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ACRONYMS

ANSI	-Area of Natural and Scientific Interest
AOC	-Area of Concern
AR	-Assessment Report
ASM	-Agricultural Source Material
AVI	-Aquifer Vulnerability Index
BioMAP	-Biological Monitoring and Assessment Program
CA	-Conservation Authority
CCME	-Canadian Council of Ministers of the Environment
CWA	-Clean Water Act
DFO	-Department of Fisheries and Oceans
DFRP	-Directory of Federal Real Property
DNAPL	-Dense Non-Aqueous Phase Liquid
DWIS	-Drinking Water Information System
DWSP	-Drinking Water Surveillance Program
EC	-Environment Canada
ESA	-Environmentally Sensitive Area
ESR	-Environmental Study Report
ET	-Evapotranspiration
GIS	-Geographic Information System
GLWQA	-Great Lakes Water Quality Agreement
GW	-Groundwater
HAB	-Harmful Algal Bloom
HCB	-Hexachlorobenzene
HEC-HMS	-Hydrologic Engineering Centre – Hydrologic Modeling System
HVA	-Highly Vulnerable Aquifer
HWIN	-Hazardous Waste Information Network
IPZ	-Intake Protection Zone
ISI	-Intrinsic Susceptibility Index
LaMP	-Lakewide Management Plan
MAC	-Maximum Acceptable Concentration
MASL	-Metres Above (mean) Sea Level
MSC	-Meteorological Services of Canada
MOE	-Ontario Ministry of the Environment
MNR	-Ontario Ministry of Natural Resources
NASM	-Non-agricultural Source Material
NHIC	-National Heritage Information Centre
NOTL	-Niagara-on-the-Lake
NPCA	-Niagara Peninsula Conservation Authority
NPSPA	-Niagara Peninsula Source Protection Area
NPSPC	-Niagara Peninsula Source Protection Committee
NRTMP	-Niagara River Toxics Management Plan
NWQPS	-Niagara Water Quality Protection Strategy
OBC	-Ontario Building Code
ODWQS	-Ontario Drinking Water Quality Standards (also known as ODWS)

Assessment Report – Acronyms
Niagara Peninsula Source Protection Area

OG	-Operational Guidelines
OGSRL	-Ontario Oil Gas and Salt Library
OMAFRA	-Ontario Ministry of Agriculture, Food & Rural Affairs
OMNR	-Ontario Ministry of Natural Resources
OP	-Official Plan
OPG	-Ontario Power Generation
OWN	-Ontario Water Network
PCB	-Polychlorinated Biphenyl
PGMN	-Provincial Groundwater Monitoring Network
PTTW	-Permit To Take Water
PWQO	-Provincial Water Quality Objective
RAP	-Remedial Action Plan
RON	-Region of Niagara
SARA	-Species at Risk Act
SARO	-Species at Risk in Ontario
SGRA	-Significant Groundwater Recharge Area
SOLRIS	-Southern Ontario Land Resource Information System
SP	-Source Protection
SPA	-Source Protection Authority
SPC	-Source Protection Committee
SPP	-Source Protection Plan
STP	-Sewage Treatment Plant
SWP	-Source Water Protection
TDWT	-Tables of Drinking Water Threats
TOR	-Terms of Reference
TOT	-Time of Travel
TR	-Technical Rules (2009)
WAS	-Water Availability Studies
WHPA	-Wellhead Protection Area
WPCP	-Water Pollution Control Plant
WQI	-Water Quality Index
WSPA	-Watershed Planning Areas
WTP	-Water Treatment Plant
WWIS	-Water Well Information System

GLOSSARY

Activity: One or a series of related processes, natural or anthropogenic that occur within a geographic area and may be related to a particular land use.

Acoustic Doppler Current Profiler (ADCP): is sonar that attempts to produce a record of water current velocities for a range of depths.

Agricultural managed land: means managed land that is used for agricultural production purposes including areas of cropland, fallow land, and improved pasture where agricultural source material (ASM), commercial fertilizer, or non-agricultural source material (NASM) is applied or may be applied.

