

ORDINANCE NO. 2004-28
WATER RESOURCE MANAGEMENT

CHAPTER 1193 Resource Management Plans

CHAPTER 1195 Floodways and Floodplains (*Repealed*)

CHAPTER 1197 Stormwater Drainage Systems

CHAPTER 1199 Erosion Controls

CHAPTER 1201 Riparian and Wetland Buffers

CHAPTER 1203 Low Impact Development

DRAFT

**CHAPTER 1193
RESOURCE MANAGEMENT PLANS**

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1193.01 GENERAL

All Developments shall be constructed and maintained so that adjacent properties are not unreasonably burdened with surface waters as a result of such developments. More specifically:

- (a) No Development may be constructed or maintained so that such Development unreasonably impedes the natural flow of water from higher adjacent properties across such Development, thereby unreasonably causing substantial damage to such higher adjacent properties; and
- (b) No Development may be constructed or maintained so that surface waters from such Development are unreasonably collected and channeled onto lower adjacent properties at such locations or at such volumes as to cause substantial damage to such lower adjacent properties.
- (c) If there are any conflicts between provisions of Chapter 1193 and other sections of the Kent Codified Ordinances, then sections of 1193 shall control.

1193.02 DEFINITIONS

These definitions shall incorporate any additions or revisions contained in the current Ohio NPDES Statewide Construction ~~Storm Water~~ Stormwater General Permit.

NUMBERING REMOVED

Acre: A measurement of area equaling 43,560 square feet

As-Built Survey: A survey shown on a plan or drawing prepared by a Registered Professional Surveyor indicating the actual dimensions, elevations and locations of any structure, underground utilities, swales, detention facilities and sewage treatments facilities after construction has been completed.

Act: The Clean Water Act (formerly referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Act Amendments of 1972) Pub. L. 92-500, as amended Pub. L. 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117 and Pub. L. 100-4, 33 U.S.C. 1251 et. Seq.

Best Management Practices (BMPs) Also Stormwater Control Measures (SCMs): The schedules of activities, prohibitions of practices, operation and maintenance procedures, treatment requirements and other management practices (both structural and non-structural) to prevent or reduce the pollution of ~~Surface Waters~~ water resources of the State and to control stormwater volume and rate. ~~BMPs-SCMs also include treatment requirements, operating procedures and practices to control plant and/or construction site runoff, spillage or leaks, sludge or waste disposal or drainage from raw material from raw material storage.~~

Clean Water Act: Pub. 92-500, as amended Pub. L 95-217, Pub. L. 95-576, Pub. L. 96-483, Pub. L. 97-117, and Pub. L. 100-4, 33 U.S.C 1251 et. seq. Referred to as the Federal Water Pollution Control Act or Federal Water Pollution Control Acts Amendments of 1972.

Community: The City of Kent, its designated representatives, boards or commissions.

Commencement of Construction: The initial Disturbance of soils associated with clearing, grubbing, grading, and placement of fill or excavating activities or other construction activities.

Comprehensive Stormwater Management Plan: The written document and plans meeting the requirements for this regulation that sets forth the plans and practices to minimize stormwater runoff from a development area, to safely convey or temporarily store and release post-development runoff at an allowable rate or minimize flooding and stream bank erosion and to protect or improve stormwater quality and stream channels.

Concentrated Stormwater Stormwater Runoff: Any Stormwater Stormwater runoff which flows through a drainage pipe, ditch, diversion or other discrete conveyance channel.

Critical Storm: A storm that is determined by calculating the percentage increase in volume of runoff by a proposed development area for the on (1) year 24 hour event. The critical storm is used to calculate the maximum allowable stormwater discharge rate from a developed site.

Development: The carrying out of building, engineering, mining or other operations in, on, over or under land, or the making of any material change in the use of any buildings or other land.

Development Area: A parcel of contiguous parcels owned by one person or persons, or operates as one development, unit and used or being developed for commercial, industrial, residential, institutional or other construction or alteration that changes runoff characteristics.

Development Drainage Area: A combination of each hydraulically unique watershed with individual outlet points on the development area.

Development Engineer: A licensed professional engineer designated by the Community Development Director to be responsible for performance of the engineering and inspection services as may be assigned by the Community Development Director.

Director: The director of the Community Development Department for the City of Kent, Ohio or his/her designee.

Discharge: The addition of any pollutant to the Surface Waters of the State from a Point Source.

Disturbance: Any clearing, grading, excavating, filling, or other alteration of land surface where natural or man-made cover is destroyed in a manner that exposes the underlying soils.

Disturbed Area: Any area of land subject to erosion due to the removal of vegetative cover and/or soil disturbing activities.

Drainage: The removal of excess surface water or groundwater from land by surface or subsurface drains.

Drainage Watershed: For purposes of the Ohio NPDES Statewide Construction Stormwater Stormwater General Permit the total contributing drainage area to a BMP SCM, i.e., the "watershed" directed to the practice. This would also include any off-site drainage.

Erosion: The process by which the land surface is worn away by the action of wind, water, ice, gravity or any combination of these forces.

Extended Detention Facility: A stormwater control measure that replaces and/or enhances traditional detention facilities by releasing the runoff collected during the stormwater quality event over 24 to 48 hours, retarding flow and allowing pollutants to settle within the facility.

Final Stabilization: means that either:

All soil disturbing activities at the site are complete and a uniform perennial vegetative cover (e.g. evenly distributed, without large bare areas) with a density of at least 80 percent cover for the area has been established on all unpaved areas and areas not covered by permanent structures or equivalent stabilization measures (such as the use of landscape mulches, rip-rap, gabions, or geotextiles) have been employed. In addition, all temporary erosion and sediment control practices are removed and disposed of and all trapped sediment is permanently stabilized to prevent further erosion; or

For individual lots in residential construction by either:

The homebuilder completing Final Stabilization as specified above or

The homebuilder establishing Temporary Stabilization including perimeter controls for an individual lot prior to occupation of the home by the homeowner and informing the homeowner of the need for and benefits of, Final Stabilization. (Homeowners typically have an incentive to put in the landscaping functionally equivalent to Final Stabilization as quick as possible to keep mud out of their homes and off sidewalks and driveways); or

For construction projects on land used for agricultural purposes (e.g. pipelines across crop or range land), Final Stabilization may be accomplished by returning the disturbed land to its pre-construction agricultural use. Areas disturbed that were previously used for agricultural activities, such as buffer strips immediately adjacent to Surface Waters of the State and which are not being returned to their pre-construction agricultural use, must meet the Final Stabilization criteria in (1) or (2) above.

Grading: The process in which the topography of the land is altered to a new slope.

Green Infrastructure: Wet weather management approaches and technologies that utilize, enhance or mimic the natural hydrologic cycle processes of infiltration, evapotranspiration and reuse.

Hydrologic Unit Code: A cataloging system developed by the United States Geological Survey and the Natural Resource Conservation Service to identify watersheds in the United States.

Impervious Cover: Any surface that cannot effectively absorb or infiltrate water. That may include roads, streets, parking lots, rooftops, sidewalks and other areas not covered by vegetation.

Individual Lot NOI: A Notice of Intent for an individual lot to be covered by this permit (see parts I and II of this permit).

Infiltration Control Measure: A stormwater control measure that does not discharge to a water resource during the stormwater quality event, requiring collected runoff to either infiltrate in to the groundwater and/or be consumed by evapotranspiration, thereby retaining stormwater pollutants in the facility.

Larger Common Plan of Development or Sale: A contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under one plan.

Low Impact Development (LID): A site design approach which seeks to integrate hydrologically functional design with pollution prevention measures to compensate for land development impacts on hydrology and water quality. LID's goal is to mimic natural hydrology and processes by using small scale decentralized practices that infiltrate, evaporate, detain, and transpire stormwater. LID stormwater control measures (SCM's) are uniformly and strategically located throughout the site.

Maximum Extent Practicable: The level of pollutant reduction that operators of small municipal separate storm sewer systems regulated under 40 C.F.R. Parts 9, 122, 123, and 124 referred to as the NPDES Stormwater Phase II, must meet.

MS4: Municipal separate storm sewer system which means a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels or storm drains) that are:

Owned or operated by the federal government, state, municipality, township, county, district(s), or other public body (created by or pursuant to state or federal law) including special district under state law such as a sewer district, flood control district or drainage districts or similar entity or a designated and approved management agency under Section 208 of the act that discharges into Surface Waters of the State; and

Designed or used for collecting or conveying solely ~~Storm Water~~, Stormwater

Which is not a combined sewer and

Which is not a part of a publicly owned treatment works.

National Pollutant Discharge Elimination System (NPDES): ~~The national program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits and enforcing pretreatment requirements, under Sections 307, 402, 318, and 405 of the CWA. The term includes an "approved program".~~ A regulatory program in the Federal Clean Water Act that prohibits the discharge of pollutants into surface waters of the United States without a permit.

NOI: Notice of Intent to be covered by this permit.

Non-Structural Stormwater Control Measure (SCMs): Any technique that uses natural processes and features to prevent or reduce the discharge or pollutant to water resources and controls stormwater volume and rate.

NOT: Notice of Termination.

Operator(s): Any party associated with a construction project that meets either of the following two criteria:

The party has operational control over construction plans and specifications, including the ability to make modifications to those plans and specifications; or

The party has day-to-day operational control of those activities at a project which are necessary to ensure compliance with an SWP3 for the site or other permit conditions (e.g., they are authorized to direct workers at a site to carry out activities required by the SWP or comply with other permit conditions).

There can be more than one Operator(s) at a site and under these circumstances, the Operator(s) shall be co-permittees.

Ordinary High Water Mark: That line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

Owner(s): The Owner of any "facility or activity" subject to regulation under the NPDES program.

Permanent Stabilization: The establishment of permanent vegetation, decorative landscape mulching, matting, sod, rip-rap and landscaping techniques to provide permanent erosion control on areas where construction operations are complete or where no further Disturbance is expected for at least one year.

Percent imperviousness: The impervious area created divided by the total area of the project site.

Point Source: Any discernable, confined and discrete conveyance, including but not limited to, any pipe ditch, channel, tunnel, conduit, well, discrete fissure, container, rolling rock, concentrated animal feeding operation, landfill leachate collection system, vessel or the floating craft from which pollutants are or may be discharged. This term does not include return flows from irrigated agriculture or agricultural ~~Storm Water~~ Stormwater runoff.

Post-Development: The condition that exists following the completion of soil disturbing activity in terms of topography, vegetation, land use and the rate, volume, quality or direction of stormwater runoff.

Pre-Construction Meeting: Meeting prior to construction between all parties associated with the construction of the project including government agencies, contractors and owners to review agency requirements and plans as submitted and approved.

Pre-Development: The condition that exists prior to the initiation of soil disturbing activity in terms of topography, vegetation, land use and the rate, volume, quality or direction of stormwater runoff.

Professional Engineer: A Professional Engineer registered in the State of Ohio with specific education and experience in water resources engineering, acting in conformance with the Code of Ethics of the Ohio state Board of Registration for Engineers and Surveyors.

Redevelopment: A construction project on land that has been previously developed and where the new land use will not increase the runoff coefficient used to calculate the water quality volume. If the new land use will increase the runoff coefficient, then the project is considered to be a new development project rather than a redevelopment project.

Qualified Inspection Personnel: A person knowledgeable in the principles and practice of erosion and sediment controls, who possesses the skills to assess all conditions at the construction site that could impact Stormwater quality and to assess the effectiveness of any sediment and erosion control measures selected to control the quality of Stormwater Discharges from the construction activity.

Rainwater and Land Development: A manual describing construction and post-construction Best Management Practices Stormwater Control Measures (SCMs) and associated specifications. A copy of the manual may be obtained by contacting the Ohio Department of Natural Resources, Division of Soil & Water Conservation.

Riparian Area: ~~The transition area between flowing water and terrestrial (land) ecosystems composed of trees, shrubs and surrounding vegetation which serve to stabilize erodible soil, improve both surface and ground water quality, increase stream shading and enhance wildlife habitat.~~ Land adjacent to any brook, creek or stream having a defined bed and bank that, if appropriately sized, helps to stabilize streambanks, limit erosion, reduce flood size flows, and/or filter and settle out runoff pollutants or perform other functions consistent with the purposes of this regulation.

Riparian and Wetland Setback: The real property adjacent to a water resource on which soil disturbing activities are limited, all as defined in Chapter 1201.

Runoff: The portion of rainfall, snow melt or irrigation water that flows across the ground surface and is eventually returned to water resources.

Runoff Coefficient: The fraction of total rainfall that will appear at the conveyance as runoff.

Sediment: The soils or other surface materials that can be transported or deposited by the action of wind, water, ice or gravity as a product of erosion.

Sedimentation: The deposition of sediment in water resources.

Sediment Settling Pond: A sediment trap, sediment basin or permanent basin that has been temporarily modified for sediment control, as described in the latest edition of *Rainwater and Land Development Manual*.

Site Owner/Operator: Any individual, corporation, firm, trust, commission, board, public or private partnership, joint venture, agency, unincorporated association, municipal corporation, county or state agency, the federal government, other legal entity or an agent thereof that is responsible for the overall construction site.

