

ORDINANCE No. 36

AN ORDINANCE OF UPPER BERN TOWNSHIP, BERKS COUNTY, PENNSYLVANIA, AMENDING THE SUBDIVISION AND LAND DEVELOPMENT ORDINANCE FOR THE TOWNSHIP BY ADDING SECTION 5.80, STORMWATER MANAGEMENT.

BE IT ENACTED AND ORDAINED by the Supervisors of Upper Bern Township, Berks County, Pennsylvania, as follows:

SECTION 1. That Article V - Design standards of the Subdivision and Land Development Ordinance for Upper Bern Township, Berks County, Pennsylvania, shall be and is hereby amended by adding Section 5.80 Stormwater Management, which Section shall read as follows:

Section 5.80 Stormwater Management

The management of storm water on a tract, both during and upon completion of the disturbances associated with proposed subdivision, land development, or any construction shall be accomplished in accordance with the minimum standards and criteria of this section.

1. General: The developer shall construct and/or install such drainage structures as necessary to:

- (a) Prevent erosion damage and to satisfactorily carry off or detain and control the rate of release of surface waters.
- (b) Carry surface water to the nearest adequate street, storm drain, detention basin, natural watercourse or drainage facility.
- (c) Maintain the adequacy of the natural stream channels and protect the natural character of the watercourse. Accelerated bank erosion shall be prevented by controlling the rate and velocity of runoff discharge to these water courses, so as to avoid increasing occurrence of stream bank overflow and to protect downstream property owners.
- (d) To insure adequate drainage of all low points along the line of streets.
- (e) To intercept stormwater runoff along streets at intervals reasonably related to the extent and grade of the area drained and to prevent substantial flow of water across intersections.

(f) Control the anticipated peak discharge from the property being subdivided or developed and the existing runoff contributed from all land at a higher elevation in the same watershed, to an amount equal to or below pre-development rates.

(g) Preserve the adequacy of existing culverts and bridges by suppressing the new flood peaks created by new land development.

(h) All stormwater detention/retention facilities and erosion and sedimentation control measures shall be in place and functioning prior to any earthmoving activities.

2. Stormwater Management Plan: A Stormwater Management Plan for the proposed subdivision or land development is required and shall contain the following:

(a) Mapping of the watershed and drainage area or areas in which the proposed subdivision or land development is located.

(b) A study shall be performed of the watershed in which the subdivision or land development is located to assess the impact the proposal will have on downstream conditions. The stormwater management plan shall address all identified impacts to the satisfaction of the Township.

(c) Computations of the stormwater runoff for all points of runoff concentration before and after development, including all supporting data.

(d) Complete drainage systems for the subdivision or land development. All existing drainage features which are to be incorporated in the design shall be so identified with an explanation of the operations of the facilities.

(e) Plans showing all existing and proposed drainage facilities affecting the subject property; plan and profile views.

(f) Computations for all proposed and existing drainage structures that are associated with this project.

(g) Plans showing ALL proposed grading, including ALL proposed dwelling(s) and/or structure(s) locations with proposed first floor elevation(s). The plan should contain a note stating that the grading of any portion of the subdivision cannot differ from the approved grading plan without the prior approval of the Township.

NOTE: Proposed driveways shall not increase the rate of runoff or direct sediment laden runoff onto public or private property without Township approval.

(h) Construction details for all proposed facilities

If, in the course of reviewing the Stormwater Management Plan the Township determines that off-site improvements are necessary to satisfactorily control the stormwater from the proposed development, the developer shall be responsible for the off-site improvements.

(i) A detailed plan of all required off-site drainage improvements.

3. Design criteria and requirements for drainage structures.

(a) Stormwater shall not be transferred from one watershed to another, unless (1) the watersheds are sub-watersheds of a common watershed which join together within the perimeter of the property; (2) the effect of the transfer does not alter the peak discharge onto adjacent lands; (3) easements and drainage releases from the affected landowner(s) are obtained by the developer and provided to the Township.