Aquifer: A geologic formation, a group of formations, or a part of a formation that is water bearing. (2) A geologic formation that stores or transmits water or both such as to springs or wells. (3) An underground layer of porous rock, sand, or gravel containing large amounts of water. (4) *Saturated rock or sediment sufficiently permeable to supply economic quantities of water to wells or springs.*

Aquifer Recharge Area: An area in which water can infiltrate the soil and replenish an aquifer relatively easily. Aquifer recharge areas allow precipitation to reach an aquifer by infiltration. Recharge areas are often much smaller than the actual aquifer area and are important to the aquifer.

Aquifer Susceptibility (or Vulnerability): An intrinsic property of a groundwater system that depends on the sensitivity of that system to human and/or natural impacts. Intrinsic vulnerability depends solely on the hydrogeologic properties of an aquifer.

Aquifer Vulnerability Index (AVI): A numerical indicator of an aquifer's intrinsic or inherent vulnerability susceptibility, to contamination expressed as a function of the thickness and permeability of overlying layers.

Aquitard: A geologic formation, group of formations, or part of a formation through which almost no water moves. (2) *A low-permeability geologic unit that can store groundwater, but that transmits groundwater slowly.*

Artesian water: Groundwater that is under pressure sufficient to raise it above the level at which it is encountered in a borehole or well.

Artesian Well: A well deriving its water from a confined aquifer in which the water level stands above the top of the aquifer. If the water level stands above the groundwater surface it will be a flowing well.

Baseflow: It is the portion of the stream flow that is not runoff, but water flow originating through the subsurface. The baseflow is the primary source of water in a stream during dry weather.

Background Monitoring Well: A monitoring well located up-gradient of the landfill or facility being monitored. Background monitoring wells are located where the groundwater is expected to be representative of the ambient or background conditions for that area and geological formation.

Bedrock: Solid rock either exposed at the surface of the earth or overlain by unconsolidated material.

Benthic Invertebrates: Small communities of aquatic organisms abundant in all types of aquatic systems that are good indicators of water quality and stream health. They live on or in the bottom sediments and include organisms such as snails, clams, worms, leeches, beetles, and the larval stages of dragonflies, stoneflies, caddisflies, and mayflies, among a wide variety of other insects.

Brownfield: Abandoned, idled, or underused industrial or commercial facilities or land, where expansion or redevelopment is complicated by real or perceived environmental contamination. They typically exist in urban industrial sections such as factories but may be found in older residential areas as previous gas stations or dry cleaners for example.

Climate Change: Is any short or long-term change in average weather over periods of time that range from decades to millions of years due to natural or anthropogenic factors. Inconsistencies include changes in temperature, wind patterns and precipitation.

Conservation Authority Regulation Limit: Any lands regulated by the conservation authority including required set-backs in our policies. These lands include Great Lakes shorelines, valley lands, wetlands, watercourses, floodplains and hazard lands (e.g. karst lands).

Consumptive Water Demand: The net amount of water that is taken from a source, and not returned locally to the same source in a reasonable amount of time.

Contaminant: Chemicals and pathogens.

Contamination: The mixing of harmful elements, compounds, or microorganisms with surface or groundwater.

Data Gaps: The lack of raw information for a specific geological area and/or specific type of information.

Decommissioned Wells: Capped, plugged, and sealed in compliance with regulatory requirements by the Ministry of Environment.

Discharge: The process by which water is removed from a groundwater system along a discharge area, which may include a spring, seepage from an excavation face, or inflow to a stream.

Dolomite: Mineral (limestone rock) consisting of a mixed magnesium and calcium carbonate, but rich in magnesium carbonate that is not easily weathered or dissolved.

Dolostone: A term used for the sedimentary rock dolomite, in order to avoid confusion with the mineral of the same name.

Drift: All unconsolidated mineral material on the bedrock.

End Moraine: A moraine that has been deposited at the lower or outer end of a glacier.

