D R A F T

WELL HEAD PROTECTION PROGRAM

VILLAGE OF FINCH
MUNICIPAL WELLS

PREPARED FOR:

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WESA

WESA
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DRAFT REPORT

WELL HEAD PROTECTION PROGRAM

Village of Finch
Municipal Wells

Prepared for:

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1.0 INTRODUCTION

The Township of North Stormont contracted Water and Earth Science Associates Ltd. (WESA), of Carp, Ontario to complete the Municipal Well Head Protection Plan (WHPP) as defined in WESA's proposal, *Proposal for Well Head Protection Program, Finch Communal Water Supply* dated February 20, 2004. The Ministry of Environment's Certificate of Approval (C of A) for the water supply system requires "the implementation of a WHPP to monitor aquifer conditions and to identify and protect the area of recharge of the wells from the risk of man-made activities". This includes potential adverse impacts due to existing and future land use.

The main components of a WHPP include the following:

1. Delineation of Wellhead Protection Areas – Well Capture Zones
2. Development of a Land Use Risk Rating Map (Using the Well Capture Zones)
3. Provide direction for appropriate wellhead and aquifer protection strategies, and
4. Development of an Aquifer Monitoring Program.

The Village of Finch is located in Southeastern Ontario, in the Township of North Stormont about 20 km east of Cornwall, Ontario and 16 km north of the 401 along CR12 where CR12 intercepts HWY 43, just west of the Payne River. The following provides a recommended Well Head Protection Program (WHPP) for the Village of Finch Municipal wells. The study area for this project includes the Village of Finch, an area encompassing approximately 500 m around the Village of Finch communal water wells, as well as key areas south of the village. A plan showing the study area, municipal and observational well locations and the Site is provided as Figure 1.

A program to implement wellhead protection strategies for the United Counties of Stormont, Dundas and Glengarry, the United Counties of Prescott & Russell, and the City of Ottawa is being carried out by the Eastern Ontario Water Resources Committee (EOWRC). The definition of Wellhead Protection Areas (WHPAs) for the Village of Finch Municipal wells and recommended measures for a wellhead protection strategy for the defined areas are provided in *Municipal Groundwater Study, Township of North Stormont, Prepared for the Eastern Ontario Water Resources Committee, October 2003*

prepared by Robinson Consultants Inc. et al., hereafter referred to as the EOWRC report. The WHPAs and Aquifer Intrinsic Susceptibility Map for the Finch Municipal Wells as determined in the *EOWRC report* is provided in Appendix A for reference. Input data used in the modeling and delineation of the WHPAs was not available for review during preparation of the WHPP.

2.0 SITE DESCRIPTION, GEOLOGY, HYDROGEOLOGY & WELL CONSTRUCTION DETAILS

2.1 SITE DESCRIPTION

The Village of Finch well site is located on the northwestern edge of the village at #20 William Street, just north of John Street. The Site is bordered by the community centre and arena parking lot to the south, William Street to the west, a commercial property to the north and the community arena building to the east. The municipal wells and treatment system are contained in a facility building.

Neighbouring land use consists of low density residential and commercial to the south and east beyond the community arena, farmland to the west and a sandblasting operation to the northwest (previously a small foam insulation industry), and a welding shop with fuel storage is located just north of the well heads. George Street runs along the east side of the community arena. To the west side of George Street is vacant property. East of this property is more residential and commercial properties located along CR12.

Access to the Site is via William Street. No fencing or gate entrance is present to control access to the Site. Two Municipal wells are located inside a secured building. A well previously used for the community centre (indicated as 'CC well' on Figure 1) and arena is located in the Community Centre/Arena parking lot. According to the well record drawings this well is located approximately 58 metres south and 20 metres east of the Municipal Wells Site. Another well was located on Lot 14, 30 m north of HWY 43 and 91 m east of CR12. These wells could be used as bedrock observation wells if they can be located and their integrity can be confirmed.

From quarterly reports on drinking water quality prepared by Ontario Clean Water Agency, the total design capacity for the Finch Water Treatment Plant and Distribution System is 778 cubic metres per day, and services a population of 441 residents. Groundwater is pumped from the two municipal wells through an aeration tower at a rate of 9.5 litres/second for hydrogen sulphide removal. Sodium hypochlorite is subsequently added to the water for disinfection prior to entering a 20 cubic metre clear well. Two high lift pumps (one active, one on standby) pump the chlorinated water from the clear well through dual media pressure filters to a 580 cubic metre capacity storage tank for distribution. The 2003 annual report described system upgrades including improved chemical storage and spill containment for the sodium hypochlorite feed system.

From the 2001 engineering report prepared by Kostuch Engineering Limited The present water treatment system has been in operation since the early 1980's.

2.2 GEOLOGY

The town is situated on unconsolidated deposits consisting primarily of a till plain with minor sand and gravel overlying the limestone bedrock of the Verulam Formation. The till is periodically overlain by discontinuous deposits of silty clay. Bedrock can be found to outcrop to the east of the village along the Payne River (Robinson Consultants Ltd. et al.).

2.3 HYDROGEOLOGY

A hydrogeological assessment completed as part of the *Municipal Groundwater Study* indicates that the regional groundwater flow direction within the bedrock aquifers is towards the northwest. However, local groundwater flow direction is also likely

influenced by the Payne River and local topography. The bedrock surface that slopes southeast towards a bedrock channel which strikes northeast-southwest between Newington and Avonmore is also an influence on local groundwater flow.

No overburden observation wells have been constructed on or surrounding the site to confirm the direction of shallow groundwater flow through the overburden or bedrock/overburden contact zone.

2.4 WELL CONSTRUCTION DETAILS

The Village of Finch municipal well site contains two municipal wells. The wells were drilled in 1972 by Ramon H. Casselman drilling contractors of Williamsburg, Ontario. The well records can be found in Appendix B. The aquifer from which the municipal well field draws its groundwater is located in an upper zone of the limestone bedrock located from 4.57 metres (15 feet) to 42.37 metres (139 feet) below the bedrock surface. A third well, formerly used as a water supply for the Community Centre and arena was constructed in 1961 and draws water from approximately 21.95 m (72 feet) below the bedrock surface.

A well construction summary for the site wells is provided in Table 1 below.

Table 1: Well Construction Summary

Construction Details	Well #1	Well #2	CC well
Current Permit to Take Water (PTTW)	80-P-4002, renewal date March 31, 2010, 777.6 m^3/day (lead/lag control arrangement)		N/A
Legal Description	Part 2 of RP52R-1181, Twp. of N. Stormont, United Counties of S, D and G		
UTM Easting:	492995 m E UTM NAD27, Zone 18, Accuracy: 100m		493110 m E, UTM NAD 27, Zone 18
UTM Northing:	4998745 m N UTM NAD27, Zone 18, Accuracy: 100m		4998700 m N UTM NAD 27, Zone 18
Depth to bedrock	3.35 metres	3.35 metres	3.96 metres
Total Depth	57.61 m (27.6 masl)	57.61 m (27.6 masl)	28.35 metres
Depth To Water Found from surface.	7.92m, 24.08m, 39.62m and 45.72m	19.51 metres	25.91 metres
Depth to water bearing zone below bedrock surface	4.57m, 20.73m, 36.27m and 42.37m	16.16 metres	21.95 metres
Well Screen Depth Interval	Open Hole for 49.07m	Open Hole for 49.07m	Open Hole for 24.38m
Well Screen slot size	N/A	N/A	N/A
Floor Elevation (masl)	81.65 masl	81.65 masl	N/A
Diameter of well	200mm	200 mm	100 mm
TOC Elevation	83.73 masl	83.73 masl	Unknown
Bottom of casing elevation	75.2 masl	75.2 masl	Unknown
Type of Casing	steel 0.2 m inside diameter		0.1 m inside diameter
Depth of casing from ground surface	8.5 m		6.4 m
Geological description	0-1.5 m fill 1.5 – 3.4 m gravel 3.4 – 57.6 m limestone	0-1.5 gravel clay fill 1.5 – 3.4 gravel 3.4 -30,2 m limestone solid 30.2 – 31.7 limestone broken 31.7 – 57.6 limestone solid	0 -2.1 m boulders sand loam 2.1-4.0 m boulders gravel clay sand 4.0 – 28.3 m limestone
Current Operational Status	**On Line**	**On Line**	**Unknown (potential observation well)**

The well records state that the municipal wells are 200 mm in diameter and that the Community Centre/Arena well is 100 mm in diameter. Both municipal wells are steel cased to a depth of 28 feet (17 feet into bedrock) according to the OWRC and MOE 1972 water well records, Appendix B). However the water well records do not indicate if the wells were ever grouted. Considering the construction date it is likely that they were not grouted to today's standards. The community centre well is also cased, to a depth of 21 feet (8 feet into bedrock). The water well record does not indicate whether this well was grouted. The Municipal well facility and the community centre/arena well locations are shown on Figure 1.

From WESA's visual inspection of the Water Treatment Plant, it is apparent that the Municipal wells are in a secure location, and the wellheads are protected from overland surface water runoff. They are located below ground surface in a basement area, however this area was dry at the time of the site visit and operators confirmed that the area did not flood. The community centre well was not inspected.

3.0 WELL HEAD PROTECTION PLAN (WHPP)

The simulated WHPAs for the Finch Municipal wells were delineated by Robinson Consultants Inc. et al.and are depicted in the EOWRC report, Figure 5.1. This figure is presented in Appendix A of this report. The EOWRC assessment indicates that the 50-day groundwater time of travel (TOT) area for the Municipal well site is situated within an 87.5 meter radius of the corner of John Street and William Street. The 2-year TOT area extends approximately 750 metres south beyond the boundaries of the Site, encompassing most of the Village south-southeast of the Site and extending onto agricultural land to the west and south-southeast. The 10-year and 25-year TOT areas extend several kilometres to the southeast. The aquifer intrinsic susceptibility index for the 50 day, the 2-year, the 10-year and the 25 year TOT areas are all "high" due to the thin, semi-permeable nature of the overburden material within the WHPAs (EOWRC report, 2003). The limits of these TOT areas were determined by Robinson Consultants Inc. et al based on their groundwater modelling of the region. WESA was not provided with the MOE well record database in order to review the derivation of these TOT areas.

An inventory of potential areas of contamination within the 500 meter radius of the Site was catalogued by WESA. By combining this information with the TOT areas developed in the EOWRC report, WESA identified areas of potential concern and greatest vulnerability with respects to groundwater impact. This information was then used as a tool to develop a strategy for groundwater protection. The steps towards developing a Groundwater Source Protection Plan for a site are listed below;

- Delineation of Groundwater Capture Areas as part of the Regional Plan (EOWRC report)
- Determination of Groundwater Intrinsic Susceptibility as part of the Regional Plan (EOWRC report)
- Site Specific Refining of Municipal Well Head Protection Areas
- Site Specific Contaminant Source Inventory
- Development of the Groundwater Source Protection Action Plan
- Aquifer Monitoring Program
- Conclusions
- Recommendations

3.1 DELINEATION OF THE GROUNDWATER CAPTURE AREAS AND DETERMINATION OF THE GROUNDWATER INTRINSIC SUSCEPTIBILITY

The objective of identifying wellhead protection areas is to delineate areas of potential risk with respect to groundwater impact.

The groundwater capture zone is essentially the footprint encompassing the area from which groundwater flows toward the groundwater production well, in this case the municipal well field.

A groundwater study was undertaken by the Eastern Ontario Water Resources Committee (EOWRC) in 2001/2002 to define the Wellhead Protection Areas (WHPA) for the municipal well field of the town of Finch, Ontario. The numerical model MODFLOW was used to estimate groundwater capture zones. A description of the

model's underlying assumptions, selected input data and boundary conditions are included in Sections 4.7 and 4.8 of the EOWRC report titled "*Municipal Groundwater Study, Township of North Stormont*" (Robinson Consultants Inc. et al., October 2003). A summary of some of the model's features and limitations are described here to ensure the reader appreciates the value of the modelling results.

The reader should understand that all numerical models involve a series of approximations and compromises, in the sense that they constitute a somewhat simplified representation of in-site conditions. At the onset of any modelling exercise, a conceptual model must be developed that defines parameters such as the geometry of the geologic units (thickness and orientation), the hydraulic conductivity of those units, the porosity of each respective unit, and the boundary conditions. The boundary conditions for a groundwater flow model is either first type (when you assign a specific hydraulic head along the perimeter of the model) or second type (when you assign a specific groundwater flux across any side of the model).

The data used to generate the potentiometric surface originated from the MOE Well Records. This source of groundwater data provides an approximation on a regional scale, and is by no means accurate at any specific location. The model geometry (stratigraphy) is also derived from the MOE well records. A greater accuracy will be attained in areas where there is a greater density of MOE Well Records. Generally the density of wells decreases with distance from the town centres. The model results around the perimeter of the modelling domain, where the density of wells is lower, must be interpreted considering the data available. Hence the modelling results presented in the EOWRC report dated October 2003 should be relatively more representative for the 0 to50 day and 50 day to 2 year WHPA since the density of well record information was is greater nearer the well field. However, the results must be interpreted loosely, with the knowledge that every step included in the modelling exercise involved the *estimation* of parameters. Caution should therefore be used when interpreting the modelling results; these should be placed in context by considering the variable quality of the underlying data used in developing the models.

The groundwater source that supplies the Finch municipal well field is the limestone bedrock. The aquifer is intercepted by two open boreholes that capture water from a series of fractures encompassing a waterbearing zone that extends from 4.5 metres (Well No. 1) or 16.5 metres (Well no. 2) below the bedrock surface. The EOWRC report stated that the main aquifer for the regional study area, including the Finch Site was a Contact Zone aquifer which included the overburden just above the bedrock and up to 10 metres within the bedrock (EOWRC report, October 2003). While the Finch Municipal Wells tap into this fracture zone, the Finch Well No. 1 Record identifies three more waterbearing zones at 24.08, 39.62 and 45.72 metres below the bedrock surface. The Municipal Wells have open boreholes and therefore extract a combination of contact zone and deeper bedrock groundwater.

The EOWRC report's WHPAs are divided into four zones, corresponding to travel times (TOT) of less than 50 days, 50 days to 2 years, 2 to 10 years and 10 to 25 years.

The natural in-situ conditions that will lead to groundwater protection are sometimes referred to as the *Groundwater Intrinsic Susceptibility* (GwIS). The objective of estimating the Groundwater Instrinsic Susceptibility is to identify areas where contamination of the groundwater is more, or less, likely to occur based on the natural capacity of the overburden and bedrock to provide a natural barrier to potential contaminant movement. The value of GwIS is to be used as a general guide to determine appropriate land use, and/or best management practices for any particular site with the intent of long-term stewardship of the underlying groundwater resources. Section 5.4.1 of the EOWRC report (October 2003) assigns an intrinsic susceptibility rating of high for the entire Finch study area. A high rating was assigned due to the limited thickness of the overburden over the bedrock surface. Hazard ratings for each potential contaminant source site in the Village of Finch study area identified by the regional study are listed in Table 5.1 of the EOWRC report and are included in Appendix C for the reader's convenience.

The results of the modelling conducted by Robinson Consultants Inc. et al. were produced on a *Wellhead Protection Area Aquifer Intrinsic Susceptibility* map for the Finch municipal wells. This map is reproduced in (Appendix A). The diagram shows that

the groundwater capture zone is relatively elongated and strikes south-southeast along County Road 12. The map is not in full agreement with the statements made by Robinson Consultants Inc. et al. in the text of their report. In Section 5.7 of the EOWRC report, reproduced herein in Appendix D, only a high rating of groundwater instrinsic susceptibility (GwIS) was assigned to the study area while in Figure 5.1 of the same report high and moderate GwIS ratings were indicated. WESA therefore reviewed the MOE well record summary and historical hydro-geological reports (published and in-house) for the study area which noted that the overburden thickness increases to the southeast. Therefore, WESA has decided to concur with Figure 5.1 (EORWC report) and assume two ratings of GwIS within the study area.

3.2 LOCAL REFINING OF MUNICIPAL WELL HEAD PROTECTION AREAS (WHPA)

WESA's first step in developing the Wellhead Protection Plan (WHPP) was to verify the reasonableness of the shape of the well head protection areas and the level of risk defined by the EOWRC study, especially in regards to the 50 day and 2 year protection zones. WESA reviewed in-house reports completed in the area of Finch, Ontario, other historical reports for the Site and topographical maps for the study area to fine tune the boundaries of the WHPA's presented in the EOWRC study. A site visit was conducted on March 10, 2004 by WESA to ground truth some of the data collected in the reports. Based on the data review, and the site visit, WESA refined the 50 day and the 50 day to 2 year wellhead protection areas surrounding the communal wells site.

Since the input database used in the modeling was not available for review during preparation of the WHPP, WESA has taken a cursory review of MOE well record summary and historical hydro-geological reports for the area (published and in-house). The general direction of groundwater flow within the bedrock contact zone aquifer is in a northwesterly direction for the study area. WESA has assumed that the data analysis by Robinson Consultants Inc et al. is a reasonable estimation based on data used in their model, however to develop the WHPP, WESA has added some additional conservatism to take into account more localized information.

Based on the southeast sloping bedrock surface and the decrease in thickness of overburden to the north and west of the Site, it is possible there is a component of groundwater flow from the northwest and WESA recommends extending the 50 day contact zone, west and north by an additional 250 metres in order to encompass the northwest corner of Finch within the 0-50 day well head protection area. Additionally, given the low density of well record information south of the village and the limitations and assumptions adopted by the model, WESA recommends widening the eastern and western boundaries of the 50 day to 2 year, 2 year to 10 year and 10 year to 25 year WHPAs. This more conservative approach will ensure a more comprehensive well head protection zone for the local area.

One final area of concern involves the buried esker deposits that are shown by the dotted area on Figure 5.1 (Appendix A). This esker deposit is believed to be part of the southern extent of the Berwick esker complex. The esker complex likely is hydraulically connected to the region's Contact Zone Aquifer (EOWRC October 2003 report, p. 23) and through WESA's hydrogeological investigations in the Crylser Municipal Well Site, it was evident that the esker groundwater is not only hydraulically connected to the contact zone but acts as a recharge reservoir for the Contact Zone Aquifer. At the Crylser Site the horizontal direction of groundwater flow in the esker deposit was to the north, this may also be true of the esker deposit in the Finch area. In the Finch area there is a mineral extraction land use zoning located within this esker complex just southwest of the Finch Municipal Well Site and just west of the 2 to 10 year WHPA. Consequent to this information, WESA recommends extending the 2 to 10 year WHPA to encompass the area to the west zoned for mineral extraction land use.

A plan showing the amended Well Head Protection Areas for the Finch Well Site is found in Figure 2.

3.3 INTRINSIC SUSCEPTIBILITY AND CONTAMINANT SOURCE INVENTORY WITHIN THE WHPA

In addition to the document review, a field visit was conducted to augment the contaminant source inventory conducted within the Village of Finch. A list of identified potential contaminant sources is found in Table 2. The GwIS results are presented in Section 5.0 of the EOWRC report. An updated Land-Use Risk Rating is presented in Section 3.3.1 herein, based on the results presented in this section. On a regional level the EOWRC report assigned a high intrinsic susceptibility rating for the Finch municipal wells since the overburden cover is relatively permeable and thin in areas. Where the overburden thickness increased a moderate intrinsic susceptibility rating was assigned (see Appendix A).

An updated diagram displaying the location of all the identified potential sources of contamination is shown on Figures 3a and 3b along with the revised WHPA. A summary of the potential contaminant sources for each WHPA are given below.

0-50 Day WHPA

There are eleven potential contaminant sources within the inner WHPA. There is a potential risk of impact to groundwater within this zone. The potential contaminant source facilities include: the welding shop with chemical and fuel storage, former foam insulation manufacturing operation presently operating as a sandblasting operation, land zoned for industrial use, the CP railway line, the community centre/arena building and parking lot, the medical centre, a former commercial fuel outlet on the corner of John street and CR12, commercial operations along CR12 and cropland to the west. As well, there are several domestic above ground fuel storage tanks (ASTs) along John Street, George Street and William Street. All ASTs as well as the potential contaminant source facilities are rated as high hazard potential contaminant sources. The medical centre and cropland are rated as moderate contaminant sources based on the rating scheme offered in the EOWRC report.

Table 2
List of Potential Contaminant Sources
Village of Finch Well Head Protection Plan Study

Source #	Municipality	Land Use	Picture Number (see Appendix I)	Historical, Current or Proposed Land Use	Potential Contaminant Source Rating	GwIS rating	Well Head Protection Zone	Land Use Risk Rating (LURR)
1	N. Stormont	Welding Shop and fuel storage (east side William St, just north of Well site)	1, 4and 7	current	high	high	50 day	high
2	N. Stormont	Foam Insulation Manufacturer (west side William St.)	2 and 19	historical	high	high	50 day	high
3	N. Stormont	Sandblasting operation, fuel storage (same location as above)	2 and 19	current	high	high	50 day	high
4	N. Stormont	Industrial Zoned land (just north of Sandblasting operation)		potential	high	high	50 day	high
5	N. Stormont	Community Arena and parking lot	1, 3, 15 and 19	current	high	high	50 day	high
6	N. Stormont	Fuel outlets (former gas station at corner of John St. and CR12)	9	Historical	high	high	50 day	high
7	N. Stormont	Railway track to north		current	high	high	50 day	high
8	N. Stormont	residential and commercial fuel tanks	10, 17 and 20	current	high	high	50 day	high
9	N. Stormont	Medical Centre (southeast corner of George St. and John St.)	8	current	moderate	high	50 day	high
10	N. Stormont	crop fields (to west)	14	current	moderate	high	50 day	high
11	N. Stormont	commercial retail establishments	8	current	low	high	50 day	high
12	N. Stormont	Fuel outlets (north side of Hwy 43 beside Payne River)		current	high	high	2 year	high
13	N. Stormont	Fuel and chemical outlet (west side of CR12, north of railway tracks)		current	high	high	2 year	high
14	N. Stormont	residential and commercial fuel tanks	10, 17 and 20	current	high	high	2 year	high
15	N. Stormont	abandoned railway line (northeast corner of Village)		Historical	high	high	2 year	high
16	N. Stormont	Industrial Zoned land (north of railway tracks, northwest corner of Village)		potential	high	high	2 year	high
17	N. Stormont	funeral home (northeast corner of William St. and Hwy 43)	13	current	moderate	high	2 year	high
18	N. Stormont	farm operation (across hwy 43 from funeral home)		current	moderate	high	2 year	high
19	N. Stormont	crop fields		current	moderate	high	2 year	high
20	N. Stormont	commercial retail establishments (along west side of CR12 north of Hwy 43)	11 and 12	current	low	high	2 year	high
21	N. Stormont	Industrial Zoned land (south of village on east side of CR 12)		current/potential	high	moderate	10 year	moderate
22	N. Stormont	mineral extraction operation		current	moderate	high	10 year	high
23	N. Stormont	farm operation		current	moderate	high/moderate	10 year	high/moderate
24	N. Stormont	crop fields		current	moderate	high/moderate	10 year	high/moderate
25	N. Stormont	mineral extraction operation		current/potential	moderate	moderate	25 year	low
26	N. Stormont	farm operation		current	moderate	moderate	25 year	low
27	N. Stormont	crop fields		current	moderate	moderate	25 year	low
28	N. Stromont	Former Landfill site		Historical	high	high	>25 year	low
29	N. Stormont	abandoned railway line		Historical	high	high/moderate	>25 year	low
30	N. Stormont	Industrial Zoned land		current/potential	high	high/moderate	>25 year	low
31	N. Stormont	mineral extraction operation		current/potential	moderate	high	>25 year	low
32	N. Stormont	farm operation		current	moderate	high/moderate	>25 years	low
33	N. Stormont	crop fields		current	moderate	high/moderate	>25 years	low
34	N. Stormont	commercial retail establishments		current/potential	low	high	>25 years	low

50 day to 2 Year WHPA

The second WHPA (50 day to 2 year TOT) extends from the 50 day boundary approximately 775 metres to the north, west and south from the Finch Well Site and approximately 635 metres northeast up to the Payne River. This area includes nine (9) potential contaminant sources including fuel outlets on HWY 43 on the west bank of the Payne River, existing fuel outlet and pesticide storage facility on CR12 just north of the CP railway, abandoned railway lines just east of the village, municipally zoned industrial land north of the CP railway line, a funeral home to the south, a farm located on the south side of HWY 43 just west of William Street intersection, cropland surrounding the Village and commercial establishments along HWY 43 and CR12. As well, several domestic and commercial above ground fuel storage tanks (ASTs) along most residential streets south and east of the Finch Well Site are a potential concern. All ASTs as well as the potential contaminant source facilities are rated as high hazard potential contaminant sources. The funeral home, farm operation and cropland are rated as moderate contaminant sources, while the retail commercial establishments have low potential for contamination.

2-10 Year WHPA

The third WHPA (2 year to 10 year TOT) extends to the south along CR12 to approximately 400 m beyond the Hunter's Road/Waldroff Road intersection. This WHPA also extends approximately 900 m southeast from this intersection. The boundary of this area also extends approximately 475 to 965 m east and west respectively of CR12. Within the 2 to 10 year WHPA there are a few farm operations along CR12 and plenty of cropland. There is also an area of land zoned for industrial land use located approximately 235 metres south of the northern boundary inside this WHPA zone. By extending the capture area to the west of CR12, this includes a mineral aggregate extraction operation on Conc.1/2 Rd. This area represents a greater travel time within the WHPA but the GwIS index values remain high due to an increase in overburden hydraulic conductivity within the buried esker complex at depth in this WHPA. Altogether there are four (4) sources of contamination within this protection area. The industrial area has a high potential for contamination while the remaining sources provide a moderate rating.

10-25 Year WHPA

The fourth WHPA (10 year to 25 year TOT) extends further south along CR12 to the Sandtown Road, a distance of approximately 950 metres beyond the 10 year TOT boundary. The WHPA eastern and western boundaries extend approximately 600 metres and 950 metres respectively on either side of CR12. There were three (3) potential contaminant sources, rated moderate, identified within this zone. Farm operations and cropland are common and an area of land zoned for mineral extraction in the most southeasterly area and a property operating as a pit and/or quarry in the northwestern section of this WHPA. This area represents a greater travel time within the WHPA, however the GwIS index value remains high according to the regional study (EOWRC report, 2003).

Greater than 25 year

There are seven (7) potential point sources of contamination surrounding the WHPA delineated for the study area, these are; a former landfill site to the southwest, an abandoned railway line to the east, land zoned for industrial use to the west and south, mineral extraction operations to the west, farm operations and commercial retail establishments. The area is extensively farmed and crop fields are established in the general area. This area is outside the context of this study.

3.3.1 LAND-USE RISK RATING

To evaluate all of the data collected during this study in terms of planning for the future, and managing present land development, a matrix system was used to integrate the results of the GwIS index and the WHPA analysis. The MOE rating scheme recommended in the *MOE Terms of Reference* was used and is presented in Table 3 below:

Table 3: Land Use Risk Rating Matrix

Saturated Zone Time of Travel	Groundwater Intrinsic Susceptibility (GwIS) Index		
	< 30	30 to 80	> 80
<50 day	High	High	High
50 day to 2 years	High	High	High/Moderate
2 to 10 years	High	Moderate	Low
10 to 25 years	Moderate	Low	Low

Based on the matrix shown above all of the area falling within the 0 to 2 year WHPA should be considered high risk as well as a portion of the 10-year and 25-year WHPAs. This is primarily due to the fact that the unstructured nature and thickness of the overburden materials (gravel till) provides little natural protection from potential contamination sources. A remaining section of the 10-year WHPA should be considered medium risk. This is primarily due to an increase in the thickness of overburden in this area. The remaining sections of the 25-year WHPA should be considered low risk. This is primarily due to the increase in travel time, increased thickness of overburden and the potential for remediation over this distance. The Land-Use Risk Rating (LURR) for Finch is shown in Figure 4.

3.4 GROUNDWATER SOURCE PROTECTION PLAN

The following describes elements of a groundwater source protection plan to assist the municipality in protecting this resource, given the high reliance on groundwater as a potable water supply.

3.4.1 Elements of the Groundwater Source Protection Action Plan

The objective of a groundwater source protection action plan is to identify areas of greatest concern with respect to safe guarding the quality of a groundwater resource.

The goal is to ensure a balance between the benefits of groundwater protection and potential impacts on economic and community development. Generally more stringent controls would be required close to the municipal well field, as well as in areas of greater sensitivity (lower GwIS).

