

Glossary

Below are some terms, both scientific and non-scientific, related to Drinking Water Source Protection. Note that some of these terms are derived from draft documents, and as such may be subject to change. They are provided here for information purposes, not as official legal definitions.

Abandoned Well: A well that is deserted because it is dry, contains non-potable water, was discontinued before completion, is not being properly maintained, was constructed poorly, or for which it has been determined that natural gas may pose a hazard.

Aboveground Storage Tank (AST): Vessel located above the ground surface or within a building. Used to store fuel or chemicals.

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

Aerobic: Refers to an environment with oxygen. The term "aerobic composting" is used to describe breakdown of the organic matter by oxidation in the presence of oxygen. The process generates a lot of heat which kills many of the weed seeds and germs in compost. The heat also helps all the pile to break down faster and results in a nice clean fairly germ free product in just a few months. For remediation, aerobic processes are used to oxidize hydrocarbons to carbon dioxide and water.

Aggregate Risks: Multiple risks in a municipal water supply protection area that are considered together relative to the overall risk to drinking water sources.

Agro-ecosystem: Any agricultural system, which incorporates a natural community of plants and animals within a particular physical environment, on land where domestic animals are raised or crops grown.

Ambient water: Natural concentration of water quality constituents prior to mixing of either point or non-point source load of contaminants.

American Water Works Association (AWWA): An international nonprofit scientific and educational society dedicated to the improvement of drinking water quality and supply.

Anaerobic: Refers to an environment low in oxygen. The term "anaerobic composting" is used to describe putrefactive breakdown of the organic matter by reduction in the absence of oxygen where end products such as methane and hydrogen sulphide are released. It is mostly produced in a closed system, such as in a plastic bag or a sealed bin or sometimes even in open exposed piles. This approach works best with nitrogen-rich materials such as non-fatty kitchen waste and soft green clippings. For remediation, anaerobic processes are used to destroy chlorinated solvents.

Aquatic: Growing or living in water.

Aquifer: An underground area of porous, permeable soil or rock that contains a sufficient amount of water to support a domestic well. Shallow aquifers exist in the overburden, the sedimentary rock and soil above bedrock, whereas bedrock aquifers are found in the bedrock itself, beneath whatever overburden is present.

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

Aquitard: The layer of geological material that prevents or inhibits the transmission of water in a confined aquifer.

Attenuation (Flow): Flow that is lessened or weakened, or the severity reduced.

Average Maximum Water Velocity: The average highest speed of a surface water body.

Bank Stability: The ability of a stream bank to resist change.

Baseflow: The water that flows into a stream through the subsurface.

Bedrock: The solid rock underlying unconsolidated surface material.

Bedrock Geology: The study of the solid rock underlying unconsolidated surface material. Also refers to description of bedrock types.

Bioengineering: The application of biological science to engineering principles. The use of living or organic plant material to achieve engineering solutions.

Biofilter: Natural wetlands act as biofilters, removing sediments and pollutants such as heavy metals from the water, and constructed wetlands can be designed to emulate these features.

Biogeochemistry: The study of the cycles of chemical elements, such as carbon and nitrogen, and their interactions with and incorporation into living things.

Biological Diversity: The variability among organisms and the ecological complexes of which they are a part.

Biological Oxygen Demand (BOD): The amount of oxygen required by aerobic microorganisms to decompose the organic matter in a sample of water, such as that polluted by sewage. It is used as a measure of the degree of water pollution. May also be referred to as carbonaceous biological oxygen demand (CBOD).

Biomass: The amount of living matter, usually measured per unit area or volume of habitat.

Bioreactor: Treatment system that consists of tree bark, leaf compost, wood chips and river sediment placed at the end of a drainage outlet or sewer outfall.

Biosolids: The product generated from tertiary treatment of waste activated sludge. Biosolids have been in use for agriculture for more than 80 years, though there is increasing pressure to stop the practice of land application due to farm land contamination.

Biotic: Relating to, produced by, or caused by living organisms.

Bog: A wetland ecosystem characterized by high acidity, low nutrient levels, and accumulation of peat and mosses, chiefly *Sphagnum*. The water table is at or near the surface in spring, and slightly below during the remainder of the year. The bog surface is often raised; if flat or level with the surrounding wetlands, it is virtually isolated from mineral soil waters. Peat is usually formed in situ under closed drainage and oxygen saturation is very low.

Broader Landscape: The watershed or drinking water source protection study area. Applies to regional rather than local aquifer vulnerability assessments usually using an indices method of vulnerability assessment.



Campylobacter Bacteria: Bacteria commonly found in the intestines of humans and animals. Some types of *Campylobacter* can cause serious illness in humans.

Canadian Council of Ministers of the Environment (CCME): This group of provincial environment ministers is the major intergovernmental forum in Canada for discussion and joint action on environmental issues of national, international and global concern. The 13 member governments work as partners in determining national environmental priorities and developing national guidelines and codes of practice.

Carbon Sequestration: Process by which carbon is removed from the environment and held within, for example, a wetland.