Drinking Water Concern: An alleged drinking water issue that has not been confirmed by monitoring, or other verification methods; will be identified through consultations with the public, stakeholder groups, and technical experts.

Drinking Water Condition: A drinking water condition refers to contamination that exists already and is associated with past activities.

Drinking Water Issue: a proven condition relating to the quality or quantity of water that interferes or will potentially soon interfere with the use of a drinking water source by a municipal residential system or designated system.

Drinking-water system: Has the same meaning as in the *Safe Drinking Water Act, 2002*;

Drinking-water threat: An existing activity, possible future activity, or existing condition that results from a past activity,

(a) that adversely affects or has the potential to adversely affect the quality or quantity of any water that is or may be used as a source of drinking water, or

(b) that results in or has the potential to result in the raw water supply of an existing or planned drinking-water system failing to meet any standards prescribed by the regulations respecting the quality or quantity of water,

and includes an activity or condition that is prescribed by the regulations as a drinking water threat;

Ecosystems: Since the late 1960s, governments, non-government groups, universities, and industry have worked to develop a common, hierarchical ecosystem framework and terminology. It gained momentum in the 1970s, especially following the creation of the Canada Committee on Ecological Land Classification.

In 1991 a collaborative project was undertaken by a number of federal agencies in cooperation with provincial and territorial governments, all under the auspices of the Ecological Stratification Working Group, to revise previous work and establish a common ecological framework for Canada. The working group focused on three priority levels of stratification, namely eozones, ecoregions, and ecodistricts.

The underlying principle for the initiative was the commitment and need to think, plan, and act in terms of ecosystems. The principle required people to move away from an emphasis on individual elements that comprise an ecosystem to a perspective that is more comprehensive - a holistic approach. This required an national ecological framework to provide a consistent, national spatial context within which ecosystems at various levels of generalization can be described, monitored, and reported on. The use of such a framework of standard ecological units provides for common communication and reporting between different jurisdictions and disciplines. In this case, the immediate requirement was to provide a common ground to report on the state of the environment and the sustainability of ecosystems in Canada. The concepts and hierarchy for ecological classification set out by the Canada Committee on Ecological Classification in the 1970s and 1980s (Ecological Stratification Working Group 1996, Ironside 1991) were the overall guide for the revised national framework.

The resulting national report "*A National Ecological Framework for Canada*" released by the Ecological Stratification Working Group in 1996 describes the methodology used to construct the ecological framework maps, the concepts of the hierarchical levels of generalization, narrative descriptions of each ecozone and ecoregion, their linkages to various data sources, examples of applications of the framework, and a list of contributors and collaborating agencies.

Ecodistrict: An Ecodistrict is a subdivision of an ecoregion and is characterized by distinctive assemblages of relief, landforms, geology, soil, vegetation, water bodies, and fauna. For example, the Jeddore Lake ecodistrict (no. 473) is one of five within the Maritime Barrens ecoregion.

Ecoregion: An ecoregion is a subdivision of an ecoprovince and is characterized by distinctive regional ecological factors, including climate, physiography, vegetation, soil, water, and fauna. For example, the Maritime Barrens ecoregion (no. 114) is one of nine ecoregions within the Newfoundland ecoprovince.

Ecoprovince: A subdivision of an ecozone characterized by major assemblages of structural or surface forms, faunal realms, and vegetation, hydrology, soil, and macro climate. For example, the Newfoundland ecoprovince (no. 6.4) is one of six ecoprovinces within the Boreal Shield Ecozone.

Environmentally Sensitive Area (ESA): Areas include the major marshes throughout the Region, important plant and wildlife habitats, major forested areas, and major landforms such as the Niagara Escarpment and the Short Hills which have an important scenic and natural value

Escarpment: A steep-faced linear ridge frequently presented by the abrupt termination of sedimentary rock layers.

Escherichia coli (*E. coli*): Bacteria found in human and animal waste and have the potential to contaminate food and water sources. Their presence in water indicates fecal contamination, and certain strains can cause infection and result in serious illness.

Fractures: Breaks in rock occurring at a variety of possible angles due to intense folding or faulting, or in response to glacial unloading or stress release.