(b) Storm Frequency

(1) Design Flow Rate - The storm drainage collection and conveyance system shall be designed for the twenty-five (25) year storm in all residential subdivisions or land developments, unless otherwise specified by the Township Engineer. Rainfall intensity curves and other hydraulic design data, provided by the Pennsylvania Department of Transportation and/or Soil Conservation Services, shall be used for design purposes. The design year peak flow rate into each inlet shall be indicated on the stormwater drainage plan. The flow rate shall be determined by the rational formula $Q = CIA$.

WHERE:

Q = Peak runoff rate measured in cubic feet per second (CFS).

C = Runoff factor, expressed as a percent of the total quantity of water falling on the area that can be considered runoff.

I = Rainfall intensity for the time of concentration of the drainage area, expressed in inches per hour for a given storm frequency.

A = Drainage area, expressed in acres.

The Rational Method is only valid for use in drainage areas of less than one hundred (100) acres. For drainage areas greater than this the applicant shall use the method described in the Soil Conservation Service Technical Release 55 "Urban Hydrology for small Watersheds."

The following Average Rainfall Intensities (I) shall be used for a 5 min. time of concentration for the frequencies shown:

- (a) 2 year - 3.1 inches
- (b) 5 year - 4.1 inches
- (c) 10 year - 4.9 inches
- (d) 25 year - 5.5 inches
- (e) 50 year - 6.1 inches
- (f) 100 year - 6.9 inches

(c) Pre and Post Development Peak Discharges

Pre and post development peak discharges shall be determined by utilizing the method described in the Soil Conservation Service Technical Release 55 "Urban Hydrology for Small Watersheds."

(1) Pre Development ground cover

In establishing the antecedent conditions for calculating runoff prior to development, the following assumptions shall apply:

(a) Woodland shall be used as the prior condition for those portions of the watershed trees of greater than six (6) inches DBH or where such trees existed within eighteen (18) months of application.

(b) Meadow shall be used for all other areas not considered woodland or impervious.

(2) After installation of impervious cover, peak discharges from the site shall not exceed the before construction peak discharge rate from 2 year, 24 hour storm of 3.1 inches of rainfall for all storms up to and including the 10 year, 24 hour storm of 4.9 inches of rainfall. Peak discharges for any storms of greater than 10 year frequency up to and including a 100 year storm shall not exceed the peak discharges from the site of such storms before development including:

(a) a 25 year, 24 hour storm of 5.5 inches of rainfall.

(b) a 50 year, 24 hour storm of 6.1 inches of rainfall.

(c) a 100 year, 24 hour storm of 6.9 inches of rainfall.

(d) Drainage Easements: Drainage easements shall be provided to accommodate all storm drainage requirements and shall be a minimum of twenty (20) feet in width. Easements shall be provided for all watercourses and storm drainage piping that are not located within street rights-of-way. Easements for existing watercourses shall conform substantially to the line of such watercourses; exceeding the minimum 20' width where required.

(e) Storm sewers: as required, shall be placed in the cartway of curbed streets and parallel to the roadway shoulders of streets without curbs. When located in undedicated land with approval by the Township Board of Supervisors, storm sewers shall be placed within an easement not less than twenty (20) feet wide.

(f) Storm Drainage Pipe: The minimum diameter of all storm drainage pipe shall be fifteen (15) inches or an equivalent thereto. All storm drainage piping shall be laid in a straight line. Storm drainage piping shall not be permitted under buildings. The minimum grade of piping shall be one-half (.5) of one percent. All pipe shall be reinforced concrete and conform to Pennsylvania Department of Transportation Specifications. All joints shall be mortared. Smooth bore polyethylene pipe meeting all Township specifications may be substituted for R.C.P. at the discretion of the Township. Minimum backfill and cover requirements shall meet the culvert manufacturer's specifications and or the Township Engineers approval.

