DRAFT TOWN OF CANANDAIGUA
NATURAL RESOURCES INVENTORY (NRI)

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DRAFT FOR INTERNAL REVIEW ONLY

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Introduction

The Town of Canandaigua's Natural Resources Inventory (NRI) is a series of maps and supporting records that document the likely presence, extent, and condition of natural resources throughout the town. It is not itself a regulatory tool, although the resources it documents are referenced in several sections throughout the town code. Although they may be shown separately, each map should be considered one of many overlapping layers of information. Several biological and physical mechanisms connect these layers into one comprehensive ecological system. To that end, the maps are supplemented with a series of suggested lines of inquiry regarding each resource, to assist in the interpretation of their local ecological values.

The NRI is intended to provide assistance to Town of Canandaigua board members and staff during the process of reviewing development proposals. It should be used in conjunction with development review guidelines as described in the town code, NRI maps, and information as provided by the applicant. The NRI should be used and understood as a dynamic resource; any analysis of the local ecosystem must account for fluctuations in the quality and quantity of environmental resources, both natural and otherwise. Periodic revisions of the NRI are expected and encouraged.

The NRI maps illustrate spatial information regarding the following environmental features that are subject to regulation elsewhere in town code and considered to be a high priority for protection:

- Wetlands
- Floodplains
- Surface water
- Steep slopes
- Forested Areas

In addition other features not illustrated on maps herein should also be considered

- Open space
- Trail systems
- Other Land cover

When reviewing development proposals, applicants should reference the NRI to examine the likely impact of the proposal on the community's natural resources. Analyses of such impacts (or lack thereof) should be provided to board members and staff, who should review them for accuracy and consistency with the NRI, as well as the community's resource protection priorities as stated within the Comprehensive Plan and other town documents.

The NRI establishes a three-step process for identifying natural resources within the town and analyzing the potential impact a given development proposal may have on such resources.

1) First, applicants, board members, and staff should examine spatial relationships between developments and the natural resources identified within NRI maps. Field verification will be needed to establish the presence and more exact boundaries of the resources that may or may not be shown on the NRI maps.
2) The second step is for all parties to understand the regulatory context within which many of these natural resources exist. What existing regulations, laws, and agencies are involved in the protection of these resources?
3) Third, board members and staff should consider the series of questions posed within the subsequent narrative, which can also serve as the basis for further inquiry including field verification. Each question examines environmental features of, and potential ecological connections between, the natural resources identified within NRI maps. The basis for each

question is provided, using clear, non-technical explanations. Ecological terminology (underlined throughout the document) is defined within a glossary, and additional references are cited for further inquiry if necessary. References beyond those provided in this document may be obtained and reviewed by any and all parties using the NRI.

The NRI has been developed to provide an objective view of the impact of development on the community's natural resources. Use of the NRI and its supporting documentation will assist applicants, board members, and staff to understand and protect the many environmental qualities that make the Town of Canandaigua an attractive, safe, and healthy community.

Regulatory context

Federal Regulation - The Clean Water Act was established to regulate impacts to waters of the United States and regulate water quality standards. Any proposed action that would alter or disturb jurisdictional streams or wetlands, such as dredging or filling, are regulated under Section 404 of the Clean Water Act. The U. S. Army Corps of Engineers (Corps) must review and issue a permit for any such proposed action that may impact streams, wetlands or other waters of the United States. As defined by the Corps, waters of the United States include all lakes, ponds, streams (intermittent and perennial), and wetlands. Section 404 of the Clean Water Act, defines jurisdictional wetlands as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions" (EPA, 2001).

New York State Regulation

Wetlands: The Freshwater Wetlands Act (Article 24 and Title 23 of Article 71 of the Environmental Conservation Law) gives the New York State Department of Environmental Conservation (NYSDEC) jurisdiction over state-protected wetlands and adjacent areas (100-foot upland buffer). The Freshwater Wetlands Act requires the NYSDEC to map all state-protected wetlands to allow landowners and other interested parties a means of determining where state jurisdictional wetlands exist. To implement the policy established by this Act, regulations were promulgated by the state under 6 NYCRR Parts 663 and 664. In general, wetlands regulated by the state are those 12.4 acres in size or larger. Smaller wetlands can also be regulated if they are considered of unusual local importance. A 100-foot adjacent area around the delineated boundary of any state-regulated wetland is also under NYSDEC jurisdiction. An Article 24 permit is required from the NYSDEC for any disturbance to a state-protected wetland or an adjacent area, including removing vegetation.

