CHAPTER 32

STORMWATER DRAINAGE CODE

32-1-1 AUTHORITY AND PURPOSE. This Code is enacted pursuant to the police powers granted to the Village by the Illinois Compiled Statutes.

The purpose of this Code 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. The cause of increases in stormwater runoff quantity and rate and impairment of quality is the development and improvement of land and as such this Code regulates these activities to prevent adverse impacts.

This Code is adopted to accomplish the following objectives:

(A) To assure that new development does not increase the drainage or flood hazards to others, or create unstable conditions susceptible to erosion;

(B) To protect new buildings and major improvements to buildings from flood damage due to increased stormwater runoff;

(C) To protect human life and health from the hazards of increased flooding on a watershed basis;

(D) 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;

(E) To protect, conserve, and promote the orderly development of land and water resources;

(F) To preserve the natural hydrologic and hydraulic functions of watercourses and flood plains and to protect water quality and aquatic habitats;

(G) 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.

32-1-2 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 a development or permit to carry out construction of a development from the Village.

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

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 damming, 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, hydraulicly equivalent volume of storage within the flood plain used to balance the loss of natural flood storage capacity when fill or structure are placed within the flood plain.

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 to stormwater in a detention basin.

Development: Any manmade change to real estate, including:

(A) Preparation of a plot of subdivision;

(B) Construction, reconstruction or placement of a building or any addition to a building;

(C) Installation of a manufactured home on a site, preparing a site for a manufactured home, or installing a travel trailer on a site for more than **one hundred eighty (180) days**;

(D) Construction of roads, bridges, or similar projects;

(E) Redevelopment of a site;

(F) Filling, dredging, grading, clearing, excavating, paving or other non-agricultural alterations of a ground surface;

(G) Storage of materials or deposit of solid or liquid waste;

(H) Any other activity that might alter the magnitude, frequency, deviation, direction, or velocity of stormwater flows 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 environment 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 Runoff: The volume and rate of flow of stormwater discharged from an urbanized drainage area which is or will be in excess of that volume and rate which pertained before urbanization.

Flood Plain: That land adjacent to a body of water with ground surface elevations at or below the base flood or the 100-year frequency flood elevation. The flood plain is also known as the Special Flood Hazard Area (SFHA).

Flood Fringe: That portion of the flood plain outside of the regulatory floodway.

Floodway: The channel and that portion of the flood plain adjacent to a stream or water course which is needed to store and convey the anticipated existing and future 100-year frequency flood discharge with no more than a **one-tenth (0.1) foot** increase in stage due to any loss of flood conveyance or storage and no more than a **ten percent (10%)** increase in velocities.

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 Event: A rainfall, runoff, or flood event having a **one percent (1%)** 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 flood plain adjacent to a stream or watercourse as designated by the Illinois Department of Transportation, Division of Water Resources, which is needed to store and convey the existing and anticipated future 100-year frequency flood discharge with no more than a **one-tenth (0.1) foot** increase in stage due to the loss of flood conveyance or storage, and on more than a **ten percent (10%)** increase in velocities. The regulatory floodways are designated for the Mississippi River on the Flood Boundary and Floodway Map prepared by FEMA and dated September 4, 1985. The regulatory floodways or those parts of unincorporated County that are within the extraterritorial jurisdiction of the Village are designated for the Mississippi River on the Flood Boundary and Floodway Map prepared by FEMA and dated September 4, 1985. To locate the regulatory floodway boundary on any site, the regulatory floodway boundary should be scaled off the regulatory floodway map 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 Division 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 and manmade, 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.

Ten-Year Event: A runoff, rainfall, or flood event having a **ten percent (10%)** chance of occurring in any given year.

Time of Concentration: The elapsed time for stormwater to flow from the most hydraulicly 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.

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

32-1-3 APPLICABILITY. This Code shall apply to all development in the Village.

32-1-4 DRAINAGE PLAN SUBMITTAL REQUIREMENTS. Each applicant shall submit the following information, depending on development size, to ensure that the provisions of this Code 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.