Catchment: The groundwater and surface water drainage area from which a woodland, wetland, or watercourse derives its water.

Chemical: A substance used in conjunction with, or associated with, a land use activity or a particular entity, and with the potential to adversely affect water quality.

Chemical Oxygen Demand (COD): The standard method for indirect measurement of the amount of pollution (that cannot be oxidized biologically) in a sample of water.

Climate: The average weather conditions of a place or region throughout the seasons.

Cold water: Water with a temperature of approximately 14 C. This thermal habitat is typically considered ideal for brook and brown trout.

Combined Sewer Overflows (CSOs); sewers that carry both sanitary waste and stormwater. These sewers are no longer permitted, but many older sewers have not been replaced.

Conceptual Water Budget: A written description of the overall flow system dynamics for each watershed in the Source Protection Area taking into consideration surface water and groundwater features, land cover (e.g., proportion of urban vs. rural uses), human-made structures (e.g., dams, channel diversions, water crossings), and water takings.

Conductivity: The quality or power of conducting or transmitting.

Confined Aquifers: An aquifer that is bounded above and perhaps below by layers of geological material that do not transmit water readily.

Conservation: The protection of natural or man-made resources and landscapes for later use.

Constructed Wetlands (CWs): These wetlands consist of a number of artificial basins (cells) connected in series and surrounded by berms of earth or concrete. Water in them usually flows in one or more parallel trains. Three types of cells may be used in a CW system: pond, free water surface, and sub-surface flow (SSF). With SSF CW cells, water flows just under the surface of porous materials (substrates) consisting of beds of gravel or rock. SSF constructed wetlands are used where the wastewater being treated is noxious or odorous; where a higher degree of freeze protection is desired; where the removal of dissolved metals/metalloids is required; where the attraction of wildlife (especially waterfowl) may be undesirable (e.g., at airports); where ample, economic supplies of substrate material are readily available; and/or where operation in an engineered wetland mode is desired.

Consumptive Use: Water use that diminishes the source and is not available for other and future uses.



Contaminant: Chemical and/or pathogen in the environment that has the potential to cause harm to human health or the environment.

Contaminant of Concern: A chemical or pathogen that is or may become a drinking water threat.

Contamination: The mixing of harmful elements, compounds or microorganisms with surface or groundwater. Contamination can occur naturally (e.g., an aquifer flowing through mineral deposits that contain heavy metals) or through human activity (e.g., sewer water flowing into a river). Nutrients, such as nitrogen and phosphorus, can also cause water contamination when they are present in excessive amounts.

Contiguous: Having contact with, or touching along a boundary or point.

Cumulative (water quality) Effects: The consequence of multiple threats sources, in space and time, which affect the quality of drinking water sources.

Cumulative (water quantity) Effects: The consequence of multiple threats sources, in space and time, which affect the quantity of drinking water sources.

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 (O. Reg. 903) established by the Ministry of the Environment.

Dense Non-Aqueous Phase Liquids (DNAPLs): a group of chemicals that are insoluble and denser than water.

Designated System: A drinking water system that is included in a terms of reference, pursuant to resolution passed by a municipal council under subsection 8(3) of the proposed *Clean Water Act*, 2005.

Developed / Developable: Reference to the useable portion of a parcel of land that meets the regulatory zoning provisions, particularly those pertaining to defining the area of occupation for buildings, structures, facilities and infrastructure.

Discharge Area: An area where water leaves the saturated zone across the water table surface.

Drainage Density: Length of watercourse per unit drainage area.

Drainage System (under the Drainage Act): A drain constructed by any means, including works necessary to regulate the water table or water level. This broad definition allows for features to be included in drainage systems to restore wetlands while still protecting the agricultural interests of the private landowners.

Drained: A condition in which the level or volume of groundwater or surface water has been reduced or eliminated from an area by artificial means.

Drinking Water Concern: A purported drinking water issue that has not been substantiated by monitoring, or other verification methods; will be identified through consultations with the public, stakeholder groups, and technical experts (e.g., water treatment plant operators).

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.

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

Ecological: Relating to the totality or pattern relations between organisms and their environment.

Ecosystem: A natural community of plants and animals within a particular physical environment, which is linked by a flow of materials throughout the non-living (abiotic) as well as the living (biotic) section of the system.

Effluent: Liquid discharge from a sewer, drainage system, or industrial process.

Electrical resistance heating (ERH): An intensive in situ environmental remediation method that uses the flow of alternating current electricity to heat soil and groundwater and evaporate contaminants.

Elevation: The height of a portion of the Earth's surface in relation to its surroundings.

Empirical: Information gained by means of observation, experience, or experiment.

Engineered Wetlands (EWs): Advanced, semi-passive kinds of constructed wetlands in which a wastewater being treated flows beneath the surface of a porous substrate such as gravel. The sub surface water flow may be either horizontal (HSSF) or vertical (VSSF). The latter are more versatile, allowing much higher wastewaters to be treated (up to tens of thousands of m³/d).

Enhancement: To add to, or to make greater; for example, to add additional water to a wetland, in order to make greater its environmental functionality.