Soil Disturbing Activity: Clearing, grading, excavating, filling or other alteration of the earth's surface where natural or human-made ground covers are destroyed that may result in, or contribute to, increased stormwater quantity and/or decrease stormwater quality.

Special Flood Hazard Area (SFHA): The area that will be inundated by the flood event having a 1-percent chance of being equaled or exceeded in any given year.

Stabilization: The use of Best Management Practice or Stormwater Control Measures that reduce or prevent soil erosion by stormwater runoff, trench dewatering, wind, ice, gravity or a combination thereof.

State Isolated Wetland Permit Requirements: The requirements set forth in Section 6111.02 through 6111.029 of the ORC.

Stormwater: ~~Storm Water~~ Defined at 40 CFR 122.26(b)(13) as stormwater runoff, snow melt runoff and surface runoff and drainage.

Stormwater Control Measure (SCM): Also Best Management Practice (BMP): The schedules of activities, prohibitions of practices, operation and maintenance procedures, treatment requirements and water resources and to control stormwater volume and rate. This includes practices to control runoff, spillage or leaks, sludge or waste disposal or drainage from raw material storage.

Structural Stormwater Management Practice or Stormwater Control Measure (SCM) : Any constructed facility, structure or device that prevents or reduces the discharge of pollutants to water resources and controls stormwater volume and rate.

Surface Water of the State or Water Bodies: Also Water Resources. All streams, lakes, reservoirs, ponds, marshes, wetlands, or other waterways which are situated wholly or partially within the boundaries of the state, except those private waters which do not combine or affect a junction with natural surface or underground waters. Water defined as sewerage systems, treatment works or disposal systems in Section 6111.01 of the ORC are not included.

SWPPP or SWP3: ~~Storm Water~~ Stormwater Pollution Prevention Plan.

Temporary Stabilization: The establishment of temporary vegetation, mulching, geotextiles, sod, preservation of existing vegetation and other techniques capable of quickly establishing cover over disturbed areas to provide erosion control between construction operations.

Total Maximum Daily Load (TMDLs): The sum of the existing and/or projected point source, nonpoint source and background loads for a pollutant to a specified watershed, water body, or water body segment. A TMDL sets and allocates the maximum amount of a pollutant that may be introduced into the water and still ensure attainment and maintenance of water quality standards.

Water Quality Volume (WQv): The volume of ~~Storm Water~~ Stormwater runoff which must be captured and treated prior to discharge from the developed site after construction is complete. WQv is based on the expected runoff generated by the mean storm precipitation volume from post-construction site conditions at which rapidly diminishing returns in the number of runoff events captured begins to occur.

Water Resource: See Surface Water.

Water Resource Crossing: Any bridge, box, arch, culvert, truss or other type of structure intended to convey people, animals, vehicles or material from one side of a water course to another. This does not include private, non-commercial footbridges or pole mounted aerial electric or telecommunication lines, nor does it include below grade utilities.

Watershed: The total drainage area contributing stormwater runoff to a single point.

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 and similar areas (40 CCFR 232, as amended).

1193.03 DEVELOPMENT PERMIT REQUIRED

- (a) A Development Permit shall be obtained before construction or Development begins. Application for a Development Permit shall be made pursuant to Chapters 1105, 1181 and 1339. In addition, Development within a Special Flood Hazard Area as established in Section 1337 (Floodplain Damage Control) shall comply with Chapter 1337 and 1201.
- (b) Exemption from Filing a Development Permit. Any proposed action exempt from filing for a Development Permit as listed in Sections 907.04(b) and 1337.03(i) is also exempt from the standards of this article.

1193.04 ~~STORM WATER~~ COMPREHENSIVE STORMWATER MANAGEMENT PLANS

In order to control ~~Storm Water~~ Stormwater damage and sediment pollution of water resources, wetlands, Riparian Areas, other natural areas, and public and private lands, the developer shall be responsible for preparing a ~~Storm Water~~ Comprehensive Stormwater Management Plan including a ~~Storm Water~~ Stormwater Pollution Prevention Plan (SWP3). A Comprehensive Stormwater Management Plan must be developed and implemented for all commercial and industrial site development. The City of Kent may require a comprehensive stormwater management plan on sites disturbing less than one (1) acre. Such plans must contain a description of controls appropriate for each construction operation covered by these regulations, and how the quantity and quality of the stormwater will be managed after construction is completed for every discharge from the site and or into a water resource or small municipal separate storm sewer system (MS4). ~~and the~~ The Operator(s) must implement such controls in a timely manner. The plans and ~~Best Management Practices (BMPs)~~ Stormwater Control Measures (SCMs) used to satisfy the conditions of these regulations shall meet the standards and specifications in the current edition of the State of Ohio's Rainwater and Land Development manual and the current Ohio NPDES Statewide Construction ~~Storm Water~~ Stormwater General Permit. The plans must make use of practices which preserve the existing natural condition to the Maximum Extent Practicable (MEP).

- (a) **Small Development Sites:** Developments that have disturbed areas smaller than one (1) acre in total size may submit abbreviated ~~Storm Water~~ Stormwater Management plans for Site Plan review, Development Plan review, or the requested permit(s). The abbreviated plan must cover the following items, in addition to any other items from this ordinance that are required by the Director:
- (1) A description of the nature and type of the construction activity (e.g. low density residential, shopping mall, highway, etc.)
 - (2) A cover page or title identifying the name and location of the site, the name and contact information of all construction site Operator(s), the name and contact information of the person responsible for authorizing and amending the SWP3, preparation date, and the estimated dates that construction will start and be complete.
 - (3) ~~Storm Water~~ Stormwater Issues: A statement as to how the increased ~~Storm Water~~ Stormwater runoff and decreased ~~Storm Water~~ Stormwater quality that will be caused by the Development will be handled, and a statement of what ~~Best Management Practices (BMP)~~ Stormwater Control Measures (SCMs) the Development will include in order to address them. When a Development is proposed to demolish an older existing structure, the developer may request, in writing, that the Director exempt such Developments from the ~~Storm Water~~ Stormwater regulations of this chapter, if it can be demonstrated that controls are infeasible at the project location and create an undue burden without commensurate benefits to the receiving stream. Undue burden shall be calculated by the Development Engineer.
 - (4) Site specific topographic plans drawn to scale showing the nature, location or dimensions and elevations of the area in question;
 - (5) The location of existing or proposed structures, fill, storage of materials, and drainage.
 - (6) Elevation in relation to mean sea level of the lowest floor, including basement, of all proposed structures located in Special Flood Hazard Areas where base flood elevation data are utilized;
 - (7) Type, size, location, grade and elevations (including their proposed invert at the building wall) for all site drainage including, but not limited to curbs and gutters, curb inlets and curb cuts, drainage grates, catch basins, trenches, manholes, pipes, drainage ditches, roof drain connections to the storm sewer together with ~~Storm Water~~ Stormwater run-off calculations, pipe size calculations, pre- and post-Development runoff factors, and ~~Storm Water~~ Stormwater retention or detention (where required) calculations and provisions.
 - (8) Approximate direction and gradient of ground slope including any embankments or retaining walls and the delineation of existing drainage patterns, waterways, and Water Bodies (including intermittent and ephemeral streams, rivers and their related river or stream bank, ponds, drainage ditches, lakes, and swamps) located within 200 feet of the site, including:
 - (i) Boundaries and elevation of floodways and floodplains as delineated in the Flood Insurance Rate Map of the Flood Insurance Study by the Federal Emergency Management Agency, or

any other existing watercourses or Water Bodies that appear on 1:24,000 U.S.G.S. maps other sources of flood information in accordance with **Section 1337.01(f)**.

- (ii) Location of wetlands (a wetlands delineation conducted by a certified wetlands biologist or approval by the Army Corps of Engineers);
 - (iii) All riparian and wetland setback areas pursuant to Chapter 1201 (Riparian and Wetland Buffers).
- (9) All existing and planned, temporary and permanent, hydro-seeding, soil erosion and sediment control conservation practices for the site. Residential lots shall include ~~BMPs~~ **CMPs** designs which meet the standards and specifications of the State of Ohio's Rainwater and Land Development manual, including but not limited to:
- (i) Construction entrance, and;
 - (ii) Temporary grass seeding with 2 tons per acre of straw mulch, and;
 - (iii) Storm drain inlet protection around every storm yard inlet on the site, and;
 - (iv) Silt fence, filter sock or other protection for any stream located on or close to the site and lacking an adequate vegetative buffer, and
 - (v) Construction fence to protect any conservation easements from encroachment.
- (10) Certification by a registered professional engineer or architect that the flood proofing methods for any nonresidential structure meet the flood proofing criteria in **Section 1337.04(e) (Nonresidential Structures)** where base flood elevation data are utilized.
- (11) A long term Inspection and Maintenance Plan and Maintenance Agreement per Section 1199.03.
- (b) **Large Development Sites:** All Developments or Larger Common Plan of Development or Sale with disturbed areas equal to or larger than one (1) acre in size shall submit a ~~Storm Water~~ Stormwater Management Plan outlining the following controls to be established to prevent sediment pollution of the water resources, wetlands, riparian buffers, and public and private properties:
- (1) All elements required under **1193.04(a)** for abbreviated ~~Storm Water~~ Stormwater Management Plans;
 - (2) A general project description including the nature, type, and purpose of earth-disturbing activity and the ~~Storm Water~~ Stormwater Management strategy proposed to meet this ordinance, including: the implementation schedule describing the sequence of major construction operations (i.e. clearing, grubbing, excavating, grading, utilities, and infrastructure installation) plus the implementation of erosion, sediment and ~~Storm Water~~ Stormwater management practices or facilities to be employed during each operation of the sequence, location and design calculations for all permanent ~~Storm Water~~ Stormwater conveyance, detention and retention structures, and other ~~Storm Water~~ Stormwater control structures, and any other ~~Storm Water~~ Stormwater management-related items as may be required by the Director.
 - (3) A vicinity sketch locating the Development and all pertinent surrounding features within 1000 feet, including water resources, wetlands, riparian buffers, conservation easements, and other sensitive natural resources including **items (6-8)** under **1193.04(b)** of this Chapter.
 - (4) Topographic maps showing the area to be drained with calculations prepared by a registered professional engineer in determining the proposed ~~Storm Water~~ Stormwater collection system, including:
 - (i) Existing and proposed watershed boundary lines, direction of flow and watershed acreage.

- (ii) The name and/or location of the immediate receiving stream or surface water(s) and the first subsequent named receiving water and the extent and description of wetlands or other special aquatic sites at or near the site which will be disturbed or which will receive Discharges from disturbed areas of the project.
- (5) TMDLs applicable for the site; demonstrate that appropriate (SCMs) have been selected to address these TMDLs.
- (6) For each SCM, identify the drainage area, percent impervious cover within the drainage area, runoff coefficient for water quality volume, peak discharge, and the time of concentration for each subwatershed per Appendix 1 of Ohio's stormwater manual, Rainwater and Land Development. Pervious and impervious areas should be treated as separate subwatersheds unless allowed at the discretion of the community engineer. Identify the SCM surface area, discharge and dewatering time, outlet type and dimensions. Each SCM shall be designated with an individual identification number.
 - (i) The location of areas receiving runoff from the Development.
 - (ii) The limits of clearing operations and earth-disturbing activity and any new contour lines resulting from earth movement (shown as solid lines) with no larger than two-foot contour intervals (existing should be shown as dotted lines) including associated off-site borrow or spoil areas that are not addressed by a separate NOI and associated SWP3.
 - (iii) Existing and planned locations of buildings and areas with hard or impervious surfaces, as well as utilities that may affect soil erosion and sediment control.
 - (iv) The types of soils within, or affected by, the Development area, and the location of all highly erodible or unstable soils as determined by the most current edition of the soil survey of Portage County, by the NRCS – USDA or an onsite, detailed Soils Engineering Report if required by the Director.
 - (v) Settling ponds drawn to scale with basic dimensions and the calculations for size and volume.
 - (vi) Any other soil erosion and sediment control related BMPs SCMs and items that are required by the Director.
- (7) Investigation conducted to verify that the condition and capacity of any existing storm sewer to be utilized as a part of the Development or as a Discharge point for ~~Storm Water~~ Stormwater from the Development is adequate and that its use will not adversely affect other properties shall be supplemented with surveys, field reports and calculations signed and sealed by a professional engineer registered in the State of Ohio.
- (8) Description of the extent to which any watercourse will be altered or relocated as a result of proposed Development and certification by a registered professional engineer that the flood carrying capacity of the watercourse will not be diminished. A watercourse is also considered to be altered if any change occurs within its banks or within the floodway as designated in Section Section 1337.03(j). Where watercourses will be altered or relocated, copies of notices sent to adjacent communities and the Ohio Department of Natural Resources, Division of Water, and evidence of submission of such notification to the Federal Emergency Management Agency shall be included in the plan.
- (9) All necessary permits from those Federal, State or local governmental agencies from which prior approval is required. The applicant shall be responsible for obtaining such permits as required including permits issued by the Department of the Army under Section 10 of the Rivers and Harbors Act and Section 404 of the Clean Water Act.
- (10) The location, size, detailed drawings, maintenance requirements and design calculations of each BMP SCM as well as the scheduling, phasing, and coordination of construction operations and long-term maintenance requirements of erosion and sediment control BMPs SCMs during the

construction and post-construction phases of each Development, including vegetative plantings and mulch, including:

- (i) The printed name and contact point of the person or entity responsible for long-term continued maintenance of all vegetative and/or mechanical BMPs SCMs used.
 - (ii) The person or entity financially responsible for maintaining the permanent inspection and maintenance of permanent ~~Storm Water~~ Stormwater conveyance and storage structures and other conservation practices.
 - (iii) The method of ensuring that funding will be available to conduct the long-term maintenance and inspections of all permanent ~~Storm Water~~ Stormwater, soil erosion and sediment control and water quality practices.
 - (iv) A description shall be provided of the BMPs SCMs that will be installed to control construction pollutants in ~~Storm Water~~ Stormwater Discharges occurring after construction operations have been completed (post construction). Such BMPs-SCMs may include, among others, infiltration of runoff, flow reduction by use of open vegetated swales, diversions, permanent grass plantings, tree and shrub plantings, stream bank protection practices, grade stabilization structures, etc.
 - (v) The type and amount of plant seed, live plants, fertilizer, agricultural ground limestone and mulch to be used. (Soil testing for fertility and lime requirements is preferred. Only perennial grass seed will be used.)
 - (vi) A description of the water quality standards and projected treatment levels, if any, that will be addressed by the water quality BMPs SCMs being installed.
- (11) Location and description of any ~~Storm Water~~ Stormwater Discharges associated with dedicated asphalt and dedicated concrete plants covered by this permit and the ~~Best Management Practices~~ Stormwater Control Measures (SCMs) to address pollutants in these ~~Storm Water~~ Stormwater Discharges.
 - (12) A copy of the permit requirements of the current Ohio NPDES Statewide Construction ~~Storm Water~~ Stormwater General Permit.
 - (13) For subdivided Developments where the SWP3 does not call for a centralized sediment control measure capable of controlling multiple individual lots, a detailed drawing of a typical individual lot showing standard individual lot erosion and sediment control practices.
 - (14) The SWP3 shall identify all subcontractors engages in activities that would impact ~~Storm Water~~ Stormwater runoff. The SWP3 shall contain signatures from all the identified subcontractors indicating that they have been informed and understand their roles and responsibilities in complying with the SWP3.

1193.05 FOREST MANAGEMENT PLANS

- (a) Selective harvesting of timber may be allowed pursuant to **Section 1201.01** (Riparian and Wetland Buffers).
- (b) Such plans shall be prepared by a Certified Arborist and accepted by the Director.
- (c) The Forest Management Plan must specify:
 - (1) The Development site will be adequately stocked after the approved selective harvest;
 - (2) That trees located less than 25 feet from the Ordinary High Water Mark will not be impacted by the proposed harvesting;

- (3) The location of any skid and haul roads required for transporting harvested trees from riparian and wetland setbacks;
- (4) The method to be used to transport harvested trees from riparian and wetland setbacks;
- (5) The erosion control ~~Best Management Practices~~ Stormwater Control Measures (SCMs) that will be employed during and after the proposed harvest. These erosion control practices shall be in conformance with the Ohio Department of Natural Resources, Division of Forestry's BMPs SCMs for Erosion Control on Logging Jobs in Ohio; and
- (6) The US Army Corps of Engineers and the Ohio EPA Wetland and Stream protection permit numbers.

1193.07 COMPLIANCE WITH STATE AND FEDERAL REGULATIONS

Approvals issued in accordance with this regulation do not relieve the applicant of responsibility for obtaining all other necessary permits and/or approval from other federal, state, and/or county agencies. If requirements vary, the most restrictive shall prevail. The permits may include, but are not limited to, those listed below. Applicant are required to show proof of compliance with these regulation before the City of Kent will issue any permits.

- a) Ohio Environmental Protection Agency (Ohio EPA) National Pollutant Discharge Elimination System (NPDES) Permits authorizing stormwater discharges associated with construction activity or the most current version thereof: Proof of compliance with these requirements shall be the applicant's Notice of Intent (NOI) number from Ohio EPA, a copy of the Ohio EPA Director's Authorization Letter for the NPDES Permit, or a letter from the site owner certifying and explaining why the NPDES Permit is not applicable.
- b) Section 401 of the Clean Water Act: Proof of compliance shall be a copy of the Ohio EPA Water Quality Certification application tracking number, public notice, project approval, or a letter from the site owner certifying that a qualified professional has surveyed the site and determined that Section 401 of the Clean Water Act is not applicable. Wetlands, and other waters of the United States, shall be delineated by protocols accepted by the U.S. Army Corps of Engineers at the time of application of this regulation.
- c) Ohio EPA Isolated Wetland Permit: Proof of compliance shall be a copy of Ohio EPA's Isolated Wetland Permit application tracking number, public notice, project approval, or a letter from the site owner certifying that a qualified professional has surveyed the site and determined that Ohio EPA's Isolated Wetlands Permit is not applicable. Isolated wetlands shall be delineated by protocols accepted by the U.S. Army Corps of Engineers at the time of application of this regulation. May 2016 12
- d) Section 404 of the Clean Water Act: Proof of compliance shall be a copy of the U.S. Army Corps of Engineers Individual Permit application, public notice, or project approval, if an Individual Permit is required for the development project. If an Individual Permit is not required, the site owner shall submit proof of compliance with the U.S. Army Corps of Engineer's Nationwide Permit Program. This shall include one of the following:
 - (i) A letter from the site owner certifying that a qualified professional has surveyed the site and determined that Section 404 of the Clean Water Act is not applicable.
 - (ii) A site plan showing that any proposed fill of waters of the United States conforms to the general and special conditions specified in the applicable Nationwide Permit. Wetlands, and other waters of the United States, shall be delineated by protocols accepted by the U.S. Army Corps of Engineers at the time of application of this regulation
- e) Ohio Dam Safety Law: Proof of compliance shall be a copy of the ODNR Division of Soil and Water Resources permit application tracking number, a copy of the project approval letter from the ODNR Division of Soil and Water Resources, or a letter from the site owner certifying and explaining why the Ohio Dam Safety Law is not applicable

**CHAPTER 1195
FLOODWAYS AND FLOODPLAINS**

(Repealed by Ord. No. 2009-61. Passed 06-17-09)

DRAFT

CHAPTER 1197
STORM-WATER STORMWATER DRAINAGE SYSTEMS

- 1197.01 General Provisions
- 1197.02 Required Improvements
- 1197.03 Required Storm Sewer

1197.01 GENERAL PROVISIONS

- (a) To the maximum extent practicable, all Development shall conform to the natural contours of the land, and natural and preexisting man-made drainage ways shall remain undisturbed.
- (b) To the maximum extent practicable, lot boundaries shall be made to coincide with natural and preexisting man-made drainage ways within subdivisions to avoid the creation of lots that can be built upon only by altering such drainage ways.
- (c) For site ~~Storm-Water~~ Stormwater drainage systems, compacted earth, stone and gravel areas capable of supporting vehicles and or material handling equipment shall be considered impervious surfaces.
- (d) No surface water may be channeled or directed into a sanitary sewer.
- (e) Off-site improvements to the ~~Storm-Water~~ Stormwater collection system as may be required to accommodate the Development shall be constructed at the expense of the developer.
[HISTORY: former Section 1339.05(b)(3)]
- (f) Drainage Easements. Future access to runoff drainage ditches and channels, swales, runoff storage facilities, storm sewers and other drainage ways and structures, as may be required by the Director, shall be secured by means of easements.
 - (1) Such easements shall be not less than twenty-five (25) feet in width, in addition to the width of the ditch, channel, or other facility it is to serve. Further, an easement of this type shall be provided on at least one (1) side of the storm drainage ditch, channel, or similar-type facility.
 - (2) Access along the initial drainage system shall be by means of easements. Such easements shall be not less than twenty (20) feet in width, with a minimum ten (10) foot width on either side of the centerline.
 - (3) Access adjacent to storage facilities shall consist of a twenty-five (25) foot easement in the case of detention (dry) basins, and a twenty (20) foot easement with a twenty-five (25) foot level bench in the case of retention (wet) basins, measured from the top of the bank, and shall include the storage facility itself.
 - (4) Storm drainage easements containing underground facilities shall be an appropriate width to allow removal and replacement of the facility and shall have a minimum width of twenty (20) feet.
 - (5) Those lots crossed by an easement shall be restricted against the planting within said easement of trees, shrubbery or plantings with woody growth characteristics, and against the construction therein of buildings, accessory buildings, fences, walls or any other obstructions to the free flow of ~~Storm-Water~~ Stormwater and the movement of inspectors and maintenance equipment and also restricted against the changing of final grade from that described by the ~~Storm-Water~~ Stormwater management
- (g) Maintenance. Any portion of the ~~Storm-Water~~ v Stormwater management systems, including on-site and off-site storage facilities that are constructed by the developer, will be continuously maintained into perpetuity.
 - (1) Single-Family Residential Developments: A Homeowners' Association, created pursuant to Ohio Law, shall be created and placed in title of the affected lands and shall be continuously

responsible for post-construction maintenance and inspections into perpetuity unless such maintenance and inspections become officially accepted by the City.

- (2) Multifamily, Commercial and Industrial Developments: The plans will clearly state that the property Owner(s) shall be continuously responsible for post-construction maintenance and inspections into perpetuity.
- (h) Maintenance Design: Designs that facilitate minimal maintenance are a priority in the design and construction of all facilities. Multi-use facilities incorporating assets such as aesthetics and recreation may be incorporated into the design of the drainage facilities. All ~~Storm Water~~ Stormwater management systems and BMPs SCMs, including on-site and off-site structures and vegetation that are constructed or planted, must be inspected and maintained into perpetuity by the responsible party designated in the ~~Storm Water~~ Stormwater Management plan and by the requirements of this Chapter. ~~Inspections will be conducted by the City periodically throughout the year to ensure that the facilities are properly operational.~~
- (i) A written and stamped report from a registered professional engineer professional (engineer, architect, landscape architect, CPESC, etc.) on the status of all ~~Storm Water~~ Stormwater basins and surface drainage swales, and status of the related easements for each project, shall be submitted to the Community Development Department by May 1st into perpetuity with dry basins systems inspection reports being submitted every five years; and wet basins systems reports being submitted every two years unless directed otherwise by the Director or his designee.
- ~~(j) A written and stamped report from a professional engineer, landscape architect or Certified Professional Soil Erosion and Sediment Control Specialist (CPESC) on the status of installed Storm Water management systems and status of the related easements shall be submitted to the Community Development Department by May 1st of each year into perpetuity.~~
- (k) If there are any conflicts between provisions of Chapter 1197 and other sections of the Kent Codified Ordinances, then sections of 1197 shall control.

1197.02 REQUIRED IMPROVEMENTS

- (a) All Developments shall be provided with a drainage system that is adequate to prevent the undue retention of surface water on the Development site. Surface water shall not be regarded as unduly retained if:
 - (1) The retention results from a technique, practice or device deliberately installed as part of an approved ~~Storm Water~~ Stormwater Management Plan; or
 - (2) The retention is not substantially different in location or degree than that experienced by the Development site in its predevelopment stage, unless such retention presents a danger to health, safety, or welfare of the community.
- (b) Whenever practicable, the drainage system of a Development shall coordinate with and connect to the drainage systems or drainage ways on surrounding properties or streets.
- (c) Use of drainage swales rather than curb and gutter and storm sewers is provided for in **Section 1339.05 and Chapter 1203**. Private roads and access ways within unsubdivided Developments shall utilize curb and gutter and storm drains to provide adequate drainage if the grade of such roads or access ways is too steep to provide drainage in another manner or if other sufficient reasons exist to require such construction.
- (d) Sufficient investigation shall be conducted to verify that the condition and capacity of any existing storm sewer to be utilized as a part of the Development or as a Discharge point for ~~Storm Water~~ Stormwater from the Development is adequate and that its use will not adversely affect other properties. Such investigation shall be supplemented with surveys, field reports and calculations.
- (e) Roof drains shall be connected to the storm sewer system, drainage course, or other approved location (i.e. rain garden). Roof drains shall not be permitted to discharge upon walks or pavement areas or

through the street curb into the street gutter. If a hole in the street curb exists and no other storm system is available, this method may be maintained. Roof drains may discharge on grade if sufficient methods are used to diffuse the flow through a spreading device or infiltration.

- (f) Wherever possible and in all projects which encumber 40,000 square feet of ground surface area with building and/or impervious surfaces (pavements, walks, etc.), the ~~Storm Water~~ Stormwater design shall incorporate storm-water detention and/or retention designed and constructed in accordance with approved engineering practices.

1197.03 REQUIRED STORM SEWER

- (a) Drainage. A drainage system shall be designed and constructed by the developer to provide for the proper drainage of the surface water of the Development and the drainage area of which it is a part. To this end, the following requirements and methods shall be followed:

- (1) Drainage requirements (Grading). No final grading or sidewalk or pavement construction or installation of utilities shall be permitted in any proposed street until the final plat has been approved or conditionally approved. The developer shall grade each Development in order to establish street, block and lot grades in proper relation to each other and to topography, as follows:

- (i) Block and lot grading.