Drainage basins smaller than **twenty (20) acres** shall submit only the Basic Drainage Plan called for in Section 32-1-5. Drainage basins larger that **twenty (20) acres** shall comply with the submittal requirements of both the Basic Drainage Plan and the Advanced Drainage Plan of Section 32-1-6. **(See Appendix "A")**

32-1-5 BASIC DRAINAGE PLAN.

(A) **Topographic Map.** A topographic survey of the property at two-foot contours unless otherwise approved by Village Engineer under existing and proposed conditions, and areas upstream and downstream, necessary to determine off-site impact of the proposed drainage plan. The map shall be keyed to a consistent datum specified by the Village.

(B) **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, size and slope of stormwater conduits and drainage swales;
(8) sanitary or combined sewer;
(9) 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.

(C) **Environmental Features.** A depiction of environmental features of the property and immediate vicinity including the following:

(1) the limits of wetland areas;
(2) any designated natural areas; and
(3) any proposed environmental mitigation features.

32-1-6 **ADVANCED DRAINAGE PLAN.** The same information as required in Section 32-1-4 is required for properties larger than **ten (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:

(A) elevations and maps of 100-year flooding;
(B) cross-section data for open channel flow paths and designated overland flow paths;
(C) direction of storm flows;
(D) flow rates and velocities at representative points in the drainage system; and
(E) a statement by the design engineer of the drainage system's provision for handling events greater than the 100-year runoff.

32-1-7 **MINIMIZATION OF INCREASES IN RUNOFF VOLUMES AND RATES.** In the selection of a drainage plan for a development, the applicant shall evaluate and implement 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:

(A) Minimize impervious surfaces on the property, consistent with the needs of the project;
(B) Provide stormwater retention structures;
(C) Provide stormwater detention structures; and
(D) Construct storm sewers.

32-1-8 **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. Retention 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.

32-1-9 **DESIGN CRITERIA, STANDARDS, AND METHODS.**

(A) **Release Rates.** The drainage system for a property shall be designed to control the peak rate of discharge from the property for the ten-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 in basins less than **twenty (20) acres**, the modified rational method of design as specified in the IDOT drainage manual may be used to calculate release rates.

(1) **Detention Basin Outlet Design.** Backwater on the outlet structure from the downstream drainage system shall be evaluated when designing the outlet.

(B) **Detention Storage Requirements.** The design maximum storage to be provided in the detention basin shall be based on the runoff from the 100-year, 24-hour event and reservoir (also called a modified puls or level pool) routing or equal. Detention storage for basins less than **twenty (20) acres** shall be computed using the rational method. Detention storage for basins greater than **twenty (20) acres** shall be computed using hydrograph methods.

(C) **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 overload flow path for flows in excess of the design capacity.

(1) **Design Methodologies.** Major and minor conveyance systems for areas up to **twenty (20) acres** may be designed using the rational formula. The rational formula may also be used in sizing the minor drainage system for larger sites. Runoff hydrograph methods as described in Section 32-1-9(D) must be used for major drainage system design for all systems with greater than **twenty (20) acres** of drainage area and for the design of all detention basins.

(2) **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 **one (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 (1) inch.**

(D) **Methods for Generating Runoff Hydrographs.** Runoff hydrographs shall be developed incorporating the following assumptions of rainfall amounts and antecedent moisture.

(1) **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 first quartile point rainfall distribution shall be used for the design and analysis of conveyance systems with critical durations less than or equal to **twelve (12) hours**. The third quartile point rainfall distribution shall be used for the design and analysis of detention basins and conveyance system with critical durations greater than 12 and less than or equal to **twenty-four (24) hours**. The fourth quartile distribution shall be used in the design and analysis of systems with durations greater than **twenty-four (24) hours**. The first, third, and fourth quartile distributions described by Huff are presented in Table 37 of Bulletin 70. The SCS Type II distribution may be used as an alternate to the Huff distributions.

