

submitted by the subdivider or a designated engineer to the Town for its records.

B. Information including, but not limited to the following should be indicated on the plans:

1. The location of manholes (both vertical and horizontal).
2. The location of catch basins (both vertical and horizontal).
3. The location (both vertical and horizontal) and direction of sanitary sewer lines, storm sewer lines and water mains.
4. The location of connections between the sanitary sewer trunk line and laterals.
5. Grades for laterals.
6. The depth and grade of main trunk lines and laterals.
7. The size, capacity and location of all storm water conveyance structures

ARTICLE VI. CLUSTER DEVELOPMENT

In an effort to encourage flexibility of design and development of land so as to promote appropriate use of land, facilitate the adequate and economic use of streets and utilities, encourage the conservation and continued agricultural use of agriculturally valuable land and preserve the natural and scenic qualities of the Town of New Scotland, the Planning Board is empowered to modify certain provisions of the subdivision law in accordance with this section and the provisions of §281 of the Town Law of the State of New York.

§6.100. Applicability.

A. This section shall apply only to subdivisions of land parcels containing an area of appropriate size and dimension to accommodate five (5) or more building lots in accordance with the Town of New Scotland zoning requirements and other relevant Town law.

B. Request by subdivider. A subdivider may request the use of this section simultaneously with, or subsequent to, presentation of the Preliminary Plat. In the event of a request by the subdivider, two (2)

Preliminary Plats, meeting the requirements described in §3.200 shall be presented simultaneously for Planning Board review, or, in lieu of two (2) Preliminary Plats, the subdivider may present two (2) Sketch Plans as provided for in §3.100 prior to Preliminary Plat submission, for concept review by the Planning Board. Any subdivider presenting a Sketch Plan for concept review, must subsequently, formally apply for Preliminary Plat and Final Plat approval as described in §3.200 and §3.300.

C. Application required by the Planning Board. The Planning Board, in accordance with the Town of New Scotland zoning requirements, may request that application be made in accordance with this section, simultaneously, or subsequent to, presentation of a Preliminary Plat. Two (2) Preliminary Plats, meeting the requirements described in §3.200 shall be presented simultaneously for Planning Board review, or, in lieu of two (2) Preliminary Plats, the subdivider may present two (2) Sketch Plans as provided for in §3.100 prior to Preliminary Plat submission, for concept review by the Planning Board. Any subdivider presenting a Sketch Plan for concept review, must subsequently, formally apply for Preliminary Plat and Final Plat approval as described in §3.200 and §3.300.

§6.200. Procedure

A. Preliminary Plat/Sketch Plan. A complete application under this part shall include a Preliminary Plat, or optional Sketch Plan, of a cluster development form in accordance with the provisions of this section and a standard Preliminary Plat or optional Sketch Plan which is consistent with all the criteria established by these subdivision regulations, including but not limited to highways, highway specifications and lots, and consistent with the Town Zoning requirements.

B. Determination. Determination on voluntary or required applications under this part shall be made by the Planning

Board based on the Preliminary Plat, or optional Sketch Plan, other information required by these and other regulation and Town of New Scotland zoning requirements.

C. Plat submission. Upon a determination by the Planning Board that such Preliminary Plat or optional Sketch Plan is suitable for the use of this section, one Preliminary Plat meeting all of the requirements of such a determination shall be presented to the Planning Board, and thereafter the Planning Board shall proceed with the required public hearings, outlined in Article IV and all other requirements of these regulations.

D. Local filing and notation on Zoning Map. Any subdivision plat finally approved which involves modifications as provided for in this section shall be filed with the Inspector, who shall make appropriate notation and reference thereto on the Town Zoning Map.

§6.300. Standards

A. No such modifications by the Planning Board shall result in a greater overall density of lots or dwelling units than is permitted in the zoning district wherein such lands lie, as specified in the Town of New Scotland zoning requirements and as shown on the Official Zoning Map.

B. No subdivision shall be approved by the Planning Board pursuant to this section which shall not reasonably safeguard the appropriate use of adjoining land or which shall not be consistent with the purposes and intent of the Town of New Scotland zoning requirements or the policy of these regulations.

C. In the event that the implementation of this section results in a plat showing lands available for park, recreation or other municipal purposes directly related to the plat, or in a plat showing land to be retained in open space in order to comply with the average density of lots or dwelling units greater than is permitted in the zoning district wherein such lands lie, then the

Planning Board, as a condition of plat approval, may establish, in the case of lands for park, recreation or other municipal purpose, such conditions on the ownership, use and maintenance of such lands as it deems necessary to assure the preservation of such lands for their intended purposes, and may further, in the case of lands to be retained in open space, require that such lands be restricted by deed restriction, restrictive covenant, conveyance of a scenic easement or conservation restriction to the Town or other appropriate means against any development or land use inconsistent, with their retention in open space.

D. The provisions of this section shall not be deemed to authorize a change in the permissible use of such lands as provided in the Town of New Scotland zoning requirements.

ARTICLE VII. WAIVERS AND MODIFICATIONS

Any subdivider aggrieved by a finding, decision or recommendation of the Inspector, or Planning Board may request and receive the opportunity to appear before the Planning Board to present additional relevant information, and request reconsideration of the original finding, decision or recommendation.