3.4.1.1 Risk Management Strategies

To reduce risk within the WHPA a number of approaches can be applied. In general the most beneficial approach is *risk avoidance*, followed by *risk management* and *awareness*. These three approaches are very different with regards to implementation.

Risk avoidance requires the removal of risk. In the context of municipal well head protection, this would be achieved by removing from the area those potential sources that are of greatest risk of causing an adverse impact to the underlying groundwater. Of the three strategies, risk avoidance is generally considered to be the most problematic to implement (methods of implementation are discussed in the Section 3.4.2.1).

Risk management would not be as effective because the potential source of contamination would remain at its current location, however stringent programs would be implemented to manage risks on the property and if implemented properly are very effective.

The third strategy is *awareness*. By informing people that they are located near the municipal groundwater wells and instructing them of the potential hazards of adversely impacting the groundwater, there will be an increased level of interest to implement risk management practices.

3.4.1.2 Risk Ranking & Associated Risk Management Strategies

These three strategies, risk avoidance, risk management and awareness, as described above, provide different levels of protection and require different levels of

effort to implement. A ranking system is therefore required to identify which level of effort is required. As described in Section 3.3.1 of this report, a Land-Use Risk Rating has been assigned within the WHPAs. The Land-Use Risk Rating takes into account time of travel to the well, intrinsic susceptibility, and the type of land-use activities. Due to the natural geology of the area (in places overburden <3 m) the WHPA's were rated high and moderate depending on the *thickness of overburden material* factor and distance from the Well Site (Figure 4).

As defined in the MOE *Terms of Reference* there were three designations for Land-use Risk Rating derived from an estimate of time of travel and intrinsic susceptibility. In the zone rated High for Land-Use Risk Rating, the objective should be one of risk avoidance. It is within this zone that the greatest care must be taken to manage any current chemical use and handling practices and to minimize, or even avoid, the addition of moderate to high risk sources. In the zone rated Moderate for Land-Use Risk Rating, the objective should be one of risk avoidance where possible and risk management. Within the areas rated low with respect to Land-use Risk Rating, the emphasis should be on awareness and education as a minimum.

3.4.2 Implementation of Well Head Protection Strategy

The suggested strategies presented above identify different activities to be implemented within different Land-Use Risk Rating zones. The implementation of any of these strategies depends on whether the site is a greenfield site (as yet undeveloped) or a site that is already developed. In the case of a greenfield site, requirements can much more easily be imposed during the planning stages prior to someone purchasing or developing the property. In the case where the property is currently developed, it is much more difficult to impose requirements.

3.4.2.1 Risk Avoidance

In the High and Moderate risk ranked area the greatest care must be taken to manage any current chemical use and handling practices and to minimize, or even avoid,

the addition of moderate to high risk sources. (For example: landfill sites, sewage lagoons, gas stations, or manufacturing facilities using significant quantities of chemicals). Moderate risk sources could include smaller manufacturing facilities or any operation that handles a moderate quantity of chemicals on a regular basis.

In Section 5.7 of the EOWRC report and Appendix D of this report, a ranking system was developed to evaluate potential contaminant sources. This ranking system, or one similar, could be used to define which businesses should be excluded from establishing themselves within a High or Moderate Land-Use Risk Rating area.

To implement risk avoidance, greenfield sites must be zoned such that certain activities are not permitted. In the Village of Finch, industries are already present within the WHPA, and forcing a change of land-use may be difficult. A method that is being considered by municipalities in Ontario is regulation through land-use planning. It is possible to amend the Official Plan and By-laws to restrict the type of land-uses in WHPA's with restrictions being more stringent closer to the well head itself. This is relatively straightforward for "greenfield" land but is more problematic for properties that are already developed.

It should be noted that under the current Planning Code in Ontario, even though some municipalities in Ontario are thinking of developing similar chemical restriction by-laws, it is possible that they may not be legal if challenged in the court or at an OMB hearing.

For the Village of Finch, changing current zoning of greenfield sites to limit development of high and moderate risk contaminant sources should be considered for those areas ranked High and Moderate in the Land-Use Risk Rating. The proposed industrial park, planned just south of the Village on the east side of CR12 is one such property that the Township planner should consider risk avoidance strategy. The current zoning by-law for areas outside the Village of Finch is shown in Appendix E. The zoning map for the Village is pending. For the Reader's interest, other risk avoidance measures used by other municipalities in Ontario are discussed in Appendix F.

In Summary the tasks Associated with Risk Avoidance are the Following:

- Task 1: Develop a ranking system to evaluate potential contaminant sources – and use this to define which businesses in the future should be excluded from establishing themselves within a High or Moderate Land-Use Risk Rating area.

- Task 2: Through land-use planning, change zoning such that certain activities are not permitted. This includes amending the Official Plan and creating By-laws to restrict the type of land-uses in WHPA's with restrictions being more stringent closer to the well head itself.

3.4.2.2 Risk Management

Where high or moderate risk activities are already present in a high or moderate risk area, initiatives need to be put in place to discourage expansion, and/or require best management practices.

Discouraging Expansion:

In cases where there are existing industries and it is too difficult or costly to move them out of the WHPA, or in cases where a new development is desired, a permitting program could be implemented requiring approval before any new expansion/development is undertaken. The permitting program would include agreements placing restrictions on the types and quantities of chemicals used, and activities undertaken based on their potential to impact the groundwater. Any future expansion/development within the WHPA, should be accompanied by a requirement to implement best management practices as described below. Permitting would serve to monitor and direct expansion/development and can also include implementation of land securement, or protection mechanisms.

Implementing Best Management Practices

Best Management Practices (BMP's) identify specific actions that lead to pollution prevention. Many of the practices are simple to implement and relatively inexpensive. It should be noted that the clean-up of any spill is extremely costly and therefore the implementation of best management practices is generally inexpensive insurance for the property owner.

To ensure the implementation of Best Management Practices, the Municipality could also encourage/ require the implementation of the following for businesses through by-law creation:

- a recognized environmental management system (such as ISO14001)
- pollution prevention plans;
- spill response plans;
- Completion and submittal of a yearly report summarizing the amount and type of chemicals in use and handling/spill response practices. (Criteria would have to be developed for minimum quantities and types of chemicals that required reporting). The questionnaire included with the MOE TOR (Appendix G) could be used for this purpose. This should include a chemical inventory, and interviews with operational staff.
- A monitoring network is recommended to be established within the village targeting various chemical parameters based on local business activities.
- impose restrictions to quantities of chemicals stored on-site, or restrict increases in the use of chemicals on site.
- The municipality could strongly encourage all medium and high risk contaminant sources to attend a workshop for BMP implementation.

By having such systems in place, it would ensure that the Best Management Practices are being implemented on a continual basis. Sample BMP fact sheets, developed by the Region of Waterloo, could be used as templates for 31 of the business sectors identified in the Finch study area. These are provided in Appendix G of this report.

To ensure the implementation of Best Management Practices, the Municipality could also encourage the implementation of the following for residents through creation of a task force (volunteer or otherwise):

- Verify the existence, construction and use of private water wells. Adequately constructed potable water wells with established integrity and still in existence within the 10, 2 year and 50 day TOT should be evaluated for inclusion in the monitoring program. All other wells should be properly abandoned beginning in the high risk ranked areas of the WHPP. Consideration can be given to properly grouting proposed observation wells, by overdrilling the existing casing.
- Verification of the proper decommissioning of private septic systems is strongly recommended beginning in the high risk ranked areas. A program should be undertaken to ensure all tanks have been properly emptied and abandoned, and septic fields decommissioned.
- WESA noted that many residents have heating oil tanks on their property. Provision of best management practices for these tanks would be beneficial. Best management practices should include information with respect to regular inspection of tanks for leaks, tank replacement requirements and spill/leak protection and response/notification in compliance with Ontario Regulation 213/01.
- Provision of best management practices for storing and handling household hazardous chemicals would be beneficial, this can expand to include household cleaners, paints, solvents, batteries, pesticides and fertilizers. In general, household use of pesticides should be discouraged and information on more environmental pest management practices provided and encouraged. Consideration to designating a day and drop off location for household hazardous wastes at a cost per item for the user is recommended.

Based on the Land-Use Risk Rating results for the Village of Finch, risk management will likely represent the primary method of Well Head Protection. It is recommended that all medium and high risk contaminant sources be targeted for the implementation of risk management measures.

In Summary the tasks Associated with Risk Management are the Following:

Task 1: Develop a permitting program to be implemented requiring approval before any new expansion/development is undertaken. Include placing restrictions on the types and quantities of chemicals used, and activities undertaken based on their potential to impact the groundwater.

Task 2: encourage the implementation of best management practices for businesses within the WHPA through By-law creation.

Task3: encourage the implementation of best management practices for residents through creation of a task force, and programs for implementation.

3.4.2.3 Awareness (Education and Training)

The objective of any awareness campaign is to target an audience, and inform as many of the target audience as possible. In this case, the targeted audience is everyone within the WHPA. It should be noted that people residing/working outside the WHPA would also benefit from this training.

There are various methods used to inform the target audience. Given the technical nature of the topic, it is strongly suggested that the material be presented in an interactive manner. Workshops are a very effective educational tool that can reach a large number of businesses at one time. For example, a one-day workshop could be held for up to 50 attendees to present the concepts of groundwater protection, to introduce the concepts of risk management in terms of environmental impact, and to present some Best Management Practices. The workshop would explain how they could potentially impact the groundwater and what measures need to be taken to prevent this from occurring.

Materials to be presented in the workshop could include the BMP's included in Appendix G. Some appropriate BMPs should be presented and reviewed in detail to demonstrate their applicability and usefulness. Implementation of such BMP's should be discussed so that participants have a concrete notion of the steps required to implement the components of the BMP. And to ensure continued awareness and implementation of the BMP's, the workshop could also mention the use of Environmental Management Systems, Pollution Prevention Plans and Spill Response Plans. The workshop should provide a list of references and web sites that participants could consult to develop their own plans.

To reach a broader audience, mail-outs included with municipal correspondence can be an effective means of raising awareness. As well public signage indicating the boundaries of the WHPA on major access routes to the Village of Finch could be established. Topics of the material included in mail outs could include the following:

- General information regarding the importance of protecting their groundwater resources
- A summary of the results of groundwater study including illustrations showing the location of the municipal wells and the groundwater capture areas
- General information about potential contaminants and how these could impact the groundwater (spills along the road, spills from underground storage tanks, impact from overuse of fertilizers and pesticides).
- Suggestions regarding prevention of potential groundwater impacts (specifically targeted to people with fuel storage tanks)
- What actions one should take in the event of a spill (reporting, cleaning-up, use of spill kits)

Another approach for creating awareness would be to have environmental theme days at the local schools associated with the WHPP, including ideas such as having students create summaries of chemicals used in the household and household chemical and waste handling practices, discussing environmental alternatives to chemical use, educating students on groundwater protection, have a groundwater protection poster contest, etc. The education program can be targeted to different age groups through age appropriate projects.

In Summary the tasks Associated with Awareness (Education and Training) are the following:

Task 1: Identify key activities of concern, and present workshops inviting specific potential polluter groups. Present BMPs, including implementation strategies, cost considerations, where more information can be found, who can help, etc.;

Task 2: Create an area on the Township website with key information on the WHPP, contacts and BMPs

Task 3: Target potential polluters through mail outs that outline specific BMPs;

Task 4: Design and post public signs indicating the boundaries of the WHPA, and the risk ranking of each area;

Task 5: Consider implementation of household hazardous waste programs for drop-off on a cost per user basis; and

Task 6: Encourage educational initiatives through the schoolboard curriculum focusing specifically on groundwater protection within the Village of Finch.

3.4.3 Summary of Action Plan Strategies

The Well Head Protection Areas in the Village of Finch are ranked High to Low with respect to Land-Use Risk Rating. Within these Land-Use Risk Rating areas, there are potential contaminant sources of low, moderate and high risk. To best manage the groundwater resources the strategies listed in Table 4 are recommended.

Table 4: Implementation of Well Head Protection Strategy

WHPP Strategy	Timeframe for Implementation
Risk Avoidance	
Task 1: Develop a ranking system, define businesses for exclusion from High or Moderate Land-Use Risk Rating area.	Implement as soon as possible
Task 2: Through land-use planning change zoning to restrict future activities within the WHPA.	August 2005
Risk Management	
Task 1: Develop a permitting program for expansions/ new developments. Include restrictions on types and quantities of chemicals, activities undertaken, based on potential groundwater impact.	August 2005
Task 2: encourage the implementation of best management practices within the WHPA through by-law creation. Task 2a • encourage all medium and high risk contaminant sources to attend a workshop for BMP implementation Task 2b • Provision of best management practices for heating oil tanks (business and residential) • Provision of best management practices for storing and handling household hazardous chemicals (business and residential) • designate day and drop off location for household hazardous wastes at a cost per item for the user.	Task 2a Implement as soon as possible Task 2b August 2005

WHPP Strategy	**Timeframe for Implementation**
Task 2c • recommend site interviews to complete chemical list and handling and storage inventory for the medium and high risk contaminant sources • based on the information collected one or several the following plans may be developed; ▫ a recognized environmental management system (such as ISO14001); ▫ pollution prevention plans; ▫ spill response plans; ▫ Yearly chemical use and handling reports.	Task 2c 2005 – for all businesses within the 50 day TOT 2007 – for all businesses within the 2 year TOT 2008 – for all businesses within the high risk land-use areas of the 10 and 25 year WHPA 2010 – for all businesses within the moderate risk land-use areas of the 10 year WHPA and the low risk land-use areas of the 25 year WHPA
Task 3: encourage the implementation of best management practices through creation of a task force, and programs for implementation. • Verify the existence, construction and use of private water wells. Evaluate wells for inclusion in the monitoring program. • Verification and actioning of the proper decommissioning of private septic systems	2005 –within the 50 day TOT 2007 –within the 2 year TOT 2008 – within the high risk land-use areas of the 10 and 25 year WHPA 2010 – within the moderate risk land-use areas of the 10 year WHPA and the low risk land-use areas of the 25 year WHPA
Awareness (Education and Training)	Coordinate all with Management strategy initiatives. Education initiatives should commence immediately and be on-going throughout execution of the WHPP.
Task 1: Identify activities of concern, and present BMP workshops inviting specific potential polluter groups.	Implement as soon as possible
Task 2: Create an area on the Township website with key information on the WHPP, contacts and BMPs.	Website creation by end of 2004
Task 3: Send mail outs that outline specific BMPs;	Coordinate with mail – out activities conducted for other purposes
Task 4: After holding the information workshops, design and post public signs indicating the boundaries of the WHPA, and the risk ranking of each area	By August 2005

WHPP Strategy	Timeframe for Implementation
Task 5: advertise household hazardous waste programs	Coordinate with household hazardous waste initiatives
Task 6: Encourage educational initiatives through the school curriculum	Implement as soon as possible. Encourage teacher and student participation and ideas.

The advantages and disadvantages of each of the methods of implementation, along with a relative cost, are presented in Table 5.

The suggested actions outlined above provide a framework within which stakeholders can provide input and recommendations. Successful implementation requires co-operation from the general population. By starting a dialogue involving participation and input by the public, a more sustainable program will be achieved in the long term. Once the municipality has compiled a list of options regarding implementation of environmental management strategies, these should be presented and discussed with the public to incorporate their comments and ideas. Implementation of any such policies would require input and co-operation from the public.

This strategy is a proposed plan that can be discussed with stakeholders and interested parties. The details of the specific components as well as an implementation schedule should be developed in consultation with these groups.

4.0 RECOMMENDED WATER SUPPLY WELL MONITORING PROGRAM

The components of a recommended Water Supply Well Monitoring Program are presented below. These recommendations were made based on a review of historical Site reports, the regional groundwater study report (EOWRC, October 2003), and site observations. The rationale for specifying each component is also provided.

Table 5: Evaluation of Protection Methods

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Protection Method	Advantages	Disadvantages	Associated Costs
By-laws, Official Plans Zoning Changes	- is legislated and can be enforced - ensures an even playing field - highly effective	- new regulations have to be developed and passed - costs to current businesses perceived to be a deterrent to economic growth - may be legally challenged	- staff time to draft amendments - hiring of additional staff to enforce - legal costs for review of amendments
Development Agreements	- can be legislated but does not have to be - targets specific locations of concern	- increased development costs	- municipal staff time
Monitoring and Reporting	- can be legislated but does not have to be - targets specific locations of concern	- increased operational costs for businesses	- municipal staff time - hiring of additional staff to enforce
Incentives	- more attractive to businesses - raises level of environmental awareness - reduces risks and liabilities for businesses - long term cost savings - business anonymity	- voluntary rather than required - program has to be "sold" to the business community - may not capture businesses with the highest risk	- varied but example of $18,000 per site for BWQP (see Appendix F).
Education and Training	- raises level of environmental awareness - reduces risks and liabilities for businesses - long term cost savings	- voluntary rather than required - requires management support at each business - more difficult to monitor success	- $2000 to $5000 per event or facility

4.1 REVIEW OF HISTORICAL SITE REPORTS

To complete this portion of the work WESA obtained and reviewed copies of the following reports:

- 'Report on a Groundwater Survey in the Village of Finch', Ontario Water Resources Commission, 1971 (OWRC, 1971);
- 'Village of Finch Water System, Engineer's Report for Water Works', Kostuch Engineering Ltd., March, 2001;
- 'Quarterly Reports on Drinking Water Quality', Ontario Clean Water Agency (OCWA), From October 2000 to March 2003;
- 'Annual Report, Drinking –Water Systems Regulation O. Reg. 170/03', OCWA, January 1 to December 31, 2003.
- 'Water Plant Performance Assessment Reports' for 2001, 2002, 2003 and up to March 2004, OCWA.

From the OWRC, 1971 report the following is noted. A groundwater survey was conducted in March, 1971 to investigate the quality of ground water as a potential municipal supply. A survey conducted in 1970 by the St. Lawrence and Ottawa Valleys Health Unit, indicated that 58 per cent of the drilled wells and 69 per cent of the dug wells yielded water of unsatisfactory bacterial quality. In this study of 12 well samples, 8 had abnormally high concentrations of nitrates, with one exceeding the recommended limit of 10 ppm. The population in 1969 was 409 residents. Shallow wells within the Village had coliform bacteria and abnormally high concentrations of nitrates. The source of these compounds was suspected to be from septic systems. Other wells tested at depths of 110 to 173 feet did not contain bacteria and had low nitrate concentrations. The 1971 report also included information on the location of private water wells. A summary of well construction logs and a figure of well locations are included in Appendix H for the reader's convenience.

From the 2001 engineering report prepared by Kostuch Engineering Limited, a review of 1999, and 2000 microbiological water quality data was undertaken. The reports revealed, that two adverse microbiological samples were observed in the distribution system in 1999, and another two in July of 2000. Raw water quality from 2000 indicated a level of total coliforms detected on two occasions reported at counts of 1

and 9 per 100 ml. Within this report it is noted that a sanitary sewer system had recently been constructed in the Village. Information in the report suggested that the wells were protected from agricultural runoff, and that the recent addition of the sanitary sewer system would act to help protect the wells from septic systems as a source of contamination. Raw water sampling was conducted in the spring of 2001. Nitrate and nitrite results were reported as non-detect, however nitrogen was reported slightly above the MOE operational guideline. The report outlined a concern that the nitrogen levels could be a result of septic or sewage effluent contamination. Levels of aluminium and copper were also noted, again only exceeding operational or aesthetic guidelines. The aluminium was speculated to originate from alumino-silicate clay, and the copper was felt to be a potentially erroneous result due to its unusualness, though verification sampling was recommended.

From the OCWA quarterly and annual reports, the following observations were noted with respect to Raw water quality:

- copper was detected in the water supply in a September 18, 2000 and January 1, 2003 monitoring event at 0.013 mg/L and 0.033 mg/L respectively. These results are well below the 1 mg/L Aesthetic Objective, however demonstrate that the copper identified previously was likely not an erroneous result;
- raw water quality turbidity ranged higher than 1 NTU in the January to March 2001 and October to December, 2002 reporting periods.
- Levels of bromodichloromethane, bromoform, chloroform and dibromochloromethane have generally been detected. These are the most commonly detected trihalomethanes. Trihalomethanes have consistently been reported in the treated and distribution water, though have met the required Maximum Acceptable Concentration (MAC);
- Nitrates have been detected in three sampling events (April 24, 2001, October 24, 2001, January 20, 2003) at concentrations of 0.11, 0.14 and 0.11 mg/L respectively, (well below the MAC of 10 mg/L).

- Raw water bacteriological adverse results with respect to total coliforms, were reported as per the below. Frequent reporting of higher than 200 counts of background colonies, especially at the location of MW2 (in 2003), were also reported, however have not been reproduced in the following table.

Table 6: Summary of Reported Total Coliform Raw Water Quality

Date	Raw Water Adverse Reports (Total Coliforms)	Total coliform count (per 100 ml)
March, 2000	1	1
April, 2000	1	1
November, 2000	1	9
April, 2002	1	1
May, 2003	1	1
June, 2003	1	1
November, 2003	2	2,3
December, 2003	3	2,5,12
March, 2004	2	1,1
April, 2004	1	20

For information purposes, excerpts for the above reported parameters have been reproduced below from the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, published by the Ontario Ministry of the Environment in June, 2003. A more detailed evaluation and analysis has been prepared for the Township's review as a memorandum under separate cover, dated July 13, 2004 and entitled "Township of Finch Historical Raw Water Quality – Review and Recommendations".

- "Aluminum in untreated water is present in the form of very fine particles of alumino-silicate clay. These clay particles are effectively removed in coagulation/filtration."

- "The aesthetic objective for copper in drinking water is 1.0 mg/L. Copper occurs naturally in the environment but is rarely present in raw water." It is therefore unusual that copper has been consistently detected at low levels in the Finch raw water supply, though is not considered a health concern. Please note: "copper is used extensively in domestic plumbing in tubing and fittings and is an essential trace component in food. Drinking water has the potential to be corrosive and to cause copper to dissolve in water. At levels above 1.0 mg/L, copper may impart an objectionable taste to the water. Although the intake of large doses of copper has resulted in adverse health effects such as stomach upsets, the levels at which this occurs are much higher than the aesthetic objective."
- "The maximum acceptable concentration of nitrates in drinking water is 10 mg/L as nitrogen. Nitrates are present in water (particularly ground water) as a result of decay of plant or animal material, the use of agricultural fertilizers, domestic sewage or treated wastewater contamination, or geological formations containing soluble nitrogen compounds."
- "The coliform group of bacteria has been the most commonly used indicator of water quality. The coliform group consists of all aerobic and facultatively anaerobic, gram-negative, oxidasenegative, non-spore forming, rod-shaped bacteria that ferment lactose in a broth medium with gas formation within 48 hours at 35°C. The group generally comprises the genera *Escherichia, Klebsiella, Enterobacter* and *Citrobacter*. The presence of these bacteria in drinking water is indicative of inadequate filtration/disinfection or in the distribution system a continuing loss of the chlorine residual. MPN (Most Probable Number), MF and P/A are methods that may be used to detect and measure coliform populations in drinking water. The tests have slightly different sensitivities to the various bacteria. Occasionally samples will produce positive results in one test and not with the others. In all cases where discrepancies are found, results from the method producing the positive result will be used in assessing the water quality."

- "The maximum acceptable concentration (MAC) for trihalomethanes (THMs) in drinking water is 0.10 mg/L based on a four quarter moving annual average of test results. Trihalomethanes are the most widely occurring synthetic organics found in chlorinated drinking water. The four most commonly detected trihalomethanes in drinking water are chloroform, bromodichloromethane, chlorodibromomethane and bromoform. Primarily, trihalomethanes in drinking water are produced by the reaction of chlorine and the naturally occurring organics (precursors) left in the water after filtration." "Control of turbidity in drinking-water systems is important for both health and aesthetic reasons. The substances and particles that cause turbidity can be responsible for significant interference with disinfection, can be a source of disease-causing organisms and can shield pathogenic organisms from the disinfection process. Turbidity is an important indicator of treatment efficiency and the efficiency of filters in particular. The effect of turbidity on disinfection efficiency, including potential for disinfection byproducts, is related to the type and nature of the particles in the water. A raw water supply which is surface water or ground water under direct influence of surface water is likely to contain organic particles that cause turbidity and adversely affect disinfection efficiency. A significant factor in the formation of disinfection by-products is the organic or humic component of turbidity. Raw water supply which is ground water with very low organic content may contain inorganic based turbidity, which may not seriously hinder disinfection. For such waters, an Operational Guideline for turbidity is not established. Since ground water quality is inherently stable, any significant variation in turbidity, excluding pump startup, should be investigated and analyzed immediately for the potential of surface water influence and the presence of organic particles. Turbidity in excess of 5.0 NTU becomes visible to the naked eye and as such a majority of consumers may object to its presence. Therefore, an aesthetic objective of 5.0 NTU has been set for all waters at the point of consumption."

4.2 GROUNDWATER QUALITY MONITORING PROGRAM

➢ Quarterly 'raw water' sampling program for Municipal wells

1. Raw water chemistry analysis should be performed for the Municipal wells. The following chemistry data is recommended to be tabulated and maintained within a suitable database for assessment of long term water quality trends on a quarterly basis. This list of parameters **is additional to the O. Reg. 170/03 requirements** and includes:

- Iron
- Manganese
- Hardness
- Alkalinity
- pH
- Conductivity
- Sodium
- Ammonia
- Chloride
- Colour
- Calcium
- Magnesium
- Dissolved Organic Carbon
- Sulphate
- Total Dissolved Solids

2. Manual collection of static water levels from the Municipal wells and the observation wells (including potentially the Community Centre/Arena well on Figure 1) in conjunction with the quarterly sampling event. To be representative of static aquifer conditions the data must be collected a minimum of 24 hours after the last operation of any site wells.

Rationale: A long term monitoring program would serve to assess the seasonal variations and long term water quality trends, and any effects from over-pumping (i.e. from the potential up-welling of poor groundwater quality at depth during periods of low aquifer recharge).

Please note:
Given the high density Site location, the presence of commercial/industrial land use, and the 'high' aquifer intrinsic susceptibility index, the greatest potential sources of groundwater quality degradation are industrial land use and fuel storage impacts derived from lands to the north, northwest, east and southeast. It is duly noted that chemical parameter testing at the municipal wells is already being completed as part of the compliance requirements of O. Reg. 170/03, and that this testing is quite costly. The frequency of testing outlined in O. Reg. 170/03 has been established by the MOE for health related groundwater quality monitoring purposes. This monitoring at the wellhead however is not preventative in nature, and will serve to create awareness of a problem once the impact has been created. Additionally, a preventative monitoring program is recommended as outlined in the following paragraph.

To monitor for chemical impacts on adjacent properties within the WHPA, it is proposed that the monitoring of non-municipal activities be passed on to the commercial/industrial establishments of concern to the largest extent possible. This can only be made mandatory for new establishments or establishments requesting an expansion, as part of the recommended By-law permitting program. For established Industrial/commercial establishments in the high risk ranked zone of the WHPA, the approach will be risk management and awareness. Established businesses should be encouraged to report their chemical use and handling practices and any concerns based on historical and present day activities. Reporting procedures for any adverse impacts to the groundwater table would follow the procedures established by the MOE, and include new procedures, where possible, for reporting to a designated qualified group for well head protection within the Township. Analytical results should be compared to potable MOE criteria as appropriate. In addition, educating residents on best management practices for handling of household chemicals, proper care of heating storage tanks, and spill prevention and reporting will greatly assist in the groundwater protection program.

- Bi-annual Assessment and Reporting of Raw Water Quality Trends

1. Every 2 years a brief letter report should be prepared by a qualified hydrogeologist assessing any apparent changes/trends in raw water quality and well static water level elevations. The assessment should evaluate both the quarterly groundwater quality data outlined above and the weekly microbiological quality data collected by the Operator.

Rationale: To be of value, the raw water quality data must be assessed for trends on a regular basis in order to identify any existing or potential future concerns. The 'Engineer's Report' that is completed every five years may not be able to identify/mitigate groundwater quality issues in a prompt enough manner.

4.3 WELL INSPECTION PROGRAM

- Semi-Annual General Inspection of Municipal Wells

The following inspections and tasks should be undertaken at each well on a semi-annual basis at approximately the same dates each year, preferably in the spring and fall:

1. Inspect the well vent to ensure that it is not blocked, that the screen is secure, and that the opening is shielded.

2. Visually inspect casing wall, cap and cover for cracks or other damage.

3. Visually inspect casing for signs of any movement.

4. Review the water level and compare with previous measurements. Observe levels after pumps have been off for a minimum period.

