

# **Appendix B**

## **Data Sources**

<b>WATER BUDGET AND STRESS ASSESSMENT (NPCA and AquaResource Inc., 2009b) and SIGNIFICANT GROUNDWATER RECHARGE AREAS (NPCA and AquaResource Inc., 2009a)</b>	
<b>Information Used</b>	<b>Purpose</b>
<b>WATER AVAILABILITY STUDIES</b> (AquaResource Inc. and Niagara Peninsula Conservation Authority, 2009a through j)	
Schroeter & Associates, 2007	Meteorological Data Missing-Value Fill-in
Selirio, I.S., Brown, D.M. & King, K.M., 1971	Estimation of Net and Solar Radiation
Weather Innovations Incorporation, 2007	Land Use Evapotranspiration Coefficients
Ministry of Natural Resources, 2006/2007	Land cover
<b>GROUNDWATER FLOW-IN</b>	
Neville, C.J. and Keizer, J.P., 2005	Estimation of transmissivity from specific capacity data
<b>WATER DEMANDS</b>	
MOE Permit To Take Water Database - 2008	Estimation of consumptive water use
de Loe, Rob C., 2001, 2005	Agricultural Water Use: Methodology
Statistics Canada Agricultural Census data 1991, 1996, 2001 and 2006	Estimation of agricultural water use using de Loe methodology
Statistics Canada Population 1991, 1996, 2001 and 2006	Estimation of non-municipal water use
<b>SIGNIFICANT GROUNDWATER RECHARGE AREAS</b>	
MOEE, 1995 MOEb, 2003 Gartner Lee Limited, 2003	Methodologies for distribution of HEC-HMS Recharge values

<b>GROUNDWATER VULNERABILITY ANALYSIS (NPCA, 2009a)</b>	
<b>Information Used</b>	<b>Purpose</b>
Ministry of the Environment, 1980 Gartner Lee Limited, 1987 MacViro Consultants Inc, Philips Engineering Ltd. & CH2MHILL Ltd., 2003b Ontario Geological Survey, 2003	Existing Vulnerability Mapping Review - Basic Hydrogeological Assessments
Waterloo Hydrogeologic Inc., 2005 Charlesworth and Associates & SNC-Lavalin, 2006 Hamilton Conservation Authority, 2006 EarthFX, 2008	Existing Vulnerability Mapping Review - Intrinsic Susceptibility Index (GwISI)
Waterloo Hydrogeologic Inc., 2005	Existing Vulnerability Mapping Review - Aquifer Vulnerability Index (AVI)
EarthFX, 2008	Existing Vulnerability Mapping Review - Surface to Aquifer Advection Time (SAAT)
<p>Other important reports informing the analysis, including transport pathways:</p> <ul style="list-style-type: none"> <li>• Site Selection and Assessment Reports prepared by Gartner Lee Limited in 1985 and 1987 on behalf of Ontario Waste Management Corporation;</li> <li>• Significant Groundwater Recharge Areas Report prepared by the Niagara Peninsula Conservation Authority and AquaResource Inc., 2009;</li> <li>• Ministry of the Environment Water Well Information System, 2006;</li> <li>• Ontario Oil, Gas and Salt Resources Library, 2009; and</li> <li>• Ministry of Natural Resources historical pits &amp; quarries &amp; authorized aggregate sites.</li> </ul>	

<b>INTAKE PROTECTION ZONE DELINEATION (Stantec Consulting Ltd, 2008a through 2008h)</b>	
<b>Information Used</b>	<b>Purpose</b>
Philips Engineering Ltd., 2004	Welland River Fluctuation Study assisted with Welland WTP IPZ delineations
Bos Engineering and Environmental Services, D.W. Draper & Associates Limited, 2001 Goss Gilroy Inc., CANTOX Environmental, 2003 Hargrave & Burdick Environmental Inc., 2004 MacViro Consultants Inc., 2004	Studies assisted with DeCew Falls WTP IPZ delineations
McCorquodale, A., 2008a through d	Determination of the IPZ-2s for the Niagara Falls, DeCew Falls, Port Colborne and Welland WTP Intakes Based on 10 year return periods
HCCL, 2008a and b, and HCCL, 2009	Determination of the IPZ-2s for the Grimsby and Rosehill WTP Intakes Based on 10 year return periods

