CHAPTER 9

MISCELLANEOUS

9.3 Storm Water Detention

9.3.1 Storm Water Management Report Required

9.3.1.1 A Storm Water Management Report shall be provided for every project. The purpose of this report shall be to formulate a plan to manage storm water runoff so that storm water runoff hazards are not created and existing runoff-related problems are not exacerbated either upstream or downstream from or within the boundaries of the property being developed. The engineer shall be responsible for obtaining all information necessary for the report. Hydrologic analysis and detention pond hydraulics (excluding dams as defined in Section 8.6 of these regulations), pipe and open channel hydraulics, culvert hydraulics and water quality best management practices shall be certified by either a professional engineer or landscape architect registered in the State of Georgia. Flood studies for any floodplain or flood prone areas, and hydrologic and hydraulic analysis and design calculations which are performed for the design of a dam as defined in Section 8.6 of these regulations, shall be certified by a professional engineer registered in the State of Georgia.

9.3.1.2 The Storm Water Management Report shall identify the locations and quantities of storm water runoff entering and exiting the site for both pre- and post-developed conditions. Analysis of the off-site properties shall anticipate future development in addition to addressing existing conditions.

All culverts, pipe systems, and open channel flow systems shall be sized based on all on-site upstream areas being developed in accordance with the development plans and the off-site upstream areas being fully developed in accordance with the Land Use Plan with no detention. Upstream detention may be included when determining flows, provided the engineer calculates the reduced flows by routing the developed flows through any storm water facility included in the analysis rather than assuming the reduction will occur. The engineer shall show that detention facilities used in the analysis will remain, be properly maintained and the storage volume and outlet structure is based on current conditions.

Detention facilities shall be designed using pre-development flows, based on existing conditions for all upstream areas including existing on-site lakes and detention. Post-development flows, except the 100-

year flow, shall be based on on-site upstream areas being developed per the development plans and existing conditions for off-site upstream areas. The 100-year flow shall be based on on-site upstream areas being developed per the development plans and the off-site upstream areas being developed per the Land Use Plan with no detention. Upstream detention may be included if it meets the conditions as described for culverts and pipe systems. Existing conditions shall be defined as the conditions of the site at the time a land disturbance permit is applied for. The existing condition includes on-site lakes and ponds. Pre-development flows shall be determined by routing the pre-development flows through these storm water facilities. Flows used to size the outlet structures for detention facilities that exceed the 25-year design flow, shall be sized as described for culverts and pipe systems. When more than 50% of the property of a developed project site is disturbed for either redevelopment or improvement, the Storm Water Management Report shall be prepared for the entire site and existing impervious areas shall be treated as forest in the pre-developed analysis. When 50% or less of the property is disturbed, detention shall be provided as required by these regulations for the disturbed area.

The report shall contain drainage area delineation maps and other exhibits at satisfactory scale and sufficient in quantity and scope to define the boundaries of the site, and off-site areas, relative to water courses, drainage divides, drainage structures, and other pertinent features. The Gwinnett County's Geographical Information System (GIS) mapping information shall be used where appropriate.

9.3.1.3 For the purposes of these regulations, the words "downstream" and "analysis" shall have the following meanings. The analysis of downstream conditions in the report shall address each and every point or area along the project site's boundaries at which runoff will exit the property. The analysis shall focus on the portion of the drainage way "immediately" downstream from the project. This area shall extend downstream from the project to a point in the drainage basin where the project area is 10 percent of the total basin area.

9.3.1.3.1 The report shall examine the conditions downstream from the project to a point where the project area is 10 percent of the total drainage basin.

- The analysis shall include all culverts obstructions, existing and potential erosion problems, elevations of existing improvements, existing drainage improvements, existing drainage complaints and any

other existing modifications to natural conditions. The downstream water courses and receiving conveyance shall be analyzed to ensure that the channel velocities do not exceed values recommended in the Design Manual nor does the pipe system exceed current design criteria of these regulations; and,

- If the existing downstream conditions are overburdened by the pre-developed flows in the stream, then the developer and the City shall jointly participate to resolve the problem. The meaning of "overburdened" shall include but not be limited to situations where 25-year velocities exceed the non-erosive velocity of the stream, habitable structures are shown to be subject to flooding for any frequency up to and including the regulatory flood and storm water facilities that can not carry the design storm in accordance with these regulations; and,

- If there are any problems identified downstream that are a result of the development, then the developer shall eliminate the conditions causing the problem.

9.3.1.3.2 Hydrographs shall be analyzed at least at two points. One study point shall be at the downstream property line where the watercourse crosses the project site's downstream property line. The second study point shall be downstream of the project at the point where the project area is 10 percent of the total drainage basin.