5. Review the flow and pressure readings as an indication of pump operation, and compare with previous measurements.

6. Review the well field protection plan for any changes or modifications to the local site condition.

7. Ensure that the well record and Permit to Take Water are valid and available for inspection.

- Every five years re-assess well and pump performance

    1. A step-drawdown test should be conducted for each well in a manner that may be repeated in the future for evaluation and comparison of well specific capacity (yield/increment of drawdown) and pump performance (amperage draw and pumping capacity). The program will use existing flow meters, pumps, and pressure gauges and will not involve pump shut down or well recovery between steps.

- Every ten years remove and inspect the pumps and assess the condition of the well.

    1. Remove well pump and inspect/repair pump, casing and pitless adaptor.

    2. Undertake a camera inspection of the well and assess the need for cleaning (i.e. acid treatment) and/or well re-development.

Rationale: The well inspection program is necessary to ensure that the site wells are maintained in optimum condition to prevent the potential local entry of microbial contamination at the well casing and/or the direct entry of foreign material.

5.0 CONCLUSIONS

Based on the information provided to WESA, and the complementary information and data collected in the field and from additional studies and reports, WESA has utilized the Well Head Protection Areas (WHPA) for the Municipality of North Stormont, Village of Finch water supply defined by the 2003 EOWRC report, and expanded the boundaries in areas of known high to moderate risk activities for a more conservative approach to well head protection. The following conclusions were derived during the course of this study.

- The regional geology of the Village of Finch is comprised unconsolidated deposits consisting primarily of a till plain with minor sand and gravel overlying the limestone bedrock of the Verulam Formation. Within the immediate vicinity of the Village of Finch, the bedrock is encountered at varying depths ranging from 3.3 m to 6.4m below the surface. The overburden materials are comprised of plain till deposits underlain by silt and clay rich gravel deposits. The local aquifer is located within the overburden and weathered bedrock Contact Zone. The municipal wells receive groundwater from 16 metres (53 feet) to 43 metres (140 feet) below the limestone bedrock surface.

- Due to the natural geologic conditions within the study area the Groundwater Intrinsic Susceptibility (GwSI) index determined by the EOWRC report to vary from high to moderate. The GwIS is calculated based on the natural conditions (i.e. thickness) of the geologic materials found above the groundwater aquifer. In this case, the overlying sediments are of moderate permeability, offering very little natural protection from potential contamination.

- An inventory of potential contaminant sources was completed initially by Robinson Consultant Inc. et al. for the EOWRC report (October 2003) and augmented by WESA during a recent field visit. Thirty-four potential sources were identified. Twenty-seven sources fall within the Well Head Protection Areas.

- Each of the potential sources was rated to assign a value corresponding to potential risk of impact. Those sources that were classified as a potentially high risk for contamination included the landfill, large lagoons for manure, gasoline service stations (past and present), domestic above groundwater fuel storage tanks, and industries. Those sources that classified as a medium risk generally included establishments with smaller quantities of chemicals on site such as commercial establishments with chemical storage, funeral home, medical centre, mineral extraction operations, crop fields (land application of biosolids or septage) and small farm operations.

- A Land-Use Risk Rating method was used to evaluate the overall risk to the underlying aquifers. Due to the limited depth and nature of the overburden deposits, the Land-Use Risk Rating was high within the 50 day, 2 year and north-western part of the 10-year and 25-year WHPAs. A south-eastern section of the 10 year WHPA was rated as moderate and within the south-eastern extent of the 25-year WHPA the land-use risk rating was low.

- To ensure long-term integrity of the groundwater, it is important that proper land stewardship be implemented. Any greenfield sites remaining within the high Land-Use Risk Rating areas should be zoned to limit high or moderate risk sources. Environment management measures should be highly encouraged for all potential sources of contamination rated high or moderate. For those potential sources that are rated high or moderate in terms of potential impact to the groundwater, planning or policy decisions may be required to monitor their environmental management efforts. As a minimum, awareness and education should be provided to all potential sources of contamination within the WHPA.

- Based on the results presented in this study, the municipality should now move forward to implement a groundwater source protection action plan.

- An outline of historical raw water quality from available reports was included with excerpts from the Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines, published by the Ontario Ministry of the Environment in June, 2003. A more detailed evaluation and analysis has been prepared for the Township's review as a memorandum under separate cover, dated July 13, 2004 and entitled "Township of Finch Historical Raw Water Quality– Review and Recommendations".

- A groundwater monitoring program and well inspection program has been provided and should be established in accordance with the recommended schedule.

6.0 RECOMMENDATIONS

The objective of this study was to provide a framework for the Township of North Stormont to ensure protection of their Village of Finch groundwater resources. It is important the following recommendations be implemented to promote awareness of groundwater protection, and to implement programs that will ensure long-term protection of this resource.

1) It is recommended that the well head protection strategies of risk avoidance, risk management and awareness be implemented as per the tasks and schedule outlined in Table 4 of Section 3.4.4 of this report. A practical and chronological approach to the Finch Municipal Well Head Protection Plan is provided below;

   a) General planning tasks to be completed in consultation with Council and Planning Department at the Municipality's prudence.

      i) Encourage all medium and high risk contaminant sources identified in Table 2 to attend information workshops regarding BMP implementation as soon as possible.
      ii) Create an area on the municipal website with key information on the WHPP, contacts and BMPs before the end of 2004.
      iii) Design and post public signs indicating the boundaries of the WHPAs and the Land-use Risk Rating within each WHPA before August 2005.
      iv) Define, as soon as possible, future businesses/operations that may be excluded from the high land-use risk rating areas (Figure 4).
      v) Through land use planning modify zoning to restrict activities within the WHPA before August 2005.
      vi) Develop a permitting program for expansions/ new developments. This could include restrictions on types and quantities of chemicals, activities undertaken, based on potential groundwater impact.
      vii) Distribute site specific BMPs by mail to potential high and medium risk sites within all WHPAs.
      viii) Encourage WHPP educational initiatives through local schools.
      ix) Designate a household hazardous waste depot day in the community, if one does not already exist.

b) It is recommended the following tasks be completed within the 50-day WHPA before August 2005;

i) Verify the existence, construction and use of all water supply wells. Geo-reference all well locations where possible.
ii) Abandon all wells not in use as required by the regulations and at the discretion of Municipal Council, re-condition wells in use to current MOE standards.
iii) Establish an overburden and bedrock groundwater monitoring network. Geo-reference all well locations where possible.
iv) Distribute and encourage the completion of the Commercial Contaminant Use Inventory/Questionnaire to all commercial/industrial establishments within Table 2 (voluntary unless triggered by a by-law - i.e. through expansion).
v) Encourage the implementation of best management practices (BMP) for residences, commercial establishments and industrial properties.
vi) Verify that all private septic systems have been decommissioned properly.
vii) Assess the existence, condition and containment of all AST and UST heating and fueling tanks (both commercial and domestic). Geo-reference tank locations where possible.
viii) Properly abandon any remaining private septic systems.
ix) Inform people of the requirements to maintain heating/fuelling tanks (Liquid Fuels Handling Act, 2001 and Ont. Reg. 213/01).

c) It is recommended the following tasks be completed within the 2-year WHPA before August 2007;

i) Verify the existence, construction and use of all water supply wells. Geo-reference all well locations where possible.
ii) Abandon all wells not in use as required by the regulations and at the discretion of Municipal Council, re-condition wells in use to current MOE standards.
iii) Establish an overburden and bedrock groundwater monitoring network. Geo-reference all well locations where possible.
iv) Distribute and encourage the completion of the Commercial Contaminant Use Inventory/Questionnaire to all commercial/industrial establishments within Table 2 (voluntary unless triggered by a by-law - i.e. through expansion).

v) Encourage the implementation of best management practices (BMP) for residences, commercial establishments and industrial properties.
vi) Verify that all private septic systems have been decommissioned properly on municipally serviced properties.
vii) Assess the existence, condition and containment of all AST and UST heating and fueling tanks (both commercial and domestic). Geo-reference tank locations where possible.
viii) Inform people of the requirements to maintain heating/fuelling tanks (Liquid Fuels Handling Code, 2001 and Ont. Reg. 213/01).
ix) Properly abandon any remaining private septic systems on municipally serviced properties.
x) Ensure that heating/fuelling tank removals, replacements and/or improvements to required specifications have been completed within the 50-day WHPA.

d) It is recommended the following tasks be completed within the high risk land-use areas of the 10 and 25 year WHPA before August 2008;

i) Verify the existence, construction and use of all water supply wells. Geo-reference all well locations where possible.
ii) Abandon all wells not in use as required by the regulations and re-condition wells in use to current MOE standards.
iii) Establish an overburden and bedrock groundwater monitoring network. Geo-reference all monitoring well locations where possible.
iv) Distribute and encourage the completion of the Commercial Contaminant Use Inventory/Questionnaire to all commercial/industrial establishments within Table 2. (voluntary unless triggered by a by-law - i.e. through expansion).
v) Encourage the implementation of best management practices (BMP) for residences, commercial establishments and industrial properties.
vi) Assess the existence, condition and containment of all AST and UST heating and fueling tanks (both commercial and domestic). Geo-reference tank locations where possible.
vii) Properly abandon any remaining private septic systems on municipally serviced properties within the 2 year WHPA.
viii) Inform people of the requirements to maintain heating/fuelling tanks (Liquid Fuels Handling Code, 2001 and Ont. Reg. 213/01).

ix) Ensure that heating/fuelling tank removals, replacements and/or improvements to required specifications have been completed within the 2-year WHPA

e) It is recommended the following tasks be completed before August 2010 within the moderate risk land-use areas of the 10 year WHPA and the low risk land-use areas of the 25 year WHPA;

i) Verify the existence, construction and use of all water supply wells. Geo-reference all well locations where possible.
ii) Abandon all wells not in use as required by the regulations and re-condition wells in use to current MOE.
iii) Establish an overburden and bedrock groundwater monitoring network. Geo-reference all well locations where possible.
iv) Distribute and encourage the completion of the Commercial Contaminant Use Inventory/Questionnaire to all commercial/industrial establishments within Table 2 (voluntary unless triggered by a by-law - i.e. through expansion).
v) Encourage the implementation of best management practices (BMP) for residences, commercial establishments and industrial properties.
vi) Assess the existence, condition and containment of all AST and UST heating and fueling tanks (both commercial and domestic). Geo-reference all tank locations where possible.
vii) Inform people of the requirements to maintain heating/fuelling tanks (Liquid Fuels Handling Code, 2001 and Ont. Reg. 213/01).
viii) Ensure that heating/fuelling tank removals, replacements and/or improvements to required specifications are completed within this area and have been completed within the high risk land-use areas of the 10 and 25 year WHPA.

2) Recommendations with respect to the review of historical water quality are presented in memo dated July 13, 2004 entitled "Township of Finch Historical Raw Water Quality – Review and Recommendations".

3) It is recommended that the municipal well monitoring and inspection program be implemented as soon as possible.

7.0 REFERENCES

Davidson, Laurence, Steve Holysh and John Mayes (2002). *An Assessment of Aquifer Vulnerability Mapping Methods for the Oak Ridges Moraine.* Ground and Water: Theory to Practice, Proceedings of the 55th Canadian Geotechnical and 3rd Joint IAH-CNC and CGS Groundwater Specialty Conferences, pp 1135 – 1142.

Kostuch Engineering Ltd. (March 2001). *Village of Finch Water System, Engineer's Report for Water Work.*

MOE (2001). Groundwater Studies 2001/2002, Technical Terms of Reference.
MOE *Terms of Reference.*

Ontario Clean Water Agency (OWRC) (1971). *Report on a Groundwater Survey in the Village of Finch, Ontario Water Resources Commission, 1971,* Table 1 and Figure.

OCWA (October 2000 to March 2003). *Quarterly Reports on Drinking Water Quality.*

OCWA (January 1 to December 31, 2003). *Annual Report, Drinking –Water Systems Regulation O. Reg. 170/0.*

OCWA (2001, 2002, 2003 and up to March 2004). *Water Plant Performance Assessment Reports.*

Ontario Ministry of the Environment (June 2003). *Technical Support Document for Ontario Drinking Water Standards, Objectives and Guidelines*

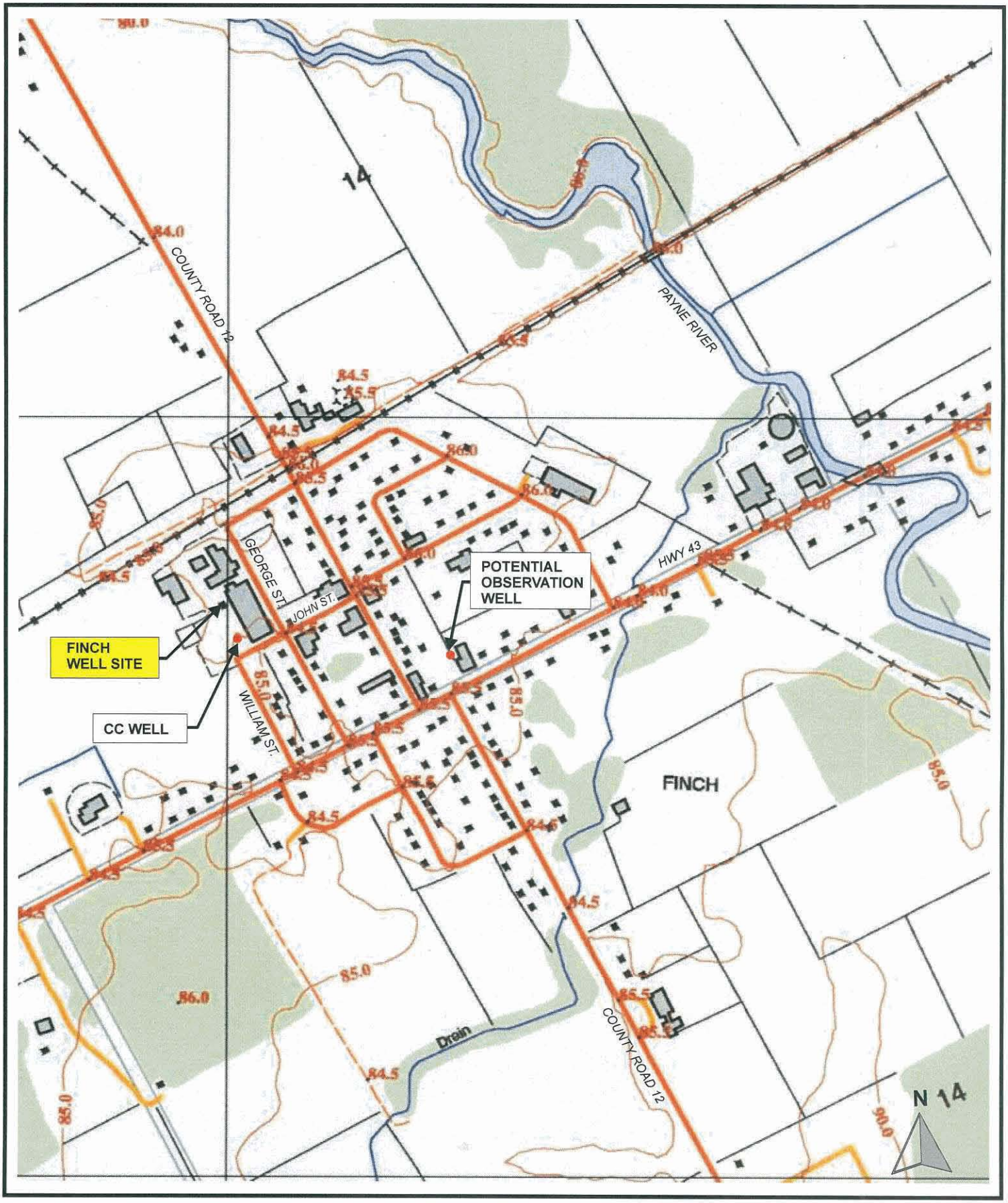


FIGURE: 1

MAP REFERENCE:
MINISTRY OF NATURAL RESOURCES
10 18 4900 49950

SITE LOCATION MAP

B3018-SMAP

WESA
A Better Environment For Business

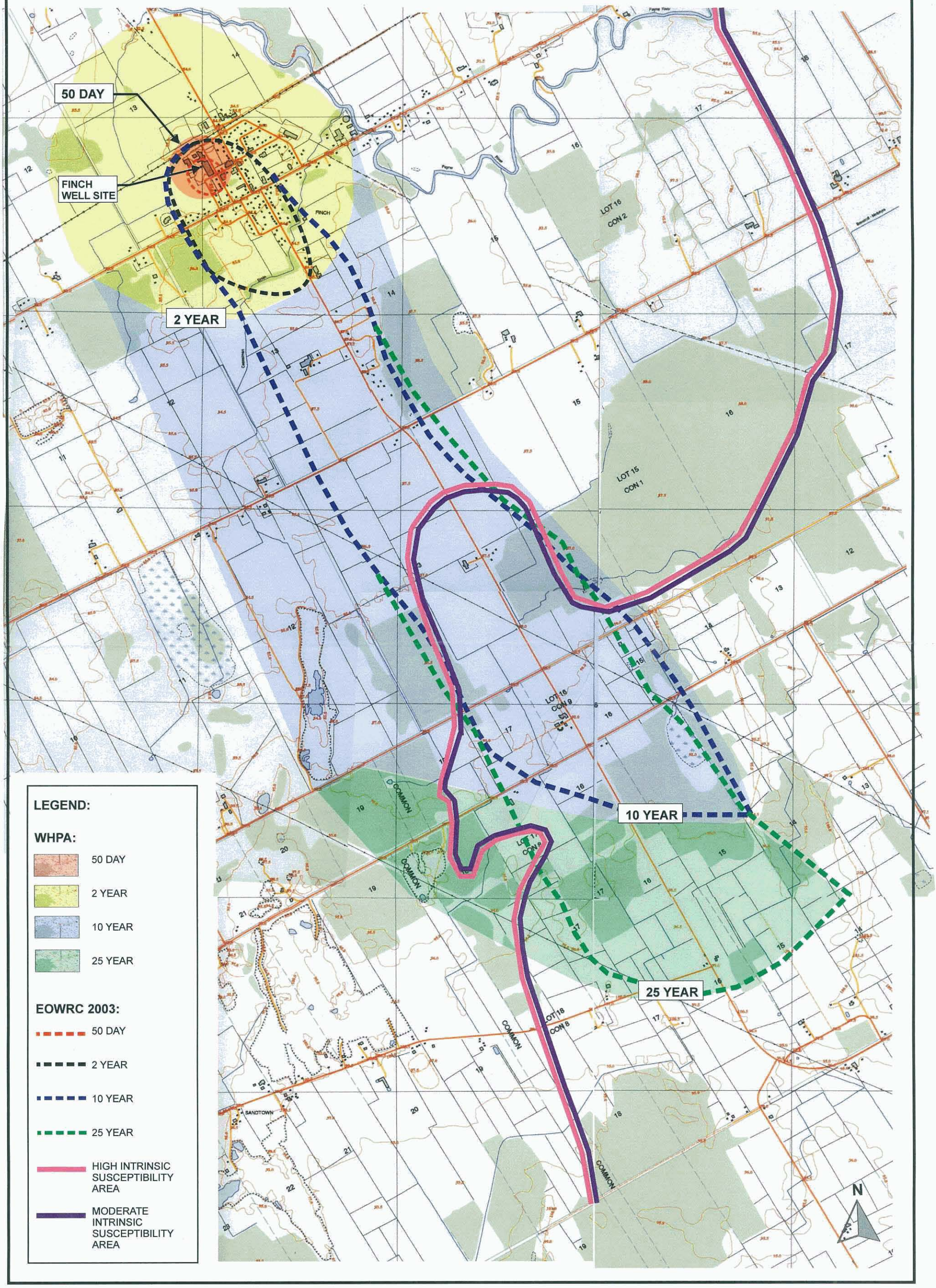


FIGURE 2:
AQUIFER INTRINSIC SUSCEPTIBILITY AND WELLHEAD PROTECTION AREAS - SURROUNDING AREA

B3018-SP

WESA
A Better Environment For Business

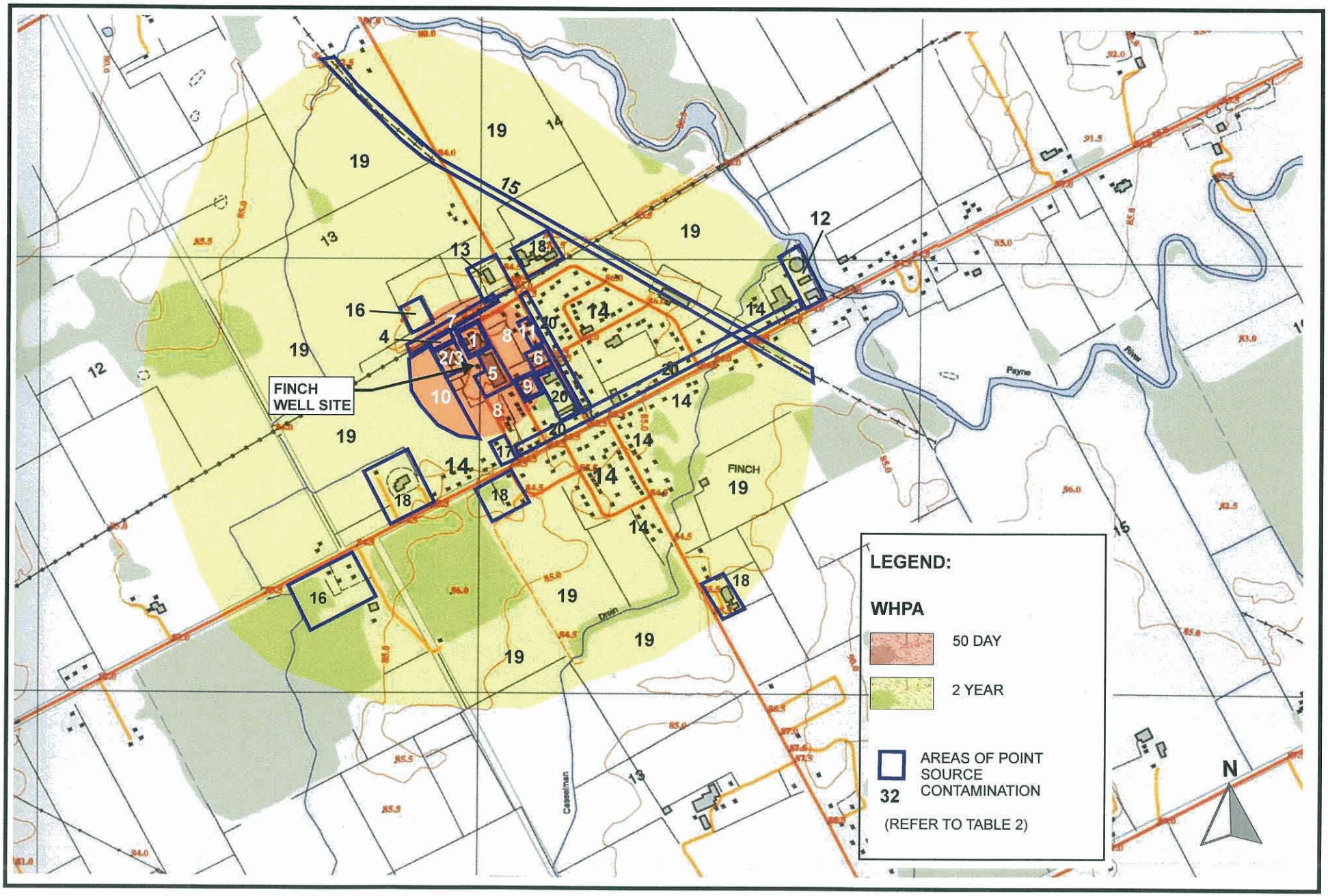


FIGURE 3A:
POTENTIAL CONTAMINANT SOURCES IN THE VILLAGE OF FINCH
FINCE WELLHEAD PROTECTION PLAN

WESA
A Better Environment For Business

50 DAY

FINCH WELL SITE

2 YEAR

10 YEAR

25 YEAR

LEGEND:

WHPA

- 50 DAY
- 2 YEAR
- 10 YEAR
- 25 YEAR

AREAS OF POINT SOURCE CONTAMINATION

32

(REFER TO TABLE 2)

FIGURE 3B:

