PARADISE TOWNSHIP

STORM WATER MANAGEMENT ORDINANCE

OCTOBER 21, 2014

Prepared by:

RETTEW
We answer to you.

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SECTION 101 TITLE

This Ordinance shall be known as the Paradise Township Storm Water Management Ordinance.

SECTION 102 STATEMENT OF FINDINGS

The Supervisors of the Township of Paradise find that:

1. Inadequate management of accelerated storm water runoff resulting from development throughout a watershed increases flood flows and velocities, contributes to erosion and sedimentation, overtaxes the carrying capacity of existing streams and storm sewers, greatly increases the cost of public facilities to convey and manage storm water, undermines floodplain management and flood reduction efforts in upstream and downstream communities, reduces groundwater recharge, and threatens public health and safety.

2. A comprehensive program of storm water management, including reasonable regulation of development and activities causing accelerated erosion, is fundamental to the public health, safety, welfare, and the protection of the people of the Township and all the people of the Commonwealth, their resources, and the environment.

3. Storm water is an important water resource, which provides groundwater recharge for water supplies and base flow of streams, which also protects and maintains surface water quality.

4. Federal and state regulations require certain municipalities to implement a program of storm water controls. These municipalities are required to obtain a permit for storm water discharges from their separate storm sewer systems under the National Pollutant Discharge Elimination System (NPDES).

5. Public education on the control of pollution from storm water is an essential component in successfully addressing storm water issues.

6. Non-storm water discharges to municipal separate storm sewer systems (MS4) can contribute to pollution of Waters of this Commonwealth.

7. Inadequate maintenance of storm water best management practices (BMPs) causes loss of water quality, flooding, and other problems.

8. A program of reasonable regulation of connections and discharges to municipal storm water management facilities will be beneficial.

SECTION 103 PURPOSE

The purpose of this Ordinance is to promote health, safety, and welfare within Paradise Township by minimizing the damages described in Section 102 of this Ordinance through provisions designed to:

1. Meet legal water quality requirements under state law to protect, maintain, reclaim, and restore the existing and designated uses of the Waters of this Commonwealth.

2. Manage accelerated runoff and erosion and sedimentation problems at their source by regulating activities that cause these problems.

3. Utilize and preserve the existing natural drainage systems.

4. Maintain recharge of groundwater to minimize degradation of surface and groundwater quality and protect water resources.

5. Maintain existing flows and quality of streams and watercourses in the Township.

6. Preserve the flood-carrying capacity of streams.

7. Require proper operations and maintenance of all temporary and permanent storm water management facilities and Best Management Practices (BMPs) that are constructed and implemented.

8. Require consistency and compliance with the requirements of the “Countywide Act 167 Plan” dated April 2013, Revised August 16, 2013 that are found in “Blueprints: An Integrated Water Resources Plan for Lancaster County.”

9. Provide procedures, performance standards, and design criteria for storm water planning and management.

10. Implement an "illegal discharge detection and elimination program" within MS4 permitted urbanized areas to address non-storm water discharges into a municipal separate storm sewer system.

11. Promote storm water runoff prevention through the use of nonstructural BMPs.

12. Provide a regulatory environment that supports the proportion, density and intensity of development called for in the comprehensive plan; allow for creative methods of improving water quality and managing storm water runoff; and promote a regional approach to water resource management.

13. Encourage the preservation, protection, conservation, and restoration of natural resource systems.

14. Promote storm water management practices that emphasize infiltration, evaporation, and transpiration.

SECTION 104 STATUTORY AUTHORITY

The Supervisors of the Township of Paradise pursuant to the Pennsylvania Storm Water Management Act, Act No. 167 of October 4, 1978, (P.L. 864) (Act 167), Section 680.1, et. seq., as amended, the Second Class Township Code, Act of May 1, 1933 (P.L. 103, No. 69), as reenacted and amended by the November 9, 1995 (P.L. 350, No. 60), as amended, and the Pennsylvania Flood Plain Management Act, Act No. 166 of October 4, 1978 (P.L. 851), and 35 P.S. Section 691.1 et seq. the Pennsylvania Clean Streams Law hereby enacts and ordains this Ordinance as the Paradise Township Storm Water Management Ordinance.

SECTION 105 APPLICABILITY

1. With the exception of activities exempted under Section 401, the provisions, regulations, limitations, and restrictions of this Ordinance shall apply to all Regulated Activities as defined in this Ordinance within Paradise Township.

2. This Ordinance shall apply to temporary and permanent storm water management facilities constructed as part of any of the Regulated Activities listed in this Section. Temporary storm water management and erosion and sedimentation control regulated by PADEP under Chapter 102 during construction activities are not specifically regulated by this Ordinance, but shall continue to be regulated by PADEP under Chapter 102, and the "Pennsylvania Clean Streams Law."

3. The following activities are defined as "Regulated Activities" and shall be regulated by this Ordinance:

    A. All Subdivisions or Land Developments

    B. Major or Minor Land Disturbances

    C. Construction of new or additional impervious or semi-pervious surfaces (driveways, parking lots, etc.).

    D. Construction of new buildings or additions to existing buildings.

    E. Diversion or piping of any natural or man-made stream channel.

    F. Installation or modification of storm water management facilities or BMPs or appurtenances thereto.

    G. Any other activities where the Township determines that said activities may affect any existing storm water management facilities or storm water drainage patterns.

SECTION 106 GENERAL REQUIREMENTS

For any of the activities regulated by this Ordinance, the final approval of subdivision and/or land development plans, the issuance of any zoning permit authorizing land disturbance or additional impervious area, or the commencement of any land disturbance activity may not proceed until the

Property Owner or Developer or his/her agent has received written approval of a Storm Water Management Site Plan from the Township or its designee.

SECTION 107 REPEALS AND CONTINUATION OF PRIOR REGULATIONS

1. Except as otherwise required by law, this Ordinance is intended as a continuation of, and not a repeal of, existing regulations governing the subject matter. To the extent that this Ordinance restates regulations contained in ordinances previously enacted by the Township, this Ordinance shall be considered a restatement and not a repeal of such regulations. It is the specific intent of the Township that all provisions of this Ordinance shall be considered in full force and effect as of the date such regulations were initially enacted. All ordinances or parts of ordinances inconsistent with the provisions of this Ordinance are hereby repealed. It is expressly provided that the provisions of this Ordinance shall not affect any act done, contract executed or liability incurred prior to its effective date, or affect any suit or prosecution pending or to be instituted to enforce any rights, rule, regulation or ordinance, or part thereof, or to punish any violation which occurred under any prior storm water regulation or ordinance. In the event any violation has occurred under any prior storm water regulation or ordinance of the Township, prosecution may be initiated against the alleged offender pursuant to the provisions of said prior storm water regulation or ordinance, and the provisions and penalties provided in said prior storm water regulation or ordinance shall remain effective as to said violation.

2. Any Storm Water Management Site Plan pending at the time of the effective date of this Ordinance shall be allowed to proceed with revisions, finalization, and implementation in accordance with any Ordinance in effect prior hereto.

SECTION 108 SEVERABILITY

Should any section, provision or part thereof of this Ordinance be declared invalid by a court of competent jurisdiction, such decision shall not affect the validity of any of the remaining provisions of this Ordinance.

SECTION 109 ABROGATION AND GREATER RESTRICTIONS

It is not intended by this Ordinance to repeal, abrogate, annul, or interfere with any existing ordinances or enactment, or with any rule, regulation, or permit adopted or issued thereunder, except insofar as the same may be inconsistent or in conflict with any of the provisions of this Ordinance, provided that where this Ordinance imposes greater restrictions upon the use of land, or prescribed larger open spaces than are required by the provisions of other such ordinance, enactment, rule, regulation or permit, then the provisions of this Ordinance shall control. Furthermore, if a discrepancy exists between any regulations contained within this Ordinance, that regulation which imposes the greater restriction shall apply.

SECTION 110 MUNICIPAL LIABILITY

Except as specifically provided by the Pennsylvania Storm Water Management Act, Act of October 4, 1978, P.L. 864, No. 167, as amended, 32 P.S. §680.1 et seq., the making of any administrative decision by the Township or any of its officials or employees shall not constitute a representation, guarantee or warranty of any kind by the Township of the practicability or safety of any proposed structure or use

with respect to damage from erosion, sedimentation, storm water runoff, flood, or any other matter, and shall create no liability upon or give rise to any cause of action against the Township and its officials and employees of the Township, by enacting and amending this Ordinance, does not waive or limit any immunity granted to the Township and its officials and employees by the Governmental Immunity Act, 42 Pa. C.S. §8541 et seq., and does not assume any liabilities or obligations.

SECTION 111 ERRONEOUS PERMIT

Any permit or authorization issued or approved based on false, misleading or erroneous information provided by an Applicant is void without the necessity of any proceedings for revocation. Any work undertaken or use established pursuant to such permit or other authorization is unlawful. No action may be taken by a board, agency or employee of the Township purporting to validate such a violation.

ARTICLE II – DEFINITIONS

SECTION 201 DEFINITION OF TERMS

For the purposes of this Ordinance, certain terms and words used herein shall be interpreted as follows:

1. Words used in the present tense include the future tense; the singular number includes the plural, and the plural number includes the singular; words of masculine gender include those of feminine gender and vice-versa.

2. The word "includes" or "including" shall not limit the term to the specific example but is intended to extend its meaning to all other instances of like kind and character.

3. The word "person" includes an individual, firm, association, organization, partnership, trust, company, corporation, or any other similar entity.

4. The words "shall" and "must" are mandatory; the words "may" and "should" are permissive.

5. The words "used or occupied" include the words "intended", "designed", "maintained", or "arranged to be used or occupied."

SECTION 202 DEFINITIONS

Specific Terms or words used herein, unless otherwise expressly stated, shall have the following meanings:

Accelerated Erosion - The removal of the surface of the land through the combined action of man's activity and the natural processes at a rate greater than would occur because of the natural process alone.

Access Easement – A right granted by a landowner to a grantee, allowing entry for the purpose of inspecting, maintaining and repairing Storm Water Management Facilities.

Act 167 Plan - A plan prepared under the authority of Pennsylvania's Storm Water Management Act of October 4, 1978, P.L. 864, No. 167, as amended 32 P.S. Section 680.1 et seq., and as may be amended in the future.

Agricultural Activities - The work of producing crops and raising livestock including tillage, plowing, disking, harrowing, pasturing and installation of conservation measures. Construction of new buildings or impervious areas is not considered an agricultural activity.

Alteration - As applied to land, a change in topography as a result of the moving of soil and rock from one location or position to another; also the changing of surface conditions by causing the surface to be more or less impervious; any land disturbance.

Animal Heavy Use Areas – A barnyard, feedlot, loafing area, exercise lot, or other similar area on an agricultural operation where due to the concentration of animals, it is not possible to establish and maintain vegetative cover of a density capable of minimizing accelerated erosion and sedimentation by usual planting methods. The term does not include entrances, pathways and walkways between areas where animals are housed or kept in concentration.

Applicant - A landowner or developer who has filed an application for approval to engage in any Regulated Activities as defined in Section 105 of this Ordinance.

BMPs (Best Management Practices) - Activities, facilities, designs, measures or procedures used to manage storm water impacts from Regulated Activities, to meet State Water Quality Requirements, to promote groundwater recharge and to otherwise meet the purposes of this Ordinance. Storm water BMPs are commonly grouped into one (1) of two (2) broad categories or measures: "non-structural" or "structural". "Non-structural" BMPs are measures referred to as operational and/or behavior-related practices that attempt to minimize storm water runoff generation resulting from an alteration of the land surface or the contact of pollutants with storm water runoff, whereas "structural" BMPs are measures that consist of a physical device or practice that is installed to capture and treat storm water runoff. "Structural" BMPs include, but are not limited to, a wide variety of practices and devices, from large-scale wet ponds and constructed wetlands, to small-scale underground treatment systems, infiltration facilities, filter strips, low impact design, bioretention, wet ponds, permeable paving, grassed swales, riparian or forested buffers, sand filters, detention basins, and manufactured devices. "Structural" storm water BMPs are permanent appurtenances to the project site.

BMP Manual – The Pennsylvania Storm Water Best Management Practices Manual as published by the Department of Environmental Protection (DEP), of December 2006, or most recent version thereof.

Building – Any enclosed or open structure, other than a boundary wall or fence, occupying more than four (4) square feet of area and/or having a roof supported by columns, piers, or walls.

Carbonate Geology - Limestone or dolomite bedrock. Carbonate geology is often associated with karst topography.

Chapter 102 - Chapter 102 of the regulations of PADEP, 25 Pa. Code Sect. 102.1 et seq (Erosion and Sediment Control).

Chapter 105 - Chapter 105 of the regulations of PADEP, 25 Pa. Code Sect. 105.1 et seq (Dam Safety and Waterway Management).

Chapter 106 - Chapter 106 of the regulations of PADEP, 25 Pa. Code Sect. 106.1 et seq (Floodplain Management).

Cistern - A reservoir or tank for storing rainwater.

Conservation Plan – A plan written by a National Resources Conservation Service (or any agency successor thereto) certified planner that identifies Conservation Practices and includes site specific BMPs for agricultural plowing or tilling activities and Animal Heavy Use Areas.

Conservation District - The Lancaster County Conservation District or any agency successor thereto.

Conveyance - The ability of a pipe, culvert, swale or similar facility to carry the peak flow from the design storm.

Culvert - A structure with appurtenant works which carries a stream under or through an embankment or fill.

Dam - An artificial barrier, together with its appurtenant works, constructed for the purpose of impounding or storing water or another fluid or semifluid, or a refuse bank, fill or structure for highway, railroad or other purposes which does or may impound water or another fluid or semifluid. The dam falls under the requirements of Chapter 105, Dam Safety and Waterway Management, if any of the following is true:

A. The contributory drainage area exceeds 100 acres.

B. The greatest depth of water measured by upstream toe of the dam at maximum storage elevation exceeds 15 feet.

C. The impounding capacity at maximum storage elevation exceeds 50 acre-feet.

DEP also PA DEP or PADEP – The Pennsylvania Department of Environmental Protection or any agency successor thereto.

Design Storm - The magnitude and temporal distribution of precipitation from a storm event measured in probability of occurrence (e.g., a 5-year storm) and duration (e.g., 24 hours), used in the design and evaluation of storm water management systems.

Designee - The agent of the Paradise Township Supervisors involved with the administration, review or enforcement of any provisions of this Ordinance.

Detention Basin - An impoundment structure designed to manage storm water runoff by temporarily storing the runoff and releasing it at a predetermined rate.

Detention Volume – The volume of runoff that is captured and released into the Waters of this Commonwealth at a controlled rate.

Developer - A person, partnership, association, corporation, or other entity, or any responsible person therein or agent thereof, that undertakes any Regulated Activity of this Ordinance.

Development Site - The specific area of land for which a Regulated Activity is proposed, planned, conducted or maintained.

Disappearing Stream - A stream in an area underlain by limestone or dolomite which flows underground for a portion of its length.

Disturbed Area - A land area where any land disturbance activity is occurring or has occurred.

Drainage Easement - A right granted by a landowner to a grantee, allowing the use of private land for storm water management, drainage, or conveyance purposes.

Environmentally Sensitive Area - Slopes greater than 15% percent, shallow bedrock (located within 6 feet of ground surface), wetlands, Natural Heritage Areas and other areas designated as Conservation or Preservation areas in ***Greenscapes***, the Green Infrastructure Element of the Lancaster County Comprehensive Plan, where encroachment by land development or land disturbance results in degradation of the natural resource.

Ephemeral Stream - A transient stream, one that flows for a relatively short time.

Erosion - The movement of soil particles by the action of water, wind, ice, or other natural forces.

Erosion and Sediment Pollution Control Plan - A plan which is designed to minimize accelerated erosion and sedimentation.

Existing Conditions - The initial condition of a project site prior to the proposed regulated activity. If the initial condition of the site is not forested or undeveloped land, the land use shall be considered as "meadow" unless the natural land cover is documented to generate lower Curve Numbers or Rational "C" Coefficients, such as forested lands.

Facility Depth – For above ground detention/retention/BMP facilities, the facility depth is defined to be the depth between the bottom invert of the lowest orifice and the invert of the spillway. If there is no spillway, the top of the berm shall be used. For basins with no orifices or outlet structure, the bottom elevation of the basin shall be used.

FEMA - The Federal Emergency Management Agency or any agency successor thereto.

Flood - A general but temporary condition of partial or complete inundation of normally dry land areas from the overflow of streams, rivers, and other Waters of this Commonwealth.

Flood Fringe – That portion of the floodplain outside of the floodway.

Floodplain - Any land area susceptible to inundation by water from any natural source or delineated by applicable Department of Housing and Urban Development, Federal Insurance Administration Flood Hazard Boundary - Mapped as being a special flood hazard area. Also, the area of inundation which functions as a storage or holding area for floodwater to a width required to contain a base flood of which there is a one percent (1%) chance of occurring in any given year. The floodplain contains both the floodway and the flood fringe.

Flood Plain Management Act - Act of October 4, 1978, P.L. 851, No. 166, as amended 32 P.S. Section 679.101 et seq., and as may be amended in the future.

Floodway - The channel of the watercourse and those portions of the adjoining floodplains which are reasonably required to carry and discharge the 100-year frequency flood. Unless otherwise specified, the boundary of the floodway is as indicated on maps and flood insurance studies provided by FEMA. In an area where no FEMA maps or studies have defined the boundary of the 100-year frequency floodway, it is assumed that the floodway extends from the stream to a point 50 feet from the top of the bank of the stream.

Forest Management/Timber Operations - Planning and activities necessary for the management of forest land. These include timber inventory and preparation of forest management plans, silvicultural treatment, cutting budgets, logging road design and construction, timber harvesting, site preparation and reforestation.

Freeboard - A vertical distance between the 100-year design elevation of the water surface at the emergency spillway, in a condition that assumes the primary outlet(s) are blocked, and the top of a dam, levee, tank, basin, berm, or diversion ridge.

Frequency - The probability or chance that a given storm event/flood will be equaled or exceeded in a given year.

Grade - A slope, usually of a road, channel or natural ground specified in percent and shown on plans as specified herein.

Grassed Waterway - A natural or constructed waterway, usually broad and shallow, covered with erosion-resistant grasses, used to conduct surface water from cropland.

Groundwater Recharge - Replenishment of existing natural underground water supplies.

Hydrologic Soil Group (HSG) – The classification of soils according to their runoff-producing characteristics by NRCS. Soils are classified into four HSGs (A, B, C, and D) according to their minimum infiltration rate, which is obtained for bare soil after prolonged wetting. The NRCS defines the four groups and provides a list of most of the soils in the United States and their group classification. The soils in the area of the development site may be identified from a soil survey report that can be obtained from local NRCS offices or conservation district offices. Soils become less pervious as the HSG varies from A to D.

Impervious Surface - A surface that prevents the infiltration of water into the ground. Impervious surfaces (or areas) shall include, but are not limited to: roofs, additional indoor living spaces, patios, garages, storage sheds and similar structures, and any new streets and sidewalks. Any surface area proposed to initially be gravel or crushed stone shall be assumed to be impervious, unless designed and maintained as an infiltration BMP. Decks, parking areas, and driveway areas are not counted as impervious areas if they do not prevent infiltration.

Impoundment - A retention or detention basin designed to retain storm water runoff and release it at a controlled rate.

Infiltration Structures - A structure designed to direct runoff into the ground (e.g., French drains, seepage pits, infiltration trench, rain gardens, etc.).

Inlet - A surface connection to a closed drain. A structure at the diversion end of a conduit. The upstream end of any structure through which water may flow.

Karst - A type of topography or landscape characterized by features including, but not limited to, surface depressions, sinkholes, rock pinnacles/uneven bedrock surface, underground drainage, and caves. Karst is formed on carbonate rocks, such as limestone or dolomite.

Land Development - Any of the following activities:

A. The improvement of one lot or two or more contiguous lots, tracts or parcels of land for any purpose involving:

(1) A group of two or more residential or nonresidential buildings, whether proposed initially or cumulatively, or a single nonresidential building on a lot or lots regardless of the number of occupants or tenure; or

(2) the division or allocation of land or space, whether initially or cumulatively, between or among two or more existing or prospective occupants by means of, or for the purpose of streets, common areas, leaseholds, condominiums, building groups or other features.

B. A subdivision of land.

C. Development in accordance with Section 503 (1.1) of the Pennsylvania Municipalities Planning Code.

Landowner - The legal or beneficial owner or owners of land including the holder of an option or contract to purchase (whether or not such option or contract is subject to any condition), a lessee if he is authorized under the lease to exercise the rights of the landowner, or other person having a proprietary interest in land.