§7.100. Waivers

A. The Planning Board may grant a waiver of certain provisions contained herein where by reason of the exceptional shape of a specific piece of property, or where by reason of exceptional topographic conditions, the strict application of these regulations would result in extreme practical difficulties upon the owner of such property; provided, however, that such relief may only be granted without detriment to the public good and without substantially impairing the intent and purposes of these regulations.

B. In granting such waiver, the Planning Board may require such conditions as will, in its judgment, secure substantially the objectives of the standards or requirements so waived.

§7.200. Modifications

The standards and requirements of these Regulations may be modified by the Planning Board in the case of subdivisions for complete communities or neighborhood units or other large scale developments which, in the judgement of the Planning Board achieve substantially the objective of the regulations contained herein and which are further protected by such covenant or other legal provisions as will ensure conformity to and achievement of the plan. Such developments will comply with the standards for Planned Unit Development as set forth in the Town of New Scotland zoning requirements.

§7.300. Procedure for Applying

A. Applications for waivers and modifications shall be submitted in writing by the subdivider at the time the Preliminary Plat is filed with the Inspector. The application shall state fully the grounds and all the facts relied upon by the applicant.

B. Applications for reconsideration shall be submitted to the Inspector, in writing by the subdivider, not less than fourteen (14) calendar days in advance of a regularly scheduled Planning Board meeting at which reconsideration is desired.

ARTICLE VIII DEFINITIONS

§8.100. Inclusions

As used in these Regulations words in the singular include the plural and those in the plural include the singular. The word "person" includes a corporation, unincorporated association and a partnership, as well as an individual. The word "building" includes structure and shall be construed as if followed by the

phrase "or part thereof". The word "street" includes avenue, boulevard, court, expressway, highway, lane, arterial, and road. The word "watercourse" includes channel, creek, ditch, drain, dry run, spring, and stream. The word "may" is permissive; the words "shall" and "will" are mandatory subject, however, to the provisions of §7.100 hereof.

§8.200. Definition of Terms

As used in these Regulations the following terms shall be defined as follows:

1. **Block:** An area bounded by streets.
2. **Board Engineer:** Shall be a designated registered Engineer retained by the Town Board to perform all administrative and/or supervisory duties required of the Board Engineer by the provisions of these regulations, whose duties, among others, are to review subdivision submissions at the request of the Planning Board, for compliance with the requirements of these regulations.
3. **Clear sight triangle:** An area of unobstructed vision at street intersections defined by lines of sight between points at a given distance from the intersection of street right-of-way lines.
4. **Cul-de-sac:** A minor street intersecting another street at one end and terminated at the other by a vehicular turn-around.
5. **Dedication:** The deliberate appropriation of land by its owner for any general and public uses, reserving no other rights than such as are compatible with the full exercise and enjoyment of the public uses to which the property has been devoted.
6. **Double Frontage Lot:** A lot with rear and front lot lines which abut existing or proposed streets.
7. **Easement:** A right-of-way granted for limited use of private land for a public or quasi-public purpose.

8. **Final Plat:** A complete and exact subdivision plat, prepared for official recording as required by statute, to define property rights and proposed streets and other improvements.

9. **Half or partial street:** A street, generally parallel and adjacent to a property line, having a lesser right-of-way width than normally required for satisfactory improvement and use of the street.

10. **Inspector:** The Building Inspector of the Town of New Scotland and/or the Building Inspector's duly appointed representative or assistant. The Inspector shall also function as the clerk of the planning board as identified under Town Law Article 16 Section 276.4, and the Code enforcement officer of the Town.

11. **Large Scale Development:** Any large development of such a size or complex nature as to require multiple review under both zoning and subdivision requirements of the Town of New Scotland, and/or which requires phased development review by the Planning Board. Such developments include but are not limited to the following:

1. Large subdivisions for complete communities or neighborhood development, often proposed in phases;
2. Any subdivision which includes rezoning of existing district boundaries;
3. Any subdivision which will include a mixture of land uses such as commercial and residential, and/or mixes of residential uses.
4. Any form of Planned Unit Development of Planned Commercial Development;
5. Any form of large cluster development.

12. **Lot:** A tract or parcel of land occupied or intended to be occupied by one principal building and accessory buildings, or utilized for a principal use and uses accessory or incidental to the operation thereof, together with such open spaces as required by this Law, and having not less than fifty (50) foot frontage on a public highway, road or street. All lot areas used to calculate frontage requirements and lot size must be held in fee-simple.

13. **Pavement:** The portion of a street or alley intended for vehicular use.

14. **Preliminary Plat:** A tentative subdivision plan in lesser detail than a Final Plat showing proposed streets and lot layout as a basis for consideration prior to preparation of a Final Plat.

15. **Reverse Frontage Lot:** A lot extending between and having frontage on a primary or secondary street and a local (minor) street, and with vehicular access solely from the latter.

16. **Right-of-Way:** Land reserved for use as a street or for other public purpose.