POTENTIAL CONTAMINANT SOURCES IN SURROUNDING AREA

FINCE WELLHEAD PROTECTION PLAN

B3018-CONTAM-3A

WESA

A Better Environment For Business

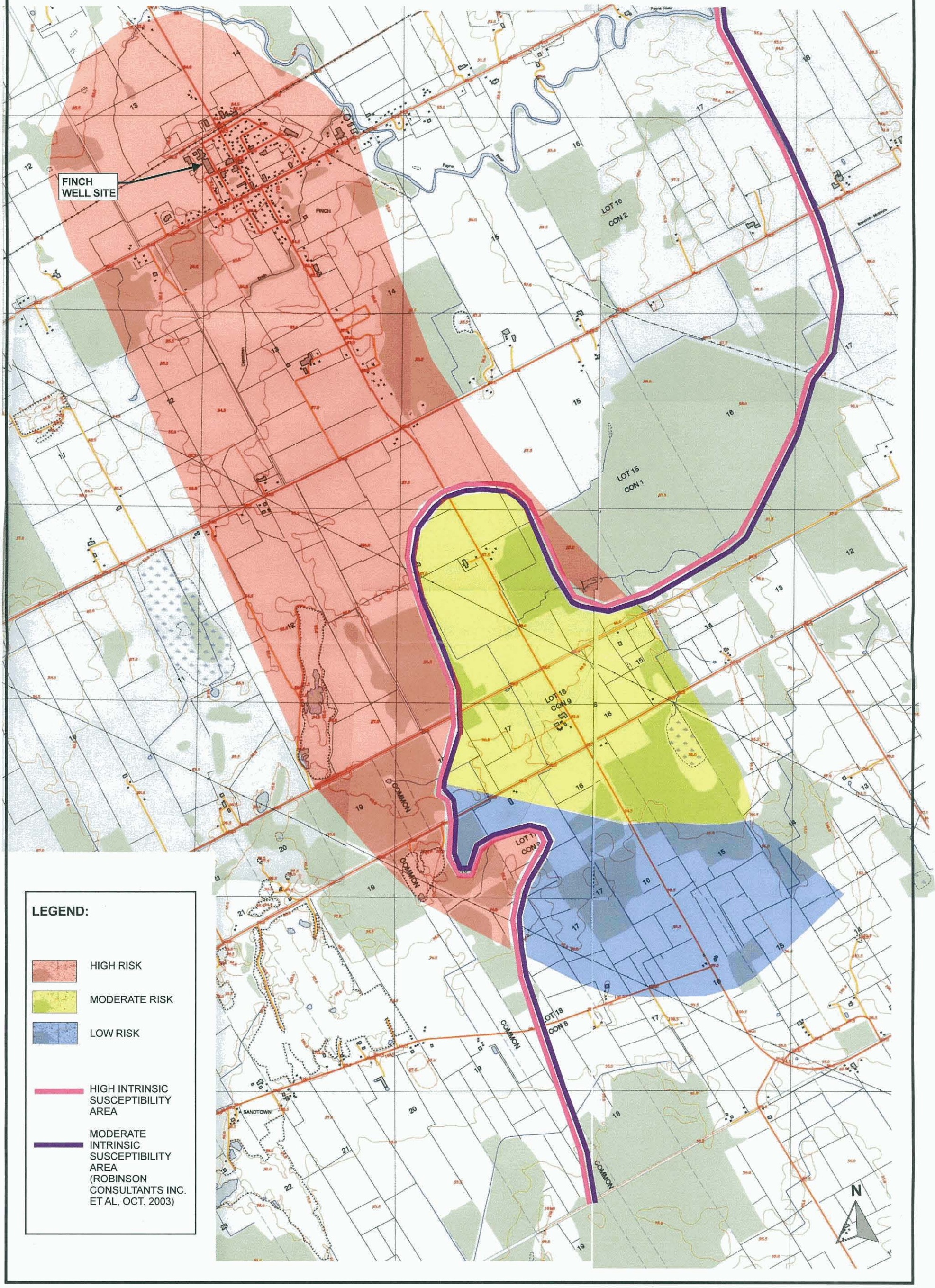


FIGURE 4:
LAND-USE RISK RATING MAP

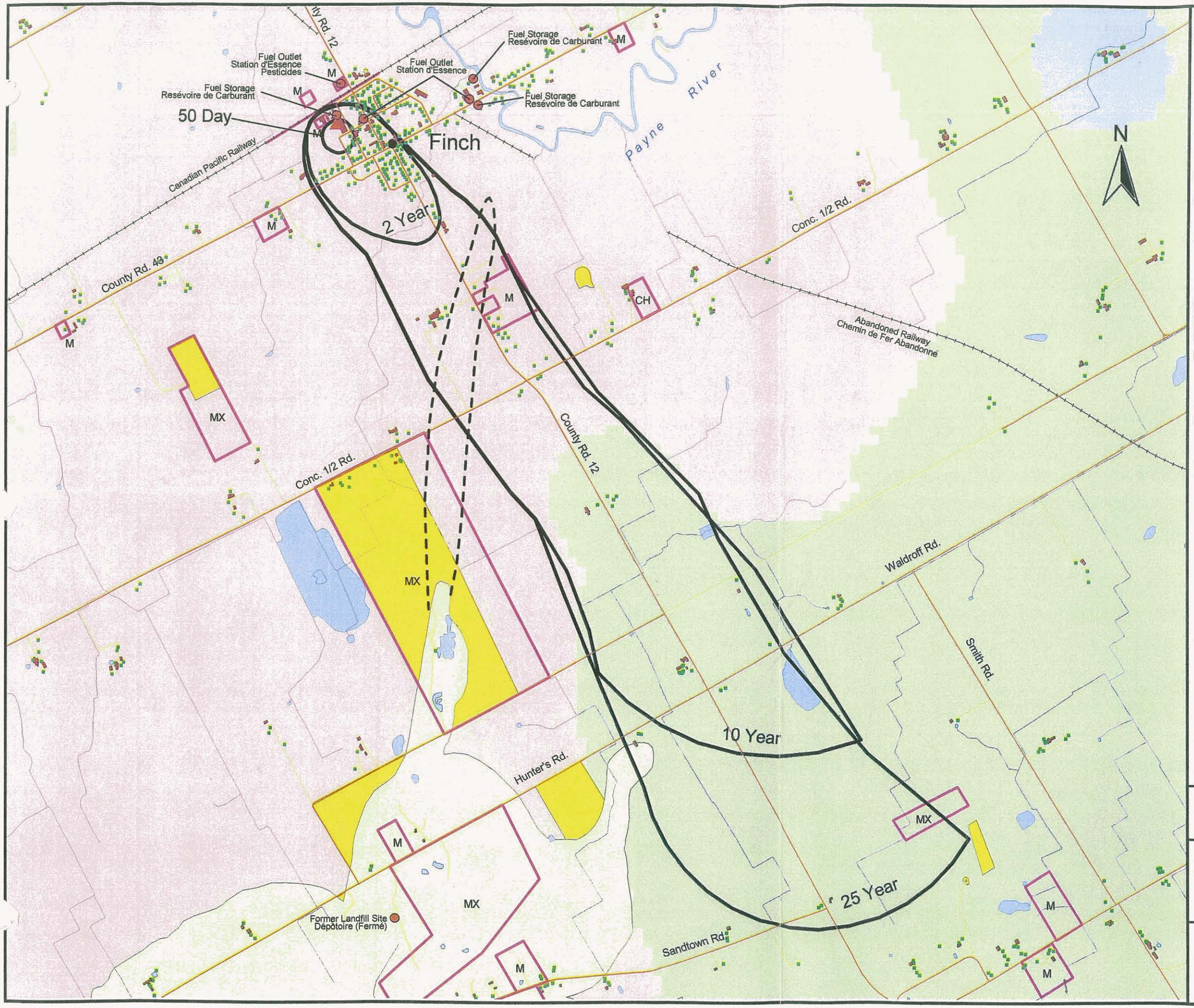
WESA
A Better Environment For Business

APPENDIX A

EOWRC 2003 Report: Figure 5.1, Wellhead Protection Areas and Aquifer Intrinsic Susceptibility Map

Figure 5.1
Wellhead Protection Area
Aquifer Intrinsic Susceptibility
Finch Municipal Wells

Périmetre de Protection de Tête de Puits
Sensibilité Intrinsèque D'eau Souterraine



Legend/Légende

- Municipal Water Well / Puits Municipal
- Water Use Permit / Permis de Puiser de l'Eau
- 50 Day — Wellhead Protection Area Groundwater Time of Travel / Périmetre de Protection de Tête de Puits Temps de Migration de l'Eau Souterraine
- Esker Deposits / Dépôt D'Esker
- Buried Esker Deposits / Dépôt D'Esker Enterré
- Pits and Quarries / Sablières et Carrières
- Point Contaminant Source / Pollutant de Source Ponctuelle

Zoning/Zonage

WD	Waste Disposal/Dépôtoir
WY	Wrecking Yard/Aire de Démolition
M	Industrial/Industriel
MX	Mineral Extraction/Sources Extractives
CH	Highway Commercial/Commerciale Routier

Intrinsic Susceptibility Index/Index de Sensibilité Intrinsèque

- High/Elévé
- Medium/Moyen
- Low/Bas

Scale 1:20,000 Échelle

0.25 0 0.25 0.5 0.75 1

Kilometers/Kilomètres

RAISIN REGION CONSERVATION AUTHORITY
OFFICE DE PROTECTION DE LA NATURE DE LA RÉGION DE RAISIN

Prescott Russell | United Counties Stormont Dundas Glengarry | Ottawa

AQUAFOR BEECH LIMITED | Robinson Consultants | Horsley & Witten Inc.

APPENDIX B

Municipal Wells - MOE Well Records

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 5801326 | MUNICIP. 58701 | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
STORMONT	FINCH		

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
VILLAGE of FINCH	FINCH	DAY 12 MO. 07 YR. 72

21 | ZONE 18 | EASTING 493000 | NORTHING 4998760 | RC. 4 | ELEVATION 0270 | RC. 5 | BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	fill			0	5
	gravel			5	11
	limestone	SHALE	OTTAWA FORMATION	11	189

FINCH WELL No 1/72

31 | 0005 01 | 0011 11 | 0189 1517

32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0026	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
0079	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
0130 (140)	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
0150 (150-165)	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
08	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	1/4	0	0028 (~~276~~)
08	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE		0028 (27½)	0189
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD	☒ PUMP ☐ BAILER
PUMPING RATE	0120 GPM
DURATION OF PUMPING	72 HOURS 00 MINS
STATIC LEVEL	016
WATER LEVEL END OF PUMPING	052 FEET
WATER LEVELS DURING	☒ PUMPING ☐ RECOVERY
15 MINUTES	029 FEET
30 MINUTES	029 FEET
45 MINUTES	031 FEET
60 MINUTES	031 FEET
IF FLOWING, GIVE RATE	GPM
PUMP INTAKE SET AT	FEET
WATER AT END OF TEST	☒ CLEAR ☐ CLOUDY
RECOMMENDED PUMP TYPE	☐ SHALLOW ☒ DEEP
RECOMMENDED PUMP SETTING	080 FEET
RECOMMENDED PUMPING RATE	0110 GPM
50-53	002.8

FINAL STATUS OF WELL

☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED

WATER USE 06

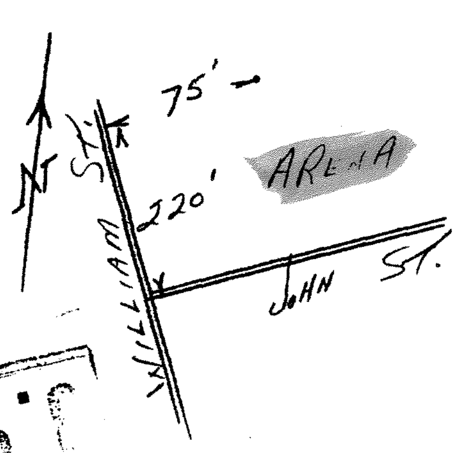
☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☒ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING

☒ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS

CONTRACTOR

NAME OF WELL CONTRACTOR: RAMON H. CASSELMAN | LICENCE NUMBER: 1505
ADDRESS: WILLIAMSBURG
NAME OF DRILLER OR BORER | LICENCE NUMBER
SIGNATURE OF CONTRACTOR | SUBMISSION DATE DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE: 1 | CONTRACTOR: 1505 | DATE RECEIVED: 190973
DATE OF INSPECTION | INSPECTOR
REMARKS:

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 07-091

MINISTRY OF THE ENVIRONMENT
The Ontario Water Resources Act

WATER WELL RECORD

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

11 | 5801327 | MUNICIP. 58701 | CON.

COUNTY OR DISTRICT	TOWNSHIP, BOROUGH, CITY, TOWN, VILLAGE	CON., BLOCK, TRACT, SURVEY, ETC.	LOT
STORMONT	FINCH		

OWNER (SURNAME FIRST)	ADDRESS	DATE COMPLETED
VILLAGE of FINCH	FINCH	DAY 19 MO. Jan. YR. 72

21 | ZONE 18 | EASTING 493000 | NORTHING 4998750 | RC 4 | ELEVATION 0270 | RC 5 | BASIN CODE 25

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	gravel	clay fill		0	5
	gravel			5	11
	limestone		solid	11	99
	"	broken		99	104
	"		solid	104	189
	FINCH	WELL	No 2/72		

31 | 0005 01 1105 0011 N | 0189 15
32

41 WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0064 ~~64-78~~	☒ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL
	☐ FRESH ☐ SULPHUR ☐ SALTY ☐ MINERAL

51 CASING & OPEN HOLE RECORD

INSIDE DIAM INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
08	☒ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE	1/4	0	0028 ~~27~~
08	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☒ OPEN HOLE		0028 (27)	~~189~~ 0189
	☐ STEEL ☐ GALVANIZED ☐ CONCRETE ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER INCHES | LENGTH FEET
MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN FEET

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

71 PUMPING TEST

PUMPING TEST METHOD	PUMPING RATE	DURATION OF PUMPING
☒ PUMP ☐ BAILER	0120 GPM	06 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING ☒ PUMPING ☐ RECOVERY: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
011 FEET	025 FEET	019 FEET	020 FEET	020 FEET	020 FEET

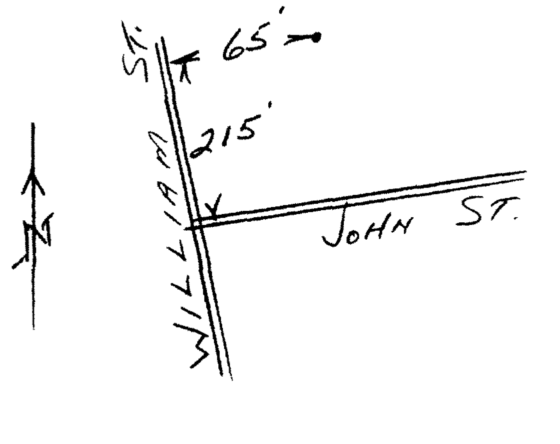
IF FLOWING, GIVE RATE: GPM | PUMP INTAKE SET AT: FEET | WATER AT END OF TEST: ☐ CLEAR ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☒ DEEP | RECOMMENDED PUMP SETTING 080 FEET | RECOMMENDED PUMPING RATE 0110 GPM

50-53: 008.6

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL

☒ WATER SUPPLY ☐ OBSERVATION WELL ☐ TEST HOLE ☐ RECHARGE WELL ☐ ABANDONED, INSUFFICIENT SUPPLY ☐ ABANDONED, POOR QUALITY ☐ UNFINISHED

WATER USE

06

☐ DOMESTIC ☐ STOCK ☐ IRRIGATION ☐ INDUSTRIAL ☐ OTHER ☐ COMMERCIAL ☒ MUNICIPAL ☐ PUBLIC SUPPLY ☐ COOLING OR AIR CONDITIONING ☐ NOT USED

METHOD OF DRILLING

☒ CABLE TOOL ☐ ROTARY (CONVENTIONAL) ☐ ROTARY (REVERSE) ☐ ROTARY (AIR) ☐ AIR PERCUSSION ☐ BORING ☐ DIAMOND ☐ JETTING ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: RAMON H. CASSELMAN | LICENCE NUMBER: 1505
ADDRESS: WILLIAMSBURG
NAME OF DRILLER OR BORER: | LICENCE NUMBER:
SIGNATURE OF CONTRACTOR: | SUBMISSION DATE DAY ___ MO. ___ YR. ___

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 1505 | DATE RECEIVED 190973
DATE OF INSPECTION | INSPECTOR
REMARKS:

FORM 7 07-091

UTM 18 Z 4931100 E

518 R 4998700 N

Elev. 5 R 0275

Basin 25

316/3E

GROUND WATER BRANCH 58 No. APR 9 1962 ONTARIO WATER RESOURCES COMMISSION

503

The Ontario Water Resources Commission Act

WATER WELL RECORD

County or District Stormont Township, Village, Town or City Finch

Con. Plan 48 Lot 45 Date completed Dec. 30/61 (day month year)

Owner The Corporation of Village of Finch (print in block letters) Address Finch Ontario.

Casing and Screen Record		Pumping Test	
Inside diameter of casing	4 in.	Static level	6 ft. 60/100
Total length of casing	21 ft.	Test-pumping rate	800 GPH G.P.M.
Type of screen		Pumping level	39 ft.
Length of screen		Duration of test pumping	1 hr.
Depth to top of screen		Water clear or cloudy at end of test	Clear
Diameter of finished hole	4 in.	Recommended pumping rate	800 GPH G.P.M. with 30 ft. tailpipe
		with pump setting of	40 ft. feet below ground surface

Well Log: Overburden and Bedrock Record	From ft.	To ft.	Water Record: Depth(s) at which water(s) found	Kind of water (fresh, salty, sulphur)
Boulders Sand Loam	0	7		
Boulders Gravel Clay Sand	7	13		
Limestone	13	93	85	fresh

For what purpose(s) is the water to be used? COMMUNITY CENTRE BUILDING

Is well on upland, in valley, or on hillside? Upland

Drilling or Boring Firm Ramon H Casselman

Address Williamsburg Ontario

Licence Number 258

Name of Driller or Borer Lorne Barkley

Address Williamsburg Ontario

Date Dec. 30/61

Ramon H Casselman

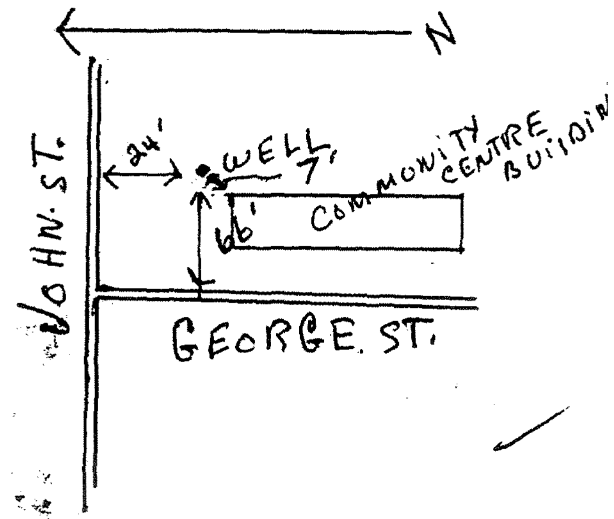
(Signature of Licensed Drilling or Boring Contractor)

Form 7 15M Sets 60-5930

OWRC COPY

Location of Well

In diagram below show distances of well from road and lot line. Indicate north by arrow.



MINISTRY OF THE ENVIRONMENT

The Ontario Water Resources Act

31G/3E

WATER WELL RECORD

Ontario

1. PRINT ONLY IN SPACES PROVIDED
2. CHECK ☒ CORRECT BOX WHERE APPLICABLE

(17) 5801908 | MUNICIP. 58.002 | CON. CON / 03

COUNTY OR DISTRICT: Stormont | TOWNSHIP, BOROUGH, CITY, TOWN OR VILLAGE: ~~DUNDAS~~ FINCH ~~TWP~~ | CON. BLOCK, TRACT, SURVEY ETC: CONCESSION 3 | LOT: 014

OWNER (SURNAME FIRST): United Counties - ~~SDG~~ | ADDRESS: ~~BOX 305~~ FINCH ~~ONTARIO~~ | DATE COMPLETED: DAY 30 ~~08~~ YR 77

(21) UTM ZONE 18 | EASTING 493650 | NORTHING 4998950 | RC 5 | ELEVATION 0275 | RC 5 | BASIN CODE 26

LOG OF OVERBURDEN AND BEDROCK MATERIALS (SEE INSTRUCTIONS)

GENERAL COLOUR	MOST COMMON MATERIAL	OTHER MATERIALS	GENERAL DESCRIPTION	DEPTH - FEET FROM	TO
	Hard Pan			0	21
	Bloders Hard Pan			21	26
	Limestone			26	54

(31) 0021 1/4 | 0026 1/3 1/4 | 0056 15

(32)

(41) WATER RECORD

WATER FOUND AT - FEET	KIND OF WATER
0035	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
0048	1 ☒ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL
	1 ☐ FRESH 2 ☐ SALTY 3 ☐ SULPHUR 4 ☐ MINERAL

(51) CASING & OPEN HOLE RECORD

INSIDE DIAM. INCHES	MATERIAL	WALL THICKNESS INCHES	DEPTH - FEET FROM	TO
06	1 ☒ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE	188		
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			
	1 ☐ STEEL 2 ☐ GALVANIZED 3 ☐ CONCRETE 4 ☐ OPEN HOLE			

SCREEN

SIZE(S) OF OPENING (SLOT NO.) | DIAMETER (INCHES) | LENGTH (FEET)

MATERIAL AND TYPE | DEPTH TO TOP OF SCREEN (FEET)

61 PLUGGING & SEALING RECORD

DEPTH SET AT - FEET FROM	TO	MATERIAL AND TYPE (CEMENT GROUT, LEAD PACKER, ETC.)

(71) PUMPING TEST

METHOD: 1 ☐ PUMP 2 ☒ BAILER | PUMPING RATE: 0010 GPM | DURATION OF PUMPING: 01 HOURS 00 MINS

STATIC LEVEL	WATER LEVEL END OF PUMPING	WATER LEVELS DURING: 15 MINUTES	30 MINUTES	45 MINUTES	60 MINUTES
015 FEET	020 FEET	020 FEET	020 FEET	020 FEET	020 FEET

1 ☒ PUMPING 2 ☐ RECOVERY

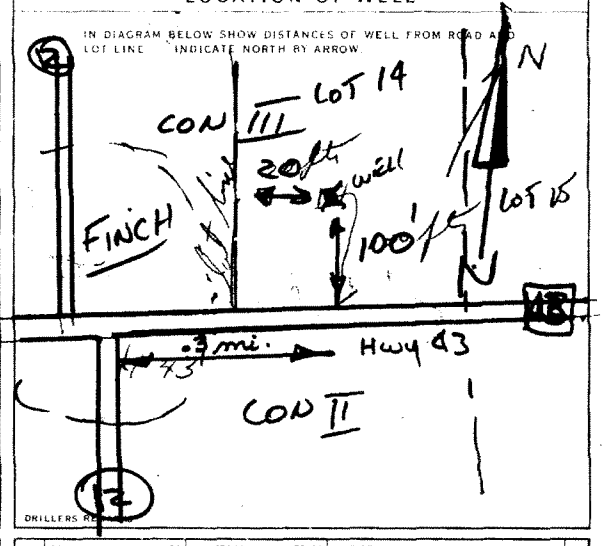
IF FLOWING GIVE RATE: ____ GPM | PUMP INTAKE SET AT: 5 FEET | WATER AT END OF TEST: 1 ☒ CLEAR 2 ☐ CLOUDY

RECOMMENDED PUMP TYPE: ☐ SHALLOW ☐ DEEP | RECOMMENDED PUMP SETTING: 050 FEET | RECOMMENDED PUMPING RATE: 0005 GPM

GPM./FT. SPECIFIC CAPACITY

LOCATION OF WELL

IN DIAGRAM BELOW SHOW DISTANCES OF WELL FROM ROAD AND LOT LINE. INDICATE NORTH BY ARROW.



DRILLERS REMARKS:

FINAL STATUS OF WELL

1 ☒ WATER SUPPLY 2 ☐ OBSERVATION WELL 3 ☐ TEST HOLE 4 ☐ RECHARGE WELL 5 ☐ ABANDONED, INSUFFICIENT SUPPLY 6 ☐ ABANDONED, POOR QUALITY 7 ☐ UNFINISHED

WATER USE 14

1 ☒ DOMESTIC 2 ☐ STOCK 3 ☐ IRRIGATION 4 ☒ INDUSTRIAL ☐ OTHER 5 ☐ COMMERCIAL 6 ☐ MUNICIPAL 7 ☐ PUBLIC SUPPLY 8 ☐ COOLING OR AIR CONDITIONING 9 ☐ NOT USED

METHOD OF DRILLING 0

1 ☐ CABLE TOOL 2 ☐ ROTARY (CONVENTIONAL) 3 ☐ ROTARY (REVERSE) 4 ☐ ROTARY (AIR) 5 ☐ AIR PERCUSSION 6 ☐ BORING 7 ☐ DIAMOND 8 ☐ JETTING 9 ☐ DRIVING

CONTRACTOR

NAME OF WELL CONTRACTOR: Armand Lanthier | LICENCE NUMBER: 2308

ADDRESS: Cryder Ont

NAME OF DRILLER OR BORER: | LICENCE NUMBER:

SIGNATURE OF CONTRACTOR: Armand Lanthier | SUBMISSION DATE: DAY 30 MO Aug YR 78

OFFICE USE ONLY

DATA SOURCE 1 | CONTRACTOR 2308 | DATE RECEIVED 2/09/77

DATE OF INSPECTION 7/06/78 | INSPECTOR Mr B. Coleman

REMARKS: P WBL

MINISTRY OF THE ENVIRONMENT COPY

FORM 7 MOE 07-091

APPENDIX C

Hazard Ratings for Potential Contaminant Sources
(EOWRC report 2003, Table 5.1)

5.5.1 Finch

The Finch production wells 1 and 2 are located in town to the immediate west of the arena. The wells are reported to be completed within the limestone aquifer. Potential sources of contamination within the immediate vicinity of the well lead are:

- The rail line located some 50 m to the north that just borders on the 50 day time of travel delineation.
- Across from the well head is a small abandoned foam insulation industry that is now believed to be used for storage. This facility is within the 2 year time of travel from the well head.
- The area to the west of the well head across the street is taken up by crop farming and falls within the 2 year time of travel from the well head.
- Approximately 20 to 30 metres north of the site is a welding shop with fuel tanks, this facility is with the 50 day time of travel delineation from the well head.
- The heating in Town is supplied by individual services and further east are County facilities that maintain fuel storage facilities.

A summary of the contaminant ranking of these potential threats is provided it **Table 5.1.**

Table 5.1
Ranking of Contaminant Threats - Finch

Land Use Category	Time of Travel	Hazard Rating 1 - 10	ISI Rank 1 - 3	Risk Index 1-30	Time of Travel Multiplier 1 -4	Rank 0.1 -12	Landuse Risk Low, Med, High *
(1)	(2)	(3)	(4)	(5) (3) x (4)	(6)	(7) (5)/10 x (6)	(8)
Finch							
Welding shops and oil tanks area	50 day	6.5	3	**19.5**	**4**	**7.8**	**HIGH**
fuel outlets	outside 25 yr	6.5	3	**19.5**	**1**	**1.95**	**LOW**
Rail track to the north - oil	2 year	6.5	3	**19.5**	**3**	**5.85**	**MEDIUM**
Arena and parking to the west - oil	50 day	6.5	3	**19.5**	**4**	**7.8**	**HIGH**
Crop fields to the west	50 day	2	3	**6**	**4**	**2.4**	**LOW**
Home and funeral home to the south - home heating	2 year	6.5	3	**19.5**	**3**	**5.85**	**MEDIUM**
General residential -home heating	2 year	6.5	3	**19.5**	**3**	**5.85**	**MEDIUM**

* **0.1 - 3 = LOW**
3 - 7 = MEDIUM
7 - 12 = HIGH

5.5.2 Moose Creek

The Moose Creek well system is located in the south end of Town. The closest sources that could provide a potential contaminant source would be homes that are located on the north side of the road that leads to the wells. These homes are approximately 100 m from the nearest well and have a septic system as well as residential heating. Although close to the well heads these locations are ugradient of the 50 day travel time zone. West of the wells, beyond the tree line is a farm with cultivated lands and a farm house. The farm house maintains a septic system, fuel tanks and likely chemical storage for farming. Further to the south and east, some two to three kilometers away, are residences and farms as well as deposits zoned for extraction. A summary of the contaminant ranking of these potential threats is provided it **Table 5.2.**

APPENDIX D

Evaluation Ranking System of Potential Risk for Contaminant Sources
(EOWRC 2003 Report: Pages 71-72)

Type 1, Highest Potential Risk.

