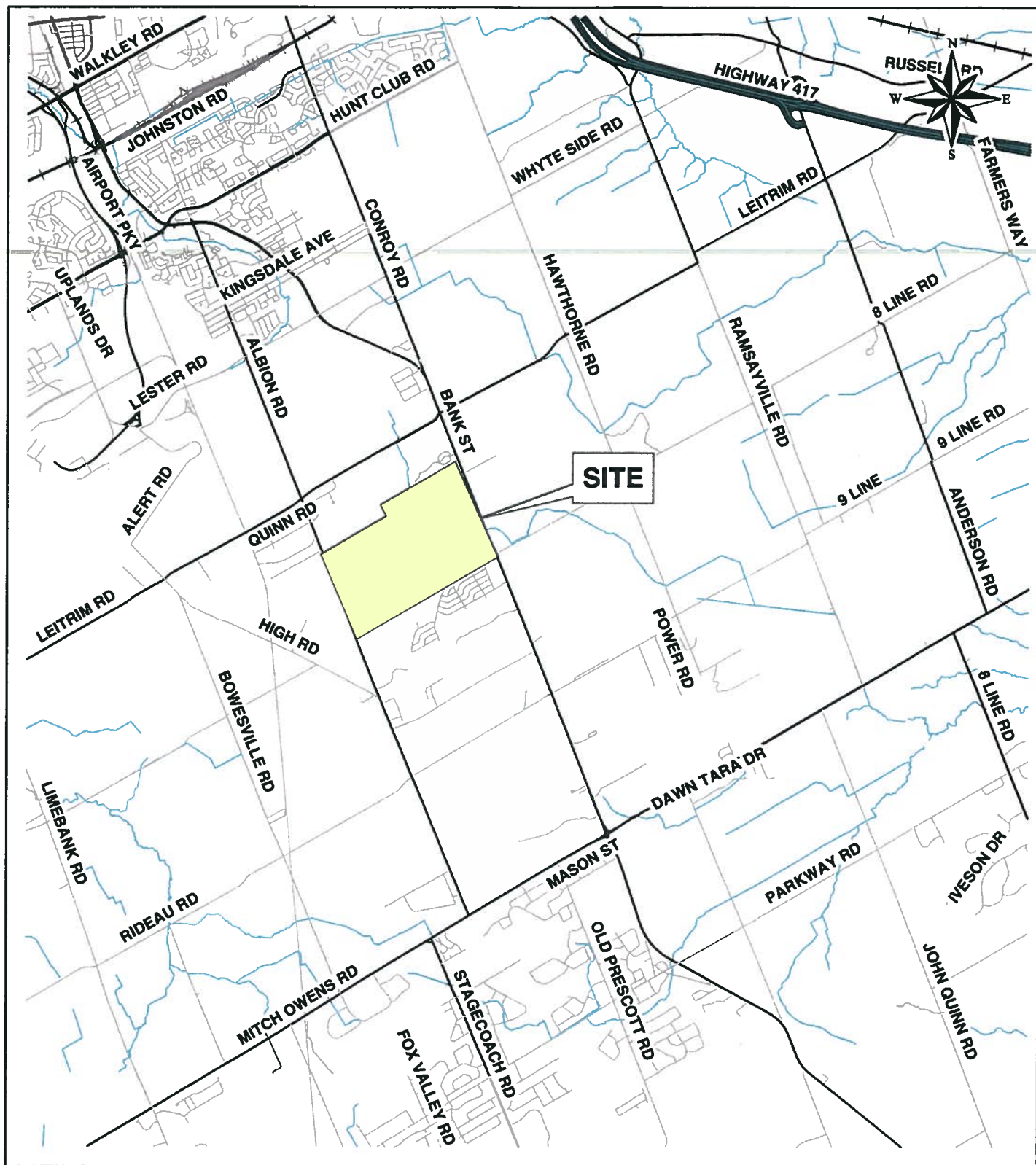
Monitor	Interval Monitored	Approximate Distance from Centroid of Pumping Locations (m)	Average Groundwater Elevation From Data Collected from 1998 and 2003 (Baseline and Pre-Berm Conditions) (m)	Minimum Groundwater Elevation in July 2006 (m)	Maximum Drawdown (m)
BH03-1	overburden	1,600	94.69	94.7	0.0
BH03-2	overburden	1,600	94.91	94.8	0.1
BH03-3	overburden	1,500	93.77	93.5	0.3
BH03-4	overburden	1,500	93.87	93.8	0.1
BH03-5	overburden	1,000	93.18	92.5	0.7
BH03-6	overburden	1,000	92.83	92.5	0.3
BH03-7A	bedrock	700	93.51	93.2	0.3
BH03-7B	overburden	700	93.21	92.9	0.3
BH03-8A	bedrock	650	91.77	90.6	1.2
BH03-8B	overburden	650	92.60	93.0	-0.4
BH03-9A	bedrock	800	93.10	92.2	0.9
BH03-9B	overburden	800	93.49	92.9	0.6
BH03-10A	bedrock	500	91.87	90.5	1.4
BH03-10B	overburden	500	91.97	90.3	1.7
BH97-2A	bedrock	600	92.68	91.4	1.3
BH97-2B	overburden	600	92.43	91.4	1.0