- The study will compare pre-developed hydrographs with post-developed hydrographs for the 2, 5, 10, 25, 50 and 100-year flood frequencies; and,

- Comparison of peak flows shall include the timing of the hydrographs; and,

- Hydrographs shall be based on a 24 hour storm.

- The analysis shall be in accordance with the Storm Water Design Manual.

9.3.1.4 The following criteria shall be evaluated by the authorized registered professional (refer to Subsection 9.3.1.1.) preparing the Storm Water Management Report, and in determining whether or not detention should be required for any portion of any site:

- Existing land uses downstream;
- Anticipated future land uses downstream;
- Magnitude of increase in peak flows due to development;
- Presence of existing drainage problems;
- Capacity of existing and anticipated drainage systems;
- Creation of concentrated flows where none had occurred previously;
- Availability of feasible locations for detention facilities;
- Existing flows generated off-site which pass through the project site; and,
- The nature of the receiving watercourse.

9.3.1.5 Where detention for a proposed project is provided in a regional detention facility that was permitted prior to January 1, 2001, the developer shall provide a copy of the original study that met the regulations at the time the facility was permitted. If the approved study cannot be found, then the engineer shall provide a recreated study. The project shall be exempt from restudy and any modifications required to meet regulations effective after January 1, 2001 provided the proposed project is in keeping with the intent of the original detention study and the detention facility is maintained.

9.3.2 Storm Water Detention Required

9.3.2.1 Whenever a Storm Water Management Report indicates that an adverse impact from storm water runoff is expected to result from the development of a property, that project shall be provided with storm water detention facilities. The meaning of "adverse impact" shall apply when pre-development flows did not cause difficulties and post-development flows do. Difficulties shall include but not be limited to situations where 25-year velocities exceed the non-erosive velocity of the stream, habitable structures are shown to be subject to increased depth of flooding for any frequency up to and including the regulatory flood, and storm water facilities that can not carry the design storm in accordance with these regulations. The detention facilities shall be designed such that peak flows from the developed site do not exceed those associated with pre-development conditions at the project boundary nor increase the peak flows.

9.3.2.2 Storm water detention facilities required in section 9.3.2.1 shall be provided, unless the authorized registered professional (refer to Subsection 9.3.1.1) certifies and provides certified documentation supporting the conclusion to the director that at least one of the following is true and correct as applicable:

9.3.2.2.1 The non-detained, post-development runoff will leave the project site as sheet flow, and will not have an adverse impact upon downstream properties. The increase for a 25-year storm should not exceed 1 cfs over a length perpendicular to the flow of 100 feet.

9.3.2.2.2 The effect of detention would be to concentrate flows where sheet flow had occurred under pre-developed conditions, and any impact of increase sheet flows upon downstream properties would be less adverse than that which would result from the concentrated flows from a detention facility even if energy dissipation devices were employed..

9.3.2.2.3 The undetained flow will pass through downstream properties, in drainage easements obtained by the developer, to an existing detention facility which has been designed to manage the upstream property's runoff or to the point in the downstream analysis (see Subsection 9.3.1.3) which shows that detention is not required.

9.3.2.2.4 The site runoff will flow directly into a stream or lake without crossing off-site properties and the downstream analysis using timing of the hydrographs shows no adverse impact from the exit of the site to the point immediately downstream from the project in the drainage basin where the project area is 10 percent of the total drainage basin area.

9.3.2.3 Should the authorized registered professional (refer to Subsection 9.3.1.1.) conclude that storm water detention may not be necessary because of anticipated compliance with subsection 9.3.2.2., rigid compliance with all of the following criteria is mandatory:

9.3.2.3.1 A Storm Water Management Report shall always be required whether or not storm water detention is required.

9.3.2.3.2 If the applicant proposes to show that the detention requirement may be eliminated for all or a portion of a project, then a pre-submittal conference with the department staff is required prior to preparation and submittal of construction plans for the project.

9.3.2.3.3 At the pre-submittal conference with the staff, the consultant shall be prepared to discuss the downstream analysis findings as follows:

- The affected stream must be analyzed downstream from the project to a point where the project area is 10 percent of the total drainage basin. The analysis must include all culverts, obstructions, existing and potential erosion problems, and any other existing modifications to natural conditions; and,

- If the existing downstream conditions are overburdened by the pre-developed flows in the stream, then detention shall be required unless the developer overburdened conditions at his or her expense when the development occurs; and,

- If there are any existing drainage complaints downstream, detention shall be required unless the developer elects to eliminate the conditions causing eh complaint at his or her expense when the development occurs.

9.3.2.3.4 If the five percent rule is to be used to show that the detention requirements may be eliminated, the following must be included in the Storm Water Management Report:

- The five percent study point shall be at the downstream property line where the watercourse crosses the project site's downstream property line; and,

- The five percent study will compare developed peak flows originating on the site against existing peak flows for the 10, 50, and 100-year flood frequencies of the major stream at the downstream property line; and,

- Comparison of peak flows shall disregard the timing of hydrographs.