- Private facilities for the disposal, storage, handling, transfer, processing and/or recycling of any solid or liquid wastes including private landfills
- Auto wrecking and salvage yards
- Earthen manure storage facilities
- Bulk storage of tires
- Petroleum products refining and asphalt batching
- Bulk storage of chemicals or hazardous substances, excluding on-site storage for agricultural production purposes
- Warehousing of cleaning products, pesticides, herbicides, fungicides and chemicals, excluding on-farm storage for agricultural production purposes
- Warehousing or the bulk storage of oil, gasoline or petroleum products
- Intensive livestock operations and associated manure storage facilities and land application of manure

Type 2, Medium Potential Risk

- Lagoons for sewage treatment
- Land application of biosolids or septage
- Golf courses
- Cemeteries
- Retail sale of agricultural fertilizers and pesticides
- Foundries
- Non-ferrous metal smelting and refining
- Metal casting operations
- Metal finishing operations (electroplating, electrocoating, galvanizing, painting, application of baked enamel)
- Assembly of aircraft and aircraft parts, motor vehicles, truck, bus bodies, trailers, rail cars, mobile homes, ships and boats
- Vehicle stampings
- Commercial or industrial dry cleaning of textiles and textile products
- Leather tanning and finishing
- Wood and wood product preservation and treatment
- Automobile service stations retail fuel sales (gas bars or card-lock facilities)
- Manufacturing of unfinished fabricated metal products and parts
- Manufacturing of cable and wire
- Manufacturing of jewellery and precious metals
- Manufacturing of engines, engine parts, steering and suspension parts, wheels and brakes
- Manufacturing of agricultural, commercial and industrial machinery
- Manufacturing of chemicals, resins, paints, varnish, printing inks, adhesives, plastics and reinforced fibreglass plastic
- Manufacturing of pharmaceuticals and medicines
- Manufacturing of electronic components such as semiconductors, printed circuit boards and cathode ray tubes
- Manufacturing of wet electrical equipment and wet batteries
- Manufacturing of motor vehicle wiring
- Manufacturing and dyeing of textiles
- Bulk road salt storage
- Snow storage and disposal facilities

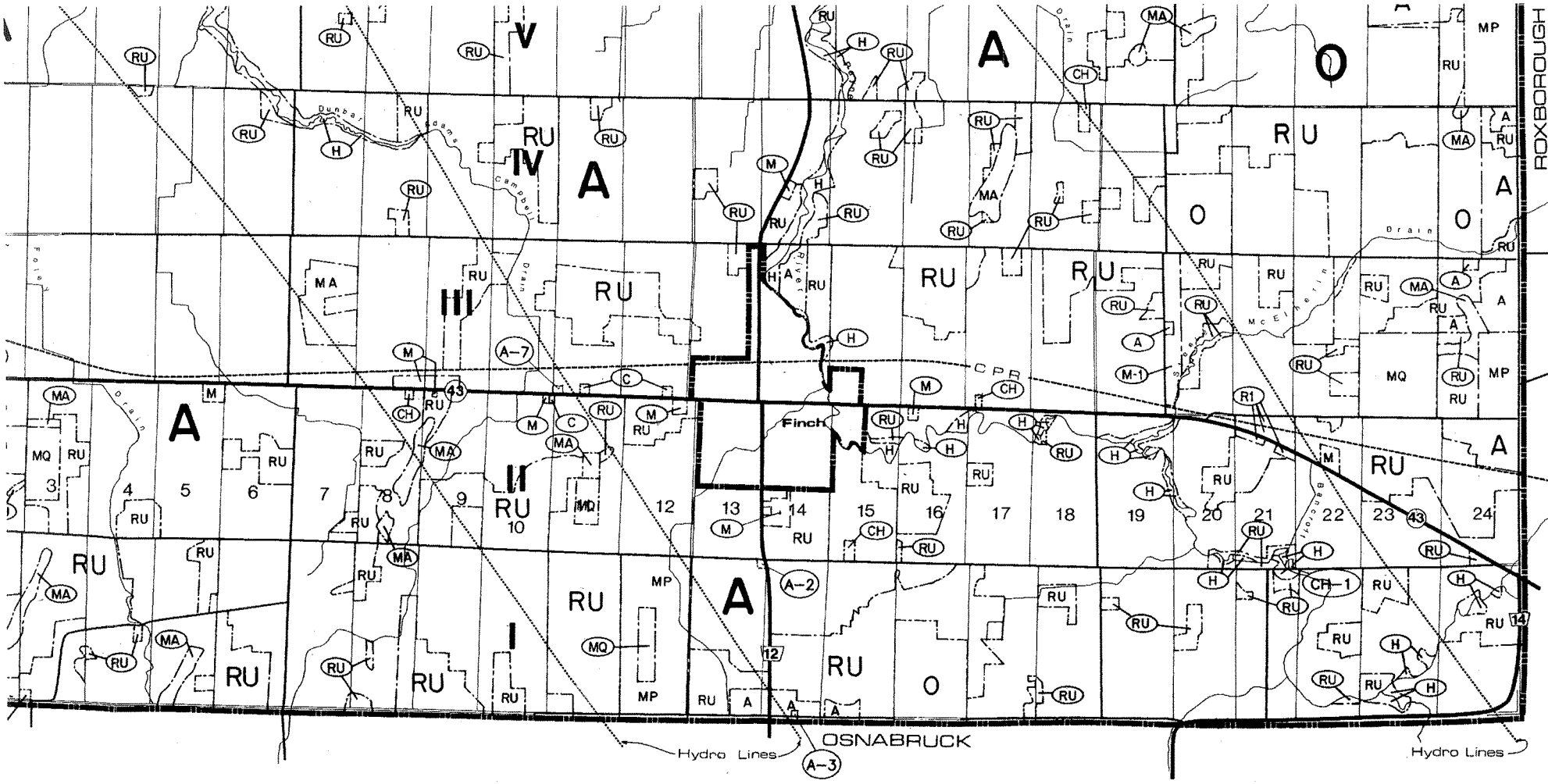
Type 3, Low Potential Risk

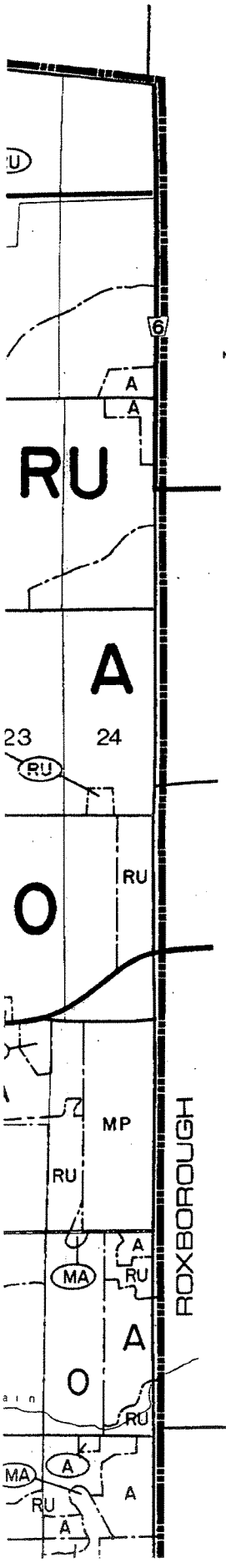
- Market gardening farms
- Automated production of baked goods, dairy, canned goods, frozen foods, processed food and meat
- Automated manufacturing of soft drinks, distilleries, breweries and wine making
- Abattoirs
- Dead stock removal operations
- Rendering facilities
- Photographic developing facilities
- Printing of newspaper, packaging and books
- Repair of photographic equipment, electrical motors, electrical equipment, vending Machines, small motors, appliances, computer equipment and jewellery
- Repair of motor vehicles, water craft, rail vehicles, trucks, buses and machinery
- Airports
- Transit terminals
- Medical, health and other laboratories
- Storage, repair yards and facilities for contractors
- Asphalt paving and roofing contractor yards
- Lawn care contractors
- Funeral homes
- Machinery equipment and rental outlets
- Manufacturing of rubber products
- Manufacturing or electrical appliances, equipment, motors, lighting fixtures, lamps
- Manufacturing of electric light bulbs and tubes
- Manufacturing of dry batteries
- Manufacturing of soaps and toiletry preparations
- Manufacturing of plastic and foam parts and products
- Furniture, casket, cabinet and other wood products manufacturing and assembly
- Glass and glass products manufacturing
- Manufacturing of paper, newsprint, boxes

Table 5.4 relates each of the land uses to the time of travel distance and the intrinsic susceptibility ranks. This information may be used in planning well head protection strategies.

APPENDIX E

Township of North Stormont: Zoning By-law Map of Area





North Arrow

scale 1:40,000

1000 750 500 250 0 1000 2000 metres

2500 1500 500 0 5000 feet

Schedule 'A'

JLR Nº 84-8603

township boundary

sub-schedule area *(See Schedule 'B')*

Legend

Residential
- first density — R1
- rural — RR
- mobile home subdivision — RMHS
- mobile home park — RMHP

Commercial - general — C
- highway — CH

Industrial - restricted — M
- rural — MR

Institutional — I

Open Space — O

Tent and Trailer Park — TP

Rural — RU

Agricultural — A

Wrecking Yard — WY

Waste Disposal — WD

Mineral Aggregate - pit — MP
- quarry — MQ
- reserve area — MA

Hazard Land — H
- special exception — -(numeral)

Notes & Revisions

APPENDIX F

Risk Strategies Implemented by other Ontario Municipalities

RISK AVOIDANCE

The following paragraphs summarize some of the risk avoidance strategies implemented in other municipalities in North America.

The majority of groundwater protection plans implemented to date in Canada and the United States use legislative changes to by-laws, official plans and zoning regulations. This method provides the municipality with the legislative authority to enforce the required changes that is not offered through voluntary programs. For example, Regina, Saskatchewan restricts any industrial land uses in WHPA's that use hazardous chemicals. New Brunswick regulates the quantities and types of chemicals that can be stored or used by new or existing businesses in WHPA's. Existing businesses that cannot meet the restrictions must move, some businesses being granted up to 15 years for this move. In Dayton, Ohio, companies within WHPA's had to compile an inventory of the type and quantity of chemicals they had on site at the time the regulation was passed. The companies are not allowed to increase the inventory, type and quantity, even if production increased or the company wished to expand. Because of the economic impact that this imposed on industrial facilities, the municipality of Dayton spent tens of millions of dollars over the last 20 years to assist up to 80% of the businesses in WHPA's to move to other locations. All of these examples can be classified as avoidance, or chemical restriction methods.

The Regional Municipality of Waterloo (Waterloo) has been addressing this issue of greenfield vs. developed property dilemma. In their case, proposed changes to greenfield sites have largely been accepted by the community and industry, although the by-laws have not yet been revised. For those properties that are currently developed they had intended to stipulate that these businesses did not meet the new by-laws and they would be deemed legal, but classified as non-conforming. The intent was to allow for increased flexibility for the existing industries however the business community rejected the stigma attached to the property especially if a property were to be sold.

The County of Oxford in southern Ontario is reportedly close to implementing groundwater protection policies. Land-use restrictions are being proposed for WHPA's similar to that proposed for Waterloo. Components of their policies for WHPA's include:

- prohibiting the use of underground storage tanks
- prohibiting any new development based on private wells or septic systems
- very stringent protocols for intense livestock operations
- development agreements could have more stringent storm water runoff requirements including the feasibility of at-source infiltration, increased design criteria, impact analysis and mitigation measures

The Oxford policies are a good example that groundwater protection should not be limited just to well head protection areas. Their policies will restrict land-uses in Environment Protection Areas (EPA) (such as Provincially Significant Wetlands) or require an Environmental Impact Study on lands contiguous to an EPA. There will be permitted, banned and conditional land-uses in recharge areas. In these areas, current businesses or new businesses would have to submit a disclosure report (i.e. essentially a chemical inventory with operational procedures). The County may also require a contingency plan in the event of a spill, site plan approval with a view on groundwater protection measures (i.e. BMPs) and groundwater monitoring programs. The policies also include measures for the redevelopment of contaminated or potentially contaminated land including historical review, soil and groundwater investigation, remedial action plans and MOE approval of those plans. Oxford's legal counsel has reviewed the policies and has the opinion that although they could be challenged, they are defendable at the Ontario Municipal Board (OMB) level.

RISK MANAGEMENT

To better control *future* activities on *developed* properties within the WHPA, Waterloo is proposing the use of a Development Permit System (DPS) that would only apply to existing businesses in WHPA's that wish to expand beyond their current boundaries or when a site is to be re-used. In this way, current businesses could proceed with current operations, but when they want to expand, or sell the property, the DPS would require the business to implement best management practices to ensure that the land-use is of equal or less risk than the existing land-use. The DPS cannot be implemented at this time since the Ministry of Municipal Affairs and Housing, which originally approved its use on a pilot basis, has acknowledged that new provincial legislation has to be implemented in order for the DPS to work effectively. It is not known when or if this legislation will be introduced.

COSTS TO IMPLEMENT WELL HEAD PROTECTION STRATEGIES

The cost to change By-laws to restrict land-use of greenfield properties is an internal cost for the Municipality. Such activities will have to be integrated into the Municipality's action items. Public Meetings and consultation will be part of the process as with any other changes to the existing By-laws.

In cases where there are existing industries, incentives could be provided to encourage them to move out of the WHPA. Incentives could include subsidies to businesses that are to move out of the area or subsidies to landowners whose property is devalued due to change of land-use. This can be very costly as seen in the Dayton, Ohio example mentioned above. If the municipality decides it is too costly and/or difficult to move high risk activities out of the WHPA, chemical restriction policies could be required. The municipality must decide whether such a program will be a voluntary one, or if it intends to enforce such an activity. As mentioned earlier different implementation strategies have been tried in Ontario. It appears the permitting option may be most easily

implemented. Unfortunately, this would only include those establishments that are undergoing some change to trigger the permitting. For those that do not fall under the permitting obligations, they may be encouraged to participate through incentive programs.

The cost to implement the restriction of chemical use lies primarily in the monitoring and enforcement of the restrictions. These additional costs would be incurred primarily through the hiring of additional staff to ensure implementation of the program is followed.

Workshops are also very effective educational tools that can reach a large number of businesses at one time. The Municipality could subsidize the information Workshops. Participants could be asked to pay a nominal fee, such as $50, to ensure attendance. The municipality would, therefore, have to subsidize the event to include the costs of the presenters, room rental, food and audiovisual equipment. The costs of a typical workshop would be approximately $5000. Detailed training for all applicable employees at a specific business on items such as Transportation of Dangerous Goods and Emergency Response typically range from $2000 to $5000 per facility.

The Business Water Quality Program (BWQP) in the Region of Waterloo provides financial and technical assistance to businesses to implement BMPs that prevent water pollution. The first step in the Program is a Facility Review and Assessment completed by a pre-qualified consultant (including WESA) who assesses the potential for spills to groundwater, surface water or sewer systems and then recommends procedural and/or capital BMPs. Procedural BMPs include employee training, spill prevention or pollution prevention plans and Environmental Management Systems (EMSs). Capital BMPs include facility and structural improvements, equipment purchases or process changes. In Waterloo, the program pays 50% of the initial assessment costs up to a maximum of $4000. None of the assessments conducted to date have exceeded $8000. The program also provides grants to implement the BMPs on a 50% cost share basis up to a maximum of $14,000. The Region has committed $1.5 million over the 5 years of the Program with additional funding being provided by the MOE and Environment Canada. The Program is administered by an outside agency (OCETA – Ontario Centre for Environmental Technology Advancement). This is an example of the type of incentive program that could be established for the study area. The level of environmental awareness is greatly increased for each business participating in the BWQP in the Region of Waterloo.

APPENDIX G

MOE Terms of Reference Questionnaires and Examples of Best Management Practices for Industry and Commercial Establishments

(Insert name of study region here)
Groundwater Study **Date:**_____
Business/Chemical Use Inventory **Please fax to (phone #) by:**_____

1. Facility Information
Facility Name:_____ ☐ Completed at time of visit
Street Address:_____ ☐ Left for business to complete
Georeferenced Location: Latitude:_____ Longitude:_____ ☐ Not completed
Person Interviewed:_____
Title:_____ Phone:_____
Name for the Mailing:_____ Title:_____
Mailing Address:_____
City:_____ Prov:_____ Postal Code:_____
Did you know your facility is located close to a municipal well? ☐ Yes ☐ No
If known, please indicate any previous facilities on the

2. Type of Service/Product **NAICS code:** _____
(refer to Terms of Reference, *Schedule D*)

Facility Type:

☐ Office	☐ Restaurant	☐ Medical	☐ Agriculture: Livestock Operations
☐ Gas Station	☐ Industry	☐ Dry Cleaner	☐ Agriculture: Crops/Nursery
☐ Computers	☐ Waste Management	☐ Automotive	☐ Printer/Photo Processor
☐ Manufacturing	☐ Other_____		

3. Materials Handling

How do you dispose of waste?	☐ On site	☐ Off site	
Is spill cleanup equipment available?	☐ Yes	☐ No	
Is there a septic system on site?	☐ Yes	☐ No	☐ Unknown
Are there floor drains in the shop?	☐ Yes	☐ No	☐ Unknown

Any wells on site?	Industrial Use Well	☐	Number of Wells:_____
	Abandoned/Unused Well	☐	Number of Wells:_____
	Irrigation Well	☐	Number of Wells:_____
	Drainage Well	☐	Number of Wells:_____
	Drinking Water Well	☐	Number of Wells:_____
	Observation Well	☐	Number of Wells:_____

Is there an Environmental Mgt System in Place? ☐ Yes ☐ No Date Initiated_____

Microbiological Contaminants Storage

	Estimated Volume	Type of Storage Container			Physical State (Sol/Liq/Gas)
		Earthen	Concrete	Metal	
Biosolids (e.g., pulp/paper waste)	_____	☐	☐	☐	_____
Septage	_____	☐	☐	☐	_____
Sewage Sludge	_____	☐	☐	☐	_____
Agricultural Manure	_____	☐	☐	☐	_____
Other Animal Waste	_____	☐	☐	☐	_____

Organic Contaminants Storage

Liquid / Solid	<25L (<5 gal) <25Kg	25-250L (5-50 gal) 25-250Kg	250-2500L (50-500 gal) 250-2500Kg	>2500L (>500 gal) >2500Kg	Above Ground Tank	Below Ground Tank	Physical State (Sol/Liq/Gas)
Petroleum Products	☐	☐	☐	☐	☐	☐	_____
Insecticides/ Herbicides	☐	☐	☐	☐	☐	☐	_____
Brake/Transmission Fluid	☐	☐	☐	☐	☐	☐	_____
Acids/Bases/Caustics	☐	☐	☐	☐	☐	☐	_____
Paints/Dyes/Stains	☐	☐	☐	☐	☐	☐	_____
Cleaning Solutions (soap, detergents, etc.)	☐	☐	☐	☐	☐	☐	_____
Chlorinated Solvents (degreasers, dry cleaning fluid, TCE, etc.)	☐	☐	☐	☐	☐	☐	_____
Other Solvents (MEK, MIBK, acetone, varsol, etc.)	☐	☐	☐	☐	☐	☐	_____
Film Chemicals	☐	☐	☐	☐	☐	☐	_____
Registered Wastes (PCBs, asbestos, etc.)	☐	☐	☐	☐	☐	☐	_____

Inorganic Contaminants Storage

	Estimated Volume	Physical State (Sol/Liq/Gas)
Fertilizers	_____	_____
Salt	_____	_____
Other_____	_____	_____

5. Landscape Application of Materials

	Yes	No	Estimated Area of Application
Nutrients (manure, biosolids)	❑	❑	_____
Fertilizers	❑	❑	_____
Pesticides	❑	❑	_____
Salt (e.g., paved surfaces)	❑	❑	_____
Other _____	❑	❑	_____

Comments:_____

_____

_____

_____

_____

_____

_____

_____

_

Water Pollution Prevention Fact Sheet

- *Accommodation Service Industries* -

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Use physical rather than chemical cleaning methods wherever possible.
- Do not put potentially hazardous materials down the sink/drain. Have them properly disposed by a licensed hazardous waste hauler.
- Use automated systems for laundry chemicals
- Reduce pesticide applications by using non-chemical pest control measures.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Closed-loop cooling systems should be used to save water and costs.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.

Regional Municipality of Waterloo – Water Services Division
Website:
www.region.waterloo.on.ca/water/docs/wateresouc.html
Version 1.1, November, 1998

Water
Ours to Protect

- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

The Regional Municipality of Waterloo has a Water Resources Protection Strategy to limit the risk of contamination of our water resources. The Region has compiled a list of Pollution Prevention Practices for most businesses in the Region. For additional information on pollution prevention and Pollution Prevention Practices contact the following:

Regional Municipality of Waterloo – Water Services Division
150 Frederick Street
7th Floor
Kitchener, ON N2G 4J3
Phone: 519-575-4426
Fax: 519-575-4424
www.region.waterloo.on.ca/water/docs/wateresouc.html

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www.cciw.ca/green-lane/or-home.html

Water Pollution Prevention Fact Sheet

- *Health and Social Service Industries*-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Do not install floor drains in x-ray processing rooms, labs, or where regulated medical wastes are stored.
- Use amalgam traps in dental offices to prevent silver and mercury bearing amalgams from entering the subsurface disposal system or sanitary sewer.
- Increased septic system detention times may improve BOD removal from the discharge of blood, formaldehyde and other degradable wastes.
- Dispose of spent or obsolete products through a vendor or medical waste collection service.
- Reduce solvent use by minimizing sizes of cultures or specimens, and using calibrated solvent dispensers.
- Reuse formaldehyde solutions in lab applications.
- Isolate and secure medical wastes, infectious wastes and biomedical wastes from other solid wastes and store in appropriate containers. Transport and dispose according to regulations.
- Use physical rather than chemical cleaning methods wherever possible.
- Wastewater from lab operations should discharge to a lab drain system that is separate from the sanitary wastewater drains. Lab drains should lead to a neutralization system before discharging to the sanitary sewer.
- Do not put potentially hazardous materials down the sink/drain. Have them properly disposed by a licensed hazardous waste hauler.
- Implement a hazardous waste minimization program. Reduce hazardous wastes by substituting with non-hazardous materials
- Large institutions can set up satellite waste accumulation areas, allowing each area to accumulate 205 L of hazardous waste. Each area must be managed by a person directly responsible for the process producing the waste.
- Use on-site distillation and filtration equipment to regenerate solvents and other chemicals.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Consider a bulletin board solely for environmental concerns.

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- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.

The Regional Municipality of Waterloo has a Water Resources Protection Strategy to limit the risk of contamination of our water resources. The Region has compiled a list of Pollution Prevention Practices for most businesses in the Region. For additional information on pollution prevention and Pollution Prevention Practices contact the following:

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Water Pollution Prevention Fact Sheet

- Food and Beverage Service Industries-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Consider composting all leftover and off-spec food waste.
- Set up a system to collect all grease, fat and meat and bone scraps. Contract a rendering facility to pick up these materials for use in manufacturing animal feed and tallow.
- Implement a preventative maintenance program for all kitchen appliances and equipment.
- Fast Food outlets should have a centrally located receptacle for pre-consumer food scraps. The waste can be composted or given to local farmers for animal feed.
- Use physical rather than chemical cleaning methods wherever possible.
- Do not put potentially hazardous materials down the sink/drain. Have them properly disposed by a licensed hazardous waste hauler.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.

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- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

The Regional Municipality of Waterloo has a Water Resources Protection Strategy to limit the risk of contamination of our water resources. The Region has compiled a list of Pollution Prevention Practices for most businesses in the Region. For additional information on pollution prevention and Pollution Prevention Practices contact the following:

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Water Pollution Prevention Fact Sheet

- Personal and Household Service Industries-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Untreated rinsewaters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Increased septic system detention times may improve BOD removal from the discharge of blood, formaldehyde and other degradable wastes.
- Mixing areas for pesticides should be located indoors, away from floor drains.
- Any floor drains in buildings used for the storage and mixing of fertilizers and pesticides should be connected to a holding tank not to a septic system or sanitary sewer.
- Dry cleaning exhaust vents should be equipped to capture any dripping liquids.
- Dry-to-dry machines eliminate the need to transfer solvent laden garments from a washer to a dryer, reducing solvent and solvent vapour loss.
- Conduct regular hazardous waste audits and implement hazardous waste minimization programs.
- Lint filters, lint, sludge, ehaust condensate and waste solvents should be disposed through a licensed hauler.
- Carefully meter the formulation of hair dyes, permanent waves, and frosting/bleaches to minimize excessive wastes.
- Reduce the frequency of solvent replacement to reduce solvent use and handling. Use on-site solvent recovery and recycling systems.
- Encourage the use of products with longer shelf lives and which can be reused if excess is generated.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and

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transportation procedures for WHMIS materials to reduce the risk of spills and accidents.

- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.

The Regional Municipality of Waterloo has a Water Resources Protection Strategy to limit the risk of contamination of our water resources. The Region has compiled a list of Pollution Prevention Practices for most businesses in the Region. For additional information on pollution prevention and Pollution Prevention Practices contact the following:

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Water Pollution Prevention Fact Sheet

- *Amusement and Recreational Service Industries*-

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- Use physical rather than chemical cleaning methods wherever possible.
- Mixing areas for pesticides should be located indoors, away from floor drains.
- Any floor drains in buildings used for the storage and mixing of fertilizers and pesticides should be connected to a holding tank not to a septic system or sanitary sewer.
- Pesticide containers can be disposed of at landfills if they are emptied in accordance with hazardous waste regulations.
- Rinse waters from pesticide containers and application equipment can be diluted and spread on turf or crops.
- Pesticide use must be registered and applied according to authorized uses, label directions and applicable regulations.
- Do not put potentially hazardous materials down the sink/drain. Have them properly disposed by a licensed hazardous waste hauler.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
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- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.

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- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

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Water Pollution Prevention Fact Sheet

- General Retail Merchandising -

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- Spent solvents and ink sludges should be stored in secure containers and disposed of through a licensed hazardous waste hauler.
- Large commercial and medical facilities should not discharge spent solutions to septic systems.
- Spent photographic fixer and developer should be should be stored in secure containers, recycled or disposed of through a licensed hazardous waste transporter.
- Photographic wastes should be treated to remove silver and other metals before discharging. Make sure the treated waste meets the applicable effluent guidelines
- Set up a staff waste reduction and pollution prevention committee.
- Keep staff informed about company pollution prevention programs, policies and objectives.
- Provide clearly labeled waste containers for source separation or train cleaning staff to source separate materials.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water.
- Recycle cleaning rags or rags contaminated with ink, paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.

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- Minimize the use of materials such as road salts and lawn-care chemicals.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
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- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
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Water Pollution Prevention Fact Sheet

- *Department & General Store Retail Merchandising*

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- Set up a staff waste reduction and pollution prevention committee.
- Keep staff informed about company pollution prevention programs, policies and objectives.
- Fast Food outlets should have a centrally located receptacle for pre-consumer food scraps. The waste can be composted or given to local farmers for animal feed.
- Provide clearly labeled waste containers for source separation or train cleaning staff to source separate materials.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
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- Use dry cleanup methods and mopping, and avoid flooding with water.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.

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- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

The Regional Municipality of Waterloo has a Water Resources Protection Strategy to limit the risk of contamination of our water resources. The Region has compiled a list of Pollution Prevention Practices for most businesses in the Region. For additional information on pollution prevention and Pollution Prevention Practices contact the following:

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Fax: 519-575-4424
www.region.waterloo.on.ca/water/docs/wateresouc.html

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Environment Canada Green Lane
Web page:
Www.cciw.ca/green-Lane/or-home.html

NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Water Pollution Prevention Fact Sheet

- *Local Government Services*-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Oil traps and oil/grit separators can be installed in storm sewer catch basins. Remove trapped oil and grease after each storm.
- Sump sediments from sealed catch basins should be removed at least twice a year.
- To reduce the amount of nutrients and pesticides in stormwater runoff, towns should encourage reductions in fertilizer and pesticide use for lawns, golf courses and agricultural lands.
- Set up a staff waste reduction and pollution prevention committee.
- Keep staff informed about office/department pollution prevention programs, policies and objectives.
- Provide clearly labeled waste containers for source separation or train cleaning staff to source separate materials.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
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- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material

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saturated with oil is a hazardous waste and should be disposed properly.

- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
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Water
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Water Pollution Prevention Fact Sheet

- Schools and Educational Service Industries-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Wastewater from lab operations should discharge to a lab drain system that is separate from the sanitary wastewater drains. Lab drains should lead to a neutralization system before discharging to the sanitary sewer.
- Do not put potentially hazardous materials down the sink/drain. Have them properly disposed by a licensed hazardous waste hauler.
- Implement a hazardous waste minimization program.
- Large institutions can set up satellite waste accumulation areas, allowing each area to accumulate 205 L of hazardous waste. Each area must be managed by a person directly responsible for the process producing the waste.
- Reduce hazardous wastes by substituting with non-hazardous materials.
- Use on-site distillation and filtration equipment to regenerate solvents and other chemicals.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Closed-loop cooling systems should be used to save water and costs.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and

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transportation procedures for WHMIS materials to reduce the risk of spills and accidents.

- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
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Water Pollution Prevention Fact Sheet

- *Business Service Industries* -

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- Set up a staff waste reduction and pollution prevention committee.
- Keep staff informed about office/department pollution prevention programs, policies and objectives.
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NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Water Pollution Prevention Fact Sheet

- *Wholesale Machinery, Equipment and Supplies*-

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- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty

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them regularly for recycling, reuse or proper disposal.

- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
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Water Pollution Prevention Fact Sheet

- *General Wholesale Products Industries*-

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- Recycle materials such as used oil, spent degreaser, and mineral spirits.
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them regularly for recycling, reuse or proper disposal.

- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
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- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
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Water Pollution Prevention Fact Sheet

- Retail Household Furniture and Appliances-

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- Parts cleaning and degreasing areas should be isolated from other operations. The area should have a permeable floor and some form of containment in case of a spill.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Discarded or damaged parts should not be left with the client for disposal after servicing.
- Segregate waste paint from waste thinner, since waste thinners can be recycled for use as a precleaning solvent.
- Use one multi-purpose solvent rather than many different types to minimize waste, improve recyclability and reuse.
- Dumpsters containing scrap metal should have a drain plug in place, be covered and located on a concrete pad.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.

Regional Municipality of Waterloo – Water Services Division
Website:
www.region.waterloo.on.ca/water/docs/wateresouc.html
Version 1.1, November, 1998

Water
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- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

The Regional Municipality of Waterloo has a Water Resources Protection Strategy to limit the risk of contamination of our water resources. The Region has compiled a list of Pollution Prevention Practices for most businesses in the Region. For additional information on pollution prevention and Pollution Prevention Practices contact the following:

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NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Water Pollution Prevention Fact Sheet

- Automotive Vehicles, Parts & Accessories - Sales-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Each service bay should be provided with a waste collection station which include labeled containers for each type of waste liquid or labeled sinks which lead to an appropriate waste holding tank.
- Service pits should have spill containment such as a sump which discharges to a holding tank.
- Store large quantities of lead-acid batteries in covered, isolated areas with no floor drains, acid resistant flooring, and secondary containment. Small quantities can be stored in acid-resistant tubs.
- Each car wash facility should maximize the recycling/reuse of rinse water.
- Floor drains should connect to an oil/water separator system.
- Service pits should have impervious, concrete floors. Old earthen floors should be checked for historical contamination and remediated as necessary.
- Check hydraulic lifts regularly for leaks.
- Vehicle storage and repair areas must have an impermeable surface and some form of containment in case of spills or leaks.
- Use above ground hydraulic lift systems whenever possible
- Dedicate service bays to a specific operation such as parts cleaning, degreasing, engine steam cleaning, vehicle washing etc. This will make waste handling more efficient.
- Do not use antifreeze as a de-icing agent. Antifreeze can be recovered on-site or off-site.
- Do not use waste oil as a dust suppressant.
- Waste paints, thinners, paint sludges and solids should be collected, drummed, labeled and disposed by a licensed waste hauler.
- Waste from the collection tank of an oil/water separator should be emptied every 6 to 12 months by a licensed waste hauler.
- Send waste solvent to a waste exchange for further reuse and recycling.
- If no floor drains are installed, there should be no vehicle washing and there should be no discharges to environment of any kind.
- Install a drying rack and/or drip pan to collect solvents dripping off of washed parts. Reuse the collected solvent.
- Use high performance oils to reduce the frequency of changes and the amount of waste produced.
- Used oil filters should be recycled for their scrap metal content. Drain (for at least 24 hrs.) and collect the residual oil prior to recycling.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.

