4.3 Glossary of Terms

GLOSSARY OF STREAM AND FLOODPLAIN TERMS

Note: where a word within a definition is italicized, it is defined elsewhere within the glossary

aquatic habitat – Physical attributes of the stream channel and *riparian area* that are important to the health of all or some life stages of fish, aquatic insects and other stream organisms. Attributes include water quality (temperature, pH), *riparian* vegetation characteristics (shade, cover, density, species), stream bed *sediment* characteristics, and *pool*/*riffle* spacing**.**

artesian – A condition in which groundwater trapped between confining layers of *clay* or other materials is under pressure. When the *clay* or other material has been breached (by fault formation or digging) groundwater can rise to, or near, the ground surface, forming springs. There are many shallow "dug" wells and deeper drilled wells in the Broadstreet Hollow valley that tap into these artesian layers.

Bank Erodibility Hazard Index (BEHI) – An index for predicting *erosion potential* on selected stream banks, usually associated with a *monitoring cross-section* for measurement of actual *erosion* rates over time (Rosgen, 1996).

berm – A mound of earth or other materials, usually linear, constructed along streams, roads, *embankments* or other areas. Berms are often constructed to protect land from flooding or eroding, or to control water drainage (as along a road-side ditch). Some berms are constructed as a byproduct of a stream management practice whereby stream bed *sediment* is pushed out of the channel and mounded on (and along the length of) the stream bank - these berms may or may not be constructed for flood control purposes; some are simply piles of excess material. These berms often interfere with other stream processes such as *floodplain* function, and can exacerbate flood-related *erosion* or stream *instability*.

bioengineering – The use of live vegetation, either alone or in combination with harder materials such as rock or (dead) wood, to stabilize soils associated with stream banks or hillslopes. Roots stabilize the soil, while stems, branches and foliage slow high *velocity* water, reducing *erosion* and encourage deposition of fine *sediment*.

boulder – In the context of *stream assessment surveys,* a boulder is stream *sediment* that measures between 256 mm and 4096 mm (about 10 inches to 13.3 feet).

braided – A stream form in which the channel splits into 3 or more separate sub-channels, often criss-crossing to produce a "braided" pattern of connected channel with large or small islands between them. Islands formed between the channels can be either bare *gravel* or *cobble* materials, or contain mature forest vegetation.

clay, clay exposure (see also glacial lake clay) – Clay is the smallest *sediment* size present in a stream, measuring less than 0.0039mm in size. Clay can be identified by its smooth and slippery texture. Clay deposits can be seen in sections of the Broadstreet Hollow valley and in the

stream, and can produce *turbidity* in stream water when it is disturbed either during floods or by activity in the stream. For a detailed description of '*glacial lake clay*,' see Chapter 3.1.1, Geology.

cobble – In the context of *stream assessment surveys*, cobble material is *sediment* that measures between 64 mm and 256 mm (about 2.5 inches to 10 inches).

confluence – The location of the joining of two separate streams, each with its own *watershed*.

convergence – The downstream end of a split channel, where the stream merges back to one channel; the two channels having the same *watershed*.

cross-section (see also monitoring cross-section) – In the context of *stream assessment surveys*, a *cross-section* is a location on a stream channel where stream *morphology* is measured perpendicular to the stream flow direction (as if taking a slice through the stream), including width, depth, height of banks and/or *terraces*, and area of flow.

culvert – A closed conduit for the free passage of surface drainage water [3]. In Broadstreet Hollow, culverts are typically used by the Town and County to control water running along and under the road, and to provide a crossing point for water from road side drainage ditches to the stream, as well as for routing *tributary* streams under the road to join the main Broadstreet Hollow stream. Culverts are also used by landowners to route roadside drainage ditch water under their driveways to reduce or prevent *erosion*.

degradation – The process by which a stream *reach* or channel becomes deeper by eroding downward into its bed over time, also called "downcutting", either by periodic episodes of bed scouring without filling, or by longer term transport of *sediment* out of a *reach* without replacement.

