

## **Chapter 11. FLOODING AND STORMWATER MANAGEMENT**

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## ARTICLE II. STORMWATER MANAGEMENT

### Sec. 11-20. Authority and Purpose.

11-2001. This ordinance is enacted pursuant to the police powers granted to the County of Whiteside by the Illinois Compiled Statutes (Chapter 55, Sections 5/5-1041).

11-2002. The purpose of this ordinance is to diminish threats to public health, safety and welfare caused by runoff of excessive stormwater from new development and redevelopment. This excessive stormwater could result in the inundation of damageable properties, the erosion and destabilization of downstream channels, and the pollution of valuable stream and lake resources. A cause of increases in stormwater runoff quantity and rate and impairment of quality is the development and improvement of land and as such this ordinance regulates these activities to prevent adverse impacts.

11-2003. This ordinance is adopted to accomplish the following objectives:

- (1) To assure that new development does not increase the drainage or flood hazards to others, or create unstable conditions susceptible to erosion;
- (2) To protect new buildings and major improvements to buildings from flood damage due to increased stormwater runoff;
- (3) To protect human life and health from the hazards of increased flooding on a watershed basis;
- (4) To lessen the burden on the taxpayer for flood control projects, repairs to flood-damaged public facilities and utilities, correction of channel erosion problems, and flood rescue and relief operations caused by increased stormwater runoff quantities from new development;
- (5) To protect, conserve, and promote the orderly development of land and water resources;
- (6) To preserve the natural hydrologic and hydraulic functions of watercourses and floodplains and to protect water quality and aquatic habitats;
- (7) To preserve the natural characteristics of stream corridors in order to moderate flood and stormwater impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.

11-2004. The provisions of this Ordinance further supplement Ordinances regulating:

- (1) The subdivision layout and improvement of lands located within unincorporated Whiteside County as regulated by Chapter 19, Zoning and Subdivision Ordinance, of the Whiteside County Code.
- (2) The excavating, filling and grading of lots and other parcels or areas.
- (3) The construction of buildings and the drainage of sites on which those structures are located, to include parking and other paved areas, as regulated under Chapter 19, Zoning and Subdivision Ordinance, of the Whiteside County Code.
- (4) The design, construction and maintenance of stormwater drainage facilities and systems.
- (5) Any development covered by Chapter 11, Article I. Flood Prevention and Protection, of



the Whiteside County Code.

- (6) Development as covered under the U. S. Environmental Protection Agency National Pollutant Discharge Elimination System (NPDES) Phase II regulations. It shall be the responsibility of any developer, who disturbs one or more acres of land after March 1, 2003, to comply with NPDES Phase II regulations.

#### **Sec. 11-21. Definitions.**

*Adverse Impacts:* Any deleterious impact on water resources or wetlands affecting their beneficial uses including recreation, aesthetics, aquatic habitat, quality, and quantity.

*Applicant:* Any person, firm, or governmental agency who executes the necessary forms to procure official approval of development or permit to carry out construction of a development from the County.

*Base Flood Elevation:* The elevation at all locations delineating the level of flooding resulting from the 100-year frequency (1%) flood event.

*Best Management Practice (BMP):* A measure used to control the adverse stormwater-related effects of development. BMP's include, but are not limited to, structural devices (e.g., swales, filter strips, infiltration trenches, and detention basins. Refer to the current acceptable standards shown in the Environmental Protection Agency Urban Manual and/or the Soil and Water Conservation District standards.) designed to remove pollutants, reduce runoff rates and volumes, and protect aquatic habitats. BMP's also include non-structural approaches, such as public education efforts to prevent the dumping of household chemicals into storm drains.

*Bypass Flows:* Stormwater runoff from upstream properties tributary to a property's drainage system but not under its control.

*Channel:* Any river, stream, creek, brook, branch, natural or artificial depression, ponded area, flowage, slough, ditch, conduit, culvert, gully, ravine, wash, or natural or manmade drainageway, which has a definite bed and bank or shoreline, in or into which surface or groundwater flows, either perennially or intermittently.

*Channel Modification:* Alteration of a channel by changing the physical dimensions or materials of its bed or banks. Channel modification includes damning, riprapping (or other armoring), widening, deepening, straightening, relocating, lining, and significant removal of bottom or woody rooted vegetation. Channel modification does not include the clearing of debris or removal of trash.

*Compensatory Storage:* An artificially excavated, hydraulically equivalent volume of storage within the floodplain used to balance the loss of natural flood storage capacity when fill or structures are placed within the floodplain.

*Conduit:* Any Channel, pipe, sewer or culvert used for the conveyance or movement of water, whether open or closed.

*Detention Basin:* A facility constructed or modified to provide for the temporary storage of stormwater runoff and the controlled release by gravity of this runoff at a prescribed rate during and after a flood or storm.

*Detention Time:* The mean residence time of stormwater in a detention basin.

*Development:* Any man-made change to real estate, including:

- (1) Preparation of a plat of subdivision for three (3) or more parcels;

- (2) Construction, reconstruction, placement of a building for commercial or industrial purposes or any addition to a building for business or industrial purposes or any improvement to the property or site.
- (3) Redevelopment of a site for commercial and/or industrial purposes;
- (4) Filling, dredging, grading, clearing, excavating, paving, or other non-agricultural alterations of the ground surface;
- (5) Storage or stockpiling of materials or deposit of non-agricultural solid or liquid waste;
- (6) Any other activity that might alter the magnitude, frequency, deviation, direction, or velocity of stormwater flowing from a property.

*Drainage Plan:* A plan, including engineering drawings and supporting calculations, which describes the existing stormwater drainage system and environmental features, as well as the drainage system and environmental features which are proposed after development of a property.

*Dry Basin:* A detention basin designed to drain completely after temporary storage of stormwater flows and to normally be dry over the majority of its bottom area.

*Erosion:* the general process whereby earth is removed by flowing water or wave action.

*Excess Stormwater Run-off:* The volume and rate of flow of stormwater discharged from a developed drainage area which is or will be in excess of that volume and rate which pertained before development.

*Flood Fringe:* That portion of the floodplain outside of the regulatory floodway.

*Floodplain:* That land adjacent to a body of water with ground surface elevations at or below the FEMA base flood elevation (1% or 100 year flood). The floodplain is also known as the Special Flood Hazard Area (SFHA).

*Flood Prone Area:* Property located in areas delineated as Zone B on Whiteside County's Flood Insurance Rate Maps or as Zone X on Whiteside County's Digital Flood Insurance Rate Maps, which are subject to occasional flooding.

*Floodway:* The channel and that portion of the floodplain adjacent to a stream or water-course which is needed to store and convey the base flood as defined in Chapter 11, Article I, Section 11-2.

*Hydrograph:* A graph showing for a given location on a stream or conduit, the flow-rate with respect to time.

*Infiltration:* The passage or movement of water into the soil surfaces.

*Major Drainage System:* That portion of a drainage system needed to store and convey flows beyond the capacity of the minor drainage system.

*Minor Drainage System:* That portion of a drainage system designed for the convenience of the public. It consists of street gutters, storm sewers, small open channels, and swales and where manmade, is usually designed to handle the 10-year runoff event or less.

*Mitigation:* Mitigation includes those measures necessary to minimize the negative effects which stormwater drainage and development activities might have on the public health, safety and welfare.



Examples of mitigation include compensatory storage, soil erosion and sedimentation control, and channel restoration.

*Natural:* Conditions resulting from physical, chemical, and biological processes without intervention by man.

*One Hundred-Year (1%) Event:* A rainfall, runoff, or flood event having a one percent chance of occurring in any given year.

*Positive Drainage:* Provision for overland paths for all areas of a property including depressional areas that may also be drained by storm sewer.

*Peak Flow:* The maximum rate of flow of water at a given point in a channel or conduit.

*Property:* A parcel of real estate.

*Regulatory Floodway:* The channel, including on-stream lakes, and that portion of the floodplain adjacent to a stream or watercourse as designated by the Illinois Department of Natural Resources, Office of Water Resources (OWR), which is needed to store and convey the existing and anticipated future 100-year (1%) frequency flood discharge with no more than 0.1 foot increase in stage due to the loss of flood conveyance or storage, and no more than a ten percent (10%) increase in velocities. The regulatory floodways are designated for Whiteside County streams on the Flood Insurance Rate Maps (FIRM's) prepared by FEMA and dated February 28, 1986 or the Digital Flood Insurance Rate Maps (DFIRM's) when such maps become available or as may be updated from time to time. To locate the regulatory floodway boundary on any site, the regulatory flood-way boundary should be scaled off the FIRM's and located on a site plan, using reference marks common to both maps. Where interpretation is needed to determine the exact location of the regulatory floodway boundary, the OWR should be contacted for the interpretation.

*Retention Basin:* A facility designed to completely retain a specified amount of stormwater runoff without release except by means of evaporation, infiltration, emergency bypass or pumping.

*Sedimentation:* The process that deposits soils debris, and other materials either on other ground surfaces or in bodies of water or stormwater drainage systems.

*Stormwater Drainage System:* All means, natural or man-made, used for conducting stormwater to, through or from a drainage area to the point of final outlet from a property. The stormwater drainage system includes but is not limited to any of the following: conduits and appurtenance features, canals, channels, ditches, streams, culverts, streets, storm sewers, detention basins, swales and pumping stations.

*Stormwater Runoff:* The waters derived from melting snow or rain falling within a tributary drainage basin which are in excess of the infiltration capacity of the soils of that basin, which flow over the surface of the ground or are collected in channels or conduits.

