VOLUME 1
REGULATIONS

STORMWATER MANAGEMENT MANUAL

METROPOLITAN GOVERNMENT OF
NASHVILLE AND DAVIDSON COUNTY
DEPARTMENT OF WATER AND SEWERAGE SERVICES
STORMWATER DIVISION
NASHVILLE, TENNESSEE

February 2016

Volume 1
REGULATIONS

STORMWATER MANAGEMENT MANUAL

METROPOLITAN GOVERNMENT OF
NASHVILLE AND DAVIDSON COUNTY
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Metro Water Services
Stormwater Division
Nashville, Tennessee

February 2016

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Chapter 1
INTRODUCTION

1.1 Background and Purpose

An ordinance for stormwater management (No. 78-840) was adopted by the Council of the Metropolitan Government of Nashville and Davidson County to take effect on January 1, 1979 (see Appendix D). In combination with Floodplain Overlay District Ordinance No. 78-843 (see Appendix E), it established the legal framework for reviewing building permits for stormwater management provisions and for requiring Grading Permits to control erosion and sedimentation problems. Regulations and technical guidelines were developed soon after adoption to assist with implementation of the regulatory program established by the ordinance.

In addition to dealing with the potential for personal injury or property damage associated with the improper management of stormwater, these ordinances secured the eligibility of the Metropolitan Government of Nashville and Davidson County (Metro) to participate in the National Flood Insurance Program (NFIP) administered by the Federal Emergency Management Agency (FEMA). Participation in the NFIP provides local property owners with the opportunity to purchase federal flood insurance. In addition, federal disaster funds beyond emergency relief are available, along with Federal Housing Administration and Veterans Housing Administration funds, which can be restricted in communities not eligible for participation in the NFIP.

1.2 Most Recent Edition

The original version of this manual was released in 1979 with revisions in 1987, 1988, 1991, 1999, 2006, 2009, 2012, and 2013. The 1999 revision was prompted by requirements in Metro's National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit issued by the Tennessee Department of Environment and Conservation (TDEC). This manual was updated in 2006 to more comprehensively address stormwater management throughout the jurisdiction of Metro and to clarify certain aspects of the program. The 2006 revision included the recommendations of the Stormwater Regulations Review Committee (SR2C), a group of stakeholders convened by the Metropolitan Department of Water and Sewerage Services (MWS). The 2009 revision contained minor editorial changes and updates of policies and procedures to align the manual with current departmental practices. In 2012, Volume 5, the Low Impact Development (LID) Manual, was added to the Stormwater Management Manual (SWMM). The 2013 revision includes improvements to the proprietary device approval policy and corrections to the LID Manual. In 2016, Volumes 1 and 5 were revised to comply with Metro's MS4 permit runoff reduction requirement. This release supersedes any and all previous manual releases.

1.3 Authorization and Title

As authorized by Ordinance No. 78-840 and Ordinance No. 97-1016 (as codified in the Metropolitan Code of Laws §15.64.010 *et. seq*.) and approved by the Mayor of Nashville, the provisions of this document establish the regulations and technical guidelines developed by the Director of the Metropolitan Department of Public Works (MPW) to enforce the terms of that ordinance. The charter to carry out these regulations has been delegated to MWS from the Director of MPW through a Memorandum of Understanding, or MOU (see Appendix G). Therefore, this design manual will refer to MWS wherever it refers to authority or responsibilities that have been delegated to MWS. However, the stormwater management ordinance, as codified in the Metropolitan Code of Laws §15.64.010 *et. seq.*, (Appendix D) will continue to refer to MPW, in accordance with the provisions of the Metropolitan Charter.

This manual shall be cited as the "Metropolitan Nashville Stormwater Management Manual" and is comprised of the following volumes:

Volume 1 – Regulations
Volume 2 – Procedures
Volume 3 – Theory
Volume 4 – Best Management Practices (BMP) Manual

1.4 Scope

The provisions of this manual shall replace any previous regulations and shall apply to all surface alteration and construction within the boundary of the Metropolitan Government of Nashville and Davidson County. Metro contains seven incorporated satellite cities: Belle Meade, Berry Hill, Forest Hills, Goodlettsville, Oak Hill, and Ridgetop, which are not bound by these regulations.

1.5 Language

1.5.1 Rules of Construction

The following rules shall apply to the text of these volumes:

1. The particular shall control the general.
2. Reference to "Ordinance" is to the Stormwater Management Ordinance 78-840 unless otherwise specified. The Ordinance, as codified in the Metropolitan Code of Laws §15.64.010 *et. seq.*, is reprinted and made a part of these regulations as Appendix D.
3. In the case of any difference in meaning or implication between the text of these regulations and the text of the Ordinance, the text of the Ordinance shall control.

4. The words "shall" and "should" are always mandatory and not discretionary. The word "may" is permissive.
5. The word "permitted" or words "permitted as of right" means permitted without meeting the requirements of these regulations.
6. Words used in the present tense include the future tense. The singular includes the plural, unless the context clearly indicates the contrary.
7. All public officials, bodies, and agencies to which reference is made are those of the Metropolitan Government of Nashville and Davidson County, Tennessee, unless otherwise indicated.
8. The term "Nashville," "Metropolitan Nashville," "Metropolitan Government," or "Metro" shall mean the area of jurisdiction of the Metropolitan Government of Nashville and Davidson County.
9. Unless specifically or otherwise noted, the term "development" shall include "redevelopment" and "significant redevelopment" as defined in Appendix B. Significant redevelopment shall be required to follow the same stormwater quality requirements as new developments.

1.5.2 Definitions

In general, all words used in these regulations shall have their common dictionary definitions. Definitions for certain specific terms as applied to these regulations may be found in Appendix B of this volume. Acronyms are found in Appendix B after the definitions.

1.6 Legal Considerations

1.6.1 Caveat

This manual neither replaces the need for professional engineering judgment nor precludes the use of information not presented in the manual. The user assumes full responsibility for determining the appropriateness of applying the information presented herein. Careful consideration should be given to site-specific conditions, project requirements, and engineering experience to ensure that criteria and procedures are properly applied and adapted.

1.6.2 Disclaimer of Liability

The degree of flood protection intended to be provided by Ordinances No. 78-840 and 78-843 and these regulations is considered reasonable for regulatory purposes, and is based on engineering and scientific methods of study. Larger floods may occur on occasion, or the flood height may be increased by manmade or natural causes, such as bridge openings restricted by debris. These ordinances and regulations do not imply that land outside the areas of special flood hazard or uses permitted within such areas will be free from flooding or flood damages. These regulations or ordinances shall not create a liability on the part of, or a cause of action against, Metro or any officer or employee thereof for any flood damages that result from reliance on these regulations or ordinances, or any administrative decision lawfully made thereunder.

1.6.3 Severability

If any section, subsection, sentence, clause, phrase, or portion of these regulations is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portion shall be deemed a separate, distinct, and independent provision, and such holding shall not affect the validity of the remaining portions of these regulations.

1.6.4 Compatibility

If any provisions of these regulations and any other provisions of law impose overlapping or contradictory requirements, or contain any restrictions covering any of the same subject matter, that provision which is more restrictive or imposes higher standards or requirements shall govern. These regulations do not relieve the applicant from provisions of any other applicable codes, ordinances, or regulations not explicitly repealed by these regulations. Nothing in these regulations alters, amends, or negates requirements under existing detention pond agreements between Metro and property owners.

1.6.5 Saving Provision

These regulations do not abate any action now pending under prior existing regulations unless as expressly provided herein.

Chapter 2
STORMWATER MANAGEMENT POLICY

2.1 Objectives

The objectives of these regulations are:

1. To protect human life and health.

2. To minimize expenditure of public money for costly flood control projects.

3. To minimize the need for rescue and relief efforts associated with flooding.

4. To help maintain a stable tax base by providing for the sound use and development of flood-prone areas in such a manner as to maximize beneficial use without increasing flood hazard potential or diminishing the quality of the natural stormwater resources.

5. To ensure that potential homebuyers are notified that property is in a flood area and generally increase the public awareness of flooding potential.

6. To minimize prolonged business interruptions.

7. To minimize damage to public facilities and utilities such as water and gas mains; electric, telephone, and sewer lines; and streets and bridges located in floodplains.

8. To ensure a functional stormwater quantity and quality management system that will not result in excessive maintenance costs.

9. To encourage the use of natural and aesthetically pleasing design that maximizes preservation of natural areas.

10. To guide the construction of stormwater management facilities by developing comprehensive master plans to address stormwater quantity and quality.

11. To protect or enhance stormwater quality to a level of “designated use” and minimize the impacts from new development or areas of significant redevelopment.

12. To encourage preservation of floodplains, floodways, and open spaces to protect and benefit the community’s quality of life and natural resources.

2.2 Policy Statements

To implement the objectives presented above, the following general policy statements shall apply:

1. The Metro Stormwater Management Program is intended to establish guidelines, criteria, and procedures for stormwater management activities within Metropolitan Government of Nashville and Davidson County (Metro). Metro contains seven incorporated satellite cities: Belle Meade, Berry Hill, Forest Hills, Goodlettsville, Oak Hill, and Ridgetop. These satellite cities are not bound by the requirements of the Metro Stormwater Management Program. Key elements of the program include the Stormwater Management Manual, Ordinances No. 78-840 and 78-843, and major watershed master plans.

2. Individual projects shall be evaluated for consistency with the stormwater management master plans, if available, for the major watershed or watersheds within which the project site is located. Figure 2-1 presents the watersheds for which stormwater quantity and/or quality master plans have been developed. The individual project evaluation will determine if stormwater quantity and quality management practices can adequately serve the property and limit impacts to downstream public and private properties. The presence of a regional facility or regional facilities will be considered in determining the extent to which quantity and/or quality controls will be necessary.

3. In the absence of a stormwater quantity and/or quality master plan, a system of uniform requirements shall be applied to each individual project site. In general, these uniform requirements will be based on the criterion that post-development stormwater peak runoff and water quality must not differ significantly from pre-development conditions. Additional requirements will be based on volume control for sites tributary to sinkholes or “drainage” wells.

4. Metro will develop or update master plans for all watersheds. The Metropolitan Department of Water and Sewerage Services (MWS) shall coordinate with Metro Planning on the development of Sub-Area Plans and develop a protocol to incorporate stormwater management needs into the planning process.

5. Metro will develop full floodplain build-out conditions for all watersheds where continued development is anticipated to significantly raise the floodplain elevation and use them to set appropriate standards.

6. Metro will identify streams or watersheds where new flood elevation studies were not performed by the Federal Emergency Management Agency (FEMA) or the U.S. Army Corps of Engineers (USACE) and prioritize them for study updates.

7. No construction, whether by private or public action, shall be performed in a manner that will have a negative impact on stormwater quantity or quality in its vicinity or in other areas

whether by flow restrictions, increased runoff, or by diminished channel or overbank storage capacity.

8. New construction may not aggravate upstream or downstream flooding. Existing downstream or upstream problems may be required to be corrected in conjunction with new development.

9. Unwarranted acceleration of erosion due to various land development activities must be controlled.

10. Metro's Grading Permit requirements must meet but may exceed the Tennessee Department of Environment and Conservation's (TDEC's) Construction General Permit requirements to remain in compliance with Metro's National Pollutant Discharge Elimination System (NPDES) permit.

11. New construction shall not be permitted until temporary or permanent erosion prevention and sedimentation control management practices have been placed or constructed, and are operational to Metro's satisfaction. Metro reserves the right to stop work on properties that do not have adequate erosion prevention and sedimentation control measures.

12. New development will be required to minimize the impact to stormwater quality by applying structural and/or nonstructural management practices selected to address site-specific conditions. Metro strongly encourages the use of non-structural stormwater control measures and better site design practices that decrease reliance on structural stormwater control measures.

13. New development and significant redevelopment will be required to maintain water quality buffers along water features that are designated as community waters.

14. Metro reserves the right to require more stringent erosion prevention and sedimentation control practices on properties within watersheds identified by TDEC as Exceptional Tennessee Waters or impaired.

15. Metro reserves the right to require maintenance or modification of stormwater management practices that are not operating properly, as determined by MWS.

16. Metro encourages regional stormwater quantity control practices that serve multiple areas. However, instream regional quantity controls are not permitted.

17. Land disturbance activities will not be permitted within the floodway or a buffer. Construction in floodplains should be done in a way that protects or enhances stormwater quality and promotes land and tree conservation, greenways, floodplain preservation, and hazard mitigation. Furthermore, development within a floodplain shall be consistent with the requirements of Ordinances No. 78-840 and 78-843 (Appendices D and E).

18. Metro reserves the right to require an "erosion prevention and sediment control professional" or other similar person designated by the TDEC or Metro to be on site for inspection and enforcement of proper construction and maintenance of erosion prevention and sediment control management practices at construction sites.

Figure 2-1
Completed Watershed Master Plans

Basin plans completed by the Department of Public Works

Basin Name	Year
Whites Creek	1988
McCrory Creek	1988
Browns Creek	1990
Pages Branch	1991
East Fork Hamilton Creek	1991
Dry Creek (including Gizzard Branch)	1994
Gibson Creek	1996
Scotts Creek	1997
Cooper Creek	2000

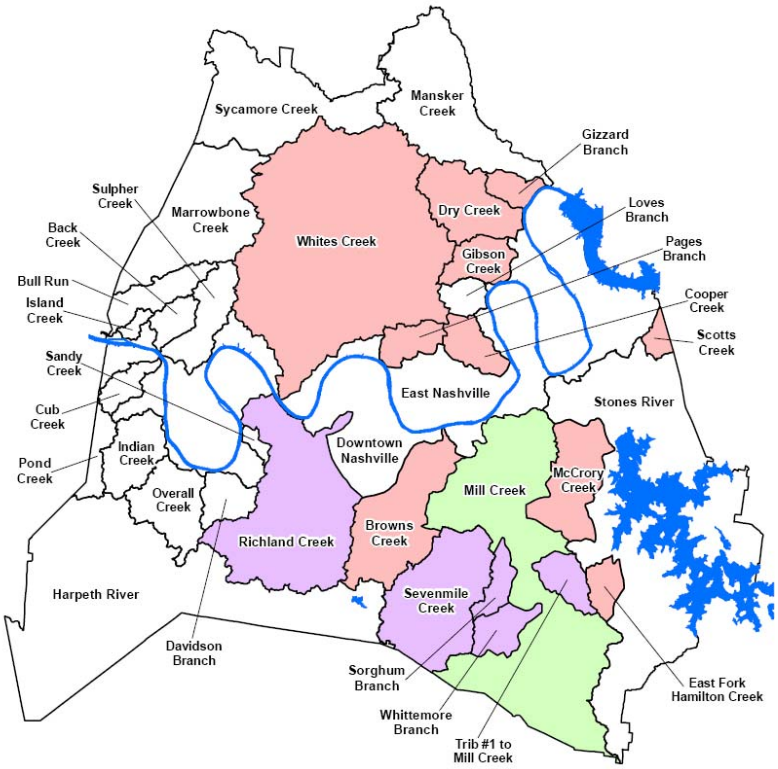
Under study by the US Army Corps of Engineers

Basin Name	Year
Mill Creek	Current

Under study by the US Army Corps of Engineers (previously studied by the Department of Public Works)

Year Completed by Department of Public Works

Basin Name	Year
Richland Creek	1990
Tributary #1 to Mill Creek	1996
Whittemore Branch	1996
Sorghum Branch	1996
Sevenmile Creek	2001



2.3 Stormwater Management Systems

For the purposes of these regulations, stormwater management systems are considered to be comprised of two parts, the major and minor systems. A brief description of these two parts is presented below.

2.3.1 Minor Systems

The minor system of a stormwater management network is sometimes termed the "initial system" and may consist of a variety of stormwater management appurtenances ranging from inlets, manholes, street gutters, roadside ditches, and swales to small channels or pipes. This system collects the initial stormwater runoff and conveys it to the major system.

2.3.2 Major Systems

The major system primarily consists of natural waterways, "Waters of the State", community waters, large storm sewers, major culverts, bridges and large water impoundments, but it can also include less obvious flow paths such as overland relief swales and infrequent floodplain storage. The major system includes not only the trunk line conveyance that receives the water from the minor system, but also the natural flow path that functions in case of overflow from or failure of the minor system. Properly designed overflow relief will not flood or damage homes, businesses, or other property. The major system is needed for small, medium, and large flood events. Eventually, it will fill with water whether or not it has been planned and designed, and whether or not development is situated wisely with respect to it.

2.4 Stormwater Quantity and Quality Detention

Increased urbanization within Metro has caused radical changes to the topography, ground cover, and minor stormwater management systems within each drainage basin. These changes have adverse effects on the environment, primarily through the subsequent increase in stormwater runoff quantity and nonpoint source pollution, which has a negative impact on stormwater quality. In some areas, the combination of increased runoff and the location of property near a stream cause frequent flooding (often several times per year). In these areas, upstream control of frequent as well as large flows may not provide adequate flood protection for residents and property downstream.

To minimize adverse stormwater quantity and quality impacts, all new developments must be evaluated for adverse impacts on downstream properties. This requirement is mandatory for all developments that are not served by an adequately sized regional stormwater management facility, subject to review by MWS. Because detention in downstream areas of a large watershed can cause increased peak flows in downstream channels, MWS reserves the right to alter the detention criteria and to prohibit it where it would cause adverse impacts. This decision shall be based on sound engineering judgment along with supporting data and studies. In all cases where detention facilities are required, the location and design must comply with any stormwater master plans that may have been adopted.

This policy is primarily concerned with maintaining pre-development conditions, for stormwater quality, flood storage, flow, and velocity; it should also be applied under certain conditions for the purpose of maintaining adequate capacity of an existing outfall or combining public and private efforts to correct existing deficiencies for flooding, erosion, and stormwater quality. In some cases

controlling the total volume of runoff to predevelopment levels may also be required, such as in areas tributary to sinkholes.

2.5 Other Stormwater Quality Management Practices

TDEC classifies surface waters into seven designated use categories based upon water quality standards and goals for each water body. The use classifications are: fish and aquatic life protection, recreation, drinking water supply, industrial water supply, livestock watering and wildlife, irrigation, and navigation. All of the lakes and streams in Metro are classified, at a minimum, for fish and aquatic life protection and recreation. Increased pollutant concentrations and loads affect the ability of Waters of the State to meet designated use goals. To minimize these stormwater quality impacts, onsite stormwater quality management practices are mandatory for all developments subject to review by MWS and on existing sites deemed by MWS as contributing significant pollutant loadings to a receiving stream or Municipal Separate Storm Sewer System (MS4).

2.6 Floodplains

Development of property located within the floodplain must comply with guidelines established in Ordinances No. 78-840 and 78-843 and provisions specified in Chapter 5 of this volume. Wise use of the floodplain is encouraged to minimize adverse effects on flood heights, flow velocities, and stormwater quality, as well as maximize land conservation, greenways, floodplain preservation, and hazard mitigation. Buffers are required in and proximate to approved floodways and community waters. See Section 6.9 of this volume for additional details.

Areas of the floodplain available for development must be protected through the use of compacted fill, elevated structures, dikes, or floodwalls (See Section 3.4.3 for acceptable fill characteristics). Any use of these measures must be in accordance with the requirements in Chapter 5 of this volume. Other flood proofing measures are subject to the approval of MWS.

2.7 Erosion and Sediment Control

All development shall be conducted in a manner that minimizes soil erosion and resulting sedimentation. Construction may not, under any circumstance, allow sediments to leave a construction site in a way that would be a violation of the site's Grading Permit or of Metro's NPDES MS4 permit. Site-specific variables such as topography, soil erodibility, stormwater management features, and vegetation shall be considered when developing an erosion control plan. The exposed area of any disturbed land shall be limited to the smallest practical area for the shortest possible period of time. New development and areas of significant redevelopment shall be required to fulfill the provisions in Section 6.10 of this volume. This includes the use of sediment detention ponds and traps at the fringes of cleared areas along with silt fences and/or berms, as appropriate. The detention shall be sized to control runoff and silt for the duration of the project.

Chapter 3
ADMINISTRATION

3.1 Overview

This chapter summarizes the division of responsibilities for administering stormwater management activities among public agencies. The requirements for permitting and activities exempted from permit review by the Metropolitan Department of Water and Sewerage Services (MWS) are delineated for both building and grading. Procedures are established for enforcement of stormwater regulations and inspection of affected sites. As-built certification requirements for the stormwater management system, cut and fill, site grading, and other construction are also addressed.

3.2 Organization

Administration of stormwater management activities is carried out by three agencies of the Metropolitan Government of Nashville and Davidson County: MWS, the Department of Codes Administration, and the Planning Commission. Stormwater management responsibilities of these three entities are briefly discussed in the following subsections. A list of addresses and phone numbers for these and other relevant agencies is presented in Table 3-1.

Table 3-1 Administrative Responsibilities for Stormwater Management Activities

Local Agencies	Contact Purpose
Metro Water Services Stormwater Division 800 Second Avenue South, Nashville, TN 37210 (615) 862-4588	Plan review and approval; Variances; As-builts; Bonds; PUD/Plat review; Floodplain information; Elevation certificates; Flood insurance program
Metro Water Services Stormwater Division-NPDES 1607 County Hospital Road Nashville, TN 37218 (615) 880-2420	Grading Permit; Pre-con meetings; Drainage system inspections & maintenance; Illicit discharge investigations; Industrial inspections; Flood response
Department of Codes Administration 800 Second Avenue South Nashville, TN 37210 (615) 862-6510	Building Permits; No-rise Certificates; Urban Forestry
Metropolitan Planning Department 730 Second Avenue South Nashville, TN 37210 (615) 862-7150	Subdivision Plat approval

Table 3-1 Administrative Responsibilities, continued

State Agencies	Contact Purpose
TDEC - Nashville Field Office 711 R.S. Gass Boulevard Nashville, TN 37216 (615) 687-7000	Aquatic Resource Alteration Permit; National Pollutant Discharge Elimination System Permit; Construction General Permit; Water quality issues
TDEC - Division of Water Resources William R. Snodgrass Tennessee Tower 312 Rosa L. Parks Avenue, 11th Floor Nashville, TN 37243 (615) 532-0625	Aquatic Resource Alteration Permit; National Pollutant Discharge Elimination System Permit; Construction General Permit; 303(d) list; TMDL; Class V Injection Well Permit, Water quality issues relating to sinkholes
TDEC- Division of Natural Areas William R. Snodgrass Tennessee Tower 312 Rosa L. Parks Avenue, 11th Floor Nashville, TN 37243 (615) 532-0431	Threatened and Endangered Species/Habitat Assessment
Tennessee Wildlife Resources Agency (TWRA) Ellington Agricultural Center P.O. Box 40747 Nashville, TN 37204 (615) 781-6643	Threatened and Endangered Species/Habitat Assessment
Federal Agencies	**Contact Purpose**
Federal Emergency Management Agency (FEMA) Region IV Mitigation Division Koger Center-Rutgers Building Atlanta, Georgia 30341 Maps: Toll free 1-877-fema-map	Floodplain/floodway mapping; Flood insurance information; Alteration of floodplains/floodways
Department of Army U.S. Army Corps of Engineers Nashville P.O. Box 1070 Nashville, TN 37202-1070 (615) 736-7161	Section 404 permit (alteration to navigable waterways and wetlands).
Natural Resources Conservation Service (NRCS) US Courthouse Room 675 801 Broadway Nashville, TN 37203 (615) 736-5477	Soils information; Hydrologic procedures (TR-55)
Department of the Interior U.S. Geological Survey (USGS) 640 Grassmere Park, Suite 100 Nashville, TN 37211 (615) 837-4700	Stream gage information; Regional regression equations; historical stream flow information

3.2.1 Metro Water Services Stormwater Division

MWS reviews Grading Permit applications for land disturbance activities. Applications are evaluated for completeness and for technical compliance with the requirements of these stormwater management regulations and other pertinent laws and ordinances, and to ensure that sites are reasonably safe from flooding. In addition, MWS is responsible for inspection and enforcement activities, and for obtaining as-built certifications by a registered professional engineer.

MWS reviews subdivision plats, specific plans (SP), and planned unit development (PUD) plans at the request of the Planning Commission. The following applies to subdivision plats only.

1. The Stormwater plat requirements are reflected on the "Subdivision Plan/Plat Application" checklist available from the Planning Department. The checklist incorporates by reference various requirements from the Stormwater Management Manuals.
2. Stormwater Review. All plats submitted for Stormwater review must comply with the requirements in the checklist. Since checklist items are not equally weighted, Stormwater will assign each plat a status of either "Approved Except as Noted" or "Returned for Correction" subsequent to plat review.

Status	What does the status mean?
Approved Except as Noted	Plat may be approved by the Metro Planning Commission subject to the noted revisions being made conditions of plat approval. Prior to the plat being recorded by the Metro Planning Department, all of Stormwater's conditions of approval must be satisfied. If they are not, the Mylar (plat) will be returned for correction until all items are addressed.
Returned for Correction	Plat is not approved by Stormwater and is not ready for Metro Planning Commission review/approval. Until the requested corrections are made, the plat will not be given approval or conditional approval by Stormwater. Table 3-2 identifies those items Stormwater typically gives a plat status of "Returned for Correction," if omitted from a plat.