Streams: Under Article 15 of the Environmental Conservation Law (Protection of Waters), the NYSDEC has regulatory jurisdiction over any activity that disturbs the bed or banks of protected streams. In addition, small lakes and ponds with a surface area of 10 acres or less, located within the course of a protected stream, are considered to be part of a stream and are subject to regulation under the stream protection category of Article 15. Protected stream means any stream, or particular portion of a stream, that has been assigned by the NYSDEC any of the following classifications or standards: AA, A, B, or C(t) or C(ts) (6 NYCRR Part 701). A classification of AA or A indicates that the best use of the stream is as a source of water supply for drinking, culinary or food processing purposes; primary and secondary contact recreation; and fishing. The best usages of Class B waters are primary and secondary contact recreation and fishing. The best usage of Class C waters is fishing. Streams designated (t) indicate that they support trout, while those designated (ts) support trout spawning. State water quality classifications of unprotected watercourses include Class C and Class D streams. Waters with a classification of D are suitable for fishing and non-contact recreation. An Article 15 permit is required from the NYSDEC for any disturbance to a stream classified C(t) or better.

Soil Disturbance: Pursuant to Section 402 of the Clean Water Act, stormwater discharges from certain construction activities are unlawful unless they are authorized by a National Pollution Discharge Elimination System (NPDES) permit or by a state permit program. New York's State Pollution Discharge Elimination System (SPDES) is a NPDES-approved program with permits issued in accordance with the Environmental Conservation Law. The NYSDEC issued SPDES General Permit for Stormwater Discharges (GP-0-10-001), which became effective on January 29, 2010 and expires on January 28, 2015. Construction activities disturbing one or more acres of soil must be authorized under this General Permit for Stormwater Discharges, and permittees are required to develop a Stormwater Pollution Prevention Plan (SWPPP) to prevent discharges of construction-related pollutants to surface waters. To obtain coverage under the General Permit a Notice of Intent (NOI) must be submitted to the NYSDEC, and a SWPPP must be prepared prior to submitting the NOI.

Summary of important considerations:

Wetlands:

1. Has the applicant accounted for all known and potential wetlands within and adjacent to the proposed development area? Have wetlands been field-verified?
2. If there are wetlands present within or adjacent to the lot proposed for development, how are those wetlands connected to the surrounding hydrologic regime?
3. How close is the proposed development to known or potential wetlands? Can this distance be mitigated in any way?
4. Are there any areas within or adjacent to the lot proposed for development that may represent valuable opportunities for wetland restoration?

Floodplains:

1. Does the proposed development occur within or will it increase runoff to a 100-year floodplain, as determined by FEMA?
2. Does the affected area of the floodplain host unique or rare plant species or otherwise provide important wildlife habitat?
3. If the proposed development occurs, what are the likely impacts to water quality in the event of flooding?
4. Can development be moved out of the floodplain or can it be reconfigured to minimize negative impacts?

Surface water:

1. Which watershed does the proposal fall into?
2. How much impervious surface is proposed, and can it be reduced or mitigated in any way?
3. What type of stream (or streams) is present within, and adjacent to, the project parcel?
4. What other natural resources are present within, adjacent to, or near the affected stream?
5. What are the dominant landscape characteristics within the stream's catchment area? And how will this landscape change as a result of the proposal?

Steep slopes:

1. Does the topography of the lot proposed for development feature any steep gradients (at or above 15% slope)?

2. What is the shape of the slopes within the proposed development?

Other resources:

WETLANDS

Background:

The ecological value and function of wetlands has only been widely recognized in recent decades. Much development has occurred at the expense of wetlands, which were frequently drained, cleared, and filled to the extent that 50-85% of the original wetlands in New York State were lost between 1780 and the mid-1980s (Dahl & Allord, 1996). In the past 30 years, increased scientific and public awareness of the benefits of wetlands has led to their regulation at both federal and state levels (National Research Council, 1995).

Despite the increased attention and regulation, the full ecological value of wetlands remains an elusive concept for much of the public. This may be partially a function of the many different types of wetlands, or that the appearance and qualities of wetlands exhibit substantial variation from one to another. However, all wetlands share a series of specific characteristics that can be compared in discerning the structure and function of each. Structural characteristics include water qualities, substrate, and biota; functional characteristics include nutrient cycling, water balance, and organic production (National Research Council, 1995). A full accounting of these characteristics can assist in understanding the role of wetlands within the regional ecosystem, including those with regard to surface water detention, streamflow maintenance, nutrient transformation, particulate separation, shoreline stabilization, habitat provision, and the enhancement of biodiversity (among others) (Tiner, 2003b; Hemond & Benoit, 1988).