(2) **Antecedent Moisture.** Computations of runoff hydrographs which do not rely on a continuous accounting of antecedent moisture conditions shall assume a conservative wet antecedent moisture condition as a minimum.

(E) **Wet Detention Basin Design.** Wet detention basins shall be designed to remove stormwater pollutants, to be safe, to be aesthetically pleasing, and as such 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 **six (6) feet** deep over **twenty-five percent (25%)** of the bottom area to prevent winter freeze-out.

(2) **Wet Basin Shoreline Slopes.** The side slopes of wet basins at the normal pool elevation shall not be steeper than 3 to 1 (horizontal to vertical).

(3) **Permanent Pool Volume.** The permanent pool volume in a wet basin at normal depth shall be equal to the runoff volume from its watershed for the 2-year event.

(4) **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.

(F) **Dry Detention Basin Design.** In addition to the other requirements of this Code, 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.

(1) **Dry Basin Drainage.** Dry basins shall be designed so that **eighty percent (80%)** of their bottom area shall have standing water no longer than **seventy-two (72) hours** for any runoff event less than the 100-year event. Underdrains directed to the outlet control shall be used if necessary to accomplish this requirement.

(2) **Velocity Dissipation.** Velocity dissipation measures shall be incorporated into dry basin designs to minimize erosion at inlets and outlets and to minimize resuspension of pollutants.

(3) **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.

(G) **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 **four (4) 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 restrictions.

(H) **Detention in Flood Plains.** The placement of detention basins within the flood plain is strongly discouraged because of questions about their reliable operation during flood events. However, the stormwater detention requirements of this Code may be fulfilled by providing detention storage within flood fringe areas on the project site provided the following provisions are met.

(1) **Detention in Flood Fringe Areas.** The placement of a detention basin in a flood fringe area shall require compensatory storage for **one and one-half (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 stream-flow and flood plain backwater conditions. Excavations for compensatory storage along watercourses shall be opposite or adjacent to the area occupied by detention. All flood plain storage lost below the ten-year flood elevation. All flood plain 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.

(2) **Detention in Floodways.** Detention basins shall be placed in the floodway only in accordance with Section 32-1-9(H)(3).

(3) **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 Code 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 32-1-10 of this Code. If on-stream detention is used for watersheds larger than **one (1) 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:

(a) 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,

(b) shall not cause or contribute to the degradation of water quality or stream aquatic habitat,

(c) shall include a design calling for gradual bank slopes, appropriate bank stabilization measures, and a pre-sedimentation basin,

(d) shall not involve any stream channelization or the filling of wetlands,

(e) shall require the implementation of an effective non-point source management program throughout the upstream watershed,

(f) shall not occur downstream of a wastewater discharge, and

(g) shall comply with 92 Illinois Administrative Code Parts 702 and 708 and the flood plain ordinance of the Village of Valmeyer.

(I) **Drainage Into Wetlands.** Wetlands 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 Code, the following requirements shall be met for all developments whose drainage flows into wetlands:

(1) **Detention in Wetlands.** 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 depressional storage in wetlands 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 **twenty-four (24) hours**, before being discharged to the wetland. This basin shall be constructed before property grading begins. In addition, the drainage hierarchy defined Section 32-1-7 should be followed to minimize runoff volumes and rates being discharged to the wetland.

(5) **Vegetated Buffer Strip.** A buffer strip of at least **twenty-five (25) feet** in width, preferably vegetated with native plant species, shall be maintained or restored around the periphery of the wetland.

(6) **Loessal Soils.** Care must be taken to avoid open flow discharges of storm water over silt (loessal) soils due to high potential for erosion.

(J) **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 (1) inch** and shall not remain flooded for more than **eight (8) hours** for any event less than or equal tot he 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.

(K) **Safety Considerations.** The drainage system components, 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 100-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 three to one (horizontal to vertical).

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

(3) **Velocity.** Velocities throughout the surface drainage system shall be controlled to safe levels taking into consideration rates and depths of flow.