- a. Block grading shall follow the approved Development Grading Plan.
- b. Lot grading shall be as follows:
 1. Lots shall be graded so that water drains away from each building at a minimum grade of two percent.
 2. Surface drainage swales shall have a minimum grade of one-half percent and shall be designed so that surface water will drain into a driveway, street gutter, storm sewer, drain inlet or natural drainage way.
 3. The minimum grades of driveways shall be four-tenths percent and a maximum of fifteen percent.

- (2) Drainage system requirements. The design criteria for the drainage systems shall be based on the State of Ohio Department of Transportation, Manual of Location and Design. Runoff or design Discharge for sewer design where the contributing area generally consists of pavement and a narrow strip back of the pavement shall be obtained from the rational formula: $Q = CIA$. The following minimum design frequencies are to be used:

- (i)

Roadway ditches	2 years
Storm sewers	5 years or 10 years
Culvert under roadways	25 years
Watercourses	10 years

- (ii) Runoff Coefficients and rainfall frequencies based on general character of tributary area are set forth in the following table:

Runoff Coefficient	Frequency of Rainfall	Frequency of Retention	Retention Period
0.50	2 years	5 years	10 years
0.60	5 years	10 years	25 years
0.70	10 years	25 years	50 years

Use Category	Minimum Impervious Area (%)	Minimum Coefficient of Permeability	Minimum Infiltration Rate (in/hr)
Open Space-Conservation	5	0.25 - 0.40	0.30
Rural Residential	5	0.25 - 0.40	0.30
Low Density Urban Residential	5	0.30 - 0.50	0.40
Medium Density Urban Residential	5	0.30 - 0.50	0.50
High Density Urban Residential	5	0.30 - 0.50	0.50
Multifamily Urban Residential	5	0.40 - 0.60	0.60
High Density Multifamily Urban Residential	10	0.50 - 0.70	0.60
High Density Multifamily/Commercial Urban Res.	10	0.50 - 0.70	0.60
Local Commercial	10	0.50 - 0.70	0.50
Office and Limited Business	10	0.50 - 0.70	0.50
Community Commercial	10	0.70 - 0.90	0.80
Central Retail-Office	10	0.70 - 0.90	0.90
Intensive and Automotive Oriented Commercial	10	0.70 - 0.90	0.90
Highway Interchange Commercial	10	0.70 - 0.90	0.80
Industrial Research and Office	10	0.50 - 0.70	0.60
Industrial	10	0.40 - 0.90	0.60
Manufacturing, Storage and Disposal	10	0.40 - 0.90	0.60
Railroad Yard Areas	10	0.20 - 0.40	0.30

- (b) Post Development runoff shall not exceed pre-development runoff for the 2, 10, 25, and 100 year design storms.
- (c) Road Drainage System. The road storm drainage system shall serve as the prime drainage system. It shall be designed to carry roadway, adjacent land and house ~~Storm Water~~ Stormwater drainage.
- (1) Road storm sewers (enclosed). The design Discharged used to determine pavement inlet spacing shall be based on the rational method mentioned in this subsection (e)(2). The gutter flow between inlets shall be calculated by the equation: $Q = .56Z/N S^{1/2} F^{8/3}$. (See Manual of Location and Design.)
 - (2) The inlet spacing shall be based on a ten year frequency, fifteen minutes duration design storm. The spread of water on the pavement shall be limited to two feet into the traveled lane. In addition, standard manholes or combination manhole inlets for cleaning purposes shall be placed no further than 300 feet apart.
 - (3) Storm sewer laterals. A storm sewer lateral shall be provided for each lot to accommodate footer drains and downspouts. Storm laterals (same material specification as sanitary laterals) should be a minimum of 4" in diameter with an absolute minimum slope of 0.5% and 18" of cover.

- (d) Off-Road Drainage Systems. The design of the off-road drainage system shall include the watershed affecting the allotment and shall be extended to a watercourse or ditch adequate to receive the storm drainage.
- (1) All watercourses or ditches with a design capacity not exceeding the capacity of a thirty-six inch concrete pipe shall be enclosed. Existing creeks or ditches constructed by the developer which exceed the above limit shall be constructed with a minimum fifteen (15) foot wide continuous earth roadway to provide access for maintenance equipment to all sections of the ditch. The ditch easement may be wide enough to contain such ditch slopes and roadway with ample clearance for the operation of maintenance equipment. Open ditches will have a side slope ratio of 2:1 and a minimum two (2) foot bottom width.
 - (2) No open ditch shall be constructed within 100 feet of the rear building line of a house, as measured from the house to the edge of the ditch easement.
 - (3) Any storm drainage courses carried along side lot lines shall be enclosed with approved pipe.
 - (4) Easements for drainage purposes shall be a minimum of twenty feet in width. Where the watercourse is large, easement widths shall be increased as determined by the Development Engineer.
- (e) Protection of Drainage Systems. The developer shall adequately protect all ditches (roadways and watercourses) to the satisfaction of the Development Engineer or his designee as follows:
- (1) All adjoining land where the vegetation has been injured or destroyed or where the land is in need of protection to prevent erosion, deposits in the drainage facilities and/or unsightly conditions shall be restored and protected as directed by the Development Engineer or his designee.
 - (2) In all cases, any drainage facility shall be in a stable condition, free from either erosion or sedimentation and/or other debris.
 - (3) No construction shall begin until the developer has complied with all of the provisions of the Kent City Codified Ordinances, and obtained all permits required by the Ohio Environmental Protection Agency and the Army Corp of Engineers.
 - (4) All storm sewer inlets that accept water runoff from the Development area shall be protected so that sediment-laden water will not enter the storm sewer, unless exempted by the Director or unless the storm system drains to a Sediment Settling Pond. In areas where construction will be ongoing, such as subdivisions, the storm sewer protection shall be maintained until all upsloped areas reach Final Stabilization, as determined by the Director.
 - (5) The developer shall hydraulically clean the storm sewers at the time of dedication and provide videotape to the satisfaction of the Director. All sediments shall be removed from the system and shall not be flushed downstream.
 - (6) All storm sewers, footer drains, roof gutter drains and all other drains will be outletted at the bottom of the slope. The slope below the outlet shall be able to control the water being drained through the storm sewer or other drains without causing erosion of the stream or channel banks or channel bottom.
- (f) Pipe policy. Pipe sizing and materials shall comply with the City Engineering Division specifications and standard drawings. ~~The following pipe policy and the pipe policy of the State of Ohio Department of Transportation, "Construction and Material Specifications, 706, 707", shall be used in designing storm sewer systems subject to the approval of the Development Engineer or his designee.~~
- ~~(1) All pipe lines (including culverts and storm sewers) which are located beneath the roadway shall meet the requirements set forth for Class A pipe.~~

- (2) ~~Longitudinal storm sewer lines, not under the main roadways, shall be Class D or Class E pipe. Where these sewers are shallow or located beneath drives, Class B or Class C pipe shall be specified.~~
- (3) ~~Longitudinal roadway drainage lines, for which sealed joints are unnecessary or undesirable, shall be Class H pipes. Portions of these drains that require stronger pipe because of shallow cover or location beneath drives shall be Class C pipe.~~
- (4) ~~Open end driveway pipe twenty four inches or less in diameter may be Class F pipe and larger pipes shall be Class B or Class C pipe.~~
- (5) ~~Outlet pipe or open joint drains (Class H or I), shall be in accordance with the provisions of Class F pipe and will usually be ten feet in length.~~
- (6) ~~Pipe under drains shall be Class I pipe.~~
- (7) ~~Pipe arches or elliptical pipes shall be Class G pipe.~~

(g) Storm Water Stormwater Basins:

- (1) *Pool Geometry:* The minimum length-to-width ratio for the pond is 3:1 (the length will be three (3) times the width).
- (2) *Riser in Embankment:* The riser shall be located within the embankment for purposes of maintenance access. Access to the riser will be by manholes.
- (3) *Water Drains:* Each retention and water quality basin shall have a drainpipe that can completely drain the pond. The drain shall have an elbow within the pond to prevent sediment deposition from plugging the drain.
- (4) *Principal Spillway:* Each principal spillway shall be designed in accordance with the NRCS standards and specifications for the office serving Portage County, Ohio. Each principal spillway shall have the capacity to pass the 100 year design storm flows. The inlet or riser size for the pipe drops shall be designed so that the flow through the structure goes from weir flow control to pipe flow control without going into orifice control in the riser. The crest elevation of the primary spillway shall be no less than one foot below the emergency spillway crest. Premium joint pipe is required and a removable trash rack shall be installed at each location. Anti-seep collars shall be provided for all pipe conduits through an embankment.
- (5) *Emergency Spillway:* An emergency spillway shall be provided on each Storm Water Stormwater management and water quality basin. Emergency spillways shall convey flood flows safely past the embankment, and shall be designed in accordance with NRCS standards and specifications for the office serving Portage County, Ohio. Excavated spillways shall have a 100 year design storm capacity unless exempted in writing by the Director.
- (6) *Non-Clogging Low Flow Orifice:* A non-clogging orifice shall be provided for the Water Quality Basins.
- (7) *Embankments:* Each dam embankment shall be designed in accordance with the NRCS standards and specifications for the office serving Portage County, Ohio. Anti-seep collars shall be provided for all pipe conduits through an embankment.
- (8) *Safety Features:* The perimeter of all water pool areas that are deeper than three (3) feet shall be surrounded by benches that meet the following:
 - (i) A safety bench, with a maximum slope of 3%, which extends outward, on dry land, from the shoreline. This bench will be a minimum of 25 feet wide to provide for the safety of individuals and maintenance vehicles that are adjacent to the water pool. The safety bench may be landscaped to prevent access to the water pool.

- (ii) Side slopes between the safety bench and the aquatic bench shall not be steeper than 3:1 (3 feet horizontal for every 1 foot vertical).
 - (iii) An aquatic bench that extends inward from the shoreline far enough to ensure public safety and has a maximum depth of 15 inches below the normal water surface elevations. The aquatic bench may be landscaped to prevent access to the deeper water pool.
 - (iv) Side slopes beyond the aquatic bench and below the permanent water level shall not be steeper than 2:1 (2 feet horizontal for every 1 foot vertical).
 - (v) The contours of the pond will be designed and managed to eliminate drop-offs and other hazards. Side slopes getting to the pond shall not exceed 3:1 and shall terminate on a safety bench.
 - (vi) The perimeter of all permanent pool areas deeper than 4 feet shall be surrounded by an aquatic bench that extends at least 8 feet and no more than 15 feet outward from the normal water edge. The 8 feet wide portion of the aquatic bench closest to the shoreline shall have an average depth of 6 inches below the permanent pool to promote the growth of aquatic vegetation. The remainder of the aquatic bench shall be no more than 15 inches below the permanent pool to minimize drowning risk to individuals who accidentally or intentionally enter the basin, and to limit growth of dense vegetation in a manner that allows waves and mosquito predators to pass through the vegetation. The maximum slope of the aquatic bench shall be 10 (H) to 1 (V). The aquatic bench shall be planted with native plant species comparable to wetland vegetation that are able to withstand prolonged inundation. The use of invasive plant species is prohibited.
 - (vii) The primary spillway opening shall not permit access to the public and other non-maintenance personnel.
- (h) These standards are general guidelines and shall not limit the right of the Director to impose at any time additional, more stringent requirements, nor shall the standards limit the right of the Director to waive, in writing, individual requirements.
- (i) Methods for controlling increases in ~~Storm Water~~ Stormwater runoff peaks and volumes may include, but are not limited to:
- (1) Retarding flow velocities by increasing friction; for example, grassed road ditches rather than paved street gutters where practical, discharging roof water to vegetated areas, or grass and rock-lined drainage channels.
 - (2) Grading and use of grade control structures to provide a level of control in flow paths and stream gradients.
 - (3) Induced infiltration of increased ~~Storm Water~~ Stormwater runoff into soil, where practical;
 - (4) Provisions for detention and retention; for example, permanent ponds and lakes with ~~Storm Water~~ Stormwater basins provided with proper drainage, multiple-use areas for ~~Storm Water~~ Stormwater detention, recreation, wildlife or transportation, or subsurface storage areas.
 - (5) Low Impact Development techniques as set forth in **Chapter 1203: Low Impact Development**.
- (j) Compensatory flood storage mitigation: In order to preserve floodplain storage volumes and thereby avoid increases in water surface elevations, any filling within floodplains approved by the City of Kent must be compensated by providing an equivalent storage volume. First consideration for the location(s) of compensatory floodplain volumes should be given to areas where the stream channel will have immediate access to the new floodplain within the limits of the development site. Consideration will also be given to enlarging existing or proposed retention basins to compensate for floodplain fill if justified by a hydraulic analysis of the contributing watershed. Unless otherwise permitted by the City of Kent, reductions in volume due to floodplain fills must be mitigated within the legal boundaries of the

development. Embankment slopes used in compensatory storage areas must reasonably conform to the natural slopes adjacent to the disturbed area. The use of vertical retaining structures is specifically prohibited.