Land Disturbance - Any activity involving grading, tilling, digging, or filling of ground or stripping of vegetation or any other activity that causes an alteration to the natural condition of the land; the erection of a dwelling or other structure; or the modification, removal, filling, or alteration of an existing storm water management facility or drainage easement. Land Disturbance Activities shall be classified as follows:

A. Major Land Disturbance Activity:

(1) Any use requiring the submission of a subdivision or land development plan as herein defined;

(2) Any land disturbance not defined as a minor land disturbance activity or deemed to qualify as a minor land disturbance activity by the Township;

(3) Any use involving the diversion or piping of any natural or man-made watercourse or existing drainage pattern;

B. Minor Land Disturbance Activity:

(1) The use of land for any single family residential purpose on an existing lot of record, including subdivided lots or land developments approved under a Major Land Disturbance Activity, provided that:

(a) The use is not within a floodplain area;

(b) No diversion or piping of any natural or man-made water course or existing drainage pattern is involved;

(c) The use does not create more than five thousand (5,000) square feet of impervious area or involves the removal of ground cover, grading, filling, or excavation of more than forty three thousand five hundred sixty thousand (43,560) square feet, either of which shall be measured on a cumulative basis from *the date of enactment of this Ordinance***.**

(d) The use does not require the submission of a subdivision or land development plan as herein defined.

(2) A non-residential use that does not involve the construction of a building or building addition, or other impervious area in excess of one thousand five hundred (1,500) square feet, involve the removal of ground cover, filling, or excavation of more than forty three thousand five hundred sixty thousand (43,560) square feet, either of which shall be measured on a cumulative basis from *the date of enactment of this Ordinance*; and,

(3) Any use of the land which, in the opinion of the Township, represents minimal ground disturbance or impact to the environment.

Limiting Zone - A rock formation, other stratum, or soil condition which is so slowly permeable that it effectively limits downward passage of effluent. Seasonal high water tables, whether perched or regional, also constitute a limiting zone.

Lineament - A fracture on the order of tens of kilometers long usually extending to the basement below sedimentary rock.

Manning Equation (Manning Formula) - A method for calculation of velocity of flow (e.g. feet per second) and flow rate (e.g. cubic feet per second) in open channels based upon channel shape, roughness, depth of flow and slope. “Open channels” may include closed conduits so long as the flow is not under pressure.

Maximum Extent Practicable (MEP) – Applies when the Applicant demonstrates to the Township’s satisfaction that the performance standard is not achievable. The Applicant shall take into account the best available technology, cost effectiveness, geographic features, and other competing interests such as protection of human safety and welfare, protection of endangered and threatened resources, and preservation of historic properties in making the assertion that the performance standard cannot be met and that a different means of control is appropriate.

Municipalities Planning Code (MPC) - The Pennsylvania Municipalities Planning Code, Act of July 1, 1967, P.L. 805, No. 247, as reenacted and amended, 53 P.S. Section 10101 et seq., and as may be amended in the future.

Municipal Separate Storm Sewer – A conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains), which is all of the following:

A. Owned or operated by a state, city, town, borough, township, county, district, association or other public body (created under state law) having jurisdiction over disposal of sewage, industrial wastes, storm water or other wastes;

B. Designed or used for collecting or conveying storm water;

C. Not a combined sewer; and

D. Not part of a Publicly Owned Treatment Works as defined at 40 CFR § 122.2.

Municipal Separate Storm Sewer System (MS4) - All separate storm sewers that are defined as "large" or "medium" or "small" municipal separate storm sewer systems pursuant to 40 CF § 122.26(b)(18), or designated as regulated under 40 CFR § 122.26(a)(1)(v).

Natural Drainageway - An existing channel for water runoff that was formed by natural forces.

Natural Ground Cover – Ground cover which mimics the infiltration characteristics of predominant hydrologic soil group found at the site.

NOAA Atlas 14 - Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, US Department of Commerce, National Oceanic and Atmospheric Administration, National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland (2004). NOAA's Atlas 14 can be accessed at Internet address: http://hdsc.nws.noaa.gov/hdsc/pfds/.

National Pollution Discharge Elimination System (**NPDES)** - The Federal government's system for issuance of permits under the Clean Water Act, which is delegated to PADEP in Pennsylvania.

Natural Resources Conservation Service (NRCS) - Previously Soil Conservation Service (SCS) or any agency successor to the NRCS.

Open Channel - A storm water management element in which storm water flows with an open surface. Open channels include, but shall not be limited to, natural and man-made drainage ways, swales, streams, ditches, canals, and pipes flowing partly full.

Outfall - The point where water flows from a conduit, stream, or drain. A "Point Source" as described in 40 CFR § 122.2 at the point where the municipal separate storm sewer system discharges to surface Waters of this Commonwealth.

Outlet - Points of water disposal from a stream, river, lake, tidewater or artificial drain.

Parent Tract - All contiguous land held in single and separate ownership, regardless of whether:

A. such land is divided into one or more lots, parcels, purparts or tracts;

B. such land was acquired by the landowner at different times or by different deeds, devise, partition or otherwise; or

C. such land is bisected by public or private streets or rights-of-way, which was held by the landowner or his predecessor in title on the effective date of this Ordinance.

Single and separate ownership is the ownership of property by any person, partnership, or corporation, in which ownership is separate and distinct from that of any adjoining property.

Peak Discharge - The maximum rate of storm water runoff from a specific storm event.

PennDOT - The Pennsylvania Department of Transportation or any agency successor thereto.

Pervious Area - Any material/surface that allows water to pass through at a rate equal to or greater than natural ground cover.

Pipe - A culvert, closed conduit, or similar structure (including appurtenances) that conveys storm water.

Plan - The storm water management and erosion and sediment pollution control plan and narrative.

Planning Commission - The Planning Commission of Paradise Township, Lancaster County, Pennsylvania.

Process Wastewater - Water that comes in contact with any raw material, product, by-product, or waste during any production or industrial process.

Project Site – The specific area of land where any regulated activities in the Township are planned, conducted, or maintained.

Qualified Person - Any person licensed by the Pennsylvania Department of State or otherwise qualified by law to perform the work required by this Ordinance.

Rate Control - Storm Water Management controls used to manage the peak flows for the purposes of channel protection and flood mitigation.

Rational Formula (Rational Method) - A rainfall-runoff relation used to estimate peak flow.

Record Plan - Where a regulated activity constitutes a subdivision or land development, the Final Subdivision or Land Development plan which contains the information the Ordinance requires. Where a regulated activity does not constitute a subdivision or land development, a Storm Water Management Site Plan containing all required information and prepared in a form acceptable to the Office of the Recorder of Deeds for recording.

Regional Storm Water Management Plan – A plan to manage storm water runoff from an area larger than a single Development Site. A Regional Storm Water Management Plan could include two (2) adjacent parcels, an entire watershed, or some defined area in between. Regional Storm Water Management Plans can be prepared for new development, or as a retrofit to manage runoff from already developed areas.

Regulated Activities - Any land disturbance activities or any activities that involve the alteration or development of land in a manner that may affect storm water runoff and that are specified in Section 105 of this Ordinance.

Release Rate - The percentage of pre-development peak rate of runoff from a site or subwatershed area to which the post-development peak rate of runoff must be reduced to protect downstream areas.

Release Rate Map – A graphical representation of the release rates for a specific area.

Retention Basin - An impoundment in which storm water is stored and not released during the storm event. Stored water may be released from the basin at some time after the end of the storm.

Retention Volume/Removed Runoff – The volume of runoff that is captured and not released directly into the surface Waters of this Commonwealth during or after a storm event.

Return Period - The average interval, in years, within which a storm event of a given magnitude can be expected to recur. For example, the 25-year return period rainfall would be expected to recur on the average once every twenty-five years or stated in another way, the probability of a 25-year storm occurring in any one year is 0.04 (i.e., a 4% chance).

Riparian Buffer - A vegetated area bordering perennial and intermittent streams and wetlands, that serves as a protective filter to help protect streams and wetlands from the impacts of adjacent land uses.

Riparian Forest Buffer – A type of Riparian Buffer that consists of permanent vegetation that is predominantly native trees, shrubs and forbs along a watercourse that is maintained in a natural state or sustainably managed to protect and enhance water quality, stabilize stream channels and banks, and separate land use activities from surface waters.

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

Runoff - Any part of precipitation that flows over the land surface.

Sediment - Soils or other materials transported by surface water as a product of erosion.

Sediment Basin - A barrier, dam, retention or detention basin located and designed to retain rock, sand, gravel, silt, or other material transported by water.

Sediment Pollution - The placement, discharge or any other introduction of sediment into Waters of the Commonwealth occurring from the failure to design, construct, implement or maintain control measures and control facilities in accordance with the requirements of this Ordinance.

Sedimentation - The process by which mineral or organic matter is accumulated or deposited by the movement of water.

Seepage Pit/Seepage Trench - An area of excavated earth filled with clean loose stone or similar coarse material, into which surface water is directed for infiltration into the ground.

Sheet Flow - Runoff which flows over the ground surface as a thin, even layer, not concentrated in a channel.

Soil Conservation Service (SCS) - Now known as National Resource Conservation Service (NRCS).

Soil-Cover Complex Method - A method of runoff computation developed by the SCS (now NRCS) that is based on relating soil type and land use/cover to a runoff parameter called Curve Number (CN).

Soil Horizon - A layer of soil or soil material approximately parallel to the land surface and differing from adjacent genetically related layers in physical, chemical, and biological properties or characteristics such as color, structure, texture, consistency, kinds and number of organisms present, degree of acidity or alkalinity, etc.

Spillway - A depression in the embankment of a pond or basin which is used to pass peak discharge greater than the maximum design storm controlled by the pond.

State Water Quality Requirements - The regulatory requirements to protect, maintain, reclaim, and restore water quality under Title 25 of the Pennsylvania Code, the Clean Streams Law and the Clean Water Act.

Storage – A volume above or below ground that is available to hold storm water.

Storage Indication Method - A reservoir routing procedure based on solution of the continuity equation (inflow minus outflow equals the change in storage) with outflow defined as a function of storage volume and depth.

Storm Event - A storm of a specific duration, intensity, and frequency.

Storm Frequency - The number of times that a given storm "event" occurs or is exceeded on the average in a stated period of years. See "Return Period."

Storm Sewer - A system of pipes and/or open channels that convey intercepted runoff and storm water from other sources, but excludes domestic sewage and industrial wastes.

Storm Water - Drainage runoff from the surface of the land resulting from precipitation or snow or ice melt.

Storm Water Management Act - Act of October 4, 1978, P.L. 864, No. 167, as amended 32 P.S. Section 680.1 et seq., and as may be amended in the future.

Storm Water Management Best Management Practices (Storm Water Management BMP) – See BMPs.

Storm Water Management Facility - Any structure, natural or man-made, that, due to its condition, design, or construction, conveys, stores, or otherwise affects storm water runoff. Typical storm water management facilities include, but are not limited to, detention and retention basins, open channels, road gutters, swales, storm sewers, pipes, BMPs, and infiltration structures.

Storm Water Management Plan - The "Countywide Act 167 Plan" for Lancaster County for managing storm water runoff adopted by Lancaster County as required by the Act of October 4, 1978, 32 P.S. P.L. 864, (Act 167) as amended, and known as the "Storm Water Management Act."

Storm Water Management Operation and Maintenance Plan (O & M Plan) – A plan, including a narrative, to ensure proper functioning of the Storm Water Management facilities in accordance with Article VI of this Ordinance.

Storm Water Management Site Plan - The plan prepared by the developer or his representative indicating how storm water runoff will be managed at the particular site of interest according to this Ordinance.

Storm Water Management Permit - A permit issued by Paradise Township after the Storm Water Management Site Plan is unconditionally approved.

Subwatershed Area - The smallest drainage unit of a watershed for which storm water management criteria have been established in the Storm Water Management Plan.

Subdivision - The division or redivision of a lot, tract or parcel of land by any means into two (2) or more lots, tracts, parcels or other divisions of land including changes in existing lot lines for the purpose, whether immediate or future, of lease, partition by the court for distribution to heirs or devisees, transfer of ownership or building or lot development; provided, however, that the subdivision by lease of land for agricultural purposes into parcels of more than ten (10) acres, not involving any new street or easement of access or any residential dwelling, shall be exempted.

Supervisors – The Paradise Township Supervisors.

Swale - A low lying stretch of land which gathers or carries surface water runoff.

Timber Operations - See Forest Management.

Time of Concentration (Tc) - The time for surface runoff to travel from the hydraulically most distant point of the watershed to a point of interest within the watershed. This time is the combined total of overland flow time and flow time in pipes or channels, if any.

Township – The Township of Paradise, Lancaster County, Pennsylvania.

USDA – United States Department of Agriculture or any agency successor thereto.

Watercourse - A stream of water; river; brook; creek; or a channel or ditch for water, whether natural or manmade, having a defined bed and banks with perennial or intermittent flow.

Watershed - The entire region or area drained by a watercourse.

Waters of this Commonwealth - Any and all rivers, streams, creeks, rivulets, ditches, watercourses, storm sewers, lakes, dammed water, wetlands, ponds, springs, and all other bodies or channels of conveyance of surface and underground water, or parts thereof, whether natural or artificial, within or on the boundaries of this Commonwealth.

Wetland - Those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions, including swamps, marshes, bogs, ferns, and similar areas. The term includes but is not limited to wetland areas listed in the State Water Plan,

the United States Forest Service Wetlands Inventory of Pennsylvania, the Pennsylvania Coastal Zone Management Plan and a wetland area designated by a river basin commission. This definition is used by the United States Environmental Protection Agency [USEPA] and the United States Army Corps of Engineers [USACOE].

ARTICLE III - PLAN PROCESSING PROCEDURES

SECTION 301 GENERAL

1. This Article sets forth the application requirements for obtaining approval of a Storm Water Management Site Plan. The form of the plans referred to in this Article and information required to be forwarded with such plans shall be as specified in Article IV.

2. Paradise Township shall not approve any Storm Water Management Site Plan that is deficient in meeting the requirements of this Ordinance. At its sole discretion and in accordance with this Article, when a Storm Water Management Site Plan is found to be deficient, Paradise Township may either disapprove the submission and require a resubmission, or in the case of minor deficiencies, Paradise Township may accept submission of revisions.

SECTION 302 COMPLIANCE WITH ZONING ORDINANCE AND ZONING HEARING BOARD DECISIONS

Whenever the Zoning Ordinance provides that the use proposed by the Applicant for a Storm Water Management Site Plan approval shall constitute a use by special exception or conditional use, or when a variance from the terms of the Zoning Ordinance is required to develop in accordance with the plan, the Applicant shall obtain such special exception, variance or conditional use approval from the Township Zoning Hearing Board or Supervisors, as applicable, prior to the submission of the Storm Water Management Site Plan. The Storm Water Management Site Plan shall be designed and developed in accordance with any conditions which have been imposed upon the grant of such special exception, variance or conditional use by the Township Zoning Hearing Board or Supervisors, as applicable.

SECTION 303 APPLICATION AND PROCESSING REQUIREMENTS

ALL applications shall follow these application and processing requirements.

1. Formal Application/Submission Deadlines. All applications for approval of a Storm Water Management Site Plan shall be made by the developer filing an application form, to be supplied by the Township, together with the appropriate plans. The plan shall include studies, reports, supporting data (including all plans, reports, and correspondence with the Lancaster County Conservation District), and required filing fee. Applications may be filed with the Township on any business day; however, the Township Planning Commission or Supervisors will review a plan at a particular meeting only if the plan was filed at least fifteen (15) business days prior to that meeting.

2. Application Requirements. All plan applications shall include the following:

   A. Two (2) copies of the plan(s). All plans shall be either black on white or blue on white paper prints and prepared in conformance with the provisions of Article IV of this Ordinance.

   B. Two (2) copies of all reports, notifications, and certifications which are not provided on the plan.

   C. Two (2) copies of the application form as provided in the Appendix.

D. Filing and Engineering and Attorney Review Escrow Fees as follows:

(1) No application shall be considered complete unless accompanied by a filing fee and review escrow fee in the amounts as specified on the fee schedule adopted by resolution of the Supervisors and available at the Township Office.

(2) Engineering and Attorney Review Fees required to be paid in accordance with this Ordinance shall be paid to the Township by the applicant and shall include but not be limited to:

(a.) Reviewing all information submitted in conformance with provisions of this Ordinance. This includes all originally submitted and revised plans, reports, specifications and agreements.

(b.) On-site observations of the layout of the site for conformance to the submitted survey, plan and specifications including preparation and distribution of observation reports.

(c.) Reviewing construction cost opinions of required improvements as submitted by the developer and financial security agreements.

(d.) On-site observations of required improvements during construction including preparation and distribution of observation reports.

(e.) Final on-site observations of completion of installation of the required improvements including preparation and distribution of observation reports and dedication agreements.

(f.) Such other technical or legal services as deemed necessary or required by the Township.

E. Two (2) copies of all reports required by Article IV.

F. Plans which require access to a highway under the jurisdiction of the PennDOT, shall include two (2) copies of the plans prepared to support the application for a Highway Occupancy Permit.

G. One (1) electronic copy (PDF format) of the information required by Items A - F of this subsection

H. The Applicant shall provide the Township with five (5) copies of the most current plan at least five (5) business days before the plan is scheduled to be reviewed by the Planning Commission or the Supervisors.

I. Applicants are encouraged to schedule a pre-application meeting to review the overall storm water management concept with Township staff/engineer. The pre-application meeting is not mandatory and shall not constitute formal filing of a plan with the Township.

3. Distribution. The Applicant shall submit one (1) copy of the above-required information to the Township and one (1) copy to the Township Engineer for their respective reviews. The developer is responsible for submitting plans to any other agencies such as the Lancaster County Conservation District, PennDOT, PADEP, etc., when approvals or permits from these agencies are required.

4. Initial Application. The Township staff shall have seven (7) business days from the date of submission of an application to check the plans and documents to determine if on their face they are in proper form and contain all information required by this Ordinance. If defective, the application shall be returned to the Applicant with a statement explaining the reason(s) of rejection, within twelve (12) business days following the date of submission by the Applicant; otherwise, it shall be deemed accepted for filing as of the date of submission. Acceptance for filing shall not, however, constitute a waiver of any deficiencies or irregularities. Under this Section, the Applicant may appeal a decision by the Township staff to the Supervisors.

5. Amendments or Corrections to an Application. The Township staff shall have seven (7) business days from the date of submission of an amended or corrected application or plan to determine whether such amended or corrected application results in a substantial amendment to the plan or if the application or plan filed is/was/has changed so as to be considered a new plan. If the Township staff determines that the amended or corrected application constitutes a substantial amendment, the Applicant shall be informed of the determination within twelve (12) business days from the date of the submission of the amended or corrected application and the Township staff shall further inform the Applicant that the Township shall consider the ninety (90) day review procedure to have been restarted as of the date of the filing of the substantial amendment. If the Township staff determines that the amended or corrected application constitutes a new plan, he shall so inform the Applicant and shall inform the Applicant that a new application and new fees are required. Under this Section, the Applicant may appeal a decision by the Township staff to the Supervisors.

6. Plan Review Process.

   A. All complete applications for approval of a plan shall be acted upon by the Supervisors, which shall render its decision and communicate it to the Applicant not later than ninety (90) days following the date the completed application is filed.

   B. The decision of the Supervisors shall be in writing and shall be communicated to the developer personally or mailed to him at his last known address not later than fifteen (15) days following the decision.

   C. When the application is not approved in terms as filed, the decision shall specify the defects found in the application and describe the requirements which have not been met and shall, in each case, cite the provisions of the Ordinance(s) relied upon.

   D. Failure of the Supervisors to render a decision and communicate it to the Applicant within the time and in the manner required herein shall be deemed a disapproval of the application in terms as presented, unless the Applicant has agreed in writing to an extension of time or change in prescribed manner of presentation or communication of the decision; in which case, failure to meet the extended time or change in manner of

presentation or communication shall have like effect.

E. Approval of a Storm Water Management Site Plan by the Township shall be obtained by the Applicant/Developer prior to the issuance of a zoning permit by the Township.

F. No Regulated Activity may begin until proof of recording of the required Operation and Maintenance Program is presented.

7. A disapproved Storm Water Management Site Plan may be resubmitted, with the revisions addressing the Township's concerns, to the Township in accordance with this Article. The applicable review fee must accompany a resubmission of a disapproved Storm Water Management Site Plan.

8. All storm water management permits or approvals shall expire twelve (12) months from the date of issuance unless an extension of time is approved. An extension of an unexpired Storm Water Management permit or approval shall be issued by the Code Enforcement Officer following the submission of a written request if, in the opinion of the Code Enforcement Officer, the subject property or affected surrounding area has not been altered in a manner which requires alteration to the Storm Water Management Site Plan.

SECTION 304 PROCEDURE FOR REQUESTING CONSIDERATION OF MODIFICATION OF PROVISIONS OF THIS ORDINANCE

1. Application Requirements. A request for a modification may be submitted to the Township at any time. All requests shall meet the requirements of Article VI, be in writing and accompanied by a plan prepared to the minimum standards of a Minor Land Disturbance Plan (See Article IV). The written request shall identify:

   A. The specific section of this Ordinance which is requested to be modified.

   B. The provisions proposed as an alternate to the requirements. The alternate provisions must be equal to or better than the requirements of, and consistent with, the intents of this Ordinance and shall not be contrary to the general public interest.