Entity: One or a series of related objects, natural or anthropogenic, that may be related to a specific process. Examples: Storage Tank, Bird Colony, Abandoned Well, Mine Tailing, Natural Radiation Source.

Entrain: To draw in and transport through water.

Episodic: Made up of separate loosely connected episodes.

Erosion: The wearing away of the land by the action of water, wind or glacial ice.

Escherichia coli (E. coli): A type of coliform bacteria found in human and animal waste. Their presence in water indicates fecal contamination.

Evapotranspiration (ET): The total water lost from leaves via plant respiration and evaporation from surface water.

Event: Occurrence of an incident (isolated or frequent) with the potential to promote the introduction of a threat into the environment. An event can be intentional, as in the case of licensed discharge or accidental, as in the case of a spill.



Existing Drinking Water Source: The aquifer or surface water body from which municipal residential systems or other designated systems currently obtain their drinking water. This includes the aquifer or surface water body from which back-up wells or intakes for municipal residential systems or other designated systems obtain their drinking water when their current source is unavailable or an emergency occurs.

Exposure: The extent to which a contaminant or pathogen reaches a water resource. Exposure, like a drinking water threat, can be quantified based on the intensity, frequency, duration and scale. The degree of exposure will differ from that of a drinking water threat dependent on the nature of the pathway or barrier between the source (threat) and the target (receptor) and is largely dependent on the vulnerability of the resource.

Fen: Fens are peatlands characterized by surface layers of poorly to moderately decomposed peat, often with well-decomposed peat near the base. The waters and peat in fens are less acid than in bogs, and often are relatively nutrient rich and minerotrophic since they receive water through groundwater discharge from adjacent uplands. Fens usually develop in situations of restricted drainage where oxygen saturation is relatively low and mineral supply is restricted. Usually very slow internal drainage occurs through seepage down very low gradient slopes, although sheet surface flow may occur during spring melt or periods of heavy precipitation or if a major local or regional aquifer discharges into the wetland. Some fen wetlands develop directly on limestone rock where minerotrophic waters are emerging through constant groundwater discharge.

Flood Pulse: The peak flow during a flooding event.

Floodplain: A plain bordering a river, which has been formed from deposits of sediment carried down the river. When a river rises and overflows its banks, the water spreads over the floodplain.

Flow Regime: The pattern of how water levels change in a stream.

Flow Stability: Determined by measuring the ratio of surface discharge to groundwater discharge on an annual basis.

Fluvial: Relating to a stream or river.

Function: An ecological role for human benefit.

Future Municipal Water Supply Areas: An area corresponding to a wellhead protection area or a surface water intake protection zone, or an aquifer or groundwater area identified for future municipal water supply infrastructure (either a well or a surface water intake pipe).

Geology: The science of the composition, structure and history of the Earth. It thus includes the study of the material of which the Earth is made, the forces which act upon these materials and the resulting structures.

Geomorphology: The scientific study of the origin of land, riverine and ocean features on the Earth surface.

Glaciation: The covering of an area or the action on that area, by an ice sheet or by glaciers.

Goals: High level achievements to aim for with respect to source protection (e.g., to protect drinking water sources). Provides an opportunity to add value statements. Not measurable through numeric means.



Gradient: The rate or regular graded ascent or descent.

Granular: Having a texture composed of small particles.

Great Lakes: The five (large) lakes located in Canada and United States: Lake Ontario, Lake Superior, Lake Huron, Lake Erie, and Lake Michigan.

Great Lakes Connecting Channels: The large rivers that connect the Great Lakes (e.g., St. Clair River, St. Lawrence River).

Groundwater: Subsurface water that occurs beneath the water table in soils and geological formations that are fully saturated.

Groundwater Discharge: The function of a wetland to accept subsurface water and hold it for release over long periods of time.

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 specified threshold.

Groundwater Table: The meeting point between the groundwater and the unsaturated layer above it.

Groundwater Under the Direct Influence of surface water (GUDI): A well that is or may be connected to the surfacewater flow system by virtue of its depth and/or the hydrogeological conditions between ground surface and the well screen.

Habitat: The environment of an organism; the place where it is usually found.

Hazard: A contaminant and/or pathogen threat.

Hazard Rating: The numeric value which represents the relative potential for a contaminant of concern to impact drinking water sources at concentrations significant enough to cause human illness.

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) its intrinsic susceptibility, as a function of the thickness and permeability of overlaying layers, or (b) by preferential pathways to the aquifer.

Horizontal Sub Surface Flow (HSSF): type of engineered wetland (see) used for wastewater treatment where the flow is primarily horizontal.

Hydraulic Gradient: A measure of the change in groundwater head over a given distance. Maximum flow will normally be in the direction of the maximum fall in head per unit of vertical distance.

Hydric Soil: A soil that is saturated, flooded, or ponded long enough during the growing season to develop anaerobic conditions that favour the growth and regeneration of hydrophytic vegetation.

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

Hydrologic Cycle: The continuous movement of water on, above, and below the surface of the earth.