Evapotranspiration: The loss of water from a land area through transpiration or plants and evaporation from the soil.

Geology: The organized body of knowledge about the composition, structure, and history of the Earth.

Geomorphology: A branch of geology that is the scientific study of landforms, particularly the origin of land, riverine, and ocean features on the Earth's surface.

Great Lakes: The five large lake located in Canada and United States: Lake Ontario, Lake Superior, Lake Huron, Lake Erie, and Lake Michigan. Ontario borders on all of the Great lakes with the exception of Lake Michigan.

Great Lakes connecting channels: The large rivers that connect the Great Lakes (e.g. Niagara River, St. Clair River, Ottawa River).

Groundwater: Water that infiltrates the earth's surface. (2) Subsurface water that occurs beneath the water table in soils and geological formations that are fully saturated.

Groundwater recharge area: The area where an aquifer is replenished from (a) natural processes, such as the infiltration of rainfall and snowmelt and the seepage of surface water from lakes, streams, and wetlands, (b) from human interventions such as the use of storm water management systems, and (c) whose recharge rate exceeds a threshold specified in the regulations. The Director's rules will specify the acceptable methodologies to determine groundwater recharge rates, i.e. what qualifies as significant.

GUDI Well: A drinking water well that extracts/produces groundwater under the direct influence of surface water. Further details are provided in the MOE Reference document "Hydrogeological Study to Examine Groundwater Sources Potentially Under Direct Influence of Surface Water" dated October 2001.

Hazard: In the context of source water protection, a hazard is equivalent to a contaminant and pathogen threat.

Hazard Rating: A numeric score representing the relative potential for a contaminant of concern to impact drinking water sources at concentrations significant enough to cause human illness.

Headwater: The upstream end or upper tributaries of a stream or river.

Highly vulnerable aquifer (HVA): An aquifer that can be easily changed or affected by contamination from both human activities and natural processes as a result of (a) intrinsic susceptibility, as a function of the thickness and permeability of overlying layers, or (b) by preferential pathways to the aquifer.

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Hydraulic conductivity: Rate at which a fluid moves through a given permeable material under a hydraulic gradient (driving force) equal to 1.0 (i.e., rise equals run). Ranges of hydraulic conductivity have been determined for various geological materials.

Hydraulic gradient: The slope of an underground water surface expressed as the change in total head (i.e., groundwater surface elevation) with change in distance in a given direction.

Hydraulic head: The pressure exerted by a fluid upon a unit area (surface) due to the height at which the fluid level stands above the surface. Usually expressed as pounds per square inch, sometimes as actual feet of head or fluid column.

Hydrogeology: Hydrogeology is the study of the movement and interactions of groundwater in geologic materials.

Infiltration: The flow of water downward from the land surface into and through the underlying soil or rock.

Intrinsic vulnerability: The potential for the movement of a contaminant(s) through the subsurface based on the properties of natural geological materials.

Isopleths: Lines on a map of equal value

Kame: A geologic unit. An irregularly shaped hill or mound, composed chiefly of poorly sorted sands and gravels deposited by a subglacial stream as an alluvial fan or delta.

Karst: Terrain with special landforms (e.g. closed depressions or sinkholes and caves) and drainage characteristics, due to greater solubility of certain rocks (notably carbonate rocks such as limestone, dolomite or magnetite) in natural waters. Derived from the geographical name “krs” from part of the karst terrain in Slovenia.

Lacustrine: Sediments deposited in a lake, consisting of layers of clay, silt, and fine sand.

Land cover: means the physical and biological cover on the land, including vegetation and anthropogenic features.

Limestone: A bedded, fine-textured sedimentary rock consisting chiefly of calcium carbonate.

Livestock Density: means the number of nutrient units over a given area, and is expressed by dividing the nutrient units by the number of acres in the same area, where,

- a. in respect of land used for the application of nutrients, the number of acres of agricultural managed land in the vulnerable area; and

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- b. in respect of land that is part of a farm unit and that is used for livestock, grazing or pasturing, the number of acres that is used for those purposes.