Although regulatory standards for wetland delineation exist, there is often still a reluctance to recognize certain lands as wetlands, or at least valuable wetlands, especially if they are only seasonally saturated (or saturated in response to a storm event), disconnected from running waterbodies, or otherwise on the "dry end" of the wetland spectrum. However, these characteristics may in fact indicate an elevated importance of a given wetland, depending on their interaction with other characteristics (Whigham, 1999; Leibowitz, 2003). The ecological value of any wetland, regardless of "dryness" or any other single characteristic, should be assessed based on the full range of structure and functions present at that particular location, according to established criteria for such assessment (Tiner, 2003a; Tiner, 2003b).

Important considerations:

1. Has the applicant accounted for all known and potential wetlands within and adjacent to the proposed development area? Have wetlands been field-verified?

   Why this is important: Although the federal National Wetlands Inventory (NWI) and the NYSDEC's Wetlands Program are relatively comprehensive, there remains the possibility that these references may not include every existing wetland within a given lot (see NYSDEC Regulations, Chapter X, §664.7[2][a]). In addition, much like streams, wetlands are not always in fact "wet" (Leibowitz, 2003). It may not be readily apparent that wetlands exist within or nearby the boundaries of the proposed development. Therefore, field verification using known wetland indicators is particularly valuable in determining the presence or absence of these natural resources. As hydrologic regimes alone do not necessarily signify the existence of wetlands, the presence of one or more hydrophytic vegetative species or hydric soils may be used as primary indicators for this purpose (Tiner, 1993).

   The following hydrophytic vegetation types are known to exist within the Town of Canandaigua:

   - [TBD]

The following hydric soil types are known to exist within the Town of Canandaigua:

- [TBD]

For further information:

- NYSDEC. (2011d). *Wetlands*. Retrieved October 2011, from New York State Department of Conservation: Lands and Waters: http://www.dec.ny.gov/lands/305.html.
- USFWS. (2011). *Wetlands Mapper*. Retrieved October 2011, from U.S. Fish & Wildlife Service National Wetlands Inventory: http://www.fws.gov/wetlands/Data/Mapper.html.
- U.S. Army Corps of Engineers. (2009). *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region.* Vicksburg, MS: U.S. Army Engineer Research and Development Center.
- Smith, G. S. (1991). *NWI Maps Made Easy: A User's Guide to National Wetlands Inventory Maps of the Northeast Region.* Hadley, MA: U.S. Fish & Wildlife Service.

2. If there are wetlands present within or adjacent to the lot proposed for development, how are those wetlands connected to the surrounding hydrologic regime?

Why this is important: As discussed above, wetlands play an important role in regulating the quantity and quality of surface waters. Their spatial and temporal connections to surface water flows (hydrologic connectivity) can be difficult to ascertain due to weather conditions and seasonal changes, which is why the practice of wetland delineation relies on more than the simple observation of wet soils (U.S. Army Corps of Engineers, 2009). Standardized indicators of the hydrologic connectivity of wetlands such as those described by the U.S. Army Corps of Engineers (2009) provide valuable and objective guidelines for determining wetland connectivity. It is critically important that these connections are understood in order to minimize damage to the wetland and surrounding ecosystem, as well as to protect property (Nadeau & Rains, 2007).

Although these connections can be determined for most wetlands, so-called "isolated" wetlands are known to occur in New York State, and (depending on their size and specific characteristics) may go unregulated by federal and state wetland programs (NYSDEC, 2011d). However, lack of regulation does not indicate that a given isolated wetland is not ecologically valuable; on the contrary, these wetlands can still improve local water quality, attenuate flooding, and serve as economically and ecologically important wildlife habitat (Leibowitz, 2003; Comer, et al., 2005; Whigham & Jordan, 2003; Whigham, 1999).

For further information:

- MNDNR. (2011). *Watershed Assessment Tool: Connectivity Concepts*. Retrieved October 2011, from Minnesota Department of Natural Resources, Natural Resources Planning: http://www.dnr.state.mn.us/watershed_tool/connect_concepts.html.
- Nadeau, T., & Rains, M. C. (2007). Hydrological Connectivity Between Headwater Streams and Downstream Rivers: How Science Can Inform Policy. *Journal of the American Water Resources Association*, 118-133.
- New York Natural Heritage Program. (2005). *Vernal Pools*. Retrieved October 2011, from NYNHP Community Guides: http://www.acris.nynhp.org/guide.php?id=9902.
- Cappiella, K., Kitchell, A., & Schueler, T. (2006). *Using Local Watershed Plans to Protect Wetlands.* Ellicott City (MD): Center for Watershed Protection and the U.S. Environmental Protection Agency.