Regional Municipality of Waterloo – Water Services Division
Website:
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Version 1.1, November, 1998

Water
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- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
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Water Pollution Prevention Fact Sheet

- Retail Food, Beverage and Drug-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Waste from the produce department is excellent composting material or animal feed. Look for local markets for this material and/or let customers and local farmers now about it.
- Scraps from the meat department can be used in the manufacturing of animal feed.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Consider a bulletin board solely for environmental concerns.
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- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.

Regional Municipality of Waterloo – Water Services Division
Website:
www.region.waterloo.on.ca/water/docs/wateresouc.html
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NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Water Pollution Prevention Fact Sheet

- *Wholesale Metals, Hardware, Plumbing, Heating & Building Materials* -

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.

Regional Municipality of Waterloo – Water Services Division
Website:
www.region.waterloo.on.ca/water/docs/wateresouc.html
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- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
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Water Pollution Prevention Fact Sheet

- *Transportation Industries* -

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- Salt storage and mixing facilities should not be located within recharge areas for water supply wells. They should be located on flat sites, with impermeable surfaces protected from run-off.
- Salt piles should be stored under cover.
- Floor drains in maintenance bays should be connected to a holding tank or sanitary sewer which is equipped with an oil and grit separator.
- Collect any saline water that may develop in a tight drainage system. Collected brine can be dried and reused.
- Environmentally sensitive areas should be identified for all road crews. Make sure all crew members now how to protect these areas.
- Avoid dumping snow directly into rivers or other water courses.
- Batteries that are cracked and leaking are considered a hazardous waste. Dispose of them through a hazardous waste transporter. Intact batteries should be reclaimed.
- Do not mix oil or diesel fuel waste with anything.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
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Regional Municipality of Waterloo – Water Services Division
Website:
www.region.waterloo.on.ca/water/docs/wateresouc.html
Version 1.1, November, 1998

Water
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- Keep track of where and why spills have occurred to prevent future spills.
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- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Whenever possible, use environmentally friendly materials.
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Water Pollution Prevention Fact Sheet

- *Trade Contracting Industries* -

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- Quickly stabilize disturbed areas by restoring overburden, replacing topsoil, avoiding steep slopes, reproducing natural drainage patterns, and replacing vegetation.
- Topsoil and subsoil should be stripped from the operation area and kept for restoration of the area.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
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- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.

Regional Municipality of Waterloo – Water Services Division
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Water
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- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
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Water
Ours to Protect

Water Pollution Prevention Fact Sheet

- Storage and Warehousing -

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Maintain an accurate inventory of materials stored on site. Investigate any changes in volume that may be due to leaks or spills.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Loading docks should be covered to prevent stormwater from mixing with any spilled chemicals.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Closed-loop cooling systems should be used to save water and costs.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.

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- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

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Water
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Water Pollution Prevention Fact Sheet

- *Wholesale Motor Vehicle, Parts and Accessories*-

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- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty

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them regularly for recycling, reuse or proper disposal.

- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

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Water Pollution Prevention Fact Sheet

- Building, Developing and General Contracting-

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- Quickly stabilize disturbed areas by restoring overburden, replacing topsoil, avoiding steep slopes, reproducing natural drainage patterns, and replacing vegetation.
- Topsoil and subsoil should be stripped from the operation area and kept for restoration of the area.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.

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- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
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Water Pollution Prevention Fact Sheet

- *All Industries and Businesses* -

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- Untreated rinsewaters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Closed-loop cooling systems should be used to save water and costs.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Minimize the use of materials such as road salts and lawn-care chemicals.

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- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

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Water
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Water Pollution Prevention Fact Sheet

- *Quarry and Sand Pit* -

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- Sand and gravel pits make groundwater especially vulnerable to contamination due to the permeable nature of their deposits. Mining activities should be located away from recharge areas of aquifers needed for public water supplies.
- Quickly stabilize disturbed areas by restoring overburden, replacing topsoil, avoiding steep slopes, reproducing natural drainage patterns, and replacing vegetation.
- Topsoil and subsoil should be stripped from the operation area and kept for restoration of the area.
- Incorporate appropriate drainage systems to prevent ground and surface water contamination. Drainage should not lead directly into streams or ponds.
- Limit active gravel removal to a total of five acres at any one time to minimize the amount of surface area susceptible to erosion.
- Ensure that access roads are constructed and maintained properly so as to prevent or control erosion.
- Maintain an adequate vertical separation between the deepest depth of excavation and the maximum high water table elevation.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty

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them regularly for recycling, reuse or proper disposal.

- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
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NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Water Pollution Prevention Fact Sheet

- *Plastic Products Manufacturing* -

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- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Closed-loop cooling systems should be used to save water and costs.
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- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.
- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
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- Recycle materials such as used oil, spent degreaser, and mineral spirits.

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- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
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- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

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150 Frederick Street
7th Floor
Kitchener, ON N2G 4J3
Phone: 519-575-4426
Fax: 519-575-4424
www.region.waterloo.on.ca/water/ docs/wateresouc.html

Environmental Business Source (CTT)
437-150 Frederick Street
Kitchener, ON, N2G 4J3
Phone: 519-579-4795
Fax: 519-575-4542
Email: ebsctt@oceta.on.ca

Canadian Centre for Pollution Prevention (C2P2)
100 Charlotte Street
Sarnia, ON, N7T 4R2
Phone: 1-800-667-9790
Fax: 519-337-3486
Email: c2p2@sarnia.com
http://c2p2.sarnia.com

Environment Canada Green Lane
Web page:
www.cciw.ca/green-lane/or-home.html

Water Pollution Prevention Fact Sheet

- *Fabricated Metal Product Manufacturing*-

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- All degreasing operations should be carried out in a properly working vapour degrease. Consider installing a vapour degreaser solution distillation system.
- Uncovered scrap metal storage areas should have a separate stormwater collection system with an oil/grit separator which discharges to a sanitary sewer or a holding tank.
- Only use water for cooling and lubrication.
- Use a recirculating bath and reusable filter system to recycle grinding fluids.
- Parts cleaning and degreasing areas should be isolated from other operations, and located within a containment area with an impermeable floor. There should be no direct access to outside.
- Incorporate appropriate drainage systems to prevent ground and surface water contamination. Drainage should not lead directly into streams or ponds.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Keep drain plugs in dumpsters and drums containing oil coated scrap metal. Collect oil/water liquid and dispose through a licensed waste hauler.
- Reduce the frequency of solvent replacement to reduce consumption and handling. Decant sludges from solvent tanks to extend the life of the solvent.
- Reduce the volume of oil used per machine, filter the oil, and increase the recirculation rate to reduce the amount of waste oil generated.
- Extend solvent life by using a two stage rinsing process with "dirty" and "clean" solvent baths.
- Preclean parts with a rag or wire brush. Then steam clean, high-pressure wash, or use an recycling aqueous solution hot bath with an oil/water separator.
- If hot water, detergent or alkaline solutions are not adequate, use a non-chlorinated organic solvent.
- Water soluble cutting fluids can be substituted for more hazardous oils.
- Use water based rather than solvent based paints.
- Use one multi-purpose solvent.
- Eliminate the organic solvents from tumbling operations.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Consider a bulletin board solely for environmental concerns.

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- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.

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Water Pollution Prevention Fact Sheet

- General Manufacturing Industries -

Everyday business practices can pollute our groundwater, rivers and lakes. There are many Pollution Prevention Practices that we can use to prevent water pollution. Many of these Pollution Prevention Practices are simple to do, yet are very effective in keeping chemicals and wastes from harming our environment. Pollution prevention can be inexpensive, while pollution cleanup can cost thousands of dollars. Some of the Pollution Prevention Practices that were developed by people in your industry are listed below.

- Containers holding hazardous wastes must be tightly closed throughout the period of accumulation, except during waste addition or removal.
- Antifreeze can contaminate groundwater. Dispose of it properly through a hazardous waste transporter.
- Clean paint guns in a secure container with a high quality, nonchlorinated solvent.
- Untreated rinse waters or floor drains should not discharge to a sanitary sewer, septic system, storm drain or surface water.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Tanks and pipe fittings should be leak tested periodically for structural integrity. Annual testing of unprotected steel tanks and piping systems should be performed, especially for those aged 15 years or more.
- Waste collection stations, with labeled containers for each kind of waste, should be provided throughout work areas for spent chemicals, soiled rags, etc.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Uncovered receiving areas should be designed with a spill sump to catch and store any spilled chemicals with manual operation for emptying.
- Do not let rainwater runoff come into contact with materials and wastes.
- Find out where your water drains. Drainage should not lead directly into streams or ponds. Cross-connections, such as sanitary discharges to storm sewers or floor drain discharges to storm sewer systems should be identified and eliminated. Install backflow preventors on water supply lines.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Closed-loop cooling systems should be used to save water and costs.
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Use dry cleanup methods and mopping, and avoid flooding with water. Absorbent material saturated with oil is a hazardous waste and should be disposed properly.
- Recycle cleaning rags or rags contaminated with paint, solvents, grease or oil, and have them cleaned by an industrial launderer.

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- Purchase products in refillable, reusable or at least recyclable containers. Ask suppliers to take back containers.
- Recycle materials such as used oil, spent degreaser, and mineral spirits.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Use spigots, pumps or funnels for the transfer of materials to reduce spillage.
- Ordinary drums may have to be handled as hazardous waste unless they are properly cleaned before disposal. Discharge cleaning residues properly.
- Whenever possible, use environmentally friendly materials.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.
- Hazardous materials are not permitted in the sanitary or storm sewers (Sewer Use By-Law 1-90). Call (519)650-8260 for information on Regional By-Law 1-90.

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Water Pollution Prevention Fact Sheet

- Paper and Related Product Manufacturing-

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- Place solvent vapour curtains around equipment to increase the amount of solvent recovered and recycled.
- Use water based inks rather than solvent based inks whenever possible.
- Incorporate appropriate drainage systems to prevent ground and surface water contamination. Drainage should not lead directly into streams or ponds.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- New and waste material storage areas should be roofed, isolated from floor drains, have sealed surfaces, and be accessible to authorized personnel only.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Consider a bulletin board solely for environmental concerns.
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty them regularly for recycling, reuse or proper disposal.
- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
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NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Water Pollution Prevention Fact Sheet

- *Agricultural Industries*-

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- A concrete walled storage area with a sloping floor can be used to store solid and liquid manure. A roof should be provided to prevent manure run-off due to rain or snow melt.
- Floor drains in pesticide mixing or storage areas should connect to a holding tank, not to the septic system.
- Manure pits should be lined with clay or other impermeable material. Pits must be large enough to handle the volume of waste generated until weather soil and crop conditions allow spreading.
- Incorporate appropriate drainage systems to prevent ground and surface water contamination. Drainage should not lead directly into streams or ponds.
- Pesticides used must be registered and applied according to authorized uses, label directions and applicable regulations.
- Wastes collected in a holding tank must be disposed through a licensed waste hauler
- Never apply more manure or fertilizer than is needed. To much can result in poor crop performance, water pollution and excessive odours. Consider soil types, crop type, acreage, and type of manure/fertilizer when determining application rates.
- Restrict cattle access to streams by putting up permanent or temporary fencing.
- Protect ditch banks and water courses by planting permanent grass buffer strips. Buffer areas filter run-off and control erosion.
- Liquid Storage areas must have secondary containment to hold any spills or leaks at 10% of the total volume of the containers, or 110% of the volume of the largest container, whichever is larger.
- Underground storage tanks (USTs) should not be used, unless required by fire codes or other regulations. Above ground storage tanks (ASTs) are preferred. Tanks should have visual gauges to monitor fluid levels. Routinely check all ASTs and USTs for leaks. Nozzles used for filling tanks should have automatic shutoff valves.
- If USTs must be used, they require secondary containment monitoring, high level and leak sensing audio/visual alarms, level indicators and overfill protection. A protective plate should be placed at the tank bottom if a dip stick is used.
- Dry wells should be eliminated. All unused wells must be abandoned (Ontario Regulation 903).
- Employees must have WHMIS training. Train all staff on proper handling, storage and transportation procedures for WHMIS materials to reduce the risk of spills and accidents.
- Keep track of where and why spills have occurred to prevent future spills.
- Cover crops and green manure crops protect the soil, add organic matter and control the leaching of crop nutrients
- Any banned or outdated pesticides should be disposed properly through a licensed hazardous waste hauler
- Perform preventative maintenance and manage equipment and materials to minimize opportunities for leaks, spills, evaporative losses and other releases of potentially toxic chemicals.
- An operator should be on-site at all times to monitor the filling of tanks and drums.
- Drip pans should be used under spigots of chemical and oil containers to catch spills. Empty

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them regularly for recycling, reuse or proper disposal.

- Develop a spill prevention and clean-up plan. Include notification procedures, site plans with storm water flow directions, and potential spill sources. Clean spills promptly and report as required. The Region's Spills reporting number is (519) 650-8200; Ontario's is 1-800-268-6060.
- Use emergency spill kits and equipment. Locate them in storage areas, loading and unloading areas, dispensing areas, and work areas.

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NOTES ON YOUR POLLUTION PREVENTION OR BEST MANAGEMENT PRACTICES...

Information Bulletin

New Safety Laws To Prevent Fuel Oil Leaks and Spills

(November 2002) The Technical Standards and Safety Authority (TSSA) is advising all owners of fuel oil heating systems of the requirement to have their heating systems inspected by qualified oil burner technicians, and the need to register their underground (buried) fuel oil storage tanks with TSSA. New requirements were introduced in October 2001 to reduce the number of fuel oil leaks and spills that occur throughout the province each year.

TSSA investigation statistics show that old, rusting underground tanks and poorly maintained and defective heating systems are the leading sources of fuel oil leaks and spills. These leaks and spills can result in serious environmental damage and costly clean-up repairs for homeowners.

The new regulations require fuel oil distributors to conduct inspections on all fuel oil heating systems. This includes all underground and aboveground tanks, associated piping, venting and heating appliances such as furnaces, boilers and water heaters. The fuel oil distributor must inspect all equipment to which they deliver fuel, whether it is located above or below ground, initially and at least once every 10 years. **Fuel oil cannot be delivered to equipment that poses an immediate hazard.**

Most fuel oil spills are preventable by a simple inspection during regular maintenance and by replacing agein or defective components. Please contact your local fuel oil supplier for more information about the inspection requirements for your heating system.

If you own a buried fuel oil tank, it must be upgraded with leak and spill-protection equipment or removed. Your first step is to register your tank, free of charge, with the Technical Standards and Safety Authority (TSSA). **Your fuel supplier may refuse to fill your underground tank if it is not registered with TSSA** This does not include oil tanks in basements and aboveground fuel storage tanks. The provincial regulations include a phased-in, multi-year program to upgrade or remove these tanks. If your underground fuel tank was installed:

- **25 or more years ago?** the tank must be upgraded or removed by **October 1, 2006**
- **20 to 24 years ago?** the tank must be upgraded or removed by **October 1, 2007**
- **10 to 19 years ago?** the tank must be upgraded or removed by **October 1, 2008**
- **Less than a year to 9 years ago?** the tank must be upgraded or removed by **October 1, 2009**

To register your underground tank and find out more about the new inspection requirements, please call TSSA's Fuels Safety program at (416) 734-3300 / toll-free at 1-877-682-TSSA (8772).

New Fuel Oil Requirements (Frequently Asked Questions)

FUEL OIL DISTRIBUTOR INSPECTIONS

Why were the new inspection requirements introduced?
The new requirements were introduced in 2001 to address safety and environmental concerns with fuel oil installations. Many fuel oil leaks and spills are attributed to equipment failure that may have been preventabl with an inspection.

A fuel oil user whose fuel oil installation leaks also faces substantial costs to clean up the resulting environmental contamination, not to mention the risk of liability in the event of an accident. The potential for personal injury and environmental harm resulting from improperly maintained or inappropriately used fuel oil installations is both unacceptable and avoidable. Fuel oil users have a responsiblity to ensure that their equipment is in compliance with safety regulations to minimize these risks wherever they live.

Can you provide details about these new requirements?
The new regulations require that the entire fuel oil system (associated piping, venting and heating appliance such as furnaces, boilers and water heaters) must be inspected by distributors before they can receive fuel. Periodic inspections - at least once every 10 years - must be performed by distributors on each fuel oil system.

What exactly is on the tank inspection checklist?
First, it is important to realize your fuel oil system consists of more thena storage tank. It includes a fill and vent pipe for oil supply and an outlet line with a valve and filter to supply the oil to your furnace. So when we discuss the oil system, we are really talking about all of these components. Keep in mind any one of these components can fail causing a leak or spill.

Some of the things your fuel dealer will be looking at during the inspection include:

- verifying the tank has a proper gauge and an overfill protection device
- checking whether the tank is leaning over and may topple
- checking whether there are signs of leakage at the tank bottom
- ensuring that the fill and vent are piped outside.

What happens if the fuel oil supplier finds an unsafe installation?
Depending on the danger from the unsafe installation, a fuel supplier can specify a time period up to 90 days for corrective action or the delivery of fuel oil will cease. If the unsafe installation is very dangerous, then the distributor must immediately stop the supply of fuel oil to the installation.

Who can fix my appliance and make it safe again?
All heating contractors working on fuel oil equipment are required to be registered with TSSA. When calling a heating contractor, ask for the contractor's TSSA registration number and request that only a TSSA certified Oil Burner Technician work on the appliance. To check if thecontractor is registered with TSSA call 1-877-682-TSSA (8772).

I don't agree with my fuel supplier and I think that my equipment is safe. What can I do?
Tank owners can get a second opinion from other Oil Burner Technicians and other Fuel Oil Suppliers to confirm whether or not there is an unsafe installation.

I have a natural gas/propane furnace, does this apply to me?
No. While natural gas and propane-fuelled appliances have similar requirements, they are governed under different regulations. For more information on regulations governing natural gas and propane appliances, vis our Web site at www.tssa.org.

What regulation governs fuel oil and where can I get a copy?
Fuel oil is governed under the Technical Standards and Safety Act, and Ontario Regulation, 213/01. You car obtain a copy from the TSSA Web site at www.tssa.org or order a copy from the Ontario Government Bookstore at 1-800-668-9938.

UNDERGROUND FUEL OIL TANKS

What are the new requirements?
In October 2001, new fuel oil regulations administered by TSSA came into effect. The new regulations requir registration of all underground fuel tanks in Ontario by May 2002.

Why were they introduced?
The new requirements were introduced to address safety and environmental concerns with underground fue oil installations. Fuel tank leaks can lead to environmental hazards.

A fuel oil user whose tank leaks also faces substantial costs to clean up the resulting contamination, not to mention the risk of liability in the event of an accident. The potential for personal injury and environmental harm resulting from improperly maintained or inappropriately used tanks is both unacceptable and avoidable Fuel oil users have a responsibility to ensure that their equipment is in compliance with safety regulations to minimize these risks wherever they live.

What's the problem with underground fuel tanks?
Many underground oil tanks in Ontario are 25 years old and older, or of an unknown age. These tanks are nc specially protected from corrosion, as newer tanks are. As a result they may be leaking and should be upgraded or removed.

Leaking fuel oil tanks will contaminate soil and groundwater. The cost of cleaning up contamination from a leaking underground tank can range from $5,000 to over $1,000,000.

Why weren't these new fuel oil requirements introduced before?
No attention was paid to fuel oil leaks and spills for years before the hazards were fully understood. Once th nature of the hazards were apparent, the new requirements were introduced to correct existing problems anc to prevent spills and leaks in the future.

Why do I have to register my underground tank?
By registering the tank, TSSA will be able to keep track of the location and condition of underground fuel oil tanks in Ontario. These new regulations will help to protect Ontario's environment from possible fuel oil leaks by creating a registry of the location and condition of each underground tank in the province and by ensuring that fuel oil tanks that are in danger of leaking do not receive fuel oil.

How do I register?
An Underground Fuel Oil Application Form must be completed and filed with TSSA. The application forms ar available on our Web site at www.tssa.org or from our Fuels Safety program at 1-877-682-8772. A registratic number will be assigned to your tank that you can give to your fuel distributor to ensure uninterrupted fuel supply.

How can I tell if my underground tank is leaking?
Because they are buried, it is difficult to tell if the tank is leaking. Some underground tanks may leak for year without owners realizing it. However, if your oil consumption suddenly goes up your tank may have sprung a large leak.

There are companies that test underground tanks for leaks. Call the Ontario Petroleum Contractors Association at (705) 735-9437 to help you find underground tank testing companies.

What do I do if my underground tank is leaking?
Call a TSSA registered fuel oil contractor to help you find and stop the leak and clean up any leaked fuel oil. You are also required to call the Spills Action Centre of the Ministry of Environment at 1-800 -268-6060 to report the leak. Your insurance company may also be able to assist you.

How do I remove my underground tank?
Underground tanks are required to be removed by TSSA registered fuel oil contractors. A certified Petroleum Equipment Mechanic Two "PM2" is required to perform the removal. When you call a contractor, ask for the TSSA registration number. When an underground tank is removed, the soil around the tank must be assesse for contamination and all contamination cleaned. The costs associated with the removal of underground fuel oil storage tanks will vary depending on the location of the tank. Owners are encouraged to attain competitiv quotes for the removal of their underground storage tank.

I have an underground tank that I am no longer using, what should I do?
Once an underground tank stops being used, or where it hasn't been used in two years the underground tan is required to be removed and all contaminated soil cleaned. The removal is to be performed by a Petroleum Equipment Mechanic Two "PM2".

Who are TSSA Registered Contractors?
By law, all contractors working on fuel oil equipment such as underground tanks are required to be registere with TSSA. Persons repairing, installing, removing and servicing fuel oil underground tanks are also required

to be trained and certified as a "Petroleum Equipment Mechanic 2." The Ontario Petroleum Contractors Association may be able to refer you to some good TSSA registered fuel oil contractors.

Who pays for the upgrading or removing of underground tanks?
Owners of underground tanks are responsible for the costs of maintaining, upgrading, and removing their underground tank.

While we are concerned with the economic burden this may place on homeowners, the investment in these environmental upgrades will reduce the incidence of fuel spills, and offset the much higher potential costs for the clean-up of contaminated sites. The environmental hazards from spills are too great to ignore. Unfortunately, there has been a number of spills which have occurred as a result of defective fuel oil installations.

How much time do I have to upgrade or remove my tank?
TSSA has established a phased-in approach for fuel oil tank removal or upgrade over several years to assist owners in managing the associated costs.

The schedule guidelines call for tanks older than 25 years by October 2001(including tanks whose age cannot be determined) must be replaced or upgraded by October 2006. Owners of tanks between 20 and 24 years old have an additional year to do this work, while tanks between 10 and19 years must be replaced or upgraded by October 2008. Tanks less than nine years old in 2001 must be replaced or upgraded by October 2009.

My insurance company wants my buried tank removed within 30 days, who is right TSSA or my insurance company?
An insurance company can set their standards higher than what the regulations require. For example, they may determine they will not insure tanks of a certain age, as each insurance company is able to make its own determination of the liability they are willing to assume.

What do the regulations say about upgrading basement or above ground tanks?
There are no requirements in the regulations or Code that make upgrading of these tanks mandatory. Some insurance companies set their standards higher than TSSA and may require these tanks to be upgraded as well.

Variance Applications for Abandonment of Underground Storage Tanks in Place

Background
Under the Liquid Fuels Handling Code and the Fuel Oil Code all underground storage tanks (UST's) must be removed within two years of disuse. This code requirement is for safety purposes as old steel tanks may corrode and leave a void in the ground that may cause the ground to collapse. Secondly, abandoned USTs left with product in them may leak and cause an environmental impact. Under the TSS Act, an applicant may make application to seek a variance from this code requirement provided they give alternative actions that meet the intended safety requirements. More...

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APPENDIX H

Well log Summary and Location Map of Village of Finch Wells

from

Report on a Groundwater Survey in the Village of Finch, Ontario Water Resources Commission, 1971

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY VILLAGE OF FINCH

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

TABLE 1

DATE JAN/71

RECORDER D.F.M.

Well No.	Location	Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc
485	VILLAGE OF FINCH	HENRY DAIGNAULT	M. LEDUC 1949	●	4	35	8	2.7	15	S	D	HARDPAN 0-15 LIMESTONE 15-35 WATER AT 35
186	"	LILLIAN JOHNSON	M. LEDUC 1950	●	4	100	8	0.5	23	F	D	HARDPAN 0-8 LIMESTONE 8-100 WATER AT 85
87	"	RENE GAULAIS	RENE GAULAIS ASSO	●	4	23	3	8.3	20	F	D	HARDPAN 0-7 GREY ROCK 7-23 WATER AT
188	"	N.G. BROWNLEE	M. LEDUC 1950.	●	4	50	6	1.25	—	S	D	HARDPAN 0-6 LIMESTONE 6-50 WATER AT 48.
9	"	S CAMERON	M. LEDUC 1950	●	4	34	8	1.25	-	F	D	HARDPAN 0-3 LIMESTONE 3-34 WATER AT 33
190	"	ALLAN MCCOLLUM	M. LEDUC 1951	●	4	26	8	3.3	20	F	D	LIMESTONE 0-26 WATER AT 8
491	"	ALBERT CHERRIER	M. LEDUC 1952	●	4	27	6	8.3	6	F	D	HARDPAN 0-8 ROCK 8-27 WATER AT
492	"	T. DWAR	M. LEDUC 1955	●	4	50	6	1.67	DRY	F	D	HARDPAN 0-8 GREY LIMESTONE 8-50 WATER AT 50
493	"	MERRITT CAMPBELL	M. LEDUC 1955	●	4	50	5	0.3	7	F	D	LIMESTONE 0-50 WATER AT 48.
494	"	BASIL GILLIES	M. LEDUC 1955	●	4	35	OVER FLOW	33		F	D	LIMESTONE 0-35 WATER AT 34.
495	"	LORNE CAMPBELL	M. LEDUC 1955	●	4	35	6	5	12	F	D	LIMESTONE 0-35 WATER AT 35
496	"	F. HOOPLE	M. LEDUC 1955	●	4	55	7	.5	7	F	D	HARDPAN 0-8 GREY LIMESTONE 8-55 WATER AT 48

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY _____ DATE JAN/71

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

RECORDER D.E.M.

Well No.	Location	Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc
497	VILLAGE OF FINCH	GEORGE DENE	M LEDUC 1955	D	4	50	8	4.2	30	F	D	HARD PAN 0-8 DARK GREY LIMESTONE 8-50 WATER AT 48.
498	"	ARCHIE CASSELMAN	M LEDUC 1956	D	4	47	6	4.2	20	F	D	HARDPAN 0-6 LIMESTONE 6-47 WATER AT 46
499	"	MILTON MILLROSS	M LEDUC 1956	D	4	34	5	4.2	34	F	D	HARDPAN 0-27 LIMESTONE 27-34 WATER AT 34.
500	"	FINCH PUBLIC SCHOOL	M. LEDUC 1957	D	4	50	5	8.3	5	F	SCHOOL	HARDPAN 0-8 LIMESTONE 8-50 WATER AT 50.
501	"	A. CASSELMAN	R. CASSELMAN 1957	D	5	109	8	10	70	F	D	TOPSOIL 0-15 TILL 15-6 LIMESTONE 6-109 WATER AT 100
502	"	POST OFFICE	R. SANCHE 1961	D	4	50	5	5	5	S	POST OFFICE	HARDPAN 0-5 CLAY 5-12 GREY LIMESTONE 12-50 WATER AT 42
503	"	CORPORATION OF FINCH	R. CASSELMAN 1961	D	4	93	6	13.3	39	F	D	BOULDERS SAND CLAY 0-7 BOULDERS, GRAVEL, CLAY, SAND 7-13-9 LIMESTONE WATER AT 85
504	"	CHARLIE ARMSTRONG	G. CHARBONNEAU 1963	D	6	130	6	12	15	F	D	CLAY LOOSESTONE 0-15 GREY LIMESTONE 15-127 WHITE SANDSTONE 127-130 WATER AT 130
505	"	W. WISEMAN	D. GAUTHIER 1963	D	4	35	5	4	30	F	D	LIMESTONE 0-35 WATER AT 30.
506	"	ELTA MCDERMID	A. GAUTHIER 1963	D	4	45	5	8	~~25~~	F	D	HARDPAN 0-5 LIMESTONE 5-45 WATER AT 42
523	"	MRS BEEHLER	M LEDUC 1953	D	4	31	8	4.2	6	F	D	HARDPAN 0-10 GREY LIMESTONE 10-31 WATER AT 31
525	"	KEITH JOHNSON	A. GAUTHIER 1961	D	4	28	12	15	20	F	D	HARDPAN 0-12 LIMESTONE 12-25 WATER AT 25

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71

RECORDER D F M.