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**CHAPTER 1199
EROSION CONTROLS**

- 1199.02 Sedimentation and Erosion Controls Required**
 - 1199.03 Design Standards**
 - 1199.04 Maintenance**
 - 1199.05 Inspection**
 - 1199.06 Control of Materials and Debris**
 - 1199.07 Water Quality Requirements**
 - 1199.07 Enforcement and Penalties**
 - 1199.08 Conflict**
-

1199.01 SEDIMENTATION AND EROSION CONTROLS REQUIRED

- (a) Effective erosion and sediment controls shall be planned and applied in accordance with the following principles:
 - (1) The smallest practical area of land shall be exposed at any one time during Development, construction, extraction, or other use.
 - (2) When land is exposed during Development, use, extraction, etc., the exposure shall be kept to the shortest practical period of time.
 - (3) Temporary vegetation and/or mulching shall be used to protect critical areas exposed during Development, use, etc.
 - (4) Sediment basins (debris basins, debiting basins, or silt traps) shall be installed and maintained to remove all sediment from run-off and/or operating waters from land undergoing Development, use, etc.
 - (5) Provisions shall be made to effectively accommodate the increased run-off caused by soil and surface conditions during and after Development, use, etc.
 - (6) The Development plan or site plan shall be fitted to the topography and soils so as to create the least erosion potential.
 - (7) Wherever feasible, natural vegetation shall be retained and protected.
 - (8) All excavation shall be made to either a water producing depth, such depth to be not less than six (6) feet below the low water mark, or shall be graded or backfilled to conform, with the surrounding area, with non-noxious, non-flammable and non-combustible solids.
 - (9) All banks resulting from reclamation of all excavations shall be sloped not greater than one (1) foot vertical to five (5) feet horizontal and said bank shall have a minimum of four (4) inches top soil mixed with four (4) inches of grade, then seeded and sufficiently mulched to eliminate any erosion.
- (b) The following type of construction projects are exempt from sediment and erosion control measures:
 - (1) If the rainfall erosivity factor, R, is less than 5 for the project.
 - (2) The construction planned is "routine maintenance" to re-establish the original line, grade or hydraulic capacity of ~~Storm Water~~ Stormwater infrastructure (i.e. ditch cleaning, detention basin dredging, etc.) where the disturbed area is less than five (5) acres.
 - (3) Silviculture Disturbances
 - (4) Agricultural Disturbances.
 - (5) Construction related to oil and gas well exploration.

- (c) The following type of maintenance projects are exempt from full sediment and erosion control measure requirements but shall stabilize the disturbed area(s) within 24-7 days of construction completion:
- (1) Replacement of utility services (water service, sanitary or storm lateral, gas service, etc) to an existing building where the disturbed area is limited to a standard trench width necessary to replace the underground utility services.
 - (2) Replacement of sidewalk, driveways, driveway aprons where the disturbed area is less than one acre.
 - (3) Demolition of small structures such as single family homes, garages, shed, etc. that have a disturbed area less than a one acre.

1199.02 DESIGN STANDARDS

In order to control sediment pollution of water resources, the Owner(s) or person(s) responsible for the Development area shall use conservation planning and low impact Development practices pursuant to **Chapter 1203: Low Impact Development**, to maintain the level of conservation established in the following standards:

- (a) The standards and specifications contained in the State of Ohio's *Rainwater and Land Development* manual. As technology and understanding of habitat and land function develop, the Director may determine that additional ~~Best Management Practices (BMPs)~~ Stormwater Control Measures (SCMs) are appropriate. These regulations do not preclude the use of innovation or experimental ~~Storm Water~~ Stormwater management technologies.
- (b) Clearing and Grubbing: Clearing and grubbing will be done in two (2) or more phases. The first phase will include only those locations necessary to install the perimeter soil erosion, sediment and ~~Storm Water~~ Stormwater control BMPs SCMs. After the perimeter controls are in place and functioning, the remaining phase(s) of clearing and grubbing may continue.
- (c) Timing of Sediment Trapping Practices: Sediment control practices shall be functional throughout all phases of up slope earth-disturbing activity. Settling facilities, perimeter controls and other practices intended to trap sediment shall be implemented as the first step of grading, and within seven (7) days from the start of grubbing. They shall continue to function until the up slope Development area is permanently restabilized. As construction progresses and the topography is altered, appropriate controls must be constructed or existing controls altered to address the changing drainage patterns.
- (d) Stabilization of Denuded Areas: Disturbed areas must be stabilized as specified in the tables below, or according to the Ohio EPA NPDES ~~Storm Water~~ Stormwater Permit Rules, whichever is most restrictive:

Permanent Stabilization

<u>Area requiring Permanent Stabilization</u>	<u>Time Frame</u>
Any areas that will lie undisturbed for one (1) year or more	Within seven (7) days of the most recent Disturbance
Any areas within fifty (50) feet of a stream and at final grade	Within two (2) days of reaching final grade
Any other areas at final grade	Within seven (7) days of reaching final grade within that area

Temporary Stabilization

<u>Area Requiring Temporary Stabilization</u>	<u>Time Frame</u>
Any disturbed areas within fifty (50) feet of a stream and not at final grade	Within two (2) days of the most recent Disturbance if the area will remain idle for seven (7) days or more
Disturbed areas that will be undisturbed for more than 21 days but less than one (1) year and not within fifty (50) feet of a stream	Within seven (7) days of the most recent Disturbance within the area
Residential subdivisions for Disturbance which has occurred on building lots	Within 7 days of the most recent Disturbance if housing unit construction on the lot is not scheduled to begin within 24-14 days of the Disturbance.
	In any case, Temporary or Permanent Stabilization will be properly installed, pursuant to the most recent edition of the <i>Rainwater and Land Development</i> manual, before the second building permit is issued.
Nonresidential subdivisions and commercial Developments	Within 7 days of the most recent Disturbance if further construction activity will not occur within 24-14 days of the Disturbance.
	Where vegetative stabilization techniques may cause structural instability or are otherwise prohibited, alternative stabilization techniques must be employed.
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

Where vegetative stabilization techniques may cause structural instability or are otherwise unobtainable, alternative stabilization techniques must be employed.

- (e) **Settling Ponds:** Concentrated ~~Storm Water~~ Stormwater Runoff (e.g. storm sewer or ditches), runoff from denuded areas ten (10) acres or more; and all areas flowing at rates that exceed the design capacity of sediment barriers and/or other sediment barriers and/or inlet protection, shall pass through a sediment settling facility. The facility's storage capacity shall be no less than sixty-seven (67) cubic yards per acre of total drainage area.
 - (1) Permanent ~~Storm Water~~ Stormwater management ponds that are designed to trap sediment during construction shall be designed to provide for a slow release of sediment-laden water. The ideal drawdown time is from three (3) to four (4) days (72 to 96 hours) with a minimum 48 hour drain time for sediment basins serving a drainage area over 5 acres.
 - (2) The design of Settling Ponds shall have a minimum length of flow of 2:1.

(f) Sediment Barriers: Sheet and fill flow runoff from denuded areas shall be diverted to a settling pond or treated by a geotextile silt fence or other sediment barrier approved by the Director. The total runoff flow treated by a sediment barrier shall not exceed the design capacity for that sediment barrier.

(1) Silt fence shall be placed on a level contour downslope of the disturbed area. Placing silt fence in parallel does not extend the permissible drainage area to the silt fence.

Maximum drainage area (in acres) to 100 linear feet of silt fence	Range of slope for particular drainage areas (in percent)
0.5	< 2%
0.25	≥2% but< 20%
0.125	≥20% but< 50%

(g) Working Near, Or Crossing Streams and Wetlands:

(1) Construction vehicles shall avoid water resources, wetlands, Riparian Areas, and their setbacks. If construction vehicles must cross these areas repeatedly during construction, an approved temporary crossing shall be constructed. Streams, including bed and banks, shall be restabilized immediately after in-channel work is completed, interrupted, or stopped.

(2) No soil, rock, debris, or any other material shall be dumped or placed into a water resource or into such proximity that it may slough, slip, or erode into a water resource unless such dumping or placing is authorized by the approving authority and, when applicable, the US Army Corps Of Engineers and Ohio EPA, for such purposes as, but not limited to, constructing bridges, culverts, or erosion control structures.

(h) Construction Access Routes:

(1) Measures shall be taken to prevent soil transport onto public roads, or surfaces where runoff is not checked by sediment controls. Gravel construction entrance(s) shall be implemented as required by the Director and the Ohio EPA.

(2) Where soil is transported onto a public road surface, the roads shall be cleaned thoroughly at the end of each day, or more frequently, in order to ensure public safety. Soil shall be removed from paved surfaces by shoveling or sweeping. Street washing shall be allowed only after shoveling or sweeping has removed most of the sediment.

(i) Unstable Soils: Unstable soils prone to slipping or land sliding shall not be graded, excavated, filled or have loads imposed upon them unless the work is performed in accordance with a qualified professional engineer's recommendations to correct, eliminate, or adequately address the problems.

(j) Cut And Fill Slopes: Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion and slippage. Consideration shall be given to the length and steepness of the slope, soil type, up-slope drainage area, groundwater conditions and slope stabilization.

(k) Stabilization Of Outfalls And Channels: Outfalls and constructed or modified channels shall be designed and constructed to withstand the expected velocity of flow from a post-development, minimum ten-year (or greater) frequency storm without eroding.

(l) Establishment of Permanent Vegetation: A permanent vegetative cover shall be established on denuded areas not otherwise permanently stabilized. Permanent vegetation shall not be

considered established until ground cover is achieved which, in the opinion of the Director, covers 80% or more of the soil surface with a uniform density, provides adequate cover, and is mature enough to satisfactorily control soil erosion and survive adverse weather conditions.

- (m) Disposition of Temporary Practices: All temporary erosion and sediment control practices shall be disposed of immediately after final site stabilization is achieved or after the temporary practices are no longer needed, unless otherwise required by the Director. Trapped sediment shall be permanently stabilized to prevent further erosion.
- (n) Underground Utility Construction: The construction of underground utility lines, pipes, etc. shall be subject to the following criteria:
 - (1) Trenches shall remain open for no more than five days.
 - (2) Trench-draining devices shall discharge in a manner approved by the Development Engineer, which will not adversely affect resource waters or adjacent off-site properties.
- (o) Permanent Stabilization of Conveyance Channels: Operator(s) shall undertake special measures to stabilize channels and outfalls and prevent erosive flows. Measures may include seeding, dormant seeding, mulching, erosion control matting, sodding, riprap, natural channel design with bioengineering techniques, or rack check dams.
- (p) Inlet Protection: Other erosion and sediment control practice shall minimize sediment laden water entering active storm drain systems, unless the storm drain system drains to a Sediment Settling Pond. All inlets receiving runoff from drainage area of one or more acres will require a Sediment Settling Pond.

1199.03 MAINTENANCE

- (a) All temporary and permanent erosion and sediment control practices shall be designed and constructed to minimize maintenance requirements. They shall be maintained and repaired as needed to ensure continued performance of their intended function. The person or entity responsible for the continued physical and financial maintenance of permanent erosion control practices shall be identified to the satisfaction of the Director.
- (b) If periodic inspections or other information indicates a control has been used inappropriately or incorrectly, the permittee must replace or modify the control for the site conditions.
- (c) Inspection and Maintenance Plan: The post construction operations and maintenance plan must be a stand alone document which contains the following:
 - (i) A designated entity for ~~Storm Water~~ Stormwater inspection and maintenance responsibilities.
 - (ii) The routine and non-routine maintenance tasks to be undertaken.
 - (iii) A schedule for inspections and maintenance.
 - (iv) Any necessary legally binding maintenance easement and agreements.
 - (v) A map showing all access and maintenance easements.
 - (vi) ~~A signed maintenance agreement shall accompany the Maintenance Plan.~~
- (d) Inspection and Maintenance Agreement: The Inspection and Maintenance Agreement required for SCMs under this regulation as a stand-alone document between the City of Kent and the

applicant. A copy of this agreement should be attached to the property deed. The agreement shall contain the following information and provisions:

- (i) Identification of the landowner(s), organization, or municipality responsible for long term inspection and maintenance, including repairs, of the SCMs.
 - (ii) The landowner(s), organization, or municipality shall maintain SCMs in accordance with this regulation.
 - (iii) The City of Kent has the authority to enter upon the property to conduct inspections as necessary, with prior notification of the property owner, to verify that the SCMs are being maintained and operated in accordance with this regulation.
 - (iv) The City of Kent shall maintain public records of the results of site inspections, shall inform the landowner(s), organization, or municipality responsible for maintenance of the inspection results, and shall specifically indicate in writing any corrective actions required to bring the SCMs into proper working condition.
 - (v) If the City of Kent notifies the landowner(s), organization, or municipality responsible for maintenance of the maintenance problems that require correction, the specific corrective actions shall be taken within a reasonable time as determined by the City of Kent.
 - (vi) The City of Kent is authorized to enter upon the property and perform the corrective actions identified in the inspection report if the landowner(s), organization, or municipality responsible for maintenance does not make the required corrections in the specified time period. The City of Kent shall be reimbursed by the landowner(s), organization, or municipality responsible for maintenance for all expenses incurred within 10 days of receipt of invoice from the City of Kent, or more with written approval from the City of Kent Service Director
 - (vii) The method of funding long-term maintenance and inspections of all SCMs.
 - (viii) A release of the City of Kent from all damages, accidents, casualties, occurrences, or claims that might arise or be asserted against the City of Kent from the construction, presence, existence, or maintenance of the SCMs.
- (e) Inspection and Maintenance Plan. This plan will be developed by the applicant and reviewed by the City of Kent. Once the inspection and Maintenance Plan is approved, a recorded copy of the Plan must be submitted to the City of Kent as part of the final inspection approval. The plan will include at a minimum:
- (i) The location of each SCM and identification of the drainage area served by each SCM.
 - (ii) Photographs of each SCM, including all inlets and outlets upon completion of construction.
 - (iii) Schedule of inspection.
 - (iv) A schedule for regular maintenance for each aspect of the stormwater management system and description of routine and non-routine maintenance tasks to ensure continued performance of the system as is detailed in the approved Comprehensive Stormwater Management Plan. A maintenance inspection checklist written so the average person can understand it shall be incorporated. The maintenance plan will include a detailed drawing of each SCM and outlet structures with the parts of the outlet structure labeled. This schedule may include additional standards, as required by the City of Kent Engineer, to ensure continued performance of SCMs permitted to be located in, or within 50 feet of, water resources.
 - (v) The location and documentation of all access and maintenance easements on the property. Alteration or termination of these stipulations is prohibited.