3. How close is the proposed development to known or potential wetlands? Can this distance be mitigated in any way?

   Why this is important: NYSDEC standards regulate a number of activities within 100 feet of state-regulated wetlands of 12.4 acres or greater (NYSDEC, 2011d). In some cases, this 100-foot buffer may be wider. However, while this one-size-fits-all approach may mitigate some types of ecological damage to the adjacent wetland, it may not be wide enough to mitigate others. For example, a 100-foot buffer from the edge of a wetland may prevent 90% of surface runoff sediment from entering the wetland. However, a 300-foot buffer may only remove 80% of surface water nutrient load (e.g. excess nitrogen and phosphorous). In addition, buffers with steeper gradients require greater width to provide the same level of mitigation as those with more moderate gradients (Castelle, et al., 1992). Resources such as the *Planner's Guide to Wetland Buffers* (see below) can assist in determining appropriate buffer widths beyond, or in the absence of, the state requirements.

   For further information:

   - McElfish, Jr., J. M., Kihslinger, R. L., & Nichols, S. S. (2008). *Planner's Guide to Wetland Buffers for Local Governments.* Washington, D.C.: Environmental Law Institute.
   - Southeastern Wisconsin Regional Planning Commission. (2010). *Managing the Water's Edge-Making Natural Connections.* Milwaukee. Available at: http://www.sewrpc.org/SEWRPCFiles/Environment/RecentPublications/ManagingtheWatersEdge-brochure.pdf.
   - Nichols, S. S., & McElfish, J. M. (2008). *Wetland Avoidance and Minimization in Action: Perspectives from Experience.* Washington, D.C.: Environmental Law Institute.

4. Are there any areas within the lot proposed for development that may represent valuable opportunities for wetland restoration?

   Why this is important: Federal policy mandates a "no net loss" approach to wetland mitigation. In light of this policy, opportunities may arise for interested parties to restore wetland functions to compensate for impacts elsewhere (Wilkinson & Thompson, 2006; Salzman & Ruhl, 2006). Wetlands can be restored (and, in some cases, created) to provide habitat, attenuate local flooding, or treat wastewater from a variety of sources including municipal and industrial facilities, agricultural operations, and storm sewers (USEPA, 2000).

   Several landscape and ecological characteristics of the lot and surrounding areas must be considered in assessing the opportunities for wetland restoration or creation. To begin with, interested parties must understand the history of the site and local hydrologic regime, the factors that contributed to wetland degradation, and the desired ecological functions to be pursued (Whigham, 1999). In addition, successful restoration plans must account for any conditions that influence the functionality of restored or created wetlands. These include, but are not limited to:

   - Lack of sufficient water supply;
   - Presence of pollutants above and beyond those that the restored wetland will be designed to treat;
   - Adequate sun exposure for plantings;
   - Selection of appropriate native species, and methods for controlling invasive species; and
   - Compatibility of nearby land uses and human access (Interagency Workgroup on Wetland Restoration, 2003).

A series of common sources of wetland degradation have been identified by wetland scientists at the Interagency Workgroup on Wetland Restoration (2003). These sources, along with corresponding corrective actions and additional considerations, have been compiled into Table __ (below), and provide guidance regarding some of the restorative measures that can improve the functionality of degraded wetlands.