2. Township Action.

   A. A modification request that is submitted as part of an application for a Storm Water Management Site Plan shall be processed along with that application of which it is a part. The plan processing procedures outlined in this Section shall apply.

   B. If a modification request is not submitted with an application for a Storm Water Management Site Plan, then the processing procedures outlined in this Section shall apply.

3. Justification for the modification. The request shall state in full the grounds and facts of unreasonableness or hardship on which the request is based.

4. The provisions of this Ordinance not related to state water quality requirements are intended as minimum standards for the protection of the public health, safety, and welfare. The Township

reserves the right to modify or to extend them conditionally in individual cases as may be necessary in the public interest; provided, however, that such variation shall not have the effect of nullifying the intent and purpose of this Ordinance, and that the Applicant shows that to the satisfaction of the Township that the applicable regulation is unreasonable, or will cause undue hardship, or that an alternative proposal will allow for equal or better results. The list of such modifications shall be listed on the plan.

5. In granting waivers/modifications for provisions of this Ordinance, the Township may impose such conditions as will, in its judgment, secure substantially the objectives of the standards and requirements of this Ordinance.

6. Where a written Erosion and Sedimentation Control Plan associated with land disturbance of five thousand (5,000) square feet to one (1) acre is required, review of the written Erosion and Sedimentation Control Plan shall constitute satisfaction of consultation with PADEP.

7. The Township may, after consultation between the Applicant and PADEP, approve measures for meeting the state water quality requirements other than those in this Ordinance, provided that they meet the minimum requirements of, and do not conflict with, state law including, but not limited to, the Clean Streams Law. The Applicant shall provide the Township with a record of consultations with PADEP pursuant to this paragraph.
8. Where an NPDES permit for storm water discharges associated with construction activities is required, issuance of an NPDES permit shall constitute satisfaction of consultation with PADEP.

ARTICLE IV – STORM WATER MANAGEMENT SITE PLAN REQUIREMENTS

SECTION 401 EXEMPTIONS

Any Regulated Activity that meets one of the following exemption criteria is exempt from the provisions of this Ordinance. These criteria shall apply to the total development even if development is to take place in phases. *The date of enactment of this Ordinance* shall be the starting point from which to consider tracts as “parent tracts" in which respective impervious area and disturbed area computations shall be cumulatively considered. Exemptions shall not relieve the Applicant from implementing such measures as are necessary to protect health, safety, and property.

1. Use of land for gardening and landscaping of the property when performed as an accessory use to the primary use of the property is specifically exempt from the plan requirements of this Ordinance.

2. As of the effective date of this Ordinance, lands improved with existing structures may be exempted for an additional one thousand (1,000) square feet of impervious surface or five thousand (5,000) square feet of land disturbance in all Zoning Districts provided that flows from the site after development leave the site in the same manner as the pre-development condition and there are no adverse effects on adjacent properties. Any Applicant desiring exemption from design, plan submission, and plan processing requirements shall provide the Township with all information necessary for the Township to determine that:

    A. There shall be no disturbance of land within floodplains, wetlands, environmentally sensitive areas, riparian forest buffers, or slopes greater than 15%.

    B. No impervious surface coverage shall be installed and no land disturbance activity shall be conducted within any existing drainage or storm water easement created by or shown on any recorded plan.

    C. The Applicant shall minimize soil disturbance, take steps to minimize erosion and sedimentation during construction activity, and promptly reclaim all disturbed areas with topsoil and vegetation.

    D. The Applicant shall take steps that runoff be directed to pervious areas on the subject property.

    E. No concentrated runoff shall be directed onto an abutting street or neighboring property.

    F. The proposed impervious surface shall not adversely impact any existing known problem areas or downstream property owners or the quality of runoff entering any storm sewer.

    G. The proposed impervious surface and/or grading shall not create accelerated erosion and sedimentation.

H. No Applicant and no activity is exempt from complying with any state or federal requirements applicable if the subject property is located in a High Quality (HQ) or Exceptional Value (EV) watershed.

I. No Applicant and no activity shall violate or cause to be violated: the Federal Clean Water Act or any regulation issued thereunder, an NPDES permit, any recorded Storm Water Management or Operations and Maintenance Agreement, or any requirement applicable to a Municipal Separate Storm Sewer System.

3. Activities on lands which have a prior approved Storm Water Management Plan, which was approved prior to the adoption of this Ordinance and which, in the opinion of the Township following consultation with the Township Engineer adequately manages storm water resulting from the proposed activities, are exempt from the requirements of this Ordinance that may conflict with the requirements of the Storm Water Management Ordinance in effect at the time of the approval of the prior approved Storm Water Management Plan.

4. Except as provided for in Section 401.6 (below), agricultural activity, excluding all buildings when operated in accordance with a conservation plan or an erosion and sedimentation pollution control plan found to be adequate by the Lancaster County Conservation District and performed according to the requirements of 25 Pa. Code Chapter 102. Agricultural activities such as growing crops, rotating crops, tilling of soil and grazing animals and other such activities are specifically exempt from the requirements of this Ordinance.

5. Except as provided for in Section 401.6 (below), Forest Management and timber operations which are following the Department of Environmental Protections' management practices contained in its publication "Soil Erosion and Sedimentation Control Guidelines for Forestry" and are operating under an erosion and sedimentation control plan according to the requirements of 25 Pa. Code Chapter 102 are specifically exempt from the requirements of this Ordinance.

6. The Township may deny or revoke any exemption pursuant to this Section at any time for any project that the Township believes may pose a threat to public health, safety, property or the environment.

SECTION 402 GENERAL REQUIREMENTS

The following general standards shall be applied to all regulated activities to promote flow attenuation, erosion and sediment control and flood control, unless the otherwise regulated activity is specifically exempted by Article IV.

1. The Storm Water Management Site Plan shall include a note on the plan informing the owner that the Township shall have the right of entry for the purposes of inspecting all storm water conveyance, treatment, or storage facilities.

2. All landowners of land included in the Storm Water Management Site Plan shall be required to execute all applications and final documents.

3. All Storm Water Management Site Plans shall be prepared by a Qualified Person.

4. A set of Storm Water Management Site plans approved by the Township shall be on file at the development site throughout the duration of the regulated activity. Periodic inspections may be made by the Township or designee during construction.

5. Storm Water Management Site Plans shall be prepared in a form that meets the requirements for recording for the Office of the Recorder of Deeds of Lancaster County.

6. For all regulated activities, erosion and sediment control BMPs shall be designed, implemented, operated, and maintained during the regulated land disturbance activities (e.g., during construction) to meet the purposes and requirements of this Ordinance and to meet all requirements under Title 25 of the Pennsylvania Code, the Clean Streams Law, and the Storm Water Management Act.

7. Impervious areas:

   A. The measurement of impervious area shall apply to the total proposed development even if development is to take place in stages or phases.

   B. For development taking place in stages or phases, the entire development plan must be used in determining conformance with this Ordinance.

   C. Any areas designed to initially be gravel or crushed stone shall be assumed to be impervious.

   D. Existing impervious areas that are not being altered by the proposed regulated activity shall not be subject to the volume and peak rate controls in Article V.

8. All regulated activities shall include such measures as necessary to:

   A. Meet the water quality goals of this Ordinance by implementing measures to:

      (1) Minimize disturbance to floodplains, wetlands, natural slopes, existing native vegetation and woodlands.

      (2) Create, maintain, or extend riparian buffers and protect existing forested buffers.

      (3) Minimize the creation of impervious surfaces and the degradation of Waters of the Commonwealth and promote groundwater recharge.

      (4) Protect natural systems and processes (drainageways, vegetation, soils, and sensitive areas) and maintain, as much as possible, the natural hydrologic regime.

      (5) Incorporate natural site elements (wetlands, stream corridors, mature forests) as design elements.

(6) Avoid erosive flow conditions in natural flow pathways.

(7) Minimize soil disturbance and soil compaction.

(8) Minimize thermal impacts to Waters of the Commonwealth.

(9) Disconnect impervious surfaces by directing runoff to pervious areas wherever possible, and decentralize and manage storm water at its source.

B. To the maximum extent practicable, the techniques for Low Impact Development (LID) Practices described in the BMP Manual shall be incorporated. The proposed LID Practices shall be noted on the Storm Water Management Site Plan.

9. The design of all storm water management facilities over karst shall include an evaluation of measures to minimize adverse effects.

10. Infiltration BMPs, to the extent practicable, shall be spread out, made as shallow as practicable when located above grade, and located to maximize use of natural on-site infiltration features while still meeting the other requirements of this Ordinance.

11. Normally dry, open top, storage facilities shall completely drain the volume control storage over a period of time not less than 24 hours and not more than 72 hours from the end of the design storm. However, any infiltration at such facilities is exempt from the minimum 24-hour standard, i.e. may infiltrate in a shorter period of time, provided that none of this water will be discharged into Waters of this Commonwealth.

12. Normally dry, open top, storage facilities shall completely drain the rate control storage over a period of time less than or equal to 24 hours from the peak 100-year water surface design elevation.

13. The design storm volumes and precipitation intensities to be used in the analysis of peak rates of discharge shall be as required in Article V.

14. The Applicant shall refer to the BMP Manual for various BMPs and their design standards.

15. For any activities that are regulated under Chapter 105 or Chapter 106 or require any other permit under applicable state or federal regulations, the permit(s) shall be part of the Storm Water Management Site Plan and must be obtained prior to final plan approval.

SECTION 403 MINOR LAND DISTURBANCE

1. The Minor Land Disturbance Plan shall include a general plan of the lot configuration, existing and proposed building locations, location and square footage of proposed impervious area or land disturbance, grading, storm water management facilities, and erosion and sedimentation control facilities.

2. The Plan need not demonstrate literal compliance with all the provisions of this Ordinance, however the plan shall demonstrate that the proposed activity will comply with the intent of this Ordinance as provided for in Article I.

3. The Minor Land Disturbance Plan shall provide for volume control for all projects but shall not be required to provide for rate control.

4. The Township may require additional information, or invoke any section of this Ordinance, as deemed necessary to adequately demonstrate compliance with the intent of this Ordinance. These requirements may be appealed to the Supervisors.

SECTION 404 MAJOR LAND DISTURBANCE

The Storm Water Management Site Plan shall consist of all applicable calculations, maps and plans, including simultaneous copies of all plans, reports, and correspondence with the Lancaster County Conservation District. A note on the maps shall refer to the associated computations and Erosion and Sediment Pollution Control Plan by title and date. The cover sheet of the computations and Erosion and Sediment Pollution Control Plan shall refer to the associated maps by title and date. All Storm Water Management Site Plan materials shall be submitted to the Township in a format that is clear, concise, legible, neat and well organized.

1. DRAFTING STANDARDS

All Storm Water Management Site Plans shall be prepared in accordance with the following drafting standards.

A. The plan shall be clearly and legibly drawn at a horizontal scale of 10 feet, 20 feet, 30 feet, 40 feet, or 50 feet to the inch.

B. All profiles of storm water management facilities, streets, sanitary sewer facilities, and water supply facilities shall be drawn at a horizontal scale of 1” = 50’ and at a vertical scale of 1” = 10’, or 1" = 5'.

C. A north arrow, graphic scale and written scale shall be provided.

D. Dimensions shall be in feet and decimals; bearings shall be in degrees, minutes and seconds. Lot line descriptions shall read in a clockwise direction.

E. The survey shall not have an error of closure greater than one (1) foot in ten thousand (10,000) feet.

F. The sheet size shall be no smaller than eighteen by twenty-two (18 x 22) inches and no larger than twenty-four by thirty-six (24 x 36) inches. If the plan is prepared in two (2) or more sections, a key map showing the location of the sections shall be placed on each sheet. If more than one (1) sheet is necessary, each sheet shall be the same size and numbered to show the relationship to the total number of sheets in the plan (e.g. Sheet 1 of 5).

2. PROJECT LOCATION AND IDENTIFICATION

The following location and identification shall be included on all Storm Water Management Site Plans:

A. The proposed project name or identifying title.

B. Name of the Township or municipalities in which the project is located, including the location of any municipal boundaries if located within 200 feet of the subject tract.

C. The name and address of the owner of the tract (or his authorized agent), the developer/subdivider, and the firm that prepared the plans.

D. The file or project number assigned by the firm that prepared the plan, the plan date and the date(s) of all plan revisions.

E. The entire existing tract boundary with bearing and distances. (If it is the intention of the landowner to retain a single lot with a lot area in excess of ten (10) acres, the boundary of that lot may be identified as a deed-plotting and may be drawn at any legible scale; if the retained lot has a lot area of ten (10) or less acres, it must be described to the accuracy of the requirements of this Ordinance.

F. The total acreage of the entire existing tract.

G. The location of existing lot line markers along the perimeter of the entire existing tract.

H. The zoning district, lot size and/or density requirements of the Township Zoning Ordinance.

I. A statement on the plan indicating the granting of a prior zoning amendment, special exception or variance, any prior modifications of the Township Subdivision and Land Development Ordinance and any prior modifications of sections of this Ordinance, including any conditions of approval attached to any of the above mentioned prior approvals.

J. The names of all adjacent landowners; both adjoining and across existing rights-of-way along with the plan book record numbers of all previously recorded plans for adjacent properties.

K. A location map, drawn to scale, relating the subdivision or land development to at least two (2) intersections of street centerlines, including the approximate distance to the intersection of centerlines of the nearest improved street intersection.

L. Source of title, deed, book, page, plan book (if applicable), and parcel account number.

M. A note indicating existing and proposed land use(s).

3. EXISTING FEATURES

The following features shall be shown on all Storm Water Management Site Plans and shall be shown on **a separate sheet** titled "Existing Features". No proposed features shall be included on this sheet.

A. Existing contours shall be shown at the following minimum vertical intervals:

Average Natural Slope	Required Contour Interval
0 to 3 %	1 foot contour interval
4 to 20%	2 foot contour interval
21% and greater	5 foot contour interval

(1) Contour interval may be adjusted based upon horizontal scale with concurrence of the Township Engineer.

(2) Contours shall be accompanied by the location of the bench mark and a notation indicating the datum used. The datum used by an Authority shall be used in all plans indicating connection to an Authority's public sewer system or public water system.

(3) Contours plotted by interpolation of Lancaster County GIS mapping or LiDAR will only be accepted for areas where there is no new construction or land disturbance proposed by the plan.

(4) Contours plotted by interpolation of the United States Geodetic Survey 7.5' mapping will not be accepted.

B. The following items **when located upon or within two hundred (200) feet** of the tract:

(1) The location and name of existing rights-of-way and cartways for private or public streets, alleys and driveways.

(2) The location and size of the following features and any related right-of-way: sanitary sewer mains, water supply mains, fire hydrants, buildings, and storm water collection, conveyance and management facilities.

(3) The location and size of existing on-lot sewage systems and wells.

(4) The location of existing rights-of-way and easements for electric, gas and oil transmission lines, and railroads.

(5) Significant environmental or topographic features such as floodplains, wetlands, quarry sites, solid waste disposal areas, historic structures, cemetery or burial sites, archaeological sites, highly erosive soils, or wooded areas.

(6) The soils names and boundaries.

C. The following items **when located within** the subject tract:

(1) The size, capacity and condition of the existing storm water management system and any other facility that may be used to convey storm flows.

(2) The location and size of existing on-lot sewage systems and wells.

(3) The location and use of existing buildings and other man-made features.

(4) Significant environmental or topographic features as identified in the Paradise Township Comprehensive Plan including, but not limited to:

(a) Prime agricultural soils;

(b) Underlying geology with any hazardous geology noted;

(c) Floodplains;

(d) Quarry sites;

(e) Solid waste disposal areas;

(f) Historic structures;

(g) Cemetery or burial sites;

(h) Archaeological sites;

(i) Highly erosive soils;

(j) Wooded areas;

(k) Natural habitat; and,

(l) PNDI sites.

(5) The location of wetlands and supporting data.

4. PROPOSED FEATURES AND PLAN INFORMATION

The following proposed features and plan information shall be shown on all Storm Water Management Site Plans and shall be shown on **a separate sheet** entitled "Proposed Features". The proposed features and plan information shall be overlaid upon a copy of the Existing Features Plan. The existing features shall be "screened" or "shaded" on the Proposed Features Plan.

A. Block and lot numbers in consecutive order (e.g. Block "A", Lots 1 through 10; Block "B", Lots 11 through 22).

B. The location and configuration of proposed buildings, parking compounds, streets including cartway and right-of-way widths, alleys, driveways, common open space, recreational areas, and all other significant planned facilities.

C. Total number of lots, units of occupancy, density, and proposed land use. If a multiple land use is proposed, the location of each land use shall be indicated.

D. Easements and rights-of-way, including

(1) A minimum twenty (20) foot wide access easement around all Storm Water Management facilities that would provide ingress from and egress to a public right-of-way. Easements shall be provided to allow for the collection and discharge of water, the inspection, maintenance, repair and reconstruction of the drainage facilities, and the passage of machinery for work.

(2) Provisions for permanent access or maintenance easements for all existing and proposed physical Storm Water Management facilities, such as ponds and infiltration structures, as necessary to implement the Operation and Maintenance (O&M) Plan. All such agreements shall be duly recorded in the Office of the Recorder Deeds and shall constitute a binding permanent covenant upon the property, superior to all liens of record and not subordinate to any easement or restriction that would interfere with its provisions and the implementation thereof.

E. Building setback line and building envelope.

F. Identification of buildings to be demolished and all other features to be removed.

G. Typical street cross-section for each proposed public or private street and typical cross-section for any existing street which will be improved as part of the application. Each cross-section shall include the entire right-of-way width.

H. The following storm water management data and plans designed in accordance with this Ordinance shall be included:

(1) All calculations, assumptions, criteria, and references used in the design of the storm water management facilities, the establishment of existing facilities capacities, and the pre- and post-development discharges.

(2) All plans and profiles of the proposed storm water management facilities, including the horizontal and vertical location, size, and type of material.

(3) For all basins, a plotting or tabulation of the storage volumes and discharge curves with corresponding water surface elevations, inflow hydrographs, and outflow hydrographs.

(4) The guidelines for lot grading within the subdivisions. This information shall identify the direction of storm water runoff flow within each lot and the areas where storm water runoff flows will be concentrated. This information shall be shown by flow arrows or topographical data.

I. A table indicating the existing zoning district, total tract area, required lot size, required setbacks, required maximum and/or minimum development density, maximum building height, maximum lot coverage, and number of lots in the proposed subdivision along with the proposals for each of these parameters.

J. A statement identifying the number of square feet of impervious coverage for which storm water management facilities have been designed for each lot.

K. A statement on the plan indicating the granting of a zoning amendment, special exception or variance, any modifications of the Township Subdivision and Land Development Ordinance and any modifications of sections of this Ordinance, including any conditions of approval attached to any of the above mentioned approvals.

L. Where the proposed regulated activity is located partially or wholly within an area prone to frequent flooding (either by impoundment or conveyance) as indicated by the flood boundary and floodway map, profiles, and supporting data, soil type or local historical record; the developer shall supply the location and elevation of all proposed roads, fills, utilities, buildings, storm water management, and erosion control facilities.

M. Location of all percolation test holes, deep probe holes and proposed well locations.

N. Easements for the on-lot sewage replacement locations.

O. The location of all trees and/or woodlands on the site and location of trees and/or woodland to be removed and trees and/or woodlands to remain.

P. The layout of lots with approximate dimensions, gross and net acreage.

Q. A detailed grading plan. The grading plan shall include finished grades and ground floor elevations. This information may be provided on separate sheets and is not subject to recording with the final plans.

R. The location of all Erosion and Sedimentation Control facilities.

S. Identification of any lands to be dedicated or reserved for public, semi-public or community use.

T. In the case of a plan which requires access to a highway under the jurisdiction of the Department of Transportation, the inclusion of the following plan note:

"A Highway Occupancy Permit is required pursuant to Section 420 of the Act of June 1, 1945 (P.L. 1242, No. 428), known as the 'State Highway Law', before access to a state highway is permitted. Access to the state highway shall be as authorized by a Highway Occupancy Permit, and the Supervisors' approval of this plan in no way implies that such a permit can be acquired."

U. A complete landscape plan showing the location, size and type of all plant material required by provisions of this Ordinance or any other applicable Township ordinances, including, but not limited to, all vegetated storm water BMPs.

(1) The landscape plan shall include the signature and seal of the registered landscape architect responsible for preparation of the plan.

(2) Native or Naturalized/Non-invasive Vegetation suitable to the soil and hydrologic conditions of the development site shall be used unless otherwise specified in the BMP Manual.

(3) The limit of existing, native vegetation to remain shall be delineated on the plan along with proposed construction protection measures.

V. A detailed schedule of observations during and following construction, as generally outlined as follows, which is tailored for the site under consideration.

(1) The detailed construction and post-construction observation schedule shall be developed by the professional responsible for the preparation of the Storm Water Management Site Plan.