17. **Setback or building line:** The line within a property defining the required minimum distance between any principal enclosed structure and the adjacent street right-of-way, and/or side and rear property line.

18. **Sight distance:** The maximum extent of unobstructed vision (in a horizontal or vertical plane) along a street from a vehicle located at any given point on the street.

19. **Sketch Plan:** A discretionary feature of subdivision review which provides the applicant the opportunity to outline the general nature of the proposal for subdivision prior to official application for subdivision review. The sketch plan is intended to provide the Planning Board with sufficient information to evaluate the proposal and advise the subdivider on the proper method of application, the general acceptability of the concept, the consistency with the Comprehensive Land Use Plan and any other special concerns which should be addressed prior to submission by the applicant for Preliminary Plat approval.

20. **Street:** Any public way used as a means for vehicular and pedestrian circulation, whether designed as a street, highway, thoroughfare, parkway, road, avenue, boulevard, land, cul-de-sac, place or otherwise designated. Classes of streets are as follows:

a) **Primary Street (Arterial Street):** Are streets which are used primarily for traffic with limited access requirements.

b) **Secondary Street (Collector Street):** Provide routes which connect Local Streets (Minor Street) to community facilities, business and industrial districts and to the Primary Street system. Secondary streets include principle entrance streets of residential developments.

c) **Local Street (Minor Street):** Are streets which are used primarily for access to abutting residential properties. Local Streets include cul-de-sacs Marginal Access Streets and streets used for circulation within residential developments which do not provide for through traffic circulation.

d) **Marginal Access Streets:** Are forms of Local Streets, generally parallel with and adjacent to Primary and Secondary Streets providing; access to abutting properties, protect against through traffic and control of the number of intersections with Primary and Secondary streets.

21. **Street, center line:** The line corresponding to the mid-point of the surfaced portion of any street.

22. **Street, public:** A street dedicated to public use.

23. **Subdivider:** The owner, or authorized agent of the owner, of a subdivision.

24. **Subdivision, Major:** The term "Major Subdivision" means the division of any parcel of land into five or more lots, plots, sites or other divisions of land for immediate or future sale or for building development on existing streets or highways or such division of land into two or more lots, plots, sites or other divisions of land for said purposes on any street or highway proposed to be dedicated to the Town of New Scotland within any part of said Town of New Scotland outside of any incorporated village and, as specified in New York State Public Health Law Article 11, Title II §1115.1.

25. **Subdivision, Minor:** The term "Minor Subdivision" means the division of land into at least two (2) but not more than four (4) lots, parcels or sites within any consecutive three year period which do not require the construction of a new street, public utility or expansion or extension of an existing street or public utility.

Town of New Scotland

ALBANY COUNTY

NEW YORK

APPENDIX A STORMWATER MANAGEMENT DESIGN CONSIDERATIONS

Adopted
APRIL 12, 1993

SUBDIVISION LAW

LOCAL LAW #1
1993

Planning Consultants



CT.MALE ASSOCIATES, P.C.
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Appendix A

Subdivision Regulations Stormwater Management Design Considerations

Following are design requirements which must be considered and addressed in any stormwater management plan submitted for review by the Town of New Scotland Planning Board

These Stormwater Management requirements are modeled after the New York State Department of Environmental Conservation, Division of Water, Technical and Operations Guidance Series 95.1.8) Stormwater Management Guidelines for New Development. A Stormwater Management Plan must be submitted prior to the Planning Board taking any action on any Major Subdivision and or any development of land specified elsewhere in the regulations and laws of the Town of New Scotland, New York. Said plan is to comply with the following requirements:

A. Definitions: As used in relationship to the requirements for Stormwater Management, the following terms shall be defined as follows:

1. **Drywell:** Similar to infiltration trench but smaller with inflow from pipe; commonly covered with soil and used for drainage areas of less than one (1) acre such as roadside inlets and rooftop run-off.

2. **Extended detention:** A practice designed to store stormwater run-off by collection as a temporary pool of water, usually having less than a twenty-four (24) hour residence time. A practice which is used to control peak discharge rates, and which provides gravity settling of pollutants.

3. **First Flush:** The delivery of a disproportionately large load of pollutants during the early part of storms due to the rapid runoff of accumulated pollutants.

The first flush in these regulations is defined as one-half inch of runoff per acre of land which has been made more impervious from pre-development (natural) conditions through land clearing, land grading and construction/development activities.

4. **Forebay:** An extra storage area or treatment area, such as a sediment pond or created wetland, near an inlet of a stormwater management facility to trap incoming sediments or take up nutrients before they reach a retention or extended detention pond.

5. **HEC-2:** A U.S. Army Corp of Engineers Computer Program intended for calculating water surface profiles for steady or gradually varied flow in natural or man-made channels.

6. **Impervious area:** Impermeable surfaces, such as pavement or rooftops, which prevent the infiltration of water into the soil.

7. **Infiltration:** A practice designed to promote the recharge of groundwater by containment and concentration of stormwater in porous soils.

8. **Infiltration Basin:** An impoundment made by excavation or embankment construction; commonly serves a drainage area of five (5) to fifty (50) acres.

9. **Outfall:** The terminus of a storm drain where the contents are released.