- A studied FEMA floodplain or the 100-year floodplain as determined by the consulting engineer must be present on the property of the proposed development in order for elimination of the detention requirement to be considered.

9.3.3 Detention Design Criteria – General

9.3.3.1 All storm water detention pond hydrologic and hydraulic analysis and design calculations shall be certified by the authorized registered professional (refer to Subsection 9.3.1.1.).

9.3.3.2 All storm water detention facilities shall be designed to detain the 1-year storm runoff, for the area draining to the pond, for 24 hours. For the project, this volume called the channel protection volume, shall be equal to or greater than the 1-year storm runoff volume from the project. In addition, these facilities shall control the peak flow rates associated with storms having 2-year, 5-year, 10-year, and 25-year return frequencies so that flows from the developed site do not exceed those associated with pre-development conditions at the project boundary nor increase the peak flows by more than 5 percent at the point downstream from the project in the drainage basin where the project area is 10 percent of the total basin. Where adverse impacts, as defined in section 9.3.2.1, occur during the 100-year storm, the 100-year storm shall be regulated.

9.3.3.3 A variety of methods of achieving storm water management goals shall be acceptable in providing detention facilities. The type of facility provided shall be based on the following criteria:

9.3.3.3.1 The type of development which the detention facility is being provided;

9.3.3.3.2 The type of development which the detention facility is intended to protect:

9.3.3.3.3 Volume of storm water to be stored;

9.3.3.3.4 Origin and magnitude of the flows to be managed;

9.3.3.3.5 Topographic opportunities and limitations;

9.3.3.3.6 Safety considerations;

9.3.3.3.7 Maintenance requirements;

9.3.3.3.8 Aesthetic considerations;

9.3.3.3.9 Likelihood of facility operation interfering with access to public or private facilities;

9.3.3.3.10 Proximity of facility to property lines, utilities, buffers, etc.; and,

9.3.3.3.11 Similar site-specific constraints.

9.3.3.4 Detention facilities may be of any of the following types, and two or more types may be used in combination with one another:

9.3.3.4.1 Normally-dry basins, whether excavated or created by damming a natural drainage feature, or a combination of both methods;

9.3.3.4.2 Lakes and ponds, whether excavated or created by damming a natural drainage feature, or a combination of both methods;

9.3.3.4.3 Parking lot facilities;

9.3.3.4.4 Underground facilities; and,

9.3.3.4.4 Roof top facilities.

9.3.3.5 Reservoir routing methods shall be used for all detention facility design.

9.3.3.6 The hydrologic methodology used for any given project shall conform to this manual.

9.3.3.7 Runoff coefficients and runoff Curve Numbers used for pre- and post-development conditions shall be consistent with those shown in this manual. The USGS Method shall be used where applicable to check the magnitude of peak flows when other hydrologic methods recommended in the manual are used.

9.3.3.8 Calculations shall be provided showing how all times of concentration or lag times were computed, both for pre- and post-developed conditions. Likewise, adequate support must be provided for all composite runoff coefficients or curve numbers used.

9.3.3.9 If a computer program is used for hydrologic and hydraulic analysis and design, including generating and routing hydrographs, the output from the program shall be summarized in the Storm Water Management Report, and the name and version of the program shall be indicated. Computer output sheets may be attached to the report if desired by the authorized registered professional (refer to Subsection 9.3.1.1.) or is requested by the Department.

9.3.3.10 The design of every detention facility of any type shall consider the effects both of inflows in excess of those the facility is designed to

accommodate and of malfunctioning of the primary outlet system. A safe path for overflow condition flows shall be provided.

9.3.3.11 Weirs shaped like a "V" ("V: notch weirs) shall be used where practical, considering structural or hydrological concerns.

9.3.3.12 In residential subdivisions, no more than 50% of the basin perimeter may be a wall of any type.

9.3.4 Detention Facility Location Criteria

9.3.4.1 For purposes of these Regulations, a detention facility shall be deemed to consist of the area within the maximum design ponding limits unless a modification application is approved, the dam (if one) including all embankment slopes and wall footings (if applicable), primary and emergency outlet works, any drainage and access easements, and any energy dissipation devices. The intent of these regulations is to ensure that the extent of the facility is defined to allow flooding, access and maintenance. Granting of a modification will not nullify these regulations when the facility is a wet pond or lake, the area within the maximum design ponding limits is reduced to a few feet inside the normal pool elevation, and easements are provided on the perimeter properties to allow for flooding, access and maintenance around the lake. In addition, granting of the modification shall only be considered when the wet pond is an amenity and under no circumstances shall the dam and outlet structure lie on private property.

9.3.4.2 Detention facilities, to the greatest extent feasible, shall be located so as to minimize the amount of flow generated on-site which by-passes the facility.