Table 3-2 Common Plat Requirements

Checklist Item	Be sure plat shows…	Reference Info.
Public Drainage Easements	Proper labeling and sizing of Public Drainage Easements	Vol. 1 Tables 6-1 & 6-2; required open channel easement widths and pipe easements widths.
Steam buffers; Floodway Buffers	Proper width and size of buffers	Vol. 1 Figures 6-1 thru 6-3; buffers are scaled from the respective tops of bank and not the stream centerline.
Water quality/quantity measures	Illustration and labeling of measures	
100 year Floodplain and Floodway	Accurate depiction of existing and proposed boundaries	
Minimum Finished Floor Elevations (FFE)	Labeling of FFE's on all lots affected by a 100 Year Floodplain	
Stormwater Maintenance Agreement	Labeling of recorded instrument # on plat	
Dedication of Drainage Easement	Labeling of recorded instrument # on plat	

MWS serves as the Federal Emergency Management Agency (FEMA) floodplain program administrator and contact for the Community Rating System (CRS) for Metro. In this role, MWS reviews and signs off on Conditional Letters of Map Revision (CLOMRs).

In order to carry out the duties set forth in Ordinance No. 78-840, the Director of MWS has the authority to initiate the following actions:

1. Authorize designated employees of MWS to act in his behalf in carrying out the duties set forth in Ordinance No. 78-840.

2. Establish and amend written regulations and technical guidelines to enforce the terms of Ordinance No. 78-840 (approval of the Mayor required).

3. Inspect private stormwater management systems and stream alterations and order corrective actions as necessary to properly maintain stormwater management systems and assure the flood-carrying capacity of a watercourse is not diminished.

4. Prepare or have prepared stormwater master plans for basins with such detail as may be needed to implement master plans.

5. Verify and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved buildings or the level to which these buildings have been floodproofed, in accordance with Chapter 5 of these regulations.

6. Maintain all records pertaining to the provisions of Ordinance No. 78-840 and these regulations. Such records shall be open for public inspection.

MWS facilitates and implements the National Pollutant Discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) permit issued to the Metropolitan Government by the Tennessee Department of Environment and Conservation (TDEC). In this role, MWS reserves the right to inspect public and private infrastructure or facilities that may have an impact on the quality of Metro's stormwater or any activities that could result in a violation of the NPDES MS4 permit. These inspections may or may not be associated with construction activities.

3.2.2 Department of Codes Administration

Codes reviews building permit applications and refers them to MWS to determine if a Grading Permit is required. A building permit cannot be issued on a project requiring a Grading Permit until the Grading Permit is issued. The Department of Codes also administers a Use and Occupancy (U&O) permit process for non-residential Grading Permit projects. Codes will not issue a U&O permit for a project until MWS approves the final grading and drainage at the site.

The Director of Codes Administration, with the approval of the Mayor, has the authority to establish written regulations and technical guidelines as necessary to enforce the terms of Ordinance No. 78-840.

3.2.3 Planning Commission

The Planning Commission is responsible for receiving and referring subdivision plats and PUD plans to MWS.

All preliminary concept plans for major subdivisions and all PUDs submitted to the Planning Commission shall include the following statement: "Any excavation, fill, or disturbance of the existing ground elevation must be done in accordance with stormwater management ordinance 78-840 and approved by the Metropolitan Department of Water Services." Depending on the potential impact of the proposed project, the Planning Commission may require that certain requirements of these regulations be included on the preliminary plan for review by MWS (see Section 4.2.2).

3.2.4 Stormwater Management Committee

The Metropolitan Stormwater Management Committee (Committee) has been established to hear appeals from adverse decisions related to compliance with the stormwater management regulations and to consider requests for variances from the requirements of these regulations.

Appeals and variances for consideration by the Committee must be filed on a form provided by MWS and will be handled in accordance with variance procedures of Section 3.6 and the internal operating rules and regulations of the Committee presented in Appendix F. All adverse decisions can be appealed to the Committee within 30 days of the decision. Decisions that are not appealed within 30 days become final and can be enforced by Metro through additional legal action in Chancery Court. Notices of Violation (NOVs) can be appealed to the Director (see Section 3.7.3 for more information).

3.3 Grading and Building Permit Requirements

Stormwater management activities associated with development projects require either building or Grading Permits or both. These permits shall be in conformance with the provisions of these regulations and are required prior to the commencement of the development activities they cover. Additional permits may be required by state or federal agencies. It is understood that an applicant who requests coverage under an MWS Grading Permit has obtained and examined Volume 1 of the Metro Stormwater Management Manual, and agrees to comply with the Grading Permit terms and conditions.

Except for exempted activities (see Section 3.5), a building permit cannot be issued until grading, drainage, and erosion control plans are submitted by a registered professional engineer and approved by MWS. If a project requires both building and Grading Permits, the Grading

Permit must be issued first. When grading, stripping, excavating, filling, or any disturbance to the natural ground cover is planned for non-exempt activities not requiring a building permit (see Section 3.4 for exemptions), then a Grading Permit is required. All development activity within a designated floodplain requires a Grading Permit. When development is exempt from obtaining a Grading Permit (see Section 3.4) or exempt from MWS approval for a building permit (see Section 3.5), MWS retains the authority to remove such exemption if a development is found to be in violation of Metro regulations.

In addition, none of the following documents shall be issued or granted under applicable zoning regulations or other laws unless and until grading and drainage and erosion control plans have been approved by MWS:

1. Final approval for a proposed subdivision by the Planning Commission.

2. Final approval for a proposed PUD by the Planning Commission.

Any of the above should be applied for at the same time as the Grading Permit. "Conditional final approval" does not constitute "final approval" under this section.

All Grading Permit applications shall include grading and drainage and erosion control plans prepared by a professional engineer, as appropriate. Methods used shall be consistent with the procedures in Volume 2 of this manual.

3.4 Grading Permit Exemptions

Activities that are exempt from obtaining a Grading Permit are identified in Sections 3.4.1 through 3.4.8. These exemptions shall not be construed as exempting the identified activities from onsite stormwater management improvements that may be required to conform to adopted building and construction codes, or from compliance with floodplain requirements presented in Chapter 5 of this volume.

In addition, the property owner or developer whose activities have been exempted from the requirements for permits and approvals enumerated in this manual shall nevertheless be responsible for complying with the intent and provisions of these regulations. This includes the installation and maintenance of proper erosion prevention and sediment control measures where necessary.

Metro, through MWS, reserves the right to revoke any of the following exemptions if an individual site may have an impact upon stormwater quality or other related provisions in implementing its NPDES MS4 permit responsibilities.

3.4.1 Exemption for Approved Subdivision or PUD Grading Plans

No Grading Permit shall be required for any individual structure within a major subdivision or PUD that was issued an overall Grading Permit. However, any alteration to the original plan may require the submittal of an additional plan.

Any person disturbing the natural ground cover in an area for which there is an approved grading, drainage, and erosion control plan shall conform to the requirements of such plan without exception. In addition, subsequent development activities shall not impair existing stormwater management systems, constitute a potential erosion hazard, or act as a source of sedimentation to any adjacent land or watercourse.

Regulated Residential Infill is the creation of 800 to 15,000 square feet of additional net impervious area (IA) through single family residential development, redevelopment, or rehabilitation in existing neighborhoods. These projects follow a different regulatory path than traditional Grading Permits and the Residential Infill Permit is issued as part of the building permit. Please see Chapter 8 and Appendix H for more information.

3.4.2 Exemption for Finish Grading

Provided a site is out of the 100-year floodplain and required buffer, no Grading Permit shall be required for finish grading or excavation below finished grade for the following structures:

1. Basements and footings of a single family or duplex residential structure.

2. Retaining walls.

3. Swimming pools.

4. Human or animal cemeteries.

5. Accessory structures related to single family residences or duplex structures authorized by a valid building permit, provided the disturbed material or fill is handled in such a manner as to conform to the approved erosion control plan for the area or, where no such erosion control plan is in effect, that such work is done in a manner which presents no significant erosion hazard.

3.4.3 Exemption for Excavation or Fill

No Grading Permit shall be required for an excavation or fill that satisfies all of the following criteria:

1. Fill material contains only inert soil, rock, concrete without rebar and no more than 24 inches in length, and/or brick rubble.

2. Fill is not in the 100-year floodplain and is less than five (5) feet in vertical depth at its deepest point as measured from the natural ground.

3. Does not result in a total quantity of more than 100 cubic yards of material being removed from, deposited on, or disturbed on any lot, parcel, or subdivision thereof.

4. Does not impair existing surface stormwater management systems, constitute a potential erosion hazard, or act as a source of sedimentation to any adjacent land or watercourse.

5. Has no fill placed on a surface having a slope steeper than five (5) feet horizontal to one (1) foot vertical (steeper slopes can be allowed if justified by calculations for appropriate stabilization measures).

6. Has no final slopes steeper than one (1) foot vertical to three (3) feet horizontal (steeper slopes can be allowed if justified by calculations for appropriate stabilization measures).

7. Has temporary or permanent soil stabilization measures applied to denuded areas within 15 days of disturbance.

8. Does not contain hazardous substances.

9. Is not partially or totally in a watershed with outlet to a sinkhole or drainage well.

10. Does not result in the exposure or disturbance of more than 10,000 square feet of land.

3.4.4 Exemption for Agricultural Practices

If the site is out of the 100-year floodplain, no Grading Permit shall be required for accepted agricultural land management practices such as plowing; cultivation; construction of agricultural structures; nursery operations such as the removal of or transplanting of cultivated sod and trees; the clearing of land to create pasture; and logging operations leaving the stump, ground cover, and root mat intact. An agricultural project involving greater than 100 cubic yards of fill must notify Metro Stormwater prior to site disturbance to obtain an exemption.

3.4.5 Exemption for Maintenance Grading

No Grading Permit shall be required for grading as a maintenance measure, or for landscaping on existing developed lots or parcels, provided all of the following criteria are met:

1. The aggregate area affected or stripped at any one time does not exceed 10,000 square feet and is not within a natural drainageway (e.g., designated floodplain).

2. The grade change does not exceed eighteen (18) inches at any point and does not alter the direction of the drainage flow path.

3. Has temporary or permanent soil stabilization measures applied to denuded areas within 15 days of disturbance.

4. The grading does not involve a quantity of material in excess of 100 cubic yards.

3.4.6 Exemption for Public Utilities

No Grading Permit shall be required for installation of lateral sewer lines, telephone lines, electricity lines, gas lines, or other public service utilities by a public utility or its agent. Although exempt, public agencies are requested to submit documents to MWS for consistency reviews and to allow coordination with other activities. This exemption does not include the construction of sites or buildings used by public utility agencies.

3.4.7 Exemption for Demolition

No Grading Permit shall be required for the demolition of aboveground structures if the following provisions are met:

1. Demolition Permit has been obtained from Codes.

2. Proper site controls to prevent demolition materials or related pollution from leaving the site are installed.

3. The earth disturbed does not exceed 10,000 square feet or 100 cubic yards.

3.4.8 Exemption for Permitted Mining Operations

Provided a site is out of the 100-year floodplain and required buffer, no Grading Permit shall be required for activities conducted within the permitted area of mining operations that are covered under a TDEC-issued Surface Mining (NPDES) Permit. Discharges from such sites are subject to a valid NPDES permit since they are considered to be industrial process wastewater. This exemption shall be conditional upon the permit holder ensuring that, at the time the NPDES permit is issued, modified or renewed, whichever is later, the quantity of any such permitted discharge does not cause the conveyance capacity of any downstream stormwater conveyance/structure to be exceeded. Activities conducted outside the permitted area are subject to Metro Stormwater Management regulation.

3.5 Exemptions from MWS Building Permit Review

Codes may exempt certain residential, commercial, or industrial activities from MWS review if they meet the conditions defined below.

3.5.1 Residential Exemptions

Activities that require a building permit may be exempted from review by MWS if they are: single to two family individual residential dwellings that do not alter a drainage channel, do not alter the landscape by excavation or fill, and meet all of the criteria presented in Section 3.4.3 for Grading Permit exemptions for excavation or fill. This exemption does not remove the water quality buffer and erosion and sediment control requirements of these regulations.

3.5.2 Commercial or Industrial Exemptions

Activities that require a building permit may be exempted from review by MWS if they are: commercial or industrial development, add less than 10,000 square feet of impervious surface, and meet all of the criteria presented in Section 3.4.3 for Grading Permit exemptions for excavation or fill.

3.6 Variance Procedures

The Stormwater Management Committee shall hear requests for variances from the requirements of these regulations. Requests for variances must be filed on a form provided by MWS and will be handled in accordance with these variance procedures and internal operating rules and regulations of the Committee presented in Appendix F. If the conditions under which a variance was approved are not met or if the Committee is informed of any misrepresentation of facts in the application or at the hearing, the Stormwater Management Committee may revoke the variance upon notice and opportunity for a hearing. MWS may issue a Stop Work Order or the Metro Department of Codes may withhold the Use and Occupancy Permit for a project until any problems identified by a Metro department with the variance are resolved to the satisfaction of the issuing department.

3.7 Enforcement

3.7.1 Right of Entry

The Director of MWS, the Director of Codes Administration, or any of their duly authorized representatives may enter upon the premises of any land within Metropolitan Nashville and Davidson County for the purposes of inspecting the site before, during, and after construction to determine compliance with these regulations.

The Director of MWS or any of his or her duly authorized representatives may enter upon the premises of any land and enter facilities within Metropolitan Nashville and Davidson County for the purposes of inspecting potential impacts to stormwater quality or any activities that may violate the NPDES MS4 permit.

3.7.2 Revocation

Upon notice and opportunity for a hearing, the Director of MWS may revoke any approval or permit issued under the provisions of these regulations for any of the following reasons:

1. A false statement or misrepresentation of facts was made in the application or plans on which the permit or approval was based;

2. The developer or EPSC professional changes on a project without notifying MWS NPDES department;

3. A permitted site has unpaid civil penalties that are delinquent by 60 days or more; or,
4. Fill in excess of 100 cubic yards was brought from the site to a location without a valid Grading Permit, creating a violation of the SWMM.

3.7.3 Notice of Violation

When it is found that any provision of these regulations is being violated, MWS may issue a Notice of Violation (NOV). This NOV shall include a description of the violation and any work or remediation required to bring the site into compliance. NOVs may also include corrective measures, the requirement for work on a project to stop, or penalties. A NOV may be issued to any or all of the following: the property owner, the contractor or subcontractor, the developer, or the homebuilder.

3.7.3.1 Corrective Measures

Any non-permitted stormwater management system, construction, or fill shall, upon written notice from the Director of MWS, be removed at the expense of either the property owner and/or the party that created the violation.

3.7.3.2 Stop Work Order

When it is found that any provision of these regulations is being violated, the Director of MWS or the Director of Codes Administration may issue a stop work order.

The stop work order shall be in writing and shall be served personally or by certified mail upon the owner of the business or property violating the provision, the duly authorized agent, or the person responsible for such work; or posted at the site of the violation or noncompliance.

The stop work order shall set forth the following:

1. The reasons why such work is being stopped;

2. The regulation or the Metropolitan Code of Law section that is being violated;

3. The conditions under which the order maybe removed and the work resumed; and

4. The right to an informal hearing before the Director to appeal the stop work order.

3.7.3.3 Penalties

Any violation of these regulations shall be punishable by a penalty as provided in the Metropolitan Code of Laws, §15.64.220 and §1.01.030. Each day a violation continues shall constitute a separate offense.

A hearing to appeal the NOV may be requested by anyone upon whom a NOV has been served. Such an appellate hearing must be requested in writing to the issuing Director within ten (10) days of service of the NOV. The issuing Director or his designee, hereinafter referred to as Director, shall hold the hearing within fifteen (15) days of receipt of the hearing request. The Director shall determine whether provisions of the Metropolitan Code of Laws or these regulations were violated and, if a violation occurred, any conditions required to bring the site into compliance. The hearing shall be informal, shall be scheduled by the issuing Director, and may be continued only with the consent of the issuing Director. A written decision shall be mailed to the owner of the business or property within ten (10) business days of the conclusion of the hearing. An adverse decision of the Director of MWS may be appealed to the Stormwater Management Committee (SWMC) pursuant to the procedures outlined in Appendix F.

If no hearing is requested within ten (10) days of service of the NOV, the NOV shall remain in effect until compliance with the cited regulation or code section can be demonstrated to the satisfaction of the issuing Director. A compliance hearing to demonstrate that the business or work is in compliance with the relevant regulation or code section may be requested at any time after issuance of a NOV. The issuing Director shall schedule such a compliance hearing within ten (10) business days of receiving the request. The hearing shall be informal and may be continued only with the consent of the issuing Director. No such continuance shall excuse the violation for purposes of the assessment of penalties for continuing violations. A written decision shall be mailed to the owner of the business or property within ten (10) business days of the conclusion of the hearing.

3.7.4 Injunctions

In addition to all other remedies provided by law, the Metropolitan Government of Nashville and Davidson County shall have the right to injunctive relief for any violation of these regulations.

3.7.5 Other Enforcement Tools

In addition to the enforcement mechanisms named above, MWS may use any of the following measures to enforce compliance with Stormwater regulations. Until the development in question is in compliance with regulations and until all penalties have been paid, MWS will:

1. Withhold release of infrastructure bonds that it holds on any phase of the development until the phase in question is in compliance and until all penalties have been paid;

2. Withhold new Grading Permits for other phases of the development until the phase in question is in compliance and until all penalties have been paid; or

3. Withhold the Stormwater Use & Occupancy permit sign-off on any phase of the development until the phase in question is in compliance with these regulations and all associated penalties have been paid.

3.8 Inspections

MWS may make or cause to be made the inspections required by this section. Reports by inspectors employed by recognized inspection services may be accepted provided that, after investigation, their qualifications and reliability prove satisfactory to MWS. No certificate called for by any provision of these regulations shall be based on such reports unless the same are in writing and certified by a responsible officer of such service.

3.8.1 Permitting

Before the Department of Codes Administration issues a building permit, MWS may examine or cause to be examined any tract of land for which an application has been received. MWS may also examine or cause to be examined any tract of land for which a Grading Permit application has been received.

3.8.2 Construction

MWS shall inspect or cause to be inspected at various intervals all construction or grading for which a building permit or Grading Permit has been issued, and a final inspection or waiver thereof shall be made of the tract of land upon completion.

Upon notification from the permittee or his agent, inspections of the tract of land shall be performed at the following times, as well as such other inspections as may be necessary:

1. Prior to the initiation of the project after temporary or permanent erosion prevention and sediment control practices have been installed.

2. After the completion of the rough grading and installation of stormwater management structures.

3. Upon completion of the project.

MWS shall either approve that portion of the construction or grading as completed or shall notify the permittee or his agent where violations are noted.

Work shall not be done on any part of the tract of land beyond the point indicated in each successive inspection without first obtaining approval from MWS. In particular, construction may not proceed until the site has been inspected to ensure that adequately sized temporary or permanent erosion prevention and sediment control (EPSC) practices have been installed and are operational for grading activities. A Grading Permit will not be issued until MWS verifies that EPSC measures are adequate.

3.9 As-Built Certifications

Prior to the issuance of a Use and Occupancy (U&O) permit or the full release of the performance bond for a development or for any structure in a development (unless exempted by Sections 3.4 and 3.5), a Tennessee registered engineer shall submit to MWS a certification letter stating that the site has been inspected and that the stormwater management system and stormwater control measures (both structural and non-structural) are complete and functional in accordance with the plans approved by MWS. Any deviations from the approved plans shall be noted on as-built drawings submitted. The as-built plan should be submitted as a CAD file on a CD and should be registered to the TN State Plane Coordinate System, North American Datum 1983 (NAD83). Data should be placed in separate layers and should be labeled for easy identification.

To insure the adequacy of stormwater quantity detention facilities, stormwater quality management practices, and public infrastructure, the certification submittal shall also include as-built drawings showing final topographic features of all these facilities. This shall include invert elevations of outlet control structures. Hydrologic and hydraulic calculations may be required for as-built conditions. Cut and fill balance certification should also be included for floodplain and sinkhole alterations. Any water quality buffers shall also be surveyed and included with the as-built submittal. Any project stormwater infrastructure that is to become the responsibility of Metro to maintain shall be video-inspected to verify proper installation with the video recording submitted as part of as-built record. Additional testing may be required as/if warranted by video inspection. The as-built submittal for sites designed in accordance with Volume 5 of the SWMM, the LID Manual, shall include a copy of the site design spreadsheet and include a site plan showing the site envelope and any areas counted towards the site-weighed runoff coefficient.

Prior to the issuance of a U&O permit or the full release of the performance bond for any new or substantially improved structure subject to minimum floor elevation requirements, a registered engineer and/or registered land surveyor shall submit to MWS certification of the elevation (in relation to mean sea level) of the lowest floor (including basement); or if the structure has been floodproofed, the elevation (in relation to mean sea level) to which the structure was floodproofed. This information must be provided on a FEMA Elevation Certificate. To ensure that floodplain cut and fill balances have been achieved, as-built plans, cross-sections, and related calculations must be submitted for all floodplain manipulations.

Chapter 4
PERMITTING PROCEDURES

4.1 Overview

This chapter explains the procedure for applying for Grading Permits[1] and the process by which the Metropolitan Department of Water and Sewerage Services (MWS) reviews permit applications.

Responsibilities of the applicant for posting permits, complying with regulations, fulfilling time limits, and obtaining other required federal and state permits are also discussed. Appendix A contains the Grading Permit process flow chart and checklists for plan contents as well as the Plan Submittal Information form and the Construction General Permit (CGP) stamp template.

4.2 Application Preparation

4.2.1 Pre-Application Meeting

All applicants may schedule a pre-application meeting with MWS to discuss their proposed projects. While not mandatory, a pre-application meeting is encouraged to assure timely permit application preparation and review. This meeting will also aid the applicant in identifying water quality buffers and post-construction water quality requirements. During this meeting, staff can determine if a proposed project qualifies for an exemption and explain how technical guidelines and criteria should be applied.

4.2.2 Required Information and Checklist

Each application for a Grading Permit or a building permit referred to MWS shall contain site preparation plans certified by a registered engineer. The plans shall indicate whether or not the tract will be developed in stages, and timing schedules shall be included when appropriate. In particular, site preparation plans shall include grading, drainage, erosion control, and stormwater management plans with appropriate details of erosion prevention and sediment control measures and details of the stormwater quantity and quality management systems.

An application checklist is provided in Appendix A to assist the applicant in preparing a complete application package, which serves to expedite the application review process. The applicant shall attach a copy of the checklist with the signed application to certify that a complete package is being submitted. The application checklist indicates that the applicant may also be

[1] Projects may also require a building permit. A building permit is required, according to the Metropolitan Code of Laws § 16.28.010, for any construction, alteration, repair, enlargement, movement, or demolition of any building or structure; or part of a building or structure; or any appurtenances connected or attached thereto.

required to meet certain State and Federal regulations for land disturbance activities that may affect "Waters of the State", "Wetlands", and/or "Sinkholes." It is the responsibility of the applicant to pursue and obtain any applicable State and Federal permits (see Section 4.2.3) prior to the initiation of any land disturbing activities. **Copies of all permits (or the permit applications) must be provided to MWS as part of the Grading Permit application.**

Some requirements of the application checklist will not be applicable to all projects, depending on the characteristics of the site. These requirements should be checked as "not applicable." Omission of any required items shall render the plans incomplete, and they shall be returned to the applicant or the designated registered engineer so that they may be completed. Sites disturbing greater than one acre must obtain a Notice of Coverage (NOC) under the Tennessee Department of Environment and Conservation's (TDEC's) Construction General Permit (CGP) before MWS National Pollutant Discharge Elimination System (NPDES) Department can schedule a Pre-Construction meeting (Pre-Con) for the project.

The following sections outline the Grading Permit plan contents. **For clarity, the EPSC plan must be on a separate plan sheet(s).**

4.2.2.1 Grading and Drainage Plans

The grading and drainage plan shall be of quality suitable for reproduction by electronic scanning or microfilm, and shall include the following:

1. A complete plan of the proposed development at a scale no less than 1 inch = 50 feet (smaller scale may be used if pre-approved by staff). This plan is to include existing and proposed contours at intervals no greater than two (2) feet (National Geodetic Vertical Datum (NGVD) to be used exclusively). Contours shall extend to the centerline of all roads bordering the site or to 25 feet outward from the property line where roads are not present. Where a stormwater management system ultimately enters the groundwater via a sinkhole or drainage well, the sinkhole or drainage well tributary area shall be delineated. At a minimum, the tributary area shall be delineated on a U.S. Geological Survey (USGS) 1:24,000 quadrangle map to show basin wide contours. Preferably, the Metro geographic information system (GIS) basemap data will be used to delineate and present the tributary area. (Contact Metro Planning for base map data).