(2) The detailed construction and post-construction observation schedule shall be submitted to the Township for review and approval during the preparation of the Storm Water Management Site Plan.

(3) The construction and post-construction observation schedule shall be shown on the approved Storm Water Management Site Plan.

(4) The developer shall provide at least twenty-four (24) hours notice prior to the start of construction of any improvements that are subject to observation.

(5) All observations of completed items shall be requested, in writing, at least forty-eight (48) hours in advance of the observation time and date.

(6) The developer shall be responsible for the cost of all observations.

(7) The Township shall observe all phases of the installation of any temporary or permanent Storm Water Management facilities during construction.

(8) It is generally required that the following phases of site construction have mandatory observation.

(9) General Site Construction

(a) Upon completion of preliminary site preparation including stripping of vegetation, stockpiling of topsoil and construction of temporary erosion and sedimentation control devices.

(b) Upon completion of rough grading, but prior to placing topsoil, permanent drainage, or other site development improvements and ground covers.

(c) During the construction of permanent storm water management and BMP facilities.

(d) Upon the final completion of permanent storm water management and BMP facilities, including the establishment of ground covers and plantings.

(e) After review of the as-built drawings, required by Article 6, but prior to final release of the financial security for completion of final grading, vegetative controls required by the BMP standards, or other site restoration work.

(10) In addition to the above outlined observations, additional observations will be made at the request of the developer for reduction of financial securities. Random observations should be made at the frequency desired by the Township. At the time of any of the above listed observations, all ongoing construction (i.e. storm drainage, sanitary sewer, water, erosion control, etc.) should also be checked for compliance with the approved plans and the findings reported. Since the above observations are mandatory, it is recommended that requests for reduction of financial security be submitted to coincide with the above observations.

W. A note indicating that As-Built Plans will be provided for all storm water management facilities prior to occupancy, or the release of financial security.

SECTION 405 NOTIFICATIONS

1. Notice from the Lancaster County Conservation District of the approval of the Erosion and Sediment Pollution Control Plan.

2. A note shall be placed on the plan indicating any area(s) to be offered for dedication, if applicable.

3. Written notice from the Township Engineer that all proposed improvements have been designed to the standards of the Township and that financial security and a completed improvement guarantee agreement in a form suitable to the Supervisors has been received.

4. Such written notices of approval as may be required by this Ordinance including, but not limited to, storm water runoff to adjacent properties.

5. Notification from the appropriate state and federal agencies that permits have been issued, or are not required, for any proposed activities within streams, wetlands or any other state or federally regulated body of water. These permits include, but are not limited to, Floodplain Encroachment Permits, Dam Safety Permits, Earth Disturbance Permits, Stream Encroachment Permits, and General Permits.

6. Public Utility Lines

   A. Where the tract described in the application includes any public utility, electric transmission line, gas pipeline, or petroleum product transmission line located within the tract, the Applicant shall notify, in writing, the owner or lessee of the right-of-way of his intentions.

   B. A note stating any conditions regarding the use of the land, minimum building setback or right-of-way lines shall be included on the plan.

   C. This requirement may also be satisfied by submitting a copy of the recorded agreement.

7. Natural Resource Easement

   A. Where the land included in the subject application has an agricultural, woodland or other natural resource easement located within the tract, the application shall be accompanied by a letter from the party holding the easement stating any conditions on the use of the land.

   B. This requirement may also be satisfied by submitting a copy of the recorded easement.

SECTION 406 CERTIFICATES

1. Certificate of review by the Planning Commission as provided in the Appendix.

2. Certificate for approval by the Board of Supervisors as provided in the Appendix.

3. Certificate for approval by the Township Engineer as provided in the Appendix.

4. Certificate of Accuracy by the Qualified Professional preparing the Storm Water Management Site Plan as provided in the Appendix.

5. A statement duly acknowledged before an officer authorized to take acknowledgment of deeds and signed by the landowner, certifying that the storm water management facilities shown on the plan is the act and the deed of the owner; that all those signing are all the owners of the property shown on the survey and plan; that they desire the same to be recorded as such, and that all streets and other property identified as proposed public property are dedicated for public use, as provided in the Appendix. This must be dated following the last change or revision to said plan.

6. A statement, signed by the landowner, acknowledging that the storm water BMPs are fixtures that cannot be altered or removed without prior approval by the Township that the Operation and Maintenance Agreement is part of the Storm Water Management Site Plan as provided in the Appendix.

ARTICLE V - STORM WATER MANAGEMENT STANDARDS

SECTION 501 GENERAL REQUIREMENTS

All storm water management, collection, conveyance, erosion control, and floodplain considerations shall be accomplished in accordance with the following provisions:

1. Prior to the final approval or commencement of any Regulated Activity within the jurisdiction of this Ordinance, the developer shall submit a Storm Water Management Site Plan to the Township for approval.

   A. When plan applications, whether preliminary or final, are submitted in sections, a detailed Storm Water Management Site Plan for the entire project site shall be submitted. This detailed plan shall demonstrate how the storm water of the proposed section will relate to the entire development. The amount and velocity at the discharge point of the section shall be included in the data submitted. If temporary facilities are required for construction of a section, such facilities shall be included in the submitted plans.

   B. The type, location, and extent of all erosion and sedimentation control measures shall be shown on an erosion and sedimentation control plan that conforms to the requirements of the Soil Erosion and Sediment Control Manual of the Pennsylvania Department of Environmental Protection and the Erosion and Sedimentation Control Design Standards of this Ordinance.

   C. An Operation and Maintenance Agreement, in recordable form acceptable to the Township, that clearly sets forth the ownership, operation and maintenance responsibility of all temporary and permanent storm water management facilities and erosion and sedimentation control facilities as provided for in Article VI. The intent of these regulations is to provide private Operation and Maintenance of storm water management and erosion and sedimentation control facilities, including:

   D. A written report shall be submitted that includes the following information:

      (1) General description of the Development Site, including a description of existing natural and hydrologic features and any environmentally sensitive areas.

      (2) General description of the overall Storm Water Management concept for the project, including a description of permanent Storm Water Management techniques, structural and non-structural BMPs to be employed.

      (3) Construction specifications of the materials to be used for structural Storm Water Management facilities.

      (4) Storm water runoff calculations for both pre-development and post-development conditions.

      (5) An erosion and sedimentation control plan narrative that conforms to the requirements of the Soil Erosion and Sediment Control Manual of the Pennsylvania Department of Environmental Protection and provides a description of all erosion and sedimentation control measures, temporary as well as permanent, including

the staging of earth moving activities, sufficient in detail to clearly indicate their function.

(6) For all proposed detention basins and retention basins, except temporary sedimentation basins, the documentation shall include a plotting or tabulation of storage volumes with corresponding water surface elevations and the outflow rates for those water surfaces.

(7) For all proposed detention basins and retention basins, except temporary sediment basins, documentation shall set forth the design hydrograph, the routing method or a method of equal caliber acceptable to the Township Engineer, utilized to determine the function of the basin.

2. All storm water runoff flowing over the project site shall be considered in the design of the storm water management facilities.

3. Storm water drainage systems shall be provided in order to permit unimpeded flow along natural watercourses, except as modified by storm water management facilities or open channels consistent with this Ordinance.

4. Where a Development Site is traversed by watercourses, a drainage easement shall be provided conforming substantially to the line of such watercourses.

   A. The terms of the easement shall prohibit excavation, the placing of fill or structures, and any alterations that may affect adversely the flow of storm water within any portion of the easement.

   B. Maintenance of vegetation within the easement shall be required.

5. The PADEP, Chapter 105, Rules and Regulations, apply to the construction, modification, operation or maintenance of both existing and proposed water obstructions and encroachments throughout the watershed, including work in wetlands. Inquiries on permit requirements or other concerns shall be addressed to PADEP's Regional Office.

6. When it can be shown that, due to topographic conditions, natural drainage ways on the development site cannot adequately provide for drainage, open channels may be constructed conforming substantially to the line and grade of such natural drainageways. Work within natural drainageways shall be subject to approval by PADEP.

7. Any storm water management facilities or any facilities that constitute water obstructions (e.g., culverts, bridges, outfalls, or stream enclosures, etc.) that are regulated by this Ordinance, that will be located in or adjacent to Waters of the Commonwealth (including wetlands), shall be subject to approval by PADEP. When there is a question whether wetlands may be involved, it is the responsibility of the Applicant or his agent to show that the land in question cannot be classified as wetlands; otherwise, approval to work in the area must be obtained from PADEP.

8. Should any storm water management facility require a dam safety permit under PADEP Chapter 105, the facility shall be designed in accordance with Chapter 105 and meet the regulations of Chapter 105 concerning dam safety which may be required to pass storms larger than one hundred (100)-year event.

9. No detention basin, storm pipe, or swale or any other storm water management facility shall discharge directly onto any publicly used Township, state or private road but shall discharge into a culvert under or along the road.

10. Any storm water management facilities regulated by this Ordinance that will be located on, or discharged onto State Highway rights-of-way shall be subject to approval by PennDOT.

11. Storm water management facilities located within or affecting the floodplain of any watercourse shall comply with the requirements of the flood plain regulations provided in the Zoning Ordinance or any future ordinances regulating construction or development within areas of the Township subject to flooding.

12. The minimum floor elevations for all structures that would be affected by a basin, other temporary impoundments, or open conveyance systems where ponding may occur shall be two (2) feet above the 100-year water surface.

    A. If basement or underground facilities are proposed, detailed calculations addressing the effects of the storm water ponding on the structure and water-proofing and/or flood proofing design information shall be provided for review and approval.

13. All existing and natural watercourses, channels, drainage systems and areas of surface water concentration shall be maintained in their existing condition unless an alteration is approved by the appropriate regulatory agency.

14. Storm Water Management Facilities intended to receive and infiltrate runoff from regulated activities shall be selected based on suitability of soils and site conditions and shall be constructed on soils that have the following characteristics:

    A. Infiltration testing shall be conducted in accordance with BMP Manual.

    B. Acceptable soil will have a percolation rate of at least 0.1 inch per hour and not more than ten (10) inches per hour (after application of the appropriate safety factor from the BMP manual).

    C. A minimum separation of twenty-four (24) inches of acceptable soil between the bottom of the facility and the limiting zone, unless it is demonstrated to the satisfaction of the Township that the selected BMP has design criteria which allow for a smaller separation.

    D. A stabilized infiltration rate sufficient to accept the additional storm water load and drain completely as determined by field tests conducted by the Applicant's professional designer.

        (1) The stabilized infiltration rate is to be determined in the same location and within the same soil horizon as the bottom of the infiltration facility.

        (2) The stabilized infiltration rate is to be determined as specified in the BMP Manual.

    E. The Township shall be notified twenty-four (24)-hours prior to infiltration tests being conducted as to provide an opportunity for the Township to witness the tests.

15. Storm water discharge points onto an adjacent property shall comply with the following:

A. Storm water flows onto adjacent property shall not be created, relocated, or peak rate increased without written notification of the adjacent property owner(s) by the developer including the establishment of an easement.

B. Storm water runoff from a project site shall flow directly into a natural watercourse or into an existing storm sewer system. If neither of these is available, the Applicant shall obtain an easement from the downstream landowner(s) to allow the site's runoff discharge to reach a natural watercourse or an existing storm sewer system through the easement. If an easement is obtained, post-developed flow characteristics must be similar to the runoff characteristics (spread, velocity, and peak rate) of the pre-developed flows. The easement from the downstream property owner(s) shall be to allow for a piped storm sewer system, an overland flow system, or a combination of the two. The downstream system design shall conform to the design requirements of this Ordinance.

C. When the Applicant provides verification that the downstream landowner(s) refuses to grant an easement at reasonable terms in the sole opinion of the Township, the site shall be designed such that the discharge from the Applicant's site shall be in a non-erosive, sheet flow condition. For all design year storms, including the 100-year storm, runoff from the Applicant's site shall flow onto the adjacent property in a manner similar to the runoff characteristics (spread, velocity, and peak rate) of the pre-developed flow. The use of level spreaders is prohibited.

D. Storm water runoff shall not be transferred from one watershed to another unless the watersheds are sub-watersheds of a common watershed which join together within the perimeter of the property, or both of the following apply: 1) the effect of the transfer does not alter the peak discharge (in conformance with the requirements of the Act 167 Plan) onto adjacent lands, and, 2) drainage easements from the affected landowners are provided.

(1) For the purposes of this subsection, affected landowners shall include all landowners receiving runoff that was transferred from one watershed to another watershed that does not join together within the perimeter of the project site, from the point of discharge from the project site to the location in the watershed where the transferred runoff discharges to a receiving watercourse located within the watershed that the runoff was transferred from.

16. Unless an alternate design is submitted to the Township for review, and said design is prepared by a licensed (in the Commonwealth of Pennsylvania) geologist or geotechnical engineer:

A. No storm water facilities shall be placed in, over or within a distance that will impact the following features:

(1) Sinkholes

(2) Closed depressions

(3) Lineaments in carbonate areas

(4) Fracture traces

(5) Caverns

(6) Intermittent streams

(7) Ephemeral streams

(8) Bedrock pinnacles (surface or subsurface)

B. The minimum isolation distance from storm water management facilities to the listed geologic features shall be as follows:

(1) One hundred (100) feet from the rim of sinkholes or closed depressions;

(2) One hundred (100) feet from disappearing streams;

(3) Fifty (50) feet from lineaments or fracture traces;

(4) Twenty-five (25) feet from surface or identified subsurface pinnacles.

C. Storm water runoff from any regulated activity shall not be discharged into sinkholes.

D. It shall be the developer's responsibility to verify if the development is underlain by carbonate geology. The certificate provided in the Appendix shall be attached to all Storm Water Management Site Plans and signed and sealed by the developer's qualified professional.

E. Whenever a storm water facility will be located in an area underlain by carbonate geology, a geological evaluation of the proposed location by a Registered Professional Geologist shall be conducted to determine subsurface conditions including soil permeability, depth to bedrock, subgrade stability, and susceptibility to sinkhole formation.

F. Impermeable liners may be used to reduce or eliminate the separation distances listed in Subsections A and B above.

17. The calculated peak rates of runoff for storm water originating on the project site must meet one of the following conditions, for all watersheds flowing from the project site:

A. Match Pre-Development Hydrograph

(1) Developers and/or landowners are encouraged to provide infiltration facilities or utilize other techniques which will allow the post-development 100-year hydrograph to match the pre-development 100-year hydrograph, along all parts of the hydrograph, for the development site.

(2) To match the pre-development hydrograph, the post-development peak rate must be less than or equal to the pre-development peak rate, and the post-development runoff volume must be less than or equal to the pre-development volume for the same storm event.

(3) A shift in hydrograph peak time of up to five (5) minutes and a rate variation of up to five (5) percent at a given time may be allowable to account for the timing effect of BMPs used to manage the peak rate and runoff volume.

(4) Incorporating the volume control requirements as given in Article V can be used as part of this option.

B. Where the pre-development hydrograph cannot be matched, the calculated peak rates of runoff for storm water originating on the project site must meet the following conditions, for all watersheds flowing from the project site:

(1) The two (2) year post-development rate of runoff (peak flow) from any regulated activity shall be less than or equal to fifty (50) percent of the calculated two (2) year pre-developed rate (peak flow) except where:

(a) The regulated activity is filed as a minor land disturbance activity; or,

(b) The proposed activity involves the subdivision of five (5) or less single family residential lots, either initially or cumulatively from the date of the adoption of this Ordinance, and providing no new streets are proposed.

(2) Where an application meets one of the above exceptions, the two (2) year post-developed rate of runoff (peak flow) shall be less than or equal to the calculated two (2) year pre-developed rate of runoff (peak flow).

(3) Post-development runoff from any regulated activity shall not exceed the peak rates of runoff prior to development for all other design storms (5, 10, 25, 50, and 100-year storm events).

C. Developers have the option to propose a regional storm water management plan or participate in a regional storm water management plan developed by others.

(1) A regional storm water management plan may include offsite volume and rate control, as appropriate and supported by a detailed design approved by the Township.

(2) A regional storm water management plan must meet all of the volume and rate control standards required by this Ordinance for the area defined by the regional storm water management plan, but not necessarily for each individual development site.

(3) Appropriate agreements must be established to ensure the requirements of this Ordinance and the requirements of the regional storm water management plan are met.

18. Areas proposed for infiltration BMPs shall be protected from sedimentation and compaction during the construction phase to maintain maximum infiltration capacity. Staging of earthmoving activities and selection of construction equipment shall consider this protection.

19. Infiltration BMPs shall not be constructed nor receive runoff from disturbed areas until the entire contributory drainage area to the infiltration BMP has achieved final stabilization.

20. If structure foundations, basements, or other underground facilities (whether on-site or off-site) would be affected by saturated soil due to a nearby Storm Water Management Facility, detailed calculations addressing the impact of the saturated soil, and water-proofing design information, where applicable, shall be submitted for approval.

In the case of any dispute in the methodology used in the design of any Storm Water Management Site Plan and/or in the presentation of such information, the Supervisors shall make the final determination on the design criteria, methodology, and form of presentation.

SECTION 502 METHODS OF CALCULATION OF RUNOFF

Methods shall be selected by the Qualified Person based on the individual limitations and suitability of each method for a particular site. The methods of computation used to determine peak discharge and runoff shall be:

1. The Soil-Cover-Complex Method (as set forth in the latest edition of Urban Hydrology for Small Watersheds, Technical Release No. 55 as published by NRCS, formerly SCS) shall be used for all detention facilities with a drainage area greater than or equal to sixty (60) acres. This method is recommended for design of storm water management facilities and where storm water runoff volume must be taken into consideration.

2. The Rational Method may be used for drainage areas up to sixty (60) acres. Extreme caution should be used by the Qualified Person if the watershed has more than one (1) main drainage channel, if the watershed is divided so that hydrologic properties are significantly different in one (1) watershed versus the other, if the time of concentration exceeds sixty (60) minutes, or if storm water runoff volume is an important factor. The combination of Rational Method hydrographs based on timing shall be prohibited.

3. The Rational Method shall be used for all:

    A. Collection Facilities;

    B. Conveyance Facilities.

4. Any other method approved by the Township Engineer.

5. If the NRCS/SCS Method (also known as Soil-Cover-Complex Method) is used, the design storm volumes to be used in the analysis of peak rates of discharge shall be obtained from the Precipitation-Frequency Atlas of the United States, Atlas 14, Volume 2, Version 3.0, U.S. Department of Commerce, National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Hydrometeorological Design Studies Center, Silver Spring, Maryland. NOAA's Atlas 14 can be accessed at: http://hdsc.nws.noaa.gov/hdsc/pfds/orb/pa_pfds.html.

    A. Provide the rainfall used for the 2, 10, 25, 50, and 100-year 24-hour storm events. Rainfall values vary throughout the county depending on location.

    B. Provide the location (longitude and latitude) or a description of the location for which the rainfall applies.

C. If rainfalls from more than one (1) location are used, provide the methodology by which the design rainfall was calculated.

D. Antecedent Moisture Condition 1 shall be used in areas of carbonate geology.

E. Antecedent Moisture Condition 2 shall be used in all other areas.

F. A Type II distribution shall be used in all areas.

6. If the Rational Method is used, the NOAA Atlas 14 data (see 503.5 above) shall be used to determine the rainfall intensity in inches per hour based on the information for the 5 through 60 minute duration storm events.

7. Hydrographs may be obtained from NRCS methods such as TR-55, TR-20, or from use of the "modified" or "unit hydrograph" rational methods.

A. If "modified" or "unit hydrograph" rational methods are used, the ascending leg of the hydrograph shall have a time of three times the time of concentration (3xTc) and the descending leg shall have a time of 7 times the time of concentration (7xTc) to approximate an NRCS/SCS type 2 hydrograph.

8. Runoff Coefficients "C" and Curve Numbers "CN" shall be based on the charts contained in the Appendix.

9. Times of concentration shall be based on the following design parameters:

A. Sheet flow: The maximum length for each reach of sheet or overland flow before shallow concentrated or open channel flow develops is one hundred fifty (150) feet. Flow lengths greater than one hundred (100) feet shall be justified based on the actual conditions at each development site. Sheet flow may be determined using the nomograph in the Appendix, or the Manning's kinematic solution shown in the Sheet Flow section of Worksheet No. 1 in the Appendix.

B. Shallow concentrated flow: Travel time for shallow concentrated flow shall be determined using Average Velocities For Estimating Travel Time for Shallow Concentrated Flow nomograph from TR-55, Urban Hydrology for small watersheds in the Appendix.

C. Open Channel flows: At points where sheet and shallow concentrated flows concentrate in field depressions, swales, gutters, curbs, or pipe collection systems, the travel times and downstream end of the development site between these design points shall be based upon Manning's Equation and/or acceptable engineering design standards as determined by the Township engineer.

10. For the purpose of calculating pre-development peak discharges, all runoff coefficients, both on-site and off-site, shall be based on actual land use assuming summer or good land conditions. Post-development runoff coefficients for off-site discharges used to design conveyance facilities shall be based on actual land use assuming winter or poor land conditions.