*Storm Sewer:* A closed conduit for conveying collected stormwater.

*Time of Concentration:* the elapsed time for stormwater to flow from the most hydraulically remote point in a drainage basin to a particular point of interest in that watershed.

*Tributary Watershed:* All of the land surface area that contributes runoff to a given point.

*Two-year Event:* A runoff, rainfall, or flood event having a fifty percent (50%) chance of occurring in any given year.

*Urban Runoff Pollutants:* Contaminants commonly found in urban runoff which have been shown to

adversely affect uses in receiving water bodies. Pollutants of concern include sediment, heavy metals, petroleum-based organic compounds, nutrients, oxygen-demanding organics (BOD), pesticides, salt and pathogens.

*Wet Basin:* A detention basin designed to maintain a permanent pool of water after the temporary storage of stormwater runoff.

*Wetland Basin:* A detention basin designed with all or a portion of its bottom area as a wetland.

#### **Sec. 11-22. Applicability.**

This ordinance shall apply to any new residential developments having a gross aggregate impervious lot coverage of 50% or more; new residential developments having 3 or more dwelling units; any development in a Special Flood Hazard Area; for any new commercial, industrial, institutional or utility developments; and for any increases of impervious parking areas or conversions of gravel parking areas to an impervious surface at existing commercial, industrial, institutional or utility developments. When existing development is being added to, a drainage plan for the new development will not include the existing development as a part of the calculations. No final subdivision plat shall be approved and no zoning certificates shall be issued until and unless the drainage plan has been reviewed and approved by the County Engineer. When development, to which this Ordinance applies, occurs within one and one half (1½) miles of an incorporated municipality, and that municipality has a Stormwater Management Ordinance or Regulation, the more restrictive shall apply.

#### **Sec. 11-23. Drainage Permit Requirements Application Procedure and Duration.**

No person, firm, corporation, or governmental body not exempted by state law shall commence any development, as defined herein, without first obtaining a drainage permit from the County Engineer. The County Engineer shall not issue a permit if the proposed development does not meet the requirements contained herein. The Planning and Zoning Administrator shall sign no final plats or issue any permits for development until he/she receives a copy of the drainage permit from the County Engineer.

11-2301. Requirements: Every application for a drainage permit shall be accompanied by a drainage plan as required herein and such other information as may be required by the County Engineer for the proper enforcement of this Ordinance. Each applicant shall submit the following information, depending on development size, to ensure that the provisions of this ordinance are met. The submittal shall include sufficient information to evaluate the environmental characteristics of the property, the potential adverse impacts of the development on water resources both on-site and downstream, and the effectiveness of the proposed drainage plan in managing stormwater runoff. The applicant shall certify on the drawings that all clearing, grading, drainage, and construction shall be accomplished in strict conformance with the drainage plan. The following information shall be submitted for both existing and proposed property conditions. Properties smaller than 10 acres shall submit only the Basic Drainage Plan called for in Section 11-24. Properties larger than 10 acres shall comply with the submittal requirements of both the Basic Drainage Plan of Section 11-24 and the Advanced Drainage Plan of Section 11-25.

11-2302. Application Procedure: When development, as defined herein, is proposed that would not require the approval of a subdivision Final Plat, a Zoning Permit or a Special Flood Hazard Arcas Development Permit, the applicant shall submit one application for a drainage permit each to both the County Engineer and the Planning and Zoning Administrator. When development, as defined herein, is proposed that would also require:

- (1) the approval of an applicable subdivision Final Plat by the Planning and Zoning Administrator, the applicant shall submit a copy of the drainage permit application cover letter to the Planning and Zoning Administrator and a full application for a drainage



permit to the County Engineer along with the submission of a Preliminary Plat as required by the Whiteside County Subdivision Regulations; or,

- (2) the issuance of a Zoning Permit by the Whiteside County Zoning Planning and Zoning Administrator, the applicant shall submit a copy of the drainage permit application cover letter to the Planning and Zoning Administrator and a full application for a drainage permit to the County Engineer along with the submission of an application for a Zoning Permit as required by the Whiteside County Zoning Ordinance; or,
- (3) the issuance of a Special Flood Hazard Areas Development Permit by the Whiteside County Planning and Zoning Administrator, the applicant shall submit a copy of the drainage permit application cover letter to the Planning and Zoning Administrator and a full application for a drainage permit to the County Engineer along with the submission of an application for a Special Flood Hazard Areas Development Permit as required by the Whiteside County Flood Prevention and Protection Ordinance.

#### 11-2303. Basic Drainage Permit and Application Forms:

A Basic Drainage Permit application shall include a cover letter, a copy of which shall be submitted to the Planning and Zoning Office, and the following:

- (1) Name(s), address(es) and telephone numbers of the owner and developer of the site, the contractor(s) and of any consulting firm retained by the applicant identifying the principal contractor.
- (2) Certification that all construction covered by the grading and drainage permit will be undertaken in compliance with this article.
- (3) A sketch acceptable to the County Engineer or his/her designee showing the amount of impervious area being created.
- (4) A sketch acceptable to the County Engineer or his/her designee showing the amount of disturbed ground area being created.
- (5) An application fee.

#### 11-2304. Advanced Drainage Permit Application:

- (1) A completed application form shall include a cover letter, a copy of which shall be submitted to the Planning and Zoning Office, and the following:
  - (a) Name(s), address(es) and telephone numbers of the owner and developer of the site, the contractor(s) and of any consulting firm retained by the applicant identifying the principal contractor.
  - (b) Certification that any land clearing, construction, or development involving the movement of earth shall be in accordance with the plans approved upon issuance of the permit.
  - (c) An application fee as set may be required by the County of Whiteside.
  - (d) A faithful performance bond or bonds, letter of credit, or other improvement security satisfactory to the County Engineer or his/her designees in an amount deemed sufficient by the County Engineer or his/her designee to cover all costs of improvements,

landscaping, maintenance of improvements and landscaping, and soil erosion and sediment control measures for such period as specified by the County Engineer or his/her designees to cover the cost of failure or repair of improvements installed on the site on a form acceptable to the County Engineer or his/her designees. Upon satisfactory completion of the improvements, the documented security would be void.

(e) The following information shall be submitted for both existing and proposed property conditions for all applicable developments: a topographic survey of the property at two foot (2') contours (or 1 foot contours for relatively flat areas where additional detail will be required to see drainage designs) unless otherwise specified or approved by the County Engineer or his/her designees keyed to a consistent datum specified by the County Engineer or his/her designees; and an existing drainage and proposed drainage plan for the property and one hundred feet (100') surrounding the property at a scale of not more than one hundred feet (100') to one inch (1"), and including the following (unless otherwise specified by the County Engineer or his/her designees):

- i. Property boundary, dimensions, and approximate acreage.
- ii. Building setback lines.
- iii. All existing and proposed structures and sizes.
- iv. Square feet of existing and proposed impervious surface.
- v. All existing, or proposed easements.
- vi. All existing, abandoned, or proposed water or monitoring wellhead locations.
- vii. All existing, abandoned, or proposed water mains.
- viii. All sanitary or combined sewer lines and septic systems.
- ix. The banks and centerline of streams and channels.
- x. Shoreline of lakes, ponds, and detention basins with normal water level elevation.
- xi. Farm drains and tiles.
- xii. Location, size and slope of storm water conduits and drainage swales.
- xiii. Detention facilities.
- xiv. Roads, streets and associated storm water inlets including finished grades.
- xv. Base flood elevation, flood fringe, and regulatory floodway.
- xvi. A vicinity map showing the relationship of the site to its general surroundings at a scale of not less than two thousand feet (2,000') to one inch (1").
- xvii. Title, scale, north arrow, legend, seal of licensed professional engineer, date, and name of person preparing plans.
- xviii. Sub-watershed boundaries within the property.



xix. Abandoned mines.

xx. Soil classifications.

(f) The following certifications and design statements shall be provided:

i. Basis of design for the final drainage system components.

ii. A statement giving any applicable engineering assumptions and calculations.

iii. A statement by the design engineer of the drainage system's provision for handling events greater than the 100-year, 24-hour runoff.

iv. Design calculations and other submittals as required by this ordinance.

v. A statement of certification of all drainage plans, calculations, and supporting data by a licensed professional engineer.

(g) A depiction of environmental features of the property and immediate vicinity including the following:

i. The limits of designated regulatory and non-regulatory wetland areas.

ii. The location of trees greater than eight inches (8") in diameter in areas to be disturbed.

iii. Any designated natural areas or prime farmland.

iv. Any proposed environmental mitigation features.

(h) Any and all local, state or federal maps marked to reflect any proposed change in the floodway delineation, base flood, or 100-year frequency flood elevation will change due to the proposed project.

(i) Conditional approval by FEMA or other regulatory agencies of the proposed changes in the floodway map that have been made if the floodway delineation, base flood, or 100-year frequency flood elevation will change due to the proposed project.

(j) Engineering calculations and data supporting all proposed plans. Hydrologic design shall be completed in accordance with the hydrologic design criteria of this ordinance. Detention system design shall be completed in accordance with this ordinance.

(k) If the project involves channel modification, the following information shall be submitted:

i. A discussion of the purpose and need for the proposed work.

ii. Discussion of the practicability of using alternative locations or methods to accomplish the purpose of the proposed work.

iii. Analysis of the impacts of the proposed project, considering cumulative effects on the physical and biological conditions of the body of water affected.

iv. Additional information as required by this ordinance.