Hydrologic Function: The functions of the hydrological cycle that include the occurrence, circulation, distribution, and chemical and physical properties of water on the surface of the land, in the soil and underlying rocks, and in the atmosphere, and water's interaction with the environment including its relation to living things.

Hydrology: The study of the Earth's water, particularly of water on and under the ground before it reaches the ocean or before it evaporates into the air.

Hydro-period: The seasonal pattern of the water level of a wetland that is a hydrologic signature of each wetland type. It defines the rise and fall of a wetland surface and subsurface water.

Hydrophytic Plants: Vegetation adapted to growing in water or in hydric soils.

Hyperaccumulation: Most plants do not allow significant amounts of metals (e.g., Ni, Cu, Zn, As) and certain other contaminants (NaCl, other salts, PCBs) to move from the contaminated soil in their root zones to aboveground tissues. However, some plants do, and these are called hyperaccumulators.

Imminent Threat to Health: A contaminant of concern that can affect human health in a short period of time.

Index of Biotic Integrity (IBI): Indicator of overall stream health.

Infiltration: The movement of water into soil pores from the ground surface.

Inland Lake: An inland body of standing water, usually fresh water, larger than a pool or pond or a body of water filling a depression in the earth surface.

Inland Rivers: A creek, stream, brook and any similar watercourse inland from the Great Lakes that is not a connecting channel between two Great Lakes.

Integrated Pest Management (IPM): A variety of techniques (i.e., mowing, watering) that maintain a healthy lawn and crops while minimizing the need for chemical treatment. These can be applied to small-scale use of pesticides as well as large-scale operations.

Intermittent: Stopping and beginning again, pausing at intervals. An intermittent stream is a watercourse that does not flow permanently year-round.

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

Invertebrates: Animals lacking a spinal column.

Impact: Often considered the consequence or effect, the impact should be measurable and based on an agreed set of indicators. In the case of drinking water source protection, the parameters may be an acceptable list of standards which identify a maximum raw water levels of contaminants and pathogens of concern. In the case of water quantity, the levels may relate to a minimum annual flow, piezometric head or lake level.

Knowledge Gaps: Lack of referenced materials or expertise to assess certain characteristics of the specific watershed that can be adequately described without tabular or spatial data.

Landform: Defines the physical shape of the landscape and the materials based on how the geologic material was deposited by glaciers.



Land Use: A particular use of space at or near the earth surface with associated activities, substances and events related to the particular land use designation.

Leachate: A solution resulting from leaching, as of soluble constituents from soil, landfill, etc., by downward percolating groundwater.

Liaising: Business act to refine logistics around gathering data and information

Local Discharge: Discharge to a watercourse that originates nearby. The water moves through the upper layers of the groundwater system.

Low Energy Precision Application (LEPA): Type of drip irrigation systems used to reduce overall irrigation water requirements.

Low flow: The flows that exist in a stream channel in dry conditions.

Macroinvertebrates: Animals lacking a spinal column that are visible with the unaided eye.

Marsh: Wetlands frequently or continually inundated with water, characterized by emergent soft-stemmed vegetation adapted to saturated soil conditions (e.g., cattails).

Meandering: A curve in the course of a river which continually swings from side to side.

Meltwater Channel: The path of drainage and leftover sedimentary deposits usually from the ice margin of an alpine or continental glacier.

Mesophilic: A type of biodigester that operates in temperatures between 20°C and about 40°, typically about 37°C.

Model: An assembly of concepts in the form of mathematical equations or statistical terms that portrays a behaviour of an object, process or natural phenomenon.

Model Calibration: The process for generating information over the life cycle of the project that helps to determine whether a model and its analytical results are of a quality sufficient to serve as the basis of a decision.

Model Evaluation: A comparison of model results with numerical data independently derived from experiments or observations of the environment.

Model Validation: A test of a model with known input and output information that is used to adjust or estimate factors for which data are not available.

Model Verification: The examination (normally performed by the model developers) of the numerical technique in the computer code to ascertain that it truly represents the conceptual model and that there are no inherent numerical problems with obtaining a solution.

Monitoring: Periodic evaluation of a site to determine success in achieving goals.

Moraine: The debris or rock fragments brought down with the movement of a glacier.

Municipal Residential System: All municipal drinking-water systems that serve or are planned to serve a major residential development (i.e., six or more private residences).

Naturalize: To make a part of the physical environment natural, free from conventional characteristics.

Natural Heritage: The legacy of natural objects and attributes encompassing the countryside and natural environment, including plants and animals.



Naturally Occurring Processes: Processes that occur in nature and that are the result of human activity. For example, erosion along a stream that provides a source of drinking water or the leaching of naturally occurring metals found in bedrock into groundwater.

N-Index: This refers to the nitrogen index, which is a tool used to identify combinations of practices and soil conditions that create significant risk of nitrate movement to groundwater, and to suggest appropriate management to minimize this risk.

Non-Aqueous Phase Liquid (NAPL): a group of chemicals that is insoluble in water, including light and dense NAPLs.

Nonconsumptive Water Use: Water use that does not diminish the source or impair future water use.