demonstration stream restoration project, (demonstration project) – A *stream (stability) restoration* project that is designed and located to maximize opportunities for *monitoring* of project success, public and agency education about different *stream restoration* techniques, and interagency partnerships for funding and cooperation.

destabilized (see also instability, unstable) – Describing a section of stream that has been made *unstable*, by natural or human activity.

discharge (stream flow) – The amount of water flowing in a stream, measured as a volume per unit time, usually cubic feet per second (cfs).

discontinuous floodplains (see also floodplain) – A series of small *floodplains*, formed as a series of small benches along stream banks. These *floodplain* features, typically seen in steeper mountain streams, are not connected sequentially following the valley floor, but still provide the critical *floodplain* functions of reducing water *velocity* and enhancing *sediment* deposition and infiltration (water sinking into the ground rather than running straight to the stream).

dumping site – For the purposes of the Broadstreet Hollow stream assessment survey, these are areas in the stream or on the *floodplain* where refuse or other non-natural or non-biodegradable materials were documented. A dumping site is not necessarily an actively used area, and may be the result of material washing downstream.

embankment – A linear structure, usually of earth or *gravel*, constructed so as to extend above the natural ground surface[3]. Similar to a *berm*, but usually associated with *road fill* areas, and extending up the hillside from the road, or from the stream up to the road surface.

entrenched – In stream classification (see s*tream type*), entrenchment (or entrenchment ratio) is defined by stream *cross-sectional* shape in relation to its *floodplain* and valley shape, and has a specific numerical value that in part determines stream type. For example, if this number is less than 1.4, the stream is said to be highly entrenched, if between 1.4 and 2.2 it is mildly entrenched, and greater than 2.2 it is not entrenched. Entrenchment ratio is used with other stream shape data to determine *stream type*, and define baseline data for future *monitoring* (Rosgen, 1996).

equilibrium (see also Astable@) – The degree to which a stream has achieved a balance in transporting its water and *sediment* loads over time without aggrading (building up), degrading (cutting down), or migrating laterally (eroding its banks and changing course).

erosion B The wearing away, detachment, and movement of the land surface (*sediment*), by running water, wind, ice, or other geological agents, including such processes as gravitational creep or *slumping*. [1] In streams, erosion is a natural process, but can be accelerated by poor stream management practices.

erosion potential – The amount of *erosion* that may be expected under given climatic, topographic, soil, and cultural conditions. [1]

fascines – A *bioengineering* method using bundles of small branches of willow or other *riparian* tree species, tied together and laid into shallow trenches along a stream to stabilize and revegetate stream bank areas.

floodplain B The portion of a river valley, adjacent to river channel, which is covered with water when river overflows its banks at flood *stage*. The floodplain usually consists of *sediment* deposited by the stream, in addition to *riparian* vegetation. [4] The floodplain acts to reduce the *velocity* of floodwaters, increase infiltration (water sinking into the ground rather than running straight to the stream - this reduces the height of the flood for downstream areas), reduce stream bank *erosion* and encourage deposition of *sediment*. Vegetation on floodplains greatly improves their functions.

gabions – Large wire-mesh baskets filled with rock material used to *harden* or *stabilize* road *embankments* and sometimes stream banks.

Geographic Information System (GIS) B Desktop software with a graphical user interface that allows loading and querying, analysis and presentation of spatial and tabular data that can be

displayed as maps, tables and charts.[5] The maps in the Broadstreet Hollow stream management plan were produced with a GIS, and can be updated as new information becomes available.

glacial lake, glacial lake clay – The layered *clay* (often referred to as *varved*, or layered, *clay*) observable in certain stream banks along Broadstreet Hollow (and other Catskill streams) was deposited several thousand years ago in small (pond-size) to large (lake-size) impoundments of glacial meltwater (glacial lakes) during the deglaciation of the Catskills. This clay is the primary source of the *suspended sediment* observable in the stream, which produces *turbidity*.