2. Outline and list square footage of areas to be disturbed and areas to remain undisturbed.

3. Existing and proposed buildings on the property.

4. Existing and proposed impervious surfaces, including calculations of directly connected impervious area (DCIA) versus non-DCIA.

5. Proposed and existing stormwater management structures, including inlets, catch basins, junction boxes, driveway culverts, culverts, cross drains, headwalls,

stormwater quality infrastructure or devices and outlet facilities, with size, type, slope, invert elevations, and quantity indicated.

6. Hydrologic, hydraulic, and stormwater quality calculations for appropriate design conditions and facilities.

7. Any proposed new swales, ditches, or modifications to existing ditches, with typical sections and limits of changes indicated.

8. Any high water or flood lines, either calculated or observed in the vicinity of the proposed development, and the source of said line or elevation indicated.

9. All fill areas identified with the limits and elevation indicated.

10. At least one benchmark located, with the proper elevation indicated (NGVD to be used exclusively).

11. Arrows indicating the existing and proposed direction of runoff throughout the plan.

12. The location, size and capacity of the two stormwater management structures immediately downstream of the proposed development in every direction that will receive runoff. This may be shown on a vicinity map with a scale no less than one (1) inch = 2000 feet.

13. Invert and top of grate elevations on all catch basins and inlets in addition to flow line elevations, stations, and percent grades of all cross drains and pipe between inlets and catch basins. Inlets should be sized to match pipe capacity.

14. Floodplain areas require the following information: existing and proposed floodplain and floodway boundaries along with floodplain elevations; area within the floodplain to be left undisturbed (must be at least 50 percent of the floodplain area); cut and fill cross sections and volume calculations and lowest floor elevations for buildings in the floodplain. No credit will be given for cut below the two-year flood elevation. Hydraulic calculations should be submitted, as appropriate.

15. Where special structures such as box culverts, bridges, or junction boxes are proposed, detailed plans showing dimensions, reinforcement, spacing, sections, elevations, and other pertinent information shall be submitted.

16. Location of streams, ponds, lakes, wetlands, water quality buffers (including any that may overlap onto the site from adjacent properties), sinkholes, or other environmentally sensitive areas. A note should be placed along the buffer indicating the number of required buffer signs and that they will be installed every 100 feet.

17. Denote if site runoff will route directly and/or indirectly to waters identified by TDEC as Exceptional Tennessee Waters or impaired for siltation or habitat alteration.

18. Plans and calculations shall be signed and sealed by a registered engineer.

4.2.2.2 Erosion Prevention and Sediment Control (EPSC) Plans

EPSC measures shall be drawn on existing site contours and should be shown on a separate sheet or sheets from the grading and drainage plans. If the EPSC needs to change significantly during the project, additional EPSC plans shall be submitted addressing these changes.

EPSC Plan Sheets shall include all of the following:

1. Existing Community Waters including streams, wetlands, lakes, and ponds.

2. Delineation of floodplains and floodways, water quality buffers, greenway conservation easements, tree and open space preservation areas, or other environmentally sensitive areas. The method of protecting these features during construction should be clearly indicated.

3. Existing topography, roads, and property boundaries.

4. Location of sinkholes on the property, including the 100-year floodplain boundary (see Chapter 6 for more information on sinkhole floodplain areas).

5. Temporary erosion prevention and sediment control measures to be implemented as initial measures or during construction including but not limited to:
   - Silt fences,
   - Fiber rolls,
   - Check dams,
   - Diversion channels,
   - Sodding,
   - Seeding,
   - Mulching,
   - Riprap,
   - Erosion blankets and geotextiles,
   - Sediment ponds and basins,
   - Detention ponds,
   - Detention pond outlet structures and pipes, and
   - Outlet protection devices.

6. Construction exits. A stabilized stone pad shall be shown at any point where traffic will be leaving a construction site. Construction exits shall be a minimum of 20 feet wide and 100 feet long.

7. Demolition items and permanent disposal areas.

8. At least one benchmark located, with the proper elevation indicated (NGVD to be used exclusively).

9. Erosion control notes.

10. Conservation areas that will be used as stormwater quality credits (see Chapter 7 for more information on stormwater quality credits).

11. Permanent erosion control measures and final stabilization measures proposed for all disturbed areas on the property. Areas with slopes 3:1 or steeper shall be stabilized with soil bioengineering techniques, "green" engineering techniques, or by other methods approved by MWS. Riprap may be used provided calculations are presented to MWS that illustrate that soil bioengineering or "green" engineering techniques are either not cost-effective for the site or not feasible. Show stabilization techniques for each open conveyance.

12. Plans shall include the maintenance activities and expected minimum frequency required for each type of temporary erosion prevention and sediment control management practice.

13. The location of and/or notes referring to Stormwater Control Measures (SCMs) designed to control site wastes such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary wastes that may cause adverse impacts to water quality.

4.2.2.3 Post-Construction Stormwater Management Plan

The Grading Permit application must also address stormwater quality and quantity after construction has been completed, or post-construction. Several sections of Volumes 4 and 5 of Metro's *Stormwater Management Manual* contain Stormwater Control Measures (SCMs) for post-construction stormwater management. These SCMs should be chosen based upon final grades and site conditions for the development and should be provided on a separate plan sheet.

A complete application package will contain a Post-Construction Stormwater Management Plan that includes the following information:

1. Calculations that show whether a development will cause any adverse stormwater impact on downstream properties. Applicants shall comply with this policy using either of the following methods:

a) Demonstrate that the post-development runoff rate is less than or equal to the pre-development rate for storm events through the 100-year storm.
b) Perform a 10 percent analysis of the development's downstream impact. The analysis must extend to the point where the site makes up 10 percent or less of the total drainage area to the point in question.

If there is no increase in peak flows from the post-development runoff rates versus the pre-development runoff rates, then no additional stormwater quantity measures (such as detention) will be required.

If an increase in peak flows is noted, then one or more of the following actions must occur to address the increase:

a) Detention must be designed for the site to bring the post-development runoff rates for storm events through the 100-year storm less than or equal to the pre-development runoff rates for the same storm events, both at the site outlet and, if performing the 10 percent analysis, at key junction points down to the point where the site makes up 10 percent or less of the total drainage area; or
b) Easements encompassing the area of the increased flow and preventing construction in the newly expanded floodplain must be obtained from downstream properties; and/or
c) Conveyances downstream from the site must be improved to accommodate the increased flow. Permission from MWS must be obtained in writing to make conveyance improvements in lieu of detention controls. Permanent drainage easements will be required to encompass all flow improvements. Easements may also be required where improvements have an impact on other properties. This section in no way authorizes any individual to perform stormwater conveyance improvements on other private properties.

2. Calculations for stormwater quantity detention pond control structures, if required, with details including multiple-stage components for stormwater quality. Ponds should include an emergency overflow to pass events greater than the 100-year storm.

3. Calculations for water quality treatment requirements.

4. Calculations, construction details, and locations for stormwater quality management practices including, but not limited to non-structural stormwater control measures, credit areas, detention, pretreatment areas, and other appropriate practices presented in Volumes 4 and 5 of the *Stormwater Management Manual*.

5. Easements on structural and non-structural SCMs that allow long-term SCM maintenance;

6. SCM Maintenance Documents for each SCM (See Section 6.7.1 and Appendix C); and

7. The method for protecting water quality buffers during and after construction activities.

4.2.2.4 Sinkhole and Drainage Well Information

Because of the many stormwater management problems commonly associated with sinkholes and drainage wells, sinkholes must be identified early in the site planning process so that flooding and the risks of structural instability associated with sinkholes are minimized. Section 6.8 provides more detailed information on the identification of sinkholes, as well as development restrictions around sinkholes.

Discharges into a sinkhole may require a Class V Injection Well Permit issued by TDEC's Division of Water Resources under the rules for Underground Injection Control (UIC). If required, the injection well permit must accompany the Grading Permit application submitted to MWS. TDEC must also approve any alterations to sinkholes. TDEC only considers water quality in its assessment of discharges to or alterations of sinkholes. Stormwater quantity concerns are regulated by MWS. Therefore an approval from TDEC does not ensure MWS approval.

The applicant must provide the following information in the grading, drainage, and erosion control plans prior to the alteration of the natural flow patterns for watersheds discharging to or affecting sinkholes:

1. Locations of proposed onsite and offsite stormwater management channels that are tributary to a sinkhole throat or drainage well inlet;

2. Hydraulic calculations defining the existing and altered (if appropriate) 100-year volume to confirm that flooding will not be increased. Such plans and hydraulic calculations are to be certified by a registered engineer and must assume plugged conditions (0 cfs outflow) for the sinkhole. The current and altered sinkhole volume must be shown on the plans.

3. Proposed stormwater control measures located within the sinkhole. The details and accompanying calculations shall illustrate temporary and/or permanent controls. SCMs located within a sinkhole must be approved by TDEC and supporting calculations submitted to MWS.

4. Detailed contours for all sinkholes (including those located offsite) that receive stormwater runoff from the site. These contours are to have a maximum interval of two (2) feet and are to be verified by field surveys.

5. Details of any plans for grading and clearing of vegetation within the sinkhole floodplain, in accordance with Section 6.8 of this manual. Sinkhole areas must be

revegetated. Compliance with any and all conditions that may be required by State and Federal permits shall be documented. The TDEC Division of Water Resources is the primary regulatory agency for injection wells.

6. Demonstration that development will not occur within the area flooded by the 100-year, 24-hour storm event under developed conditions. The 100-year elevation may be lowered by construction of a drainage system to convey water away from the sinkhole. Calculations that document a lowering of the 100-year elevation shall be based on plugged conditions (0 cfs outflow) for the 100-year storm using an appropriate safety factor for discharge into the sinkhole.

4.2.3 Federal and State Permits

It is the responsibility of the applicant to obtain and submit copies, as applicable, of the following State and Federal permits before a Grading Permit application will be approved:

- Section 10 permit from the U.S. Army Corps of Engineers (USACE)
- Section 404 permit from the USACE.
- Notice of Coverage (NOC) under TDEC's General NPDES Permit for Storm Water Discharges Associated with Construction Activities.
- Aquatic Resource Alteration Permit (ARAP) from the TDEC Division of Water Resources.
- Sinkhole permits from TDEC Division of Water Resources.
- Any other permits required by any other State or Federal agencies.

See Table 3-1 in Chapter 3 for selected agency addresses and phone numbers.

4.2.3.1 U.S. Army Corps of Engineers

Section 10 of the Rivers and Harbors Act of 1899 prohibits the unauthorized obstruction or alteration of any navigable water of the United States unless the work has been previously authorized by a Department of the Army (DA) permit. The construction of outfalls, stormwater management outlets, or other structures below ordinary high water of any navigable water will require a DA permit prior to construction.

Section 301 of the Clean Water Act prohibits the discharge of dredged or fill material into Waters of the United States, which includes wetlands, rivers, lakes and streams, unless the work has been previously authorized by a permit pursuant to Section 404 of the same Act. Placement of dredged or fill material below ordinary high water mark of any Waters of the United States in conjunction with stormwater management improvements (e.g., channel realignments, concrete slope paving) will require a DA permit prior to construction.

If an Individual Section 404 Permit is required, more than 120 days may be required for permit processing. Depending on the nature and location of the work, it is possible that the work has been previously approved under authority of the Nationwide Permit and individual processing would not be required.

4.2.3.2 Tennessee Department of Environment and Conservation

Clearing, grading, and excavation activities that disturb one or more acres must obtain coverage under TDEC's General NPDES Permit for Storm Water Discharges Associated with Construction Activities, also known as the Construction General Permit (CGP). The NOC must be provided to MWS before a Pre-Con can be scheduled and a Grading Permit can be issued.

In accordance with the Tennessee Water Quality Control Act, T.C.A. 69-3-108, any activity that alters the course or physical character of a stream or wetland, as defined by TDEC, requires an Aquatic Resource Alteration Permit (ARAP) from the Division of Water Resources. This permit is required for all stream or wetland alteration activities including minor sand and gravel dredging, utility line crossings, road crossings, and bank stabilization projects.

Section 405 of the Water Quality Act of 1987 (WCA) added section 402(p) of the Clean Water Act (CWA) to require the Environmental Protection Agency (EPA) to establish regulations setting forth NPDES permit application requirements.

Projects must be designed with sensitivity to stormwater quality issues and must comply with Section 405 as administered by TDEC's Division of Water Resources.

The Division of Water Resources is the primary regulatory agency for injection wells including sinkholes. A sinkhole is considered an injection well under the Underground Injection Control (UIC) regulations. A UIC permit is required for alterations to a sinkhole or alterations to any land in the contributing drainage area to a sinkhole. Certain stormwater infiltration practices are regulated as injection wells. They include some proprietary subsurface detention vaults that are designed to capture and infiltrate stormwater. Please contact TDEC for additional information.

4.3 Application Processing

Applications for *building* permits are made to the Department of Codes Administration and applications for *Grading* Permits are made to MWS. A flow chart for processing of applications by MWS is presented in Appendix A. Each major component of this review process is briefly described below.

4.3.1 Initial Receipt and Resubmittals

When Grading Permit applications are referred or submitted to MWS, they are logged in by date and assigned a tracking number. The applicant must complete a Plan Submittal Information Sheet, included in Appendix A, for the project. Failure by the applicant to complete the Plan Submittal Information Sheet upon initial submission or to include the tracking number in resubmittals will result in a delay in the review of the proposed plans.

4.3.2 Staff Review and Recommendation

MWS first conducts a sufficiency review of the Grading Permit application to determine if all basic information has been included. A sufficiency review checklist similar to the application checklist presented in Appendix A will be used for this purpose. If it is determined that the permit application is incomplete, the application will be returned to the applicant along with a request for additional information needed. The returned application will include the application tracking number that must accompany a resubmittal.

When all basic information has been supplied pursuant to section 4.3.1, MWS staff will conduct a technical evaluation of the permit application. This technical evaluation will be based on the technical criteria outlined in Chapter 6 of this volume, the procedures presented in Volume 2, and the SCM design guidance presented in Volume 4. If the work described in the permit application conforms to the requirements of these regulations and other pertinent laws and ordinances, the Grading Permit Application will be approved for a Pre-Construction meeting (Pre-Con). If the application does not meet these conditions, the plans will be returned to the applicant with an explanation of the deficiencies and a tracking number for resubmittal.

4.3.3 Erosion Prevention and Sediment Control (EPSC) Professional

Every development project requiring a Grading Permit shall designate and retain the services of an individual who has successfully completed the TDEC Level 1 Erosion Prevention and Sediment Control training class or obtained a waiver from the requirements from MWS. Waivers will be reviewed on a case-by-case basis and will take into consideration equivalent certification programs and/or experience. This person will be referred to as the EPSC Professional for the site.

The major responsibilities of the EPSC Professional for the site are:

- Review the EPSC plan for the project prior to the Pre-Construction Meeting.
- Attend the Pre-Con.
- Oversee the installation and maintenance of EPSC measures.
- Direct the contractor to immediately cease land disturbance activities if Community Waters not identified on the plans are encountered. The EPSC Professional must notify MWS and TDEC and ensure that necessary permissions for the alteration of these features are obtained before work can continue.
- Communicate the site's EPSC considerations (including buffer and conservation areas) to all applicable contractors that are to work on the site.
- Conduct routine inspections twice every calendar week. Inspections shall be performed at least 72 hours apart.
- Provide copies of the inspection reports in a timely manner upon request by MWS.
- Oversee the installation of buffer boundary markers to prevent buffer disturbance.
- Facilitate communication between MWS and the appropriate parties for the development.
- Must notify MWS if continued/ongoing deficiencies are found during three (3) consecutive inspections.
- Verify final stabilization.

If the EPSC Professional stops working on a site during the course of a project, he or she must submit a Notice of Withdrawal in writing to MWS. The developer must submit a Notice of Change in writing to MWS that shall identify the replacement EPSC Professional. **However, the EPSC Professional that attends the Pre-Con must also be the EPSC Professional that ensures initial installation of measures and conducts the first inspection**. The EPSC Professional that attends the Pre-Con must have reviewed the plans prior to the Pre-Con. MWS reserves the right to revoke a person's ability to serve as an EPSC Professional for Metro Grading Permit sites.

4.3.4 Pre-Construction (Pre-Con) Meeting

The applicant will be contacted by MWS staff to schedule a Pre-Con. A Pre-Construction Meeting Application should be completed online and submitted to MWS before a Pre-Con can be scheduled. Pre-Con Applications can also be obtained from the Stormwater NPDES Office (615-880-2420). The applicant must also file a building application (if required) with the Department of Codes and submit landscape plans (if required) to the Urban Forestry Department prior to a Pre-Con being scheduled. The applicant must attend a Pre-Con within six months of technical review completion. After the six month period, the Grading Permit application will be considered invalid, and a new application process must be started.

The application package will be discussed during the Pre-Con, including specific issues such as sinkholes, EPSC measures, buffer protection, and stormwater SCMs. If the applicant has any outstanding issues or violations with Metro or TDEC, resolutions to these issues will also be discussed at the Pre-Con. If all requirements have been met at the time of the Pre-Con, the applicant will be issued a letter granting permission to perform any grading activities required for the installation of EPSC measures. This letter also notifies the applicant that the Grading Permit is approved conditioned upon the proper installation of initial EPSC measures. The applicant must obtain a Grading Permit within six months from the date of the Pre-Con. Grading Permits shall expire one year from the date of the Pre-Con.

4.3.5 Installation of Initial Measures

Initial measures should be installed as detailed in the EPSC plans and as discussed during the Pre-Con. **No land-disturbing activities, except what is necessary to install initial EPSC measures, shall begin prior to the issuance of a Grading Permit**. Once initial measures have been installed and the EPSC Professional has inspected and verified that they are installed according to plans and as discussed at the Pre-Con, the EPSC Professional shall notify the MWS NPDES Section that the site is ready for a Grading Permit inspection. The NPDES Section will then inspect the site for proper installation of the initial erosion prevention and sediment control measures. If the site passes the inspection, a Grading Permit will be issued by MWS. If it is determined that minimum EPSC standards have not been met, a Grading Permit will not be issued, and the applicant will be required to bring the EPSC measures up to standard. The site's EPSC Professional must re-inspect the site and contact NPDES staff once the measures are adequate.

4.3.6 Grading Permit Issuance and Expiration

After the successful installation and inspection of the initial EPSC measures, a Grading Permit shall be issued. MWS will notify the Department of Codes Administration of the Grading Permit issuance so they may release the building permit if their own requirements are satisfied. Upon notice to the applicant and an opportunity for a hearing, MWS may revoke a Grading Permit for a site that is not in compliance with these regulations.

A Grading Permit shall expire one year from the date of the Pre-Con. The Grading Permit holder may request an extension to the Grading Permit expiration date of up to six (6) months. The extension request must be made in writing to MWS at the address below and submitted prior to the expiration date. No more than two extensions can be requested for any site unless adequate justification for additional extensions is proven.

When an extension is requested, MWS staff can require additional information, a new Pre-Con, or any other information if staff determines that the site needs additional measures. Extensions will not be granted for projects not in compliance with these regulations.

Extension requests must be submitted in writing to:

Metro Water Services – Stormwater Division
NPDES Program
1607 County Hospital Road
Nashville, TN 37218
(615) 880-2420

4.3.7 Revisions to Approved Plans

If changes are anticipated prior to or during construction that would constitute a revision of plans already approved by MWS, the approved plans shall be revised and signed by a registered engineer and resubmitted in triplicate. The resubmission shall include a letter stating why such changes from the approved plans are necessary, the Grading Permit number, and a completed Plan Submittal Information Sheet for the project. MWS reserves the right to waive this requirement or to re-review the entire set of plans in the light of requested changes. Plan revisions must be approved by MWS prior to implementing changes to approved plans in the field. MWS reserves the right to require installed stormwater features to be removed and/or replaced that are not per approved grading permit plans and/or are not performing as designed.

4.4 Construction Procedures

A person, firm, or corporation required to obtain a Grading Permit from MWS in compliance with these regulations must do so prior to commencing any work on the site. Corrective measures including, but not limited to, stop work orders, penalties, permit revocations, and injunctions may be taken, as necessary, to enforce the terms of this requirement. Any enforcement actions taken against a Grading Permit shall be upon the entity that signs as the "owner" of the permit (*Note*: see Section 3.7.2. Revocation).

4.4.1 Posting of Permit

Work requiring a Grading Permit shall not begin until the permit holder or his agent posts the Grading Permit card, or a copy of the card, in a conspicuous place on the front of the premises. The permit shall be protected from the weather. The permit card shall remain posted by the permit holder until the Department of Codes Administration has issued the Use and Occupancy permit or until MWS staff verifies that the site has reached final stabilization.

4.4.2 Effect of Permit

A Grading Permit issued pursuant to this section shall be construed to be a license to proceed with the work and shall not be construed as authority to violate, cancel, alter, or set aside any of the provisions of these regulations, nor shall issuance of a permit prevent MWS or the Department of Codes Administration from thereafter requiring a correction of errors in plans or in construction or a correction of violations of these regulations. In addition to Metro Grading Permit requirements, certain land disturbance activities that will impact "Waters of the State", "Wetlands", and/or "Sinkholes" may be required to meet certain State and Federal regulations. All such applicable regulations must be met prior to the initiation of land disturbance activities. This includes the receipt of any necessary permits.

4.4.3 Site Inspections

The site's designated EPSC Professional shall conduct site inspections twice every calendar week and at least 72 hours apart. The following areas and items must be inspected according to the above schedule:

- All disturbed areas that have not reached final stabilization.
- Any areas used for storage of materials that are exposed to precipitation.
- Temporary and permanent structural control measures.
- Locations where vehicles enter and exit the site.
- Stormwater outfall points (where discharges from the site enter streams or the stormwater system not controlled by the site operator).
- Erosion and sediment control measures.
- Structural and non-structural stormwater quantity and quality control measures.

EPSC inspection reports should include the scope of the inspection, name(s) and title or qualifications of personnel making the inspection, the date of the inspection, and major observations relating to the implementation of the erosion prevention and sediment control plan and post-construction stormwater quality plan, as appropriate for the stage of the development. The inspection reports should document maintenance taken or needed, where new or upgraded EPSC measures are needed, and any actions taken to gain or maintain compliance. In addition to the EPSC inspection reports, the following records shall be maintained on site: the dates when major grading activities occur; the dates when construction activities temporarily or permanently cease on a portion of the site; and the dates when stabilization measures are initiated.

During construction, inspections should be conducted by the EPSC Professional. However, if circumstances prevent the EPSC Professional from conducting the inspection, a qualified replacement, appointed by the EPSC Professional, may perform the inspection. The replacement inspector must have successfully completed the TDEC Level 1 Training course.

All inspections performed by the EPSC Professional must be documented in writing. Inspection reports must be provided in a timely manner upon request by MWS. It is recommended that reports be written immediately following inspections and kept in a secure location on site.

If continued/ongoing EPSC deficiencies are found during three (3) consecutive inspections, the EPSC Professional must notify MWS in writing of the issues within two business days. The EPSC Professional's inspection reports shall be included as part of the written notification.

Once the site has been stabilized and construction has ceased, routine inspections of the post-construction stormwater quality and quantity controls are required, based upon the inspection schedule established in the SCM Maintenance Documents (See Section 6.7.1 and Appendix C). Routine inspections are the responsibility of the property owner or SCM owner.

4.4.4 EPSC Professional vs. Permit Holder Responsibilities

Although the Grading Permit holder is required to have an EPSC Professional identified to serve as the contact for the site during development, the permit holder is *ultimately* responsible and shall be held accountable for all EPSC requirements from MWS.

For residential developments, the party that posts the bond is responsible for erosion prevention and sediment control measures for the site until the bond has been released. After the release of the bond, the individual lot owners, homebuilders, and/or contractors are responsible for erosion and sediment control on a lot-by-lot basis.

Chapter 5
FLOODPLAIN REQUIREMENTS

5.1 Zoning Ordinance

Uses permitted within the floodplain shall be in accordance with Article V of Chapter 17.36 of the Metropolitan Code of Laws (Appendix E) and as summarized in Sections 5.2 and 5.3 of this manual. The regulations and controls set forth shall be applied within the areas designated on the zoning map or on special overlays (established by Ordinance No. 78-843 in Appendix E) that are made a part of the Metropolitan Code of Laws and may be viewed upon request at the office of the Metropolitan Clerk. However, nothing contained herein shall prohibit the application of the Article V, Chapter 17.36 regulations to lands that can be demonstrated by competent engineering survey, using the adopted profiles from which the flood protection elevation is derived, to lie within any floodplain. Conversely, any lands that can be demonstrated by competent engineering to lie beyond the floodplain shall not be subject to the Article V, Chapter 17.36 regulations. Any lands within the areas designated as floodplains on the zoning map or special overlays shall be subject to the regulations on controls pertaining to floodplains as set forth in this manual. In addition, the floodplain shall be preserved and/or developed in accordance with Section 17.28.040 of the Metropolitan Code of Laws and as summarized in Section 5.4 of this manual.