Non-Point Source: A source of pollutants from a wide geographic area, such as manure runoff, stream bank erosion, and storm water runoff, which threatens the quality of surface and groundwater sources of drinking water.

Non-Renewable Resources: A resource that is not capable of being replaced by natural ecological cycles or sound management practices within the timeframe of a human life.

Nutrient: Something that nourishes and promotes growth. It is possible to have too many nutrients in an ecosystem, which can result in an unhealthy imbalance or overgrowth of certain species.

ODWS: Ontario Drinking Water Standards. The primary purpose of the Ontario Drinking Water Standards, Objectives and Guidelines is to provide information for the protection of public health through the provision of safe drinking water.

Ontario Ministry of Agriculture, Food, and Rural Affairs (OMAFRA): This provincial ministry is committed to achieving a vision of "thriving rural Ontario, agriculture and food sectors". The ministry's vision supports the Ontario government's agenda of strengthening our economy, fostering rural development, ensuring a reliable energy supply, protecting our shared environment, fostering better health and serving the public interest. The ministry's mission is to be "a catalyst for transforming our agriculture and food sectors and rural communities for a healthy Ontario".

Ontario Ministry of the Environment (Ministry of the Environment, MOE): The provincial ministry that is spearheading Drinking Water Source Protection in Ontario. The *Clean Water Act* was passed in 2006 and proclaimed into full effect in July of 2007, and ensures that communities are able to identify potential risks to their supply of drinking water, and take action to reduce or eliminate these risks. Under the Act, municipalities, Conservation Authorities acting as Source Protection Authorities (SPAUs), landowners, farmers, industry, community groups, First Nations, health, Province of Ontario ministries and the public are working together to meet common goals. For more information on the Ontario Ministry of the Environment (MOE) and the *Clean Water Act*, visit www.ene.gov.on.ca.

Organic Matter: Of, relating to, or derived from living organisms.

Organic Soil Conditioner (OSC): Organic soil conditioners are sometimes called soil amendments. They are materials added to soil that improves the overall health of the plants grown there by improving the structure of the soil.

Overburden: Unconsolidated geologic material above the bedrock.



Parcel Level: A parcel is a conveyable property, in accordance with the provisions of the Land Titles Act. The parcel is the smallest geographic scale at which risk assessment and risk management are conducted.

Pathogen: A disease-causing organism.

Percolation: The downward movement of water in the ground through porous soil and cracked or loosely-packed rock.

Permeability: The quality of having pores or openings that allow liquids to pass through.

Phosphorus: A non-toxic pollutant that is an essential nutrient. In excessive amounts it leads to eutrophication of a water system. Phosphorus accumulates along the entire length of a river from a variety of point and non-point sources.

Physiography: The study or description of landforms.

Phytoextraction: The process whereby some plants accumulate contaminants without adverse effects to the plants. These contaminants can be removed by plant harvesting, and the harvested material may be sent for landfill disposal or recycling.

Phytoremediation: The use of green plants to remove, contain, or otherwise render harmless environmental contaminants.

P-Index: The P Index considers many factors, such as the conditions of a field (phosphorus levels in the soil, soil erosion and soil runoff risk), the quantity of nutrients to be applied along with their methods of application, and the distance to the nearest surface water. The P-Index assigns a number - 0, 1, 2, 4, 8 or 16 - to each of the conditions which can affect phosphorus losses, where 0 is the lowest P loss potential and 16 is the highest P loss potential. This is completed according to the probability of P loss from the site. Furthermore, each site characteristic is assigned a weighting factor that indicates the seriousness of the P loss potential of that individual site characteristic. All of the weighted conditions are added together to obtain the P Index.

Planned Drinking Water Source: The drinking water source (i.e., aquifer or surface water body) from which planned municipal residential systems or other planned designated systems are projected to obtain their drinking water from in the future and for which specific wellhead protection areas and surface water intake protection zones have been identified.

Polychlorinated Biphenyls: Complex chlorinated hydrocarbons once used in a wide range of application including power transformers, capacitors, and ink. Now banned in Canada and many other countries because of their persistence in the environment and potential long term effects on human health.

Point Source: A source of pollutants from a municipal treatment plant or an industrial facility, often by way of a pipe.

Polyacrylamide (PAM): An environmentally friendly compound that immobilizes nutrients and microbes before they can escape from farmers' fields and make their way to ponds, lakes, streams, or rivers.

Poly Vinyl Alcohol (PVA): Beads coated with PVA are used to remove ammonia from animal wastes. PVA may also refer to poly vinyl acetate, a related compound.



Poorly Drained: Soils that are saturated at or near the surface during a sufficient part of the year such that field crops cannot be grown without drainage.

Permeable reactive subsurface barrier (PRB): An emplacement of reactive materials where a contaminant plume must move through it as it flows, typically under natural gradient, and treated water exits on the other side.

Precipitation: The deposits of water in either liquid or solid form which reach the Earth from the atmosphere. It includes rain, sleet, snow and hail.

Preferential Pathways: Any structure of land alteration or condition resulting from a naturally occurring process or human activity which would increase the probability of a contaminant reaching a drinking water source.