10. **Peak Flow:** The maximum instantaneous flow of water during a storm, usually in reference to a specific design storm event.

11. **Peak Flow Attenuation:** The reduction of the peak discharge of storm runoff by storage and gradual release of that storage.

12. **Retention:** A practice designed to store stormwater run-off by collection as a permanent pool of water without release except by means of evaporation, infiltration, or attenuation release when runoff volume exceeds the permanent storage capacity of the permanent pool.

13. **Riprap:** A combination of large stone, cobbles and boulders used to line channels, stabilize stream banks, reduce runoff velocities, or filter out sediment.

14. **Riser:** A vertical pipe extending from the bottom of a pond that is used to control the discharge rate from the pond for a specified design storm.

15. **Sand attenuating filter:** A chamber open to the surface containing a surface layer of sand over high void aggregate base. Such chambers may only be used for atypical situations such as where a site is unsuitable for stormwater infiltration or retention.

16. **Sheetflow:** Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

17. **Special flood hazard area:** Areas in the Town that have been identified as susceptible to a one (1%) percent or greater chance of flooding in any given year. A one (1%) percent probability flood also is known as the 100-year flood.

18. **SPDES:** An acronym for the State Pollutant Discharge Elimination System. A regulatory permit program administered under Article 17 of the Environmental Conservation Law, by the NYS Department of Environmental Conservation to control point source discharges of water pollution.

19. **Storm frequency:** The average frequency of occurrence of events having a given volume and duration. For example; a 2-year; 10-year;; or 100-year storm.

20. **Storm Drain:** Any open or closed conduit designed to convey stormwater.

21. **Storm duration:** The length of time over which a precipitation event occurs (e.g., 24-hours).

22. **Storm volume:** The total amount of precipitation occurring over the storm duration.

23. **Swale:** A depression or wide a shallow ditch used to temporarily route, or filter runoff.

24. **TR-20:** A rainfall model developed by the USDA Soil Conservation Service for hydrologic analysis of a watershed under present conditions of land cover/use and structural or channel modifications using single event storm rainfall-frequency data. Output consists of peaks and/or flood hydrographs, their time of occurrence and water surface elevations at any desired cross section or structure.

B. Flood Control Requirements: The following requirements are to be followed to ensure that stormwater runoff is safely conveyed through and beyond a development site during and after construction. Also, through peak flow attenuation, the requirements are to be used to facilitate the control of stormwater runoff to minimize or alleviate flooding and stream bank erosion associated with land development. The requirements are as follows:

1. **Peak Flow Attenuation**

- a) The release of stormwater runoff from development shall not exceed pre-development (natural) conditions. To accomplish this, stormwater runoff is to be controlled so that during and after development, the-site will generate no greater peak than prior to development for a 2-year, 10-year, and 100-year 24-hour storm considered individually as follows:

1. Attenuation of the 2-year storm is intended to achieve stream channel erosion control.

2. Attenuation of the 10-year storm is intended to assure the adequacy of existing and proposed culverts and storm drain systems.
3. Attenuation of the 100-year storm is intended to reduce the rate of runoff from development to prevent expansion of the 100-year flood plain so as to alleviate flooding of improved properties and streets.

- b) Peak flow attenuation requirements may be satisfied by means of detention basins and/or other appropriate structures. Infiltration trenches, dry wells, or stone reservoirs underneath paving, may be used for the purpose of attenuating peak flows for smaller storms provided appropriate consideration is given to the length of life of the stormwater facility, and feasibility of maintenance of such facility.
- c) Where dams are to be constructed for attenuating peak flows, approval may have to be obtained from DEC pursuant to Article 15-0503 of the Environmental Conservation Law.

2. 100-Year Flood Plains

- a) Encroachment into any Area of Special Flood Hazard shall be allowed only in compliance with local restrictions adopted for participation in the National Flood Insurance Program, and other appropriate New York State laws and regulations.
- b) A fifty (50) foot buffer (building restriction line) is required between the flood hazard area and any structure as a safety factor to allow for inaccuracy in boundary determination. Pursuant to Article 24 of the Environmental Conservation Law, a one hundred (100) foot buffer is required around any protected wetland.
- c) The stormwater management plan for all developments of five (5) or

more acres or containing five (5) or more dwelling units located wholly or partially within a 100-year flood plain where flood elevation data are not available through the NFIP, must include a study to determine 100-year flood plain elevations in accordance with TR-20, HEC-2 or other standard engineering methods. Such elevation data shall be used to regulate flood plain encroachments in accordance with the NFIP. The 100-year flood plain elevation and the building restriction line shall be shown on the subdivision plat.

3. Runoff Conveyance Systems

- a) Priority shall be given to maintaining natural drainage systems, including perennial and intermittent streams, swales and drainage ditches in an open condition.
- b) Where closed storm drain systems (i.e., those involving a culvert or similar conduit) are deemed essential, justification shall be made as to why it is necessary to have a closed system. When justified, the closed system shall be designed to:

1. convey the 10-year storm flow within the closed storm drain system; and
2. provide for safe overland conveyance of flow of the 100-year storm through the development (generally over the top of the closed storm drain system). All overland flow conveyance structures are to be at least one (1) foot above the 100-year flood plain elevation and the outfalls of such conveyances are to be stabilized with rip-rap or other suitable material to reduce erosion.