Table __, Common Wetland Problems and Corrective Methods

Wetland Damage		Reason for Damage	Suggested Correction	Considerations
	Water Quality Impairment	Excess sediment or nutrients in runoff from adjacent area	Work to change local land use practices; install vegetated buffers/ swales/constructed treatment wetlands; install sediment traps.	Sediment traps will need periodic cleaning; an expert may be needed to design buffers and swales.
	Water Quality Impairment	Excess sediments from eroding slopes	Stabilize slopes with vegetation/ biodegradable structures.	Many corrective methods exist; look for most sustainable and effective methods.
Hydrology	Altered Hydrology (drained)	Ditching or tile drains	Fill or plug ditches or drains; break tiles.	Organic soil may have decomposed so that the elevation of the site is lower than it used to be.
	Altered Hydrology (constrained)	Road crossing with undersized culvert	Replace with properly sized culvert or with a bridge.	Hydrologic expert needed to correct this.
	Altered Hydrology (drained)	Former wetland diked off from its water sources	Remove/breach dikes or install water control structures.	Substrate elevation may not be correct for vegetation; add soil or control water level with low maintenance structures.
	Raised Elevation	Soil dumping or fill	Remove material.	Fill may have compressed soil to lower than initial elevation; take steps to avoid erosion.
Soils	Subsidence	Soil removal; oxidation of organics; groundwater removal	Add fill; allow natural sedimentation.	Fill must support target wetland; test fill for toxic compounds.
	Toxic Soils	By-product of on-site or off-site industrial process; dumping; leaching and concentration of natural compounds.	Treatment systems or methods appro-priate to the soil / pollutants; remove material; cover with appropriate soil.	Work with experts to choose treatment methods that cause least amount of indirect damage; choose a different site to avoid serious toxin problems.
	Loss of Biodiversity	Change in original habitat	Restore native plant and animal community using natural processes.	Allow species to colonize naturally; import species as appropriate.
Biota	Loss of Native Plant Species	Invasive and/or non- native plants; change in hydrology; change in land use	Remove invasive, non-native plants (allow native plants to re-colonize); try to reverse changes in hydrology.	Pick lowest impact removal method; repeat removal as non-natives re- invade; alter conditions to discourage non-native species.

Source: Interagency Workgroup on Wetland Restoration (2003).

For further information:

- USEPA. (2007). *River Corridor and Wetland Restoration*. U.S. Environmental Protection Agency, Office of Wetlands, Oceans, and Watersheds: http://www.epa.gov/owow/restore/.
- USEPA. (2000). *Guiding Principles for Constructed Treatment Wetlands.* Washington, D.C.: U.S. Environmental Protection Agency Office of Wetlands, Oceans, and Watersheds.
- Cappiella, K., Fraley-McNeal, L., Novotney, M., & Schueler, T. (2008). *The Next Generation of Stormwater Wetlands.* Ellicott City (MD): Center for Watershed Protection and the U.S. Environmental Protection Agency.

FLOODPLAINS

Background:

Floodplains are the level lands adjacent to river systems. There is no single floodplain for any given waterway; the extent of any flood is dependent on many factors, including the intensity and duration of the storm event, saturation due to previous storms, and local or upstream soil characteristics. Floodplains are referenced according to the frequency of flood occurrence throughout a given area. The 100-year floodplain describes the geographic extent of inundation that is likely to occur once every 100 years; in other words, in any given year there is a 1% chance that a river system will reach its 100-year flood stage. By that same logic, in any given year there is a 20% chance that a river system will reach its 5-year flood stage. (Note: Though they employ similar terminology and often coincide, a 100-year storm does not always produce a 100-year flood).

The Federal Emergency Management Agency (FEMA) produces a series of maps describing flood frequency for the purposes of administering the National Flood Insurance Program (NFIP). The central focus of FEMA and the NFIP is mitigation of property damage (Thomas & Medlock, 2008). While the mission and objectives of the agency and its insurance program are important, they do not account for the ecological value or function of floodplains.

Important considerations:

1. Does the proposed development occur within or will it increase runoff to a 100-year floodplain, as determined by FEMA?

   Why this is important: Development within flood prone areas can create an increased risk for property damage as well as downstream flooding. Such development can result in negative impacts to water quality during floods as well as and the loss of unique plant life and wildlife habitats.

2. Does the affected area of the floodplain host unique or rare plant species or otherwise provide important wildlife habitat?

   Why this is important: If the development is within a 100-year floodplain, this indicates that the surrounding vegetation and soils have evolved to accommodate periodic flooding, and in many cases, thrive because of it. Vegetation within floodplains tends to be more diverse than that of uplands, providing a wider range of wildlife habitat. Floodplain vegetation serves to stabilize stream banks, and provides a degree of flood mitigation through root storage, evapotranspiration, and increased levels of soil porosity and percolation (Smardon & Felleman, 1996). Disturbance of floodplain vegetation may therefore reduce its ability to mitigate floodwaters, and contribute to a loss of biodiversity.

3. If the proposed development occurs, what are the likely impacts to water quality in the event of flooding?

   Why this is important. In addition to property damage and the hazard to human health, flooding of developed areas can transport a wide variety of pollutants into adjacent waterways creating lasting, long term negative impacts to natural systems.