11-2305. Duration of Drainage Permit: When the County Engineer has issued a drainage permit, such permit shall become null and void six (6) months after the date thereof unless the authorized development is commenced within such period. (Ord. #2, 4-19-11)

**Sec. 11-24. Basic Drainage Plan.**

11-2401. Topographic Map: A topographic survey of the property at two foot contours under existing and proposed conditions, and areas upstream and downstream, necessary to determine off-site impacts of the proposed drainage plan. One foot intervals may be required if deemed necessary by the County Engineer. The map shall be keyed to USGS elevations in English units as specified by the County.

11-2402. Drainage System: Mapping and descriptions, where relevant, of existing and proposed drainage system features of the property and immediate vicinity including:

- (1) the banks and centerline of streams and channels;
- (2) shoreline of lakes, ponds, and detention basins;
- (3) farm drains and tiles;
- (4) sub-watershed boundaries within the property;
- (5) watershed soils classifications;
- (6) the property's location within the larger watershed;
- (7) location, type, size and slope of stormwater conduits and drainage swales;
- (8) sanitary or combined sewers;
- (9) existing depressional storage areas;
- (10) delineation of upstream and downstream drainage features and watersheds which might be affected by the development;
- (11) detention facilities;
- (12) roads and streets and associated stormwater inlets;
- (13) base flood elevation, and regulatory floodway where identified for the property; and
- (14) basis of design for the final drainage network components, including supporting calculations.

11-2403. Environmental Features: A depiction of environmental features of the property and immediate vicinity including the following:

- (1) the limits of wetland areas as depicted upon the appropriate Wetland Delineation Map from the USDA Soil Conservation Service and/or the U. S. Fish and Wildlife Service National Wetland Inventory maps.
- (2) any designated natural areas; and
- (3) any proposed environmental mitigation features.

11-2404. Erosion and Sedimentation Plan: A plan depicting the methods utilized to control erosion and sedimentation with BMP's.

**Sec. 11-25. Advanced Drainage Plan.**

The same information as required in Section 11-24 is required for properties larger than 10 acres along with the following additional information for the minor drainage system's design runoff event and the 100-year runoff event of critical duration:

- (1) elevations and maps of 100-year flooding;
- (2) cross-section data for open channel flow paths and designated overland flow paths;



- (3) direction of stormflows;
- (4) flow rates and velocities at representative points in the drainage system; and
- (5) a statement by the design engineer of the drainage system's provisions for handling events greater than the 100-year's runoff including flowpaths and areas of inundation.

#### **Sec. 11-26. Minimization of Increases in Runoff Volumes and Rates**

In the selection of a drainage plan for a development, the applicant shall evaluate and implement, where practicable, site design features which minimize the increase in runoff volumes and rates from the site. The applicant's drainage plan submittal shall include evaluations of site design features which are consistent with the following hierarchy:

- (1) Minimize impervious surfaces on the property, consistent with the needs of the project and current development regulations;
- (2) Attenuate flows by use of open vegetated swales and natural depressions and preserve existing natural stream channels;
- (3) Infiltrate runoff on-site;
- (4) Provide stormwater retention structures;
- (5) Provide stormwater detention structures; and
- (6) Construct storm sewers.

#### **Sec. 11-27. Water Quality and Multiple Uses**

The drainage system should be designed to minimize adverse water quality impacts downstream and on the property itself. Detention basins shall incorporate design features to capture stormwater runoff pollutants. In particular, designers should give preference to wet bottom and wetland designs and all flows from the development shall be routed through a basin (i.e., low flows shall not be bypassed). Retention and infiltration of stormwater shall be promoted throughout the property's drainage system to reduce the volume of stormwater runoff and to reduce the quantity of runoff pollutants.

The drainage system should incorporate multiple uses where practicable. Uses considered compatible with stormwater management include open space, aesthetics, aquatic habitat, recreation (boating, trails, playing fields), wetlands and water quality mitigation. The applicant should avoid using portions of the property exclusively for stormwater management.

#### **Sec. 11-28. Design Criteria, Standards, and Methods**

11-2801. Release Rates: The drainage system for a property shall be designed to control the peak rate of discharge from the property for the two-year, 24-hour and 100-year, 24-hour events to levels which will not cause an increase in flooding or channel instability downstream when considered in aggregate with other developed properties and downstream drainage capacities. The post-development peak discharge shall not exceed the pre-development peak discharge.

11-2802. Detention Basin Outlet Design: Backwater on the outlet structure from the downstream drainage system shall be evaluated when designing the outlet.

11-2803. Detention Storage Requirements: The design maximum storage to be provided in a detention basin shall be based on the runoff from the 100-year, 24-hour event and reservoir (also called modified pool or level pool) routing or equal. Detention storage calculations using hydrograph methods as described in this section is preferred for all developments, but is required for all areas over 10 acres.

11-2804. Drainage System Design and Evaluation: The following criteria should be used in evaluating and designing the drainage system. The underlying objective is to provide capacity to pass the 10-year peak flow in the minor drainage system and an overland flow path for flows in excess of the design capacity.

11-2805. Design Methodologies: Major and minor conveyance systems for areas up to 10 acres may be designed using the rational formula. The rational formula may also be used in sizing the minor drainage system for larger sites, however the hydrograph method is preferred. Runoff hydrograph methods as described in Section 704.0 must be used for major drainage system design for all systems with greater than 10 acres of drainage area, for all properties in a Flood Prone Area, and for the design of all detention basins. When using the rational method, runoff coefficients shall be in accordance with the Runoff Coefficient table for Whiteside County provided in the Appendix D.

11-2806. Positive Drainage: Whenever practicable, all areas of the property must be provided an overland flow path that will pass the 100-year flow at a stage at least 1 foot below the lowest foundation grade in the vicinity of the flow path. Overland flow paths designed to handle flows in excess of the minor drainage system capacity shall be provided drainage easements. Street ponding and flow depths shall not exceed curb heights by more than one inch.

11-2807. Methods for Generating Runoff Hydrographs: Runoff hydrographs shall be developed incorporating the following assumptions of rainfall amounts and antecedent moisture. Acceptable runoff hydrograph calculation methods would include, but not necessarily be limited to HEC-1, SCS TR 20, SCS TR 55 Tabular Method, etc.

11-2808. Rainfall: Unless a continuous simulation approach to drainage system hydrology is used, all design rainfall events shall be based on the Illinois State Water Survey's Bulletin 70. The SCS Type II distribution may be used as an alternate to the Huff distributions, and shall be used for hydrograph design methods.

11-2809. Antecedent Moisture: Computation of runoff hydrographs which do not rely on a continuous accounting of antecedent moisture conditions shall assume antecedent moisture condition II.

11-2810. Wet Detention Basin Design: Wet detention basins shall be designed to remove stormwater pollutants, to be safe, to be aesthetically pleasing, and as much as feasible to be available for recreational use.

(1) Wet Basin Depths: Wet basins shall be at least three feet deep, excluding near shore banks and safety ledges. If fish habitat is to be provided they shall be at least ten feet deep over twenty-five percent of the bottom area to prevent winter freeze-out.

(2) Wet Basin Shoreline Slopes: The side slopes of wet basins above the normal pool elevation shall not be steeper than 5 to 1 (horizontal to vertical).

(3) Permanent Pool Volume: The permanent pool volume in a wet basin at normal depth shall be equal to or greater than the runoff volume from its watershed for the two-year event.

11-2811 Wetland and Dry Detention Basin Design: In addition to the other requirements of this ordinance, wetland and dry basins shall be designed to remove stormwater pollutants, to be safe, to be aesthetically pleasing and as much as feasible to be available for multiple uses.



11-2812. Wetland and Dry Basin Drainage: Wetland and dry basins shall be designed so that the portion of their bottom area which is intended to be dry shall have standing water no longer than forty-eight hours for any runoff event less than the 100-year event. Underdrains directed to the outlet may be used to accomplish this requirement. Grading plans shall clearly distinguish the wet/wetland portion of the basin bottom from the dry portion. Ground slopes in the dry portions of detention basins shall be 1.5% or steeper slope.

11-2813. Erosion Protection: Outfalls into ponds and out of ponds shall be protected with erosion control measures. Such measures shall consider erosion from the entire range of events that the pond is designed to serve.

11-2814. Inlet and Outlet Orientation: To the extent feasible, the distance between detention inlets and outlets shall be maximized. If possible, they should be at opposite ends of the basin. There should be no low flow bypass between the inlet and outlet and paved low flow channels shall not be used.

11-2815. Temporary Stilling/Sedimentation Basins: A detention facility may be utilized as a temporary stilling/sedimentation basin for its drainage area. Restoration to design detention volume is required after construction is complete, or during construction if the pond has lost functionality due to the accumulation of sediment.

11-2816. Minimum Detention Outlet Size: Where a single pipe outlet or orifice plate is to be used to control discharge, it shall have a minimum diameter of 3 inches. If this minimum orifice size permits release rates greater than those specified in this section, and regional detention is not a practical alternative, alternative outlet designs shall be utilized which incorporate self-cleaning flow restrictors.

11-2817. Detention in Floodplains: The placement of detention basins within the floodplain is strongly discouraged because of questions about their reliable operation during flood events. However, the stormwater detention requirements of this ordinance may be fulfilled by providing detention storage within flood fringe areas on the project site provided the following provisions are met.