(g) Manholes and Inlets (catch basins): when proposed, shall not be spaced more than three hundred (300) feet apart for pipes of less than or equal to twenty-four (24) inch diameter and five hundred (500) feet apart for pipes of greater than twenty-four (24) inch diameter. Additionally, manholes or inlets shall be placed at all changes in alignment, grade, pipe size, and at all points of convergence of two (2) or more influent storm sewer lines. Inlets may be substituted for manholes where they will serve a useful purpose.

Manholes and inlets must conform to PennDOT standards.

At street intersections, inlets shall be placed in the tangent and not in the curved portion of the curbing or radius.

Inlets shall be spaced on curbed streets to limit the gutter spread into the travel lanes to one-half the lane width during the 10 year storm. Capacity of the inlets shall not exceed four (4) cubic feet per second (cfs) for four (4) foot inlets and five (5) cfs for six (6) foot inlets in non ponding areas.

Inlets with a depth greater than four (4) feet must be provided with ladder rungs and noted on the plan as such.

When there is a change in pipe size in the inlet, the elevation of the top of pipes shall be the same or the smaller pipe higher. A minimum drop of two (2) inches shall be provided for all inlets from the inlet pipe invert elevation to the outlet pipe invert elevation. A grouted channel shall be provided on the bottom of all inlets to smoothly direct the flow through the inlet.

(h) Overflow System: An overflow system shall be provided to carry the flow to the detention basin when the capacity of the storm drain pipe system is exceeded. The overflow system shall have sufficient capacity to carry the difference between the one hundred (100) year and the twenty-five (25) year peak flow rates.

(i) Inlets and manhole cover frames: shall conform to Pennsylvania Department of Transportation Specifications. Manhole covers shall have the word "STORM" cast in two (2) inch high letters on the top of the cover.

(j) Stormwater roof drains and sump pumps: shall not discharge water directly onto a sidewalk or a street, and shall be constructed to retain all discharge wholly on the property except where such drainage can be conveyed to a storm sewer system.

(k) Drainage structures which drain watershed areas in excess of one-half (1/2) square mile (320 acres), or which have a span of eight (8) feet or more, shall be designed for a maximum expected runoff as calculated using the Soil Conservation Service Technical Release 55 "Urban Hydrology for Small Watersheds (less than 2000 acres)". The design storm shall be a minimum fifty (50) year storm. A one hundred (100) year storm shall be used if the structure will significantly affect the existing one hundred (100) year flood plain. A Water Obstruction Permit shall be obtained from the Pennsylvania Department of Environmental Resources for all waterway openings prior to preliminary plan approval.

(1) Stormwater Detention/Retention: The following criteria shall be used for design of retention/detention areas. Any reference to detention basin shall also include retention basin.

All stormwater detention and retention basins shall be designed to hold and meter the fifty (50) year storm without utilizing the emergency spillway and routed with the one hundred (100) year storm in order to analyze the basin's capabilities.

(1) Design of stormwater detention areas shall be based upon criteria set forth in the latest edition of Urban Hydrology for Small Watersheds, Technical Release 55 and National Engineering Handbook, Section 4, Hydrology as published by the U.S. Department of Agriculture, Soil Conservation Service.

(2) If permanent ponds are used, the developer shall demonstrate that such ponds are designed to protect the public health and safety.

(3) Prior to the granting of final approval of any subdivision or land development plan, the Township must be satisfied through contractual arrangements, where required, that all stormwater facilities will be properly maintained. If all or a portion of the facilities are on the property which will be conveyed to an individual, homeowners association or any other eventual owner, the guarantees must be in such form that they will carry through to the new owners.

(4) When detention basins are provided, they shall be designed to utilize the natural contours of the land wherever possible. When such design is impracticable, the construction of the basin shall utilize slopes as flat as possible to blend the structure into the terrain. All basins shall have slopes three (3) horizontal to one (1) vertical (3:1) or less.