Global Positioning System (GPS) B A satelliteBbased positioning system operated by the U.S. Department of Defense (DoD). When fully deployed, GPS will provide all-weather, worldwide, 24-hour position and time information.[6] The *stream assessment survey* done for the Broadstreet Hollow stream management plan included the use of a GPS unit to document the locations of all mapped stream features. This information was added to the *GIS* to produce the maps.

gravel – In the context of *stream assessment survey*, gravel is *sediment* that measures between 2 mm and 64 mm (about 0.08 inches to 2.5 inches).

hardening – Any structural *revetment* that fixes in place an eroding stream bank, *embankment* or hillside by using Ahard@ materials, such as rock, sheet piling or concrete, that does not allow for revegetation or enhancement of *aquatic habitat*. *Rip-rap* and *stacked rock walls* are typically considered to be hardening measures, though some revegetation of these areas is possible.

head-cut – A marked change in stream bed slope, as in a Astep@ or waterfall, that is unprotected or of greater height than the stream can maintain. This location, also referred to as a Aknick point@, moves upstream, eventually reaching an *equilibrium* slope.

hydroseeding – A method of spreading seed and mulch material with a specialized machine, to cover bare ground areas with groundcover vegetation. Seed, mulch and water are added together to make a slurry that can be sprayed onto the ground surface from a distance. This method is more efficient for seeding bare ground areas to establish groundcover, because it provides the mulch material and water in the same step with the seed (traditional manual methods require three separate steps to spread seeds, mulch and water, and are labor intensive).

inboard – Referring to a roadside ditch that is between the road and adjacent hillside, on the higher or uphill side of the road.

ice-contact deposit – Complex glacial deposits that are deposited along the ice margin. The deposits are typically unconsolidated assemblages of *silt* through *boulder* size material. In the Catskills these include unsorted moraine deposits as well as stratified and somewhat sorted deposits such as kames, kame terraces and eskers. Kame terrace deposits form hillslope margins along portions of the Broadstreet Hollow.

in-situ – A reference to something being in its original location, in place.

instability (see also Aunstable@) B An imbalance in a stream=s capacity to transport *sediment* and maintain its channel shape, pattern and profile.

invasive plants – Species that are not native to a region or country that have the ability to compete with and replace native species in natural habitats, also referred to as Aexotic@ plants. (Erich Haber, Impact of Invasive Plants, 2002).

Japanese Knotweed (see also invasive plants) – An *invasive plant*, not native to the Catskill region, that colonizes disturbed or wet areas, especially stream banks, road-side ditches and *floodplains*. This plant out-competes natives and other beneficial plants, and may contribute to *unstable* stream conditions.

large organic debris – Any woody material, such as from trees or shrubs, that washes into a stream channel or is deposited on a *floodplain* area. Organic debris provides important *aquatic habitat* functions, including *nutrient* sources and micro-habitats for aquatic insects and fish. Large wood is especially influential to stream *morphology* in small streams, though may be detrimental in the vicinity of structures or infrastructure.

leaching – The process by which chemical or mineral materials are removed from a physical *matrix* (such as soil, or mixed *sediment* materials) by water running through and creating a solution of those chemicals.

left bank – The left stream bank as looking or navigating downstream. This is a standard used in *stream assessment surveys*.

matrix – The framework material within which other materials are lodged or included. For example, *cobbles* could be embedded in a matrix of *sand* and fine *gravel*.

meander – Refers both to a location on a stream channel that is curved (a "meander bend"), and to the process by which a stream curves as it passes through the landscape (a "meandering stream").

monitoring – The practice of taking similar measurements at the same site, or under the same conditions, to document changes over time.

monitoring cross-section – For the purposes of the Broadstreet Hollow stream management plan, this is a location where metal rebar rods have been used to permanently locate an actively eroding stream bank. At this site, detailed data have been gathered to document the stream condition. The site is permanently marked to enable future measurements that, when compared to the existing condition, provide information about the stream's change. Measuring change over time is considered '*monitoring*,' and this information provides early warning to stream managers about important but perhaps visually imperceptible changes in the stream.