**VULNERABILITY SCORES**  
**(Stantec Consulting Ltd, 2009f and 2009g)**

<b>Information Used</b>	<b>Purpose</b>
Land cover: SOLRIS and SIL mapping OMFRA Soils mapping Municipal storm sewer layout and stormsewersheds Municipal public works: Port Colborne, Welland, Thorold, Niagara Falls, Grimsby, Fort Erie NPCA watercourse mapping Watercourse field surveys, Municipal drain mapping, Topographic mapping, Road/bridge/canal mapping, Sanitary sewage pumping stations, Combined sewer overflow stations OMFRA tile drain mapping, Flood plain mapping	Area Vulnerability Factor
Depth of intake: field survey, operator interview and/or design drawings, Distance of intake from land: field survey, operator interview and/or design drawings, Historical water quality: DWIS, DWSP and WTP operator interviews	Source Vulnerability Factor

**THREATS INVENTORY**  
(Stantec Consulting Ltd., 2009a through 2009f)

Information Used	Purpose
Canadian Water and Wastewater Association (CWWA) Directory of Contaminants Database	One of the resources used to associate chemicals with land use.
North American Classification System (NAICS)	Used to classify and organize land use activities.
National Pollutant Release Inventory (NPRI)	Used to search for reporting facilities within each vulnerable area.
Environmental Compliance Reports	MOE Reports listing air emissions, municipal sewage discharges, and industrial sewage discharges.
Hazardous Waste Inventory Network (HWIN)	Land use activities that were inventoried as being threats were compared to the list of currently registered hazardous waste generators and recorded for interest.
Municipal Industrial Strategy for Abatement (MISA)	MISA data were used for the chemical inventory process to help enumerate significant threats.
MOE Tables of Drinking Water Threats	Outline prescribed land use activity drinking water threats
Brownfield Redevelopment Strategy (R.C.I. Consulting et al., 2006)	Report appendix provided a useful listing of relative risk associated with particular land uses
MOE IPZ-1 Threats Database for Niagara Region	Compiled information including Certificates of Approval and investigates conducted in response to complaints. Used as background information for inventorying land uses and identifying conditions within IPZ-1s
Niagara Region Business Directory	Used to inventory existing land use activities within each vulnerable area.
Municipal Parcel Information	Primary resources used to inventory existing land use activities within each vulnerable area.
Niagara Peninsula Conservation Authority Datasets (Waterloo Hydrogeologic, 2005)	Datasets used in the Groundwater Study Report. Used to supplement potential land use threats. GIS information included information such as landfills and fuel storage
Technical Memorandum 1 and 2 Reports (Stantec, 2009g and 2009h)	This document provides the vulnerable area delineations in which land use activities were inventoried.
Water and Wastewater Systems	GIS information provided by Niagara Region and used to determine pumping station locations within each vulnerable area.
Federal Contaminated Sites Inventory	Used to determine the presence of contaminated sites as part of the Conditions Assessment.
MOE Provincial Brownfield Sites Registry, 2009g	
MOE Spills Database for Niagara Region, WHI, 2005	
Dove, A., Painter, S., and Kraft, J. 2003a and 2003b	
Soil Investigation and Human Health Risk Assessment for the Rodney Street Community (MOE, 2002) and INCO, 2004	Used to determine the presence of contaminated sites as part of the Conditions Assessment for Port Colborne
Bos Engineering & Environmental Services, D.W. Draper & Associates Limited, 2001	Sediment data for DeCew WTP conditions analysis

<b>WTP ISSUES EVALUATION</b> <b>(Stantec Consulting Ltd., 2009a through 2009f)</b>	
<b>Information Used</b>	<b>Purpose</b>
Drinking Water Information System (DWIS) Data	Data were evaluated to identify any raw water quality issues.
Drinking Water Surveillance Program (DWSP) Data	Data were evaluated to identify any raw water quality issues.
Ontario Drinking Water Quality Standards (ODWQS)	Used to identify the parameters for issues evaluation. Also used to assist with establishing issues benchmarks.
MOE Near Shore Intake Monitoring Program, 2008c	Data were reviewed to further evaluate organic nitrogen at Rosehill and Grimsby
Goss Gilroy Inc., CANTOX Environmental, 2003	Water quality of Lake Gibson Intake Protection Zone
Niagara River Toxic Management Plan Progress Report, Niagara River Secretariat, 2007	For the Niagara Falls WTP, the report summarizes progress made in dealing with the 18 priority toxics of the Niagara River.
Niagara Region Water Treatment Plant Process Data	Temperature and turbidity process data
<b>GROUNDWATER ISSUES EVALUATION</b>	
<b>Information Used</b>	<b>Purpose</b>
Jagger Hims Limited, 2008	Ambient Groundwater Quality
Niagara Region Public Health (2001), MacViro Consultants Inc (2002, 2006) and EarthTECH (2005)	Report on Wainfleet Groundwater Nitrate Contamination