11-2818. Detention in Flood Fringe Areas: The placement of a detention basin in a flood fringe area shall require compensatory storage for 1.5 times the volume below the base flood elevation occupied by the detention basin including any berms. The release from the detention storage provided shall still be controlled consistent with the requirements of this section. The applicant shall demonstrate its operation for all streamflow and floodplain backwater conditions. Excavations for compensatory storage along watercourses shall be opposite or adjacent to the area occupied by detention. All floodplain storage lost below the ten-year flood elevation shall be replaced below the ten-year flood elevation. All floodplain storage lost above the existing ten-year flood elevation shall be replaced above the proposed ten-year flood elevation. All compensatory storage excavations shall be constructed to drain freely and openly to the watercourse.

11-2819. Detention in Floodways: Detention basins shall be placed in the floodway only in accordance with 11-2825.

11-2820. On-stream Detention: On-stream detention basins are discouraged but allowable if they provide regional public benefits and if they meet the other provisions of this ordinance with respect to water quality and control of the two year and 100-year, 24-hour events from the property. Further criteria are presented in Section 11-29 of this ordinance. If on-stream detention is used for watersheds larger than one square mile, it is recommended that the applicant use dynamic modeling to demonstrate that the design will not increase stage for any properties upstream or downstream of the property. Also, impoundment of the stream as part of on-stream detention:

- (1) shall not prevent the migration of indigenous fish species, which require access to

upstream areas as part of their life cycle, such as for spawning;

- (2) shall not cause or contribute to the degradation of water quality or stream aquatic habitat;
- (3) shall include a design calling for gradual bank slopes, appropriate bank stabilization measures, and a pre-sedimentation basin;
- (4) shall not involve any stream channelization or the filling of wetlands;
- (5) shall require the implementation of an effective nonpoint source management program throughout the upstream watershed which shall include at a minimum: runoff reduction BIVIP's consistent with Section 11-26 of this ordinance; 2-year detention/sedimentation basins for all development consistent with Section 11-2830; and a program to control nonpoint sources at the source for prior development constructed without appropriate stormwater BMP's;
- (6) shall not occur downstream of a wastewater discharge; and,
- (7) shall comply with 92 Illinois Administrative Code Parts 702 and 708 and the Whiteside County Flood Prevention and Protection Ordinance.

11-2821. Protection of Wetlands and Other Depressional Storage Areas: Wetlands and other depressional storage areas shall be protected from damaging modifications and adverse changes in runoff quality and quantity associated with land developments. In addition to the other requirements of this ordinance, the following requirements shall be met for all developments whose drainage flows into wetlands and other depressional storage areas (as appropriate):

- (1) Detention in Wetlands and Depressional Storage Areas: Existing wetlands shall not be modified for the purposes of stormwater detention unless it is demonstrated that the existing wetland is low in quality and the proposed modifications will maintain or improve its habitat and ability to perform beneficial functions. Existing storage and release rate characteristics of wetlands and other depressional storage areas shall be maintained and the volume of detention storage provided to meet the requirements of this section shall be in addition to this existing storage.
- (2) Sediment Control: The existing wetland shall be protected during construction by appropriate soil erosion and sediment control measures and shall not be filled.
- (3) Alteration of Drainage Patterns: Site drainage patterns shall not be altered to substantially decrease or increase the existing area tributary to the wetland.
- (4) Detention/Sedimentation: All runoff from the development shall be routed through a preliminary detention/sedimentation basin designed to capture the two-year, 24-hour event and hold it for at least 24 hours, before being discharged to the wetland. This basin shall be constructed before property grading begins. In addition, the drainage hierarchy defined in section 11-26 should be followed to minimize runoff volumes and rates being discharged to the wetland.
- (5) Vegetated Buffer Strip: A buffer strip of at least 25 feet in width, vegetated with native plant species, shall be maintained or restored around the periphery of the wetland. No development, with the exception of recreational trails, shall take place within the buffer strip.

11-2822. Street, Parking Lot, and Culvert Drainage

- (1) Streets: If streets are to be used as part of the minor or major drainage system, ponding depths shall not exceed curb heights by more than one inch and shall not remain flooded for more than



eight (8) hours for any event less than or equal to the 100-year event.

(2) Parking Lots: The maximum stormwater ponding depth in any parking area shall not exceed six (6) inches for more than four (4) hours.

(3) Culvert Road and Driveway Crossings: Sizing of culvert crossings shall consider entrance and exit losses as well as tailwater conditions on the culvert.

11-2823. Infiltration Practices: To effectively reduce runoff volumes, infiltration practices including basins, trenches, and porous pavement should be located on soils in hydrologic soil groups "A" or "B" as designated by the U.S. Soil Conservation Service. Infiltration basins and trenches designed to recharge groundwater shall not be located within seventy-five feet of a water supply well or a building foundation. A sediment settling basin shall be provided to remove coarse sediment from stormwater flows before they reach infiltration basins or trenches. Stormwater shall not be allowed to stand more than forty-eight hours over eighty percent of a dry basin's bottom area for the maximum design event to be ex-filtrated. The bottom of infiltration facilities shall be a minimum of four feet above seasonally high groundwater and bedrock.

11-2824. Vegetated Filter Strips and Swales - To effectively filter stormwater pollutants and promote infiltration of runoff, sites should be designed to maximize the use of vegetated filter strips and swales. Wherever practicable, runoff from impervious surfaces should be directed onto filter strips and swales before being routed to a storm sewer or detention basin.

11-2825. Safety Considerations: The drainage system component, especially all detention basins, shall be designed to protect the safety of any children or adults coming in contact with the system during runoff events.

(1) Side Slopes: The side slopes of all detention basins at one-hundred year capacity shall be as level as practicable to prevent accidental falls into the basin and for stability and ease of maintenance. Side slopes of detention basins and open channels shall not be steeper than four to one (horizontal to vertical). See Section 11-2812 for Wet Bottom facility side slopes.

(2) Safety Ledge: All wet detention basins shall have a level safety ledge at least four (4) feet in width and two and one half to three (2.5 to 3) feet below the normal water depth.

11-2826. Velocity: Velocities throughout the drainage system shall be controlled to safe and non-erosive levels taking into consideration rates and depths of flow.

11-2827. Overflow Structures: All stormwater detention basins shall be provided with an overflow structure capable of safely passing excess flows at a stage at least 1 foot below the lowest foundation grade in the vicinity of the detention basin. The design flow rate of the overflow structure shall be equivalent to the 100-year inflow rate.

11-2828. Maintenance Considerations: The stormwater drainage system shall be designed to minimize and facilitate maintenance. Turfed sideslopes shall be designed to allow lawn mowing equipment to easily negotiate them. Wet basins shall be provided with alternate outflows which can be used to completely drain the pool for sediment removal.

(Pumping may be considered if drainage by gravity is not feasible). Pre-sedimentation basins shall be included, where feasible, for localizing sediment deposition and removal. Access and access easements for heavy equipment shall be provided.

#### **Sec. 11-29. Accommodating Flows From Upstream Tributary Areas.**

Stormwater runoff from areas tributary to the property shall be considered in the design of the property's drainage system. Whenever practicable, flows from upstream areas that are not to be detained should be routed around the basin being provided for the site being developed.

11-2901. Upstream Areas Not Meeting Ordinance Requirements: When there are areas not meeting the storage and release rates of this ordinance, tributary to the applicant's property, regionalized detention on the applicant's property shall be explored by the applicant. The following steps shall be followed:

- (1) The applicant shall compute the storage volume needed for his property using the release rates of Section 11-27, the applicant's property area, and the procedures described in Section 11-28;
- (2) Areas tributary to the applicant's property, not meeting the storage and release rate requirements of this ordinance, shall be identified;
- (3) Using the areas determined in 11-2901 (2) above plus the applicant's property area, total storage needed for the combined properties shall be computed;

Allowable release rates shall be computed using the combined property areas. Storage shall be computed as described in Section 11-28. If tributary areas are not developed, a reasonable fully developed land cover, based on local zoning, shall be assumed for the purposes of computing storage.

Once the necessary combined storage is computed, the County may choose to pay for oversizing the applicant's detention basin to accommodate the regional flows. The applicant's responsibility will be limited to the storage for his property as computed in "a" above. If regional storage is selected by the County, then the design produced in "c" above shall be implemented. If regional storage is rejected by the County, the applicant shall bypass all tributary area flows around the applicant's basin whenever practicable. If the applicant must route upstream flows through his basin and the upstream areas exceed one-square mile in size, the applicant must meet the provisions of Section 11-2825 for on-stream basins.

11-2902. Upstream Areas Meeting Ordinance Requirements: When there are areas which meet the storage and release rate requirements of this ordinance, tributary to the applicant's property, the upstream flows shall be bypassed around the applicant's detention basin, or be routed through the applicant's detention basin if this is the only practicable alternative. Storage needed for the applicant's property shall still be computed as described in Section 11-2901 (1).

However, if the County decides to route tributary area flows through an applicant's basin, the final design stormwater releases shall be based on the combined total of the applicant's property plus tributary areas. It must be shown that at no time will the runoff rate from the applicant's property exceed the allowable release rate for his/her property alone.

#### **Sec. 11-30. Other pre-ordinance drainage conditions.**

Upon passage of this Ordinance, drainage conditions in residential, commercial and industrial areas, in Whiteside County, shall be considered established as existing drainage conditions. Changes to these existing, drainage conditions, through improvements, which have an adverse effect on adjoining or neighboring properties, shall be considered as a violation of this Ordinance. The Planning and Zoning Administrator shall have the authority to investigate such changes when complaints are filed with the Development office. The Planning and Zoning Administrator shall require that pre-ordinance drainage conditions be re-established. If compliance is not forthcoming, the Planning and Zoning Administrator shall file a complaint with the States Attorney's office under this Ordinance.