4. Can development be moved out of the floodplain or can it be reconfigured to minimize negative impacts?

   Because of the unpredictability, intensity and destructive power of floods, the most effective means of mitigating the potential for negative environmental impacts is to simply place development well outside of known flood hazard areas. Limiting fill within flood areas will minimize potential for increased impacts downstream.

   For further information:

   - Smardon, R., & Felleman, J. (1996). *Protecting Floodplain Resources: A Guidebook for Communities.* Washington, D.C.: Federal Interagency Floodplain Management Task Force.

- Federal Emergency Management Agency. (2005). *Reducing Damage From Localized Flooding: A Guide for Communities.* Washington, D.C.: U.S. Department of Homeland Security, Federal Emergency Management Agency.

SURFACE WATER

Background:

The Town of Canandaigua is situated within the boundaries of three watersheds: Canandaigua Lake, Canandaigua Outlet, and Mud Creek. Watersheds are nested systems; these three drain to the Seneca River, then the Oswego River, Lake Ontario, the St. Lawrence River, and eventually the Atlantic Ocean. Most of the land within the town [__%] lies within the Canandaigua Lake watershed.

The health of the watershed is critically important to the safety and quality of the town's drinking water supplies. Canandaigua Lake is the sole source of public water supply within the town and much of the surrounding area, providing drinking water for 60,000 area residents. In addition, the lake attracts many visitors to the area, which contributes nearly $100 million in local tourism and recreation spending, and adds substantial value to the local tax base (Canandaigua lake Watershed Council, 2011).

Streams are a critical link in the health of the watershed and the entire local ecosystem. They have a number of beneficial uses including water supply, recreation, fish propagation, agricultural and industrial use, and waste assimilation (Randolph, 2004). American Rivers, a national research and advisory non-profit organization, further identifies the following benefits of small streams (Meyer, et al., 2007):

- Provision of flood control
- Sediment trapping
- Recycling of organic and inorganic carbons
- Maintenance of biological diversity

Headwaters, which include zero-, first-, and second-order streams, are often not well indicated on USGS topographic maps, and such streams can represent more than two-thirds of a given river network (Meyer, et al., 2007; Freeman, Pringle, & Jackson, 2007). Therefore, it is often important that the identification and classification of streams be field-verified so that the town has a clear understanding of the resources that could be affected by a given proposal. Several standardized and efficient resources for the assessment of streams are available for this purpose (NRCS, 2009; NCDWQ, 2010; Fritz, Johnson, & Walters, 2006).

Current health of the resource:

The health of Upper Naples Creek and its minor tributaries has not been assessed to date by the NYSDEC. The lower portion of Naples Creek and its minor tributaries are thought to have water quality problems, but the state has not yet documented their extent. Upper Mud Creek and its minor tributaries are listed as having minor impacts, but the lower portion has not yet been assessed. The health of the Canandaigua Lake has been identified by the NYSDEC as being potentially threatened. Threatened waterbodies and those with minor impacts are included in the state's "Priority Waterbodies List". These and other waterbodies on the list "are the focus of remedial/corrective and resource protection activities" on behalf of the state (NYSDEC, 2007).

Important considerations:

1. Which watershed does the proposal fall into?

Why this is important: The incremental impacts of any given proposal will first be experienced within that watershed. The cumulative impacts will have direct bearing on the health of the water body at the outlet (USEPA, 2011b).

For further information:

- NYSDEC. (2007). *The Oswego River Finger Lakes Basin Waterbody Inventory and Priority Waterbodies List.* Albany, NY: New York State Department of Environmental Conservation, Division of Water, Bureau of Watershed Assessment and Management.
- USEPA. (2011). *Watersheds*. U.S. Environmental Protection Agency, Office of Water: http://water.epa.gov/type/watersheds/
- Center for Watershed Protection. (2011). *Center for Watershed Protection*. Home page: http://www.cwp.org/
- Gilman, B. A., & Olvany, K. (2009). *Long Term Water Quality Report: Health of Canandaigua Lake and its Tributary Streams.* Canandaigua, NY: Canandaigua Lake Watershed Council.
- Olvany, K. (ed). (2000). *The Canandaigua Lake Watershed Management Plan: A Strategic Tool to Protect the Lifeblood of Our Region.* Canandaigua, NY: Canandaigua Lake Watershed Council.