5.2 Base Flood and Floodway Data

All applications for proposed projects within areas of special flood hazard shall provide base flood elevations and floodway data to establish floodplain limits and lowest floor elevations, and cut and fill quantities. Areas of special flood hazard along with base flood elevation and floodway data for streams in Metro are available from the Flood Insurance Rate Map (FIRM) MWS map revision files. All proposed developments near streams included in Federal Emergency Management Agency (FEMA) flood studies must be designed in accordance with the provisions of these regulations.

If a project is located in an unnumbered A zone, the applicant shall provide base flood elevation data as documented in a Floodplain Report. In addition, a Floodplain Report shall be required for areas outside unnumbered A zones, when the stream has a tributary area of one square mile or greater. Approximate methods for flood level determination may be used if prior approval is granted by MWS. See Volume 2 for information on approximate methods.

The Floodplain Report shall consist of plan and profile data and water surface elevation calculations. The plan view shall show the floodway, floodplain limits, base line, cross section stations, and stream buffer limits. The profile should show stream invert, cross section stations,

and computed water surface elevations. The report should also show the topographic divides on the plan and the ultimate zoning categories used.

Base flood elevation and floodway data submitted by the applicant for areas previously without such data or for areas not studied by FEMA shall be reviewed by MWS and, if acceptable, shall be processed for adoption as part of the official floodplain data. When the base flood elevation and floodway data submitted by the applicant result in a deviation from the data developed by FEMA, such deviation shall become official, following review and approval by both MWS and FEMA. Acceptable methods and models are presented in Volume 2 of this manual.

5.3 General Standards

In all areas of special flood hazard, the following provisions are required:

1. New construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

2. Manufactured homes shall be anchored to prevent flotation, collapse, or lateral movement. Methods of anchoring may include, but are not limited to, use of over-the-top or frame ties to ground anchors. This standard shall be in addition to and consistent with applicable state requirements for resisting wind forces.

3. New construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

4. New construction or substantial improvements shall be constructed by methods and practices that minimize flood damage.

5. Electrical, heating, ventilation, plumbing, air conditioning equipment, and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

6. New and replacement water supply systems shall be designed to minimize or eliminate infiltration of floodwaters into the system.

7. New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of floodwaters into the systems and discharges from the systems into floodwaters.

8. Onsite waste disposal systems shall be located and constructed to avoid impairment to or contamination from them during flooding.

9. Any alteration, repair, reconstruction, or improvements to a structure that is in compliance with the provisions of these regulations shall meet the requirements of "new construction" as contained in these regulations.

10. Any alteration, repair, reconstruction, or improvements to a structure that is not in compliance with the provisions of these regulations shall be undertaken only if said non-conformity is not furthered, extended, or replaced.

11. If a structure is “substantially damaged” or “substantially improved”, it must be brought into compliance with the requirements defined by the Stormwater Management Manual, Chapter 5 – Floodplain Requirements.

5.4 Preserved Floodplain

In accordance with Section 17.28.040 of the Metropolitan Code of Laws, all development proposed on property that is not developed as defined herein, encumbered by natural floodplain or floodway as of April 5, 2003, shall leave a minimum of fifty percent of the natural floodplain area, including all of the floodway area, or all of the floodway area plus fifty feet on each side of the waterway, whichever is greater, in its original, natural state. The preserved floodplain shall be adjacent to the floodway, or as otherwise approved by the Zoning Administrator or by the Metropolitan Planning Commission if the property is the subject of a subdivision or rezoning application.

For purposes of this subsection, a portion of a lot shall be deemed to be developed if a grading or building permit has been issued or, if a portion of the lot has been disturbed by (approved) grading or if a portion of the lot is improved with any material that substantially reduces or prevents the infiltration of stormwater by the total horizontal area of the lot including, but not limited to, roofs, streets, sidewalks and parking lots paved with asphalt, concrete, compacted sand, compacted gravel, or clay. Evidence that a portion of the property is developed shall include grading or building permits and/or aerial photographs. Absent grading or building permits, a lot shall not be deemed developed under this section if the use of the property was for agricultural activities.

The undisturbed portion of water quality stream buffers, as defined in Section 6.9 of this manual, can count towards the preserved floodplain requirement.

5.5 Specific Standards

In all areas of special flood hazard where base flood elevation data have been provided, the provisions detailed below are required. It is the intent of MWS that all construction, whether within or adjacent to delineated floodplains, shall be subject to the provisions of these

regulations. All residential construction shall be elevated such that the lowest floor is no lower than 4 feet above the base flood elevation. The Director of MWS or his designee has the authority to approve improvements to buildings where the lowest floor elevation is at least 1 foot above base flood elevation and the improvement value does not exceed 50 percent of the building's pre-improvement value. To determine a building's pre-improvement value, an applicant can rely on the structure appraisal value available at the Tax Assessor's office or can obtain a separate appraisal. An applicant may request that the Stormwater Management Committee (SWMC) reviews the decision of the Director. Any request for review shall adhere to the procedural requirements put forth in Appendix F. The applicant shall be required to demonstrate to the SWMC that the required elevation is so conservative as to place an unreasonable burden upon developers or property owners. The SWMC shall not grant requests for review that place Metro in conflict with National Flood Insurance Program (NFIP) requirements. Improvements to buildings valued at more than 50 percent of the building's pre-improvement value are considered substantial improvements and therefore must comply with all floodplain requirements, including elevating the building as required in this Chapter.

5.5.1 Residential Construction

New construction or substantial improvement of any residential structure (or manufactured home) shall have the lowest floor, including basement, elevated no lower than four feet above the base flood elevation. If solid foundation perimeter walls are used to elevate a structure, openings sufficient to facilitate the unimpeded movements of floodwaters shall be provided in accordance with the standards for elevated buildings described in Section 5.5.4.

5.5.2 Standards for Manufactured Homes and Recreational Vehicles

Manufactured homes and recreational vehicles shall meet the following provisions:

1. All manufactured homes placed, or substantially improved, on individual lots or parcels, in expansions to existing manufactured home parks or subdivisions, or in substantially improved manufactured home parks or subdivisions, must meet all the requirements for new construction, including elevation and anchoring.

2. All manufactured homes placed or substantially improved in an existing manufactured home park or subdivision must be elevated so that:

    a. The lowest floor of the manufactured home is elevated no lower than four feet above the base flood elevation.

    b. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least an equivalent strength, of no less than 36 inches in height above grade.

    c. The manufactured home must be securely anchored to the adequately anchored foundation system to resist floatation, collapse, and lateral movement.

d. Any replacement of a manufactured home that has incurred "substantial damage" as the result of a flood shall meet the standards for elevation and anchoring listed above.

3. All recreational vehicles placed on sites must either:

a. Be fully licensed and ready for highway use, that is, it must be on its wheels or jacking system, is attached to the site only by quick disconnect type utilities and security devices and has no permanently attached structures;~~,~~ or

b. The recreational vehicle must meet all the requirements for new construction, including elevation and anchoring in items 1 and 2 above.

5.5.3 Non-Residential Construction

New construction or substantial improvement of any commercial, industrial, or non-residential structure (including manufactured structures) shall have the lowest floor, including basement, at least one foot above the level of the base flood elevation. Structures located in A and AE zones may be floodproofed pursuant to Section 5.5.7 in lieu of being elevated, provided that all areas of the structure below the required elevation are watertight, with walls substantially impermeable to the passage of water, and use structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy. A registered engineer shall certify that these standards are satisfied.

5.5.4 Elevated Buildings

New construction or substantial improvements of elevated buildings that include fully enclosed areas formed by foundation and other exterior walls below the base flood elevation shall be designed to preclude finished living space. Design shall also allow for the entry and exit of floodwaters to automatically equalize hydrostatic flood forces on exterior walls. Designs for complying with this requirement must either be certified by a registered engineer, and meet the following minimum criteria:

1. A minimum of two openings having a total net area of not less than one square inch shall be provided for every square foot of enclosed area subject to flooding.

2. The bottom of all openings shall be no higher than one foot above grade.

3. Openings may be equipped with screens, louvers, valves, or other coverings or devices provided they permit the automatic flow of floodwaters in both directions.

All electrical switches, outlets, equipment, HVAC units, ductwork, plumbing, and other utility connections shall be no less than one foot above the 100-year base flood elevation (BFE). Access to the enclosed area shall be the minimum necessary to allow for parking of vehicles (garage door) or limited storage of maintenance equipment used in connection with the premises

(standard exterior door) or entry to the living area (stairway or elevator). The interior portion of such enclosed area shall not be partitioned or finished into separate rooms.

5.5.5 Floodways

Areas designated as floodways are located within areas of special flood hazard. The floodway is an extremely hazardous area because of the velocity of floodwaters, which can carry debris and potential projectiles and have erosion potential. Floodways are also used as a base in determining the width of the required stream buffer as described in Section 6.9. Thus, the following provisions shall apply:

1. Encroachments, including fill, excavation, clearing, new construction, and other developments, are prohibited unless certification (with supporting technical data) by a registered engineer is provided demonstrating that encroachments shall not result in any increase in flood levels during occurrence of the base flood discharge and a variance is granted through the SWMC.

2. If Item 1 above is satisfied, all new construction shall comply with all applicable flood hazard reduction provisions of these regulations.

3. The placement of manufactured homes is prohibited except in an existing manufactured home park or subdivision. A replacement manufactured home may be placed on a lot in an existing manufactured home park or subdivision provided the anchoring, elevation, and encroachment standards of these regulations are met.

The floodway is a component of Zone 1 of Metro's stream buffer. Zone 1 is considered a "no disturb" area where only necessary disturbances are permitted. Allowable uses for and permissible disturbances to the floodway are outlined in Section 6.9.

5.5.6 Floodplain Alterations

All floodplain alterations that result in the filling or elimination of floodplain storage shall provide compensating storage capacity by dredging out at least an equal amount of volume as occupied by fill. All dredged or cut materials shall be removed from the site before fill materials can be delivered, unless all fill material is generated onsite. Dredging or cut volumes below the elevation of the two-year storm event shall not be included in the compensating storage capacity calculation. Every effort shall be made to preserve natural flow lines and to avoid situations that encourage sediment deposition in slack water areas.

All dredged or cut areas shall be stabilized immediately to prevent erosion. Areas to be filled must be cleared of standing trees, stumps, brush, downed timber, and all objects including structures on and above the ground surface. Topsoil shall be removed and stockpiled, while all other spoil materials must be disposed of offsite in an approved manner on an approved site. Only acceptable fill material, defined as inert soil, rock, concrete no more than 24 inches in length without rebar, and/or brick rubble, shall be used. Fill material obtained offsite shall not be

stockpiled onsite before grading cuts are completed. Fill material shall be placed in compacted layers and the minimum distance from the perimeter of any proposed building to the top of the slope shall be either 25 feet or twice the depth of fill at that point, whichever is greater. The fill material must not have slopes equal to or greater than 3:1 unless stabilization measures approved by the MWS are installed. All slopes shall be stabilized.

No alterations can be made to floodplain land and stormwater management channels without the approval of the Director of MWS or his designee. All applicable requirements of Ordinances No. 78-840 and 78-843 and, in addition, the following specific conditions must be met before such approval will be granted:

1. The construction of a levee, earth fill, building, or other structure that alters a floodplain area shall only be permitted based on a plan prepared by a registered engineer, showing existing and proposed elevations, existing and proposed stormwater management channels, and existing and proposed structures. The plan shall be approved by the Director of MWS or his designee certifying that the alteration and construction as proposed are in compliance with all applicable flood hazard reduction provisions of these regulations.

2. The proposed excavation, filling, or change of alignment of any existing channel under the jurisdiction of the U.S. Army Corps of Engineers shall be approved by same.

5.5.7 Floodproofing

Floodproofing measures such as those identified below are acceptable provided they are certified by a registered engineer as being consistent with the base flood conditions for the particular area, and that floodproofing criteria for non-residential construction in Section 5.5.3 are met.

1. Anchoring to resist flotation and lateral movement.

2. Installation of watertight doors, bulkheads, and shutters.

3. Reinforcement of walls to resist water pressures.

4. Use of paints, membranes, or mortars to reduce seepage of water through walls.

5. Addition of mass or weight to structures to resist flotation.

6. Installation of pumps to lower water levels in structures.

7. Construction of water supply and waste treatment systems to prevent the entrance of floodwaters.

8. Pumping facilities for subsurface stormwater management systems for buildings to relieve external foundation wall and basement floor pressures.

9. Construction to resist rupture or collapse caused by water pressure or floating debris.

10. Cutoff valves on sewer lines or the elimination of gravity flow basement drains.

5.6 Standards for Streams Without Established Base Flood Elevations and/or Floodways

It is the intent of MWS that all construction whether within or adjacent to delineated floodplains, shall be subject to the provisions of these regulations. As an example, all residential construction shall be elevated such that the lowest floor is no lower than four (4) feet above the base flood elevation. Exceptions to this standard may be granted on appeal to the SWMC based on a demonstration that the regulatory elevation is so conservative as to place an unreasonable burden upon developers or property owners. Appeal procedures are presented in Appendix F.

For proposed developments located near small streams but where no base flood data or floodways have been provided or required under the National Flood Insurance Program or by Section 5.2 of these regulations, the following provisions apply:

1. Placement of fill material or structures within a water quality buffer, as defined by Section 6.9 of this Volume, require certification by a registered engineer that such encroachments shall not result in any increase in flood levels during the occurrence of the base flood discharge. Encroachments must also be approved by the SWMC.

2. New construction or substantial improvements of residential structures shall have the lowest floor, including basement, elevated at least four (4) feet above the base flood elevation as determined by an appropriate approximate method. Information on approximate methods is presented in Volume 2.

3. New construction and substantial improvements of non-residential structures shall have the lowest floor, including basement, elevated at least two (2) feet above the highest adjacent grade; or, together with attendant utility and sanitary facilities, be completely flood-proofed to or above that level so that any space below that level is watertight, with walls substantially impermeable to the passage of water, and with structural components having the capability of resisting hydrostatic and hydrodynamic loads and the effect of buoyancy.

5.7 Subdivision Standards

All subdivision projects shall meet the following provisions:

1. Stormwater management systems shall provide adequate drainage to reduce exposure to flood hazards.

2. Design shall be consistent with the need to minimize flood damage.

3. Public utilities and facilities such as sewer, gas, electrical, and water systems shall be located and constructed to minimize flood damage.

4. Stormwater management facilities shall be provided to reduce exposure to flood hazards.

5. Base flood elevation and floodway data shall be provided as required in Section 5.2.

5.8 Nonconforming Uses

The existing lawful use of a structure or premise that is not in conformity with the floodplain requirements of this manual may be continued subject to the following conditions:

1. No such use shall be expanded or enlarged except in conformity with the provisions of this manual.

2. No structural alterations, additions to, or repairs to any nonconforming structure over the life of the structure shall exceed 50 percent of its assessed value at the time of its becoming a nonconforming use unless permanently changed.

3. If such use is discontinued for 12 consecutive months, any future use of the building and premises shall conform to the provisions of this manual.

4. Uses or adjuncts thereof which are nuisances shall not be permitted to continue as nonconforming uses.

5. Any alteration, addition to, or repair to any nonconforming structure permitted shall be protected by floodproofing measures pursuant to Section 5.5.7.

5.9 Dikes and Floodwalls

The design of dikes and floodwalls for flood protection purposes should consider several factors, including alternate compensating storage, possible surcharge in flood heights, overtopping, and failure.

Dikes are generally earth embankments that can extend around sections of a building. Fill material used in their construction should be dredged from the floodplain to aid in providing compensating storage. The fill material shall be placed on cleared ground, compacted in layers, and protected from seepage. Buildings shall have a minimum setback from the base of the dike of 20 feet or twice the height of the embankment, whichever is greater.

Floodwalls are preferred for locations with limited space and can be constructed as cantilever I-type steel piles, cellular walls, buttress walls, or gravity walls. They shall be well founded with cutoffs installed to prevent seepage. Areas located behind a dike or floodwall should be drained by conduits installed with automatic flap gates to prevent backflow, or by manually operated valves that are closed during flooding, or by a combination of these methods.

Chapter 6
TECHNICAL GUIDELINES AND CRITERIA

6.1 Adequate Stormwater Management Systems

Adequate stormwater management systems shall be designed to accomplish the following:

1. Account for both offsite and onsite stormwater.
2. Maintain natural topographic and watershed divides.
3. Convey stormwater to a stream, natural channel, or other existing facility in a manner that does not cause flooding or erosion.
4. Discharge stormwater into the natural channel by connecting the channel at natural elevations, or by discharging the stormwater into an existing facility of sufficient capacity to receive it, or by discharging into an approved drainage well.
5. Treat stormwater quality consistently on new development and significant redevelopment sites to the pollutant reduction goal of 80 percent of total suspended solids, as measured on an average annual basis, from post-construction stormwater runoff (i.e., after construction on a site is completed).

Determination of the size and capacity of an adequate stormwater management system shall take into account the future development in the watershed or affected portions thereof. The design must not adversely affect adjacent or neighboring properties. Any alterations or additions to the Metro stormwater management system require the approval of MWS.

It is the responsibility of the developer or property owner to pick up or acceptably handle the quantity of runoff as it flows onto his or her property from the watershed above, and conduct it through the property to an adequate outfall at the lower property line or beyond. The outfall must be sufficient to receive the runoff without causing deterioration of the downstream channel and the conveyance across the property must be located in a public utility and drainage easement.

The stormwater management system for new developments and significant redevelopment shall be designed to meet stormwater quality for runoff from the development site only and shall be designed to convey stormwater from other properties draining onto the development. If a downstream regional stormwater quality facility serves the runoff from the site then the developer may, with approval from the Metro Water Services (MWS), limit the extent to which runoff quality is controlled. If it is infeasible to implement an on-site stormwater quality Stormwater Control Measures (SCM) then the developer may, with approval from MWS, design a system that controls quality for an equivalent portion of runoff entering from the watershed above.

6.1.1 Minor Systems

The design of the minor stormwater management system shall be based on a storm frequency of 10 years. This criterion shall be applied to both closed conduit and open channel systems. However, if the 10-year design flow for an open channel system is greater than 100 cubic feet

per second (cfs), then the open or closed system shall be capable of passing the 100-year design flow within the drainage easement. Systems relying on sinkholes or drainage wells for discharge shall be capable of passing the 100-year design flow within the drainage easement, assuming plugged conditions (0 cfs drawdown) for the sinkhole.

In residential subdivision developments where the average lot size is less than 20,000 square feet, the following general guidelines shall be observed in the design of the minor system:

1. Design surface runoff across lots shall not have erosive velocities (see Volume 2).
2. Quantities of surface runoff greater than four (4) cfs that flow through lots shall be collected and conveyed in a system of open channels, closed conduits, or a combination of both.
3. Lots should generally be graded in such a manner that surface runoff does not cross more than three (3) lots before it is collected in a system of open channels, closed conduits, or a combination of both. However, runoff will be permitted to cross more than three (3) lots before it is collected if the system is designed to achieve stormwater quality benefits and does not pose a risk of erosion or other damage to public or private property. This may only be performed with approval from MWS.

Design flows may be determined by the methods identified in Volume 2 of this manual.

6.1.2 Major Systems

Wherever possible, natural waterways serving the major system should remain undisturbed, with proposed development situated wisely and accordingly. Detention may be required to avoid discharges that exceed the capacity of natural waterways. Channelization and other related modifications to the natural waterways are discouraged. Improvements to natural open channels that are to function primarily as the major system shall be designed to pass the 100-year design flow without damage to the channel. Man-made channels designed to function as the major system (trunk line system) shall be capable of carrying a 100-year design flow. Where man-made channels are necessary, the channels should be located as far away from buildings or structures as possible and preferably in established greenways or other conservation corridors.

The onsite major stormwater management system for most developments is the natural backup system and consists of the less obvious drainageways. Ideally, this major system should provide relief such that no building will be flooded with a 100-year design flow even if the minor system capacity is exceeded. The 100-year frequency storm shall be used to compute runoff for the design of the onsite major stormwater management system. This system shall be designed to provide relief for flow in excess of the 10-year design flow. The following guidelines pertain to design of the onsite major stormwater management system:

1. Areas should be graded in such a manner or buildings located or constructed in such a manner that if the capacity of the minor system is exceeded, no building will be flooded by the design flow.
2. Critical areas to consider are sumps, relatively flat areas, and areas where buildings are located below streets or parking lots.

3. The 100-year frequency storm for the duration equivalent to the time of concentration shall be used to compute runoff for the major stormwater management system.
4. For the first trial, the same time of concentration values shall be used that were used in designing the minor stormwater management system and the minor system should be assumed to be completely inoperable. If no building will be flooded based on these assumptions, then the analysis can be considered complete.
5. If buildings will be flooded based on the assumptions used in the preceding item, more precise hydrologic and hydraulic computations are required. The minor system, overland relief swales, or surface storage should be designed so that no building will be damaged by flooding.
6. In general, the minor stormwater management system should not be oversized as a basis for providing major system capacity. The major stormwater management system should be in the form of area grading or the location and construction of buildings in such a manner that overland relief swales or surface storage will provide adequate flood protection.

The major stormwater management system should be evident on the drainage plan, including overland relief swales and areas that may be affected by surface storage for a 100-year design storm. Calculations performed for major system design should be submitted with the drainage plan.

6.2 Open Channels

6.2.1 Channel Capacity

Open channel capacity shall be determined by Manning's equation. Appropriate Manning's n values as presented in Volume 2 shall be used for design and are subject to approval from MWS.

6.2.2 Lined Channels

Open channels may be designed as hard-armored, geosynthetic or soil bioengineering lined channels. Geosynthetic and soil bioengineering techniques are described in Volume 4 – Best Management Practices Manual. Acceptable lining materials must be placed in accordance with applicable subdivision regulations. Approval of lining materials is subject to review by MWS.

Channel lining shall be required when the design velocity exceeds the allowable, non-erosive velocity for a given channel reach and no other erosion control measures provide adequate protection. Allowable, non-erosive velocities for various soil types are presented in Volume 2.

6.2.3 Grassed Channels

The design of grassed channels shall consider the variable degree of retardance generated by different types of cover (see Volume 2).

Temporary erosion control shall be utilized during non-growing seasons and during grass cover establishment. The engineer shall note on the drawings or in the specifications that "All grassed channels must be in a well-stabilized condition and show no sign of erosion at the time of final acceptance by MWS."

6.2.4 Easement Width

All open channels shall be located within the right-of-way of a public utility and drainage easement. Minimum easement width shall be determined from Table 6-1. Public drainage easements for open channels must be properly sized, labeled, and identified on all plats submitted for review. Furthermore, the applicant must illustrate and label the respective tops of banks on any plat submitted for review.

Table 6-1
Minimum Easement Width for Open Channels

Top Width of Channel	Easement Width
Less than 5 feet	10 feet centered over channel
5 - 20 feet	5 feet on both sides
Greater than 20 feet	15 feet greater than top width of channel, with minimum of 5 feet on one side

6.3 Storm Pipes and Culverts

6.3.1 Conduit Capacity

Closed conduits shall be designed for the total flow intercepted by the inlets during the design storm event. The minimum diameter for all storm drains shall be 15 inches. Cross-drains shall be a minimum of 18 inches in diameter. The two materials for pipes allowed within Right of Ways (or pipes that carry public water) are concrete and corrugated metal. Corrugated metal pipe (CMP) systems should be Aluminized Steel – Type 2. Corrugated metal pipe underground detention systems and corrugated metal pipe culverts must be Aluminized Steel – Type 2, unless they are open-bottom culverts. All reinforced concrete pipes (RCP) with inverts less than 18 feet shall be Class III.

6.3.2 Pressure Flow

Storm drain systems should generally be designed as non-pressure systems. However, pressure flow systems, if coordinated with MWS during the preliminary design phase, may be allowed. The hydraulic gradient for pressure flow systems shall not exceed the following criteria:

1. An elevation greater than one (1) foot below the established ground surface; or
2. More than five (5) feet above the crown of the conduit.

6.3.3 Easement Width

Minimum allowable easement width for storm water pipes and culverts shall be determined from Table 6-2. Public drainage easements for all storm water infrastructures must be properly sized, labeled and identified on all plats submitted for review. Easement widths presented in Table 6-2 are calculated based on the assumption that maintenance will be performed, if necessary, using the open-cut method with laid back slopes. The easement widths are calculated in accordance with the Occupational Safety & Health Administration (OSHA) Technical Manual dated January 20, 1999, Section V, Chapter 2. Easement widths presented are rounded up to the nearest five-foot increment and the use of shoring was not considered.

Table 6-2 Minimum Easement Width for Storm Drains.