#### **Sec. 11-31. Early Completion of Detention Facilities.**

Where detention, retention, or depressional storage areas are to be used as part of the drainage system for a property, they shall be constructed as the first element of the initial earthwork program. Any eroded sediment captured in these facilities shall be removed by the applicant before project completion in order to maintain the design volume of the facilities.

#### **Sec. 11-32. Fee in Lieu of Detention.**

All single-family residential developments under 5 acres in size and all other development under 1 acre in size shall pay a fee equal to the Engineer's cost estimate for the detention project, plus 4% of that cost, rather than installing detention facilities on the property, unless specifically directed to do otherwise by the County Engineer. The County also shall have the option for larger properties of requiring either a fee equal to the Engineer's cost estimate for the detention project, plus 4% of that cost, or a fee of \$12,000 for each acre-foot of detention needed, whichever fee is greater, in lieu of the applicant building a basin on-site, provided the property will discharge stormwater to the County's storm drainage system.

In instances where regional benefits and economies of scale can be achieved, it will be permissible for adjacent properties to utilize a common regional detention basin. Applicants and adjoining properties can jointly build the necessary facilities themselves. Applicants shall also have the option of paying to the County either a fee equal to the Engineer's cost estimate, plus 4% of that cost, or a fee of \$12,000 for each acre-foot of detention required, whichever fee is greater, with the approval of the County Engineer, with the County in charge of building a regional facility.

All fees shall be payable to the County Engineer, in a financial instrument agreed to by the Engineer and the applicant, and in the name of the applicant and Whiteside County. That financial instrument shall be held in the Whiteside County Treasurer's office and any interest accrued by the financial instrument during the life of the project, shall be returned to the applicant, along with the financial instrument, at the end of the project.

#### **Sec. 11-33. Maintenance Responsibility.**

11-3301. Maintenance of stormwater drainage facilities located on private property shall be the responsibility of the owner of that property. Before a zoning certificate is obtained from the County, the applicant shall execute a maintenance agreement with the County guaranteeing that the applicant and all future owners of the property will maintain its stormwater drainage and sediment control system. The maintenance agreement shall also specifically authorize representatives of the County to enter onto the property for the purpose of inspections and maintenance of the drainage system. Such agreement shall be recorded with the Whiteside County Recorder and shall be made a part of all future deeds for the property or properties in question. The maintenance agreement shall include a schedule for regular maintenance of each aspect of the property's stormwater drainage and sediment control system and shall provide for access to the system for inspection by authorized personnel of the County. The maintenance agreement shall also stipulate that if the County Engineer notifies the property owner in writing of maintenance problems which require correction, the property owner shall make such corrections within 30 (thirty) calendar days of such notification. If the corrections are not made within this time period, the County may have the necessary work completed and assess the cost to the property owner. The County has the option of requiring a bond to be filed by the property owner for maintenance of the stormwater drainage system.

11-3202. Maintenance of stormwater drainage facilities located on public property or upon easements dedicated to a public authority shall be the responsibility of the owner of that public property or public agency to whom the easement is dedicated. Before a zoning certificate is obtained from the County, the applicant shall deposit an amount equal to 100 % of an Engineer's Estimate of Cost to Complete the



stormwater drainage facilities into an escrow account administered by the County to be utilized by that public property owner or public agency for the future maintenance of the stormwater drainage facilities.

**Sec. 11-34. Administration.**

11-3401. Performance Surety: Prior to approval of the drainage plan submitted to the County, the applicant shall post a performance surety, in a form acceptable to the County, for an amount equal to an Engineer's Estimate of Cost to Complete the stormwater drainage facilities and sediment control system approved by the County Engineer.

11-3402. Construction Inspection Fee: Prior to approval of the drainage plan submitted to the County, the applicant shall post a fee of four (4) percent of the approved Engineer's Estimate of Cost to Complete the stormwater drainage facilities and sediment control system with the County. This fee shall serve to offset the cost of inspections performed in association with Section 11-35.

**Sec. 11-35. Inspections.**

11-3501. Inspections During Construction: General site grading shall not begin until the County Engineer has certified in writing to the applicant that any necessary detention facilities are in place and operational. A professional engineer, hired by the developer, shall be responsible for determining whether the drainage system is in conformance with requirements specified in Article II, and whether development is proceeding in accordance with the approved drainage system. Periodic inspection of the development site shall be made by the developer's engineer to ensure that the drainage system is properly implemented.

The County Engineer or his duly authorized representative will also conduct periodic inspections of the work in progress to be certain that the drainage system is being built as designed. If any violations of the provisions or requirements of this ordinance are noted during such inspections, the County Engineer shall notify the applicant in writing of the items needing correction. The applicant shall have ten (10) calendar days to make such corrections unless given a specific extension of time in writing by the County Engineer. Failure to complete such corrections within the specified time period shall constitute a violation of this ordinance and the applicant shall be considered in default of any performance surety in place with Whiteside County.

11-3502. Final Inspection: Upon notification by the applicant that the drainage system is completed, the County Engineer or his duly authorized representative shall conduct a final inspection. If the drainage system is found to contain deficiencies which require correction, the County Engineer or his duly authorized representative shall notify the applicant of the necessary corrections. The applicant shall correct such deficiencies within ten (10) calendar days unless given a specific extension of time in writing by the County Engineer. Failure to make necessary corrections within the specified time period shall constitute a violation of this ordinance. Upon finding that the drainage system meets the provisions and requirements of this ordinance the County Engineer shall issue in writing a notice of drainage system completion to the applicant.

11-3503. Routine Inspections: All privately owned drainage systems shall be inspected by representatives of the County not less often than once per year. A written report shall be filed of the results of any inspection and a copy sent to the property owner detailing any problems which need correction.

11-3504. Enforcement: The administration and enforcement of this ordinance shall be the responsibility of the County Engineer of Whiteside County or his duly authorized representative(s).

(1) *Work suspension.* In the event that work performed does not conform to the provisions of the approved stormwater management plan and specifications, a written notice to comply shall be served upon the developer or property owner by the County Engineer with a copy provided to the Planning and Zoning Administrator. Such notice shall set forth the nature of the correction required and the time limit within which corrections shall be made. Failure to comply with such



notice shall result in the issuance of a stop-work order applicable to all construction activity except that necessary for correction of the violation. Said stop-work order shall be initiated by the County Engineer with notification sent to the Planning and Zoning Administrator. Upon correction of the violation, the County Engineer shall notify the Planning and Zoning Administrator and void the stop-work order so that construction may resume.

(2) *Financial security forfeiture.* In the event of continued violation of the approved stormwater management plan, a public hearing on the matter shall be conducted by the Planning and Zoning Commission. Written notice shall be served upon the developer by registered mail and shall state:

- A. The grounds for the complaint.
- B. The time and place such hearing is to be held.

Such notice shall be served at least fifteen (15) days prior to the date set for the hearing. At any such hearing, the developer shall be given an opportunity to be heard, and may call witnesses and present evidence on his behalf. After such hearing, if the Planning and Zoning Commission concludes that the issuance of additional correction notices would be futile, any financial instruments or cash deposits posted with the County shall be forfeited, whereupon said security shall be used for completion of the Stormwater Management Plan as approved.

(3) *Zoning certificate/building permit.* No zoning certificate/building permit shall be issued for improvements on any property which is found to be in violation of a stormwater management plan or changes to existing drainage conditions until said violation is corrected to the satisfaction of the appropriate authority.

11-3505. Appeals: All appeals of the County Engineer's decisions regarding the interpretation of this ordinance shall be heard by the Planning and Zoning Commission. The fee for such an appeal will be the same as the fee for an appeal of a Planning and Zoning Administrator's decision as found in the Whiteside County Code at Appendix 2.

#### **Sec. 11-36. Abrogation and Greater Restrictions.**

This chapter repeals and replaces the original Stormwater Management Ordinance adopted by the County Board: Whiteside County Code, Chapter 11, Article II, Sections 11-20 thru Section 11-40 entirely. However, this chapter does not repeal, abrogate or impair any existing easements, covenants or deed restrictions. Where this chapter and other ordinance, easements, covenants or deed restrictions conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

#### **Sec. 11-37. Severability.**

If any section, clause, provision or portion of this ordinance is judged unconstitutional or invalid by a court of competent jurisdiction, the remainder of this ordinance shall remain in force and not be affected by such judgment.

#### **Sec. 11-38. Penalties.**

Any person convicted of violating any of the provisions or requirements of this ordinance shall be guilty of a misdemeanor and shall be subject to a fine of not more than \$500.00. Each week the violation continues shall be considered a separate offense.

#### **Sec. 11-39. Effective Date.**

This ordinance shall be in full force and effect upon adoption by the County Board.