Pre Sidedress Nitrogen Test (PSNT): This test is used to determine if sidedress N fertilizer is needed on fields with a history of manure and/or sods. It attempts to 1) gauge the pool of potentially mineralizable organic N in the soil and 2) link that pool with a likelihood of a yield response from additional N fertilizer at sidedressing time.

Productivity: Rate of production, especially of food or solar energy by producer organisms.

Qualified Professional (QP): Remediation efforts must be conducted under the direct supervision of a Qualified Person (QP) under O.Reg 153/04 (as amended by O.Reg 511/09). The Qualified Person will oversee all aspects of the remediation efforts including design, implementation, contractor supervision, sampling and post remediation reporting and monitoring. It will be the responsibility of the qualified person to complete remedial efforts, sampling and analysis in accordance with applicable regulations and industry standard practices.

Raw Water: Water that is in a drinking-water system or in plumbing that has not been treated in accordance with, (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 outside a drinking-water system that is a source of water for the system.

Recharge Area: An area where water enters a saturated zone at the water table surface.

Redox (Reduction/Oxidation reactions): chemically convert hazardous contaminants to nonhazardous or less toxic compounds that are more stable, less mobile, and/or inert.

Regional Discharge: Water that has traveled deep beneath the ground through the saturated zone and resurfaces at the water table.

Regulated Areas: Those areas for which Conservation Authorities delineate and restrict land uses by making regulations under subsection 28(1) of the Conservation Authority Act. This subsection applies to watercourses, streams, lakes, valleys, flood plains, and wetlands in Ontario. Provincially approved standards and methodologies for delineating Regulated Areas are outlined in draft guidance documents prepared by Conservation Ontario in cooperation with the Ontario Ministry of the Natural Resources (MNR).

Renewable Resources: Resources that are capable of being replaced through ecological processes or sound management practices.

Reserve Amounts: Minimum flows in streams that are required for the maintenance of the ecology of the ecosystem.

Restoration: Changing existing function and structure of wetland habitat so that it is similar to historical conditions.

Return Period: The frequency in which a flow event in a stream is likely to repeat itself.

Receptor: The exposed target in danger of incurring a potential impact. An example would be any aquifer or surface water body used for drinking water consumption.

Response Factor: Typical factors affecting the response include dilution, rate of discharge, absorption, and degradation of the contaminant or pathogen in question. Because of the nature of the water resource, certain contaminants and pathogens may not have an impact (see definition), great enough to warrant concern or responsive action. The level of impact may not effectively degrade the water resource and therefore would not require a mitigative action.

Riffle/Pool System: A riverine system that alternates cycles of shallow broken water (riffle) and deeper still water (pool).

Riparian Areas: Vegetated areas close to or within a water body that directly or indirectly contribute to fish habitat by providing a variety of functions such as shade, cover, and food production areas.

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.

Riverine: Relating to or resembling a river.

Runoff: Water that moves over land rather than being absorbed into the ground. Runoff is greatest after heavy rains or snowmelts, and can pick up and transport contaminants from landfills, farms, sewers, industry and other sources.

Saturated Soil: Soil that is full of moisture.

Scale: A graduated series or scheme of rank or order.

Security of well or intake infrastructure: An evaluation of structures/measures that are in place or are needed to protect a municipal groundwater supply well or surface water intake from potential contamination from external sources.

Sediment: Material deposited by water, wind or glaciers.

Sedimentary Bedrock: Rock formed of mechanical, chemical or organic sediment such as rock formed from sediment transported from elsewhere, by chemical precipitation from solution or from inorganic remains of living organisms.

Semi-Quantitative: Describes an approach or methodology that uses measurable or ranked data, derived from both quantitative and qualitative assessments, to produce numerical values to articulate results.

Sensitivity Analysis: Sensitivity analysis evaluates the effect of changes in input values or assumptions on a model results.



Severity: The degree to which an impact is measured compared to an idealized value of some indicator of concern. In the case of water quality, the severity may relate to degree of measurable exceedance of some contaminant or pathogen. In the case of water quantity, deviation from some measurable indicator (e.g., minimum annual flow, piezometric head or lake level) must also be established.

Sidedress: To provide a boost of fertilizer on top of the soil, immediately beside a plant or a row of plants.

Significant Hydrologic Features: A variety of water related features, including:

- (a) Permanent or intermittent stream;
- (b) Wetlands;
- (c) Kettle lakes and their surface catchment areas;
- (d) Seepage areas and springs; and
- (e) Aquifers and recharge areas that have been identified as significant by the Ministry of Natural Resources, using evaluation procedures established by that Ministry, as amended from time to time.

Sinkhole: Any depression in the surface of the ground, with or without collapse of the surrounding soil or rock, which provides a means through which surface water can enter the ground and therefore come in contact with groundwater. Sinkholes often allow this contact to occur quite rapidly and do little to filter any contaminants the surface water may contain.

Site-level: The most refined scale at which technical assessment of hydrological and hydrogeological conditions can be conducted. These assessments may contribute to water budgets, vulnerability assessments, and issues evaluation.