Conduit Width (inches)	Invert Depth (feet)	Minimum Total Easement Width (feet) For OSHA Soil Categories[1]		
		A	B	C
15-18 inches	0-5	15	15	20
	5-10	20	25	35
	10-15	30	35	50
	15-20	35	45	65
21-33 inches	0-5	15	15	20
	5-10	20	25	35
	10-15	30	35	50
	15-20	35	45	65
36-48 inches	0-5	15	20	25
	5-10	25	30	40
	10-15	30	40	55
	15-20	40	50	70
54-72 inches	0-5	N/A	N/A	N/A
	5-10	25	30	40
	10-15	35	40	55
	15-20	40	50	70

[1]OSHA soil categories are defined in the OSHA Technical Manual and in Appendix B of this manual.

Initial easement width requirements must be determined from Table 6-2 assuming an OSHA soil category of "B". In order to use OSHA soil category "A" for easement width determination, a field investigation to determine the presence of type "A" soils will be required. Following the field investigation, a certification by a licensed professional must be submitted to MWS for review and approval. If at any point during design or construction, it is determined that site

conditions warrant the assignment of OSHA soil category "C", easement width requirements must be determined from Table 6-2 using soil category "C". In the event that easement width requirements change after plans have been approved by MWS, plans showing the corrected easement width must be submitted to the MWS for review and approval.

6.3.4 Inlets

Inlets shall be designed to convey the 10-year frequency, time of concentration storm event.

6.3.5 Culverts

Culverts are to be designed with upstream and downstream headwalls. The design flow for culverts shall be based on the following return frequencies:

1. 100-year for residential collector and commercial road crossings.
2. 10-year for residential roads and crossings.

In addition, building elevations shall be checked for flooding caused by the 100-year, 24-hour storm.

6.4 Outlet Protection

The design discharge at the outlet of stormwater management systems shall not result in velocities that equal or exceed the erosive velocity of the receiving channel, unless energy dissipation and permanent erosion protection measures are placed at the outlet. Energy dissipation and erosion control devices shall have no overfall at the terminal end and shall discharge onto a stable section. The terminal section shall be considered stable if the terminal section design velocity is less than the erosive velocity.

6.5 Bridges

All bridges shall be designed for the 100-year, 24-hour storm event. The design flow shall consider runoff from the total tributary area and will require stream channel routing, as appropriate.

6.6 Stormwater Quantity Detention

The purpose of stormwater detention is to protect downstream properties from flood increases due to upstream development. The design is required to control peak flow at the outlet of a site such that post-development peak flows are equal to or less than pre-development peak flows for the 2-year, 5-year, 10-year, 25-year, 50-year and 100-year design storms.

In the event that Metro has developed a master plan for the area, the recommendations within the master plan will establish the requirements for detention. Metro retains the right to require detention in areas of known flooding when detention will not exacerbate downstream flooding. Metro also retains the right to waive detention where detention is proven to exacerbate flooding or will have no proven impact on flooding.

The release rate from any detention facility should approximate that of the site prior to the proposed development for the 2-year through 100-year storm events, with emergency overflow capable of handling at least the 100-year discharge except where waived or altered by MWS. Detention systems must be constructed during the first phase of major developments to eliminate damage to adjacent properties during construction. In this regard, the detention systems shall be designed to function as sediment traps and cleaned out to proper volumes before completion. If siltation has occurred, detention systems must be restored to their design dimensions after construction is complete and certified as part of the as-built submittal (see Section 3.9).

6.7 Quantity & Quality Stormwater Control Measure (SCM) Maintenance

Care must be taken to ensure that any required detention facilities do not become nuisances or health hazards. Stormwater quality management practices generally require more maintenance than stormwater quantity management practices. Detention facilities should be designed to require minimal maintenance, and maintenance responsibility must be clearly stated on the plans. Detention facilities may be designed to serve multiple purposes whereby runoff may be detained under wet-weather conditions, but also serve as common or recreational areas during dry-weather conditions. Where multi-purpose facilities are provided, or where flat grades or poorly draining soils are encountered, provisions for adequate low flow stormwater management system may be required. Where the retention/ detention facility is planned to be used as a lake, pond or stormwater quality management practice with a permanent pool, water budget calculations shall be performed and submitted to demonstrate that an adequate pool is expected during dry summer months. More detailed specifications on detention structures can be found in Volume 4 Section 6.

All stormwater quantity and/or quality control SCMs must be located within public utility and drainage easements and must be maintained by the landowner or the homeowner's association.

6.7.1 SCM Maintenance Document

A Maintenance Document must be submitted with the Grading Permit application and must include the following:

1. Either an Inspection and Maintenance (I&M) Agreement, which includes an easement requirement, or a Declaration of Restrictions and Covenants, whichever is appropriate as determined by Stormwater staff[1], signed by the current owner. Copies of the two alternative forms may be found in Appendix C.
2. A long-term maintenance plan prepared by the design engineer. The maintenance plan must include a description of the stormwater system and its components, inspection priorities and inspection schedule for each component, and SCM schematics for each SCM.
3. A system location map to enable MWS to locate SCMs, which include water quality buffers, as needed.

The Maintenance Document must be recorded prior to final Grading Permit approval. If the final configuration of the stormwater system components or SCM differs from the original configuration proposed with the Grading Permit application, the Maintenance Document must be revised, finalized, and rerecorded. Failure to follow the Maintenance Document could result in enforcement action. Nothing in these regulations alters, amends, or negates requirements under existing detention pond agreements between the Metropolitan Government and property owners.

6.7.2 Inspection and Maintenance Responsibilities

The long-term maintenance plan within the Maintenance Document contains the inspection priorities and schedule for the stormwater system components and SCMs. The SCM owner is responsible for inspecting the stormwater system, including SCMs, according to the schedule and annually submitting completed inspection reports to MWS to document that inspections have been completed and necessary maintenance has been performed. MWS must be notified through the annual inspection process of any SCM ownership changes. Failure to file annual inspection reports and perform required SCM maintenance could result in enforcement action.

A comprehensive inspection of SCMs must be performed every five (5) years by a qualified professional as specified by MWS or a professional engineer or a landscape architect. The inspection report shall be submitted to MWS and shall include the following:

- Facility Type,

[1] In making this determination, staff will take the following into consideration. The Declaration of Restrictions and Covenants may be permissible in lieu of an Inspection and Maintenance Agreement /Easement where the potential impact the stormwater system components in question could have on the public stormwater system is minimal or where the signatory to the Maintenance Document is an established institution that can reasonably be expected to continue to hold the property where the stormwater system components are located for the foreseeable future. Examples of such instances would include an urban highrise with a green roof or a similar SCM, or SCMs proposed to be maintained on the property of an established educational institution or hospital. An example of a situation in which it would not be appropriate would be where public water would need to flow through the stormwater system components across private property, in which case an easement would be required.

- Inspection date,
- Latitude and longitude and nearest street address,
- SCM owner information (e.g., name, address, phone number, email)
- A description of SCM condition including: vegetation and soils; inlet and outlet channels and structures; embankments, slopes, and safety benches; spillways, weirs, and other control structures; and any sediment and debris accumulation,
- Photographic documentation of SCMs, and
- Specific maintenance items or violations that need to be corrected by the SCM owner along with deadlines and re-inspection dates.

6.8 Sinkholes and Drainage Wells

In alignment with Planning Commission policy, sinkholes are to be included in open space. Metro defines sinkholes as follows:

> *A sinkhole is a depression that occurs naturally in a karst area with no surface outflow of water and shall be identified by the first closed contour on 2-foot contour interval map or as designated by the Tennessee Department of Environment and Conservation.*

If a party disagrees with a sinkhole as determined by a contour map or as identified by MWS, the party may appeal to TDEC for review. If TDEC determines the feature not to be a sinkhole, Metro will defer to TDEC's determination.

All stormwater management systems discharging to sinkholes or drainage wells shall be designed using the 100-year storm. A geologic investigation and report as described in Section 4.2.2.4 is required, along with a demonstration that development will not occur within the area flooded by the 100-year storm. The project must also comply with all state and federal sinkhole permitting requirements. Any lost sinkhole volume from the 100-year storm event will need to be compensated within the development or demonstrate that no adverse conditions will occur.

6.9 Water Quality Buffers

6.9.1 Identification of Community Waters and Application of Buffers

New development, significant redevelopment, and sites needing a Grading Permit are required to preserve water quality buffers along Metro's community waters. Buffers shall be clearly marked on site development plans, Grading Permit applications, plats and/or concept plans. Community waters include the following:

1. Intermittent and perennial streams (and their source springs)

2. Lakes and ponds with hydrologic connectivity (stream leading into/out of the pond or obvious spring input)
3. Wetlands that have been identified by the U.S. Army Corps of Engineers, TDEC, or MWS staff.

Intermittent streams are natural or man-made watercourses (streams), which may cease to flow for sustained periods during a normal rainfall year (typically during the later summer through fall months). Perennial streams generally flow year-round, however they too may also run dry during years of extreme drought. Both intermittent and perennial streams will be collectively referred to as "streams" throughout this manual.

Channels identified on Metro's GIS layer as streams or as draining 40 acres or more must be buffered unless the developer can clearly demonstrate the watercourse in question is not a community water. Hydrologic determinations can be performed by qualified staff either using MWS' Hydrologic Determination Policy or TDEC's Guidance for Making Hydrologic Determinations. These hydrologic determinations must be submitted to MWS for review prior to acceptance. MWS will also accept determinations performed by TDEC. Please contact MWS for additional information.

Where Metro's Water Quality Buffer requirements differ from TDEC's Construction General Permit (CGP) buffer requirements, the more restrictive requirement shall apply. Furthermore, the Grading Permit plans must address how and when the transition from the CGP buffer requirement to Metro's buffer requirement will transpire on the site.

6.9.2 Buffer Widths

The following buffer widths and zones shall be applied to community waters, as described in Section 6.9.1. **Zone 1** for all buffers shall be considered a "no disturb zone", where the vegetation cannot be disturbed, removed or replanted unless a buffer restoration plan has been approved by MWS. **Zone 2** can consist of managed vegetation, meaning the buffer zone can be disturbed and planted with grass or other vegetation. However, no structures or impervious surfaces shall be placed in Zone 2. This includes Permanent Treatment Practices (SWMM Vol. 4) and Green Infrastructure Practices (SWMM Vol. 5) that are being used to meet a site's water quality and/or quantity requirements. In defining the inner limits of stream buffers, top of bank is defined as the uppermost limit of the active channel of a stream during "bank full" conditions, usually marked by a break in slope. The tops of bank must be properly illustrated and labeled on plats submitted for review.

<u>Streams</u>

1. Streams draining < 100 acres: 30' from top of bank; Zone 1=30' (See Figure 6-1)
2. Streams draining ≥ 100 acres, but < 1 square mile: 50' from top of bank; Zone 1=30' and Zone 2=20' (See Figure 6-2)
3. FEMA studied streams, streams with a Local Flood Study, or streams with a drainage area ≥ 1 square mile: 75' from the floodway, Zone 1=floodway + 50' and Zone 2=25' (See Figure 6-3). MWS staff may allow a large undisturbed floodway to count towards the buffer requirement in consultation with Metro Parks and Greenways if the

undisturbed area complies with the requirements of the floodplain overlay district and if staff determines that the undisturbed area would adequately serve water quality functions.

Ponds

Ponds with hydrologic connectivity (stream leading into/out of the pond or obvious spring input): 25' from normal water pool, with Zone 1 = 10' and Zone 2 = 15'

Wetlands

25' from the wetland delineation line (accepted by USACOE, TDEC, or MWS), with no disturbance allowed within the 25'.

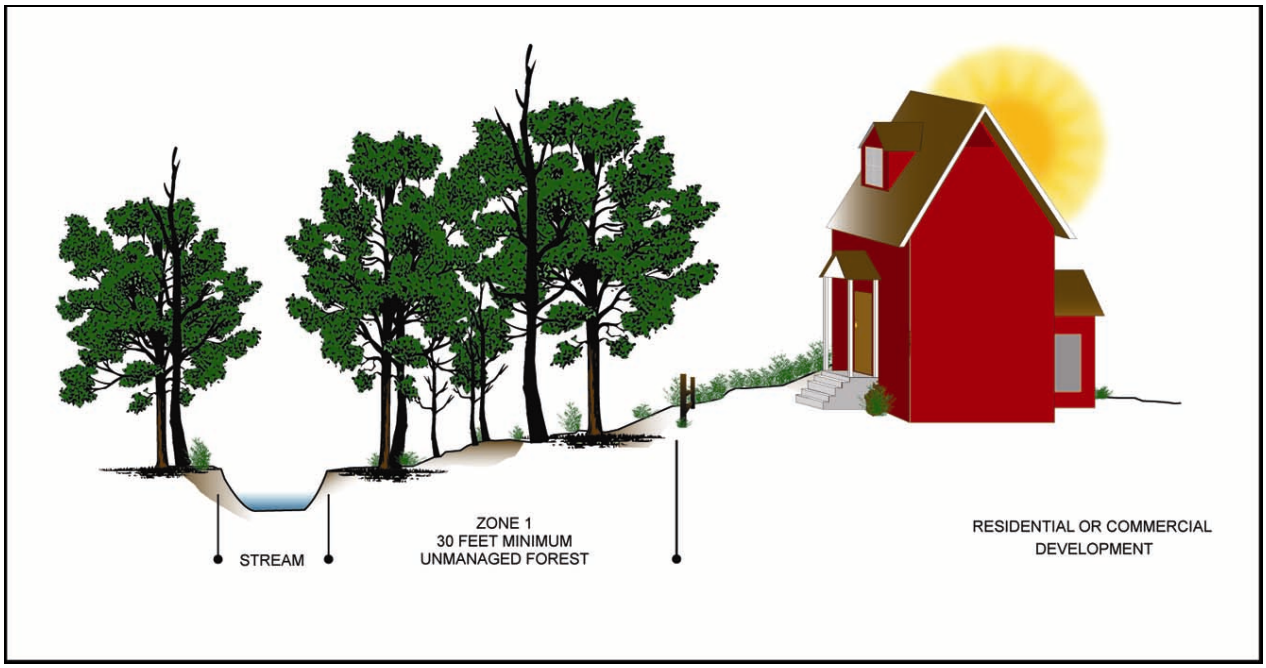


Figure 6-1 Buffer Example for Streams with Drainage Area < 100 acres

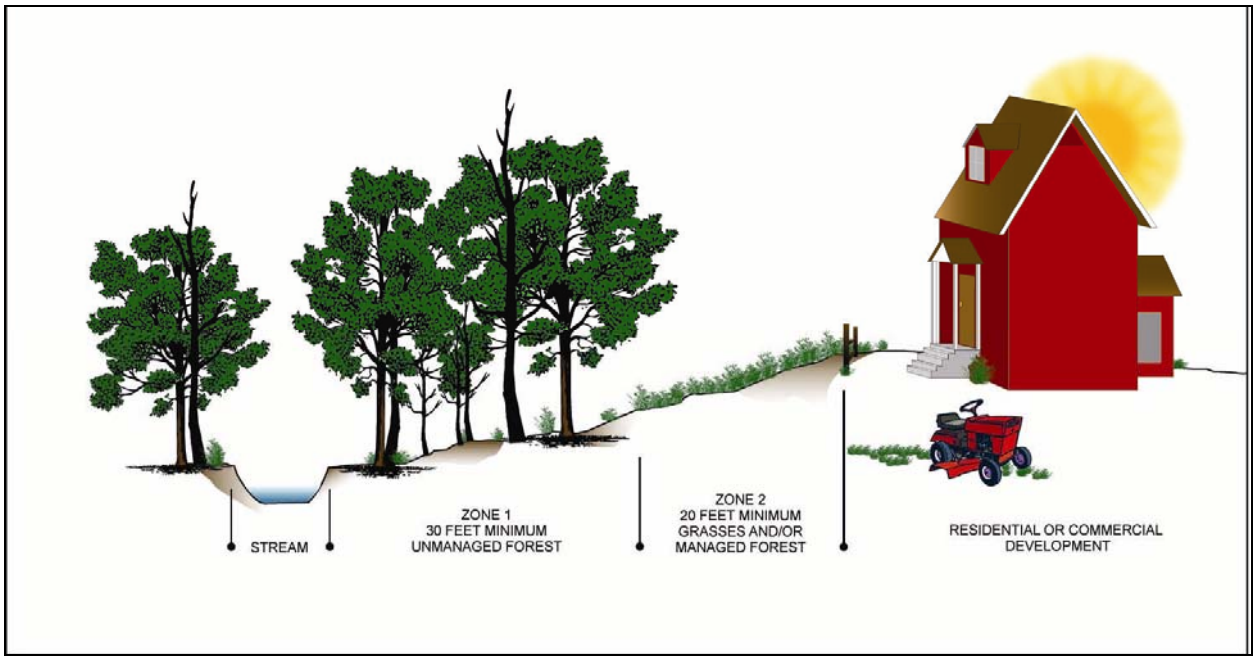


Figure 6-2 Buffer Example for Streams with Drainage Area ≥ 100 acres

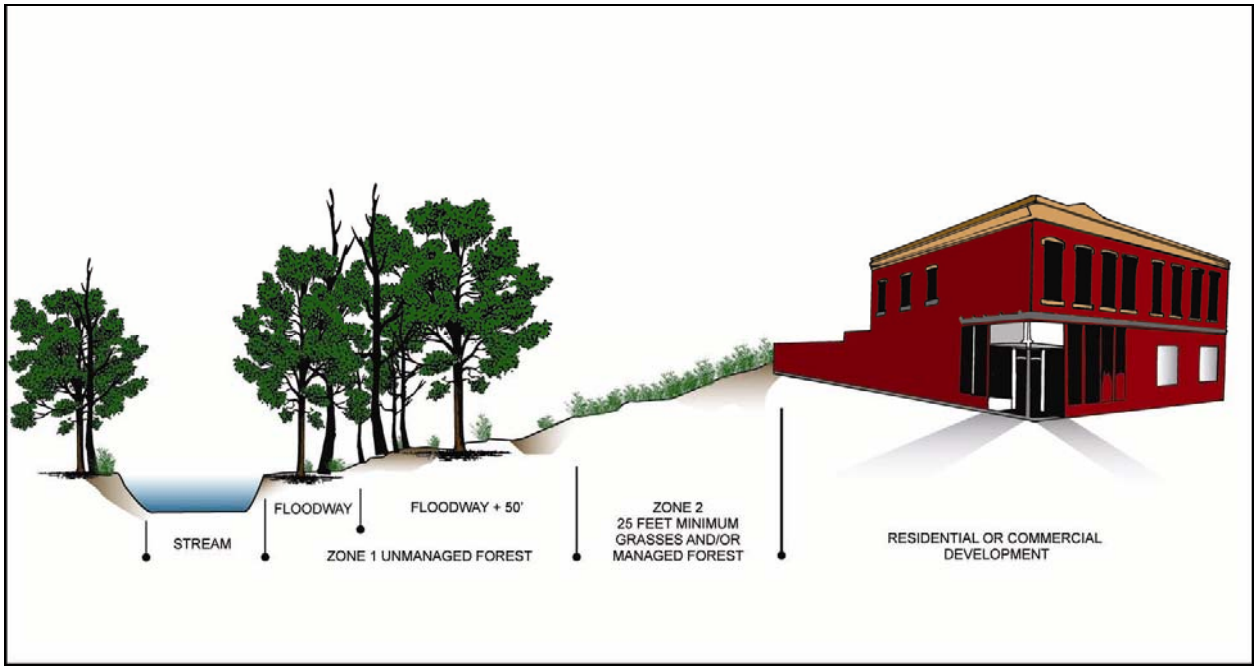


Figure 6-3 Buffer Example for Streams with Floodways

6.9.3 Preservation of Water Quality Buffers

Buffers shall be preserved both during development and perpetually after development.

1. During development, Zone 1 of all buffers shall be clearly marked and protected from construction activities. Zone 2 may be disturbed and revegetated.
2. For single family residential grading permits, water quality buffers shall be placed in open space / public utility and drainage easements.
3. Prior to the release of the Stormwater Bond or Stormwater Use & Occupancy Permit sign-off, water quality buffer limits shall be clearly marked with permanent signs placed every 100 feet along the outside edge of Zone 1 (the edge furthest from the stream). The number of required buffer signs should be indicated along the buffer line on the Grading and Drainage plans. Please contact MWS for the sign requirements.
4. Projects that disturb buffers for enhancement or restoration shall be allowed with prior approval from MWS.

When the application of the buffer area would result in the extreme loss of buildable area, modifications to the width of the buffer area may be allowed through the Stormwater Management Committee appeals process. An alteration to a community water also requires a variance from the Stormwater Management Committee. Septic systems cannot be located within 25' of a community water. This distance is not appealable to the SWMC. A variance will be required if they are located in Zone 1 outside of the 25' setback. Additional information on the variance process is found in Section 3.6 and Appendix F.

6.9.4 Maintenance of Water Quality Buffers

In order to maintain the functional value of the buffer area, indigenous vegetation may be removed as follows:

a. Dead, diseased, or dying trees that are in danger of falling and causing damage to dwellings or other structures may be removed at the discretion of the landowner.
b. Debris in the buffer area that is caused by storm damage may be removed.
c. Invasive plant species may be removed if they are replaced by native species that are equally effective in retarding runoff, preventing erosion, and filtering nonpoint source pollution from runoff. A buffer restoration plan for removal of invasive species must be approved by MWS. See section 6.9.6 for buffer restoration plan requirements.
d. Woody vegetation growing on a levee or within 15 feet of the levee toe may be removed to protect the integrity of the levee.
e. Vegetation may be maintained in certain areas so as to not conflict with other Metro Code (i.e. Chapter 13 – Traffic and Parking) relating to "sight distances" for ROW, roadway maintenance, driveways, or other paths of travel.

6.9.5 Uses in the Buffer that are Permissible with Conditions

Some buffer impacts are inevitable with development. In order to minimize variance requests, Metro has identified allowable or permissible disturbances or uses of the buffer that can be approved at the staff level. Table 6-3 outlines permissible buffer impacts and the appropriate

conditions for each impact type. Impacts to the buffer that do not meet these conditions are required to request a variance.

The benefits of buffers are maximized in unbroken corridors along streams rather than in interrupted, segmented buffers. Therefore, the buffer program promotes minimizing stream crossings. For buffer crossings proposed in plans, the developer must show that there is not a feasible alternative to the crossing.

6.9.6 Buffer Restoration and Enhancement

Buffer restoration is required when a buffer is disturbed without approval from MWS or the Stormwater Management Committee. A developer or property owner may also wish to enhance a buffer to bring it closer to an optimal, undisturbed native forest condition. Prior to reestablishing or planting the buffer, a restoration or enhancement plan must be submitted to and approved by MWS.

6.9.6.1 Buffer Restoration and Enhancement Plan Requirements

Buffer restoration and/or enhancement plans must include the following:

1. *A drawing or plan* that shows the location of the buffer in relation to the existing or planned development and to the buffered community water; the disturbance limits for the planned buffer restoration; direction of flow of runoff from the site and flow within the community water feature; erosion prevention and sediment control measures to be installed to protect the community water; any existing or proposed stream crossings; existing or proposed streambank stabilization measures; access to a water source for the purposes of watering vegetation; and other pertinent information. The plan(s) must be stamped by a registered landscape architect.
2. *A plan in visual or narrative form that describes the vegetation plan for the buffer*. Zone 1 of buffers must be planted with native trees, shrubs, and grasses that will not be mowed. Please contact MWS for native plant lists. Zone 2 may be planted with fescue or Bermuda grasses, at a minimum, but can also be planted as described for Zone 1.
3. The schedule for when plantings will occur and a two (2) year survival guarantee provided by the responsible party.

Table 6-3 Permissible Buffer Impacts, with Conditions

Permissible Activities with Conditions	Stream Drainage Area < 100 acres Zone 1 = 30'	Stream Drainage Area ≥ 100 acres Zone 1 = 30' Zone 2 = 20'	Stream Drainage Area ≥ 1 sq mile Zone 1 = floodway+50' Zone 2 = 25'	Wetland Buffers Zone 1 = 25'	Pond Buffers Zone 1 = 10' Zone 2 = 15'
Metro Greenways	Permissible with the following conditions: Minimize impacts to buffer based on Staff approval. Trails that do not require the removal of buffer vegetation and are made of mulch or other pervious materials are permitted.				
Wildlife and fisheries management	Permissible if activity is approved through TN Wildlife Resources Association or US Fish & Wildlife Service.				
Water dependent structures (boat docks, piers, marinas)	Permissible with the following conditions: Minimize disturbance and stabilize disturbed areas. Contain all pollutants related to boating activities such as oil and gas, boat sewage, solvents, antifreeze, detergents, and toxic metals.				
Driveway crossings	**Not permissible except under the following conditions:** At least 1,000 feet between crossings, three sided culvert or span is used and the width of the buffer impact perpendicular[1] to stream = road width + slope area over pipe (fill slope of 3:1 or flatter) + 10' from toe of fill on either side of crossing (for construction purposes)			Permissible when there are no other feasible alternatives	Permissible when there are no other feasible alternatives
Road crossings	**Not permissible except under the following conditions:** Only when there are no other feasible alternatives and at least 1,000 feet between crossings; three sided culvert or span is used and the width of the buffer impact perpendicular[1] to stream = road width + slope area over pipe (fill slope of 3:1 or flatter) + 10' from toe of fill on either side of crossing (for construction purposes)			Permissible when there are no other feasible alternatives	Permissible when there are no other feasible alternatives
Drainageway Improvements	Permissible with conditions: 1) necessary approvals from MWS and/or TDEC 2) with an MWS approved buffer reestablishment plan.				
Underground utility lines associated with new development[1]	**Zone 1: Only when there are no other feasible alternatives; preferred crossing is perpendicular** Zone 2: Permissible			Permissible when there are no other feasible alternatives	Permissible when there are no other feasible alternatives

[1] Crossings that are within 15 degrees of being perpendicular to the stream can be approved by staff without a variance. Proposed crossings that vary more than 15 degrees from perpendicularity must go through the Stormwater Management Committee.