## **APPENDIX A**

### **Sample Letters of Credit and Performance Bonds**

**SAMPLE  
LETTER OF CREDIT**

\_\_\_\_\_  
Name of Bank

\_\_\_\_\_  
bank location - city, state

Irrevocable Credit No. \_\_\_\_\_

Date: \_\_\_\_\_, 20\_\_

County of Whiteside, Illinois  
Morrison, Illinois

All drafts must be marked:  
"Drawn under Credit No. \_\_\_\_\_  
dated \_\_\_\_\_, 20\_\_

Gentlemen:

We hereby open an Irrevocable Letter of Credit in the amount of \_\_\_\_\_

\_\_\_\_\_ (\$ \_\_\_\_\_) in your favor for the  
account of \_\_\_\_\_

(Developer), the developer of \_\_\_\_\_ (name of project) \_\_\_\_\_, proposed in  
the County of Whiteside, Illinois, or within its territorial jurisdiction, for the benefit of the County of  
Whiteside. Said money hereunder shall be available by your drafts at sight drawn on us drawn in the  
name of the County of Whiteside, Illinois. All drafts so drawn must be marked "Drawn under  
\_\_\_\_\_ (name of bank) \_\_\_\_\_, Credit No. \_\_\_\_\_ Dated \_\_\_\_\_, 20\_\_."

Drafts must be accompanied by a signed statement by an appropriate official of the County of  
Whiteside, Illinois, that the request is for the installation or construction of improvements required  
pursuant to the plans, specifications and cost estimates dated \_\_\_\_\_, 20\_\_, and approved by  
the County of Whiteside, Illinois, and on file with the appropriate official. Further, all requests for  
disbursements under this Letter of Credit made prior to (must be 2 years after filing) \_\_\_\_\_, 20\_\_, shall be  
submitted by the developer and accompanied by a certified estimate of units and value of work  
completed with the contractor's sworn statement and waiver of mechanics' liens, all approved by the  
developer's engineer and the appropriate official of the County of Whiteside, Illinois. It is understood as  
to all disbursements that an appropriate official shall approve partial drawings only as long as there  
remains a sufficient balance to the Credit to cover his then current estimate of costs for the required  
improvements which at that time remain to be completed, but in no case shall his approval exceed ninety  
percent (90%) of the value of work completed.

In the event that all of the work for the improvements is not completed to the satisfaction of the  
County on or before (1 day short of 2 years after filing) \_\_\_\_\_, 20\_\_, the funds remaining under this Letter of  
Credit shall be available to the County of Whiteside, Illinois upon presentation of their draft at sight drawn  
on in the name of the County of Whiteside, Illinois. This draft must be marked "Drawn under  
\_\_\_\_\_ (name of bank) \_\_\_\_\_, Credit No. \_\_\_\_\_, dated \_\_\_\_\_, 20\_\_." Further, such  
draft shall be accompanied by a signed statement by the appropriate official of the County of Whiteside,  
Illinois as follows: "I, \_\_\_\_\_ (name) \_\_\_\_\_, appropriate official for the County of Whiteside,  
Illinois, do hereby certify that work on required improvements for the project named \_\_\_\_\_  
has not been completed to the satisfaction of the County of Whiteside on or before \_\_\_\_\_ (1 day short of 2  
years after filing) \_\_\_\_\_, 20\_\_.

This Credit shall expire on \_\_\_\_\_ (2 years after filing) \_\_\_\_\_, 20\_\_; provided, however, the



undersigned shall notify the appropriate official by certified mail, return receipt requested, at least 90 days prior to the expiration date that this Letter of Credit is about to expire and provided, however, in no event shall this Credit expire except upon prior written notice, it being expressly agreed by the undersigned that the above expiration date shall be extended as shall be required to comply with this notice provision.

The undersigned further agrees that this Credit shall remain in full force and effect and pertain to any and all amendments or modifications which may be made from time to time to the specifications and agreements for the project, without notice from the County of the amendments or modifications.

All acts, requirements and other preconditions for the issuance of this Irrevocable Letter of Credit have been completed.

We hereby engage with the drawers, endorsers and bona fide holders of drafts, drawn under and in compliance with the terms of this Credit, that same shall be honored upon presentation to the drawer. This Credit must accompany any draft which exhausts the Credit and must be surrendered concurrently with the presentation of such draft.

We hereby undertake and engage that all demands made in conformity with this Credit will be honored upon presentation. If, within then (10) days of the date any demand made in conformity with this Credit is presented, we fail to honor same, we agree to pay all attorneys' fees, court costs and any otheexpenses incurred by the County of Whiteside in enforcing the terms of this Credit.

Dated: \_\_\_\_\_, 20\_\_.

\_\_\_\_\_  
(name of bank)

By: \_\_\_\_\_  
(title)

Attest:

\_\_\_\_\_  
(title)

**SAMPLE  
PERFORMANCE BOND**

KNOWN ALL MEN BY THESE PRESENTS, that \_\_\_\_\_, as  
PRINCIPAL, \_\_\_\_\_, as SURETY, and \_\_\_\_\_,  
as ADDITIONAL SURETY, are held and firmly bound unto the County of Whiteside, Illinois, as  
OBLIGEE, in the sum of \_\_\_\_\_ (\$ \_\_\_\_\_) lawful money  
of the United States, for payment whereof to the Obligee, the Principal and the Surety, and Additional  
Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and  
severally, firmly to these presents:

SIGNED, SEALED AND DATED, THIS \_\_\_\_\_ day of \_\_\_\_\_, 20\_\_.

WHEREAS, application was made to the Obligee for approval of a project entitled "\_\_\_\_\_  
\_\_\_\_\_", located in the County of Whiteside, Illinois, filed with  
the appropriate official of the County of Whiteside, Illinois, on \_\_\_\_\_, 20\_\_, said  
project may be approved upon certain conditions, one of which is that a performance bond in the amount  
of \_\_\_\_\_ (\$ \_\_\_\_\_), to be filed with the County Treasurer  
to guarantee certain improvements in said project.

NOW, THEREFORE, THE CONDITION OF THIS OBLIGATION is such that if the above  
named Principal shall within two (2) years from the date hereof will and truly make and perform the  
required improvements and construction of the public improvements in and adjacent to said project in  
accordance with the specifications of the County of Whiteside appropriate department and the  
Stormwater Regulations of the County of Whiteside, then this obligation to be void; otherwise to remain  
in full force and effect.

It is hereby understood and agreed that in the event that any required improvements have not  
been installed as provided aforesaid within the term of this Performance Bond, the Governing Body may  
thereupon declare this bond to be in default and collect the sum remaining payable thereunder and upon  
receipt of the proceeds thereof, the County of Whiteside shall install such improvements as are covered  
by this bond and commensurate with the extent of development that has taken place in said project, but  
not exceeding the amount as such proceeds.

\_\_\_\_\_  
Principal

By: \_\_\_\_\_ Principal

\_\_\_\_\_  
Surety

By: \_\_\_\_\_

Attorney in Fact

Additional Surety

Approved as to Form:

\_\_\_\_\_

By: \_\_\_\_\_

\_\_\_\_\_



## **APPENDIX B**

### **Sample Covenants and Restrictions**

## **Covenant To Be Included In Subdivision Covenants**

### **Stormwater Detention Basin**

A stormwater detention basin has been constructed within the subdivision, in accordance with the requirements of the Whiteside county stormwater ordinance, and is so designated as "Detention Basin" on the subdivision plat. The detention basin shall provide for the temporary detention of stormwater runoff from the subdivision to meet release rates as required by the county.

The real estate upon which the detention basin is located, designated as Outlot "X" on the plat, shall be deeded from the Developer to the Homeowner's Association upon sale of 75% of the lots within the subdivision.

The Developer as owner, and subsequent to the conveyance of title, the Homeowner's Association as owner, shall be responsible for the following:

The Developer, as owner, and subsequent to the conveyance of title, the Homeowner's Association as owner, shall be responsible for the following:

- a. Ann annual report on the detention basin condition, using the checklist designated below, shall be submitted to the appropriate jurisdiction official.
- b. At five (5) year intervals, the basin shall be inspected by a professional engineer registered in the State of Illinois. A report of this inspection shall be submitted to the appropriate jurisdiction official within sixty (60) days of the inspection. The inspection shall include an evaluation of the checklist items in the checklist below. An annual report is not required the year the five year report is due.

Each owner of an improved lot within the subdivision shall be assessed by the Homeowner's Association for the cost of maintaining the detention basin and for the cost of complying with the requirements of these covenants and the requirements of the county. The Declaration regarding the establishment of a Homeowner's Association and the procedures for the assessment and collection of dues for the cost of maintaining the detention basin shall be filed and recorded by the Developer as a separate document.



DECLARATION OF RESTRICTIVE AND PROTECTIVE COVENANTS AND  
CONDITIONS REGARDING THE ESTABLISHMENT OF A HOMEOWNERS  
ASSOCIATION FOR THE STORMWATER DETENTION BASIN SYSTEM AS LOCATED  
WITHIN \_\_\_\_\_

Dated \_\_\_\_\_

Filed \_\_\_\_\_

To

The Public

This declaration, made on the date hereinafter set forth by \_\_\_\_\_

\_\_\_\_\_, hereinafter referred to as "Declarant".

WITNESSETH:

Whereas, Declarant is the owner of certain property in the County of Whiteside, Illinois, which is more particularly described as:

NOW, THEREFORE, Declarant hereby declares that all of the properties described above shall be held, sold and conveyed subject to the following easements, restrictions, covenants and conditions, all of which are for the purpose of enhancing and protecting the value, desirability and attractiveness of the real property, and for the purpose of complying with stormwater retention requirements of the County of Whiteside, Illinois. These covenants, restrictions and conditions shall run with the real property and shall be binding on all parties having or acquiring any right, title or interest in the described property or any part thereof, and shall inure to the benefit of each owner thereof.

ARTICLE I.