Slope: Ground that forms a natural or artificial incline.

Source Protection (Drinking Water Source Protection): Protecting surface water sources such as lakes, rivers and streams, and groundwater sources from contamination or overuse, particularly through the planning process under the *Clean Water Act, 2006*. It is the first step in the multi-barrier approach to protecting drinking water. Other barriers include water testing and monitoring, reliable water treatment and distribution systems and training of water managers and staff. At this time, the emphasis of the project is to identify and address existing or potential threats to municipal water supplies by concentrating on zones immediately surrounding municipal wellheads and surface water intake zones in Lake Huron. See the About Source Protection tab for more details.

Source Protection Planning: The creation of local, watershed-based plans for the protection of the quality and quantity of drinking water sources, now and in the future. Plans will be created by local stakeholders on Source Protection Committees (SPCs); this process will be facilitated by conservation authorities, who will ensure that SPCs have the technical knowledge to ensure that plans are science-based. See the About Source Water Protection and Our Project tabs for more details.

Spawn: To produce or prevent eggs in the reproductive process (particularly in aquatic animals).

Spillway: The valley that results when glacial meltwater cuts into the landscape. Spillways are often composed of sand and gravel.



STP: Sewage Treatment Plant.

Stratigraphy: Geology that deals with the origin, composition, distribution and succession of layers of the Earth.

Stream: A body of running water flowing on the surface of the Earth.

Substrate: The base on which an organism lives.

Subwatershed: An area that is drained by an individual tributary into the main watercourse of a watershed.

Successional Areas: Ecosystems undergoing the gradual process of change that results from one community gradually replacing another.

Surface Water: Water occurring in lakes, rivers, and streams that may be used as a source of drinking water. As water moves in a cycle (hydrologic cycle), groundwater and surface water interact; this may cause contaminants to move between groundwater and surface water systems.

Surface to Aquifer Advection Time (SAAT): The average time required by a water particle to travel from a point at the surface to the aquifer of concern. The SAAT is approximated by using the vertical component of the advective velocity integrated over the vertical distance and the average porosity.

Surface to Well Advection Time (SWAT): The average time required by a water particle to travel from a point at the ground surface to the well, including both vertical and horizontal movement.

Surface Water Intake Protection Zone (IPZ): The contiguous area of land and water immediately surrounding a surface water intake, which includes:

- 1) The distance from the intake;
- 2) The 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; and
- 3) The remaining watershed area upstream of the minimum travel time area (also referred to as the Total Water Contributing Area) is applicable to inland water courses and inland lakes only.

Surficial Geology: The study and description of the forms on the outer layer of the Earth.

Semi-Volatile Organic Compounds (SVOCs): These chemicals (e.g., poly-nuclear aromatic hydrocarbons such as naphthalene - used in mothballs) are less volatile than VOCs, and typically are only effectively volatile when heated. Most are toxic to plants and animals.

Swamp: Any wetland dominated by woody plants such as trees and shrubs. This is generally considered as 25% or more cover of trees or tall shrubs. Standing to gently flowing waters occur seasonally or persist for long periods on the surface. Many swamps are characteristically flooded in spring, with dry relict pools apparent later in the season.



Targets: In the context of technical guidance documents, these are detailed goals that are often expressed as numeric goals (e.g., to reduce contaminant “X” in this aquifer by 10 per cent by 2009).

Ten-year storm wind conditions: The maximum sustained wind speed coming from a single direction likely to occur once every ten years.

Terrestrial: Living on or growing on land.

Thermal Regime: The characteristic behaviour and pattern of temperature.

Thermophilic: A rapid biodigestion process where the ideal conditions for the rapid growth and colonization of bacteria are created and maintained. This facilitates the expedient destruction and breakdown of organic materials, giving off heat as part of the biological reaction.

Till: A tough, poorly stratified to unstratified, poorly sorted (wide range of grain sizes) sediment originating from finely ground rock particles that were deposited by glacial activity.

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.

Tolerance of a Water Supply System: A measure of the ability to sustain required pumping levels even during exposure events.

Toxicity Characteristic Leaching Procedure (TCLP): A laboratory procedure that is designed to determine the mobility of both organic and inorganic analytes present in liquid, solid, and multiphasic wastes.

Topography: A detailed description or representation of the features, both natural and artificial, or an area. Also the physical and natural features of an area, and their structural relationships.

Transport Pathway: A man-made or natural feature on the landscape that may promote quicker travel of contaminants to the water bearing rock material, than would otherwise occur in the surrounding landscape. Where Transport Pathways occur the vulnerability score maybe increased.

Uncertainty Analysis: Uncertainty analysis investigates the effects of lack of knowledge and other potential sources of error in the model

Uncertainty Score: Uncertainty addresses known gaps in data/information about, or deficiencies in methods of assessment for, threats and/or vulnerability. It reflects the degree of confidence in the semi-quantitative data used to calculate risk.

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

Unsaturated Zone Advection Time (UZAT): Estimated time for water to flow vertically from ground surface through to the water table.