Alteration or termination of these stipulations is prohibited.

1199.04 INSPECTIONS

- (a) The Owner(s) of the Development area shall have the site inspected for soil erosion, sediment control and other environmental concerns every seven (7) calendar days, and within twenty-four (24) hours of a 0.5 inch or greater rainfall event until the site is certified as being stable by the Development Engineer or his designee.

- (b) The Owner(s), or his designated representative, shall keep a written log of each inspection and any subsequent improvements to the soil erosion, sediment control or other environmental controls. The inspections shall include the date of the inspections, the name of the inspector, weather conditions, and the actions needed to correct the identified problems.
- (c) The inspections will include the date and actions taken to correct problems noted in past inspection logs.
- (d) If the construction site is subject to Ohio EPA's National Pollutant Discharge Elimination System (NPDES) permits, a copy of all of the required inspection sheets will be submitted to the Development Engineer or his designee monthly if the Development is for a residential subdivision or a commercial or industrial site. Single family residential sites and other similar sites as identified by the Development Engineer or his designee need only submit inspection reports at the completion of the building permit phases.
- (e) Inspections are not required for exempted items listed in section 1199.01(b) and 1199.01(c).

1199.05 CONTROL OF MATERIALS AND DEBRIS

Site management practices shall be implemented to prevent toxic materials, hazardous materials, or other debris from entering the Community's and state's water resources or wetlands. These practices shall include, but are not limited to, the following:

- (a) A covered dumpster shall be made available for the proper disposal of construction site waste materials, garbage, plaster, drywall, grout, gypsum and etc. A second covered dumpster will be provided for the proper disposal of toxic and hazardous wastes.
- (b) The washing of excess concrete material into a street, catch basin, or other public facility or natural resource shall not be permitted. A designated area for concrete washouts shall be made available and used for all concrete washouts.
- (c) All fuel tanks and drums shall be stored in a marked storage area. A dike shall be constructed around this storage area with a minimum capacity equal to 110% of the volume of the largest container in the storage area. All additional requirements of the local fire authority must be followed. If the fuel tanks have a self-contained "dike," the plug will be kept in the "dike" tank at all times. A mobile fueling spill prevention and response plan must be prepared and followed by all site personnel.
- (d) Any toxic or hazardous waste and contaminated soils shall be disposed of properly.
- (e) Runoff from contaminated sites shall not be allowed to leave the site.
- (f) Proper permits shall be obtained for Development projects on solid waste landfill sites.

1199.06 WATER QUALITY REQUIREMENTS

~~Storm-Water~~ Stormwater released from any part of a small Development site of 1 acre or greater but less than 5 acres shall implement post construction ~~Best Management Practices (BMPs)~~ Stormwater Control Measures (SCMs). Structural post construction ~~BMP-SCM~~ methods and design parameters shall be commensurate with the impacts on the watershed and follow the current version of the *State of Ohio's Rainwater and Land Development* manual. A description of the measures that will be installed during the construction process to control pollutants in ~~Storm-Water~~ Stormwater Discharges that will occur after construction operation has been completed must be included in the (SWP3) for review & approval. Specify all new impervious areas must be treated?

~~Storm-Water~~ Stormwater released from any part of a large Development site of 5 or more acres or will disturb less than 5 acres, but is a part of a larger common plan of Development or sale which will disturb 5 or more acres of land, shall meet the most restrictive of the following criteria as well as the current requirements of the Ohio EPA:

- (a) The rationale for ~~BMP~~ SCM selection must address the anticipated impacts on the hydrology, water quality and riparian form (habitat).
- (b) Post construction ~~BMPs~~ SCMs must achieve the following goals:
 - (1) Water Quality Volume (WQv): For all large Development on previously undeveloped property, structural (designed) post-construction ~~Storm-Water~~ Stormwater treatment practices shall be incorporated into the permanent drainage system for the site. These practices must be sized to treat the Water Quality Volume (WQv). The WQv shall be the maximized water quality capture volume for the site, as defined in "Urban Runoff Quality Management," WEF Manual of Practice No. 23 and ASCE Manual and Report on Engineering Practice No. 87 (WEF and ASCE, 1998).
 - (2) The WQv shall be determined, through a site hydrologic study approved by the Development Engineer, that uses continuous hydrologic simulation and local long-term hourly precipitation records, or by using the following equation:

$$WQv = C * P * A / 12$$

where:

WQv = Water Quality Volume in acre-feet

C = Runoff Coefficient appropriate for storms less than 1 inch (see Table 1)

P = 0.75 inch precipitation depth

A = area draining into the ~~BMP~~ SCM in acres

TABLE 1

Runoff Coefficients Based on the Type of Land Use

Land Use	Runoff Coefficient
Industrial & Commercial	0.8
High Density Residential (>8 dwellings/acre)	0.5
Medium Density Residential (4 to 8 dwellings/acre)	0.4
Low Density Residential (<4 dwellings/acre)	0.3
Open Space & Recreational Areas	0.2

Where the land use will be mixed, the Runoff Coefficient should be calculated using a weighted average. For example, if 60% of the contributing drainage area to the Storm Water Stormwater treatment structure is Low Density Residential, 30% is High Density Residential and 10% is Open Space, the Runoff Coefficient is calculated as follows $(0.6)(0.3)+(0.3)(0.5)+(0.1)(0.2) = 0.35$.

The following alternative equation may also be used:

$$WQv = \infty (0.858i^3 - 0.78i^2 + 0.774i + 0.04) * PA/12$$

where: WQv = Water Quality Volume in acre-feet
 l = watershed impervious ratio, namely, percent total imperviousness divided by 100;

P = mean storm presentation volume in inches

∞ = regression constant from least-squares analysis (see Table in Subsection ii)

A = area draining into the facility in acres

TABLE 2

Regression Constant and Required Draw Down Time for Structural Post-Construction Treatment Control Practices (WEF & ASCE, 1998)

Best Management Practice	Draw Time of WQv in Hours	Regression Constant ∞
Infiltration, Vegetated Swale and Filter Strip	12	1.109
Extended Detention Basin (Dry Ponds)	48	1.545
Retention Ponds (Wet Ponds) - Solids Removal Only*	12	1.109
- Solids and Dissolved Nutrient Removal**	N/A	3.0
Constructed Wetlands (above permanent pool)	24	1.299
Media Filtration, Bioretention	40	1.500
Other Facilities (if acceptable by the Development Engineer and Ohio EPA)	24	1.299

* Provide both a permanent pool and an extended detention volume above the permanent pool, each sized at WQv

** Based on a permanent pool with wetland vegetation and a 2 to 3 week retention time

- (3) An additional volume equal to 20 percent of the Water Quality Volume shall be incorporated into the facility for sediment storage and/or reduced infiltration capacity. Facilities shall be designed according to the methodology included in the WEF and ASCE manual of practice, *State of Ohio's Rainwater and Land Development* manual, or in another design manual acceptable for use by the Director and Ohio EPA.
- (4) The BMP's SCM's listed in Table 2 below shall be considered standard BMP's SCM's approved for general use. BMP's SCM's listed in the current Ohio EPA NPDES permit shall also be incorporated in this list. BMP's SCM's shall be designed such that the drain time is long enough to provide treatment, but short enough to provide storage available for successive rainfall events as described in Table 2 below and avoid the creation of nuisance conditions. The outlet structure must not discharge more than the first half of the WQv or extended detention volume (EDv) in less than one-third of the drain time. The EDv is the volume of Storm Water Stormwater runoff that must be detailed by a structural post-construction BMP SCM. The EDv is equal to 75 percent of the WQv for wet extended detention basin, but is equal to the WQv for all the other BMP's SCM's listed in Table 2.
- (5) Detention basins shall be provided with an emergency drain, where practicable, so that the basin may be emptied if the primary outlet becomes clogged and/or to drain the permanent pool to facilitate maintenance. The emergency drain should be designed to drain by gravity where possible.

TABLE 2

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Target Draw Down (Drain) Times for Structural
Post-Construction Treatment Control Practices

Practice	Target Draw Down (Drain) Time
Infiltration Basin or Trench [^]	24 - 48 hours
Permeable Pavement – Extended Detention	24 hours
Permeable Pavement – Infiltration	48 hours
Enhanced Water Quality Swale (ie. Bioretention)	24 hours
Dry Extended Detention Basin*	48 hours
Wet Extended Detention Basin**	24 hours
Constructed Wetland (above permanent pool)+	24 hours
Sand & Other Media Filtration	24 hours
Bioretention Area/Cell [^]	24 hours
Pocket Wetland#	24 hours
Vegetated Filter Strip with Berm	24 hours

* Dry basins must include forebay and micropool each sized at 10% of the WQv

** Provide both a permanent pool and an EDv above the permanent pool, each sized at 0.75 times WQv.

+ Extended detention shall be provided for the full WQv above the permanent water pool.

[^] The WQv shall completely infiltrate within 48 hours so there is not standing or residual water in the BMP SCM

Pocket wetlands must have a wet pool equal to the WQv with 25% of the WQv in a pool and 75% in marshes. The EDv about the permanent pool must be equal to the WQv.

- (5) Facilities shall be cleaned and maintained such that the full Water Quality Volume is available and that the facility functions as designed.
- (6) All construction activities shall maintain or improve ecological function of watercourses by protecting or improving the stream and riparian form. Ecological functions include pollution assimilation, flood attenuation, maintenance of the sediment regime, base flow, moderation of temperature and habitat to the maximum extent practicable (MEP);
- (7) For all construction activities immediately adjacent to Surface Waters of the state, a minimum Riparian and Wetland setback, pursuant to Chapter 1201: Riparian and Wetland Buffers, shall be maintained in its natural state as a permanent buffer. Where impacts within this setback area are unavoidable due to the nature of the construction activity (e.g., stream crossings for roads or utilities), the project shall be designed so the number of stream crossings and the width of the Disturbance within the setback area are minimized.
- (8) For all redevelopment projects: Post-construction practices shall assure a net reduction of 20% of the impervious area of the site, or provide for treatment of 20% of the WQv.
- (9) Transportation improvement projects of existing facilities located predominantly within existing rights-of-way may provide post construction water quality measures in accordance with the Ohio Department of Transportation's Location & Design Manual. The above is permissible if significant right-of-way impacts are required to meet the provision of the case as determined by the Director.
- (10) Transportation Projects: The construction of new roads and roadway improvement projects by public entities may implement post construction BMP's SCM's in compliance

with the current version of the Ohio Department of Transportation's *Location and Design Manual, Volume Two Drainage Design*.

- (11) Offsite Mitigation of Post-Construction: Offsite mitigation of post construction BMP SCM requirements where the standard methods listed in Table 2 are not feasible, must be approved by the Ohio EPA.

1199.07 Enforcement and Penalties

- (a) **Notice of Violation**: When the City of Kent determines that a land Development activity is not being carried out in accordance with the requirements of this local law, it may issue a written notice of violation to the landowner. The notice of violation shall contain:
1. The name and address of the landowner, developer or applicant.
 2. The address when available or a description of the building, structure or land upon which the violation is occurring.
 3. A statement specifying the nature of the violation.
 4. A description of the remedial measures necessary to bring the land Development activity into compliance with this local law and a time schedule for the completion of such remedial action.
 5. A statement of the penalty or penalties that shall or may be assessed against the person to whom the notice of violation is directed.
 6. A statement that the determination of violation may be appealed to the municipality by filing a written notice of appeal within fifteen (15) days of service of notice of violation.
- (b) **Stop Work Orders**: The City of Kent may issue a stop work order for violations of this law. Persons receiving a stop work order shall be required to halt all land Development activities, except those activities that address the violations leading to the stop work order. The stop work order shall be in effect until the City of Kent confirms that the land Development activity is in compliance and the violation has been satisfactorily addressed. Failure to address a stop work order in a timely manner may result in civil, criminal, or monetary penalties in accordance with the enforcement measures authorized in this local law.
- (c) **Permit Revocation**: The City of Kent may suspend or revoke the permit after providing written notification to the permittee based on any of the following reasons:
1. Any violation(s) of the terms or conditions of the approved erosion and sediment control plan or permit.
 2. Noncompliance with violation notice(s) or stop work order(s) issued.
 3. Changes in the site characteristics upon which plan approval and permit issuance were based.
 4. Any violation(s) of this or any other City of Kent laws, regulation, ordinance(s) or any rules and regulations adopted under it.
 5. The work is, or threatens to become, a hazard to property or public safety; is adversely affecting or about to adversely affect adjacent property or rights-of-way; a drainage way, wetlands, fish or wildlife habitat, or a ~~Storm Water~~ Stormwater facility; or is otherwise adversely affecting the public health, safety or welfare.
- (d) **Violations**: Any land Development activity that is commenced or is conducted contrary to this local law, may be restrained by injunction or otherwise abated in a manner provided by law.
- (e) **Penalties**: In addition to or as an alternative to any penalty provided herein or by law, any person who violates the provisions of this local law shall be guilty of a violation punishable by the following schedule. For the purposes of conferring jurisdiction upon courts and judicial officers generally, violations of this local law shall be deemed an unclassified misdemeanor and for such purpose only all provisions of law relating to misdemeanors shall apply to such violations. Each week's continued violation shall constitute a separate additional violation.
- a. First offense - a fine not exceeding three hundred fifty dollars (\$350) or imprisonment for a period not to exceed six months, or both for conviction.