DEFINITIONS

1. "Association" shall mean and refer to Homeowners Association of \_\_\_\_\_, Inc., an Illinois nonprofit corporation, its successors and assigns.

2. "Properties" shall mean and refer to that certain real property hereinbefore described, moare particularly described as: Lots \_\_\_\_\_ through \_\_\_\_\_ of \_\_\_\_\_ (Sub), Whiteside county, Illinois, and such additions thereto as may hereafter be brought within the jurisdiction of the Association.

3. "Lot" shall mean and refer to any plot of land shown on any recorded subdivision map or plat of the properties.

4. "Member" shall mean and refer to every person or entity who hold membership in the association.

5. "Owner" shall mean and refer to the record owner, whether one or more persons or entities, of a fee simple title to any lot which is part of the Properties, including contract sellers, but excluding those having such interest merely as security for the performance of an obligation.

6. "Declarant" shall mean and refer to \_\_\_\_\_, to successors and assigns, if such successors or assigns should acquire more than one undeveloped lot from the Declarant for the purpose of development.

7. "Developer" shall mean the same as "Declarant".

## ARTICLE II

### MEMBERSHIP AND VOTING RIGHTS

Every person or entity who is a record owner of a fee or undivided interest in any Lot which is subject by covenants of record to assessment by the Association, including contract Sellers, shall be a member of the Association. The foregoing is not intended to include persons or entities who hold an interest merely as security for the performance of an obligation. No owner shall have more than one membership. Membership shall be appurtenant to and may not be separated from ownership of any lot which is subject to assessment by the Association. Ownership of such lot shall be the sole qualification for membership.

## ARTICLE III

### ESCROW FUND FOR MAINTENANCE

The primary source of funds for maintenance of the master stormwater detention system shall be an escrow fund. Declarant shall establish the Escrow Fund at some local banking institution at such time as the first lot in The Properties is transferred to an owner other than the Declarant. The Association shall have the power to expend the escrow fund for the maintenance authorized in accordance with the provisions of Article V.

## ARTICLE IV

### COVENANT FOR MAINTENANCE ASSESSMENT

1. Creation of the lien and Personal Obligation of Assessments. The Declarant, for each improved Lot owned within the Properties, hereby covenants, and each Owner of any Lot by acceptance of a Deed therefor, whether or not it shall be so expressed in such Deed, is deemed to covenant and agree to pay to the Association: (1) annual assessments or charges, such assessments to be established and collected from time to time as hereinafter provided. The term "improved Lot" shall mean any Lot having a building erected thereon and ready for occupancy as approved by Whiteside County, Illinois. The annual assessments, together with interest, shall be a charge on the land and shall be a continuing lien upon the property against which each such assessment is made. Each assessment together with interest, costs and reasonable attorney's fees for collection, shall also be the personal obligation of the person or entity who was the owner of such property at the time the assessment fell due. The personal obligation for delinquent assessments shall not pass to his successors in title unless expressly assumed by them.

2. Purpose of Assessments. The assessments levied by the Association shall be used exclusively to maintain the stormwater detention basin system, as provided for under the Restrictive and Protective Covenants of \_\_\_\_\_. The Board of Directors of the Association shall establish a budget by January 1<sup>st</sup> of each year and shall levy an assessment upon each improved Lot



without the Subdivision by February 1<sup>st</sup> of each year, payable by the 1<sup>st</sup> of May.

3. Notice and Quorum for Any Action Authorized Under Section 3. Written notice of any meeting called for the purpose of establishing the budget and making the assessment shall be sent to all members not less than 15 days nor more than 30 days in advance of the meeting. At the first such meeting called, the presence of Members or of proxies entitled to cast 50% of all votes of each class of membership shall constitute a quorum. If the required quorum is not present, another meeting may be called subject to the same notice requirement, and the required quorum at the subsequent meeting shall be one-half of the required quorum at the preceding meeting. No such subsequent meeting shall be held more than 60 days following the preceding meeting.

4. Uniform Rate of Assessment. Annual assessment must be fixed at a uniform rate for all improved Lots and shall be collected on an annual installment basis, except as hereinafter provided.

5. Date of Commencement of Annual Assessments; Due Dates. The annual assessments provided for herein shall commence as to all improved Lots on the first day of the month following the conveyance of any such improved Lot. The first annual assessment shall be adjusted according to the number of months remaining in the calendar year. The Board of Directors of the Association shall fix the amount of the annual assessment against each lot at least 30 days in advance of each annual assessment period. Written notice of the annual assessment shall be sent to every Owner subject thereto. The annual assessment shall be paid in one annual payment, and the due dates and delinquency dates shall be uniformly established by the Board of Directors of the Association. The Association shall, upon demand, and for a reasonable charge, furnish a certificate signed by an officer of the Association setting forth whether the assessments on a specified Lot are current or delinquent. Such Certificate shall be conclusive evidence of payment of any assessment therein stated to have been paid.

6. Effect of Non-payment of Assessments: Remedies of the Association. Any annual payment not paid within 30 days after the due date shall bear interest from the date of delinquency at the rate of 10% per annum. The Association may bring any action at law against the Owner personally obligated to pay the same, or foreclose the lien against the property by an action in equity. In any such action, interest, costs and reasonable attorneys fees shall be added to the amount of the delinquent assessment and collected as a part of said judgement. In the event of such foreclosure, if the Association waives any and all rights to a deficiency judgement against the owner, the period for redemption as provided by the statutes of the State of Illinois shall be reduced to six months from the date of foreclosure sale. Any lot ultimately acquired by the Association through Judges Deed after such a foreclosure shall be sold by the Association within a reasonable time either at public or private sale, and any surplus remaining after the payment of assessments, interest, costs and attorneys fees shall be paid over to the former Owner of said Lot. No Owner may waive or otherwise escape liability for the assessment provided for herein by non-use of the Detention Basin or by abandonment of his Lot.

7. Subordination of the Lien to Mortgages. The lien of the assessments provided for herein shall be subordinate to the lien of any first mortgage placed upon any Lot. Sale or transfer of any Lot shall not affect the assessment lien. However, the sale or transfer of any lot pursuant to Mortgage foreclosure or any assessments as to payments which became due prior to such sale or transfer, provided that such sale or transfer shall not extinguish the personal obligation of the prior Owner or his heirs, successors or assigns, payment of such assessment. No sale or transfer shall relieve such Lot from liability for any assessment thereafter becoming due or from the lien thereof.

## ARTICLE V.

### GENERAL PROVISIONS

1. Enforcement. The Association, or any Owner shall have the right to enforce by any

proceeding at law or in equity all restrictions, conditions, covenants or reservations now or hereafter imposed by the provisions of this Declaration. The Association shall have the sole right to enforce, by proceedings at law or in equity, the liens and charges now or hereafter imposed by the provisions of this Declaration. Failure by the Association or by any Owner to enforce any covenant or restriction herein contained shall in no event be deemed a waiver of the right to do so thereafter.

2. Severability. Invalidation of any one of these covenants or restrictions by judgement or Court Order shall in no wise affect any other provisions which shall remain in full force and effect.

3. Duration. The covenants and restrictions of this Declaration shall run with and bind the land, for a term of 21 years from the date this Declaration is recorded, after which time they shall be automatically extended for the successive periods of 10 years each.

4. Amendment. This Declaration may be amended during the first 21 years period by an instrument signed by not less than 75% of the Lot owners and thereafter by an instrument signed by not less than 65% of the Lot Owners, provided, however, that no such amendment shall be valid or effective until it has been, and a certified copy of said resolution, and a certified copy of the amendment adopted by the Lot Owners, having both been recorded in the office of the Recorder of Whiteside County, Illinois.

By: \_\_\_\_\_  
OWNER AND DECLARANT

By: \_\_\_\_\_  
OWNER AND DECLARANT



## **APPENDIX C**

### **Inspection Checklists**

**#1 - Grading and Drainage Permit Submittal Checklist**

**#2 - Operation and Maintenance Inspection Report  
for Enhanced Swales/Grass Channels/  
Filter Strips/Open Channels**

**#3 - Operation and Maintenance Inspection Report  
for Stormwater Pond/Wetland**

**WATERSHED DEVELOPMENT PERMIT  
CLASS 2 GRADING AND DRAINAGE  
PERMIT SUBMITTAL CHECKLIST**

Permit No: _____ Reviewer: _____ Date: _____			
Preliminary: _____ Approved: _____ As Built: _____ Name: _____ Location: _____			
Type:    _____ Residential    _____ Commercial    _____ Industrial    _____ Municipal			
_____ Other Total Land Ownership: _____ Acres			
Owner/Applicant: _____ Address: _____ Phone: _____			
Consulting Firm: _____ Address: _____ Phone: _____			

  

Yes	No	N/A	Item Description	Comments
			Application	
			Application Fee	
			Certification to Comply with Plans for Movement of Earth	
			Letters of Credit and Performance Bonds	
			Plans and Site Plans	
			Property boundary, dimensions and approximate acreage.	
			Building setback lines.	
			All existing and proposed structures and sizes	
			Square feet of existing and proposed impervious surface.	
			All existing and proposed easements.	
			All existing, observed or proposed water or monitoring well head locations.	
			All existing, observed or proposed watermain.	
			All sanitary or combined sewer lines and septic systems.	
			The banks and centerlines of streams and channels.	
			Shoreline of lakes, ponds and detention basins with normal water level elevation.	
			Location, size and slope of stormwater conduits and drainage swales.	
			Detention facilities showing inlet and outlet locations and details.	
			Roads, streets and associated stormwater inlets including finished grades.	
			Base flood elevation, flood fringe and regulatory floodway.	
			A vicinity map showing the relationship of the site to its general surroundings at a scale of not greater than two thousand (2,000) feet to one (1) inch (1:24,000).	