11. Design of on-site conveyance systems calculations may use the Rational Method of Q=CIA where Q is the peak discharge of the watershed in cubic feet per second, C is the coefficient of runoff, I is the intensity of rainfall in inches per hour, and A is the area of the watershed in acres; or any other method approved by the Township.

12. Runoff calculations shall include a hydrologic and hydraulic analysis indicating volume and velocities of flow and the grades, sizes, and capacities of water carrying structures, sediment basins, and retention and detention structures and sufficient design information to construct such facilities. Runoff calculations shall also indicate both pre-development and post-development rates for peak discharge of storm water runoff from the project site.

13. Runoff calculations will also be made to ensure that the runoff from the upstream watershed area can be accommodated by the pipes, drainage easements, watercourses, etc. on the site.

14. Runoff calculations will also be made to ensure that the runoff from the project site can be accommodated by the receiving pipes, drainage easements, watercourses, etc., downstream from the site.

15. Peak rate control is not required for off-site runoff. Off-site runoff may be bypassed around the site provided all other discharge requirements are met. If offsite runoff is routed through rate control facilities, runoff coefficients for off-site discharges used to design those rate control facilities shall be based on actual land use assuming winter or poor land conditions.

SECTION 503 DESIGN STANDARDS – EROSION AND SEDIMENT CONTROL

1. The Applicant shall meet requirements as contained in 25 PA Code, Chapters 92 and 102 as required and applicable as follows:

   A. The implementation and maintenance of erosion and sediment control BMPs.

   B. Development of written plans.

   C. Submission of plans for approval.

   D. Obtaining Erosion and Sediment Control and NPDES permits.

   E. Maintaining plans and permits on site.

2. Evidence of any necessary plan or permit approval for land disturbance activities from PADEP or the Lancaster County Conservation District must be provided to the Township.

3. A copy of the Notice of Termination for NPDES Permits shall be provided to the Township once accepted by Lancaster County Conservation District.

4. Construction of temporary roadways (e.g., for utility construction, timber harvesting, etc.) shall comply with all applicable standards for erosion and sedimentation control and stream crossing regulations under 25 PA Code, Chapters 102 and 105.

5. The Erosion and Sedimentation Control Plan shall be submitted to the Lancaster County Conservation District for approval and shall address the following, as applicable:

   A. Design of the roadway system, including haul roads, skid roads, landing areas, trails, and storage and staging areas.

   B. Runoff control structures (e.g., diversions, culverts, detention ponds, etc.).

   C. Stream crossings for both perennial and intermittent streams.

   D. Access to public roadways, including design of rock construction entrance for mud and debris control.

   E. A remediation plan for restoring the disturbed area through re-grading, topsoil placement, reseeding, and other stabilization techniques, as required.

6. The following principles shall be applied to the design plan and construction schedule to minimize soil erosion and sedimentation.

   A. Stripping of vegetation, grading or other soil disturbance shall be done in a manner that will minimize soil erosion.

   B. Whenever feasible, natural vegetation shall be retained and protected.

SECTION 504 DESIGN STANDARDS – WATER CARRYING FACILITIES

1. All storm sewer pipes, grass waterways, open channels, swales, and other water-carrying facilities that service drainage areas within the site shall be designed to convey the twenty-five (25) year storm event unless in the opinion of the Township or Township Engineer the character of development and potential for damage warrant design for the 50- or 100-year storm.

2. Storm water management facilities that convey off-site water through the site shall be designed to convey the fifty (50)-year storm event.

3. All developments shall include provisions that allow for the overland conveyance and flow of the post-developed one hundred (100)-year storm event without damage to public or private property.

4. Conveyance facilities shall comply with the design criteria in the following table:

Conveyance facility design criteria			
Location	**Within public street right-of-way**	**Outside public street right-of-way**	
Loading	**All**	**Vehicular loading**	**Non-vehicular loading**
(a) Pipe design			
[1] Material	SLHDPE, RCP	SLHDPE, RCP	SLHDPE, RCP
[2] Slope (minimum)	0.5%	0.5%	0.5%
[3] Cover	1 foot to stone subgrade	1 foot to stone subgrade	1 foot to surface
[4] Diameter (minimum)	18 inches	18 inches	18 inches
[5] Street crossing angle	90°	90°	N/A
[6] Access/maintenance port frequency (maximum)	400 feet	400 feet	400 feet
(b) Inlet design			
[1] Material	Concrete	Concrete	N/A
[2] Grate depression	N/A	N/A	6 inches w/20:1 approach slope
(c) Manhole design			
[1] Material	Concrete	Concrete	Concrete
(d) Swale design			
[1] Freeboard (minimum)	6 inches	N/A	6 inches
[2] Velocity (maximum)	Stability check	N/A	Stability check
[3] Slope (minimum)	2%	2%	2%
[4] Side slopes (residential area)	4:1 max	N/A	4:1 max
[5] Side slopes (non-residential area)	4:1 max	N/A	3:1 max
[6] Bottom width to flow depth ratio	12:1	N/A	12:1
(e) Pipe Inlet/Outlet design			
[1] End treatment	Concrete Headwall/endwall	Headwall/ endwall or flared end section	Headwall/ endwall or flared end section
[2] Energy dissipater	Required	N/A	Required

5. All storm sewer pipes, culverts, manholes, inlets, endwalls and end sections shall be constructed in accordance with Pennsylvania Department of Transportation Publication 408, as modified by Paradise Township.

6. Storm sewer pipes, culverts, manholes, inlets, endwalls, and end sections proposed for dedication or located along streets shall conform to the requirements of the Pennsylvania Department of Transportation, Bureau of Design, Standards for Roadway Construction, Publication No. 72, in effect at the time the design is submitted, as modified by Paradise Township.

7. The roughness coefficient (Manning "n" values) used for conveyance pipe capacity calculations shall be determined in accordance with PennDOT Publication 584, PennDOT Drainage Manual, or per the manufacturer's specifications.

8. Inlets shall be placed along streets as follows:

   A. On both sides of streets at low spots.

   B. At all changes in the horizontal or vertical direction of storm sewers

   C. At points where the flow in gutters exceeds three (3) inches.

   D. At or beyond the curb radius points at intersections.

      (1) For the purpose of inlet location at intersections, the depth of flow shall be considered for each gutter.

      (2) At intersections, the depth of flow for the 25-year storm across the through streets shall not exceed one (1) inch.

   E. Inlets shall be depressed below the grade of the road-side swale or ground surface as indicated in the above design chart.

   F. An access/maintenance port may either be an inlet or manhole.

   G. Manholes may be substituted for inlets at locations where inlets are not required to collect surface runoff.

9. Material consistency and placement depths for storm sewer pipe backfill shall be (at a minimum) per all applicable pipe manufacturer's recommendations, further providing it should be free of large (not exceeding 6 inches in any dimension) stone, rock, or other objectionable or detritus material.

10. Within the public street right-of-way, the gutter spread based on the 25-year storm shall be no greater than one-half of the travel lane and have a maximum depth of three (3) inches at the curb line. A parking lane shall not be considered as part of the travel lane.

11. Inlets or manholes shall be placed at all points of changes in the horizontal or vertical directions of conveyance pipes. Curved pipe sections are prohibited.

12. All inlets placed in paved areas shall have heavy duty bicycle-safe grating consistent with PennDOT Publication 72M, latest edition. A note to this effect shall be added to the Storm Water Management Site Plan or inlet details therein.

13. Inlets, junction boxes, or manholes greater than five (5) feet in depth shall be equipped with non-aluminum ladder rungs and shall be detailed on the Storm Water Management Site Plan.

14. Where the connecting pipe has a diameter eighteen (18) inches or greater, headwalls and endwalls shall be provided with a protective barrier device to prevent entry of the storm sewer pipe by unauthorized persons. Such protection devices shall be designed to be removable for cleaning.

15. Flow velocities from any storm sewer shall not result in a degradation of the receiving channel.

16. Energy dissipaters shall be placed at the outlets of all storm sewer pipes where flow velocities exceed maximum permitted channel velocities.

17. The capacities of swales shall be computed from the Manning Equation using the following design parameters: Permissible open channel velocities and design standards shall be in accordance with good engineering practice as documented in the Engineering Field Manual for Conservation Practices, U.S.D.A., S.C.S., or in Design Charts for Open-Channel Flow, Hydraulic Design Series No. 3, U.S. Department of Transportation.

    A. Vegetated swales:

        (1) The first condition shall consider swale stability based upon a low degree of retardance ("n" = 0.03);

        (2) The second condition shall consider swale capacity based upon a higher degree of retardance ("n" = 0.05); and

    B. The "n" factors to be used for paved or riprap swales or gutters shall be based upon accepted engineering design practices, as approved by the Township Engineer.

    C. All swales shall be designed to maximize infiltration and concentrate low flows to minimize siltation and meandering, unless geotechnical conditions do not permit infiltration.

SECTION 505 DESIGN STANDARDS – ABOVE GROUND STORAGE FACILITIES

1. Above ground storage facilities shall consist of all storm water facilities which store, infiltrate/evaporate/transpire, clean, release, or otherwise affect storm water runoff and the top of which is exposed to the natural environment. Above ground storage facilities shall be located above the finished ground elevation. Above ground storage facilities do not include storm water management facilities designed for conveyance, or cisterns.

2. Facilities with a facility depth greater than eight (8) feet shall not be permitted in residential areas.

3. Above ground storage facilities shall comply with the design criteria in the following table:

Above-ground storage facility design criteria			
	Facility Depth		
	Less than 2 feet	**2 feet to 6 feet**	**Greater than 6 feet**
(a) Embankment Geometry			
[1] Top width (minimum)	2 feet	5 feet	8 feet
[2] Interior side slope (maximum)	3:1	5:1	5:1
[3] Exterior side slope (maximum)	3:1	3:1	3:1
(b) Embankment construction			
[1] Clay/Impervious Core	Not required	Required	Required
[2] Pipe collar	Not required	Required	Required
[3] Compaction density	Not required	Required	Required
(c) Internal Construction			
[1] Dewatering feature	N/A	Required	Required
[2] Pretreatment elements	Not required*	Required	Required
(d) Outlet Structure			
[1] Pipe size (minimum)	12 inches	18 inches	18 inches
[2] Pipe material	SLHDPE, PVC, RCP	SLHDPE, RCP	SLHDPE, RCP
[3] Anticlogging devices	Required	Required	Required
[4] Antivortex design	Not required	Required	Required
[5] Watertight joints in piping?	Yes	Yes	Yes
(e) Spillway Requirements			
[1] Spillway freeboard (minimum)	3 inches	6 inches	12 inches
[2] Width (minimum)	5 feet	10 feet	20 feet
[3] Width (maximum)	20 feet	50 feet	50 feet
[4] Spillway channel design	Required	Required	Required
[5] Routing of 100-year storm	Permitted	Permitted	Permitted

* Pretreatment is required for infiltration BMPs unless shown to be unnecessary.
N/A = Not applicable
SLHDPE = Smooth lined high density polyethylene pipe; PVC = Polyvinyl chloride;
RCP = Reinforced concrete pipe

4. If required, pretreatment elements shall be designed according to the BMP manual.

5. All above ground storage facilities shall be structurally sound and shall be constructed of sound and durable materials.

   A. All discharge control devices with appurtenances shall be made of reinforced concrete and stainless steel.

B. Bolts/fasteners shall be stainless steel.

C. The completed structure and the foundation of all basins shall be stable under all probable conditions of operation.

D. Spillways shall be capable of discharging the peak discharge of a post-development 100-year storm event through the emergency spillway facilities, in a condition that assumes the primary outlet(s) are blocked, which will not damage the integrity of the facility or the downstream drainage areas.

E. Use of the spillway to convey flows greater than the 50-year design storm shall be permitted.

6. The effect on downstream areas if the above ground storage facility embankment fails shall be considered in the design of all basins. The basin shall be designed to minimize the potential damage caused by such failure of the embankment.

7. An easement shall be provided from the spillway outfall to a natural or artificial watercourse.

8. The maximum depth of water for above ground storage facilities without restricted access shall not exceed six (6) feet.

   A. Access to basins with a maximum depth of water greater than six (6) feet shall be restricted by fencing that will discourage access.

9. Above ground storage facilities without restricted access shall have impoundment areas with side slopes no greater than the horizontal to vertical ratios in the design chart.

   A. Access to basins with steeper side slopes than those shown in the chart shall be restricted by fencing that will discourage access.

10. All detention basins shall include an outlet structure to permit draining the Rate Control Volume within twenty-four (24) hours, exclusive of BMP storage.

11. All outlet structures and emergency spillways shall include a satisfactory means of dissipating the energy of flow at its outlet to assure conveyance of flow without endangering the safety and integrity of the basin and the downstream drainage area.

12. A clay/impervious core shall consist of a cutoff trench (below existing grade) and a core trench (above existing grade).

   A. A clay/impervious core may not be required wherever the facility depth is less than two (2) feet.

   B. Materials used for the clay/impervious core shall conform to the Unified Soil Classification GC, SC, CH, or CL and must have at least 30% passing the No. 200 sieve.

C. The dimensions of the clay/impervious core shall provide a minimum trench depth of two (2) feet below existing grade, minimum width of four (4) feet and side slope of 1H:1V or flatter.

D. The clay/impervious core should extend up to the 25-year water surface elevation or six (6) inches below the emergency spillway elevation, whichever is lower.

E. The clay/impervious core shall extend four (4) feet below any pipe penetrations through the impervious core.

F. The core shall be installed along or parallel to the centerline of the embankment.

G. Compaction requirements for the clay/impervious core shall be the same as those for the embankment to assure maximum density and minimum permeability.

13. All pipe collars, if required, shall be designed in accordance with Chapter 7 of the PADEP Erosion and Sediment Control Manual. The material shall consist of concrete or otherwise non-degradable material around the outfall barrel and shall be watertight.

14. The embankment fill material shall be free of top soil, organic material, roots, stumps, wood, rubbish, stones greater than six (6) inches, frozen or other objectionable materials.

15. The minimum freeboard for spillways shall be provided above the 100-year design elevation of the water surface at the emergency spillway in a condition that assumes the primary outlet(s) is (are) blocked.

16. The minimum bottom slope of facilities not designed for infiltration shall be one percent (1%). A flatter slope may be used if an equivalent dewatering mechanism is provided.

17. If required, dewatering shall be provided through the use of underdrain, surface device, or an alternate approved by the Township Engineer. If the facility is to be used for infiltration, the dewatering device should be capable of being disconnected and only be made operational if the basin is not dewatering within the required timeframe.

18. Within basins designed for infiltration, a planting plan shall be prepared in accordance with this Ordinance and the BMP Manual.

SECTION 506 DESIGN STANDARDS – VOLUME CONTROL

Storm water runoff volume controls shall be designed using the Design Storm Method (CG-1 in the BMP Manual) as follows:

1. The *Design Storm Method* (CG-1 in the BMP Manual) is applicable to any size of regulated activity. This method requires detailed modeling based on site conditions.

A. The post-development total runoff volume shall not increase for all storms equal to or less than the 2-year 24-hour storm event.

B. For modeling purposes:

(1) Existing (pre-development) non-forested pervious areas must be considered meadow in good condition.

(2) 20% of existing impervious area, when present, shall be considered meadow in good condition in the model for existing conditions.

(3) The maximum loading ratio for volume control facilities in Karst areas shall be:

(a) 3:1 impervious drainage area to infiltration area and 5:1 total drainage area to infiltration area.

(b) The maximum loading ratio for volume control facilities in non-Karst areas shall be 5:1 impervious drainage area to infiltration area and 8:1 total drainage area to infiltration area.

2. Any portion of the volume control storage that meets the following conditions may also be used as rate control storage:

A. Volume control storage that depends on infiltration and is designed according to the infiltration standards in this Ordinance and the BMP Manual.

B. The volume control storage which will be used for rate control is that storage which is available within 24 hours from the end of the design storm based on the stabilized infiltration rate and/or the evapo-transpiration rate.

3. Volume Control BMPs and pretreatment elements shall be designed in accordance with the BMP Manual and the soil and infiltration testing requirements of Article V.

4. All applicable worksheets from Chapter 8 of the BMP Manual must be used when establishing Volume Controls.

SECTION 507 DESIGN STANDARDS – SUBSURFACE STORAGE FACILITIES

1. Subsurface storage facilities shall consist of all storm water facilities which store, infiltrate/evaporate/transpire, clean, release, or otherwise affect storm water runoff and the top of which is not exposed to the natural environment. Subsurface facilities shall be located below the finished ground elevation. Subsurface facilities shall not include storm water management facilities designed for conveyance.

2. Subsurface storage facilities shall comply with the design criteria in the following table:

Subsurface storage facility design criteria		
	Facility Type	
	Infiltration and Storage	**Storage without Infiltration**
(a) Facility Geometry		
[1] Depth from surface (maximum)	2 feet less than limiting zone	N/A
[2] Loading ratio (maximum)	Per BMP Manual*	N/A
(b) Distribution System Requirements		
[1] Pipe size (minimum)	4 inches	4 inches
[2] Loading/balancing	Required	Required
[3] Observation/access ports	Required	Required

*unless otherwise determined by professional geologic evaluation

3. The facility shall be designed according to the BMP Manual to provide pretreatment to eliminate solids, sediment, and other debris from entering the subsurface facility.

4. The facility shall be designed to provide a means of evenly balancing the flow across the surface of the facility to be used for infiltration.

5. Observation/access ports shall be provided for all subsurface storage facilities as follows:

   A. For facilities with the bottom less than five (5) feet below the average grade of the ground surface, a clean-out shall be an acceptable observation port.

   B. For facilities with the bottom five (5) feet or more below the average grade of the ground surface, a manhole or other means acceptable to the Township shall be provided for access to and monitoring of the facility.

   C. The number of access points shall be sufficient to flush or clean out the system.

6. Storage and distribution system piping shall be PVC, SLHDPE, or RCP.

7. The stone used for infiltration beds shall be clean washed, uniformly graded coarse aggregate. The void ratio for design shall be assumed to be 40%.

8. Material consistency and placement depths for backfill shall be (at a minimum) per all applicable pipe manufacturer's recommendations.

   A. Backfill material shall be free of large (not exceeding 6 inches in any dimension) stone, rock, or other objectionable or detritus material.

   B. Select non-aggregate backfill material should be indigenous to the surrounding soil material for non-vehicular areas.

C. Backfill material within vehicular areas shall comply with the requirements of the governing municipal road/street or subdivision and land development ordinance.

D. If the design concept includes the migration of runoff through the backfill to reach the infiltration facility, the material shall be well drained, free of excess clay or clay-like materials and generally uniform in gradation.

9. Non-woven geotextiles shall be placed on the bottom, all sides and top of subsurface infiltration facilities.

10. When located under pavement, the top of the subsurface facility shall be a minimum of three (3) inches below the bottom of pavement subbase. Where located under vegetative cover, the top of the subsurface facility shall be a minimum of twelve (12) inches below the surface elevation or as required to establish vegetation.

11. Subsurface facilities shall be designed to safely convey and/or bypass flows from storms exceeding the design storm.

ARTICLE VI ADMINISTRATION

SECTION 601 OPERATION AND MAINTENANCE AGREEMENTS

1. Prior to final approval of the development site's Storm Water Management Site Plan, the record owner of the Development Site shall execute and record an Operation and Maintenance Agreement, in a recordable form acceptable to the Township, covering all temporary and permanent storm water management and erosion control facilities that are to be privately owned. The Agreement, as provided in the Appendix, shall include:

   A. A written description of all temporary and permanent storm water management and erosion control facilities, areas, or structures used as Storm Water Management BMPs and their maintenance requirements.

   B. Facilities, areas, or structures used as Storm Water Management BMPs shall be enumerated as permanent real estate appurtenances and recorded as deed restrictions or conservation easements that run with the land.

   C. The Operation and Maintenance Agreement shall be recorded as a restrictive deed covenant that runs with the land.

   D. Identification of a responsible individual, corporation, association or other entity for operation and maintenance of temporary and permanent storm water management and erosion control facilities.

   E. The Landowner, successor and assignees shall maintain all temporary and permanent storm water management and erosion control facilities in good working order in accordance with the approved maintenance schedule and shall keep all facilities in a safe manner.

   F. The Landowner shall convey to the Township easements and/or rights-of-way to assure access for periodic inspections by the Township and maintenance, if required.

   G. The owner shall keep on file with the Township the name, address and telephone number of the person or company responsible for maintenance activities; in the event of a change, new information will be submitted to the Township within ten (10) days of the change.

   H. In the case of Condominium and Planned Communities, separate agreements will be entered and be in a legal form capable of being enforced against the common elements and the ownership interests of the individual units or properties, as the case may be, so that the Township has the ability to force compliance with the provisions of such agreements and to assess the cost (as set forth in this Ordinance) against all.

   I. The owner is responsible for the operation and maintenance of the storm water management BMPs. If the owner fails to adhere to the Operation and Maintenance Agreement, the Township may perform the services required and charge the owner appropriate fees. Nonpayment of fees shall result in a lien against the property.