9.3.4.3 No portion of any detention facility shall disturb any required (as opposed to voluntary) buffer, landscape strip, or tree protection area, except that natural bottom detention ponds and its appurtenant structures, which require no grading and removal of trees, may encroach into a required construction buffer.

9.3.4.4 The 100-year ponding limits of a detention facility shall not encroach upon a public right-of-way.

9.3.4.5 Detention facilities may be located within utility easements or rights-of-way, or encroach upon utility easements or rights-of-way, upon receipt by the Department of written permission from both the property and utility owners.

9.3.4.6 Detention facilities may be constructed within recreation areas, if the following criteria are met:

9.3.4.6.1 Ownership of the area will be held by a Qualified Property Owners Association, Homeowners Association, or other private parties.

9.3.4.6.2 Permanent structures, such as buildings and swimming pools, will not be constructed within the boundaries of the detention facility.

9.3.4.6.3 Detention facilities within recreation areas will be approved only if the design of the area includes recreation amenities such as ball fields, tennis courts, grassed open areas or other similar improvements. The intent is to provide recreation facilities with detention as a secondary feature.

9.3.4.6.4 Permanent detention features shall not interfere with the intended used of the recreation amenity, (i.e., a ditch or large swale shall not traverse a ball field, an inlet structure shall not be in a tennis court, etc.)

9.3.4.7 If a subdivision (residential or nonresidential) project is provided with an on-site detention facility not located within a recreation area as specified in 9.3.4.6, a property owners association shall be established for its ownership and maintenance. The facility shall be located on a single lot within the development and owned by the property owners association. The association bylaws shall be recorded concurrently with the recording of a final subdivision plat.

9.3.5 Detention Facility Easement Requirements

9.3.5.1 An easement at least 30 feet in width for residential and 20 feet for nonresidential shall be required to provide access to all detention facilities from a public street. This easement shall be cleared, grubbed and graded so that it can be utilized by rubber-tired construction vehicles. The easement location shall be such as to minimize the amount of grading required. Access easements shall not overlay drainage easements containing an open channel.

9.3.5.2 The drainage easement of any detention facility shall be at least 10 feet beyond the limits of the 100 year flood elevation.

9.3.6 Detention Facility Maintenance

9.3.6.1 The detention storage capacity or function of any detention basin, pond or other impoundment, whether natural or man-made, shall not be removed or diminished without the express approval of the Department.

9.3.6.2 It shall be the responsibility of the property owner or property owners association to maintain the operational characteristics of any facility constructed on their property for storm water detention pursuant to City requirements, and to maintain the facility free of obstruction, silt or debris.

9.3.6.3 Prior to the issuance of a Development Permit, the owner shall submit a detailed schedule of long-term maintenance and inspection activities. This schedule of activities shall be incorporated into a maintenance agreement to be entered into between the City and the owner. The schedule shall describe all maintenance and inspection activities and the parties responsible. The maintenance agreement shall be in a form acceptable to the City prior to approval of a final plat or issuance of a certificate of occupancy. The maintenance agreement shall be part of the recorded deed.

9.3.7 Detention Facility Construction Standards

9.3.7.1 Storm water detention facilities shall be constructed in accordance with plans reviewed and approved by the Department, and be in place and inspected prior to the initiation of other improvements. If the detention facility is planned to be a lake, temporary detention facilities shall be provided and small remain in place until such time as the lake has become effective in providing stormwater management.

9.3.7.2 Within a detention basin, all stumps are to be cut flush with the ground or removed and all debris is to be removed below the 10-year ponding elevation. Trees or shrubs may be allowed to remain below the 10-year ponding elevation only upon certification of the survivability of the vegetation.

9.3.7.3 Detention slopes that are disturbed are to be grassed. The ground cover within the basin shall be well established with all exposed areas covered prior to the end of the maintenance period.

9.3.7.4 If the developer desires to place a fence around a detention facility, it shall be a minimum 4-foot high fence of durable material, with a 12-foot wide access gate. The fence shall be contained within an easement at least 20 feet wide, shall not encroach upon the detention facility

(although their easements may overlap by up to 10 feet), and shall comply with the location requirements of the Zoning Resolution.

9.3.8 Detention Facility Certification and Record Drawings

A certified record survey of each detention facility shall be prepared by a land surveyor currently registered in the State of Georgia. A certified record drawing of the facility shall be prepared based upon this survey. Based on the actual parameters established on the record drawing, an addendum to the Storm Water Management Report shall be prepared which demonstrates that the facility, as constructed, complies with the requirements of these Regulations. The amended Storm Water Management Report shall be certified by the authorized registered professional (refer to Subsection 9.3.1.1.). The certified record survey shall be submitted and approved before the issuance of the Certificate of Occupancy.

END OF SECTION 9.3