6.10 Erosion Prevention and Sediment Control Measures

By policy, Metro's requirements for Erosion Prevention and Sediment Control (EPSC) measures are consistent with those of TDEC's CGP. Some of the more crucial design requirements are outlined in this section. Wherever the Metro and CGP requirements are in conflict, the more restrictive requirements should be applied.

EPSC measures shall be designed according to the size, slope, and soil type of disturbed or drainage areas to prevent erosion and to capture sediment. In addition, for sites discharging to streams impaired by sediment or habitat alteration (as indicated on the most recent 303(d) list maintained by TDEC Division of Water Resources) or TDEC designated Exceptional Tennessee Waters, EPSC measures shall be designed for the 5-year, 24-hour storm event, at a minimum. EPSC measures for sites that do **not** discharge into streams impaired for sediments (as indicated on the most recent 303(d) list maintained by TDEC) must be designed for the 2-year, 24-hour storm event. The approximate values for the corresponding storm events for Nashville are 3.39 inches for the 2-year, 24-hour storm event and 4.5 inches for the 5-year, 24-hour storm event.

An EPSC plan shall identify the erosion prevention and sediment control measures that are appropriate for the actual site conditions. These plans should be drawn upon existing site contours without the final grading lines. In addition, the appropriate schedule of implementation shall be identified. Particular attention is required for concentrated stormwater flows. Either concentrated stormwater flows shall be avoided or the conveyance system shall be protected sufficiently to prevent significant erosion. Sediment control measures are required at all points where sediment has the potential to leave the site. The plan shall identify provisions including but not limited to the following.

- Erosion prevention on denuded areas;
- Non-structural management practices to be implemented;
- Perimeter controls;
- Permanent stormwater conveyance structures;
- Temporary and final stabilization methods and schedule;
- Provision for removing temporary control measures;
- Stabilization of the site where temporary measures are removed;
- Maintenance requirements for temporary management practices including minimum inspection requirements;
- Maintenance requirements for any permanent measures.

Additional guidance for selecting, designing and implementing appropriate erosion prevention and sediment control practices is presented in Volumes 2 and 4.

6.10.1 Disturbed Areas

Disturbed area shall be limited to 50 acres. For projects in which over 50 acres of soil will be disturbed, construction must be phased. Temporary or permanent stabilization must be completed no later than 15 days after construction activity in that portion of the site has temporarily or permanently ceased. Steep slopes shall be stabilized not later than seven (7) days

after construction activity on the slope has temporarily or permanently ceased. Exceptions to this requirement include:

1. Where the initiation of stabilization measures by the seventh day is precluded by snow cover or frozen ground conditions, stabilization measures shall be initiated as soon as practicable; and
2. Where construction activity on a portion of the site is temporarily ceased, and earth-disturbing activities will be resumed within 15 days, temporary stabilization measures do not have to be installed on that portion of the site.

Soil stabilization refers to measures that protect soil from the erosive forces of raindrop impact and flowing water. Applicable practices include but are not limited to vegetative establishment, mulching, geotextiles, and the early application of gravel base on areas to be paved. Selected soil stabilization measures should be appropriate for the time of year, site conditions, and estimated duration of use.

Soil stockpiles shall be stabilized if left undisturbed for 15 or more days. They shall be protected with sediment trapping measures that may include sediment traps or detention ponds to prevent soil loss from the project site throughout the life of the soil stockpiling practice.

6.10.2 Final Stabilization

Final stabilization is achieved when all soil disturbing activities at the site have been completed, no further construction activity is planned, and perennial vegetation and/or a permanent non-erodible surface has been established on the entire area of disturbance. Permanent vegetation shall not be considered established until a ground cover is achieved that, in the opinion of MWS, is mature enough to control soil erosion satisfactorily and to survive severe weather conditions. Also, there should be no signs of accelerated erosion on steep slopes. Channels and concentrated flow paths shall be completely stabilized.

6.10.3 Protection of Adjacent Properties

Properties adjacent to the site of a land disturbance shall be protected from sediment deposition. This may be accomplished by preserving a well-vegetated buffer strip around the lower perimeter of the land disturbance; by installing perimeter controls such as sediment barriers, filters, diversion berms, or sediment basins; or by a combination of such measures.

6.10.4 Timing and Stabilization of Sediment Trapping Measures

Sediment basins and traps, perimeter diversion berms, sediment barriers and other measures intended to trap sediment onsite shall be constructed as a first step in grading, and be made functional before upslope land disturbance takes place. All sediment control practices at hydraulic outlets from the site must be installed before additional construction may take place. Earthen structures such as dams, dikes, and diversions shall be seeded and mulched within 15 days of installation.

6.10.5 Sediment Basins

Stormwater runoff from tributary areas with five (5) acres or greater disturbed area shall pass through a sediment basin or other suitable sediment control measure until final stabilization of the site. This basin must be designed for the calculated runoff from a 5-year, 24-hour storm if the site discharges to impaired for sediment or habitat alteration or Exceptional Tennessee waters as determined by TDEC. Otherwise, the basin must treat the runoff from a 2-year, 24-hour event. Runoff from any undisturbed acreage should be diverted around the disturbed area and the sediment basin. Diverted runoff can be omitted from the volume calculation for the sediment basin size. *Metro reserves the right to request/require more stringent controls if the proposed or existing controls are deemed inadequate.*

6.10.6 Cut and Fill Slopes

Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion. Consideration must be given to the length and steepness of the slope, the soil type, upslope tributary area, groundwater conditions, and other applicable factors. As a minimum, all slopes at 3 to 1 or steeper shall be stabilized with rock riprap, geosynthetic material, or other method approved by MWS.

6.10.7 Construction Exits

A stabilized stone pad shall be placed at any point where traffic will be leaving a construction site to a public right-of-way, street, alley, or parking lot. Stone pads shall contain two (2)- to three (3)-inch stone, be six (6) inches thick, and be a minimum of 100 feet long and 20 feet wide. Detailed requirements for construction exits are presented in the Volume 4 of this manual.

6.10.8 Litter and Construction Waste Materials

Grading Permittees shall control site wastes such as discarded building materials, concrete truck washout, chemicals, litter, and sanitary wastes at their construction site that may cause adverse impacts to water quality. "Control" shall constitute SCMs addressing the aforementioned site issues and should be being depicted on the EPSC sheet of the site's approved Grading Permit plan as well as being implemented and maintained on the project site as required to prevent pollution from being lost from the site.

A Grading Permit must be obtained for any parcel of land accepting 100 cubic yards of fill or more. Transporting/disposing of excess or unwanted fill on a site that does not already hold a valid Grading Permit will result in the issuance of a Notice of Violation (NOV), a Stop Work Order (SWO), a penalty, or the revocation of the Grading Permit for the project that is the source of the fill material.

6.10.9 Deficient Performance

If at any time it is determined by MWS, that the erosion prevention and sediment control practices as originally designed are not capable of preventing sediment from leaving the site,

then the EPSC plan shall be revised and submitted for approval to MWS and additional controls shall be implemented. If MWS inspectors determine that adequate inspections and maintenance procedures are not being performed or the controls as designed are not meeting performance objectives presented in this chapter, then MWS may issue a SWO, NOV with penalty, rescind a Grading Permit, or take other appropriate legal actions. See Section 3.7 of this Volume for additional information.

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Chapter 7
POST-CONSTRUCTION WATER QUALITY POLICIES AND PROCEDURES

7.1 Overview

Metro's comprehensive stormwater management program addresses stormwater runoff during construction through Erosion Prevention and Sediment Control (EPSC) practices and after construction through stormwater quantity and quality controls. After construction has been finished on a site and the site is stabilized, pollutants can be washed into the storm drain system and into receiving streams off of hardened or impervious surfaces, such as driveways, roads and roofs. Typical stormwater runoff from stabilized urban sites contains sediments, nutrients and metals, as well as gross solids such as litter. These pollutants are carried into streams and other water bodies. Major metropolitan areas, including Metro, are required under Federal and State law to reduce the discharge of these stormwater pollutants to achieve stormwater treatment goals set by the U.S. Environmental Protection Agency. Projects that disturb greater than 10,000 square feet and are new developments, significant redevelopments, and/or grading permit sites are therefore required to design, install, and maintain stormwater quality and quantity controls.[1] In the case of significant redevelopment, the entire footprint of the significantly redeveloped structure shall count toward the total disturbed area. Stormwater quality and quantity controls should be integrated into a development's conceptual design early in the design process.

Metro has established a post-construction stormwater quality program that applies a consistent standard that seeks to achieve pollutant removal primarily by runoff reduction practices regardless of the type of development. This chapter describes the post-construction stormwater quality program and associated requirements including:

- Runoff reduction requirement;
- Pollutant removal requirement (to be utilized if runoff reduction is demonstrated to be unfeasible);
- Water quality treatment volume requirement for new development;
- A listing of pre-approved structural Stormwater Control Measures (SCMs);
- Testing requirements for proprietary SCMs.

The Stormwater Management Manual, Volume 5 Low Impact Development (LID) and Volume 4 Best Management Practices, Section 6, contain detailed design, inspection and maintenance information as well as design examples for the pre-approved Stormwater Control Measures (SCMs) listed in this chapter. A site design tool that can be used in developing the post-construction stormwater quality plan can be downloaded from Metro Stormwater's website.

[1]Please see Chapter 8 and Appendix H for residential infill requirements.

7.2 Runoff Reduction

The site design shall provide, in combination or alone, management measures that are designed, built, and maintained to infiltrate, evapotranspire, harvest, and/or use, at a minimum, the stormwater runoff generated at a site by the first inch of every rainfall event preceded by 72 hours of no measureable precipitation. A site designed in accordance with the Stormwater Management Manual, Volume 5, LID Manual, that meets the 80% runoff reduction goal contained therein is presumed compliant with this goal.

7.2.1 Redevelopment Credit

Projects on previously developed sites can reduce their runoff reduction requirement from 80% to 60%. A site is considered previously developed if its pre-development site weighted runoff coefficient is greater than 0.4. Please see Section 3.2 of the LID Manual for additional information on runoff coefficients. Please contact MWS Development Review Section for runoff reduction requirements for sites located in Metro Nashville's combined sewer area.

7.2.2 Site Limitations

MWS staff may approve alternative practices to runoff reduction when site limitations exist. Criteria to determine the circumstances under which alternatives are available shall not be based solely on the difficulty or cost of implementing practices. The determination may be based on the following site limitations:

i. Where the potential for introducing pollutants into groundwater exists, unless pretreatment is provided;
ii. Where pre-existing soil contamination is present in areas subject to contact with infiltrated runoff;
iii. Presence of sinkholes or other karst features on a site;
iv. Where pre-development infiltrative capacity of soils precludes runoff reduction measures;
v. A site-use that is inconsistent with capture and reuse of stormwater or a green roof.

Site limitations should be assessed per site post construction drainage area. Please see the *Tennessee Permanent Stormwater Management and Design Guidance Manual* for additional information on limitations to runoff reduction.

If a project is requesting an exemption from the runoff reduction requirement for any of the site drainage areas, the project engineer must submit adequate justification as determined by Metro Stormwater that one of the aforementioned limitations applies. This may include, but is not limited to soil maps, geotechnical reports, infiltration testing, soil logs, and environmental site assessments.

7.3 Pollutant Removal

Site drainage areas that cannot meet the runoff reduction requirement must be designed to remove at least 80% of the average annual post-construction total suspended solids (TSS) load. It is presumed that the drainage area complies with this performance standard if:

- It is sized to capture and treat the water quality treatment volume, which is defined as the runoff volume resulting from the first 1.1 inches of rainfall from a site; and
- Appropriate structural stormwater controls are selected, designed, constructed, and maintained according to the specific criteria in the SWMMs.

More information about the pollutant removal methodology can be found in the SWMM Vol. 4, Section 6. Please contact MWS Development Review Section for TSS removal efficiency requirements for sites located in Metro Nashville's combined sewer area.

7.4 Pre-Approved SCMs

Stormwater Control Measures (SCMs) are structural and non-structural practices designed to reduce the pollutants leaving a site. For the purposes of this manual, SCMs are divided into Green Infrastructure Practices (GIPs) and Permanent Treatment Practices (PTPs). GIPs are designed for runoff volume reduction and typically have two runoff reduction levels based on design. Table 7-1 lists the accepted GIPs and the runoff reduction credit given to each. PTPs are designed for pollutant removal and are rated by their ability to removal Total Suspended Solids. Table 7-2 presents a pre-approved listing of PTPs and their assigned TSS removal capability. Design and maintenance information for each SCM can be found in the SWMM Volume 5, LID Manual, and SWMM Volume 4, Permanent Treatment Practices (PTP) Section 6.

Table 7-1 GIPs for use in Metro

Green Infrastructure Practice	% Rainfall Volume Removed/Captured – RR Credit							
	Level 1				Level 2			
1. Bioretention	40				80			
2. Urban Bioretention	40				N/A			
3. Permeable Pavement	45				75			
4. Infiltration Trench	50				90			
5. Water Quality Swale	40				60			
6. Extended Detention	15				N/A			
7. Downspout Disconnection	25				50			
8. Grass Channel	10/20				20/30			
9. Sheet Flow	50				75			
10. Reforestation (A, B, C, D soils)	96	94	92	90	98	97	96	95
11. Rain Tanks/Cisterns	Design dependent							
12. Green Roof	45				60			

Table 7-2 PTPs for use in Metro

PTP Removal Efficiency for Total Suspended Solids (TSS)	
Structural Control	**TSS Removal (%)**
Wet Pond	80
Stormwater Wetland	80
Bioretention Area	80
Sand Filter	80
Enhanced Swale	80
Filter Strip	50
Grass Channel	50
Organic Filter	80
Underground Sand Filter	80
Submerged Gravel Wetland	80
Infiltration Trench	80
Gravity (Oil-Grit) Separator	40
Proprietary Structural Control	Based on Testing (see Section 7.6)
Dry Detention / Dry ED Basin	60

7.5 Proprietary SCMs

Many proprietary SCMs are available to treat stormwater runoff. However, some of these SCMs do not have established pollutant removal data. Pollutant-removal capability shall be determined as percent total suspended solids (TSS) removal by both field testing and laboratory testing.

Proprietary devices shall be approved by MWS, through an application and acceptance process, prior to consideration for use in Metro. Please contact Stormwater staff for the current list of approved devices. Metro requires applicant manufacturers to conduct testing to demonstrate the pollutant-removal capability of proprietary SCMs. Metro has established submittal requirements and guidelines for test protocol. Qualified laboratories, which follow the applicable requirements and guidelines, should be utilized to ensure the usefulness and accuracy of the data submitted. Additionally, manufacturers' claims for SCM performance must be verified through data that is obtained in independent, third-party testing. More specific application requirements can be found in section 7.6.1; however, manufacturers are to contact MWS prior to application to ensure that the most recent application requirements are obtained.

MWS may additionally accept manufacturers operating under current proprietary SCM certifications from the New Jersey Department of Environmental Protection (NJDEP). MWS may consider the results of other certification systems and review each on a case-by-case basis. If MWS accepts such a certification, the acceptance shall be based on the same conditions for performance, including deadlines for documentation that are defined in the issuer's certification letter.

7.5.1 Submittal Requirements

The application for consideration of proprietary SCM approval by Metro shall include the following:

1. Statement of the intended use of the device. Intended uses may include pretreatment (for floatables, oil and grease, or sediment, for example), water quality treatment, hydraulic detention, velocity dissipation, an element of a comprehensive treatment train, etc.
2. Statement of the TSS removal performance at the flow rate specified in the equation in Section 7.6.2, certified by an independent testing laboratory.
3. A report of the results of the independent testing laboratory satisfying the requirements of Section 7.6.3.1.
4. Published technical papers, if available, documenting performance of the device.
5. Engineering drawing of the assembled device.
6. Installation, repair, and maintenance instructions and schedule.
7. Parts list including materials of construction and recommended manufacturers.
8. Certified tests of load bearing capacity for traffic bearing devices.
9. A sample device should be made available to Metro Water Services Stormwater Division upon request.
10. A list of locations where the device is installed and operational. The list should include the customer's name, agency, telephone number, and address.
11. Other relevant information requested by Metro from the manufacturer.

Any device found not to meet the certified performance criteria may be removed from the approved list. Submittals containing unsubstantiated or unrealistic claims shall be returned without further review pending receipt of a resubmittal without such claims. An approved device may not be suitable for use in all applications. Metro may reject the use of an otherwise approved device, if a specific application is determined by Metro to be not suitable.

7.5.2 Design Guidance for Water Quality Treatment

Most proprietary SCMs are flow-through-type SCMs and rated for TSS removal based upon a specified flow rate. The WQv equation, which forms the foundation of Metro's stormwater quality program, establishes a volume that must be treated. In an effort to simulate the WQv approach for proprietary SCMs, the following peak flow design equation must be used to develop the stormwater quality treatment required.

$$Qp = C * I * A$$

Where:

Qp = the peak flow through the proprietary SCM in cubic feet/second (cfs) =runoff coefficient

I = rainfall intensity, 2.45 inches/hour for Metro

A = the contributing drainage area for the SCM, in acres

7.5.3 Performance Standards for Proprietary SCMs

Water quality treatment for Metro is defined as a goal of eighty percent (80%) TSS removal. Treatment may be achieved using a single treatment method, such as a wet pond, or by using a treatment train. A treatment train achieves eighty percent (80%) removal of TSS using a combination of pretreatment and/or treatment methods. Manufacturers of proprietary SCMs may apply for either 1) pretreatment approval (50% TSS removal); or 2) full treatment approval (80% TSS removal).

Proprietary SCM approval shall last for four (4) years, unless the terms of certification provide for a shorter period, for devices approved under the application and approval procedures contained herein, after which time reapplication is required. Applicants are required to meet any and all Metro rules, regulations, and policies in effect. Proprietary SCM approval for devices certified by NJDEP shall expire as stated in such certification letter.

Metro reserves the right to terminate approvals for reasons including, but not limited to: 1) restrictions placed by the Tennessee Department of Environment and Conservation; 2) product modifications or system failures indicating questionable performance capability; 3) changes in Metro stormwater regulations or policy, or 4) changes in the Technology Acceptance Reciprocity Partnership (TARP) or NJDEP protocols.

7.5.3.1 Testing Requirements for Proprietary SCMs

It is the responsibility of the manufacturer to develop and implement technically-valid plans for laboratory and field testing. The following guidelines are provided as minimum considerations for an approvable testing program. Metro reserves the right to reject any data submitted, including invalid or undocumented testing procedures. Metro may provide review of test plans, as staff time allows.

All testing plans must include a Quality Assurance Plan, which defines testing and analysis methods. The Quality Assurance Plan must be prepared by a qualified testing laboratory. Examples of a Quality Assurance Plan are provided, among other sources, in *The Technology Acceptance Reciprocity Partnership Protocol for Stormwater SCM Demonstrations, August 2001 (updated July 2003).*

7.5.3.1.a Field Testing

Metro requires that field testing conform to *The Technology Acceptance Reciprocity Partnership Protocol for Stormwater SCM Demonstrations, August 2001 (updated July 2003) and the NJDEP Protocol for Total Suspended Solids Removal Based on Field Testing Amendments to TARP Protocol Dated August 5, 2009, Revised December 15, 2009*, and that conformation with and deviations from the TARP be noted in an applicant's protocol and test report.

The following items are required in addition to the TARP procedure:

1. Results are to be reported in mg/L TSS, which is consistent with the requirements of the MWS NPDES Discharge Permit. TSS shall be analyzed in accordance with Standard Method APHA 2540D. Reporting in both total suspended solids, TSS, and suspended sediment concentration, SSC, is recommended by TARP procedure.
2. All data collected must be reported. All maintenance performed on the tested device at any time during the overall field testing program shall be reported. This reporting shall include a description of each task performed, reason(s) for the maintenance, the quantities of any sediment removed, and a discussion of any anomalous, irregular, or missing maintenance data.
3. Particles larger than 1000 microns must be excluded from the analysis results.
4. At a minimum, the peak runoff rate from at least three of the sampled storms shall exceed seventy-five percent (75%) of the design flow of the unit. At least five (5) of the flows must exceed fifty percent (50%) of the design flow of the unit.
5. Field tests must be conducted without adding sediment to the influent or augmenting flow. Sediment must be naturally-occurring, undisturbed, on-site sediment.
6. Rainfall data from a site gauge must be provided for each sampled storm event.
7. In order to determine the tested device's required maintenance interval, the minimum duration of the overall field testing program shall be one (1) year beginning at the time of the device's installation, commissioning, or the beginning of the removal rate testing, whichever is greater.

7.5.3.1.b Laboratory Testing

Metro requires that laboratory testing conform to the following NJDEP protocols:

- *NJDEP Protocol for Manufactured Hydrodynamic Sedimentation Devices for Total Suspended Solids Based on Laboratory Analysis, August 5, 2009 (Revised December 15, 2009)*
- *NJDEP Protocol for Manufactured Filtration Devices for Total Suspended Solids Based on Laboratory Analysis, August 5, 2009 (Revised December 15, 2009)*

As of January 25, 2015 all devices must have either a current NJDEP certification or comply with the following laboratory testing protocols:

- *NJDEP to Assess Total Suspended Solids Removal by a Hydrodynamic Sedimentation Manufactured Treatment Device, January 25, 2013*
- *NJDEP Laboratory Protocol to Assess Total Suspended Solids Removal by a Filtration Manufactured Treatment Device, January 25, 2013*

Conformation with and deviations from the NJDEP protocol should be noted in an applicant's protocol and test report.

7.6 Safety and Mosquito Control

7.6.1 Safety Considerations

Public safety must be considered in the design of each SCM. Volume 5 and Section 6 of Volume 4 contains the detailed design parameters for each SCM type. These design parameters incorporate safety factors into the design itself, such as safety benches in wet ponds and locking grate options for vault type SCMs. Additional safety precaution options are listed below.

1. Fencing is not usually recommended because of access requirements for maintenance and emergency response; therefore, alternative safety precautions, such as gentle slopes and safety benches, are preferred. However, Fencing of stormwater ponds may be required under conditions such as those specified in Volume 2, Chapter 8.10 Access Management.
2. When structural SCMs are installed in residential areas, signs should be posted to warn residents of potential dangers.
3. Each entrance point for water into a detention area should incorporate an energy dissipater so that water does not flow into ponds at an unsafe rate.
4. All devices should be easily and safely accessible without special requirements (e.g. confined-space equipment and procedures).
5. All covers should be spring-loaded or lightweight for easy opening and a manually activated locking mechanism should be incorporated into the structure. Automatic locking devices are not permissible.
6. Vegetative growth should be controlled to prevent barriers to access inlets, outlets and treatment areas.
7. Stormwater management ponds shall include escape provisions as follows:
    a. If a pond has an outlet structure greater than 4 feet in height, escape provisions must be incorporated in or on the structure. Escape provisions include permanent ladders, steps, rungs, or other features that provide an easy egress from the pond or its outlet structure.
    b. In new ponds, the maximum interior slope for an earthen dam, embankment, or berm shall not be steeper than 3:1 (horizontal to vertical).

7.6.2 Mosquito Control

Many stormwater SCMs have either a permanent pool of water or hold stormwater for an extended period of time and can potentially provide mosquito-breeding habitat. However, if structural SCMs are properly designed, installed, and maintained, mosquito problems can be minimized. The following controls should be considered when determining the appropriate SCM and long-term maintenance plans for each development:

1. SCMs with open water (such as stormwater ponds) may need aeration or some other means of water movement through artificial means.
2. Ponds designed to detain water temporarily should discharge water in 72 hours or less. (This issue has been addressed in the Permanent Treatment Practices (PTP) section of Volume 4 through the design and maintenance guidance.)