(4) **Overflow Structures.** All stormwater detention basins shall be provided with an overflow structure capable of safely passing excess flows at a stage at least one 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.

(L) **Maintenance Considerations.** The stormwater drainage system shall be designed to minimize and facilitate maintenance. Turfed side slopes shall be designed to allow lawnmowing 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 for heavy equipment shall be provided.

32-1-10 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.

(A) **Upstream Areas Not meeting Code Requirements.** When there are areas not meeting the storage and release rates of this Code, 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 32-1-8, the applicant's property area, and the procedures described in Section 32-1-9.

(2) Areas tributary to the applicant's property, not meeting the storage and release rate requirements of this Code, shall be identified.

(3) Using the areas determined in Section 32-1-10(A) 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 32-1-9. 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 Village may choose to pay for over-sizing 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 "1" above. If regional storage is selected by the Village, then the design produced in "3" above shall be implemented. If regional storage is rejected by the Village, 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 (1) square mile** in size, the applicant must meet the provision of Section 32-1-9(H)(3) for on-stream basins.

(B) **Upstream Areas Meeting Code Requirements.** When there are areas which meet the storage and release rate requirements of this Code, tributary to the applicant's property, the upstream flows shall be bypassed around the applicant's detention basin if this is the only practicable alternative. Storage needed for the applicant's property shall be computed as described in Section 32-1-10(A)(1). However, if the Village 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.

32-1-11 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.

32-1-12 FEE IN LIEU OF DETENTION. All single-family residential developments under **five (5) acres** in size and all other developments under **one (1) acre** in size shall pay a fee of **Ten Thousand Dollars ($10,000.00)** for each acre-foot of detention which would be required under this Code rather than installing detention facilities on the property, unless specifically directed to do otherwise by the appropriate local official. The Village also shall have the option for larger properties of requiring a fee of **Ten Thousand Dollars ($10,000.00)** for each acre-foot of detention needed in lieu of the applicant building a basin on-site provided the property will discharge stormwater to the Village's storm sewer 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 shall have the option of paying a fee of **Ten Thousand Dollars ($10,000.00)** for each acre-foot of detention required so that the Village can build regional facilities, or they can jointly build the necessary facilities themselves.

32-1-13 MAINTENANCE RESPONSIBILITY. Maintenance of stormwater drainage facilities located on private property shall be the responsibility of the owner of that property. Before an appropriate permit is obtained from the Village the applicant shall execute a maintenance agreement with the Village guaranteeing that the applicant and all future owners of the property will maintain its stormwater drainage system. Such agreement shall be recorded with the Recorder of Deeds of Monroe County. The maintenance agreement shall include a schedule for regularly maintenance of each aspect of the property's stormwater drainage system and shall provide for access to the system for inspection by authorized personnel of the Village. The maintenance agreement shall also stipulate that if the appropriate personnel of the Village notify the property owner in writing of maintenance problems which require correction, the property owner shall make such corrections within **thirty (30) calendar days** of such notification. If the corrections are not made within this time period, the Village may have the necessary work completed and assess the cost to the property owner.

The Village has the option of requiring a bond to filed by the property owner for maintenance of the stormwater drainage system.

32-1-14 ADMINISTRATION.

(A) **Inspections.**

(1) **Inspections During Construction.** General site grading shall not begin until the appropriate official of the Village has certified in writing to the applicant that any necessary detention facilities are in place and operational. The appropriate official or his 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 Code are noted during such inspections, the appropriate official shall notify the property owner in writing of the items needing correction. The property owner shall have **ten (10) calendar days** to make such corrections unless given a specific extension of time in writing by the appropriate official.

Failure to complete such corrections within the specified time period shall constitute a violation of this Code.