J. Where the NPDES permit for the project requires that BMPs be installed, annual written reporting of the inspection and maintenance of those BMPs shall be included in the program.

2. Maintenance Responsibilities of Storm Water Management facilities shall include, but not be limited to, the following:

A. Regular inspection of the Storm Water Management facilities to assure proper implementation of BMPS, maintenance and care, as per Subsection 3 below.

B. All pipes, swales and detention facilities shall be kept free of any debris or other obstruction and in original design condition.

C. Removal of silt from all permanent structures which trap silt or sediment in order to keep the material from building up in storm water management facilities and thus reducing their capacity to convey or store water.

D. Mowing grass areas as necessary to maintain adequate growth and to control weeds. Chemical weed control may be used to maintain the specified planting (i.e. grass, wetlands plants, etc.) if federal, state and local laws and regulations are met.

E. Liming and fertilizing vegetated channels and other areas according to the specifications in the PADEP Erosion and Sediment Pollution Control Manual.

F. Re-establishment of vegetation by seeding and mulching or sodding of scoured areas or areas where vegetation has not been successfully established. Selection of seed mixtures shall be subject to approval by the Township.

G. Where the NPDES permit for the project requires that BMPs be installed, annual written reporting of the inspection and maintenance of those BMPs shall be provided to the Township. LID Practices shall be included in the annual written report. A form for reporting shall be available at the Township office. Failure to provide such reports may result in enforcement and penalties by the Township.

3. Storm Water Management BMPs shall be inspected by the landowner, or the landowner's designee, according to the following list of minimum frequencies:

A. Annually for the first five (5) years.

B. Once every three (3) years thereafter.

C. During or immediately after the cessation of a 10-year or greater storm.

4. The Township reserves the right to accept or reject any proposal to dedicate ownership and operating responsibility of any Storm Water Management facilities to the Township.

A. Where the Supervisors accept dedication of storm water management facilities, the Supervisors may require the developer to establish, at the time of dedication, a

maintenance fund, in an amount determined by the Township, adequate for the perpetual care of such facilities.

5. Maintenance of existing storm water management facilities and BMPs existing on the effective date of this Ordinance, which have not been accepted by the Township or for which maintenance responsibility has not been assumed by a private entity such as a homeowners' association shall be maintained by the individual Landowners.

   A. Such maintenance shall include at a minimum those items above.

   B. If the Township determines at any time that any permanent Storm Water Management facility has been eliminated, altered, blocked through the erection of structures or the deposit of materials, or improperly maintained, the condition constitutes a nuisance and the Township shall notify the Landowner of corrective measures that are required, and provide for a reasonable period of time within which the property owner shall take such corrective action.

      (1) If the Landowner does not take the required corrective action, the Township may either perform the work or contract for the performance of the work and bill the Landowner for the cost of the work plus a penalty of 10% of the cost of the work.

      (2) If such bill is not paid by the property owner within 30 days, the Township may file a municipal claim against the property upon which the work was performed in accordance with the applicable laws.

      (3) The Township shall have the right to choose among the remedies and may use one or more remedies concurrently.

SECTION 602 PERFORMANCE GUARANTEE

1. A financial security (bond, restricted account or letter of credit) for storm water related improvements shall be supplied by the Developer in conjunction with the subdivision/land development approval, or in conjunction with the Storm Water Management Site Plan approval if no subdivision/land development plan is required.

2. The Applicant shall provide a financial security to the Township for the timely installation and proper construction of all Storm Water Management facilities, as required by the approved Storm Water Management Site Plan and this Ordinance and in accordance with the provisions of Article 5 of the MPC.

3. As the work of installing the required improvements proceeds, the party posting the financial security may request the Township to release or authorize the release from time to time, such portions of the financial security necessary for the payment to the contractor or contractors performing the work. Any such request shall be in writing and addressed to the Supervisors and the Supervisors shall have forty-five (45) days from the receipt of such request to allow the Township Engineer to certify, in writing, to the Supervisors that such portion of the work has been completed in accordance with the approved plan. Upon such certification, the Supervisors shall authorize

release from the required financial security of an amount as estimated by the Township Engineer as representing the value of the work completed.

4. In the event that any Storm Water Management Facilities which may be required have not been installed as provided in the approved Storm Water Management Site Plan the Supervisors are hereby granted the power to enforce any corporate bond, or other security by appropriate legal and equitable remedies. If proceeds of such bond, or other security are insufficient to pay the cost of installing or making repairs or corrections to all the Storm Water Management Facilities covered by said security, the Supervisors may, at their option, install part of such Storm Water Management Facilities and may institute appropriate legal or equitable action to recover the monies necessary to complete the remainder of the Storm Water Management Facilities. All of the proceeds, whether resulting from the security or from any legal or equitable action brought against the Developer, or both, shall be used solely for the installation of the Storm Water Management Facilities covered by such security, and not for any other Municipal purpose.

5. For Storm Water Management Site Plans that are required to have an NPDES permit and a financial security to the Township is required, evidence of the NPDES permit's executed "Notice of Termination" shall be provided to the Township prior to the release of the financial security.

SECTION 603 MODIFICATION OF APPROVED PLANS AND FACILITIES

1. Any modification which involves a change in storm water management control methods or techniques, or which involves the relocation or redesign of control measures, or which is necessary because soil or other conditions are not as stated on the approved plan, shall require the submission of a revised plan by the developer in accordance with the plan requirements as set forth in Article III of this Ordinance.

2. Any replatting, revision, or resubdivision of recorded plans or any replatting, revision, or resubdivision of any approved final plan which has not been recorded, including lot grading plans in subdivisions, shall be considered as a new application and shall comply with all the requirements of this Ordinance.

SECTION 604 AS-BUILT PLAN

1. Prior to the final release of the financial security, the developer shall provide the Township with two (2) paper copies, and one (1) GIS compatible electronic copy of the Storm Water Site As-built Plan.

2. The requirements for the as-built plan shall be developed by the professional responsible for the preparation of the Storm Water Management Site Plan.

3. The as-built plan requirements shall be submitted to the Township for review and approval during the preparation of the Storm Water Management Site Plan.

4. The as-built plan requirements shall be shown on the approved Storm Water Management Site Plan.

5. In addition to any requirements required by the Township's subdivision and land development ordinance, the as-built plan shall include the following:

   A. The actual horizontal and vertical location of all storm water management facilities including material, type, size, slope and size of storm drainage pipes and swales and their location in reference to any accompanying easements.

   B. The actual horizontal and vertical location and cross section(s) of all designed swales and their location in reference to any accompanying easements.

   C. Actual location of floodplain by elevation and/or dimension from property line(s).

   D. Above Ground and Subsurface Storage Facilities:

      (1) Actual contours of the storm water management facility.

      (2) Actual outlet structure details including type, size and inverts of outlet pipes.

      (3) Actual elevation of the embankment and emergency spillway.

      (4) A table showing the stage/storage/discharge curve for the constructed conditions.

      (5) A table providing a comparison of the approved design vs. the as-built discharge rates from all storm water management facilities.

   E. Actual horizontal and vertical location of cartway centerline versus right-of-way centerline.

   F. The coordinates for the GIS compatible electronic copy shall be based on the PA South Zone State Plane Coordinate System (NAD83 for horizontal and NAVD88 for vertical).

6. The as-built plan shall include a certification of completion signed by the Applicant's qualified licensed professional verifying that all permanent Storm Water Management BMPs have been constructed and are functioning in accordance with the requirements of the approved Storm Water Management Site Plan and specifications.

SECTION 605 PROHIBITED DISCHARGES AND CONNECTIONS

1. The following connections are prohibited, except as provided in Section 605.3 below.

   A. Any drain or conveyance, whether on the surface or subsurface, that allows any non-storm water discharge including sewage, process wastewater, and wash water to enter a separate storm sewer system (if applicable), or Waters of this Commonwealth, and any connections to the storm drain system from indoor drains and sinks.

   B. Any drain or conveyance connected from a commercial or industrial land use to the separate storm sewer system (if applicable) which has not been documented in plans, maps, or equivalent records, and approved by the Township.

2. No person shall allow, or cause to allow, discharges into surface Waters of this Commonwealth which are not composed entirely of storm water, except (1) as provided in Section 605.3 below and (2) discharges allowed under a state or federal permit.

3. The following discharges are authorized unless they are determined by the Township or PADEP to be significant contributors to pollution to the Waters of this Commonwealth:

- Discharges from firefighting activities	- Flows from riparian habitats and wetlands, diverted stream flows
- Potable water sources including water line flushing	- Uncontaminated water from foundations or from footing drains
- Irrigation and Landscape irrigation drainage	- Lawn watering
- Air conditioning condensate	- Dechlorinated swimming pool discharges
- Springs	- Uncontaminated pumped groundwater, rising groundwater, and groundwater infiltration
- Water from crawl space pumps	- Water from individual residential car washing
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occurred (unless all spill material has been removed) and where detergents are not used	- Routine external building wash down (which does not use detergents or other compounds)

4. In the event that the Township or PADEP determines that any of the discharges identified above significantly contribute to pollution of the Waters of this Commonwealth, the Township or PADEP will notify the responsible person(s) to cease the discharge.

SECTION 606 NOTIFICATION

In the event that any person fails to comply with the requirements of this Ordinance, or fails to conform to the requirements of any permit issued hereunder, the Township shall provide written notification of the violation. Such notification shall set forth the nature of the violation(s) and establish a reasonable time limit, for correction of these violation(s). Failure to comply within the time specified shall subject such person to the penalty provisions of this Ordinance. All such penalties shall be deemed cumulative and shall not preclude the Township from pursuing any and all other remedies.

SECTION 607 ENFORCEMENT/VIOLATIONS

1. The Supervisors are hereby authorized and directed to enforce all of the provisions of this Ordinance. All inspections regarding compliance with the Storm Water Management Site Plan shall be the responsibility of the Township Engineer or other qualified persons designated by the Township.

A. It shall be unlawful for any person, firm, or corporation to undertake any Regulated Activity on any property except as provided for in the approved Storm Water Management Site Plan and pursuant to the requirements of this Ordinance.

B. It shall be unlawful to alter or remove any control structure required by the Storm Water Management Site Plan pursuant to this Ordinance or to allow the property to remain in a condition which does not conform to the approved Storm Water Management Site Plan.

C. The Township may provide a limited time period for the owner to correct any violation. In these cases, the Township will provide the owner, or the owner's designee, with a written notice of the violation and the time period allowed for the owner to correct the violation. If the owner does not correct the violation within the allowed time period, the Township may revoke or suspend any, or all, applicable approvals and permits pertaining to any provision of this Ordinance.

D. Any approval or permit issued by the Township pursuant to this Ordinance may be suspended or revoked for:

(1) Non-compliance with or failure to implement any provision of the approved Storm Water Management Site Plan or Operation and Maintenance Agreement.

(2) A violation of any provision of this Ordinance or any other applicable law, ordinance, rule, or regulation relating to the Regulated Activity.

(3) The creation of any condition or the commission of any act during the Regulated Activity which constitutes or creates a hazard, nuisance, pollution, or endangers the life or property of others.

E. A suspended approval may be reinstated by the Township when:

(1) The Township has inspected and approved the corrections to the violations that caused the suspension.

(2) The Township is satisfied that the violation has been corrected.

F. An approval that has been revoked by the Township cannot be reinstated. The Applicant may apply for a new approval under the provisions of this Ordinance.

2. It shall be a violation of this Ordinance to commit any of the following acts:

A. To commence Regulated Activities prior to obtaining unconditional approval of a Storm Water Management Site Plan or in violation of the terms or conditions of a Storm Water Management Site Plan approved under this Ordinance.

B. To install, repair, modify or alter Storm Water Management Facilities prior to obtaining approvals under this Ordinance, or, in a manner which violates the terms and conditions of any Approval issued under this Ordinance.

C. To misuse or fail to maintain any Storm Water Management Facility installed upon a property.

D. To construct any improvements upon, grade, fill, place any structure, landscaping or vegetation, or take any other action which will impair the proper functioning of any Storm Water Management Facility without the written approval of the Township.

E. To place false information on, or, omit relevant information from an application for Approval under this Ordinance.

F. To fail to comply with any other provisions of this Ordinance.

SECTION 608 PENALTIES/REMEDIES

1. For each violation of the provisions of this Ordinance, the owner, agent, lessee, or contractor or any other person who commits, takes part in, or assists in any such violation shall be liable upon conviction thereof in a summary proceeding to pay a fine of not less than $200.00 nor more than $1,000.00 for each offense, together with the costs of prosecution. Each day or portion thereof in which a violation exists shall be considered a separate violation of this Ordinance, and each Section of this Ordinance which is violated shall be considered a separate violation.

2. The Township may also institute suits to restrain, prevent, or abate a violation of this Ordinance in equity or at law. Such proceedings in equity or at law may be initiated before any court of competent jurisdiction. In cases of emergency where, in the opinion of the court, the circumstances of the case require immediate abatement of the unlawful conduct, the court may, in its decree, fix a reasonable time during which the person responsible for the unlawful conduct shall correct or abate the same. The expense of such proceedings shall be recoverable from the violator in such manner as may now or hereafter be provided by law.

3. The Supervisors may also take actions relating to suspension or revocation of permits set forth in Article VI.

SECTION 609 APPEALS

1. Any person aggrieved by any action of the Township or its designee may appeal to Supervisors within thirty (30) days of that action. Any such appeal shall be governed by the procedures of Article V of the Local Agency Law, 2 Pa. C.S.A. 401 et seq.

2. Any person aggrieved by any decision of Supervisors may appeal to the Lancaster County Court of Common Pleas within thirty (30) days of that decision, in accordance with Article VII of Local Agency Law, 2 Pa. C.S.A. 701 et seq. the Local Agency Law.

SECTION 610 CONSTRUCTION

Nothing in this Ordinance shall be construed to affect any suit or proceeding pending in any court, or any rights or liability incurred, or any permit issued, or any approval granted, or any cause or causes of action existing prior to the enactment of this Ordinance.

SECTION 611 EFFECTIVE DATE

This Ordinance shall take effect and be in force five (5) days after its enactment by the Supervisors of the Township of Paradise, as provided by law.

DULY ORDAINED AND ENACTED by the Supervisors of the Township of Paradise, Lancaster County, Pennsylvania, on the 21st day of October, 2014, in lawful session duly assembled.

Township Of Paradise

(Vice) Chairman, Supervisors

Attest: Secretary

[Township SEAL]

APPENDICES

CERTIFICATION OF PLAN ACCURACY

I hereby certify that, to the best of my knowledge, the plan shown and described hereon is true and correct to the accuracy required by the Paradise Township Storm Water Management Ordinance.

_____, 20___ *_____

* Signature and seal of a professional registered in the Commonwealth of Pennsylvania qualified to perform such duties and responsible for the preparation of the plan.

CERTIFICATION OF SURVEY ACCURACY

I hereby certify that, to the best of my knowledge, the survey shown and described hereon is true and correct to the accuracy required by the Paradise Township Storm Water Management Ordinance.

_____, 20___ *_____

* Signature and seal of a professional registered in the Commonwealth of Pennsylvania qualified to perform such duties and responsible for the preparation of the plan.

STORM DRAINAGE PLAN CERTIFICATION

I hereby certify that, to the best of my knowledge, the storm drainage facilities shown and described hereon are designed in conformance with the Paradise Township Storm Water Management Ordinance.

_____, 20___ *_____

* Signature and seal of a professional registered in the Commonwealth of Pennsylvania qualified to perform such duties and responsible for the preparation of the storm drainage plan.

CERTIFICATE OF OWNERSHIP, ACKNOWLEDGEMENT OF PLAN, AND OFFER OF DEDICATION (INDIVIDUAL)

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF LANCASTER

On this, the _____day of _____, 20 ____, before me, the undersigned officer, personally appeared _____, who being duly sworn according to law, deposes and says that he is the *_____ of the property shown on this plan, that the plan thereof was made at his direction, that he acknowledges the same to be his act and plan, that he desires the same to be recorded, and that all streets and other property identified as proposed public property (excepting those areas labeled "NOT FOR DEDICATION") are hereby dedicated to the public use.

**_____

***_____

My Commission Expires _____, 20_____

* Identify Ownership or Equitable Ownership
** Signature of the Individual
*** Signature and Seal of Notary Public or Other Authorized to Acknowledge Deeds.

CERTIFICATE OF OWNERSHIP, ACKNOWLEDGEMENT OF PLAN, AND OFFER OF DEDICATION (COPARTNERSHIP)

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF LANCASTER

On this, the _____day of _____, 20 ____, before me, the undersigned officer, personally appeared _____, being the members of the firm of _____ who being duly sworn according to law, deposes and says that the copartnership is the *_____ of the property shown on this plan, that the plan thereof was made at its direction, that it acknowledges the same to be its act and plan and desires the same to be recorded, and that all streets and other property identified as proposed public property (excepting those areas labeled "NOT FOR DEDICATION") are hereby dedicated to the public use.

**_____

***_____

My Commission Expires _____, 20_____

* Identify Ownership or Equitable Ownership
** Signature of the Individual
*** Signature and Seal of Notary Public or Other Officer Authorized to Acknowledge Deeds.

CERTIFICATE OF OWNERSHIP, ACKNOWLEDGEMENT OF PLAN, AND OFFER OF DEDICATION (CORPORATE)

COMMONWEALTH OF PENNSYLVANIA
COUNTY OF LANCASTER

On this, the _____day of _____, 20 ____, before me, the undersigned officer, personally appeared _____, being * _____ of ** _____ who being duly sworn according to law, deposes and says that the corporation is the *** _____ of the property shown on this plan, that he is authorized to execute said plan on behalf of the corporation, that the plan is the act and deed of the corporation, that the corporation desires the same to be recorded and on behalf of the corporation further acknowledges, that all streets and other property identified as proposed public property (excepting those areas labeled "NOT FOR DEDICATION") are hereby dedicated to the public use.

****
_____

*****
_____

******
_____

My Commission Expires _____, 20_____

*	Individual's Title
**	Name of Corporation
***	Identify Ownership or Equitable Ownership
****	Signature of Individual
*****	Corporate Seal
******	Signature and Seal of Notary Public or Other Officer Authorized to Acknowledge Deeds

PARADISE TOWNSHIP BOARD OF SUPERVISORS
STORM WATER MANAGEMENT SITE PLAN APPROVAL CERTIFICATE

At a meeting held on _____, 20___, the Paradise Township Board of Supervisors approved this project including the complete set of plans and information which are filed with the Supervisors in File No. _____, based upon its conformity with the standards of the Paradise Township Storm Water Management Ordinance.

*_____

* Signature of the Chairman or Vice Chairman or their designee.

PARADISE TOWNSHIP ENGINEER
REVIEW CERTIFICATE

Reviewed by the Paradise Township Engineer this _____ day of _____, 20___.

_____

* Signature of the Paradise Township Engineer.

PARADISE TOWNSHIP PLANNING COMMISSION
REVIEW CERTIFICATE

At a meeting held on _____, 20____, the Paradise Township Planning Commission reviewed this plan and a copy of the review comments is on file in the Township office.

*_____

* Signatures of the (Vice) Chairman or their designee.

PARADISE TOWNSHIP STORM WATER FACILITIES AND BEST MANAGEMENT PRACTICES (BMP) OPERATIONS AND MAINTENANCE (O&M) AGREEMENT AND DECLARATION OF EASEMENT

THIS AGREEMENT AND DECLARATION OF EASEMENT made this_____day of _____,20_____, by and between _____ (hereinafter referred to as the "Grantor") and **Paradise Township**, Lancaster County, Pennsylvania, a Township duly organized under the laws of the Commonwealth of Pennsylvania, with its municipal office located at 2 Township Drive, Paradise, PA 17562 (hereinafter referred to as the "Township").

BACKGROUND

Grantor is the owner of premises located at_____ _____ , in Paradise Township, Lancaster County, Pennsylvania, as more specifically described in a deed recorded in Record Book _____, Page_____, in the Office of the Recorder of Deeds in and for Lancaster County, Pennsylvania, and as shown on the _____ , prepared by _____ , Drawing No. _____ , dated_____ , last revised_____(hereinafter referred to as the "Premises").

Prior to beginning construction on any subdivision or land development, Grantor is required, under the Paradise Township Subdivision and Land Development Ordinance and the Paradise Township Storm Water Management Ordinance (collectively referred to as the "Ordinances"), to file a final plan with Paradise Township. Pursuant to the Ordinances, Grantor must provide storm water management data in its application. The Ordinances require that Grantor's final plan reflect and/or be accompanied with supporting documentation which identifies the ownership of, and the method of administering and maintaining, all permanent storm water management facilities. Drainage courses, swales, grassed waterways, storm water inlets, pipes, conduits, detention basins, retention basins, infiltration structures, and other storm water management facilities, including Best Management Practices facilities ("BMPs"), shall be included under the term "storm water management facilities" in this Agreement and Declaration of Easement.