Justice: A provincial judge or a justice of the peace;

Kriging: A weighted-moving-average interpolation method where the set of weights assigned to samples minimizes the estimation variance, which is computed as a function of the variogram model and locations of the samples relative to each other, and to the point or block being estimated. (EPA, 1991, GEO-EAS 1.2.1 User's Guide).

Major residential development: means a development of six or more private residences on one or more properties.

Managed Land: means land to which nutrients are applied.

Moraine: An accumulation of boulders, stones, or other debris carried by a glacier. Moraines are deposits of glacial Till. Lateral moraines are the ridges of Till that mark the sides of the glacier's path. Terminal moraines are the material left behind by the farthest advance of the glacier's toe.

Multi-barrier approach: A recommendation of Justice Dennis O'Connor's Walkerton Inquiry for the prevention of drinking water contamination. Protecting water at the source is the first step, followed by water treatment systems, distribution, testing and drinking water.

Non-Point Source Pollution: Pollution discharged over a wide land area rather than a specific location.

Nutrient Unit: has the same meaning as in section 1 of Ontario Regulation 267/03 (General) made under the Nutrient Management Act, 2002; and is determined in accordance with section 3.1 of the Nutrient Management Protocol for the Ontario Regulation 267/03 made under the Nutrient Management Act, 2002.

Overburden: Any loose unconsolidated material which has been deposited upon solid rock (i.e. sand or clay).

Pathogen: A disease causing organism

Pathogenic contaminant: A microscopic organism that is capable of producing infection or infectious disease in humans.

Permeability: Capacity of a soil or rock to transmit a fluid. Depends upon the size and shape of the pores and their interconnection. It is measured by the rate of fluid movement in the porous medium.

Physiography: The study or description of the earth's physical features.

Piezometric surface: A surface that represents the level to which water will rise in a well. The water table is a piezometric surface for an unconfined aquifer.

Point source: A discrete, identifiable point or area from which a discharge of a fluid or other substance occurs, commonly into air or a water body.

Potentiometric Surface (NPSP Area Specific): An imaginary surface representing the total head of groundwater in a confined aquifer that is defined by the level to which the water will rise in wells greater than 15 metres in depth.

QDEMAND: Groundwater Consumptive Use; calculation: Groundwater consumptive use is calculated as the portion of estimated average annual and monthly rate of groundwater takings in a subwatershed that is not returned to the aquifer that is the source of the water taking.

QSUPPLY: Definition: Groundwater Supply; Calculation: Groundwater supply is calculated as the estimated annual recharge rate plus the annual estimated groundwater inflow into a subwatershed. To establish monthly amounts the annual amount shall be divided by 12.

QRESERVE: Definition: Groundwater Reserve; Calculation: 10% of the total groundwater supply (QSupply) should be maintained, as a minimum, as a reserve.

Raw water: Water that is in a drinking-water system or in plumbing that has not been treated in accordance with the, (a) the prescribed standards and requirements that apply to the system, or (b) such additional treatment requirements that are imposed by the license or approval for the system.

Raw water supply: Water that is outside a drinking-water system that is a source of water for the system.

Recharge: The addition of water to the groundwater system by natural (precipitation and infiltration) or artificial processes. *The process by which water is added to groundwater, which may include the downward infiltration of precipitation or inflow from streams or other surface water bodies.*

Riparian area: Riparian areas are vegetated ecosystems, usually the banks and adjacent areas of a stream, river, lake, or wetland. The zone is intermittently inundated and usually supports wet meadow, marshy, or swampy vegetation.

Risk: The likelihood of a drinking water threat (a) rendering an existing or planned drinking water source impaired, unusable, or unsustainable, or (b) compromising the effectiveness of a drinking water treatment process, resulting in the potential for adverse human health effects.

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Risk assessment: means an assessment of risks prepared in accordance with the regulations and the rules;

Risk management plan: means a plan for reducing a risk prepared in accordance with the regulations and the rules;

Runoff: Rainwater that does not infiltrate the soil but flows across the earth's surface into a body of water. The proportion of runoff varies greatly depending on a number of factors such as the topography, soil conditions, and vegetative cover.