monumented – Refers to a location, usually a *cross-section*, that is marked with a permanent or semi-permanent marker, or "monument", to enable future *monitoring* at the same place.

morphology, stream morphology – The physical shape, or form, of a landscape or stream channel, that can be measured and used to analyze stream or landscape condition, type or behavior.

native material – *Sediment* material with a local or on-site source, as in material pushed up out of a stream channel to armor the banks.

non-quarried, or natural boulders – *Boulder*-sized rock material, either *native* or imported material, not harvested from a quarry. This material has been used in the past in stream bank stabilization, usually harvested directly from the stream or from nearby hillsides.

nutrient – The term "nutrients" refers broadly to those chemical elements essential to life on earth, but more specifically to nitrogen and phosphorus in a water pollution context. In a water quality sense nutrients really deals with those elements that are necessary for plant growth, but are likely to be **limiting** -- that is, where used up or absent, plant growth stops.

pathogen – Disease-causing agent, especially microorganisms such as bacteria, protozoa, and viruses.

pool – A small section of stream characterized by having a flat or nearly flat water surface compared to the average *reach* slope (at low flow), and deep and often asymmetrical *cross-sectional* shape.

reach – A section of stream with consistent or distinctive *morphological* characteristics[1].

reference reach, stable reference reach – A *stable* portion of a stream that is used to model restoration on an *unstable* portion of stream. Stream *morphology* in the reference reach is documented in detail, and that *morphology* is used as a blueprint for design of a *stream stability restoration* project.

revetment – Any structural measure undertaken to stabilize a road *embankment*, stream bank or hillside.

riffle – A small section of stream characterized by having a steep water surface slope compared to the average *reach* slope (at low flow), and a shallow and often uniform *cross-sectional* shape.

right bank – The right stream bank as looking or navigating downstream. This is a standard used in *stream assessment surveys*.

riparian (area, buffer, vegetation, zone) – The area of land along stream channels, within the valley walls, where vegetation and other landuses directly influence stream processes, including flooding behavior, *erosion*, *aquatic habitat* condition, and certain water quality parameters.

rip-rap – Broken rock, *cobbles*, or *boulders* placed on earth surfaces, such as a road *embankment* or the bank of a stream, for protection against the action of water; materials used for soil *erosion* control. [1]

road fill (see also *embankment*) – Typically *gravel*- and *sand*-sized material used to elevate the level of the road, control the road grade, or provide a buffer for the road grade from stream *erosion*.

rotational failure – A geotechnical term referring to the shape and mechanism of a hillslope failure that results in a section of land surface that falls, or "fails", by rotating out of place along a curved plane surface (as opposed to sliding along a straight line or flat plane surface). This type of failure is common in the Broadstreet Hollow valley, easily recognized by "back leaning" trees on displaced sections of the slope, separated by fault scarps (cracks in the ground surface perpendicular to the failure direction, also often curved) as these blocks of land rotate downward and outward (see Section 3.2.4, Geology, for description and diagrams of this phenomenon, as well as MU3 where such a failure occurred prior to the *Demonstration Project*).

runoff – The portion of precipitation (i.e., rainfall) that reaches the stream channel over the land surface.

sand – In the context of *stream assessment surveys*, sand material is *sediment* that measures between 0.063 mm and 2 mm (up to 0.08 inches).

sediment, stream bed sediment - Material such as *clay*, *sand*, *gravel* and *cobble* that is transported by water from the place of origin (stream banks or hillsides) to the place of deposition (in the stream bed or on the *floodplain*). [3]

silt – In the context of *stream assessment surveys*, silt material is *sediment* that measures between 0.0039 mm and 0.063 mm.

slump – The product or process of mass-wasting when a portion of hillslope slips or collapses downslope, with a backward rotation (also a rotational failure).

stable (see also equilibrium) – A stable stream is defined as maintaining the capacity to transport water and *sediment* loads over time without aggrading (building up), degrading (cutting down), or migrating laterally (eroding its banks and changing course). Stable streams resist flood damage and *erosion*, and provide beneficial *aquatic habitat* and good water quality for the particular setting.