3. Good maintenance and monitoring of SCMs is essential. For instance, discharge orifices should be monitored for debris or sediment clogging *weekly* in the summer months when mosquito breeding peaks.
4. Grout around riprap to prevent pooling while maintaining the benefits of the riprap for energy dissipation.
5. Vault-type SCMs that have the potential to hold water for longer than 72 hours should be contained and completely sealed.
6. Introduce *Gambusia affinis* (mosquitofish) or other mosquito predators into stormwater ponds with permanent pools. They feed on immature mosquitoes.
7. Use mosquito larvicides as a last resort to control mosquitoes.

7.7 Stormwater Control Measure (SCM) Long Term Maintenance

Each water quality SCM installed on a site requires maintenance so that it functions properly, ensuring that it helps fulfill the water quality goal for the site. Therefore, a SCM-specific Maintenance Document for each development site is required. Please see Section 6.7.1 or Appendix C for additional information.

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Chapter 8
REGULATED RESIDENTIAL INFILL

8.1 Overview

Land development can permanently alter the way in which stormwater flows across a site due to grading, compaction, and the installation of impervious cover. In order to mitigate these impacts, Metro requires, in accordance with the stormwater ordinance, that stormwater management measures be utilized when construction of a home or an addition meets the definition of regulated residential infill.

8.2 Definition and Requirement

Regulated Residential Infill is the creation of 800 to 15,000 square feet of additional net impervious area (IA) through new single family residential development, redevelopment, or rehabilitation in existing neighborhoods.

Exemptions from Regulated Residential Infill regulation are projects that:

(1) add less than 800 square feet of net new IA,
(2) add more than 15,000 square feet of net new IA,
(3) are on lots larger than 40,000 square feet, or
(4) are on lots with a grading permit previously issued by Metro, as long as the post-construction IA conforms to the original grading plan.

Note a previously issued grading permit does not automatically result in an exemption. There may be sites that have had a grading permit in the past but the drainage system is currently inadequate to handle design discharges. The existence of a past grading permit allows the developer to omit use of the one-inch criteria in favor of use of any designed, constructed and maintained competent drainage system already in existence per section 8.2.2. The developer must still insure the downstream system is competent to handle the increased discharge. If the system is not competent the developer may choose to follow normal Tier I, II or III steps, or may choose simply to restore and/or improve the drainage system to handle the increased discharge from the infill site. For Tier III sites detention will still be required.

Projects on lots larger than 40,000 square feet may seek infill classification on a case-by-case basis at the discretion of MWS.

There are three tiers of infill development for <u>non-exempt</u> projects:

- ***Tier I*** - Projects creating between **800** and **2,500** square feet of net additional IA with the total lot IA percentage exceeding 30% must treat, by means of capture of the first inch of rainfall runoff, an IA equal to the net increase of added IA.

- ***Tier II*** - Projects creating between **2,500** and **8,000** square feet of net additional IA, without regard to total lot IA percent, must treat, by means of capture of the first inch of

rainfall runoff, an IA equal to the net increase of added IA.

- ***Tier III*** – Projects creating between **8,000** and **15,000** square feet of net added IA, without regard to total lot IA percent, must treat, by means of capture of the first inch of rainfall runoff, an IA equal to the net increase of added IA. Additionally, the project design must insure there is no increase in the 10-year storm peak flow from the site, and the design must be certified by a professional engineer.

8.2.1 One-Inch Capture Requirement

The size and type of stormwater management practices implemented must be in accordance with Appendix H, Regulated Residential Infill Guidance. These post-construction stormwater management practices must be designed to capture the first inch of rainfall runoff from an impervious area equal to the net added impervious area.

8.2.2 Alternatives to One-Inch Capture

The owner/developer of a project meeting the definition of regulated residential infill shall endeavor to treat the first one inch of rainfall runoff from net added impervious. If this treatment proves impractical two alternatives are offered to the one-inch capture requirement for each tier as described below:

A) Tier 1 Alternatives (Net addition of between 800 and 2,500 square feet of impervious area)
   1. Demonstrate that an adequate drainage system is present downstream by using the simple method described in Appendix H.
   2. If an adequate drainage system does not exist downstream, work with MWS and a licensed engineer to devise a solution to improve the drainage downstream to accommodate the increase in flow resulting from the added impervious area.

B) Tier 2 Alternatives (Net addition of between 2,500 and 8,000 square feet of impervious area)
   1. Demonstrate that an adequate drainage system is present downstream by analyzing the on and off site drainage as described in the residential infill guidance document (requires a licensed engineer).
   2. If an adequate drainage system does not exist downstream, work with MWS and a licensed engineer to devise a solution to improve the drainage downstream to accommodate the increase in flow resulting from the added impervious area.

C) Tier 3 Alternatives (Net addition of between 8,000 and 15,000 square feet of impervious area)
   1. Demonstrate that an adequate drainage system is present downstream by analyzing the on and off site drainage as described in the residential infill guidance document (requires a licensed engineer).

2. If an adequate drainage system does not exist downstream, work with MWS and a licensed engineer to devise a solution to improve the drainage downstream to accommodate the increase in flow resulting from the added impervious area.

8.3 Permitting

Permitting of residential infill properties will take place through Metro's Development Services Center as outlined on the next page.

8.3.1 Pre-Application Meeting

All applicants may schedule a pre-application meeting with MWS to discuss their proposed projects. While not mandatory, a pre-application meeting is encouraged to assure correct and timely permit application preparation and review. This meeting will also aid the applicant in identifying water quality buffers, special site challenges, and residential infill requirements. During this meeting, staff can determine if a proposed project qualifies for an exemption and explain how technical guidelines and criteria should be applied.

8.3.2 Required Information and Checklist

Each application for a Residential Infill Permit shall contain site preparation plans and a completed Stormwater Checklist for Residential Infill Lots containing the following items: identification of all impervious surface areas pre- and post-development, the net increase in impervious area, proposed drainage infrastructure in right of way, lot/building layout with dimensions, contours (existing and proposed), erosion and sediment control measures (silt fence, construction entrance), green infrastructure control specifications sheets, easements, all points where stormwater leaves the site, culvert/drainage pipes in right-of-way with size, capacity and material and if applicable, buffers (stream, floodway) zones, any trees receiving the infill credit, 100-year floodplain boundary, scale on drawing, proof of zero increase in 10-year peak runoff, proof of competent downstream drainage, and a previously assigned grading permit.

Residential Infill Permit Flowchart

Nashville/Davidson County

Pre-Application Meeting (optional)
An optional meeting with the Development Service Center is encouraged to assure correct and timely permit application preparation and review. We will determine if a proposed project qualifies for an exemption and explain how technical guidelines and criteria should be applied.

⇩

Submit Application
Development Services Center
(first floor of the Metro Office Building, 800 Second Avenue South)

Application & Plans submitted with all required documentation for Preliminary Zoning Review and Application Submittal

⇩

Technical Review & Approval
(Development Services Center)

Development Services Center Representative Departments
- Codes
- Fire Marshal
- Public Works
- Water Services
- Planning
- Stormwater
- Historical Commission
- MDHA

⇩

Residential Infill Permit Issued
(with building permit)

⇩

Site Inspection
(Codes and Stormwater)

Building Permit site inspections will take place as usual (Footing, Framing, Final) with additional checks for the following:
1. Erosion Control Measures & Construction Entrance
2. Progress of Green Infrastructure Installation as outlined in the Residential Infill Permit and Site Plans

⇩

Use and Occupancy Certificate Issued

8.3.3 Application Processing

The Development Services Center will review the application and issue a permit based on the completeness and correctness of the application.

8.3.3.1 Initial Receipt and Resubmittals

When residential infill projects are referred or submitted to MWS, they are logged in by date and assigned a tracking number. The applicant must complete a Stormwater Checklist, included in Appendix H, for the infill project. Failure by the applicant to complete the Stormwater Checklist upon initial submission or to include the tracking number in resubmittals will result in a delay in the review of the proposed plans.

8.3.3.2 Staff Review and Recommendation

MWS first conducts a sufficiency review of the Residential Infill Checklist and Site Plan to determine if all basic information has been included. If it is determined that the application is incomplete, the application will be returned to the applicant along with a request for additional information needed. The returned application will include the application tracking number that must accompany a resubmittal.

When all basic information has been supplied pursuant to section 8.3.3.1, MWS staff will conduct a technical evaluation of the permit application. This technical evaluation will be based on the technical criteria outlined in Appendix H.

8.3.3.3 Installation of Erosion Control Measures

Initial measures should be installed as detailed in the EPSC plan. **No land-disturbing activities, except what is necessary to install initial EPSC measures, shall begin prior to the issuance of a residential infill permit**.

8.3.3.4 Residential Infill Permit Issuance and Expiration

A Residential Infill Permit shall expire one year from the date of issuance. The permit holder may request an extension to the expiration date of up to 6 months. No more than two extensions can be requested for any site unless adequate justification for additional extensions is proven.

When an extension is requested, MWS staff can require additional information or additional measures on the site. Extensions will not be granted for projects not in compliance with these regulations.

8.3.3.5 Revisions to Approved Plans

If changes are anticipated prior to or during construction that would constitute a revision of plans already approved by MWS, the approved plans shall be revised and signed by a

registered engineer (if applicable) and resubmitted. The resubmission shall include a letter stating why such changes from the approved plans are necessary, the residential infill permit number, and a completed Residential Infill Checklist for the project. MWS reserves the right to waive this requirement or to re-review the entire set of plans in the light of requested changes. Plan revisions must be approved by MWS prior to implementing changes to approved plans in the field. MWS reserves the right to require installed stormwater features that are not per approved residential infill permit plans and/or are not performing as designed to be removed and/or replaced.

8.4 Construction Procedures

8.4.1 Posting of Permit

Work requiring a Residential Infill Permit shall not begin until the permit holder or his agent posts the Residential Infill Permit, or a copy of the permit, in a conspicuous place on the front of the premises. The permit shall be protected from the weather. The permit shall remain posted by the permit holder until the Department of Codes Administration has issued the Use and Occupancy Certificate or until Development Services Center staff verifies that the site has reached final stabilization.

8.4.2 Effect of Permit

A Residential Infill Permit issued pursuant to this section shall be construed to be a license to proceed with the work and shall not be construed as authority to violate, cancel, alter, or set aside any of the provisions of these regulations, nor shall issuance of a permit prevent MWS or the Department of Codes Administration from thereafter requiring a correction of errors in plans, construction, or a correction of violations of these regulations. In addition to Metro Residential Infill Permit requirements, certain land disturbance activities that will impact “Waters of the State”, “Wetlands”, and/or “Sinkholes” may be required to meet certain State and Federal regulations. All such applicable regulations must be met prior to the initiation of land disturbance activities. This includes the receipt of any necessary permits

8.4.3 EPSC Permit Holder Responsibilities

The Residential Infill Permit holder is *ultimately* responsible and shall be held accountable for all EPSC requirements.

8.4.4 Site Inspections

Inspections will be conducted by Development Services Staff to ensure EPSC requirements and green infrastructure practices are being installed per the submitted plan.

8.4.5 Use and Occupancy

The Use and Occupancy Certificate will be issued after all Development Services Center departments have signed off on the property.

APPENDIX A
PLAN SUBMITTAL INFORMATION

- **Grading Permit Process Flowchart**
- **Checklist**
- **Plan Submittal Information Form**
- **Tennessee General Construction Stormwater Permit Certification Stamp**

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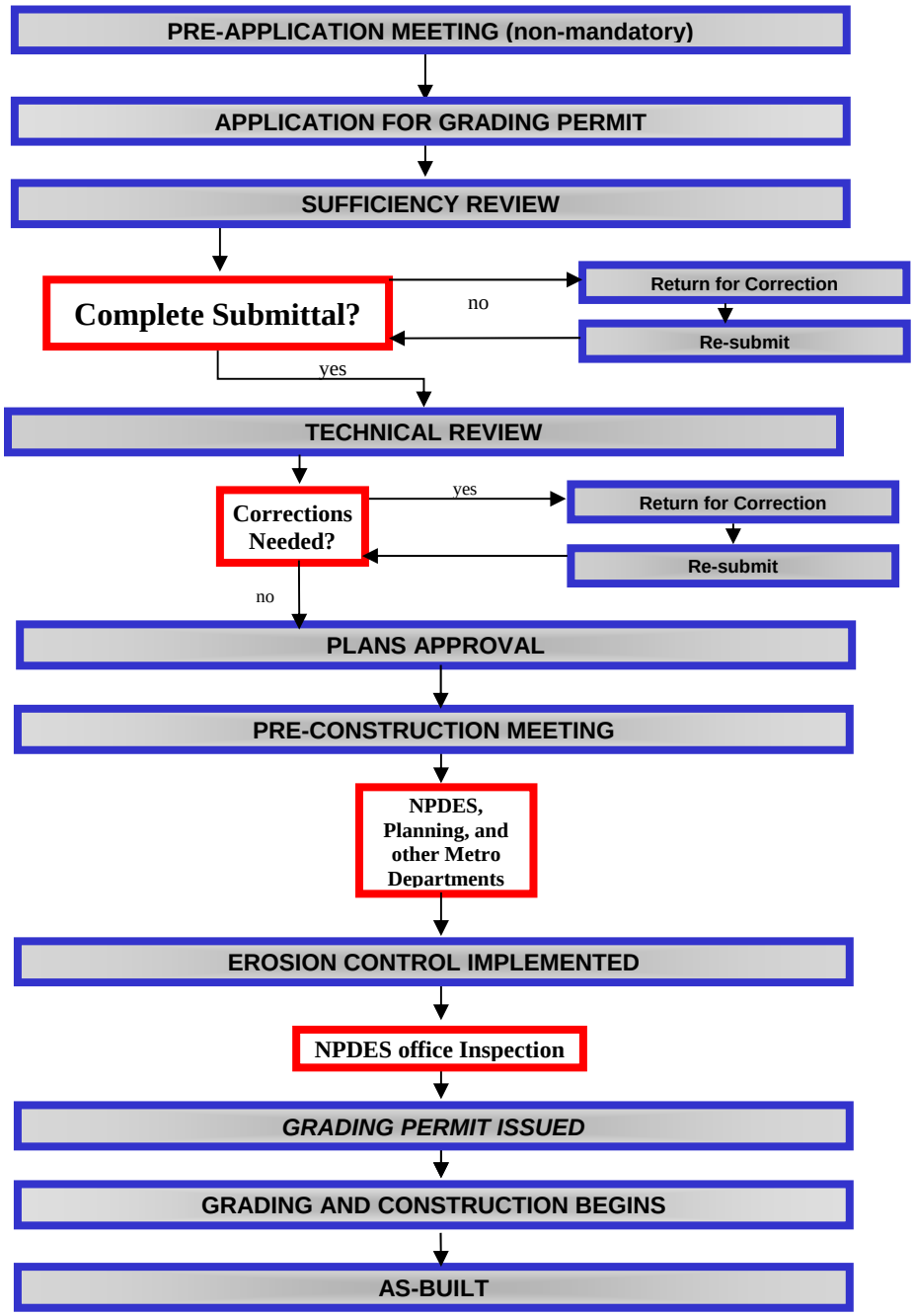
Plans Review and Grading Permit Process



Appendix A
GRADING PERMIT APPLICATION CHECKLIST

		Included	Not Applicable
1.	Project Fee Computation Worksheet completely filled out. Do not include payment with initial submittals. Calculated fees will be reviewed and verified during sufficiency review. Payment for Plan Review Fees will be required prior to technical review. Payment for Grading Permit fees, if applicable, will be required prior to a Pre-Construction meeting being scheduled.	❑	
2.	"Plans Submittal Information" form signed by the responsible party. Available on the MWS web page and at the front desk of the Stormwater Development Review Office. Plans will not be accepted for review without the completed form. (See page A-7)	❑	
3.	The Tennessee Construction General Permit Notice of Coverage (NOC) note on the plans (See page A-8). A NOC must be obtained by all sites that disturb one acre or more of land before a Grading Permit will be issued. Enter date NOC applied for:_____	❑	❑
4.	Copies of all other required State and Federal permits (or copies of the permit applications), including, but not limited to ARAP, U.S. Army Corps of Engineers Section 404, or TDEC sinkhole permits.	❑	❑
5.	Submittal of one copy of the following: grading and drainage plans (with post-construction stormwater management details), site utility plans, and erosion prevention and sediment control plans (including separate initial plan shown with existing conditions). Plans must be at a scale of no less than one inch = fifty feet and a maximum size of 24" x 36".	❑	
6.	Property Map and Parcel Number	❑	
7.	Existing and proposed site contours at an interval no greater than two (2) feet.	❑	❑
8.	Existing and proposed buildings on the property.	❑	❑
9.	Existing and proposed paving on property.	❑	❑

		Included	Not Applicable
10.	Existing and proposed stormwater management structures on and in the immediate vicinity of the property. Must include the location, size, and capacity of the next two structures immediately downstream in every direction that will receive runoff. Must include size, type, slope, and invert elevation of the structures.	❑	
11.	Calculations showing that pre=post construction flows.	❑	❑
12.	At least one benchmark located, with the proper datum reference indicated (If flood study exists, datum must match flood study.).	❑	❑
13.	Locations of all construction site entrances/exits.	❑	❑
14.	Temporary erosion and sediment control measures to be implemented during construction.	❑	❑
15.	Final stabilization measures proposed for all disturbed areas on the property. Areas with slopes 3:1 or steeper must be stabilized by methods approved by MWS.	❑	❑
16.	Stormwater management system design calculations including drainage maps based on 10-year design storm for minor systems and 100-year design for major systems. Calculation should be for pipes and ditches as well as areas where the runoff sheet flows.	❑	❑
17.	Stormwater quantity detention design calculations including drainage maps, for detaining the 2-year, 5-year, 10-year, 25-year, 50-year, and the 100- year storm. Provide details of an emergency overflow device for storms over the 100-year event.	❑	❑
18.	Stormwater quality design calculations (including drainage area maps and the LID Site Design Sheet if using Runoff Reduction or site limitation rationale if using Pollutant Removal. See Chapter 7 for more information)	❑	❑
19.	Floodplain and floodway boundaries, floodplain elevations, and water quality buffer zones.	❑	❑
20.	Cut and fill cross-sections and volume calculations for the floodplain.	❑	❑
21.	First floor elevations for building in and adjacent to the floodplain.	❑	❑
22.	Detail drawings of swales, ditches, inlets, head walls, detention pond outlet structures and overflows, erosion control measures, etc.	❑	❑

		Included	Not Applicable
23.	Delineation of wetlands, streams, ponds, lakes, buffers, community waters or other environmentally sensitive areas. A note should be placed along each water quality buffer indicating the number of required buffer signs and that they will be installed every 100 feet.	❑	❑
24.	One (1) copy of sinkhole and drainage well information, if applicable to the site conditions, including sinkhole 100-year volume information	❑	❑
25.	Proposed construction schedule if greater than twelve months.	❑	❑
26.	Plan must be stamped by a registered engineer.	❑	❑
27.	The As-Built note shall be shown in a "stand alone" box on the grading and drainage plans. The note should read as follows:	❑	❑

In accordance with the Metro Stormwater Management Manual, Volume 1, Section 3.9, As-Built Certifications, MWS Stormwater Division must approve the following as-builts prior to issuance of the Use & Occupancy Permit:

- Underground detention and water quality infrastructure
- Above ground detention and water quality infrastructure
- Public storm sewer infrastructure
- Cut & fill in the floodplain
- Sink hole alterations

The engineer shall contact Stormwater Development Review staff for submittal requirements.

Some requirements will not be applicable to all plans, depending on the permit being requested. Omission of any of the heretofore mentioned requirements for detailed plans shall deem these plans as being incomplete, and shall be returned to the Developer, or designated Engineer, for completion before review

Metropolitan Nashville-Davidson County
Grading Permit Review
Plans Submittal Information

MWS use only

Date

RESUBMITTAL? ☐ No ☐ Yes → **Review Number (if Yes):**

PROJECT INFORMATION

STANPAR | Building Application # | PUD #

Check all items below that apply to project:

☐ In floodplain ☐ Applying for the Green Roof Credit
☐ Conforms to Stormwater Management Manual Volume 5, The LID Manual

Name
Description
Address
City | Zip Code

VARIANCE REQUESTED ☐

Description

OWNER/DEVELOPER INFORMATION

Company
Last Name | First Name
Address
City | State | Zip Code
Phone | Fax | email

The grading permit for this project will be held by and bind to the owner/developer of the project. The owner/developer assumes all responsibility for the terms, conditions, rules, and regulations that govern the grading permit. Failure to notify MWS of a change in the ownership or development rights to this property may result in the issuance of a Notice of Violation, penalty, stop work order, or the revocation of the grading permit.

Signature | Date

ENGINEER INFORMATION

Company
Last Name | First Name
Address
City | State | Zip Code
Phone | Fax | email

OPERATOR/CONTRACTOR (if known)

Company
Last Name | First Name
Address
City | State | Zip Code
Phone | Fax | email

Tennessee Construction General Permit Certification Stamp

Metropolitan Government of Nashville Davidson County Department of Water & Sewerage Services

Tennessee Construction General Permit Notice of Coverage (NOC) Certification:

Please fill out and sign/date one of the following two statements:

1. The project associated with these submitted plans is covered under Tennessee Construction General Permit TN_____. The Total Disturbed Area is: _____acres.

Check all that apply: This site discharges into waters identified by TDEC as:
❑ Impaired for siltation ❑ Impaired for habitat alteration ❑Exceptional

_____ _____
Signature Date

Circle one: Developer Project Engineer Other _____

Please attach a copy of the Notice of Coverage under the Construction General Permit.

NOTE: A project will not be scheduled for a Pre-Construction Meeting until the State Construction General Permit NOC letter is submitted.

2. I hereby certify that this project does not require coverage under a Tennessee Construction General Permit. The Total Disturbed Area is: _____acres.

Check all that apply: This site discharges into waters identified by TDEC as:
❑ Impaired for siltation ❑ Impaired for habitat alteration ❑Exceptional

_____ _____
Signature Date

Circle one: Developer Project Engineer Other _____

Note: Projects of one (1) or more acres require State permit coverage, while projects of less than one (1) acre do not require State permit coverage. Also, projects of less than one (1) acre that are part of a total development project of one (1) or more acres require State permit coverage.

(If you are unsure whether your particular project requires coverage under a Tennessee General Storm Water permit, please call the TDEC Field Office @ (615) 687-7000).

APPENDIX B
DEFINITIONS & ACRONYMS

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Appendix B
DEFINITIONS

The following definitions shall apply in the interpretation and enforcement of the provisions of these regulations in addition to those terms defined in the Ordinance, unless specifically stated otherwise:

Acceptable Fill Material – Inert material no more that 24" in length consisting of soil, rock, concrete without rebar, and/or brick rubble.

Accessory Structure – Shall represent a subordinate structure to the principal structure on a building site and, for the purpose of this regulation, shall conform to the following:

1. Accessory structures shall not be used for human habitation.
2. Accessory structures shall be designed to have low flood damage potential.
3. Accessory structures shall be constructed and placed on the building site so as to offer the minimum resistance to the flow of floodwaters.
4. Accessory structures shall be firmly anchored to prevent flotation that may result in damage to other structures.
5. Service facilities such as electrical and heating equipment shall be elevated or floodproofed.

Act - The statutes authorizing the National Flood Insurance Program that are incorporated in 42 U.S.C. 4001-4128.

Addition (to an existing building) - Any walled and roofed expansion to the perimeter of a building in which the addition is connected by a common load-bearing wall other than a fire wall. Any walled and roofed addition which is connected by a fire wall or is separated by independent perimeter load-bearing walls is considered to be new construction.

Appeal - A request for a review of an adverse decision of the director.

Applicant – The developer of a property or the owner of a property being developed who is financially responsible for the project and shall sign and submit the grading permit application package.

Area of Shallow Flooding – A designated AO, AH, AR/AO, AR/AH, or VO zone on a community's Flood Insurance Rate Map (FIRM) with a one percent or greater annual chance of flooding to an average depth of 1 to 3 feet where a clearly defined channel does not exist, where the path of flooding is unpredictable, and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of Special Flood-related Erosion Hazard - The land which is most likely to be subject to severe flood-related erosion losses. The area may be designated as Zone E on the Flood Hazard

Boundary Map (FHBM). After the detailed evaluation of the special flood-related erosion hazard area in preparation for publication of the FIRM, Zone E may be further refined.

Area of Special Flood Hazard - The land in the floodplain subject to a one percent or greater chance of flooding in any given year. The area may be designated as Zone A on the FHBM. After detailed ratemaking has been completed in preparation for publication of the flood insurance rate map, Zone A usually is refined into Zones A, AO, AH, A1-30, AE, A99, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, VO, or V1-30, VE, or V. For purposes of these regulations, the term "special flood hazard area" is synonymous in meaning with the phrase "area of special flood hazard".

Base Flood - The flood having a one percent chance of being equaled or exceeded in any given year.

Basement - That portion of a building having its floor subgrade (below ground level) on all sides.