- b. Second offense – when both of which were committed within a period of five years, punishable by a fine not less than three hundred fifty dollars (\$350) nor more than seven hundred dollars (\$700) or imprisonment for a period not to exceed six months, or both.
 - c. Third or subsequent offense - all of which were committed within a period of five years, punishable by a fine not less than seven hundred dollars (\$700) nor more than one thousand dollars (\$1000) or imprisonment for a period not to exceed six months, or both.
- (f) Withholding of Certificate of Occupancy: If any building or land Development activity is installed or conducted in violation of this local law, the Director may prevent the occupancy of said building or land.
- (g) Restoration of lands: Any violator may be required to restore land to its undisturbed condition. In the event that restoration is not undertaken within a reasonable time after notice, the City of Kent may take necessary corrective action, the cost of which shall become a lien upon the property until paid.

1199.08 CONFLICTS

If there are any conflicts between provisions of Chapter 1199 and other sections of the Kent Codified Ordinances, then sections of 1199 shall control.

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**CHAPTER 1201
RIPARIAN AND WETLAND BUFFERS**

1201.01 Riparian and Wetland Buffers Required

1201.02 Designated Watercourses and Riparian Setbacks

1201.03 Riparian and Wetland Setbacks

1201.04 Variances

1201.05 Conflicts

RIPARIAN AND WETLAND BUFFERS REQUIRED

- (a) It is hereby determined that the system of wetlands, Riparian Areas, rivers, streams, and other natural watercourses within the City contributes to the health, safety, and general welfare of the residents. The specific purpose and intent of these regulations is to regulate future uses and Developments within riparian and wetland setbacks that would impair the ability of riparian and wetland areas to:
- (1) Reduce flood impacts by absorbing peak flows, slowing the velocity of floodwaters, and regulating base flow.
 - (2) Assist in stabilizing the banks of watercourses to reduce bank erosion and the downstream transport of sediments eroded from watercourse banks.
 - (3) Reduce pollutants in watercourses during periods of high flows by filtering, settling, and transforming pollutants already present in watercourses.
 - (4) Reduce pollutants in watercourses by filtering, settling, and transforming pollutants in runoff before they enter watercourses.
 - (5) Provide watercourse habitats with shade and food.
 - (6) Provide habitat to aquatic organisms and wildlife, by maintaining diverse and connected riparian and wetland vegetation.
 - (7) Benefit the City economically by minimizing encroachment on wetlands and watercourse channels and the need for costly engineering solutions such as dams, retention basins, and rip rap to protect structures and reduce property damage and threats to the safety of residents; and by contributing to the scenic beauty and environment of the City, and thereby preserving the character of the City, the quality of life of the residents of the City, and corresponding property values.

1201.02 DESIGNATED WATERCOURSES AND RIPARIAN SETBACKS

- (a) Designated watercourses shall include those watercourses meeting any one of the following criteria:
- (1) All watercourses draining an area greater than ½ square mile, or
 - (2) All watercourses draining an area less than ½ square mile and having a defined bed and bank.
 - (3) In determining if watercourses have a defined bed and bank, the City may consult with a representative of the Portage County Soil and Water Conservation District or other technical experts as necessary.
- (b) Riparian setbacks on designated watercourses are established as follows:
- (1) A minimum of 200 feet on both sides of all watercourses draining an area greater than 300 square miles. (Cuyahoga River)
 - (2) A minimum of 100 feet on both sides of all watercourses draining an area greater than 20 square miles and up to and including 300 square miles. (Breakneck Creek)

- (3) A minimum of 50 feet on both sides of all watercourses draining an area greater than one half square mile and up to and including 20 square miles. (Plum Creek and Fish Creek)
 - (4) A minimum of 25 feet on both sides of all watercourses draining an area less than one half square mile and having a defined bed and bank as determined above.
- (c) The reach of the Cuyahoga River from the point where Standing Rock Avenue if extended would intersect with the river to the Stow Street bridge is exempt from the setback requirements of this section.

1201.03 RIPARIAN AND WETLAND SETBACKS

(a) Riparian Setback Map:

- (1) The City shall use the latest edition of the official soil survey of Portage County Soil and Water Conservation District, as the map identifying designated watercourses and their riparian setbacks. The drainage features identified on the paper maps in the official soil survey and the information contained therein shall be believed to be accurate.
- (2) At the time of application of this regulation, if any discrepancy is found between the Riparian Setback Map and the criteria for designated watercourses or riparian setbacks as set forth in these regulations, the most restrictive criteria shall prevail.
- (3) In reviewing and interpreting such maps the City may consult with a representative of the Portage County Soil and Water Conservation District or other technical experts as necessary.

(b) The following conditions shall apply in riparian and wetland setbacks:

- (1) Riparian and wetland setbacks shall be measured in a perpendicular and horizontal direction outward from the Ordinary High Water Mark of each designated watercourse and defined wetland boundary.
- (2) Except as otherwise provided in this regulation, riparian and wetland setbacks shall be preserved in their natural state and shall be established prior to any soil disturbing or land clearing activities.
- (3) Where the 100-year floodplain is wider than a riparian setback on either or both sides of a designated watercourse, the riparian setback shall be extended to the outer edge of the 100-year floodplain.
- (4) Where wetlands are identified within a riparian setback, the minimum riparian setback width shall be extended to the outer boundary of the wetland. In addition, wetlands shall be protected to the extent detailed in these regulations.
- (5) Wetlands shall be delineated by a site survey approved by the City using delineation protocols accepted by the U.S. Army Corps of Engineers and the Ohio EPA at the time of application of this regulation. If a conflict exists between the delineation protocols of these two agencies, the delineation protocol that results in the most inclusive area of wetland shall apply.
- (6) The developer shall be responsible for delineating riparian and wetland setbacks, including any expansions or modifications as required by these regulations, and identifying these setbacks on all Site Plans, Development Plans, and/or applicable permit applications submitted to the City. This delineation may be done by a metes and bounds survey and shall be subject to review and approval by the Director.
- (7) Prior to any soil-disturbing activity, riparian and wetland setbacks shall be clearly delineated on site by the developer, and such delineation shall be maintained throughout soil disturbing activities.

- (8) No approvals or permits shall be issued prior to on-site delineation of riparian and wetland setbacks in conformance with these regulations.
 - (9) Upon completion of a Development or other improvement, riparian and wetland setbacks shall be permanently recorded on the final plat, pursuant to Article IV: Permits and Approval Processes.
- (c) Wetland setbacks are established as follows:
- (1) A minimum of 75 feet surrounding all Ohio EPA Category 3 Wetlands, or current equivalent Ohio EPA classification.
 - (2) A minimum of 50 feet surrounding all Ohio EPA Category 2 Wetlands, or current equivalent Ohio EPA classification.
- (d) Procedure for wetland setbacks:
- (1) Upon filing a Site Plan or Preliminary Development Plan, the developer shall retain a qualified professional to survey the proposed Development site for wetlands. If no wetlands are found, the developer shall submit a letter with the Site Plan or Preliminary Development Plan verifying that a qualified professional has surveyed the site and found no wetlands. If wetlands are found, the following procedures shall be followed:
 - (i) A qualified professional, acceptable to the Director, shall determine the presence of Ohio EPA Category 2 or 3 wetlands (or current equivalent Ohio EPA classification) on the proposed Development site using the latest version of the Ohio Rapid Assessment Method for wetland evaluation approved at the time of application of this regulation. Acceptance of this determination shall be subject to approval by the Director.
 - (ii) If Ohio EPA Category 2 or 3 wetlands (or current equivalent Ohio EPA classification) are located on the proposed Development site, the developer shall delineate these wetlands and the wetland setback in conformance with these regulations. The developer shall identify all delineated wetlands and their associated setbacks on all Site Plans or Preliminary Development Plans, and/or applicable permit applications submitted to the Community Development Department.
- (e) Uses permitted in riparian and wetland setbacks:
- (1) By-Right Uses Without A Permit:
 - (i) Open space uses that are passive in character shall be permitted in riparian and wetland setbacks, including, but not limited to, those listed in these regulations. No use permitted under these regulations shall be construed as allowing trespass on privately held lands.
 - (ii) Recreational Activity. Passive recreational uses, as permitted by federal, state, and local laws, such as hiking, fishing, hunting, picnicking, and similar uses.
 - (iii) Removal of Damaged or Diseased Trees. Damaged or diseased trees may be removed.
 - (iv) Revegetation and/or Reforestation. Riparian and wetland setbacks may be revegetated with non-invasive native plant species.
 - (2) By-Right Uses With A Permit:
 - (i) Selective Harvesting of Timber. Selective harvesting of timber may be allowed upon presentation of a Forest Management Plan pursuant to **Section 1193.05** (Forest Management Plans) prepared by a Qualified Forester and approved by the Director.

- a. Any landowner harvesting timber for sale shall post a \$5,000 performance guarantee with the City. This performance guarantee shall be in the form of a Security Bond, Escrow Account, Certified Check or Cash, and it shall be held until completion of the timber-harvesting operation.
- b. Due to the potential for felled logs and branches to damage downstream properties and/or to block ditches or otherwise exacerbate flooding, logs or branches resulting from permitted selective harvesting that are greater than 6 inches in diameter at the cut end shall be cut into sections no longer than 6 feet or removed from the 100-year floodplain. Harvested trees or felled logs/branches that are part of a designed and approved Streambank Stabilization and/or Erosion Control Measure shall be allowed to remain in a designated watercourse.
 - (ii) Streambank Stabilization and Erosion Control Measures. Streambank stabilization and erosion control measures designed to protect existing structures or uses may be allowed provided that such measures are ecologically compatible and substantially utilize natural materials and native plant species where practical. The streambank stabilization and erosion control measures shall only be undertaken upon approval of a ~~Storm Water~~ Stormwater Management Plan by the Director.
 - (iii) Crossings. Crossings of designated watercourses and through riparian setbacks by publicly and privately owned sewer and/or water lines and public and private utility transmission lines shall only be allowed upon approval of a Utilities Plan by the Director, pursuant to Chapters 1187 (Design Standards), 11896 (Improvements) and 1339 (Technical Plan Review and Conformance). Such crossings shall minimize Disturbance in riparian setbacks and shall mitigate any necessary Disturbances.
 - (iv) Conservation Easements. Placing permanent conservation easements on riparian and wetland setback areas is encouraged by the City.
- (f) Uses prohibited in riparian and wetland setbacks:
 - (1) Any use not authorized under these regulations shall be prohibited in riparian and wetland setbacks. The following uses are specifically prohibited; however, prohibited uses are not limited to those uses listed here.
 - (2) Construction. There shall be no structures of any kind.
 - (3) Dredging or Dumping. There shall be no drilling, filling, dredging, or dumping of soil, spoils, liquid, or solid materials, except for non-commercial composting of uncontaminated natural materials, and except as permitted under Subsection (b).
 - (4) Roads or Driveways. There shall be no roads or driveways permitted in riparian and/or wetland setback area, except as permitted under Subsection (b). There shall be no roads or driveways permitted in wetlands or watercourses without a permit issued by the US Army Corps of Engineers and/or the Ohio EPA.
 - (5) Motorized Vehicles. There shall be no use of motorized vehicles, except as permitted under Subsection (b).
 - (6) Disturbance of Natural Vegetation. There shall be no Disturbance of the natural vegetation, except for such conservation maintenance that the landowner deems necessary to control noxious weeds; for such plantings as are consistent with this regulation; for such Disturbances as are approved under Subsection (b); and for the passive enjoyment, access, and maintenance of landscaping or lawns existing at the time of passage of this regulation. Nothing in this regulation shall be construed as requiring a landowner to plant or undertake any other activities in riparian and wetland setbacks.