**TABLE 2: POTENTIAL SOURCES OF CONTAMINATION  
WITHIN THE AREA OF INFLUENCE**

Approximate Year(s) of Operation	Location	Description
1949 - 1986	southeast of Albion Road and Leitrim Road (adjacent and to the west of the railway tracks)	Hazardous waste dump and municipal landfill operated by the Township of Gloucester from 1949 to 1975 and by Government of Canada Transport Canada from 1969 to 1986
1964	east of Bank Street and north of Leitrim Road	Unnamed Waste Disposal Site
1967 - 1985	east of Bank Street to the north and south of Leitrim Road;	Canadian Forces Station: contains 2 sewage lagoon cells and telecommunication and radio transmitters
1919 - 1999	south side of Leitrim Road between Bowesville Road and Albion Road;	Aviall Canada Ltd. (1998), Kenting Earth Sciences Intl. Corp. (1994), Ottawa International Airport/CFB Ottawa (1919-1999), 4 vertical tanks (1967 - 1985) and 2 horizontal tanks (1985), Uplands Airport (1922)
1972 - 1981	south side of Leitrim Road between Albion Road and Bank Street	City of Gloucester Leitrim Work Site and Garage: contains bulk salt and sand storage, truck and heavy equipment storage and repairs, 3 pumps (gas and diesel)
1973	2764 Fenton Road	Applied Insulation
1973	2773 Fenton Road	Anker Fence
1973	Southclark Place	Curbex of Canada Ltd.
1973	2793 Fenton Road	P.E. Brule Company Ltd.
1976	south side of Del Zotto Avenue	Curbex of Canada Ltd.
1976 - 1999	2590 Del Zotto Avenue	Weldon Shouldice Contracting
1977	2740 Fenton Road	Nortec Air Conditioning Industries Ltd.
1978	4210 Del Zotto Avenue	Del Zotto's
1979	Del Zotto Avenue	McCaffrey Welding Ltd.
1979	east side of Bank Street south of Blais Road	Pri-Tec Ltd. Universe Tractor and Equipment Ltd. on the
1973 - 1998	4806 Bank Street	Doms Auto Body and N. Di Bello
1986 - 1998	4949 Bank Street	United Aggregates Ltd. at
1986 - 1994	2730 Fenton Road	Otal Precision Company Limited
1989 - 1998	4726 Bank Street	W O Stinson & Son Ltd. Fuels
1993	4531 Southclark Place	Delisle Yogourt
1994	2783 Fenton Road	Cam-Tag Industries Inc.
1994	2615 Del Zotto Avenue	Ottawa Greenbelt Construction
1994	4550 Bank Street	Corporation of the City of Gloucester
1994	2790 Fenton Road	Millimeter Machine Stop Ltd.
1994	2595 Del Zotto Avenue	M.A. Thompson Cartage Ltd.
1994	2510 Del Zotto Avenue	Robert B. Somerville Co. Ltd.
1994	4836 Bank Street	UCO Petroleum Inc.
1994	4794 Bank Street	Superior Roof Truss
1994	4294 Hawthorne Drive	Gloucester Hydro
1994	2518 Del Zotto Avenue	R.L. Coolsaet
1994 - 1995	4565 Bank Street	Gloucester Hydro - contains ballasts, electrical equipment and other materials containing high levels of PCB (>1000ppm)
1994 - 1998	4210 Albion Road	RLD Industries
1994 - 1998	2714 Fenton Road	Tyrell Press Ltd.
1994 - 1998	2623 Fenton Road	Pryor Metals Ltd.
1994 - 1998	2565 Del Zotto Avenue	Triangle Pump Service Ltd.
1994 - 1998	4543 Southclark Place	Canada Ltd. (1994) and Reliable Plating and Surface Finishing
1997 - 1999	4603 Bank Street	Greenacres Mobile Mechanics, Hodgins Asphalt Sealer, Oil Care Rust Proofing, and Redmore Automotive Centre
1998	2759 Fenton Road	B&R Auto Repair
1998	2575 Del Zotto Avenue	Road Masters Auto Body
1998	2430 Del Zotto Avenue	Ottawa Equipment Hydraulic

**TABLE 2: POTENTIAL SOURCES OF CONTAMINATION  
WITHIN THE AREA OF INFLUENCE**

Approximate Year(s) of Operation	Location	Description
1998	2506 Del Zotto Avenue	Construction Taormina Ltd. and S&G Truck & Auto Body
1998	2592 Del Zotto Avenue	Ottawa South Truck Centre Ltd.
1998	2588 Del Zotto Avenue	Bruce Sales
1998	4747 Bank Street	Leitrim Supply
1998	4941-4945 Bank Street	Canada Building Materials Co.
1998	4108 Albion Road	Blade Runners Automotive Repair Services
1998	4869 Bank Street	A Acceptable Alternative
1998	2532 Del Zotto Avenue	Loretta Paving Co.
1998	2684 Fenton Road	Howison Sales and Service Ltd.
1998	2474 Leitrim Road	Pedro Construction Ltd.
1998	2546 Leitrim Road	General Repair Service Machine Shop
1998	4815 Bank Street	Ottawa Camping Trailers Ltd.
1998	4863 Bank Street	Travel-Mor Trailer Sales
1998	4505 Bank Street	Kemp Service Station and Leitrim Service Centre Inc./MacEwen Petroleum
1998	4521 Southclark Place	Hawley Signs and Graphics Ltd.
1999	4727 Bank Street	W O Stinson & Son Ltd.



#### REFERENCE

Digital base map data supplied by DMTI Spatial Inc. CANMAP, 2005  
 Projection: Transverse Mercator Datum: NAD 83 Coordinate System: UTM Zone 18

1,500 0 1,500  
 SCALE 1:75,000 METRES



DATE	MAY 2008
DESIGN	BT
GIS	BT

TITLE

## KEY PLAN

PROJECT No. 07-1122-0277

CHECK	PAS
REVIEW	PAS

PROJECT FINDLAY CREEK VILLAGE - FUTURE STAGES  
 PTTW APPLICATION

SCALE AS SHOWN

REV. 0

FIGURE: 1