Well No.	Location	Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
546	VILLAGE OF FINCH	H. SMITH	R. CASSELMAN 1964	●	5	52	8	10	30	F	D	DUG WELL 0-12 HARDPAN 12-14 LIMESTONE 14-52 WATER AT 45
549	"	MELVIN ROE	R. CASSELMAN 1963	●	5	120	15	16?	18	F	D	GRAVEL, CLAY, BOULDER, 0-5 LIMESTONE 5-120 WATER AT 110.
550	"	ST LUKES CHURCH	R. CHARTRAND 1964	●	4	45	5	1	DRY	F	CHURCH	HARDPAN 0-5 LIMESTONE 5-45 WATER AT 30.
553	"	ELRICH McMILLAN	M. LEDUC 1950	●	4	65	8	0.34	—	S	D	HARDPAN 0-18 LIMESTONE 18-65 [redacted] WATER AT 6
554	"	ALFRED BEEHLER	M. LEDUC 1950	●	4	52	7	—	—	S	D	HARDPAN 0-5 BOULDERS CLAY 5-13 HARDPAN 13-32 LIMESTONE WATER AT 52
555	"	ROMAN CATHOLIC EPISCOPAL CORPORATION	M. LEDUC 1952	●	4	60	8	3.3	—	F	D	HARDPAN 0-8 LIMESTONE 8-60 WATER AT 52.

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY TOWNSHIP OF FINCH
COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71
RECORDER D.F.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
508	TOWNSHIP OF FINCH	1	5	DONALD CASSELMAN	M. LEDUC 1965	●	4	65	10	5	35	F	FARM.	HARDPAN 0-12 LIMESTONE 12-65 WATER AT 63
509	"	1	5	DONALD CASSELMAN	R. CASSELMAN 1963	●	4	92.5	21	8.3	60	F	FARM.	OLD WELL 0-61.5 LIMESTONE 61.5-92.5 WATER AT 90.
510	"	1	7	EDGAR McLEAN	R. CASSELMAN 1963	●	5	216		DRY			FARM.	0-21 OLD WELL LIMESTONE 21-216
511	"	1	7	EDGAR McLEAN	R. CASSELMAN 1963	●	5	100		DRY			FARM.	TOP SOIL 0-1 BROKEN ROCK 1-4 LIMESTONE 4-100
512	"	1	7	EDGAR McLEAN	R. CASSELMAN 1963	●	5	110		DRY			FARM	CLAY GRAVEL 0-5 CLAY GRAVEL BOULDERS 5-20 LIMESTONE 20-110
513	"	1	7	EDGAR McLEAN	R. CASSELMAN 1963	●	6	36	9	5	26	F	STOCK	LOAM 0-2 CLAY SAND GRAVEL 2-19 FINE SAND 19-20 LIMESTONE 20-36 WATER AT 20
514	"	1	9	GEORGE McLEAN	A. GAUTHIER 1967	●	5	66	10	5	55	F	FARM.	HARDPAN 0-3 LIMESTONE 3-66 WATER AT 30/60
515	"	1	15	E. NAIDON	M. POLISKIN 1958	●	6	100	15	4	30	F	FARM.	HARDPAN 0-18 GRAVEL 18-19 LIMESTONE 19-100 WATER AT 75
516	"	2	1	HARMAN OOSTERMAN	R. BOURGEOIS 1962	●	4	39	12	5	13	F	FARM	GREY GRAVEL 0-6 HARDPAN 6-9 BLACK ROCK 9-39 WATER AT 36.
517	"	2	1	DIRK TESTERINK	A. GAUTHIER 1967	●	4	42	8	6	20	F	D	HARDPAN 0-23 LIMESTONE 23-42 WATER AT 40.
518	"	2	3	ST. PAQUETTE	A. GAUTHIER 1953	●	4	54	10	0.7	10	F	D	HARDPAN 0-7 LIMESTONE 7-54 WATER AT 54
519	"	2	2	EARL LANG	R. CASSELMAN 1963	●	5	104.5	32	15	32	F	D	DOUBLE 0-30 LIMESTONE 30-104.5 WATER AT 100

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY TOWNSHIP OF FINCH. DATE JAN/71

COUNTY STORMONT RECORDER D.F.M.

TABLE OF WATER WELL RECORDS

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
520	TOWNSHIP OF FINCH	2	9	DONALD MACINTYRE	M. LEDUC 1952	●	4	120	8	2.5	60	F	D	HARDPAN 0-20 LIMESTONE 20-120 WATER AT 100.
521	"	2	11	ALMA CHENE	A. GAUTHIER 1965	●	4	46	7	5	15	F	D	HARDPAN 0-15 LIMESTONE 15-46 WATER AT 45
522	"	2	11	CARL BECKSTEAD	R. CASSELMAN 1965	●	4	44	3	16.6	11	F	D	CLAY GRAVEL BOULDERS 0 LIMESTONE 20-44 WATER AT 34
524	"	2	13	ST LUKES CHURCH	M. LEDUC	●	4	37	12	5	12	F	CHURCH	HARDPAN 0-12 LIMESTONE 12-37 WATER AT 35
527	"	2	14	CHARLES BROWNELL	M. LEDUC 1957	●	4	25	6	5	6	S	D	GRAVEL 0-10 HARDPAN 10-21 LIMESTONE 21-25 WATER AT 23
528	"	2	14	HENRI MARTIN	R. BOURGEOIS 1962	●	4	37	3	5	20	F	D	GREY GROUND 0-5 HARDPAN 5-13 GREY ROCK 13-37 WATER AT 35.
529	"	2	14	RAY RUNIONS	R. BOURGEOIS 1962	●	4	25	3	5	5	F	D	GREY GROUND 0-4 HARDPAN 4-11 GREY ROCK 11-25
530	"	2	15	GEORGE RUPERT	M. LEDUC 1956	●	4	63	10	1	60	S	D	CLAY 0-18 LIMESTONE 18-63 WATER AT 62
531	"	2	17	M BEGG	M. LEDUC 1950	●	4	25	5	5	15	A	FARM	HARDPAN 0-25 WATER AT 25
532	"	2	18	FINCH TWP SCHOOL AREA	M. LEDUC.	●	4	50	8	6.6	8	S	STOCK	CLAY 0-10 HARDPAN 10-30 LIMESTONE 30-50 WATER AT 42
533	"	2	18	F. ELIGH	A. GAUTHIER 1955	●	4	190		DRY				HARDPAN 0-22 LIMESTONE 22-190
534	"	2	20	M. PRICE	M. LEDUC 1949	●	4	30	OVERFLOWING			F	D.	WHITE CLAY 0-10 HARDPAN 10-30

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY TOWNSHIP OF FINCH

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71

RECORDER D. E. M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
535	TOWNSHIP OF FINCH	2	20	DON CAMBELL	A. GAUTHIER 1950	●	4	50	10	8.3	25	F	FARM.	DUG WELL 0-10 ROCK 10-50 WATER AT 10.
536	"	2	21	DEPT OF HIGHWAYS ONTARIO.	R. CASSELMAN	●	6	103	4	16.6	33	F	GARAGE	BOULDER [illegible] 0-5 BOULDER MARLPAN 5-15 GRAVEL SAND & MARLPAN 15-2[illegible] LIMESTONE 27[illegible]-[illegible] WATER AT [illegible]
537	"	3	3	GLENDON SMITH	R. CASSELMAN 1965	●	6	62	14	8.3	52	F	FARM & D.	DUG WELL 0-21 CLAY GRAVEL 21-26 LIMESTONE 26-62 WATER AT 50.
538	"	3	5	M. MARLENUS	BOURGEOIS 1960 + SANCHE	●	4	30	10	2	20	F	D	GREY CLAY 0-10 HARDPAN 10-17 SAND 17-19 GREY LIMESTONE 19-30 WATER AT 19.
539	"	3	7	DUART MACLEAN	M. LEDUC 1952	●	4	23	6	6.6	6	F	D.	HARDPAN 0-20 LIMESTONE 20-23 WATER AT 17
540	"	3	9	STUART DUFF	A. GAUTHIER 1960	●	4	80	25	1.5	70	F	D	HARDPAN 0-7 LIMESTONE 7-80 WATER AT 70
541	"	3	9	TERESA M. MAHON	A. GAUTHIER 1963	●	4	89	50	1.5	DRY	F	D	HARDPAN 0-5 LIMESTONE 5-89 WATER AT 70.
542	"	3	9	FRANCES BERUATLE	M. LEDUC 1953	●	4	26	4	6.6	8	F	D	GREY HARDPAN 0-20 LIMESTONE 20-26 WATER AT 26
543	"	3	10	ALCIDE COEILLEGIS	M. LEDUC 1953	●	4	28	8	5	8	M	FARM	HARDPAN 0-26 GRAVEL 26-28 WATER AT 28
544	"	3	10	CHARLES OUDERKIRK	A. GAUTHIER 1960	●	4	75	5	5	31	F	D	HARDPAN 0-20 SAND 20-22 LIMESTONE 22-75 WATER AT 57
545	"	3	12	HAROLD OUDERKIRK	R. CASSELMEN 1960	●	5	76	5	8.3	21	F	D	BOULDER CLAY 0-5 BROKEN LIMESTONE 5-14 LIMESTONE 14-76 WATER AT 66
546	"	3	12	PAUL LALONDE	A. GAUTHIER 1964	●	4	39	7	12	25	F	D	HARDPAN 0-19 LIMESTONE 19-39 WATER AT 32

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71

RECORDER D.F.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
547	TOWNSHIP OF FINCH	3	13	LIND WILFRED	M. LEDUC 1950	•	4	48	8	3·3	-	M	FARM	HARDPAN 0-35 LIMESTONE 35-48 WATER AT 46
548	"	3	13	ROY REISPORT	M. LEDUC 1958.	•	4	92	8	1·03				HARDPAN 0-20 LIMESTONE 20-92 WATER AT 92
551	"	3	13	IAN MACINTOSH	A. GAUTHIER 1964	•	4	130	-	DRY		-	-	HARDPAN 0-5 LIMESTONE 5-130
552	"	3	13	R.J. BENDER	A. GAUTHIER 1966	•	4	45	5	10	20	F	D	HARDPAN 0-15 LIMESTONE 15-45 WATER AT 40
556	"	3	14	CARL WALDROFF	M. CAYER 1969	•	4	110	10	CAN BE PUMPED DRY		F	D	TOP SOIL 0-5 LIMESTONE 5-110 WATER AT 45
557	"	3	14	GEORGE KIRBY	R BOURGEOIS 1962	•	4	26	10	5	13	F	D	YELLOW GROUND 0-5 HARDPAN 5-20 GRAVEL 20-24 BLACK ROCK 24-26 WATER AT 24
558	"	3	14	UNITED COUNTIES REPAIR SHOP	R CASSELMAN 1962	•	6¼	153	5	10	90	S	SHOP	BOULDER CLAY 0-18 LIMESTONE 18-153 WATER AT 135
559	"	3	15	LINDSAY HOTT	M. LEDUC 1953	•	4	38	20	3·3	20	F	D	HARDPAN 0-14 LIMESTONE 14-38 WATER AT 37
560	"	3	15	DALTON McMINLAN	A. GAUTHIER 1960	•	4	40	15	1	35	F	D	HARDPAN 0-5 LIMESTONE 5-40 WATER AT 30
561	"	3	16	LINDSAY HOTT	BOURGEOIR 1962	•	5	28	10	5	15	F	D	YELLOW GROUND 0-5 HARDPAN 5-25 GRAVEL 25-28 WATER AT 28
562	"	4	2	JOSEPH MANNEY	A. GAUTHIER 1961	•	4	52	10	12	15	F	FARM	HARDPAN 0-35 LIMESTONE 35-52 WATER AT 50
563	"	4	4	ANTONIUS SANDERS	A. GAUTHIER 1961	•	5	65	5	20	10	F	FARM	HARDPAN 0-35 LIMESTONE 35-65 WATER AT 60.

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71

RECORDER P.F.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
564	TOWNSHIP OF FINCH	4	8	DEWEY MCRAE	R. CASSELMAN 1956	●	5	259		DRY				CLAY 0-9 LIMESTONE 9-259
565	"	4	8	DEWEY MCRAE	R. CASSELMAN 1956	●	5	150	9	0 83	80	F	D	TOPSOIL 0-3 CLAY 3-9 LIMESTONE 9-150 WATER AT 80.
566	"	4	13	DONALD DINGMAN	A. GAUTHIER 1959	●	4	50	18	33	40	F	FARM	HARDPAN 0-21 LIMESTONE 21-50 WATER AT 45.
567	"	4	16	BERNICE OUDERKIRK	M. LEDUC 1951	●	4	65	6	17	-	M	-	LIMESTONE 0-65
568	"	5	1	WILLIAM MORIARTY	A. GAUTHIER 1957	●	4	37	20	0.67	28	F	D	HARDPAN 0-36 GRAVEL 36-37 WATER AT 37
569	"	5	7	SCHOOL NO 18	BOURGEOIS 1959	●	5	30	5	25	5	F	SCHOOL	GREY CLAY 0-10 HARDPAN 10-20 BLACK SAND 20-30 WATER AT 30.
570	"	5	8	RAYMOND HAMEL	A. GAUTHIER 1948	●	4	35	10	FAIR	-	F	FARM	DUG WELL 0-20 HARDPAN 20-35 WATER AT 35,
571	"	5	9	ARNOLD MCANTHOLM	M. LEDUC 1952	●	4	106	6	-	-	S	FARM	HARDPAN 0-4 LIMESTONE 4-106 WATER AT 6.
572	"	5	9	ARNOLD MACINTOSH	BOURGEOIS 1960	●	4	178	38	5	45	S	FARM	GREY CLAY 0-10 HARDPAN 10-13 SAND 13-18 LIMESTONE 18-178 WATER AT 40.
573	"	5	10	J. POLLOCK	M. LEDUC 1955	●	4	69	9	1	CAN PUMP DRY	F	D	HARDPAN 0-6 DARK GREY LIMESTONE 6-6 WATER AT 69
574	"	5	13	SCHOOL NO 4	BOURGEOIS 1959	●	5	173	8	30	8	S	SCHOOL	GREY CLAY 0-10 SAND 10-43 GREY LIMESTONE 43-173 WATER AT 173
575	"	5	14	A.V. EMPEY	M. LEDUC 1950	●	4	65	6	3	-	S	D	HARDPAN 0-31 LIMESTONE 31-65 WATER AT 62

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY _____

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71.

RECORDER D.F.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
576	TOWNSHIP OF FINCH	5	14	OSCAR GODARD	A. GAUTHIER 1963	●	4	38	10	8	30	F	D	HARDPAN 0-28.5 LIMESTONE 28.5-38 WATER AT 36
577	"	5	15	CLAUDE MELDRUM	M. LEDUC 1957	●	4	35	8	5	8	F	D	CLAY 0-20 SAND 20-32 GRAVEL 32-35 WATER AT 35
578	"	5	16	ERICH BROWN	A. GAUTHIER 1963	●	4	33	3	15	20	F	D	HARDPAN 0-32 GRAVEL 32-33 WATER AT 33
581	"	6	3	CHAS. CRADY	M. LEDUC 1952	●	4	50	6	8.3	6	S	FARM	CLAY 0-23 HARDPAN 23-45 GRAVEL 45-50 WATER AT 50
580	"	6	7	CLINTON CASSELMAN	M. CAYER 1960	●	5	80	15	12	35	F	FARM	DUG WELL 0-14 LIMESTONE 14-80 WATER AT 75
582	"	6	13	SOUGE KALCAR	GAUTHIER & CAYER 1948	●	4	45	10	—	—	F	D	ROCK 0-45 WATER AT 40.
583	"	6	13	PERCY MCLEOD	M. LEDUC 1953	●	4	38	20	3.3	—	RUSTY	D	HARDPAN 0-30 GREY LIMESTONE 30-38 WATER AT 30.
584	"	6	13	UBALL VALLONDE	M. LEDUC 1954	●	4	25	13	5	13	F	D	HARDPAN 0-21 GRAVEL 21-25 WATER AT 13.
585	"	6	13	ARNOTT EMPEY	R. BOURGEOIS 1961	●	5	45	6	5	35	F	D	GREY CLAY 0-5 HARDPAN 5-35 GRAVEL 35-42 LIMESTONE 42-45 WATER AT 4
586	"	6	13	ADAM ANDERSON	R. BOURGEOIS 1961	●	4	38	6	5	28	F	D	GREY CLAY 0-5 HARDPAN 5-27 GRAVEL 27-38 WATER AT 35.
587	"	6	13	TOWNSHIP OF FINCH	A. GAUTHIER 1967	●	5	64	15	5	55	S	CALCIUM	HARDPAN 0-34 LIMESTONE 34-64 WATER AT 60.
588	"	6	14	BERTE RADY	GAUTHIER & CAYER 1948	●	4	45	15	8.3	35	F	D	ROCK 0-45 WATER AT 40.

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TABLE OF WATER WELL RECORDS

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RECORDER D.F.M

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
589	TOWNSHIP OF FINCH	6	14	MacQUEEN BROS.	M. LEDUC 1951	●	4	33	8	5	15	F	D	GRAVEL 0-33
590	"	6	14	CATHERINE MACQUEEN	M LEDUC 1954	●	4	35	11	5	14	F	D	GRAVEL 0-15 HARDPAN 15-32 GRAVEL 32-35 WATER AT 34
591	"	6	14	R. LARUE	M LEDUC 1957	●	4	37	24	33	24	F	D	CLAY 0-15 HARDPAN 15-32 LIMESTONE 32-37 WATER AT 36.
592	"	6	14	B. McANTHCLH	M. LEDUC 1957	●	4	41	33	0-33	41	F	D	HARDPAN 0-41 WATER AT 41
593	"	6	14	R. COLEMAN	M. LEDUC 1957	●	4	41	11	33	11	F	D	HARDPAN 0-37 LIMESTONE 37-41 WATER AT 40.
594	"	6	14	R. RADEY	BOURGEOIS & CAYER 1957	●	4	98	6	133	20	S	D	CLAY 0-15 HARDPAN 15-40 LIMESTONE 40-95 WATER AT 95
595	"	6	14	BERNARD DUTH	A. GAUTHIER 1958	●	4	42	16	83	25	F	D	HARDPAN 0-37 LIMESTONE 37-42 WATER AT 41
596	"	6	14	KRAFT FOODS LTD	J DUFRESNE 1959	●	8	177	13	—	—	F	FACTORY	CLAY + STONES 0-37 GRAVEL + SAND 37-40 LIMESTONE 40-177 WATER AT 37/100
597	"	6	14	DON SMALLE	BOURGEOIS & SANILE 1959	●	5	110		DRY			D	CLAY & PEBBLES 0-12 LIMESTONES 12-110
598	"	6	14	CARMEL SMALLE	M CAYER 1959	●	5	120		DRY			FARM	HARDPAN 0-12 LIMESTONE 12-120
599	"	6	14	KRAFT FOODS LTD	B. SPARKS 1959	●	8	277	10	25	35	F	FACTORY	OVERBURDEN 0-177 BROWN LIMESTONE 177-200 GRAY LIMESTONE 200-277 WATER AT 270
600		6	14	ANGUS McDERMID	A. GAUTHIER 1963	●	4	43	20	10	30	F	D	HARDPAN 0-40 LIMESTONE 40-43 WATER AT 40.

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY ' "

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71 ' "

RECORDER D.F.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
601	TOWNSHIP OF FINCH.	6	14	FINCH TOWNSHIP SCHOOL	A. GAUTHIER 1964	●	5	70	14	5	50	S	SCHOOL	HARDPAN 0-14 LIMESTONE 14-70 WATER AT 64
602	"	6	16	V. NAPIER	GAUTHIER & CAYER 1950	●	4	100	20	-	-	F	FARM	LIMESTONE 0-100 WATER AT 100
603	"	6	16	FLOSSIE MELORUM	M LEDUC 1956	●	4	40	12	3.3	22	F	FARM	HARDPAN 0-25 QUICKSAND 25-37 GRAVEL 37-40 WATER AT 40
579	"	6	17	JOHNSON OUDERKIRK	A. GAUTHIER 1965	●	4	48	14	3	40	F	FARM	HARDPAN 0-17 LIMESTONE 17-48 WATER AT 38
604	"	7	5	JEAN SALOMDE	A. GAUTHIER 1960	●	4	46.5	22	5	35	F	D	HARDPAN & BOULDERS 0-4 GRAVEL 45-46.5 WATER AT 46.5
605	"	7	7	RHEAL LAMOURGY	A. GAUTHIER 1960	●	4	53	8	8.3	30	F	FARM	HARDPAN 0-52 GRAVEL 52-53 WATER AT 53
606	"	7	8	HENRY PRESCOTT	A. GAUTHIER 1958	●	4	39	7	6.6	7	F	FARM	CLAY 0-29 HARDPAN 29-37 GRAVEL 37-39 WATER AT 39
607	"	7	12	GLEN RUSHFORD	M CAYER 1960	●	5	66	15	8	46	F	FARM	HARDPAN 0-18 LIMESTONE 18-35 GREY ROCK 35-66 WATER AT 65
608	"	7	14	RUSSELL DILLABOUGH	A. GAUTHIER 1964	●	5	70	15	2	15	F	FARM	HARDPAN 0-16 LIMESTONE 16-70 WATER AT 55
609	"	7	15	DONALD MENDRUM	A. GAUTHIER 1958	●	4	158	10	1	155	F	D	HARDPAN 0-17 GREY LIMESTONE 17-158 WATER AT 17
610	"	7	18	LEVI, PICKERSGILL	M LEDUC 1951	●	4	64	11	3.3	-	F	D	GREY QUICKSAND 0-60 LIMESTONE 60-64 WATER AT 64
611	"	7	21	EUGENE CLOUTIER	M LEDUC 1949	●	4	22	6	16?	16	F	D	YELLOW SOIL 0-11 BEDROCK 11-22 WATER AT 6

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY _____ DATE JAN/71

COUNTY STORMONT RECORDER D.F.M

TABLE OF WATER WELL RECORDS

Well No	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
348	TOWNSHIP OF OSNABROCK	7	14	HAROLD ARMSTRONG	M LEONE 1958	●	4	52	30	3.3	30	F	D	HARDPAN 0-32 LIMESTONE 32-52 WATER AT 52
349	"	7	14	HAROLD ARMSTRONG	A.GAUTHIER 1960	●	4	52	5	20	20	F	D	CLAY 0-30 LIMESTONE 30-52 WATER AT 50
350	"	7	16	GEORGE BAKER	A GAUTHIER [illegible]	●	4	39	6	20	15	F	D	HARDPAN 0-35 GRAVEL 35-39 WATER AT 39
351	"	7	21	C. REYNOLDS	R.CASSELMAN 1965	●	6	124	3	5	100	F	D	OLD WELL 0-15 CLAY, GRAVEL 15-20 LIMESTONE 20-124 WATER AT 120
352	"	8	2	GLEN WATKINS	R.CASSELMAN 1951	●	5	131	51	5	67	F	D	OLD WELL 0-34 TILL 34-70 TILL BOULDERS 70-87 LIMESTONE 87-131 WATER AT 121
353	"	8	3	JACK HELMER	A. CAYER [illegible]	●	5	77	25	2	70	F	D	HARDPAN 0-73 ROCK 73-77
354	"	8	6	OSNABROCK TWP SCHOOL BOARD	R.CASSELMAN 1955	●	6	208	9	20	50	F	S+DOM	TOP SOIL 0-2 TILL, BOULDER 2-63 LIMESTONE 63-208 WATER AT 200
355	"	8	6	CHARLES DIXON	R.CASSELMAN [illegible]	●	6	257	9	375	40	F	D	HARDPAN CLAY, GRAVEL, SA 0- GRAVEL SAND 40- LIMESTONE 63-2 WATER AT 40/210.
356	"	8	7	KRAFT FOOD LTD	I. W. S. 1959	○	5	15		NO	TEST			TOP SOIL 0-1 BROWN SANDY CLAY 1-3 BLUE CLAY, GRAVEL, BOULDE 3-1 BLUE CLAY, GRAVEL SAND BOULDERS 10-15
357	"	8	7	KRAFT FOOD LTD	I W S 1959	●	5	34		NO	TEST.			TOP SOIL 0 BROWN SANDY CLAY 1- BLUE CLAY, GRAVEL, BOULDERS 3 BLUE CLAY, GRAVEL SAND, BOULDERS 10- LIMESTONE 32-

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY

COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71

RECORDER D.F.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
858	TOWNSHIP OF CHARLOTTENBURGH	8	7	KRAFT FOODS LTD	I. W. S. 1959	●	2	26	3	30	10	F	FACTORY	TOP SOIL 0 DIRTY SAND, GRAVEL, CLAY, BOULDERS 1 GRAVEL, SAND, BOULDERS 13 LIMESTONE 23 WATER AT 15 AP
859	"	8	7	KRAFT FOODS LTD.	I. W. S 1959	●	2	23	1	13	16	F	FACTORY	TOP SOIL 0- DIRTY SILTY SAND BOULDERS 1- GRAVEL, BLUE CLAY, BOULDERS 7- SILTY SAND BOULDERS 10 TIGHT GRAVEL, SAND BOULDERS 13.2 WATER AT 15 APPRO
860	"	8	7	KRAFT FOODS LTD	I. W. S. 1959	●	5	13		NO	TEST			TOP SOIL 0-1 DIRTY SILTY SAND GRAVEL, BOULDERS 1-13
861	"	8	7	KRAFT FOODS LTD	I. W. S 1959	●	5	21		NO	TEST			TOP SOIL 0-1 DIRTY SILTY SAND, GRAVEL, BOULDERS 1-21
862	"	8	7	KRAFT FOOD LTD.	I. W. S 1959	●	5	36		NO	TEST			TOP SOIL 0-1 CLAY 1-3 DIRTY SILT, SAND, GRAVEL BOULDERS 3-36
863	"	8	7	UNITED CHURCH	M. CAYER 1964	●	5	41	15	5	20	F	CHURCH	SANDY SOIL 0-8 HARDPAN 8-35 SAND + GRAVEL, 35-41 WATER AT 41
864	"	8	7	FRED CLEMENT	A. GAUTHIER 1966	●	4	45	5	5	30	F	D	HARDPAN 0-34 LIMESTONE 34-45 WATER AT 42
865	"	8	8	KRAFT FOODS LTD	C. MORRISON 1954	●	10	22		DRY				BLACK EARTH 0-2
866	"	8	8	BELEC ANDRE	A. BOURGEOIS 1959	●	5	105	9	4.1	9	F	D	CLAY, GRAVEL 0 33 BLACK SLATE 33 TO 5 WATER AT 101
867	"	8	8	RUSSEL PRESLEY	A. GAUTHIER 1965	●	4	38	4	3	25	F	D	HARDPAN 0-24 LIMESTONE 24-38 WATER AT 37

ONTARIO WATER RESOURCES COMMISSION

AREA OF SURVEY

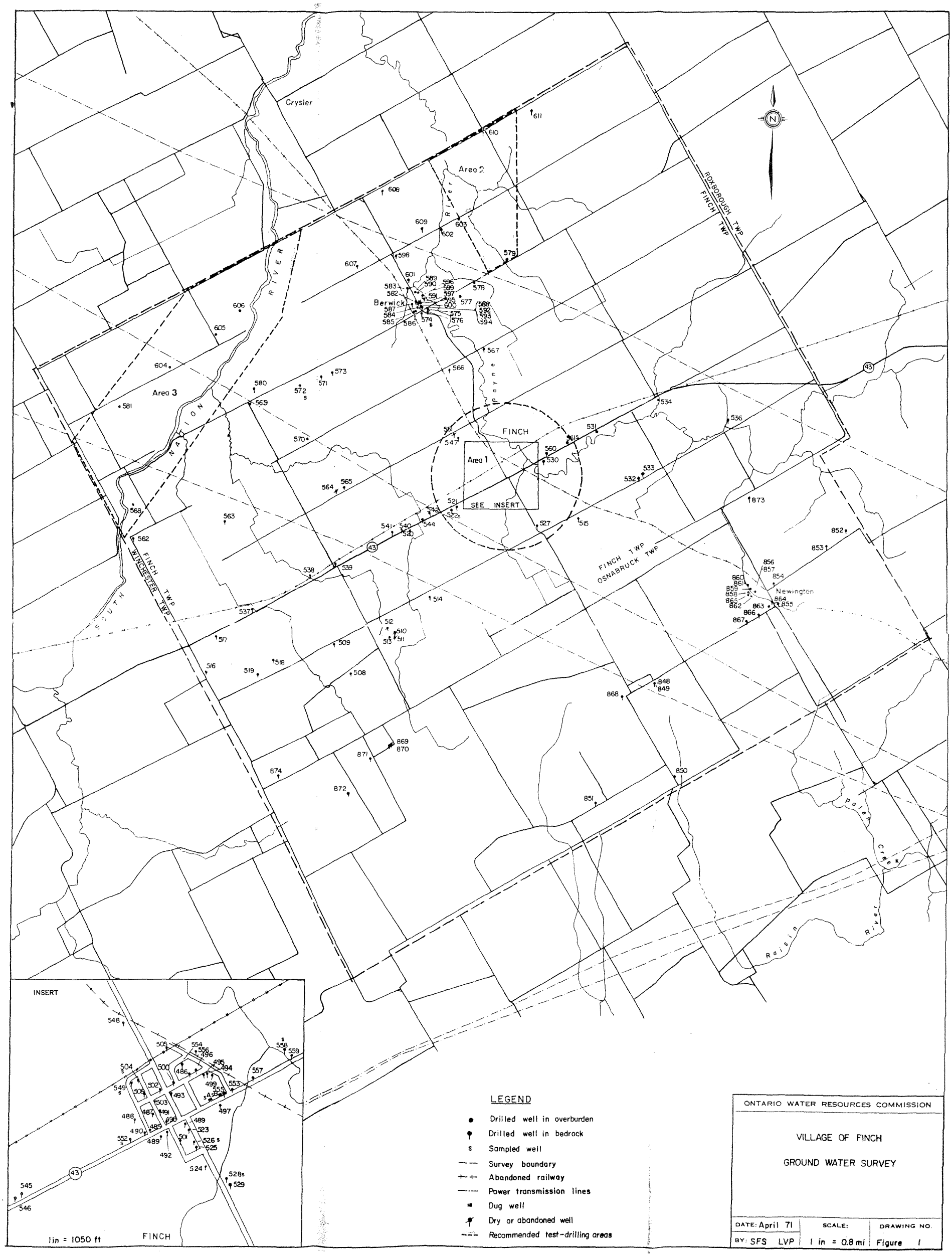
COUNTY STORMONT

TABLE OF WATER WELL RECORDS

DATE JAN/71

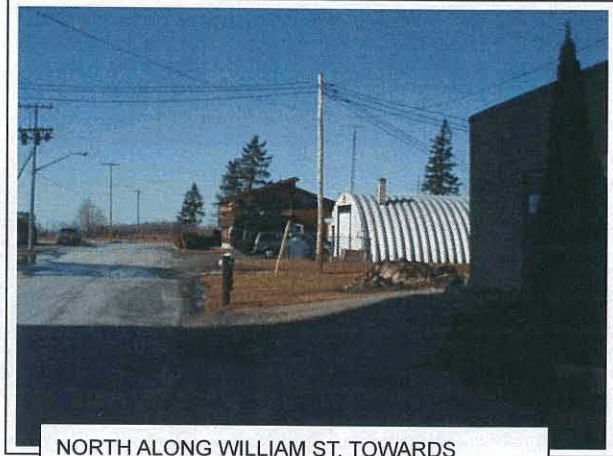
RECORDER D.E.M.