- (7) Parking Lots. There shall be no impervious parking lots or other human-made impervious cover, except as permitted under Subsection (b).
 - (8) New Surface and/or Subsurface Sewage Disposal or Treatment Areas. Riparian and wetland setbacks shall not be used for the disposal or treatment of sewage except in accordance with local county Board of Health regulations in effect at the time of application of this regulation.
 - (9) Crossings. Crossings of designated wetland setbacks by publicly and privately owned sewer and/or water lines and public and private utility transmission lines without a permit issued by the US Army Corps of Engineers and/or the Ohio EPA.
- (g) Nonconforming structures or uses in riparian and wetland setbacks:
- (1) A nonresidential, nonconforming use within a riparian and wetland setback which is in existence at the time of passage of this regulation, and which is not otherwise permitted under these regulations, may be continued. However, the use shall not be changed or enlarged unless it is changed to a use permitted under these regulations.
 - (2) A nonconforming structure within a riparian and wetland setback which is in existence at the time of passage of this regulation, and which is not otherwise permitted under these regulations, may be continued. However, the existing building footprint or roof line may not be expanded or enlarged in such a way that would move the structure closer to the stream or wetland.
 - (3) A nonconforming use or deteriorated structure within a riparian and wetland setback which is in existence at the time of passage of this regulation, and which is discontinued, terminated, or abandoned for a period of two (2) years or more may not be revived, restored, or re-established.

1201.04 VARIANCES

- (a) The Board of Building Appeals may grant a variance from these regulations as provided in **Chapter 1109** (Board of Zoning Appeals). In determining whether there is unnecessary hardship or practical difficulty such as to justify the granting of a variance, the Board of Zoning Appeals shall consider the potential harm or reduction in riparian and/or wetland area functions that may be caused by a proposed structure or use.
- (b) In making a variance determination, the Board of Zoning Appeals shall consider the following:
 - (1) The soil type natural vegetation of the parcel, as well as the percentage of the parcel that is in the 100-year floodplain. The provisions of the City's flood hazard reduction regulations, pursuant to Chapter 1337.04, may be used as guidance when granting variances in the 100-year floodplain.
 - (2) The extent to which the requested variance impairs the flood control, erosion control, sediment control, water quality protection, or other functions of the riparian and/or wetland area. This determination shall be based on sufficient technical and scientific data.
 - (3) The degree of hardship this regulation places on the landowner, and the availability of alternatives to the proposed activity.
 - (4) Soil disturbing activities permitted in a riparian and/or wetland setback through variances should be implemented in order to minimize clearing to the extent possible, and to include ~~Best Management Practices~~ Stormwater Control Measures (SCMs) necessary to minimize erosion and maximize sediment control.
 - (5) The presence of significant impervious cover or smooth vegetation, such as maintained lawns, in riparian setback areas compromising benefits to the City.
 - (6) A parcel existing at the time of passage of this ordinance is made unbuildable.

- (7) Varying the front, rear and side yard setback before the riparian and wetland setbacks are varied.
- (c) Variances shall not be granted for asphalt or concrete paving in the riparian and wetland setbacks. Variances may be granted for gravel driveways in riparian setbacks when necessary.

1201.05 CONFLICTS

If there are any conflicts between provisions of Chapter 1201 and other sections of the Kent Codified Ordinances, then sections of 1201 shall control.

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**CHAPTER 1203
LOW IMPACT DEVELOPMENT**

1203.01 Purpose

1203.02 Waiving of Site Requirements

1203.03 Low Impact Development Standards

1203.01 PURPOSE

- (a) Low Impact Development is an ecologically friendly approach to site Development and Storm Water Stormwater management that aims to mitigate Development impacts to land, water, and air. The approach emphasizes the integration of site design and planning techniques that conserve natural systems and hydrologic functions on a site. Impact Development site design and strategies may provide the means by which Storm Water Stormwater management objectives may be achieved. The goals of low impact Development include:
- (1) Incorporating natural topographic features (wetlands, stream corridors, mature forests) and constraints in site design;
 - (2) Maintaining site hydrologic functions and mitigate impacts to such functions;
 - (3) Providing alternative layout and sizing of traditional site;
 - (4) Maintaining the total number of buildable lots within a Development (lot yield);
 - (5) Customizing infrastructure (lots, streets, curbs, gutters, sidewalks) to each site;
 - (6) Decentralizing and micro-managing Storm Water Stormwater at its source; and
 - (7) Providing of aesthetically pleasing Storm Water Stormwater management controls
- (b) Maintaining natural function and mitigating impact to the hydrologic cycle of a site allows for greater protection of the water resources of the site. This benefits the health, safety, and welfare of local stakeholders by controlling Storm Water Stormwater at its source and minimizing the non-Point Source pollution that results in water resource degradation.
- (c) If there are any conflicts between provisions of Chapter 1203 and other sections of the Kent Codified Ordinances, then sections of 1203 shall control

1203.02 WAIVING OF SITE REQUIREMENTS

- (a) To encourage the use of low impact Development techniques, the Planning Commission is empowered to waive or otherwise modify other requirements. Such modifications of these requirements shall only be to the extent necessary to provide for and encourage the use of low impact Development techniques as described in this chapter and may be done only upon the recommendation of the Director.
- (b) Any waiver in site requirements for low impact Development standards shall in no way be construed as a waiver of all requirements of the aforementioned articles. Therefore, whenever the Planning Commission allows deviation from the presumptive requirements set forth in the **Zoning and Subdivision Codes Chapters**, it shall enter on the face of the Development Permit the low impact Development site design standards and/or techniques that it accepts in lieu of meeting the standard set forth in the aforementioned Articles, and the reasons for allowing or requiring the deviation.

1203.03 LOW IMPACT DEVELOPMENT STANDARDS

- (a) The use of low impact Development standards may provide developers with flexibility in site design and numerous environmental and economic benefits. The following site design elements should be considered in low impact Development.

(1) Reduce Limits of Clearing and Grading. The limits of clearing and grading refer to the site area to which Development is directed. This Development area includes all impervious areas (roads, sidewalks, and rooftops) and pervious areas (graded lawn areas and open drainage systems).

(i) To minimize hydrologic impacts on existing site land cover the area of Development should be located:

- a. In less sensitive areas or areas with lower value in terms of hydrologic function (e.g., developing barren clay soils will have less hydrologic impact than Development of forested sandy soils).
- b. Outside of sensitive area buffers such as streams, floodways, floodplains, wetlands, and steep slopes.
- c. Outside of areas with soils which have high infiltration rates to reduce net hydrologic site impacts.

(ii) Additionally, minimal Disturbance techniques may be employed to further reduce the limits of clearing and grading, by restricting ground Disturbance by identifying the smallest possible area and clearly delineating it on the site. These techniques include:

- a. Reduce paving and compaction of highly permeable soils;
- b. Minimizing the size of construction easements and material storage areas during the construction phase of a Development;
- c. Avoid removal of existing trees where possible, and specifically those trees over 18 inches in diameter;
- d. Minimizing imperviousness by reducing the total area of paved surfaces;
- e. Disconnecting as much impervious area as possible to increase opportunities for infiltration and reduce water runoff flow;
- f. Maintaining existing topography and associated drainage divides to encourage natural dispersed flow paths.

(2) Drainage as a Design Element. To reduce impacts created by land Development, site planning should incorporate drainage by carefully conducting hydrologic evaluations and reviewing spatial site layout options. These procedures should be incorporated into the site planning process early on to understand and take advantage of site conditions. Hydrologic evaluation procedures can be used to minimize runoff potential and to maintain the predevelopment time of concentration. Open drainage systems should be designed within natural landforms and land uses to become major design elements of a site plan or Development plan. The ~~Storm Water~~ Stormwater management drainage system can suggest pathway alignment, optimum locations for open space, and potential building Development sites. The drainage system helps to integrate urban forms, giving the Development an integral, more aesthetically pleasing relationship to the natural features of the site. Not only does the integrated site plan complement the land, but it can also save on Development costs by minimizing earthwork and construction of expensive drainage structures.

(3) Minimize Impervious Surfaces. The entire traffic distribution network, (roadways, sidewalks, driveways, and parking areas), are the greatest source of impervious area. Changes in the impervious area alter runoff, recharge values, and site hydrology. Managing the imperviousness contributed by road and parking area pavement is an important component of the site planning and design process. An appropriate strategy may avoid problems from runoff and water table depletion, by reducing such surfaces that prevent natural filtration. Methods that can be used to achieve a reduction in the total runoff volume from impervious surfaces are presented below:

- (i) *Alternative roadway layouts;*
 - (ii) *Narrow Road Sections.* Reduced width road sections can be used to reduce total site imperviousness as well as clearing and grading impacts. By using the rural residential road section in place of the primary residential section, the width of paving may be reduced. The rural section also eliminates the use of concrete curb and gutter which reduces construction costs substantially and facilitates the use of vegetated roadside swales.
 - (iii) *Reduced Application of Sidewalks to One Side of Primary Roads.* Total site imperviousness can also be reduced by limiting sidewalks to one side of primary roads.
 - (iv) *Reduced On-Street Parking.* Reducing on-street parking requirements to one side, or even elimination of on-street parking altogether, has the potential to reduce road surfaces and therefore overall site imperviousness. Two-sided parking requirements may be unnecessary to provide adequate parking facilities for each lot.
 - (v) *Rooftops.* Rooftops contribute to site imperviousness, and the number of lots per acre (or lot coverage) generally determines the site's rooftop impervious area. House type, shape, and size can affect rooftop imperviousness. Vertical construction (two story) is favored over horizontal layouts (ranch-style) to reduce the square footage of rooftops.
 - (vi) *Vegetative Roof Systems.* Moss, grass, herbs, wildflowers, and native plants may be used to create a lightweight and aesthetically pleasing permeable vegetative surface on an impervious roof area.
 - (vii) *Driveways.* Driveways are another element of the site plan that can be planned to reduce the total site imperviousness. Some techniques that can be used include:
 - a. Using shared driveways whenever possible, but especially in sensitive areas.
 - b. Limiting driveway width to nine (9) feet (for both single and shared driveways).
 - c. Minimizing building setbacks to reduce driveway length.
 - d. Using driveway and parking area materials which reduce runoff and increase travel times such as pervious pavers or gravel.
 - (viii) *Permeable Pavement Surfaces.* A variety of materials ranging from traditional asphalt, and concrete, gravel or pavers may be used to construct these surfaces. These roadways or parking areas must allow water to flow through, replenishing the soil areas directly beneath. The subbase underneath these permeable pavements must be engineered to accommodate temporary water storage and filtration.
- (4) **Minimize Directly Connected Impervious Areas.** Additional environmental benefits can be achieved and hydrologic impacts reduced by disconnecting unavoidable impervious areas. Strategies for accomplishing this include:
- (i) Disconnecting roof drains and directing flows to vegetated detention areas.
 - (ii) Directing flows from impervious (paved) areas to stabilized vegetated areas.
 - (iii) Breaking up flow directions from large paved surfaces.
 - (iv) Encouraging sheet flow through vegetated areas.

- (v) Carefully locating impervious areas so that they drain to natural systems, vegetated buffers, natural resource areas, or infiltratable soils.
- (5) Modify Drainage Flow Paths. The time of concentration, in conjunction with hydrologic site conditions, determines the peak Discharge rate for a storm event. Site and infrastructure components such as: travel distance (flow path); slope of the ground surface and/or water surface; surface roughness; and channel shape, pattern, and material components can affect the time of concentration. Techniques that can affect and control the time of concentration can be incorporated into site design by managing flow and conveyance systems within the Development site:
- (i) Maximize overland sheet flow;
 - (ii) Increase and lengthen flow paths;
 - (iii) Lengthen and flatten site and lot slopes;
 - (iv) Maximize use of open swale systems;
 - (v) Increase and augment site and lot vegetation.
- (b) In order to reduce the volume of ~~Storm Water~~ Stormwater runoff and decentralize flows, a basic strategy incorporating the following low impact Development practices and techniques should be integrated in the overall site design.
- (1) Open Swales. These may serve as alternatives to curb and gutter systems. Grass or other vegetation should be used to reduce runoff velocity and allow filtration, while channeling high volume flows safely away.
- (i) Plantings, check dams, and other similar features may be incorporated to further reduce velocity and increase filtration;
 - (ii) Walkways shall be separated from roadways by such swales or relocated to another area;
 - (iii) Plant species used shall be selected for their tolerance to salt.
- (2) Rain Gardens. These areas provide storage for excess ~~Storm Water~~ Stormwater to collect and filter into the soil. Typical components of these gardens include grass buffers, sand beds, a ponding area for excess runoff storage, organic layers, and planting soil and vegetation.
- (i) They shall be located on site away from any structures and/or roadways;
 - (ii) Downspouts should be directed towards such rain gardens;
 - (iii) Permanent ponds may be incorporated into the design of the garden;
 - (iv) Temporary storage areas without ponds may be used;
 - (v) Such areas shall be landscaped with native plants and grasses;
 - (vi) Plantings shall be selected according to their ability to tolerate pollutants;
 - (vii) Annual maintenance guarantees must be provided for these areas in the site plan or Development plan.
- (3) Filter Strips. These areas are designed to collect flow from large impervious surfaces (parking lots, et cetera). They may direct water into vegetated detention areas or special sand filters that capture pollutants and gradually discharge the water.

(4) Cisterns/Rain Barrels.

- (i) Cisterns are designed to store ~~Storm Water~~ Stormwater for irrigation during dry periods, rather than channeling it away. Cistern collection systems may be designed to be installed beneath permeable pavement areas allowing for maximum storage capacity.
- (ii) Rain barrels are smaller and are designed to collect individual residential ~~Storm Water~~ Stormwater from roof drainage.

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