- c) Any alteration to a stream, a stream bed or the banks thereof, including the installation of stormwater conveyance systems will require an Article 15, Protection of Water Permit and may require an Article 24, Freshwater Wetlands Permit administered through the New York State Department of Environmental Conservation.
- d) Any culvert or stormwater structure placed in a stream shall not impede fish migration.

4. Stream Corridor Management

- a) Consistent with the State's Stream Corridor Management Program, land clearing and land grading within a stream corridor shall be avoided or minimized, except at stream crossings, so that stream and drainage courses remain in a natural state¹.
- b) To the extent possible, riparian vegetation, including grasses, shrubs and trees in the stream corridor or along the watercourse, shall remain undisturbed during land clearing, land grading and land development. Provisions for temporary and permanent protection of said vegetation shall be identified on the subdivision plat.

C. Water Quality Management: The following requirements are to be used in conjunction with the flood control requirements outlined in Subsection A to protect water quality from runoff associated with land clearing, land grading and construction activities. The requirements must be presented by the subdivider in the form of a stormwater management plan (SMP). These

¹ New York State Department of Environmental Conservation, "Stream Corridor Management: A Basic Reference Manual", Albany, 1986.

requirements apply to all land areas where soil permeability has been and/or will be changed as a result of land clearing, land grading and land development.

1. Control of "first flush" - Control of the "first flush" is a priority in stormwater management as most runoff-related water quality contaminants are transported from land, particularly impervious surfaces, during the initial stages of a storm event. Regardless of whether infiltration, retention or extended detention practices are used to capture the first flush, the required control shall accommodate the following:

- a) Provide for control of the first 1/2-inch of runoff from all land areas for which the surface porosity has been or will be changed from pre-development (natural) conditions due to land clearing, land grading and land development².

2. Control of Thermal Discharges: Control of thermal energy in stormwater runoff in watersheds having streams which support cold water fisheries is essential. Impervious surfaces including asphalt parking areas and roofs, store large quantities of heat during hot weather. The heat from such surfaces is released to stormwater through conduction during storm events. Stormwater runoff having elevated temperatures can, in turn, increase stream temperatures during storm events and adversely impact cold water fisheries. Accordingly, stormwater discharges are to be consistent with the thermal criteria found in Part 704 of the Water Quality Regulations, Title 6, Chapter X, New York State Codes, Rules and Regulations.

² In addition to paved surface areas and areas covered by roofed structures, the contributory area for which the first 1/2-inch of runoff is to be controlled includes lawn and similarly landscaped surfaces.

3. Hierarchy of Methods for Managing Stormwater Quality (See Design guidelines for controlling the first one-half inch of runoff starting on page 8): The following stormwater management systems, summarized in descending order of preference, are to be used to control the first flush when designing stormwater facilities. The practices are:

- a) infiltration
- b) retention, and
- c) extended detention.

When a stream supporting a cold water fishery is the object of protection, extended detention should be placed ahead of retention in the hierarchy. A combination of these practices, including stormwater management adjuncts may be used to achieve first flush control objectives. Justification for the rejection of practices listed as having a higher priority must be provided prior to acceptance of a Stormwater Management Plan by the Planning Board.

a) Infiltration

Infiltration of runoff on-site by use of vegetated depressions and buffer areas, pervious surfaces, drywells, infiltration basins and trenches permits immediate recharge of groundwater and aids quality treatment through soil filtration. This practice eliminates or minimizes direct stormwater discharges to a waterbody and provides thermal benefits to cold water fisheries.

b) Retention

Retention by use of wet ponds and wetlands constructed in upland areas provides for the storage of collected runoff in a holding area prior to release in a waterway allowing quality treatment by sedimentation, flocculation, and biological removal. Retention is used when post-development runoff volume is expected to exceed the capabilities of infiltration. Summer temperatures of

water in a retention facility may exceed temperatures required to sustain a cold water fishery, therefore, retention is not appropriate where stored (warm) water in a retention facility is displaced by storm runoff and discharged to a trout stream in contrast of Part 704 standards.

c) Extended Detention

Extended detention provides for the temporary storage of collected runoff in a holding area prior to release into a waterway. Settling is the primary pollutant removal mechanism associated with extended detention. Extended detention can provide thermal benefits to trout streams. By using a perforated, low flow drain pipe encased in a gravel jacket having an adequate mass, extended detention may be used to dissipate heat and cool stormwater runoff prior to its discharge to a trout stream.

d) Stormwater Management Adjuncts

Flow and pollutant attenuation by use of open vegetated swales, vegetated buffer zones, or filter strips, provides water quality treatment by filtration, attenuation, buffering, sedimentation, biological removal and particle retention. These practices should be used to complement infiltration, retention or extended detention.

**Subdivision Regulations
Design Guidelines for Controlling
The First One-Half Inch of Runoff**

Following are design guidelines for controlling the first one-half (1/2) inch of runoff from contributory drainage.