Well No.	Location			Owner	Driller	Well Type	Well Diameter	Depth	Static Level	Pumping Rate	Pumping Level	Quality	Use	Remarks, Log, etc.
868	TOWNSHIP OF OSNABRUCK	8	16	OSNABRUCK PUBLIC SCHOOL	R. CASSELMAN 1951	●	5	92	16	8.3	23	F	SCHOOL	TOPSOIL 0-2 GRAVEL 4-8 HARDPAN 8-1 TILL 18-3 FINE SAND 30-4 WHITE LIMESTONE 40-9 WATER AT 86
869	"	8	29	S. CARBINO	R. CASSELMAN 1964	●	5	125	·	DRY			FARM	CLAY GRAVEL 0-15 LIMESTONE 15-125 WATER AT DRY.
870	"	8	29	S. CARBINO	R. CASSELMAN 1964	●	5	252		DRY			FARM	CLAY, GRAVEL 0-18 LIMESTONE 18-2
871	"	8	29	S. CARBINO	R. CASSELMAN 1964	●	6	83	10	4.1	83	F	FARM	OLD DRILLED WELL 0-2 LIMESTONE 23-83 WATER AT 10.
872	"	8	32	MARGERITE SHEA & BERNIECE TESSIER	R. GAUTHIER 1960	●	4	30	15	15	17	F	FARM	HARDPAN 0-18 LIMESTONE 18-30 WATER AT 25
873	"	9	15	K. RUSSELL	POLISKIN DRILLERS 1958	●	6	100	18	4	30	F	FARM	HARDPAN 0-68 GRAVEL 68-69 GREY LIMESTONE 69-100 WATER AT 50
874	"	9	33	RONALD SERVAGE	R. GAUTHIER	●	4	40	15	4	30	F	D	HARDPAN 0-15 LIMESTONE 15-40. WATER AT 35


Crysler
Area 2
Area 3
Area 1
FINCH
SEE INSERT
Berwick
Newington
RIVER
NATION
Payne
River
ROXBOROUGH TWP
FINCH TWP
FINCH TWP
OSNABRUCK TWP
SOUTH
WINCHESTER TWP
Poley Creek
Raisin River
43
INSERT
1 in = 1050 ft
FINCH
LEGEND
Drilled well in overburden
Drilled well in bedrock
s Sampled well
Survey boundary
Abandoned railway
Power transmission lines
Dug well
Dry or abandoned well
Recommended test-drilling areas
ONTARIO WATER RESOURCES COMMISSION
VILLAGE OF FINCH
GROUND WATER SURVEY
DATE: April 71
BY: SFS LVP
SCALE: 1 in = 0.8 mi
DRAWING NO. Figure 1

APPENDIX I

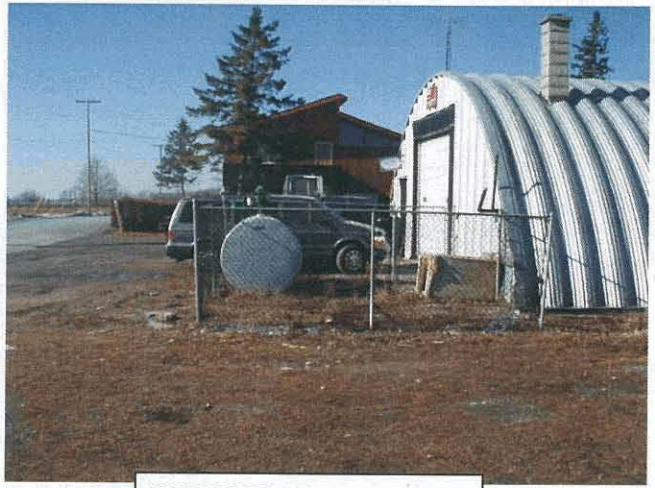
Photolog



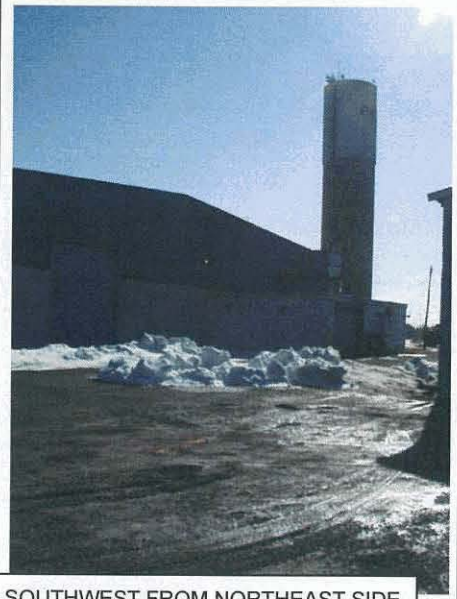
NORTH ALONG WILLIAM ST. TOWARDS WELDING SHOP. FINCH WATER SUPPLY BUILDING AT RIGHT OF PHOTOGRAPH

SANDBLASTER SHOP ACROSS ROAD FROM SITE (LOOKING NORTHWEST)

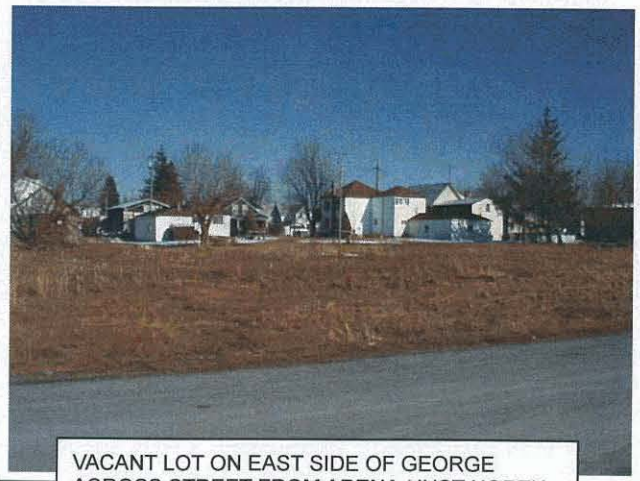
PUMPHOUSE & TREATMENT PLANT (FINCH)



WELDER TO NORTH OF SITE



LOOKING SOUTHWEST FROM NORTHEAST SIDE OF ARENA (WATER TOWER IN BACKGROUND)



VACANT LOT ON EAST SIDE OF GEORGE ACROSS STREET FROM ARENA (JUST NORTH OF JOHN STREET)

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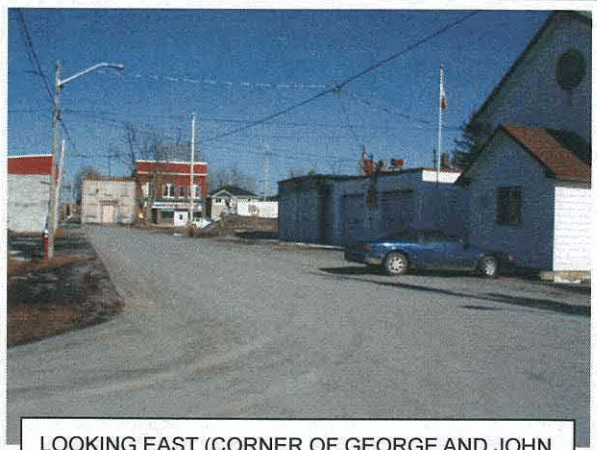
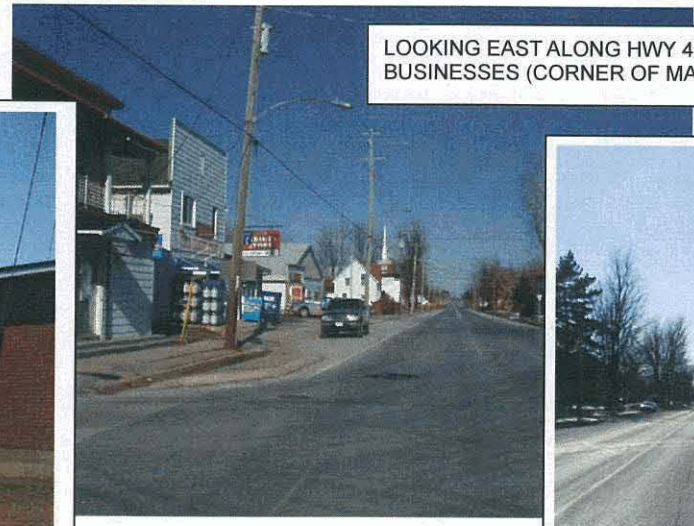
EAST SIDE OF WELDER TO NORTH ON WEST SIDE OF GEORGE STREET LOOKING NORTHWEST

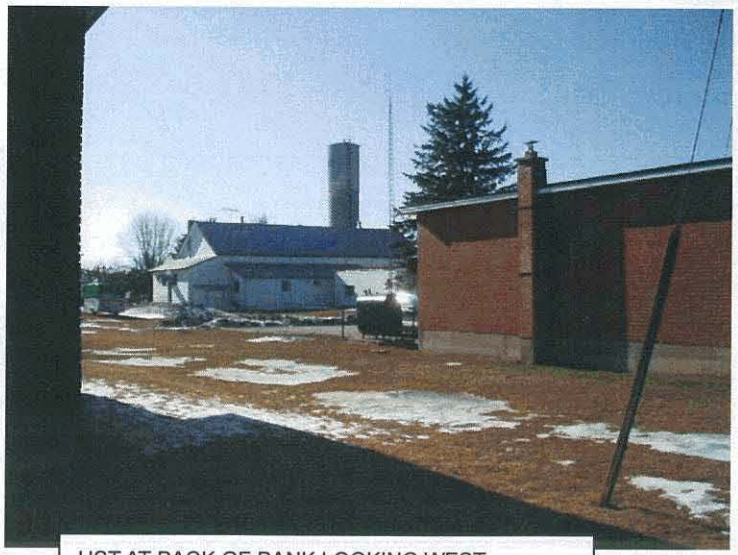


LOOKING EAST (CORNER OF GEORGE AND JOHN ST.) FROM SOUTHEAST CORNER OF ARENA

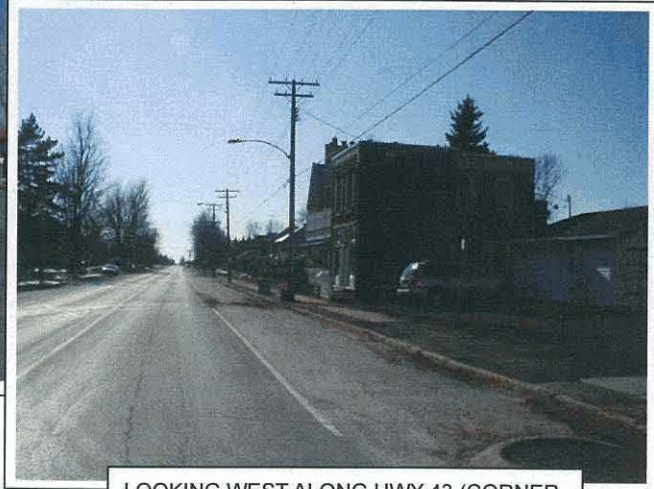
LOOKING NORTHWEST AT NORTHWEST CORNER OF MAIN & GEORGE AT OLD GAS STATION SITE (WATER TOWER IN BACKGROUND)



LOOKING EAST ALONG HWY 43 COMMERCIAL BUSINESSES (CORNER OF MAIN & HWY 43)



UST AT BACK OF BANK LOOKING WEST NORTHWEST (WATER TOWER IN BACKGROUND)



LOOKING WEST ALONG HWY 43 (CORNER OF MAIN & HWY 43)

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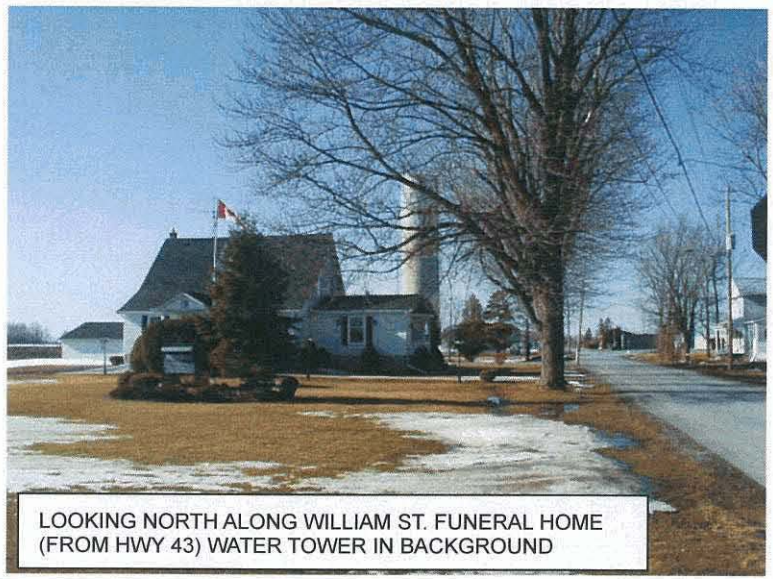
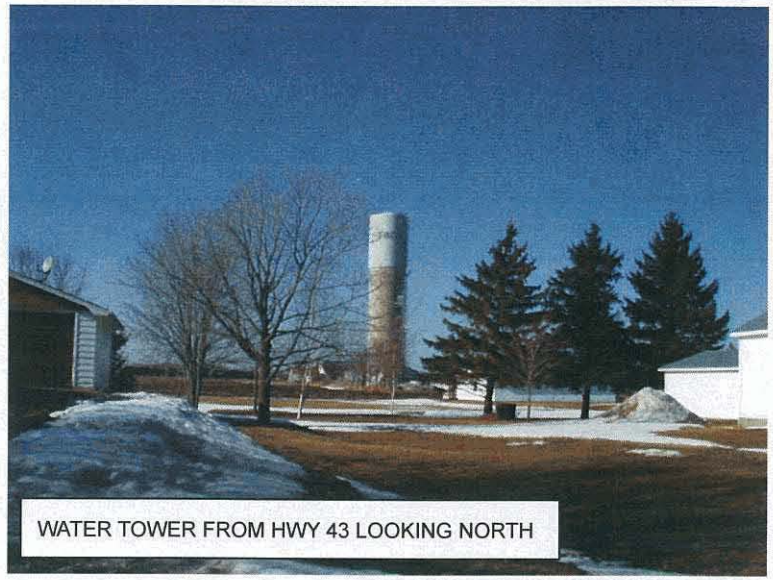
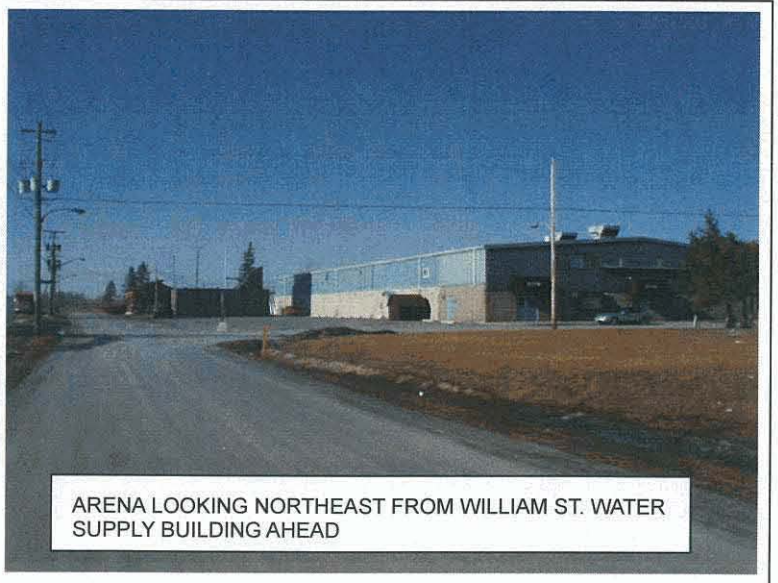


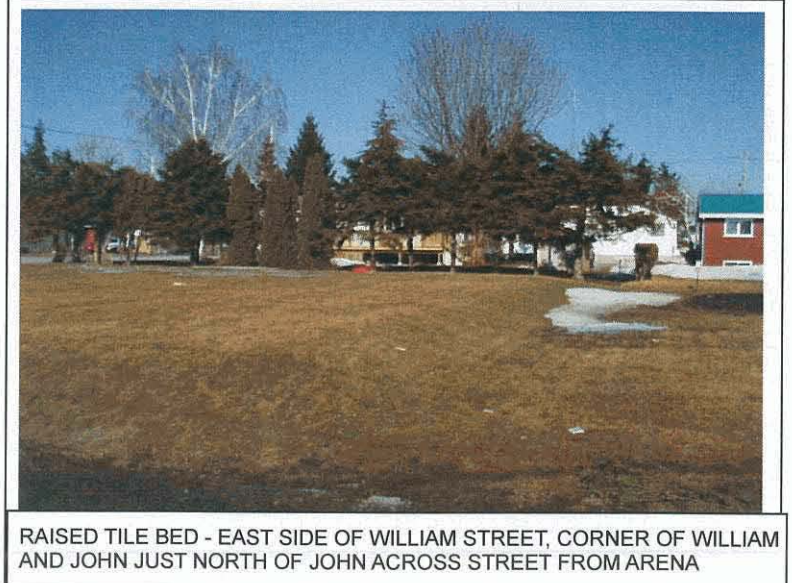
LOOKING NORTH ALONG WILLIAM ST. FUNERAL HOME (FROM HWY 43) WATER TOWER IN BACKGROUND



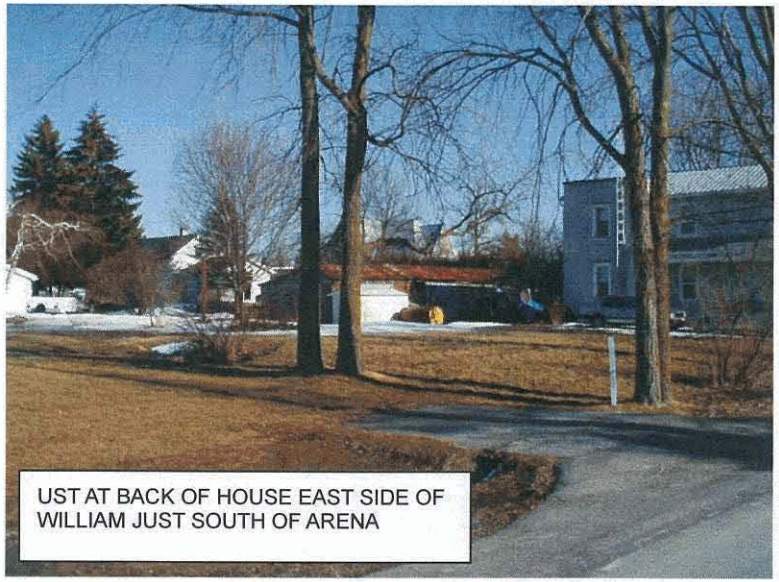
WATER TOWER FROM HWY 43 LOOKING NORTH



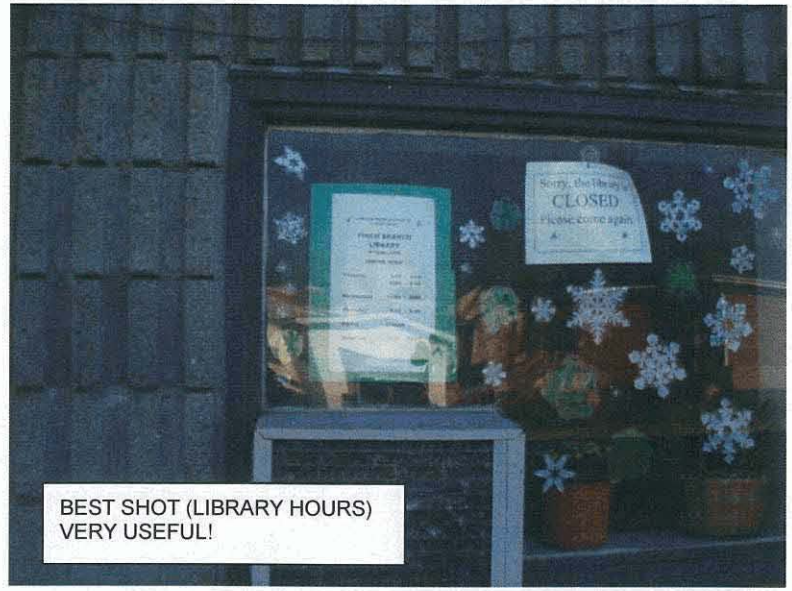
ARENA LOOKING NORTHEAST FROM WILLIAM ST. WATER SUPPLY BUILDING AHEAD



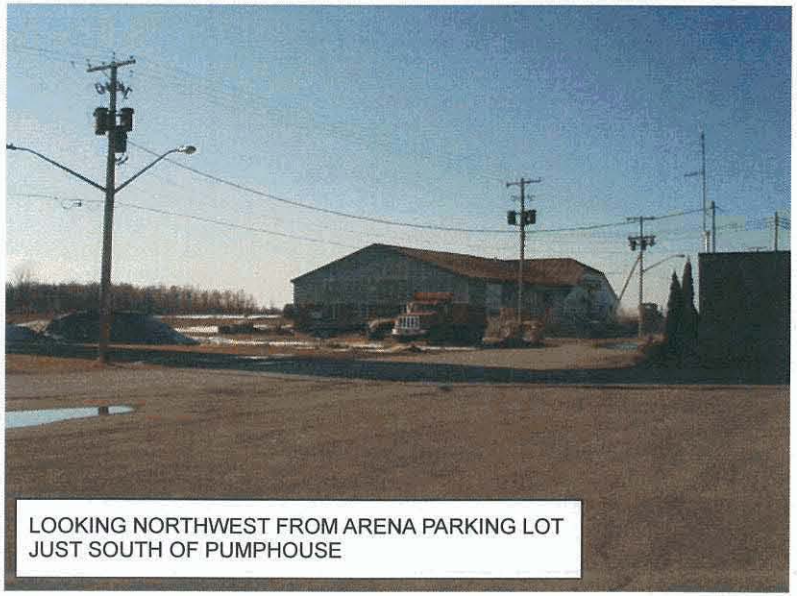
RAISED TILE BED - EAST SIDE OF WILLIAM STREET, CORNER OF WILLIAM AND JOHN JUST NORTH OF JOHN ACROSS STREET FROM ARENA



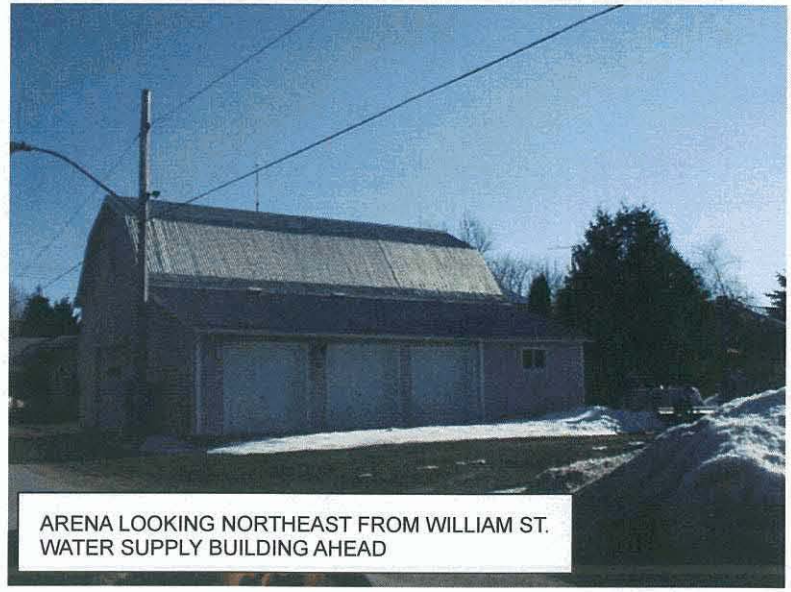
UST AT BACK OF HOUSE EAST SIDE OF WILLIAM JUST SOUTH OF ARENA



BEST SHOT (LIBRARY HOURS) VERY USEFUL!



LOOKING NORTHWEST FROM ARENA PARKING LOT JUST SOUTH OF PUMPHOUSE



ARENA LOOKING NORTHEAST FROM WILLIAM ST. WATER SUPPLY BUILDING AHEAD

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