stability – In stream channels, the relative condition of the stream on a continuum between *stable* (in *equilibrium* or balance) and *unstable* (out of *equilibrium* or balance). Stream stability assessment seeks to quantify the relative *stability* of stream *reaches*, and can be used to rank or prioritize sections of streams for management.

stacked rock wall – A *boulder revetment* used to line stream banks for stabilization. Stacked rock walls can be constructed on a steeper angle than *rip-rap*, so they take up less of the stream *cross-section*, provide a wider road surface, and provide less surface area for solar heating, allowing stream temperature to remain cooler relative to banks lined with *rip-rap*. These features can be augmented with *bioengineering* to enhance *aquatic habitat* and *stability* functions.

stage – In streams, stage refers to the level or height of the water surface, either at the current condition (i.e., current stage), or referring to another specific water level (i.e., flood stage).

stream assessment, stream assessment survey – The methods and summary information gathered in a stream *reach* or series of *reaches*, primarily focused on stream *morphology*. Stream assessment for the Broadstreet Hollow included detailed characterization and mapping of stream channel patterns, *cross-section* shapes and slope.

stream flow (discharge) – The amount of water flowing in a stream, measured as a volume per unit time, usually cubic feet per second (cfs).

stream stability restoration (design, project) – An *unstable* portion of stream that has been reconstructed, using *morphology* characteristics obtained from a *stable reference reach* in a similar valley setting, that returns the stream to a *stable* form (that is, to a shape that may allow the stream to transport its water and *sediment* load over time without dramatic changes in its overall shape).

stream type – As defined by Rosgen (1996), one of several categories defined in a stream classification system, based on a set of delineative criteria in which measurements of channel parameters are used to group similar *reaches*.

summer base-flow – Stream discharge primarily from groundwater (not from surface *runoff*). [1] Typically this is the lowest flow of the year, occurring in late summer, or following extended periods of drought.

suspended sediment – *Sediment* carried in the water column (above the stream bed), including *clay*, *silt* and sometimes fine *sand*. These materials contribute to *turbidity*.

terrace – A level area in a stream valley, above the active *floodplain*, that was deposited by the stream but has been abandoned as the stream has cut downward into the landscape. These areas may be inundated (submerged) in higher floods, but are typically not at risk in more common floods.

thalweg – The line followed by the majority of the stream flow. [1] In *stream assessment*, this location is used as a reference location for surveys and other measurements, and is most often associated with the deepest point in the stream *cross-section* (i.e., the stream channel that would still have water flowing in it at even the lowest flow conditions).

toe – The bottom, or base, of a stream bank or *embankment*.

tributary – A stream that feeds into another stream; usually the tributary is smaller in size than the main stream (also called "mainstem"). The location of the joining of the two streams is the *confluence*.

turbidity – A measure of opacity of a substance; the degree to which light is scattered or absorbed by a fluid. Streams with high turbidity are often referred to as being "turbid".

unstable (see also instability) – Describing a stream that is out of balance in its capacity to transport *sediment* and maintain its channel shape, pattern and profile over time.

watershed – A unit of land on which all the water that falls (or emanates from springs) collects by gravity and runs off via a common outlet (stream).[2]

wetland – An area that is saturated by surface water or ground water with vegetation adapted for life under those soil conditions, as in swamps, bogs, fens, and marshes.

velocity – In streams, the speed at which water is flowing, usually measured in feet per second.

[1]New York Guidelines for Urban Erosion and Sediment Control, USDA SCS, 1972

[2]Black, P., Watershed Hydrology, 1991, Prentice-Hall Inc., Englewood Cliffs, NJ

[3]Lo, S. 1992. Glossary of Hydrology. Water Resourced Publications, PO Box 2841, Littleton, CO. 80161

[4]Rosgen, D.L. 1996. Applied River Morphology.

[5]ArcView GIS: The Geographic Information System for Everyone. Environmental Systems Research Institute, Inc. 1996.

[6]GPS Pathfinder Office: Getting Started Guide. Trimble Navigation Limited. 1999.