A. Infiltration

1. Infiltration systems should be designed to capture the first one half inch of stormwater runoff from impervious surfaces, lawns and similarly landscaped areas in the development site. Storm water volumes in excess of this amount should be managed for quantity control by supplemental practices.

2. Infiltration systems should incorporate measures which:

- a. Recognize that the recommended design time to drain stored runoff from an infiltration system depends on the specific method or practice. Accordingly, the following ponding or storage times represent the maximum design time period for the referenced facility:

<u>TYPE</u>	<u>TIME (24 - hour days)</u>
Infiltration Basin	5
Infiltration Trench	15
Dry Wells	15
Porous Pavement	2
Vegetated Depression	1

- b. Ensure that infiltration measures are placed at least one-hundred (100) feet from septic systems and water supply wells.
- c. Recognize that soils with infiltration rates less than 0.5 inches per hour are unsuitable for infiltration measures.
- d. Provide for a vertical separation distance of at least 4 feet between the bottom of the infiltration system and the seasonably high groundwater table or bedrock. (The excavation of an inspection trench/pit or soil borings at the proposed site of the infiltration facilities to determine the elevation of

bedrock and groundwater, and the documentation of such tests must be conducted under the direction of a professional engineer, architect, or landscape architect licensed to practice in New York State.)

- e. Trap excess loads of sediment, grease, oils, and settleable solids and other objectionable materials including floatable organics materials from roadways, parking surfaces, and similar paved areas before they enter the infiltration system.
- f. Route design runoff flows through an infiltration basin without scouring or eroding the basin floor and clogging the surface soil pores.
- g. Route base floor (if any exists) rapidly through the basin to prevent ponding or standing water.
- h. Distribute storm water runoff volume evenly over the floor of the basin to maximize exfiltration rates.
- i. Provide for safe emergency overflow with measures to provide a non-erosive velocity or flow along its length and at the outfall.
- j. Infiltration systems should not receive runoff until the entire contributory drainage area to the infiltration system is permanently stabilized.
- k. Placement of infiltration facilities in areas which have been filled is unacceptable. Compacted fill material loses permeability and the in-situ/fill material interface may cause slope failure due to slippage.
- l. If on-site septic systems are to be used, soils must be able to accommodate loading from both on-site infiltration facilities and on-site septic systems.

B. Retention

1. Retention (Wet) Ponds

- a. Retention is the preferred method of stormwater management when the water table or bedrock is too high for infiltration and soils are poorly drained. Retention improves stormwater quality by gravity settling, naturally occurring chemical flocculation, and biological uptake.
- b. Wet ponds (another term for retention pond) should not be constructed by impounding existing wetlands unless authorized by the DEC under Article 24 Freshwater Wetlands Act. If existing wetlands are to be located in an anticipated permanent pool area, the maximum normal pool elevation should not increase mean water depth in the wetland area.
- c. Retention ponds should be enhanced with areas of shallow water habitat for additional water quality benefits. Retention ponds also can be part of a created shallow water wetland design, (see use of wetlands for stormwater management, subsection B.2).
- d. Retention ponds (other than shallow marshes addressed in subsection B.2.b) should be designed as follows:
 1. pond geometry should provide for complete mixing of inflow before discharging.
 2. in larger ponds, diversion barriers such as small islands should be used to increase effective length of flow and permit maximum mixing.
 3. the depth of the pond will vary depending on its intended use. The pond contour should include:
 - i an average pond depth of three (3) to six (6) feet;
 - ii a shallow area six (6) inches to two (2) feet deep at the inlet;
 - iii a littoral area or bench ten (10) feet in width along the perimeter to promote marsh habitat for filtering and nutrient removal; and
 - iv an area eight (8) feet to fourteen (14) feet in depth to promote gravity settling and fish habitat.
 4. the minimum drainage area to be served by a wet (retention) pond should be approximately 10 acres. Soils should have infiltration rates less than 0.5 inches/hour.
 5. if soils are so porous that an unreasonably large drainage area is required to sustain a relatively small pond, then infiltration practices should be used.
 6. the residence time of pond water should be twenty-four (24) to forty (40) hours to remove a minimum of two-thirds of the suspended solids and other pollutants from the incoming stormwater. For removal of phosphorus compounds in lake watersheds where eutrophication is a threat or problem, larger volume ponds should be designed to provide a fourteen (14) day residence time.
 7. retention ponds should accommodate up to ten (10) year storm volumes. The minimum volume retained should be that associated with the first one-half inch of runoff. Excess volumes, for example, the one-hundred (100) year storm, may be detained.
 8. velocity dissipation devices should be placed at the outfall of all retention structures and along the length of any outfall channel as necessary to provide a non-erosive velocity of flow from the structure to water course. Velocity dissipation devices may be required in stream channels at outfall locations to prevent erosion and fisheries habitat degradation. Pursuant to Article 15 of the Environmental Conservation Law, a Protection of Waters Permit may have to be obtained in order to install

in-stream velocity dissipation devices in protected streams.