2. How much impervious surface is proposed, and can it be reduced or mitigated in any way?

Why this is important: Imperviousness is a common, quantifiable, and valuable indicator of the health of watersheds (Randolph, 2004). Increases in impervious surface coverage (such as roads, parking lots, and rooftops) are directly associated with negative impacts on stream flow and flooding, habitat, and the biodiversity of aquatic systems, and many other measures of water quality (Schueler T. , 2000). These impacts are known to occur in all geographic areas, across a multitude of measures, at relatively low levels of imperviousness- at or near 10% impervious coverage (Schueler T. , 2000). When the health of the watershed is degraded, the impact is felt by everyone: landowners, water ratepayers, recreational users, the agricultural and business communities, etc.

For further information:

- Prince George's County. (1999). *Low Impact Development: An Integrated Design Approach.* Largo, MD: Prince George's County (MD) Department of Environmental Resource Programs and Planning Division.
- Schueler, T., & Holland, H. (eds). (2000). *The Practice of Watershed Protection; Techniques for Protecting our Nation's Streams, Lakes, Rivers, and Estuaries.* Ellicott City, MD: Center for Watershed Protection.
- Arnold, Jr., C. L., & Gibbons, C. J. (1996). Impervious Surface Coverage: The Emergence of a Key Environmental Indicator. *Journal of the American Planning Association*, 243-258.

3. What type of stream (or streams) is present within, and adjacent to, the project parcel?

Why this is important: Stream classification is a useful tool in describing the flow characteristics and ecological value of a given stream. In New York State, streams are classified in descending order of quality from AA to D, according to standards set by the DEC (see “Regulatory Context” above). It may also be useful to discuss the stream in terms of ephemeral, intermittent, or perennial stream flows, as defined within the NRI glossary. These terms describe the source, frequency, and duration of stream flow. Standardized visual assessments can assist the applicant in describing the characteristics of streams (see *Background*, above).

For further information:

- State of New York. (2011). 6 NYCRR Part 701: Classifications- Surface Waters and Groundwaters. *Title 6 of the New York State Codes, Rules and Regulations*. Albany, NY: Thomson West: http://www.dos.ny.gov/info/nycrr.html.
- NCDWQ. (2010). *Methodology for Identification of Intermittent and Perennial Streams and their Origins, Version 4.11.* Raleigh, NC: North Carolina Department of Environmental and Natural Resources, Division of Water Quality.
- Randolph, J. (2004). *Environmental Land Use Planning and Management.* Washington, D.C.: Island Press.

4. What other natural resources are present within, adjacent to, or near the affected stream?

Why this is important: Stream health is influenced by the many interactions between the stream and the natural resources found under and alongside the stream. The riparian zone is the transition zone along edges of stream channels. The hyporheic zone is composed of the saturated sediment beneath and beside the channel (Meyer, et al., 2007). Disturbance of the areas beside streams is associated with changes in the following ecological characteristics of streams (among others):

- Nutrient removal: Vegetated buffers of at least 50 meters (roughly 160 feet) have been found to consistently remove nitrogen from surface runoff entering into a stream (Mayer, Reynolds, McCutchen, & Canfield, 2006). Nitrogen in surface runoff is a byproduct of many human systems, including the fertilization of crops, and is associated with adverse impacts on human health, the growth of algae, and the reduction of oxygen levels in water bodies (USEPA, 2011a).
- Oxygen regulation: The productivity of riparian vegetation influences the ability of the ecosystem to regulate oxygen within the soil (Tabacchi, Correll, Hauer, Pinay, Planty-Tabacchi, & Wissmar, 1998). Greater productivity (less disturbance) allows for better oxygen regulation, both upstream and downstream.
- Habitat quality: The removal of canopy cover near streams is associated with reduced shading, increased water temperatures, reduced bank stability, growth of invasive species, and the loss of large woody debris (Allan, 2004). These impacts are detrimental to the habitat of fish, birds, amphibians, and humans.
- Stream sedimentation and channelization: The presence of highly erodible soils within or directly adjacent to the streambed is a primary factor in stream sedimentation and channelization, which can cause or further compound water quantity and quality problems downstream. Recognition of susceptible terrain such as this is an important step in mitigating the impact of development on streams (Booth, 1990).
- Connectivity: Hydrologic connectivity is a fundamental characteristic of the water cycle. Although incremental changes to the smallest headwater streams may not have obvious impacts to the community, their cumulative impact is associated with several impacts downstream, including eutrophication, reduced river productivity, and reduced viability of freshwater species (Freeman, Pringle, & Jackson, 2007).