The purpose of this Agreement and Declaration of Easement is to describe the ownership and maintenance responsibilities for the storm water management facilities which will be installed on the Premises and to impose the ownership and maintenance responsibilities upon Grantor, his heirs, personal representatives and assigns and upon successor owners of the Premises, and set forth the rights of the Township.

NOW, THEREFORE, intending to be legally bound hereby and in consideration of receiving approval of its Subdivision and/or Land Development Plan or its Storm Water Management Site Plan (hereinafter referred to as the "Plan") from Paradise Township, and in consideration of receiving permits from the Township to develop the Premises, Grantor, for Grantor and the heirs, personal representatives and assigns of Grantor, covenant and declare as follows:

1. The storm water management facilities will be owned by Grantor, his heirs, personal representatives, successors and assigns.

2. All drainage courses, swales, storm water inlets, pipes, conduits, detention basins BMPs, and other storm water management facilities shall be installed, constructed and maintained by Grantor, his heirs, personal representatives, successors and assigns, in a first-class condition in conformance with the Plan, as approved by Paradise Township, including any accompanying

storm water management plans and information, and as recorded in the Office of the Recorder of Deeds in and for Lancaster County, and in a manner sufficient to meet or exceed the performance standards and specifications set forth on the Plan, as approved by Paradise Township, including any accompanying storm water management plans and information. These responsibilities shall include, but not be limited to, the following:

A. Liming, fertilizing, seeding and mulching of vegetated channels and all other unstablized soils or areas according to the specifications in the "Erosion and Sediment Pollution Control Manual" published by the Pennsylvania Department of Environmental Protection, the Penn State Agronomy Guide, or similar standard acceptable to Paradise Township.

B. Reestablishment of vegetation by seeding and mulching or sodding of scoured areas or areas where vegetation has not been successfully established.

C. Mowing as necessary to maintain adequate stands of grass and to control weeds. Chemical weed control may be used if federal, state and local laws and regulations are met. Selection of seed mixtures shall be subject to approval by the Township.

D. Removal of silt from all permanent structures which trap silt or sediment in order to keep the material from building up in grass waterways, pipes, detention or retention basins, infiltration structures, BMPs, and/or other facilities and thus reducing their capacity.

E. Removal of silt from all permanent drainage structures, in particular BMPs, in order to maintain the design storage volumes. Regular programs shall be established and maintained.

F. Regular inspection of the areas in question to assure proper maintenance and care, including, but not limited to, proper implementation of BMPs. **ADD ANY SPECIFIC INSPECTION REQUIREMENTS IN THE PCSM PLAN.**

G. Regular maintenance to insure that all pipes, swales and detention facilities shall be kept free of any debris or other obstruction. **ADD ANY SPECIFIC MAINTENANCE REQUIREMENTS IN THE PCSM PLAN.**

H. Regular maintenance of all storm water management facilities designed to improve water quality to ensure that the storm water management facilities function in accordance with their design. **ADD ANY SPECIFIC MAINTENANCE REQUIREMENTS IN THE PCSM PLAN SUCH AS:** Maintenance of the infiltration system by mowing grass regularly over the infiltration system; keeping the yard drains and roof drains free of debris in good repair at all times; flushing the infiltration system using a water hose at the cleanouts once every ninety (90) days to insure the infiltration system is clear of debris; keeping the sumps in the yard inlets and downspout sumps free of debris; and inspecting the infiltration system four (4) times per year or after each rain event exceeding one (1) inch.

I. Repair of any subsidence, including subsidence caused by sinkholes.

J. **IF APPLICABLE:** Replacement of displaced riprap within the outlet energy dissipater immediately after it is displaced, particularly after major storm discharge events.

K. **IF APPLICABLE:** Vacuum sweeping of areas of porous paving to keep surface free of sediment, typically three to four times per year and maintaining all areas of porous paving free from sealing, surfacing or re-paving with non-porous materials.

L. Removal of trash and debris on a regular basis.

Include a statement that the approved Operations and Maintenance (O&M) Plan is attached as an exhibit if there are any requirements in addition to those in Paragraph 2.

Grantor, his heirs, personal representatives, successors and assigns, shall be responsible for performing the foregoing maintenance.

3. Grantor, for himself, his heirs, personal representatives, successors and assigns, agrees that the failure to maintain all drainage courses, swales, storm water inlets, pipes, conduits, detention basins, BMPs, and other storm water management facilities in a first-class condition in conformance with this Agreement and Plan, as approved by Paradise Township, including any accompanying storm water management plans and information, shall constitute a nuisance and shall be abatable by the Township as such.

4. The Grantor agrees to provide the Township with an annual written report documenting the following items:

   A. Listing of all Post-Construction Storm Water Management (PCSM) Best Management Practices (BMPs) that were installed to meet requirements in NPDES Permits for Stormwater Discharges Associated with Construction Activities approved since March 10, 2003;

   B. The exact location of the PCSM BMP (e.g., street address);

   C. Information (e.g., name, address, phone number(s)) for BMP owner and entity responsible for BMP Operation and Maintenance (O&M), if different from BMP owner;

   D. The type of BMP and the year it was installed;

   E. Maintenance required for the BMP type according to the Pennsylvania Storm Water BMP Manual or other manuals and resources;

   F. The actual inspection/maintenance activities performed for each BMP during the year;

   G. An assessment by the permittee if proper operation and maintenance occurred during the year and if not, what actions the permittee has taken, or shall take, to address compliance with O&M requirements.

5. Grantor, for himself, his heirs, personal representatives, successors and assigns, authorizes the Township, at any time and from time to time, by its authorized representatives, to enter upon the Premises to inspect the storm water management facilities. Grantor acknowledges that the Township has the right to establish a schedule of regular inspections including, but not limited to, annual inspections. If the Township determines to establish a schedule of inspections of storm water management facilities, Grantor, its successors and assigns, shall reimburse the Township for the costs of such inspection and/or pay any annual fee for the administration of a Township storm water management program.

6. The Township may require that Grantor, and assigns or any future owner or occupier of the Premises or any part thereof, take such corrective measures as the Township may deem reasonably necessary to bring the Premises into compliance with this Agreement and with the Plan, as approved by Paradise Township, including any accompanying storm water management plans and information.

7. Upon the failure of the owner or occupier of the Premises or any part thereof to comply with the terms of this Storm Water Management Agreement or to take corrective measures following reasonable notice from the Township, the Township, through its authorized representatives, may take such corrective measures as it deems reasonably necessary to bring the Premises into compliance with this Agreement and with the Plan, as approved by Paradise Township, including any accompanying storm water management plans and information, including, but not limited to, the removal of any blockage or obstruction from drainage pipes, swales, detention basins, and BMPs, and may charge the cost thereof to Grantor, his heirs, personal representatives, successors and assigns, or any owner of the Premises or any part thereof and, in default of such payment, may cause a municipal lien to be imposed upon the Premises or any part thereof. Any municipal lien filed pursuant to this Agreement shall be in the amount of all costs incurred by the Township, plus a penalty of ten percent (10%) of costs, including the Township's reasonable engineering and attorneys' fees.

8. If ownership or maintenance responsibility of the storm water management facilities is assigned to a home owners' association, condominium unit owners' association, or similar entity, the Township shall be notified. If the association fails to properly maintain the storm water management facilities, the Township shall have the same rights granted to municipalities under Section 705 of the Pennsylvania Municipalities Planning Code, Act of July 31, 1968, P.L. 805, No. 247, with reference to maintenance of common open space, to maintain the storm water management facilities. Any association so formed shall enter into an agreement with the Township recognizing its duties and the Township's rights under this Agreement.

9. Grantor hereby imposes upon the Premises for the benefit of all present and future owners of the Premises or part of the Premises, the Township, and all other property owners affected by the storm water management facilities, the perpetual right, privilege and easement for the draining of storm water in and through the drainage courses, swales, storm water inlets, pipes, conduits, detention basins, BMPs, and other storm water management facilities depicted on the plan or plans submitted to the Township or hereafter made of record and now or hereafter installed on or constructed upon the Premises and, in addition, easements of access to the storm water facilities.

10. Grantor agrees to indemnify and defend Paradise Township and all of its elected and appointed officials, agents and employees (hereafter collectively referred to as the "Indemnitees") against and hold Indemnitees harmless from any and all liability, loss or damage, including attorneys' fees and costs of investigation and defense, as a result of claims, demands, costs or judgments against Indemnitees which arise as a result of the design, installation, construction or maintenance of the storm water facilities.

11. Grantor's personal liability under this Agreement shall cease at such time as:

    A. all storm water management facilities have been constructed in accordance with the specifications of the Township Subdivision and Land Development Ordinance, the Township Storm Water Management Ordinance and the approved plans;

    B. the storm water management facilities have been inspected and approved by the Township Engineer;

    C. all financial security, including any maintenance security, posted by Grantor has been released by the Township; and

    D. Grantor has transferred the Premises and/or all lots to be created from the Premises to third parties.

Notwithstanding the foregoing, Grantor's personal liability shall continue for any violations of this Agreement and Declaration of Easement which occurred during the time that Grantor owned the Premises or any lot created from the Premises or in the event the storm water management facilities were not completed, inspected or approved as set forth in (a) through (c) herein.

12. It is the intent of the parties to this Agreement that personal liability and maintenance obligations shall pass to subsequent title owners upon change in ownership of the Premises or any lot created from the Premises, and such subsequent owners shall assume all personal liability and maintenance obligations for the time period during which they hold title. Personal liability shall remain for any violations of this Agreement and Declaration of Easement which occurred during the period in which an owner held title.

13. The Township may, in addition to the remedies prescribed herein, proceed with any action at law or in equity to bring about compliance with the Paradise Township Storm Water Management Ordinance, the Paradise Township Subdivision and Land Development Ordinance and this Agreement.

14. This Agreement and Declaration of Easement shall be binding upon the Grantor, the successors and assigns of Grantor, and all present and future owners of the Premises or any part thereof and is intended to be recorded in order to give notice to future owners of the Premises of their duties and responsibilities with respect to the storm water management facilities. Grantor shall include a specific reference to this Agreement in any deed of conveyance for the Premises or any part thereof.

15. This Agreement and Declaration of Easement may be amended only by written instrument signed on behalf of all owners of the Premises and Paradise Township.

16. When the sense so requires, words of any gender used in this Agreement and Declaration of Easement shall be held to include any other gender, and the words in the singular number shall be held to include the plural, and vice versa.

IN WITNESS WHEREOF, the undersigned have caused this Agreement and Declaration to be executed on the day and year first above written.

Paradise Township
Lancaster County, Pennsylvania

Attest: _____ By:_____
(Assistant) Secretary (Vice) Chairman
Township Board of Supervisors

[Paradise Township SEAL]

(Individual or Husband and Wife Developer)

Witness:

_____ _____(SEAL)
(Signature of Individual)

_____ _____(SEAL)
(Signature of Spouse if Husband and Wife are Co-Developers)

IF APPLICABLE
Trading and Doing Business as
_____

(Partnership Developer*)

_____
(Name of Partnership)

Witness:

_____ By_____(Seal)
Partner

_____ By_____(Seal)
Partner

_____ By_____(Seal)
Partner

*All Partners must execute the Agreement.

(Corporation Developer)

_____
(Name of Corporation)

ATTEST:

By:_____ By:_____
(Assistant) Secretary (Vice) President

(CORPORATE SEAL)

(Limited Liability Company Landowner***)

_____
(Name of Limited Liability Company)

Witness:

_____ By_____(Seal)
Member

_____ By_____(Seal)
Member

_____ By_____(Seal)
Member

***All Members must sign.

ACKNOWLEDGMENT FOR PARADISE TOWNSHIP

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF _____)

On this, the _____ day of _____, A.D., 20___, before me, the undersigned officer, a Notary Public in and for the aforesaid Commonwealth and County, personally appeared _____, who acknowledged ___self to be (Vice) Chairman of the Board of Supervisors of Paradise Township, Lancaster County, Pennsylvania, and that he/she, as such officer, being authorized to do so, executed the foregoing Storm Water Management Agreement and Declaration of Easement, for the purposes therein contained, by signing the name of such Township by ___self as such officer.

IN WITNESS WHEREOF, I set my hand and official seal.

Notary Public: _____
My Commission expires:_____

ACKNOWLEDGMENT FOR INDIVIDUAL OR HUSBAND AND WIFE DEVELOPER

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF _____)

On this, the _____day of_____, 20___, before me, the undersigned officer, a Notary Public, in and for the aforesaid Commonwealth and County, personally appeared _____, known to me (or satisfactory proven) to be the person(s) whose name(s) is/are subscribed on the within instrument and acknowledged the foregoing Storm Water Management Agreement and Declaration of Easement to be _____ act and deed and desired the same to be recorded as such.

IN WITNESS WHEREOF, I set my hand and official seal.

Notary Public: _____
My Commission expires:_____

ACKNOWLEDGMENT FOR CORPORATE DEVELOPER

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF _____)

On this, the _____day of_____, 20____, before me, a Notary Public, personally appeared, the undersigned officer,_____who acknowledged ___self to be the _____ of _____, a corporation, and that such officer being authorized to do so, acknowledged the foregoing instrument for the purpose therein contained, by signing the name of the corporation by ___self as _____.

IN WITNESS WHEREOF, I set my hand and official seal.

Notary Public: _____
My Commission expires:_____

ACKNOWLEDGMENT FOR PARTNERSHIP DEVELOPER

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF _____)

On this, the _____day of_____, 20_____, before me, a Notary Public, the undersigned officer, personally appeared _____ who acknowledged themselves to be all of the partners of _____, a _____ partnership, and that they, as such partners, being authorized to do so, executed the foregoing instrument for the purposes therein contained, by signing the name of the partnership by themselves as such partners.

IN WITNESS WHEREOF, I set my hand and official seal.

Notary Public: _____
My Commission expires:_____

ACKNOWLEDGMENT FOR LIMITED LIABILITY COMPANY LANDOWNER

COMMONWEALTH OF PENNSYLVANIA)
) SS:
COUNTY OF _____)

On this, the _____day of_____, 20____, before me, the undersigned officer, personally appeared _____ who acknowledged themselves to be all of the members of _____, a _____ limited liability company, and that they, as such members, being authorized to do so, executed the foregoing instrument for the purposes therein contained, by signing the name of said limited liability company by themselves as such members.

IN WITNESS WHEREOF, I set my hand and official seal.

Notary Public: _____
My Commission expires:_____

JOINDER BY MORTGAGEE

_____("Mortgagee"), as holder of a certain mortgage on the premises of within Paradise Township, Lancaster County, Pennsylvania, described in the Deed in recorded in/at_____ in the Office of the Recorder of Deeds in and for Lancaster County, Pennsylvania, which mortgage, in the amount of _____ dollars ($_____) and dated_____ and is recorded or is about to be recorded in the Recorder of Deeds Office in and for Lancaster County, Pennsylvania, as well as any other mortgages which Mortgagee may now or hereafter hold on the Premises (all such mortgages hereinafter collectively referred to as the "Mortgages"), joins in, consents to, and expressly approves the grant of easements and other rights and privileges described in the attached Storm Water Management Agreement and Declaration of Easement (the "Agreement").

The Mortgagee, for itself, its successors and assigns (which shall include any assignee of the Mortgages and any purchaser of the Premises at a sale in foreclosure of the Mortgages or otherwise), hereby covenants and agrees that the rights and privileges herein granted with respect to the Premises shall not be terminated or disturbed by reason of any foreclosure or other action which may be instituted by the Mortgagee, its successors and assigns, as a result of any default under the Mortgages or the debt instruments that such Mortgages secure. Mortgagee by consenting to the Agreement shall not by virtue of its interest as Mortgagee be deemed to have undertaken any of the obligations of the Grantor under the Agreement, including, but not limited to, construction, maintenance, inspection or indemnification.

IN WITNESS WHEREOF, Mortgagee hereby joins in the execution of the Agreement as of this _____ day of _____, 20___

_____

(Name of Mortgagee)

ATTEST: _____ By:

[SEAL]

ACKNOWLEDGMENT FOR MORTGAGEE

COMMONWEALTH OF PENNSYLVANIA)

) SS:

COUNTY OF _____)

On this, the _____day of_____, 20____, before me, a Notary Public, the undersigned officer, personally appeared, _____ who acknowledged ___self to be the _____ of _____, a corporation, and that such officer being authorized to do so, acknowledged the foregoing instrument for the purpose therein contained, by signing the name of the Bank by ___self as _____.

IN WITNESS WHEREOF, I set my hand and official seal.

Notary Public: _____

My Commission expires:_____

LOW IMPACT DEVELOPMENT PRACTICES

LOW IMPACT DEVELOPMENT PRACTICES
ALTERNATIVE APPROACHES FOR MANAGING STORM WATER RUNOFF

Natural hydrologic conditions may be altered radically by poorly planned development practices, such as introducing unneeded impervious surfaces, destroying existing drainage swales, constructing unnecessary storm sewers, and changing local topography. A traditional drainage approach of development has been to remove runoff from a site as quickly as possible and capture it in a detention basin. This approach leads ultimately to the degradation of water quality, as well as expenditure of additional resources for detaining and managing concentrated runoff at some downstream location.

The recommended alternative approach is to promote practices that will minimize post-development runoff rates and volumes, which will minimize needs for artificial conveyance and storage facilities. To simulate pre-development hydrologic conditions, forced infiltration is often necessary to offset the loss of infiltration by creation of impervious surfaces. The ability of the ground to infiltrate runoff depends upon the soil types and its conditions.

Preserving natural hydrologic conditions requires careful alternative site design considerations. Site design practices include preserving natural drainage features, minimizing impervious surface area, reducing the hydraulic connectivity of impervious surfaces, and protecting natural depression storage. A well-designed site will contain a mix of all those features. The following describes various techniques to achieve the alternative approaches:

- **Preserving Natural Drainage Features.** Protecting natural drainage features, particularly vegetated drainage swales and channels, is desirable because of their ability to infiltrate and attenuate flows and to filter pollutants. However, this objective is often not accomplished in land development. In fact, commonly held drainage philosophy encourages just the opposite pattern - streets and adjacent storm sewers typically are located in the natural headwater valleys and swales, thereby replacing natural drainage functions with a completely impervious system. As a result, runoff and pollutants generated from impervious surfaces flow directly into storm sewers with no opportunity for attenuation, infiltration, or filtration. Developments designed to fit site topography also minimize the amount of grading on site.
- **Protecting Natural Depression Storage Areas.** Depressional storage areas have no surface outlet, or drain very slowly following a storm event. They can be commonly seen as ponded areas in farm fields during the wet season or after large runoff events. Traditional development practices eliminate these depressions by filling or draining, thereby obliterating their ability to reduce surface runoff volumes and trap pollutants. The volume and release-rate characteristics of depressions should be protected in the design of the development site. The depressions can be protected by simply avoiding the depression or by incorporating its storage as additional capacity in required detention facilities.
- **Avoiding Introduction of Impervious Areas.** Careful site planning should consider reducing impervious coverage to the maximum extent possible. Building footprints, sidewalks, driveways, and other features producing impervious surfaces should be evaluated to minimize impacts on runoff.
- **Reducing the Hydraulic Connectivity of Impervious Surfaces.** Impervious surfaces are significantly less of a problem if they are not directly connected to an impervious conveyance system (such as storm sewer). Two (2) basic ways to reduce hydraulic connectivity are: routing of roof runoff over

lawns; and reducing the use of storm sewers. Site grading should promote increasing travel time of storm water runoff and should help reduce concentration of runoff to a single point in the development.

- **Routing Roof Runoff Over Lawns.** Roof runoff can be easily routed over lawns in most site designs. The practice discourages direct connections of downspouts to storm sewers or parking lots. The practice also discourages sloping driveways and parking lots to the street. The routing of roof drains and crowning the driveway to allow runoff to discharge to pervious areas is desirable as the pervious area essentially acts as a filter strip.
- **Reducing the Use of Storm Sewers.** By reducing the use of storm sewers for draining streets, parking lots, and backyards, the potential for accelerating runoff from the development can be greatly reduced. The practice requires greater use of swales and may not be practical for some development sites, especially if there are concerns for areas that do not drain in a "reasonable" time. The practice requires educating local citizens and public works officials, who expect runoff to disappear shortly after a rainfall event.
- **Reducing Street Widths.** Street widths can be reduced by either eliminating on-street parking or by reducing cartway widths. Municipal planners and traffic designers should encourage narrower neighborhood streets, which ultimately could lower maintenance and maintenance-related costs.
- **Using Permeable Paving Materials.** These materials include permeable interlocking concrete paving blocks or porous bituminous concrete. Such materials should be considered as alternatives to conventional pavement surfaces, especially for low use surfaces such as driveways, overflow parking lots, and emergency access roads.
- **Reducing Building Setbacks.** Reducing building setbacks reduces driveway and entry walks and is most readily accomplished along low-traffic streets where traffic noise is not a problem.
- **Constructing Cluster Developments.** Cluster developments can also reduce the amount of impervious area for a given number of lots. The biggest savings is in street length, which also will reduce costs of the development, Cluster development "clusters" the construction activity onto less-sensitive areas without substantially affecting the gross density of development.