9. the construction of wet (retention) ponds in and around class AA, A, B, C(T) and (TS) streams (water suitable for trout) may not be appropriate to protect these waters and are not be permitted except where, pursuant to 6 NYCRR Part 704 of the Water Quality Regulations, Title 6, Chapter X, retention will not be injurious to cold water fisheries or their habitat. This practice may elevate water temperatures as well as reduce dissolved oxygen levels.

10. pursuant to Article 15-0503 of the Environmental Conservation Law, approval for construction of a dam for a stormwater retention facility may have to be obtained from DEC.

2. Use of Wetlands

The use of wetlands for stormwater management is receiving increased attention. Wetlands are known to provide water quality benefits by filtering and trapping suspended solids including sediment, chemical adsorption, biological assimilation, microbial decomposition and chemical decomposition.

a. Use of Existing Wetlands

1. It is not acceptable to discharge untreated stormwater directly into naturally existing wetlands. Direct, untreated discharges may overload the natural system, and make it impractical to manage (e.g., by periodic sediment removal) resulting in contamination of the wetland and accelerated succession. Direct discharges also may alter the hydrology and hydroperiod of the wetland, which may significantly alter the vegetative community therein.
2. Incorporating an existing wetland in its natural state into a well-designed stormwater management plan may be

an acceptable method of stormwater management when adverse impacts to the wetland can be avoided. Natural wetlands should be used only for final polishing after pre-treatment by preliminary practices, such as infiltration, retention or extended detention. In these situations, ultimate discharge to the natural wetland may maintain base flow into the system, thereby helping to maintain the health of the wetland.

3. Except as provided for in subsection B. (1) b., natural wetlands shall not be impounded for the creation of either wet or dry ponds.

b. Use of Artificially Created Wetlands

1. Wetlands may be created as part of a stormwater management plan to provide water quality improvement. They may enhance treatment provided by wet ponds and create extended detention areas by enlarging the wetland portions of existing basins.
2. A created wetland also can provide first-flush treatment when one or more smaller ponds are included. Such a design will be essential if no other pre-treatment practices are used. In the winter when vegetative uptake mechanisms are absent, a pond in the wetland retains higher levels of nitrogen compounds which would otherwise escape downstream.

c. Factors for Consideration in designing Created Wetlands

1. Location - the preferred locations are: upland areas adjacent to, but separated from, existing streams and wetlands by vegetated filter strips wide enough to provide a buffer; in an upland extended detention basin; or as a forebay to a wet pond or detention basin.

2. **Hydraulic design** - specific stormwater management plan criteria must be determined for each site to ensure the created wetland is sufficient to meet the demands being placed on it and to determine hydrologic impacts to receiving wetlands, if any.
3. **Expected inflows** - inflows may be composed of stormwater surface water or groundwater. Stormwater should be introduced to wetlands as sheet flow whenever possible. If inflow is conveyed through the outfall, a forebay is necessary. Incoming velocities should not exceed 4 feet per second during two (2) year storm events.
4. **Shape and depth** - shallow ponds do not have as long a residence time as deeper ponds. Therefore, caution should be used in substituting deep ponds with shallow marshes. However, the water quality values provided by the substrate, biota and vegetation in wetlands may provide services not provided by deeper ponds. It is important to determine what water quality improvement is needed and whether ponds or wetlands better serve that need.

When creating wetlands, seventy-five (75) percent of the wetland should be eighteen (18) inches or shallower. Twenty-five (25) percent of the total surface area should be reserved for open water areas that are deeper than eighteen (18) inches. However, if the water exits the wetland through an outlet structure, the outlet should be located in water approximately three (3) feet deep. Similarly, if a forebay is used, it should be at least three (3) feet deep and comprise ten (10) percent of the total wetland and pond volume.

5. **Vegetative composition** - the plant species selected should be compatible with the physical nature of the wetland (e.g., depth), the climate conditions of the area, and their tolerance to the

presence of pollutants. A planting scheme and schedule should be incorporated into the stormwater management plan.

C Extended Detention

1. Extended detention ponds may be used to enhance water quality in stormwater runoff. Extending the detention time of dry or wet ponds is an effective, low cost means of removing particulate pollutants and controlling increases in downstream bank erosion. Extended detention is preferred over retention where there is a need to maintain stream temperatures in support of a trout fishery pursuant to the thermal criteria found in Part 704 of the Water Quality Regulations, Title 6, Chapter X.

2. When extended detention ponds are used, they may be acceptable with the following conditions:

- a. The "first-flush" runoff volume (i.e., the first one-half inch of runoff from the contributory drainage) should be extended over a 24-hour detention period.
- b. Stormwater runoff volume generated from a one-inch storm should be released over a 24-hour detention period. The control device should be adjusted so that smaller runoff events (0.1 to 0.2 inches), which normally pass through the pond quickly, are detained for at least a minimum of six hours. In larger watersheds, up to forty (40) hours of extended detention may be needed for streambank erosion control.
- c. Pond outfall velocities should not exceed four (4) feet per second during two (2) year storm events.
- d. Velocity dissipation devices should be placed at the outfall of all extended detention structures and along the length of any outfall channel as necessary to provide a non-erosive velocity of flow from the structure to a water course. Velocity dissipation devices may be required in stream channels at outfall locations to prevent erosion and fisheries

habitat degradation. Pursuant to Article 15 of the Environmental Conservation Law, a Protection of Waters Permit may have to be obtained in order to install in-stream velocity dissipation devices in protected streams.