Sedimentary rock: Rock formed by the accumulation of sediments or chemical precipitates (e.g., gypsum) that forms bedding layers.

Shale: A sedimentary rock made up of clay- and silt-sized particles, hardened into rock.

Significant drinking water threat: means a drinking water threat that, according to a risk assessment, poses or has the potential to pose a significant risk;

Source protection area: means a drinking water source protection area established by subsection 4 (1) or by the regulations of the Clean Water Act;

Source protection authority: means a conservation authority or other person or body that, under subsection 4 (2) or section 5, is required to exercise and perform the powers and duties of a drinking water source protection authority under of the Clean Water Act;

Source protection committee: means a drinking water source protection committee established under section 7 of the Clean Water Act;

Source protection plan: means a drinking water source protection plan prepared under of the Clean Water Act;

Source protection region: means a drinking water source protection region established by the regulations of the Clean Water Act;

Source Water: Water in its natural or raw state, prior to being withdrawn into the drinking water system.

Surface water intake protection zone: The contiguous area of land and water immediately surrounding a surface water intake, which includes:

- the distance from the intake;
- a minimum travel time of the water associated with the intake of a municipal residential system or other designated system, based on the minimum response time for the water treatment plant operator to respond to adverse conditions or an emergency;
- the remaining watershed area upstream of the minimum travel time area (also referred to as the Total Water Contributing Area) – applicable to inland water courses and inland lakes only.

Tables of Drinking Water Threats: means the Ministry of the Environment publication “Table of Drinking Water Threats: Clean Water Act, 2006” dated December 12, 2008, as amended from time to time.

Threat Assessment - Tier 1: Preliminary examination of a drinking water threat based on readily accessible information.

Threat Assessment - Tier 2: Advanced examination of a drinking water threat through accessing more detailed information, interviews, and perhaps when warranted, additional monitoring, modeling, or studies.

Tier 1, 2 and 3 Water Budgets: Numerical analysis at the watershed/subwatershed (Tier 1 and 2) or local area (Tier 3) level considering existing and anticipated amounts or water use within the watershed, as well as quantitative flow between the groundwater and surface water systems.

Till: Sediments deposited by the glacial ice sheet, consisting of a mixture of clays, silt, and sand, with cobbles and boulders. Unstratified drift deposited by a glacier, without reworking by meltwater.

Time of Travel (TOT): An estimate of the time required for a particle of water to move in the saturated zone from a specific point in an aquifer into the well intake.

Transmissivity: The rate at which water is transmitted through a unit width of an aquifer, under a unit hydraulic gradient.

Uncertainty analysis: Uncertainty analysis investigates the effects of lack of knowledge and other potential sources of error.

Unconfined aquifer: An aquifer whose upper boundary is the water table.

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Vulnerable area: means,

- (a) a groundwater recharge area,
- (b) a highly vulnerable aquifer,
- (c) a surface water intake protection zone, or
- (d) a wellhead protection area.

Water source: An aquifer or surface water body being used to supply drinking water.

Watershed: An area that is drained by a river and its tributaries.

Water table: The level of groundwater saturation. The water table is often the upper surface of an unconfined aquifer.

Wellhead protection area: The surface and subsurface area surrounding a water well or well field that supplies a municipal residential water system or other designated system through which contaminants are reasonably likely to move so as to eventually reach the water well or well. The wellhead protection areas are described in the Groundwater Vulnerability Analysis Guidance Module.

Wetlands: Land such as a swamp, marsh, bog, or fen (not including land that is being used for agricultural purposes, and longer exhibits wetland characteristics) that, (a) is seasonally or permanently covered by shallow water or has the water table close to or at the surface, (b) has hydric soils and vegetation dominated by hydrophobic or water-tolerant plants, and (c) has been further identified, by the Ministry of Natural Resources or by any other person, according to evaluation procedures established by the MNR as amended from time to time.