For further information:

- USEPA. (2010, October). *CADDIS: The Causal Analysis/Diagnosis Decision Information System*. Retrieved October 2011, from U.S. Environmental Protection Agency: http://www.epa.gov/caddis/index.html

- NYSDEC. (2011a). *Guidance on Protection of Shorelines.* Retrieved October 2011, from New York State Department of Environmental Conservation, Protection of Waters Program: http://www.dec.ny.gov/docs/fish_marine_pdf/shoreprotect.pdf

5. What are the dominant landscape characteristics within the stream's catchment area? And how will this landscape change as a result of the proposal?

   Why this is important: Transformation of the undeveloped catchment areas for residential, commercial, industrial, or transportation purposes (urbanization) is often associated with the alteration of streams' physical habitat. Even incremental increases in urbanization can have significant negative impacts on the physical habitat of streams, including:

   - Increased channel modification (e.g. piping and burial);
   - Channel enlargement and incision;
   - Decreased woody debris;
   - Changes in landform characteristics;
   - Changes in streambed substrate characteristics; and
   - Decreased habitat complexity (USEPA, 2010).

   For further information:

   - USEPA. (2010, October). *CADDIS: The Causal Analysis/Diagnosis Decision Information System*. Retrieved October 2011, from U.S. Environmental Protection Agency: http://www.epa.gov/caddis/index.html
   - NRCS. (2009). *Stream Visual Assessment Protocol, Version 2 (Draft).* Washington, D.C.: U.S. Department of Agriculture, Natural Resources Conservation Service.

STEEP SLOPES

Background:

In general terms, four factors are most important when determining a given site's vulnerability to soil erosion: climate, soil, topography, and land use. While all sites within the Town of Canandaigua feature nearly identical climate, substantial differences in soil characteristics, topography, and land use are common. These factors combine to exert much influence on a site's erodibility, which in turn influences site safety, the quality of local waterways, and the efficiency of ecological functions. As any given site loses soil to erosion its slopes become destabilized, while excess sediment is carried into streams, wetlands, and the public water supply.

Important considerations:

1. Does the topography of the lot proposed for development feature any steep gradients (at or above 15% slope)?

   Why this is important: Town of Canandaigua regulations identify the 15% threshold as the point at which slopes are no longer suitable for development. Beyond the additional construction costs associated with steep slope development, it also exacerbates erosion of the site and sedimentation of downslope receiving waters (Li, 2008). Nearly all surface runoff within the town is eventually deposited into the lake. The public has a substantial fiscal interest in reducing the sedimentation of receiving waters before it occurs, as they must pay to remove sediment from the water supply.

   For further information:

- Center for Watershed Protection. (2011b). *Stormwater Manager's Resource Center*. Retrieved November 2011, from http://www.stormwatercenter.net/.
- Low Impact Development Center. (2011). *Home page*. Retrieved November 2011, from http://www.lowimpactdevelopment.org/.

2. What is the shape of the slopes within the proposed development?

   Why this is important: The shape of the slope is one key factor in measuring the risk of erosion. Risk of erosion is greatest along convex slopes that are steep near the end of the slope length. Less problematic are concave slopes, where the upper end of the slope is steepest (Agricultural Research Service, 2010).

   For further information:

   - Agricultural Research Service. (2010). *How RUSLE2 Computes Rill and Interrill Erosion*. Retrieved November 2011, from United States Department of Agriculture, Agricultural Research Service: http://www.ars.usda.gov/Research/docs.htm?docid=6014.

Other important resources

1. Is the lot proposed for development addressed within the 2006 “Prioritizing Farmland and Scenic Views in the Town of Canandaigua” report?
2. Is the lot proposed for development addressed within the 2004 “Farmland and Open Space Program” report?
3. Does the lot proposed for development contain any existing trails, as identified in the 2010 “Trails Master Plan”? Or could any connections be made to existing or planned trails?

GLOSSARY

Ephemeral stream-

Intermittent stream-

Headwaters-

Hyporheic zone-

Hydrologic connectivity-

Perennial stream-

Riparian zone-

Watershed- a contiguous area of land that drains to a common body of water, such as a stream, lake, or wetland.

Wetland- an ecosystem that depends on constant or recurrent, shallow inundation or saturation at or near the surface of the substrate. The minimum essential characteristics of a wetland are recurrent, sustained inundation or saturation at or near the surface and the presence of physical, chemical, and biological features reflective of recurrent, sustained inundation or saturation. Common diagnostic features of wetlands are hydric soils and hydrophytic vegetation. These features will be present except where specific physiochemical, biotic, or anthropogenic factors have removed the, or prevented their development (National Research Council, 1995).

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