			Title, scale, north arrow, legend, seal of Licensed Professional Engineer, date and name of person preparing plans.	
			Subwatershed boundaries within the property.	
			Offsite areas draining to property, including entire offsite drainage boundary(ies).	
			Depressional storage areas, including non-jurisdictional wetlands.	
			Inventoried farm drains and tiles.	
			Soil classifications.	
			Certifications and Design Statements	
			Basis of design for the final drainage system components.	
			A statement giving any applicable engineering assumptions and calculations.	
			Design calculations and other submittals as required by this Ordinance, including flow rates and velocities at critical points in the drainage system.	
			A statement of certification of all drainage plans, calculations and supporting data by a Professional Engineer licensed in the State of Illinois.	
			Depiction of Environmental Features	
			The limits of wetland areas.	
			The location of trees greater than eight (8) inches in diameter, taken at 4.5 ft. dbh in areas to be disturbed.	
			Any designated natural areas or prime farmland so designated by the Federal, State or County government.	
			Any proposed environmental mitigation features.	
			Location and dimensions of a stream buffer area (if required by local jurisdiction).	
			Base flood elevation, flood fringe and regulatory floodplains.	
			Local, State or Federal maps Delineating Floodplains, floodways or 100-year Frequency Flood Elevation Annotated to Reflect the Proposed Change.	
			Conditional Approval by FEMA or Other Regulatory Agencies of Proposed Changes in the FIRM Map.	
			Engineering Calculations and Data	
			Hydrologic analysis completed in accordance with this ordinance.	
			Detention System design completed in accordance with this ordinance.	
			Modification of Channel with Upstream Watershed Exceeding 200-Acres	
			A discussion of the purpose and need for the proposed work.	
			Discussion of the practicality of using alternative locations or methods to accomplish the purpose of the proposed work.	
			Analysis of the impacts of the proposed project, considering cumulative effects on flood storage and the physical and biological conditions of the body of water affected.	
			Hydraulic analysis of the Channel modifications including pre- and post-project base flood elevations.	
			Additional information as required by this Ordinance.	
			Storm Water Pollution Prevention Plan (SWP3) Prepared in Accordance with this Ordinance	

# OPERATION AND MAINTENANCE INSPECTION REPORT FOR ENHANCED SWALES/GRASS CHANNELS/FILTER STRIPS/OPEN CHANNELS

Project \_\_\_\_\_

Location: \_\_\_\_\_

Watershed: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

As-built Plans Available? \_\_\_\_\_

Inspection Items	Checked Yes/No	Maintenance Needed? Yes/No	Inspection Frequency	Comments
1. Debris removal			A	
Facility and adjacent area clear of debris			A	
Inlets and outlets clear of debris			A	
Any dumping of yard wastes into facility			A	
Has litter (branches, etc.) been removed			A	
2. Vegetation				
Adjacent area stabilized			A	
Grass mowed			A	
Plant height not less than design water depth			A	
Fertilized per specifications			A	
Any evidence of erosion			A	
Is plant composition according to approved plans			A	
Any unauthorized or inappropriate plantings			A	
Any dead or diseased plants			A	
Any evidence of plant stress from inadequate watering			A	
Any evidence of deficient stakes or wires			A	
3. Oil and grease				
Any evidence of filter clogging			A	
4. Dewatering				
Facility dewatered between storms			A	
5. Check dams/energy dissipators/sumps				
Any evidence of sedimentation buildup			A,S	
Are sumps greater than 50% full of sediment			A,S	



Inspection Items	Checked? Yes/No	Maintenance Needed? Yes/No	Inspection Frequency	Comments
Any evidence of erosion at downstream toe of drop structures			A,S	
6. Sediment deposition				
Swale clean of sediment			A	
Sediments should not be > than 20% of swale design depth			A	
7. Outlets/overflow spillway				
Good condition (no need for repair)			A,S	
Any evidence of erosion			A,S	
Any evidence of blockages			A,S	
8. Integrity of facility				
Has facility been blocked or filled inappropriately			A	
9. Bioretention planting soil				
Any evidence of planting soil erosion			A	
10. Organic layer				
Mulch covers entire area (NO voids) and to specified thickness			A	
Mulch is in good condition			A	

Inspection Frequency Key    A = Annual; S = After Major Storm

# OPERATION, MAINTENANCE AND MANAGEMENT INSPECTION REPORT FOR STORMWATER POND/WETLAND

Project

Location: \_\_\_\_\_

Site Status: \_\_\_\_\_

Inspection Date: \_\_\_\_\_

Inspection Time: \_\_\_\_\_

Inspector Name: \_\_\_\_\_

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
<b>1. Embankment and Emergency Spillway (Annual, After Major Storms)</b>		
A. Vegetation and ground cover adequate		
B. Embankment erosion		
C. Animal burrows		
D. Unauthorized planting		
E. Cracking, bulging or sliding of dam		
1) Upstream face		
2) Downstream face		
3) At or beyond toe		
a) downstream		
b) upstream		
F. Pond, toe and chimney drains clear and functioning		
G. Seeps/leaks on downstream face		
H. Slope protection or riprap failure		
I. Vertical/horizontal alignment of top of dam "As-Built"		
J. Emergency spillway clear of obstructions and debris		
K. Other (specify)		
<b>2. Riser and Principal Spillway (Annual)</b>		
Type: Reinforced concrete _____		
Corrugated pipe _____		
Masonry _____		
A. Low flow orifice obstructed		
B. Low flow trash rack		
C. Weir trash rack maintenance		
1) Debris removal necessary		
2) Corrosion control		
D. Excessive sediment accumulation inside riser		
E. Concrete/masonry condition riser and barrels		



Maintenance Item	Satisfactory/ Unsatisfactory	Comments
1) Cracks or displacement		
2) Minor spalling (<1")		
3) major spalling (rebars exposed)		
4) Joint failures		
5) water tightness		
F. Metal pipe condition		
G. Control valve		
1) Operational/exercised		
2) Chained and locked		
H. Pond drain valve		
1) Operational/exercised		
2) Chained and locked		
I. Outfall channels functioning		
J. Other (specify)		
<b>3. Permanent Pool (Wet Ponds) (Monthly)</b>		
A. Undesirable vegetative growth		
B. Floating or floatable debris removal required		
C. Visible pollution		
D. Shoreline problem		
E. Other (specify)		
<b>4. Sediment Forebays</b>		
A. Sedimentation noted		
B. Sediment cleanout when depth < 50% design depth		
<b>5. Dry Pond Areas</b>		
A. Vegetation adequate		
B. Undesirable vegetative growth		
C. Undesirable woody vegetation		
D. Low flow channels clear of obstructions		
E. Standing water or wet spots		
F. Sediment and/or trash accumulation		
G. Other (specify)		
<b>6. Condition of Outfalls (Annual, After major Storms)</b>		
A. Riprap failures		
B. Slope erosion		
C. Storm drain pipes		
D. Endwalls / headwalls		
E. Other (specify)		
<b>7. Other (Monthly)</b>		

Maintenance Item	Satisfactory/ Unsatisfactory	Comments
A. Encroachment on pond, wetland or easement area		
B. Complaints from residents		
C. Aesthetics		
1) Grass growing required		
2) Graffiti removal needed		
3) other (specify)		
D. Conditions of maintenance access routes		
E. Signs of hydrocarbon build-up		
F. Any public hazards (specify)		
<b>8. Wetland Vegetation (Annual)</b>		
A. Vegetation healthy and growing Wetland maintaining 50% surface area coverage of wetland plants after the second growing season (if unsatisfactory, reinforcement plantings needed)		
B. Dominant wetland plants: Survival of desired wetland species Distribution according to landscaping plan?		
C. Evidence of emergent plantings needed		
D. Maintenance of adequate water depths for desired wetland plant species		
E. Harvesting of emergent plantings needed		
F. Have sediment accumulations reduced pool volume significantly or are plants "choked" with sediment		
G. Eutrophication level of the wetland		
H. Other (specify)		

**Comments:**

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## **APPENDIX D**

### **Runoff Coefficients for Rational Formula**

**APPENDIX D**  
**Runoff Coefficients for**  
**Rational Formula**

RUNOFF COEFFICIENT ( C ) FOR RATIONAL FORMULA BY HYDROLOGIC SOIL GROUP AND GROUND SLOPE												
Land Use	A			B			C			D		
	<2%	2-6%	>6%	<2%	2-6%	>6%	<2%	2-6%	>6%	<2%	2-6%	>6%
Forest	0.08	0.11	0.14	0.10	0.14	0.18	0.12	0.16	0.20	0.15	0.20	0.25
Meadow/Lawn	0.14	0.22	0.30	0.20	0.28	0.37	0.26	0.35	0.44	0.30	0.40	0.50
Pasture	0.15	0.25	0.37	0.23	0.34	0.45	0.30	0.42	0.52	0.37	0.50	0.62
Farmland	0.14	0.18	0.22	0.16	0.21	0.28	0.20	0.25	0.34	0.24	0.29	0.41
Gravel	0.65	0.67	0.69	0.66	0.68	0.70	0.68	0.70	0.72	0.69	0.72	0.75
Impervious	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95