(2) **Final Inspection.** Upon notification by the applicant that the drainage system is completed, the appropriate official of the Village or his

representative shall conduct a final inspection. If the drainage system is found to contain deficiencies which require correction the appropriate official or his representative shall notify the property owner of the necessary corrections. The property owner shall correct such deficiencies within **ten (10) calendar days** unless given a specific extension of time in writing by the appropriate official. Failure to make necessary corrections within the specified time period shall constitute a violation of this Code. Upon finding that the drainage system meets the provision and requirements of this Code the appropriate official shall issue in writing a notice of drainage system completion to the property owner.

(3) **Routine inspections.** All privately owned drainage systems shall be inspected by representatives of the Village 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.

(B) **Enforcement.** The administration and enforcement of this Code shall be the responsibility of the Building and Zoning Administrator of the Village or his representatives.

(C) **Appeals.** All appeals to the Building and Zoning Administrator's decisions regarding the interpretation of this Code shall be heard by the Board of Appeals.

32-1-15 PENALTIES. Any person convicted of violating any of the provision or requirements of this Code shall be guilty of a misdemeanor and shall be subject to a fine of not more than **One Thousand Dollars ($1,000.00)**. Each day the violation continues shall be considered a separate offense.

(Ord. No. 94-13; 07-23-94)

APPENDIX "A"

VALMEYER STORM WATER MANAGEMENT PLAN

Purpose

This report is submitted to present the preliminary design for the storm water drainage systems plan for the Village of Valmeyer in compliance with Village Ordinance 94-13 - "Storm Water Drainage and Detention Ordinance".

Design Objectives

a) To assure that new development does not increase the drainage or flood hazards to others, or create unstable conditions susceptible to erosion;

b) To protect new buildings and major improvements to buildings from flood damage due to increased storm water runoff;

c) To protect human life and health from the hazards of increased flooding on a watershed basis;

d) 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 storm water runoff quantities from new development;

e) To protect, conserve, and promote the orderly development of land and water resources;

f) To preserve the natural hydrologic and hydraulic functions of watercourses and flood plains to protect water quality and aquatic habitats;

g) To preserve the natural characteristics of stream corridors in order to moderate flood and storm water impacts, improve water quality, reduce soil erosion, protect aquatic and riparian habitat, provide recreational opportunities, provide aesthetic benefits and enhance community and economic development.

Description of Development

The relocation of the Village of Valmeyer encompasses a 500-acre tract of land. Two hundred thirty-four (234) acres will be developed in residential, commercial, industrial and public uses. Two hundred sixty-four (264) acres will be preserved in its natural state as public open space. Refer to Comprehensive Plan.

Planned land uses will add impervious surfaces to the land which will increase runoff. The site has been planned in recognition of various site factors including highly erodible soils, steep slopes, karst topography as well as increased runoff.

Description of Watershed

The site of the New Valmeyer is located approximately 1.5 miles East of the existing Village. This site drains to six different drainage watersheds, as shown on the USGS map #1. These basins are:

Watershed Area	Description	Acreage
1.	Southeastern	26.64
2.	Southwestern	76.19
3.	Western	204.83
4.	Northwestern	76.02
5.	Northern	101.17
6.	Northeastern	106.31
7.	Interal	11.17
	TOTAL	602.33

The terrain for each of these watersheds is very similar, with the exception of the Southeastern area. This watershed is the only one to drain easterly to Bond Creek. This watershed is much flatter and has no woodlands. The remaining five drainage areas are extremely steep with severe head cut, wind, and weather erosion problems. The current farming activity is contributing greatly to the sediment problems in Moredock Lake. Four of the drainage areas (Western, Northwestern, Northern, and Northeastern) drain into the upstream end of Moredock Lake (see map 2). The Southwestern watershed drains to the Dennis Hollow Creek, and then into the lake overflow.

The head cut erosion problems that occurs in drainage areas 2-6 is of the most immediate concern on this site relative to storm water management. Head cut erosion occurs at almost every point where drainage leaves the fields and continues down slope to the rock bottom creeks. This initial drop in elevation from field edge to creek bottom varies from 20 to 50 feet over very short distances.