Underground Storage Tank (UST): Vessel located beneath the ground surface, but not within a building, that is used to store fuel or chemicals.

Valley: A long, narrow depression on the earth surface, usually with a fairly regular downward slope. A river or stream usually flows through it, or in the case of a buried bedrock valley, historically flowed through it.



Valuation of the Supply: An evaluation of the importance of a particular municipal well or intake to the whole municipal drinking water supply. For example, where there are multiple supplies, value may be smaller, versus a single supply where value may be greater.

VFS: Vegetative Filter Strips (VFS): Areas next to cropland that are seeded to close-growing plants. They are designed to remove sediment, organic material, nutrients, and chemicals carried in runoff or waste water.

Vernal Pools: Temporary pools of water that are usually devoid of fish, and thus allow the safe development of natal amphibian and insect species.

Vertical Sub Surface Flow (VSSF): Type of engineered wetland (see) used for wastewater treatment where the flow is vertically downward.

Volatile Organic Compounds (VOCs): These comprise a wide range of chemicals that have a high vapor pressure at average room temperatures and pressures. Examples include automotive fuel and petroleum-based solvents (including many chlorinated solvents). Many VOCs are dangerous to human health or cause harm to the environment. VOCs are numerous, varied, and ubiquitous. VOCs are typically not acutely toxic, but instead have compounding long-term health effects.

Waste Water Treatment Plant (WWTP): A facility that treats to sanitary sewage

Water Treatment Plant (WTP): A facility that provides treated municipal drinking water.

Water Well Information System (WWIS): A database of water wells from across Ontario that includes a summary of the characteristics of the well and soil for each well.

Water Balance: Use of a water budget to mitigate changes to the hydrological cycle following urbanization, typically by increasing infiltration and evaporation and decreasing runoff.

Water Budget: The movement of water within the hydrologic cycle can be described through a water budget or water balance. It is a tool that when used properly allows the user to determine the source and quantity of water flowing through a system. From a groundwater perspective the key components of a water budget are: infiltration, contribution to baseflow, deeper groundwater flow outside the study area and groundwater taking.

Water Control Structure: An engineered structure designed to hold back water and mimic a natural water regime that promotes wetland restoration, without affecting adjacent agricultural practices.

Watercourse: An identifiable depression in the ground in which a flow of water regularly or continuously occurs (*Conservation Authorities Act, Section 28(1), Regulations by the Minister of Natural Resources, May 2006*).

Water Cycle: The continuous movement of water from the oceans to the atmosphere (by evaporation), from the atmosphere to the land by condensation and precipitation, and from the land back to the sea (via stream flow).

Watershed: An area where many sources of surface water drain into the same place.

Water Quality Indicator: An entity that provides information on the condition and quality of water through its life cycle patterns. Water quality can also be determined through non-living sources, like chemical sampling.

Water Table: The surface below which the soil is saturated with water.

Water Wells: A hole in the Earth surface used to obtain water from an aquifer. For a bored well, an earth auger is used to bore a hole carry earth to the surface. The casing is usually steel, concrete or plastic pipe. Modern dug wells are dug by power equipment and typically are lined with concrete tile. Dug and bored wells have a large diameter and expose a large area to the aquifer. These wells are able to obtain water from less-permeable materials such as very fine sand, silt, or clay. Drilled wells are constructed by either percussion or rotary-drilling machines. Drilled wells that penetrate unconsolidated material require installation of casing and a screen to prevent inflow of sediment and collapse. A flowing, or Artesian, well is completed in a confined aquifer that has a water level higher than the ground surface at the location of the well. This causes water to flow out of the well.

Weathering: The disintegration of the Earth crust by exposure to the atmosphere, most importantly, rain.

Well Capture Zone: The area in the aquifer that will contribute water to a well in a certain time period. Often measured in days and years. Area at the ground surface is also included if the time period chosen is longer then the travel time for water in the aquifer and the groundwater recharge area is incorporated.

Wellhead Protection Area (WHPA): The surface and underground area surrounding a water well or well field that supplies a municipal residential system or other designated system through which contaminants are reasonably likely to move so as to eventually reach the water well or wells.

Wetland: Land that is seasonally or permanently covered by shallow water, as well as land where the water table is close to or at the surface. In either case, the presence of abundant water has caused the formation of hydric soils and has favoured the dominance of either hydrophytic plants or water tolerant plants. The four major types of wetlands are swamps, marshes, bogs, and fens. Periodically soaked or wet lands being used for agricultural purposes, which no longer exhibit wetland characteristics, are not considered to be wetlands for the purposes of this definition (*Provincial Policy Statement, 2005*).

Wetland Values: Wetland processes or attributes which are beneficial to society.

Woodland: A treed area that provides environmental and economic benefits to both the private landowner and the public, such as erosion prevention, hydrological and nutrient cycling, clean air and long-term storage of carbon, wildlife habitat, outdoor recreational opportunities, and the sustainable harvest of a wide range of woodland products. Woodlands include treed areas, woodlots, or forested areas and vary in their level of significance at local, regional, and provincial levels (*Provincial Policy Statement, 2005*).