- e. Pursuant to Article 15-0503 of the Environmental Conservation Law, approval for construction of a dam for a stormwater detention facility may have to be obtained from DEC.

D. Stormwater Management Adjuncts

Relatively small volumes of stormwater can be managed entirely by flow and pollutant attenuation practices (i.e., drainage from less than 1 acre or relatively small storms). Therefore, flow and pollutant attenuation practices usually are used to supplement other practices. Under this practice, stormwater should be managed as sheetflow to the extent possible and have velocities less than four (4) feet per second during two (2) year storm events. The following design criteria should be considered when vegetative swales or filter strips are used to control stormwater runoff.

1. Vegetative swales

- a. Vegetative swales typically are applied in single family residential developments and highway medians as an alternative to curb and gutter drainage systems. When individual lots are greater than one half (1/2) acre, open section roadways with vegetated swales and check dams are preferred over curb and gutter management systems for stormwater conveyance. In designing and constructing swales:
- b. Small slopes in the flow of swales should be graded as close to zero as drainage will permit. Side-slopes of swales should be no greater than 3:1.
- c. A dense cover of water tolerant, erosion resistant grass must be established. Reed canary grass is recommended for this purpose. Swale grasses should not be mowed close to the ground, as this impedes the filtering and hydraulic

functions of the swale. Also, if a swale is adjacent to a roadway, sensitive species with a low salt tolerance (e.g., bluegrass) should be avoided.

- d. Underlying soils should have a percolation rate of at least one half (1/2) inch per hour.
- e. The swale should be tilled before the grass cover is established to restore infiltration capacity lost as a result of prior construction activities.
- f. Check dams can be installed in swales to promote additional infiltration. A preferred method is to sink a railroad tie halfway into the swale, and place stones on the downstream side to prevent a scour hole from forming. If a check dam is used, the designer should make sure that the maximum ponding time of runoff backed up behind the check dam does not exceed twenty-four (24) hours.

2. Filter Strips

- a. Filter strips do not provide enough storage or infiltration to effectively reduce peak discharges to pre-development levels for design storms. Filter strips are however, viewed as one component of an integrated stormwater management system.
- b. The top edge of the filter strip should follow across the same elevational contour. If a section on the top edge of the strips dips below the contour, it is likely that runoff will eventually form a channel toward the low spot.
- c. A shallow stone trench which follows the contour can be used as level spreader at the top of the strip to distribute flow evenly.
- d. The top edge of the filter strip should directly abut the contributing impervious area otherwise, runoff may travel along the top of the filter strip rather than through it. Berms can be placed at fifty (50) to one-hundred (100) foot intervals perpendicular to the top edge of the filter

strip to prevent runoff from by-passing the strip.

- e. As an absolute minimum, a grass strip should be at least twenty (20) feet wide. Improved performance can be achieved if the strip is fifty (50) to seventy-five (75) feet wide, plus an additional four (4) feet wide per each one percent of slope at the site (particularly if it is a forested strip).
- f. Wooded filter strips are preferred to grassed strips. If an existing wooded belt cannot be preserved at the project site, the grassed strip should be managed to gradually become wooded by intentional plantings.
- g. If a filter strip has been used as a sediment control measure during the construction phase, it is advisable to regrade and reseed the top edge of the strip. Otherwise, the sediment trapped in the filter strip may affect the flow patterns across the strip, thereby reducing its effectiveness.

E. References

The basic design criteria, methodologies and construction specifications for stormwater management should be those of the Soil Conservation Service, the Soil and Water Conservation Society, the Department of Environmental Conservation, and the Metropolitan Council of Governments which may be found in the most current editions of the following publications and their subsequent revisions:

1. Empire State Chapter, Soil and Water Conservation Society, New York Guidelines for Urban Erosion and Sediment Control. Syracuse, 1988.
2. Soil Conservation Service. "Urban Hydrology for Small Watersheds", Technical Release No., 55. June 1986.
3. Soil Conservation Service. "Engineering Field Manual", latest edition, as applicable.

4. "Soil Conservation Service Standards and Specifications for Ponds." Specifications No, 378. July 1981. (This document allows for use of metal pipe risers. Steel structures may corrode in 20 years or less. Therefore, use materials other than steel, especially in aggressive environments.)

5. U.S. Department of Agriculture, Soil Conservation Service, Ponds - Planning Design, Construction. Agriculture Handbook No. 590. 1982.

6. New York State Department of Environmental Conservation, "Guidelines for Design of Dams", Revised January 1988.

7. New York State Department of Environmental Conservation, "An Owners Guidance Manual for the Inspection and Maintenance of Dams in New York State". June 1987.

8. New York State Department of Environmental Conservation. "Stream Corridor Management: A basic Reference Manual." Albany, 1986

9. Metropolitan Washington Council of Governments, Controlling Urban Runoff: A practical Manual for Planning and Designing Urban BMPs. July 1987.