Storm Water Management Design Goals

The objectives of our storm water management system must take on two roles. First, we must stop the head cut erosion and repair existing damage that has been done to the site. Secondly, we must reduce the possibility of this type or any new type of damage from occurring in the future.

To accomplish the first objective we must reduce the amount of water and the number of locations where water is allowed to travel down the steep slopes to the creeks. We must also repair the damage that has been done in the head cut erosion areas.

The second objective to reduce the possibility of new damage from occurring will be achieved by incorporating appropriate storm water management practices.

Development of the Storm Water Management Plan, however, must be done in concert with other site conditions. These include highly erodible soils, slope stability, and karst topography. Following are specific recommendations which have been made by the Illinois State Geological Survey and the actions the Village has taken or incorporated into plans to mitigate the problem. In several cases the Village could not comply with the recommendation.

Erosion

Recommendation: Protect soil during construction to minimize loss and sedimentation downstream of site.
Action: Village has adopted "Soil Erosion and Sediment Control Ordinance" to require this. Plans and specifications for infrastructure have erosion control requirements. Individual homeowners are also required to incorporate erosion control into their sites.

Recommendation: Construct a well-designed storm sewer system.
Action: Village has designed a complete storm sewer system with watertight joints.

Recommendation: Construct a sanitary sewer system - no septic fields.
Action: Village has designed a complete sanitary sewer collection system and will carry effluent to existing treatment plant in Old Village of Valmeyer.

Recommendation: Connect all house gutters and downspouts to storm water sewer system.
Action: Soil Erosion and Sediment Control Ordinance requires all structures (residential, commercial, industrial, and institutional) to have gutters and down spouts connected to storm sewer system.

Recommendation: Line all catchment basins or ponds.
Action: This recommendation can only be partially met due to conflicting agency requirements and site factors. The wet basin which will serve as a lake site is to be lined - see new Valmeyer Lake and Dam preliminary design report. The four wetland ponds located on the site cannot be lined by conditions imposed by the U.S. Army Corps of Engineers Wetland Permit. Lining of the existing pond in the southwestern basin would have more negative effects than positive. The pond had held water for many years. Excessive disturbance of natural areas would be caused by installing liners in the other dry basins. The plan calls for the dry basins to be constructed with an underdrain system to disperse water through the outlet pipe.

Recommendation: During construction of any water carrying system ensure that joints are tight and backfill is well compacted so that settlement will not create leaks at joints in the future.
Action: All water carrying systems have been designed using watertight joints and will be closely monitored during installation. All water carrying lines will be tested in conformance with Standard Specifications for Water and Sewer Main Construction in Illinois 4th Edition (1986). The design calls for use of a granular pipe cradle and initial granular trench backfill for all water carrying lines in the Village. This material properly installed will prevent settlement problems. Burlington Environmental, the Village's Soils and Geo-technical consultant, will recommend appropriate materials and compaction methods for backfill material.

Recommendation: Seal all joints in any storm water system components.
Action: All joints in the concrete curb and gutters will be sealed with pavement sealer.

Slope Stability

Recommendation: Avoid construction near steep slopes.
Action: The Soil Erosion and Sediment Control Ordinance and the final plats for the Village define and delineate a slope disturbance line. No construction will be permitted beyond the slope disturbance line unless designed by a professional engineer and must incorporate appropriate measures to insure slope stability.

Recommendation: Do not remove material from base of slopes.
Action: No construction activity or disturbance will occur at the base of slopes.

Recommendation: Do not add weight to the top of the steep slopes by pushing soil material out over slopes to form more flat land to enlarge lot sizes.
Action: The site grading design utilized the residential "Finger" areas as borrow sites. Street and lot area will be leveled basically by cut - not by fill. Borrow material is used as fill principally for the dam and the school sites.

Recommendations: Do not construct septic fields.
Action: No septic fields are included in design.