(5) A routed hydrograph and calculations shall be furnished for each storm through the retention/detention basin.

(6) Emergency overflow facilities (emergency spillway) shall be provided for all detention facilities which shall pass the peak discharge, after development for the 100 year storm under orifice block conditions.

(7) If the land of the proposed subdivision or land development will be conveyed to two (2) or more separate

owners, the retention/detention basin and any outflow facility shall be placed on a single parcel of ground unless an exception is granted by the Board of Supervisors in their sole discretion. The developer shall provide written assurance and deed restrictions to the Township for the proper maintenance of the basins by the property owners.

(8) Design computations for the sizing of the outlet device.

(9) A stage-storage curve for said detention/retention basin.

(10) Flood routing and/or storage requirement calculations.

(11) A plan showing the berm embankment and outlet structure. The plan shall indicate top of berm elevation, top width of berm, side slopes, emergency spillway elevation and length, elevations of the outlet structure including riser, dimensions and spacing of anti-seep collars.

(12) A cross section through the outlet structure, emergency spillway, and berm embankment.

(13) A detailed plan of the trash rack and anti-vortex device (if required).

(14) Detention Basins shall be designed to facilitate regular maintenance, mowing and periodic desilting and reseedling. Basins shall not be located within floodplains or alluvial soils. In residential subdivisions and residential developments, shallow broad basins are preferred to steep sided basins.

(15) The maximum slope of the earthen detention embankments shall be three (3) to one (1). The top and/or toe of any slope shall be located a minimum of twenty-five (25) feet from any property line. Whenever possible the side slopes and basin shape shall conform to the natural topography.

(16) The minimum top width of the detention basin berm shall be ten (10) feet. A cutoff trench (key-way) of impervious material shall be provided under all embankments that require fill material. The cutoff trench shall be a minimum of eight (8) feet wide, two (2) feet deep, and have side slopes of one (1) to one (1).

The detention basin berm shall be provided with an impervious core.

(17) In order to insure proper drainage on the floor of the basin, a minimum grade of two (2) percent shall be maintained for areas of sheet flow. For channel flow, a minimum grade of one (1) percent shall be maintained. Under certain circumstances, such as continuous seasonal flow, the Township may require an erosion resistant low flow channel be constructed.

(18) All detention/retention basin embankments shall be compacted to the satisfaction of the Township Engineer.

(19) Whenever possible, the emergency spillway for detention basins shall be constructed on undisturbed ground. Emergency spillways shall be constructed of reinforced concrete checker blocks or other permanent material approved by the Township Engineer. All emergency spillways shall be constructed so that the detention basin berm is protected against erosion. The minimum capacity of all emergency spillways shall be the peak flow rate from the one hundred (100) year design storm after development. The construction material of the emergency spillway shall extend along the upstream and downstream berm embankment slopes. The upstream edge of the emergency spillway material shall be a minimum of three (3) feet below the spillway crest elevation. The downstream slope of the spillway material shall, as a minimum, extend to the toe of the berm embankment. The emergency spillway shall not discharge over earthen fill and/or easily erodible material.

(20) The minimum freeboard shall be one (1) foot. Freeboard is the difference between the design water elevations in the detention/retention basin and the top of the outlet structure. Another foot of elevation difference shall be provided between the top of the outlet structure and the crest of the spillway elevation.

(21) Anti-seep collars shall be installed around the pipe barrel within the normal saturation zone of the detention basin berms. The anti-seep collars and their connections to the pipe barrel shall be watertight. The anti-seep collars shall extend a minimum of two (2) feet beyond the outside of the principal pipe barrel. The maximum spacing between collars shall be fourteen (14) times the minimum projection of the collar measured perpendicular to the pipe. A minimum of two (2) anti-seep collars shall be installed on each pipe outlet.