In summary, careful consideration of the existing topography and implementation of a combination of the above mentioned techniques may avoid construction of costly storm water control measures. Other benefits include: reduced potential of downstream flooding, reduced water quality degradation of receiving streams and water bodies, enhancement of aesthetics, and reduction of development costs. Beneficial results include: more stable base flows in receiving streams, improved groundwater recharge, reduced flood flows, reduced pollutant loads, and reduced costs for conveyance and storage.

STORM WATER MANAGEMENT DESIGN CRITERIA

RATIONAL METHOD RUNOFF COEFFICIENTS

Hydrologic Soil Group and Slope Range

	A			B			C			D		
Land Use	**0 to 2%**	**2 to 6%**	**6+%**	**0 to 2%**	**2 to 6%**	**6+%**	**0 to 2%**	**2 to 6%**	**6+%**	**0 to 2%**	**2 to 6%**	**6+%**
Cultivated Land	0.08[a] 0.14[b]	0.13 0.18	0.16 0.22	0.11 0.16	0.15 0.21	0.21 0.28	0.14 0.20	0.19 0.25	0.26 0.34	0.18 0.24	0.23 0.29	0.31 0.41
Pasture	0.12 0.15	0.20 0.25	0.30 0.37	0.18 0.23	0.28 0.34	0.37 0.45	0.24 0.30	0.34 0.42	0.44 0.52	0.30 0.37	0.40 0.50	0.50 0.62
Meadow	0.10 0.14	0.16 0.22	0.25 0.30	0.14 0.20	0.22 0.28	0.30 0.37	0.20 0.26	0.28 0.35	0.36 0.44	0.24 0.30	0.30 0.40	0.40 0.50
Forest	0.05 0.08	0.08 0.11	0.11 0.14	0.08 0.10	0.11 0.14	0.14 0.18	0.10 0.12	0.13 0.16	0.16 0.20	0.12 0.15	0.16 0.20	0.20 0.25
Residential 1/8 acre	0.25 0.33	0.28 0.37	0.31 0.40	0.27 0.35	0.30 0.39	0.35 0.44	0.30 0.38	0.33 0.42	0.38 0.49	0.33 0.41	0.36 0.45	0.42 0.54
Residential 1/4 acre	0.22 0.30	0.26 0.34	0.29 0.37	0.24 0.33	0.29 0.37	0.33 0.42	0.27 0.36	0.31 0.40	0.36 0.47	0.30 0.38	0.34 0.42	0.40 0.52
Residential 1/3 acre	0.19 0.28	0.23 0.32	0.26 0.35	0.22 0.30	0.26 0.35	0.30 0.39	0.25 0.33	0.29 0.38	0.34 0.45	0.28 0.36	0.32 0.40	0.39 0.50
Residential 1/2 acre	0.16 0.25	0.20 0.29	0.24 0.32	0.19 0.28	0.23 0.32	0.28 0.36	0.22 0.31	0.27 0.35	0.32 0.42	0.26 0.34	0.30 0.38	0.37 0.48
Residential 1 acre	0.14 0.22	0.19 0.26	0.22 0.29	0.17 0.24	0.21 0.28	0.26 0.34	0.20 0.28	0.25 0.32	0.31 0.40	0.24 0.31	0.29 0.35	0.35 0.46
Industrial	0.67 0.85	0.68 0.85	0.68 0.86	0.68 0.85	0.68 0.86	0.69 0.86	0.68 0.86	0.69 0.86	0.69 0.87	0.69 0.86	0.69 0.86	0.70 0.88
Commercial	0.71 0.88	0.71 0.88	0.72 0.89	0.71 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.89	0.72 0.90	0.72 0.89	0.72 0.89	0.72 0.90
Streets	0.70 0.76	0.71 0.77	0.72 0.79	0.71 0.80	0.72 0.82	0.74 0.84	0.72 0.84	0.73 0.85	0.76 0.89	0.73 0.89	0.75 0.91	0.78 0.95
Open Space	0.05 0.11	0.10 0.16	0.14 0.20	0.08 0.14	0.13 0.19	0.19 0.26	0.12 0.18	0.17 0.23	0.24 0.32	0.16 0.22	0.21 0.27	0.28 0.39
Parking	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97	0.85 0.95	0.86 0.96	0.87 0.97

NOTES:

[a]Runoff coefficients for storm recurrence intervals less than twenty five (25) years.

[b]Runoff coefficients for storm recurrence intervals of twenty five (25) years or more.

Source: Rawls, W.J., S.L. Long, and R.H. McCuen, 1981. Comparison of Urban Flood Frequency Procedures Preliminary Draft Report prepared for the Soil Conservation Service, Beltsville, Maryland

RUNOFF CURVE NUMBERS (FROM NRCS (SCS) TR-55)

Runoff Curve Numbers for Urban Areas					
Cover Description		**Curve Numbers for Hydrologic Soil Groups**			
Cover Type and Hydrologic Condition	***Average Percent Impervious Area***	***A***	***B***	***C***	***D***
Fully Developed Urban Areas (Vegetation Established)					
Open Space (lawns, parks, golf courses, etc.):					
Poor Condition (grass cover < 50%)		68	79	86	89
Fair Condition (grass cover 50% to 75%)		49	69	79	84
Good Condition (grass cover > 75%)		39	61	74	80
Impervious Areas:					
Paved Parking Lots, Roofs, Driveways, etc.		98	98	98	98
Streets and Roads:					
Paved: Curbed and Storm Sewers		98	98	98	98
Paved: Open Ditches		83	89	92	93
Gravel		76	85	89	91
Dirt		72	82	87	89
Urban Districts:					
Commercial and Business	85%	89	92	94	95
Industrial	72%	81	88	91	93
Residential Districts by Average Lot Size:					
1/8 Acres or less	65%	77	85	90	92
1/4 Acre	38%	61	75	83	87
1/3 Acre	30%	57	72	81	86
1/2 Acre	25%	54	70	80	85
1 Acre	20%	51	68	79	84
2 Acres	12%	46	65	77	82

Runoff Curve Numbers for Cultivated Agricultural Lands

Cover Description			Curve Numbers for Hydrologic Soil Groups			
Cover Type	***Treatment***	***Hydrologic Condition***	***A***	***B***	***C***	***D***
Fallow	Bare Soil	--	*77*	*86*	*91*	*94*
	Crop Residue Cover (CR)	Poor	*76*	*85*	*90*	*93*
		Good	*74*	*83*	*88*	*90*
Row Crops	Straight Row (SR)	Poor	*72*	*81*	*88*	*91*
		Good	*67*	*78*	*85*	*89*
	SR + CR	Poor	*71*	*80*	*87*	*90*
		Good	*64*	*75*	*82*	*85*
	Contoured (C)	Poor	*70*	*79*	*84*	*88*
		Good	*65*	*75*	*82*	*86*
	C + CR	Poor	*69*	*78*	*83*	*87*
		Good	*64*	*74*	*81*	*85*
	Contoured & Terraced (C & T)	Poor	*66*	*74*	*80*	*82*
		Good	*62*	*71*	*78*	*81*
	C & T CR	Poor	*65*	*73*	*79*	*81*
		Good	*61*	*70*	*77*	*80*
Small Grain	SR	Poor	*65*	*76*	*84*	*88*
		Good	*63*	*75*	*83*	*87*
	SR + CR	Poor	*64*	*75*	*83*	*86*
		Good	*60*	*72*	*80*	*84*
	C	Poor	*63*	*74*	*82*	*85*
		Good	*61*	*73*	*81*	*84*
	C + CR	Poor	*62*	*73*	*81*	*84*
		Good	*60*	*72*	*80*	*83*
	C & T	Poor	*61*	*72*	*79*	*82*
		Good	*59*	*70*	*78*	*81*
	C & T + CR	Poor	*60*	*71*	*78*	*81*
		Good	58	69	77	*80*
Close Seeded or Broadcast Legumes Or Rotation Meadow	SR	Poor	*66*	*77*	*85*	*89*
		Good	*58*	*72*	*81*	*85*
	C	Poor	*64*	*75*	*83*	*85*
		Good	*55*	*69*	*78*	*83*
	C & T	Poor	*63*	*73*	*80*	*83*
		Good	*51*	*67*	*76*	*80*

Runoff Curve Numbers for Other Agricultural Lands					
Cover Description		***Curve Numbers for Hydrologic Soil Groups***			
Cover Type	***Hydrologic Condition***	***A***	***B***	***C***	***D***
Pasture, Grassland, or Range – Continuous Forage for Grazing	Poor	*77*	*86*	*91*	*94*
	Fair	*76*	*85*	*90*	*93*
	Good	*74*	*83*	*88*	*90*
Meadow – Continuous Grass, Protected from Grazing and Generally Mowed for Hay	--	*30*	*58*	*71*	*78*
Brush – Brush, Weed, Grass Mixture with brush the major element	Poor	*48*	*67*	*77*	*83*
	Fair	*35*	*56*	*70*	*77*
	Good	*30*	*48*	*65*	*73*
Woods – Grass Combination (orchard or tree farm)	Poor	*57*	*73*	*82*	*86*
	Fair	*43*	*65*	*76*	*82*
	Good	*32*	*58*	*72*	*79*
Woods	Poor	*45*	*66*	*77*	*83*
	Fair	*36*	*60*	*73*	*79*
	Good	*30*	*55*	*70*	*77*
Farmsteads – Buildings, Lanes, Driveways and Surrounding Lots.	--	*59*	*74*	*82*	*86*

MANNING'S EQUATION "n" ROUGHNESS COEFFICIENTS

Description	Manning's "n"[1]
Smooth-Wall Plastic Pipe	0.011
Concrete Pipe	0.012
Smooth-Lined Corrugated Metal Pipe	0.012
Corrugated Plastic Pipe	0.024
Annular Corrugated Steel And Aluminum Alloy Pipe (Plain or Polymer Coated)	
68 mm x 13 mm (2 2/3 in x 1/2 in) Corrugations	0.024
75 mm x 25 mm (3 in x 1 in) Corrugations	0.027
125 mm x 25 mm (5 in x 1 in) Corrugations	0.025
150 mm x 50 mm (6 in x 2 in) Corrugations	0.033
Helically Corrugated Steel And Aluminum Alloy Pipe (Plain or Polymer Coated)	
75 mm x 25 mm (3 in x 1 in), 125 mm x 25 mm (5 in x 1 in), or 150 mm x 50 mm (6 in x 2 in) Corrugations	0.024
Helically Corrugated Steel And Aluminum Alloy Pipe (Plain or Polymer Coated)	
68 mm x 13 mm (2 2/3 in x 1/2 in) Corrugations	
a. Lower Coefficients*	
450 mm (18 in) Diameter	0.014
600 mm (24 in) Diameter	0.016
900 mm (36 in) Diameter	0.019
1200 mm (48 in) Diameter	0.020
1500 mm (60 in) Diameter or larger	0.021
b. Higher Coefficients**	0.024
Annular or Helically Corrugated Steel or Aluminum Alloy Pipe Arches or Other Non- Circular Metal Conduit (Plain or Polymer Coated)	0.024
Vitrified Clay Pipe	0.012
Ductile Iron Pipe	0.013
Asphalt Pavement	0.015
Concrete Pavement	0.014
Grass Medians	0.050
Grass - Residential	0.030
Earth	0.020
Gravel	0.030
Rock	0.035
Cultivated Areas	0.030 - 0.050
Dense Brush	0.070 - 0.140
Heavy Timber (Little undergrowth)	0.100 - 0.150
Heavy Timber (with underbrush)	0.40
Streams:	
Some Grass And Weeds (Little or no brush)	0.030 - 0.035
Dense Growth of Weeds	0.035 - 0.050
Some Weeds (Heavy brush on banks)	0.050 - 0.070

Notes:

* Use the lower coefficient if any one (1) of the following conditions apply:

A. A storm pipe longer than twenty (20) diameters, which directly or indirectly connects to an inlet or manhole, located in swales adjacent to shoulders in cut areas, shoulders in cut areas or depressed medians.

B. A storm pipe which is specially designed to perform under pressure.

** Use the higher coefficient if any one (1) of the following conditions apply:

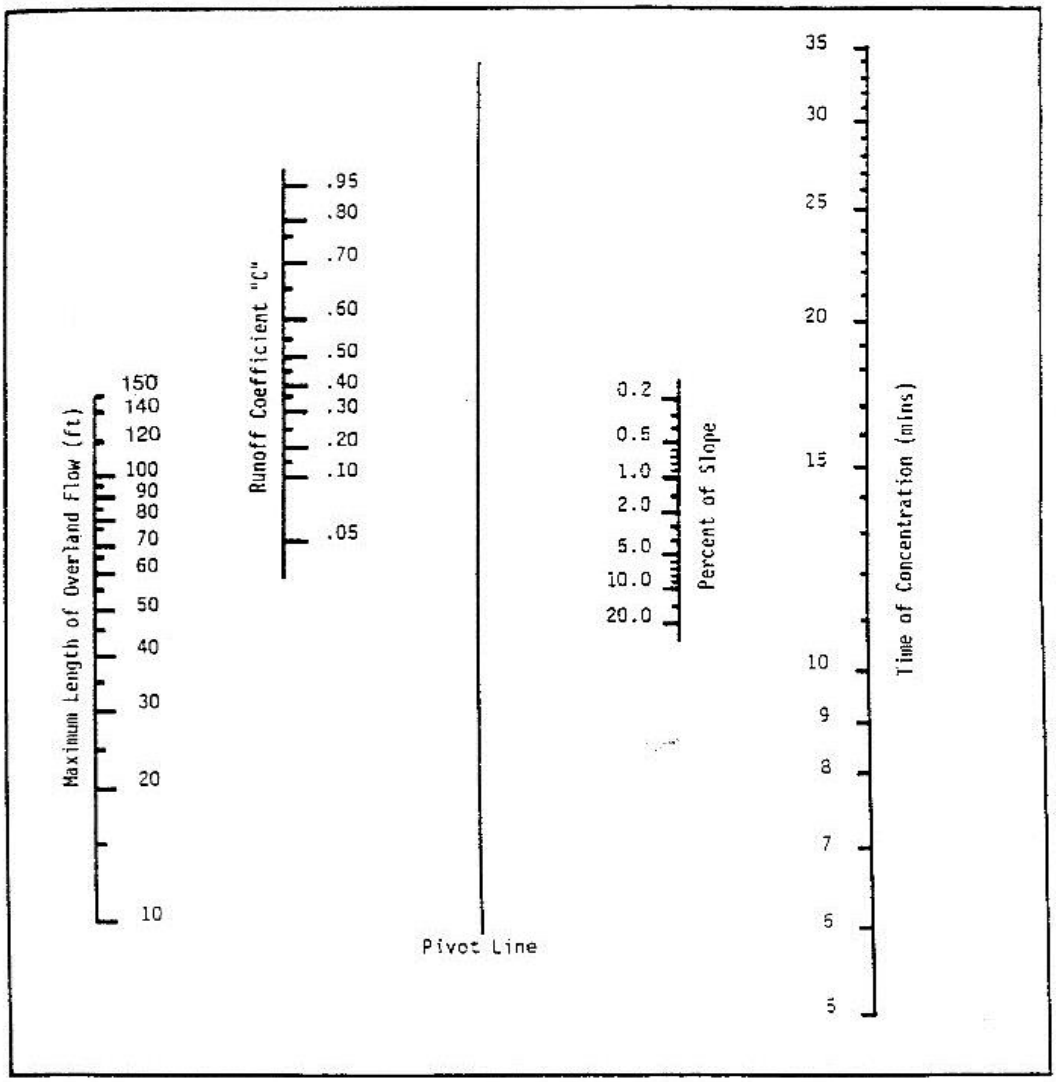
A. A storm pipe which directly or indirectly connects to an inlet or manhole located in highway pavement sections or adjacent to curb or concrete median barrier.

B. A storm pipe which is shorter than twenty (20) diameters long.

C. A storm pipe which is partly lined helically corrugated metal pipe.

NOMOGRAPH FOR DETERMINING SHEET FLOW

(for use with the Rational Method)



Worksheet #1: Time of concentration (T_C) or travel time (T_t)

Project _____ By _____ Date _____

Location _____ Checked _____ Date _____

Circle one: Present Developed _____

Circle one: T_c T_t through subarea _____

NOTES: Space for as many as two segments per flow type can be used for each worksheet.

Include a map, schematic, or description of flow segments.

Sheet flow (Applicable to T_c only)	**Segment ID**			
1. Surface description (table 3-1)				
2. Manning's roughness coeff., n (table 3-1)				
3. Flow length, L (total L ≤ **150 ft) ft				
4. Two-yr 24-hr rainfall, P_2 in				
5. Land slope, s ft/ft				
6. $T_t = \frac{0.007\,(nL)^{0.8}}{P_2^{0.5}\,s^{0.4}}$ Compute T_t hr		+		=
Shallow concentrated flow	**Segment ID**			
7. Surface description (paved or unpaved)				
8. Flow length, L ft				
9. Watercourse slope, s ft/ft				
10. Average velocity, V (figure 3-1) ft/s				
11. $T_t = \frac{L}{3600\,V}$ Compute T_t hr		+		=
Channel flow	**Segment ID**			
12. Cross sectional flow area, a ft^2				
13. Wetted perimeter, P_w ft				
14. Hydraulic radius, $r = \frac{a}{P_w}$ Compute r ft				
15. Channel slope, s ft/ft				
16. Manning's roughness coeff., n				
17. $V = \frac{1.49\,r^{\frac{2}{3}}\,s^{\frac{1}{2}}}{n}$ Compute V ft/s				
18. Flow length, L ft				
19. $T_t = \frac{L}{3600V}$ Compute T_t hr		+		=
20. Watershed or subarea T_c or T_t (add T_t in steps 6, 11, and 19) hr				

*Table 3-1 per latest TR-55, Urban Hydrology for Small Watershed

**150' sheet flow length per latest TR-55 revision

AVERAGE VELOCITIES FOR ESTIMATING TRAVEL TIME FOR SHALLOW CONCENTRATED FLOW

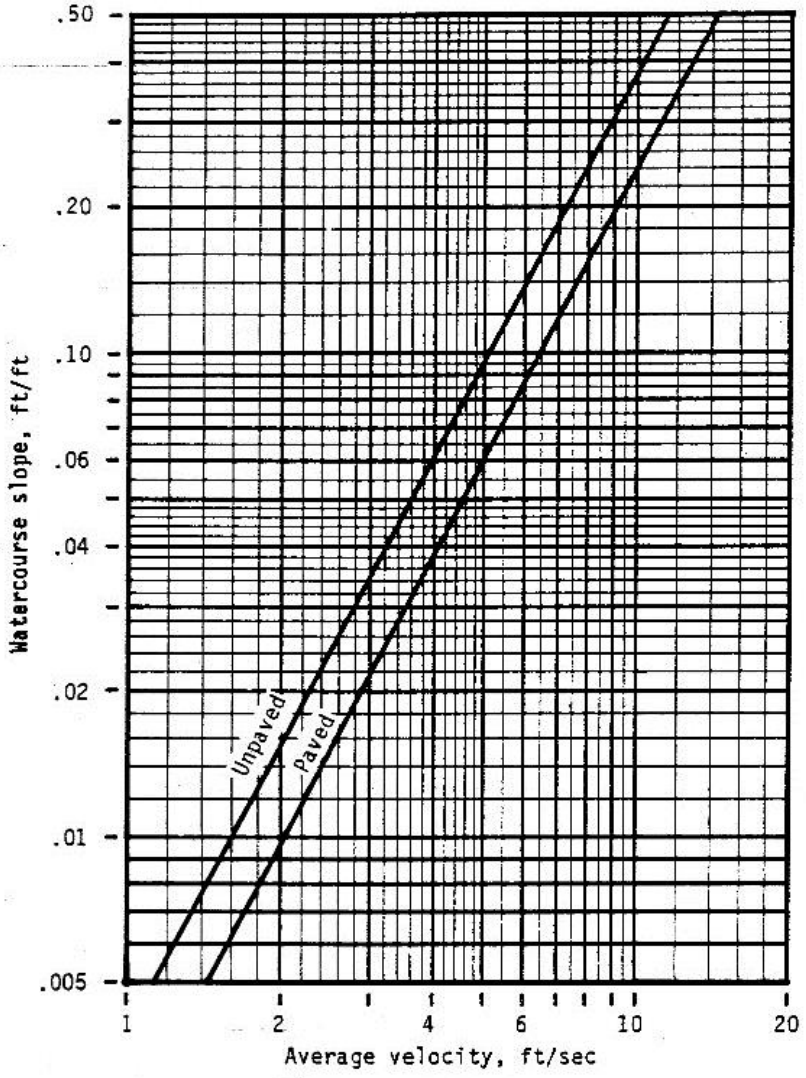


Figure 3-1.—Average velocities for estimating travel time for shallow concentrated flow.