Recommendation: Do not allow excessive watering above or on steep slopes.
Action: This will be addressed through a home builders education process that the Village has been conducting since January, 1994. A series of seminars, home show, literature etc. has been presented to the prospective residents of "New Valmeyer" to enlighten then as to their new environment. This topic will be included in upcoming seminars.

Recommendation: Do not remove trees on steep slopes or near top of slopes.
Action: The Erosion and Sediment Control Ordinance requires a permit for any tree cutting where the tree is in excess of 4" in diameter. The intent is to prevent unnecessary cutting of trees that would cause erosion or slope stability problems.

Recommendation: Create green belts along the tops of slopes so that an association or village controls activities in these critical areas.
Action: This recommendation was not considered practical because in the residential "fingers" this would mean the loss of approximately 50% of the saleable land and thereby make the project infeasible The Village has used other measures to mitigate this concern.

Karst (other recommendations covered above)

Recommendation: Eliminate areas that pond water on the surface.
Action: The identified wetland areas cannot be drained under conditions of the U.S. Army Corps of Engineers permit. Other depressional areas have been designed to be graded so as to not permit ponding.

Drainage Plan

The development of the final drainage plan has been a reciprocal type of process which incorporates drainage considerations into other components of the design i.e., plat of the town, site grading plan, street design, sanitary sewer design, karst topography considerations, etc.

Site grading and street grades were set so as to allow all front yard drainage from lots to flow toward the street and to allow water from gutters and downspouts to flow toward the street. A storm sewer system including curb inlets then carries storm water runoff from lots to impervious surfaces, and gutters and downspouts to either a retention or detention structure. The Village's Soil Erosion and Sediment Control Ordinance requires that all gutters and downspouts be connected to storm sewer systems. See Map #3 for location and sizing of storm sewers and inlets.

The new town site is located at a high point and therefore drainage is to all directions. It is necessary to have numerous drainage basins in order to allow for gravity flow of storm water from the site. The following table identifies the watershed along with the drainage basin/sub-basin and the acreage associated with each.

Watershed	Watershed Area/Acres	Drainage Basin/Acres	Control Structure
Southeastern	26.64		
Basin #1		24.79	detention
Southwestern	76.19		
Existing Lake		7.24	retention
Basin #2		3.52	detention
Western	204.83		
Lake*		71.31	retention
Basin 3A		3.22	detention
Basin 3B		1.51	detention
Northwestern	76.02		
Basin #4		9.85	detention
Basin #5		4.93	detention

Northern	101.17		
Basin #6		17.08	detention
Basin #7		34.02	detention
Northeastern	106.31		
Basin #8		19.30	detention
Basin #9		3.48	detention
Basin #10A		1.61	detention
Basin #10B		1.76	detention
Basin #10C		4.09	detention
Wetland#3		2.88	wetland pond
Internal			
Wetland #1		3.76	wetland pond
Wetland #2		3.94	wetland pone
		218.29	

*Refer to Valmeyer Lake Preliminary Design Report

The location of basins is shown on Map #3. See Maps 3A and 3B for more detail.

The basins are designed to serve the dual purpose of detaining storm events and as sediment control structures. An additional two basins will serve as sediment control structures during construction – temporary basins #1, and #2/

A typical design of the dry detention structure is attached.

In addition to the above improvements the storm water management plan includes repair of head cut erosion in locations where down cutting by erosion has left steep gullies and washes. Repair will consist of replacing eroded material and measures to prevent re-occurrences.

Due to the presence of highly erosive loessal soils in the uppermost soils horizon storm water flow will be transported over these soils in drain piping as it enters or leaves detention/retention basins.

Design Criteria

The storm water drainage system has been designed in accordance with the Storm Water Drainage and Detention Ordinance to control the peak rate of discharge from the property for the 10 year - 24 hour and 100 year - 24-hour events to levels which will not cause an increase in flooding or channel instability downstream. The drainage system design had the capacity of passing a 100 year storm event at a level at least one foot below the lowest foundation grade in the flow path.

Maintenance

It will be the responsibility of the Village of Valmeyer to maintain the storm water management system once it is developed.