(22) All outlet pipes through the basin berm shall be reinforced concrete pipe having o-ring joints.

(23) Energy dissipating devices (riprap, paved outlets, etc.) shall be placed at all basin outlets.

(24) During construction, a perforated riser pipe shall be provided at each outlet of all detention basins for sediment control. The riser shall be constructed of metal or concrete. The riser shall meet the current requirements of the County Conservation District. The perforated riser shall be designed so that the rate for outflow is controlled by the pipe barrel through the basin berm when the depth of water within the basin exceeds the height of the riser. All metal risers shall be suitably coated to prevent rust. A trash rack or similar appurtenance shall be provided to prevent debris from entering the riser. All risers shall have a concrete base attached with a watertight connection. The base shall be of sufficient weight to prevent flotation of the riser. An anti-vortex device, consisting of a thin vertical plate normal to the basin berm, shall be provided on the top of the riser. All permanent and temporary sediment control basins shall meet the requirements of the County Conservation District.

(25) Permanent Detention / Retention basins outlet structures shall be designed to incorporate multiple stage outlet release devices.

(m) Swales: properly designed, graded, and lined drainage swales may be permitted in lieu of storm sewers in commercial, industrial, and residential areas where approved by the Township. The swale designs shall not exceed the following standards:

(1) Maximum capacity - 5 cfs.

(2) Maximum velocity - 4 fps.

(3) Maximum slope - 5%.

Swale lining must meet the County Conservation District design standards. All drainage channels shall have a maximum side slope grade of three (3) horizontal to one (1) vertical. All drainage swales shall be provided with a minimum 6 inch freeboard, measured from the top of the design storm flow to the top of the swale.

(n) Curbing: Curb requirements shall vary according to street hierarchy and intensity of the development. Curbing will be

required for any one or more of the following reasons. (Penn DOT standard vertical curb shall be used unless otherwise approved by the Township)

1. For stormwater management.
2. To stabilize pavement edge.
3. To delineate parking areas.
4. At intersections, corners and tight radii.

(o) Pipe underdrain and/or Pavement base drain: Shall be provided in areas noted as "Seasonal High Water Table", if during the construction phase of the project the Township Engineer identifies an area where pipe underdrains and/or pavement base drains are needed and were not labeled on the plan as such; the developer shall install the township approved underdrain system at the developer's expense.

Pipe underdrains and pavement base drains shall be constructed in accordance with PennDOT Pub. 408 Section 610.

(p) Pipe endsections and/or headwalls meeting PennDOT specifications shall be utilized at all terminated pipe segments.

(q) All drainage structures within the State Highway rights of way shall be approved by PennDOT, a letter from PennDOT indicating such approval shall be submitted to the township.

4. Existing Watercourses and Natural Drainage Features:

(a) Whenever a watercourse, stream, or intermittent stream is located within a development site, it shall remain open in its natural state and location and shall not be piped except for proposed road crossings.

(b) The existing points where natural drainage discharges onto adjacent property shall not be altered in anyway or form without the written approval and consent from the affected landowner(s).

(c) No stormwater runoff or natural drainage shall be so diverted as to overload an existing drainage system, or create flooding or the need for additional drainage structure on other private properties or public lands.

(d) No watercourse shall be altered or relocated unless approved by the Township and the Pennsylvania D.E.R., Bureau of Dams and Waterway Management.

August 12, 1992

015/C102445

SECTION 2. That all other provisions of the Subdivision and Land Development Ordinance for Upper Bern Township, as hereby amended are ratified and confirmed.

SECTION 3. That any ordinance inconsistent with the provisions of this Ordinance are repealed to the extent of the inconsistency.

ENACTED AND ORDAINED this 2 day of Dec, 1992.

BOARD OF SUPERVISORS
UPPER BERN TOWNSHIP

Eric Starzy Jr

Tim Kentschke

John S. ...

Attest: Deborah K. ...
Secretary