Breakaway Wall - A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces, without causing damage to the elevated portion of the building or supporting foundation system.

Blue line streams - Streams that are represented on the United States Department of the Interior Geological Survey 1:24,000 quadrangle maps.

Buffer - A vegetated area, including trees, shrubs and herbaceous vegetation, which exists or is established to protect community water. Alteration of this natural area is strictly limited.

Building - Any structure built for support, shelter, or enclosure for any occupancy or storage. For floodplain management purposes, see “structure.”

Building Permit - Permit required under the Metropolitan Code of Laws for the construction, alteration, expansion or renovation of a structure.

Certification - Written verification received by the Director of MWS from a registered engineer that all work performed on a site was done in compliance with any approvals or permits previously granted.

Channel - A natural or artificial watercourse of perceptible extent, with definite bed and banks to confine and conduct continuously or periodically flowing water. Channel flow is that water which is flowing within the limits of the defined channel.

Codes - Metropolitan Department of Codes Administration.

Community Waters - Intermittent and perennial streams, lakes and ponds with hydrologic connectivity (stream leading into/out of the pond or obvious spring input), and wetlands that have been identified by the U.S. Army Corps of Engineers, TDEC, or MWS staff.

Critical Area - A site subject to erosion or sedimentation as a result of cutting, filling, grading, or other disturbance of the soil; a site difficult to stabilize due to exposed subsoil, steep slope, extent of exposure, and other conditions.

Cut - Portion of land surface or area from which earth has been removed or will be removed by excavation; the depth below original ground surface to the excavated surface.

D50 – Average particle size.

Designated Use - Those water uses identified in state water quality standards that must be achieved and maintained as required under the Clean Water Act.

Detention - The temporary delay of storm runoff prior to discharge into receiving waters.

Developer - Any individual, firm, corporation, association, partnership, or trust involved in commencing proceedings to effect development of land for himself or others.

Development - Any man-made change to improved or unimproved real estate, including but not limited to, buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or permanent storage of equipment or materials.

Drainage Basin - A part of the surface of the earth that is occupied by and provides surface water runoff into a stormwater management system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Drainage Easement - An easement required for the installation of storm water sewers or surface drainage channels, or the preservation or maintenance of a natural stream or watercourse.

Drainage Well - A bored, drilled, driven, dug, or naturally occurring shaft or hole with a depth greater than the largest surface dimension; used to drain surface fluid, primarily storm runoff, into a subsurface formation (See also Sinkhole).

Easement - Authorization by a property owner creating the right for the use by another, for a specified purpose, and only the specified purpose, of any designated part of his property.

Elevated Building - A non-basement building built to have the lowest floor elevated above the ground level by means of fill, solid foundation perimeter walls, pilings, columns (posts and piers), shear walls, or breakaway walls.

Emergency Flood Insurance Program or emergency program - The Program as implemented on an emergency basis in accordance with section 1336 of the National Flood Insurance Act (42 U.S.C. 4056). It is intended as a program to provide a first layer amount of insurance on all insurable structures before the effective date of the initial FIRM.

Erosion - The disintegration or wearing away of the earth's surface by the action of wind and water.

Excavation - See cut.

Exception - A waiver from the provisions of these regulations that relieves an applicant from the requirements of a rule, regulation, order or other determination made or issued pursuant to these regulations.

Existing Grade - The slope or elevation of existing ground surface prior to cutting or filling.

Existing Construction - Any structure for which the "start of construction" commenced before the effective date of these regulations.

Existing Manufactured Home Park or Subdivision - A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of these regulations.

Existing Structures - see Existing Construction.

Expansion to an Existing Manufactured Home Park or Subdivision - The preparation of additional sites by the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads).

Fill - Portion of land surface or area to which soil, rock, or other materials have been or will be added; height above original ground surface after the material has been or will be added. See Acceptable Fill Material.

Finished Grade - The final slope or elevation of the ground surface, after cutting or filling.

Flood or Flooding - Water from a river, stream, watercourse, lake, or other body of standing water that temporarily overflows and inundates adjacent lands and which may affect other lands and activities through increased surface water levels and/or increased groundwater level.

Flood Elevation Determination - A determination by the Floodplain Administrator of the water surface elevations of the base flood, that is, the flood level that has a one percent or greater chance of occurrence in any given year.

Flood Insurance Rate Map (FIRM) - An official map for Nashville and Davidson County, on which the Federal Emergency Management Agency has delineated both the areas of special flood hazard and the risk premium zones applicable to Nashville and Davidson County.

Flood Insurance Study - The official report provided by the Federal Emergency Management Agency. The report contains elevations of the base flood, floodway widths, flood velocities, and flood profiles.

Floodplain or Floodprone Area - The relatively flat or lowland area adjoining a river, stream, watercourse, lake, or other body of standing water which has been or may be covered temporarily by floodwater. For purposes of this manual, the floodplain is defined as the 100-year floodplain having a one percent chance of being equaled or exceeded in any given year.

Floodplain Management - The operation of an overall program of corrective and preventive measures for reducing flood damage, including but not limited to emergency preparedness plans, flood control works and floodplain management regulations.

Floodplain Management Regulations - Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such state or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Flood Protection System - Those physical structural works for which funds have been authorized, appropriated, and expended and which have been constructed specifically to modify flooding in order to reduce the extent of the area within a community subject to a "special flood hazard" and the extent of the depths of associated flooding. Such a system typically includes hurricane tidal barriers, dams, reservoirs, levees or dikes. These specialized flood modifying works are those constructed in conformance with sound engineering standards.

Floodproofing - A combination of structural and non-structural provisions, changes, or adjustments to properties and structures subject to flooding primarily for the reduction or elimination of flood damages to properties, water and sanitary facilities, structures, and contents of buildings in a flood hazard area.

Flood-related Erosion - The collapse or subsidence of land along the shore of a lake or other body of water as a result of undermining caused by waves or currents of water exceeding anticipated cyclical levels or suddenly caused by an unusually high water level in a natural body of water, accompanied by a severe storm, or by an unanticipated force of nature, such as a flash

flood or an abnormal tidal surge, or by some similarly unusual and unforeseeable event which results in flooding.

Flood-related Erosion Area or Flood-related Erosion Prone Area - A land area adjoining the shore of a lake or other body of water, which due to the composition of the shoreline or bank and high water levels or wind-driven currents, is likely to suffer flood-related erosion damage

Flood-related Erosion Area Management - The operation of an overall program of corrective and preventive measures for reducing flood-related erosion damage, including but not limited to emergency preparedness plans, flood-related erosion control works, and floodplain management regulations.

Floodway - That portion of the stream channel and adjacent floodplain required for the passage or conveyance of a 100-year flood discharge. The floodway boundaries are placed to limit encroachment in the floodplain so that a 100-year flood discharge can be conveyed through the floodplain without materially increasing (less than one foot) the water surface elevation at any point and without producing hazardous velocities or conditions. This is the area of significant depths and velocities and due consideration should be given to effects of fill, loss of cross sectional flow area, and resulting increased water surface elevations.

Floodway Fringe - That portion of the floodplain lying outside the floodway. This is the area of the floodplain that may be developed or encroached upon as long as the water surface elevation of the 100-year flood is not increased. Compensating storage is required when fill is placed in this area.

Floor - The top surface of an enclosed area in a building (including basement), i.e., top of slab in concrete slab construction or top of wood flooring in wood frame construction. The term does not include the floor of a garage used solely for parking vehicles.

Freeboard - A factor of safety usually expressed in feet above a flood level for purposes of floodplain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect_of urbanization of the watershed.

Functionally Dependent Facility - A facility that cannot be used for its intended purpose unless it is located or carried out in proximity to water, such as a docking or port facility necessary for the loading and unloading of cargo or passengers, shipbuilding, or ship repair. The term does not include long-term storage, manufacture, sales, or service facilities.

Grading - Any operation or occurrence by which the existing site elevations are changed; or where any ground cover, natural, or manmade, is removed; or any watercourse or body of water, either natural or manmade, is relocated on any site, thereby creating an unprotected area. This

includes stripping, cutting, filling, stockpiling, or any combination thereof, and shall apply to the land in its cut or filled condition.

Grading Permit - A permit issued to authorize excavation or fill to be performed under the provisions of these regulations.

Highest Adjacent Grade - The highest natural elevation of the ground surface, prior to construction, next to the proposed walls of a structure.

Historic Structure Designation - Any structure that is: listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register; certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historical district or a district preliminarily determined by the Secretary to qualify as a registered historic district; or listed individually on a state or local inventory of historic places which have been approved by the Secretary of the Interior.

Impervious Area - The portion of a parcel of property that is covered by any material, including without limitation roofs, streets, sidewalks and parking lots paved with asphalt, concrete, compacted sand, compacted gravel or clay, that substantially reduces or prevents the infiltration of storm water. Impervious area shall not include natural undisturbed surface rock.

Impervious Surface - A term applied to any ground or structural surface that water cannot penetrate or through which water penetrates with great difficulty, including but not limited to paved concrete or asphalt areas, graveled areas with limited infiltration, and roofs.

Levee - A man-made structure, usually an earthen embankment, designed and constructed in accordance with sound engineering practices to contain, control, or divert the flow of water so as to provide protection from temporary flooding.

Levee System - A flood protection system which consists of a levee, or levees, and associated structures, such as closure and drainage devices, which are constructed and operated in accordance with sound engineering practices.

Lowest Floor - The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for parking of vehicles, building access, or storage and in an area other than the basement area, is not considered a building's lowest floor, provided that such an enclosure is not built so as to render the structure in violation of the elevation design requirements of these regulations.

Manufactured Home Park or Subdivision - A parcel (or contiguous parcels) of land divided into two or more manufactured home lots for rent or sale.

Map – The Flood Hazard Boundary Map (FHBM) or the Flood Insurance Rate Map (FIRM) for Metro, issued by FEMA.

Mean Sea Level - For purposes of the National Flood Insurance Program, the National Geodetic Vertical Datum (NGVD) of 1929 or other datum, to which base flood elevations shown on a community's Flood Insurance Rate Map are referenced.

Major Stormwater Management System – Drainage system that carries the runoff from a 100-year frequency storm. Although damage may occur, runoff will be carried by the major system whether or not it has been planned and designed, and whether or not improvements are situated wisely in respect to it. The major system usually includes features such as streets, and major stormwater management channels. Storm sewer systems may reduce the flow in many parts of the major system by storing and transporting water underground. Good planning and designing of a major system should eliminate major damage and loss of life from storms having a one percent chance of occurring in any given year.

Manufactured Home - A structure, transportable in one or more sections, which is built on a permanent chassis and designed to be used with or without a permanent foundation when connected to the required utilities. The term also includes park trailers, travel trailers, and similar transportable structures placed on a site for 180 consecutive days or longer and intended to be improved property.

Minor Stormwater Management System - System that is frequently used for collecting, transporting, and disposing of snowmelt, miscellaneous minor flows, and storm runoff up to the capacity of the system. The capacity should be equal to the maximum rate of runoff to be expected from the initial design storm, which has statistical frequency of occurrence of once in ten years or as specified by the Stormwater Management Committee. The minor system is sometimes termed the "convenience system," "initial system," or the "storm sewer system", and may include features ranging from curbs and gutters to storm sewer pipes and open drainageways.

NAVD 88 - North American Vertical Datum of 1988. A geodetic reference for elevations, created by the NGS to replace the NGVD 29. This new datum was published in 1991 and it is adjusted based on field work prior to 1929 as well as surveys as recent as 1988.

National Geodetic Vertical Datum (NGVD) - As corrected in 1929, a vertical control used as a reference for establishing varying elevations within the floodplain.

Natural Ground Surface - The ground surface in its original state before any grading, excavating, or filling.

New Construction - Structures for which the "start of construction" commenced on or after the effective date of these regulations.

New Manufactured Home Park or Subdivision - A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of these regulations.

One Hundred-Year Flood - A flood that has an average frequency of occurrence of once in one hundred (100) years, determined from an analysis of floods on a particular watercourse and other watercourses in the same general region. Statistically, it has a one percent chance of occurring in any given year. See Base Flood.

Permittee - Any person, firm, or any other legal entity to whom a grading or building permit is issued in accordance with these regulations.

Person - Includes any individual or group of individuals, corporation, partnership, association, or any other entity, including State and local governments and agencies.

Planning Commission - Metropolitan Planning Commission.

PUD - Planned unit development as defined in the Metro Zoning Ordinance.

Recreational Vehicle - A vehicle which is: built on a single chassis; 400 square feet or less when measured at the largest horizontal projection; designed to be self-propelled or permanently towable by a light duty truck; and designed primarily not for use as a permanent dwelling but as a temporary living quarters for recreational, camping, travel, or seasonal use.

Redevelopment - Development improvements that have a value less than 50% of the current assessed value and/or increases the floor area by less than 25%. Demolition and reconstruction is considered development and not redevelopment. Note: this is different than significant redevelopment.

Regional facilities – Stormwater quantity or quality structural facilities that serve multiple lots. Instream regional facilities are not permitted in Metro community waters.

Registered Engineer - An engineer duly registered or other-wise authorized by the State of Tennessee to practice in the field of civil engineering.
Registered Architect - An architect duly registered or otherwise authorized by the State of Tennessee to practice in the field of building architecture.

Registered Landscape Architect - A landscape architect duly registered or otherwise authorized by the State of Tennessee to practice in the field of landscape architecture.

Registered Land Surveyor - A land surveyor duly registered or otherwise authorized by the State of Tennessee to practice in the field of land surveying.

Registered Grading - Any grading performed with the approval of and in accordance with criteria established by the MDPW.

Regulatory Floodway - The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without cumulatively increasing the water surface elevation more than one foot.

Retention - The prevention of storm runoff from direct discharge into receiving waters. Examples include systems which discharge through percolation, exfiltration, filtered bleed-down and evaporation processes.

Riverine - Relating to, formed by, or resembling a river (including tributaries), stream, brook, etc.

Sediment - Solid material, both mineral and organic, that is in suspension, is being transported, or has been moved from its site of origin by air, water, or gravity as a product of erosion.

Significant Redevelopment - Development improvements that have a value greater than 50% of the current assessed value, increases the floor area by 25% or more, increases in the impervious surface area by 25% or more, redirects the flow of storm water, or modifies the storm sewer system. Demolition and reconstruction is considered development and not redevelopment. Note: this is different than redevelopment.

Sinkhole - A sinkhole is a natural depression with no surface outflow of water that occurs naturally in a Karst area. Sinkholes are indicated by first closed contour on 2-ft.contour interval maps or as designated by TDEC. The rim of the sinkhole is defined as the 100-yr. flood elevation assuming no drawdown.

Site - All contiguous land and bodies of water in one ownership, graded or proposed for grading or development as a unit, although not necessarily at one time.

Slope - Degree of deviation of a surface from the horizontal, usually expressed in percent or ratio.

Soil - All unconsolidated mineral and organic material of any origin that overlies bedrock and that can be readily excavated.

Soil Engineer - A professional engineer who is qualified by education and experience to practice applied soil mechanics and foundation engineering.

Special Hazard Area - An area having special flood, mudslide (i.e., mudflow), or flood-related erosion hazards, and shown on an FHBM or FIRM as Zone A, AO, A1-30, AE, AR, AR/A1-30, AR/AE, AR/AO, AR/AH, AR/A, A99, AH, VO, V1-30, VE, V, M, or E.

Start of Construction - Includes substantial improvement, and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, or improvement was within 180 days of the permit date. The actual start means the first placement of permanent construction of a structure (including a manufactured home) on a site, such as the pouring of slabs or footings, installation of piles, construction of columns, or any work beyond the stage of excavation or the placement of a manufactured home on a foundation. Permanent construction does not include land preparation, such as clearing, grading and filling; nor does it include the installation of streets and/or walkways; nor does it include excavation for a basement, footings, piers, or foundations or the erection of temporary forms; nor does it include the installation on the property of accessory buildings, such as garages or sheds, not occupied as dwelling units or not part of the main structure.

State Coordinating Agency – Under the National Flood Insurance Program, it is the agency of the state government, or other office designated by the Governor of the state or by state statute that assists in the implementation of the National Flood Insurance Program in that state. In Tennessee, the state coordinating agency is the Tennessee Department of Economic and Community Development, Local Planning Assistance Office.

Steep Slope - A natural or created slope of steeper than one foot vertical to three feet horizontal. Designers of sites with steep slopes must pay attention to stormwater management BMPs depicted in the approved Grading Permit Plan to route runoff nonerosively around or over a steep slope. In addition, site managers should focus on erosion prevention on the slope(s) and stabilize the slope(s) as soon as practicable to prevent slope failure and/or sediment discharges from the project.

Stripping - Any activity that removes or significantly disturbs the vegetative surface cover, including clearing and grubbing operations.

Structure - Anything constructed or erected, the use of which requires a more or less permanent location on or in the ground. Such construction includes but is not limited to objects such as buildings, towers, smokestacks, overhead transmission lines, carports, and walls. For floodplain management purposes, a walled and roofed building, including a gas or liquid storage tank, that is principally above ground, as well as a manufactured home. "Structure" for insurance coverage purposes means a walled and roofed building other than a gas or liquid storage tank that is principally above ground and affixed to a permanent site, as well as a manufactured home on a permanent foundation. For the latter purpose, the term includes a building while in the course of

construction, alteration, or repair, but does not include building materials or supplies intended for use in such construction, alteration, or repair, unless such materials or supplies are within an enclosed building on the premises.

Structure, Permanent - A structure that is built of such materials and in such a way that it would commonly be expected to last and remain useful for a substantial period of time.

Structure, Temporary - A structure that is built of such materials and in such a way that it would commonly be expected to have a relatively short useful life, or is built for a purpose that would commonly be expected to be relatively short-term.

Substantial Damage - Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damage condition would equal or exceed 50 percent of the market value of the structure before the damage occurred. Substantial damage also means flood related damage sustained by a structure on two (2) separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market value of the structure before the damage occurred. See definition of "Substantial Improvement."

Substantial Improvement - Any reconstruction, rehabilitation, addition, or other improvement of a structure, or the cumulative total of such activities over a ten year period (see definition of "cumulative substantial improvement"), the cost of which equals or exceeds 50 percent of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed.
The term does not, however, include either:

(1) Any project for improvement of a structure to correct existing violations of state or local health, sanitary, or safety code specifications which have been identified by the local code enforcement official and which are the minimum necessary to assure safe living condition or
(2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

Substantial Improvement also means any repair, reconstruction, or improvement to a structure on two separate occasions during a 10 year period, for which the total cost of repairs, reconstruction or improvement at the time of each alteration, equals or exceeds 25 percent of the market value of the structure before the damage occurred or the Substantial Improvement began. The Floodplain Administrator may determine if separate actions constitute a single project. For the purposes of this definition, "Substantial Improvement" is considered to occur when the first alteration of any wall, ceiling, floor or other structural part of the building commences, whether or not that alteration affects the external dimensions of the structure."

Substantial Improvement, Cumulative - For the purposes of calculating substantial improvement, two or more instances of repair, reconstruction, alteration, addition, or improvement to a structure, over the course of ten consecutive years. If the value of such activities, when added together, equals or exceeds fifty (50) percent of the market value of the structure, the activity as a whole shall be considered to be a "substantial improvement."

Substantially Improved Existing Manufactured Home Park or Subdivision - When the repair, reconstruction, rehabilitation or improvement of the streets, utilities and pads equals or exceeds 50 percent of the value of the streets, utilities and pads before the repair, reconstruction or improvements commenced.

Temporary Protection - Short-term stabilization of erosive or sediment-producing areas.

Top of Bank - The uppermost limit of the active channel of a stream containing normal flows, usually marked by a break in slope.

TYPE A SOILS - Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144 Kilopascal [kPa]) or greater. Examples of Type A cohesive soils are often: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. (No soil is Type A if it is fissured, is subject to vibration of any type, has previously been disturbed, is part of a sloped, layered system where the layers dip into the excavation on a slope of 4 horizontal to 1 vertical [4H:1V] or greater, or has seeping water.)

TYPE B SOILS - Cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa). Examples of other Type B soils are: angular gravel; silt; silt loam; previously disturbed soils unless otherwise classified as Type C; soils that meet the unconfined compressive strength or cementation requirements of Type A soils but are fissured or subject to vibration; dry unstable rock; and layered systems sloping into the trench at a slope less than 4H:1V (only if the material would be classified as a Type B soil).

TYPE C SOILS - Cohesive soils with an unconfined compressive strength of 0.5 tsf (48 kPa) or less. Other Type C soils include granular soils such as gravel, sand and loamy sand, submerged soil, soil from which water is freely seeping, and submerged rock that is not stable. Also included in this classification is material in a sloped, layered system where the layers dip into the excavation or have a slope of four horizontal to one vertical (4H:1V) or greater.

Unnumbered Zone A – See "Zone A."

Variance - A grant of relief from the requirements of these regulations which permits construction in a manner otherwise prohibited by these regulations where specific enforcement would result in unnecessary hardship.

Vegetative Protection - Stabilization of erosive or sediment producing areas by covering the soil with any of the following materials: permanent seeding for long-term vegetative cover, short-term seeding for temporary vegetative cover, sodding, producing areas covered with a turf of perennial sod-forming grass, tree planting, or other planting.

Violation - The failure of a development to be fully compliant with Metro's stormwater management regulations. For floodplain management purposes: the failure of a structure or other development to be fully compliant with Metro's floodplain management regulations. A structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in these regulations is presumed to be in violation until such time as that documentation is provided.

Water Budget - A chronological accounting of water volume changes (including infiltration, exfiltration, evaporation, diversion, inflow, and outflows) to and from a point of storage such as an aquifer, retention pond, or other natural or man-made water system.

Watercourse - A channel, natural depression, slough, gulch, stream, creek, pond, reservoir, or lake in which storm runoff and floodwater flows either regularly or infrequently. This includes major drainageways for carrying urban storm runoff.

Waters of the State – As defined by TDEC, waters of the State are any and all water, public or private, on or beneath the surface of the ground, which is contained within, flows through or borders on Tennessee or any portion thereof except those bodies of water confined to and retained within the limits of private property in single ownership which do not combine or effect a junction with natural surface or underground waters.

Water surface elevation - The height, in relation to the National Geodetic Vertical Datum (NGVD) of 1929, (or other datum, where specified) of floods of various magnitudes and frequencies in the floodplains of coastal or riverine areas.

Wet Weather Conveyance – Man-made or natural watercourses, including natural watercources that have been modified by channelization, that flow only in direct response to precipitation runoff in their immediate locality and whose channels are above the groundwater table and which do not support fish or aquatic life and are not suitable for drinking water supplies.

Wetland - Those areas that are inundated or saturated by surface or ground water at a frequency or duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typical to life in saturated soil conditions. Wetlands generally include, but are not limited to, swamps, marshes, bogs and similar areas.

Zone A (Unnumbered) – No base flood elevations determined.

Zone AE – Base flood elevations determined.

Zone AO – Flood depths of one to three feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ACRONYMS

303(d) – State's List of Impaired Waterways (Below Water Quality Criteria for Use Classifications)
ARAP – Aquatic Resource Alteration Permit
BFE – Base Flood Elevation
BMP – Best Management Practice
cfs – cubic feet per second
CGP – Construction General Permit
CLOMR – Conditional Letter of Map Revision
CMP – Corrugated Metal Pipe
CRS – Community Rating System
CSS – Combined Sewer System
CWA – Clean Water Act
DA – Department of the Army
DCIA – Directly Connected Impervious Area
EPA – Environmental Protection Agency
EPSC – Erosion Prevention and Sediment Control
FEMA – Federal Emergency Management Agency
FFE – Finished Floor Elevation
FIRM – Flood Insurance Rate Map
GIS – Geographic Information System
IA – Impervious Area
LID – Low Impact Development
M.C.L. – Metropolitan Code of Laws
MEP – Maximum Extent Practical
Metro - Metropolitan Government of Nashville and Davidson County.
MOU – Memorandum of Understanding
MPW – Metropolitan Department of Public Works
MS4 – Municipal Separate Storm Sewer System
MWS – Metropolitan Department of Water and Sewerage Services
NAD83 - North American Datum 1983
NFIP – National Flood Insurance Program
NGVD – National Geodetic Vertical Datum
NJCAT - New Jersey Center for Environmental Technology
NOC – Notice of Coverage
NOV – Notice of Violation
NPDES – National Pollutant Discharge Elimination System
NRCS – Natural Resource Conservation Service
OSHA – Occupational Health and Safety Agency
PTP – Permanent Treatment Practice
PUD – Planned Unit Development
RCP – Reinforced Concrete Pipe

SCM – Stormwater Control Measure
SOP – Standard Operating Procedure
SP – Specific Plan
SR2C – Stormwater Regulations Review Committee
SSC – Suspended Sediment Concentration
SWCD - Davidson County Soil and Water Conservation District
SWMC – Stormwater Management Committee
SWMM – Stormwater Management Manual
SWO – Stop Work Order
TARP - Technology Acceptance Reciprocity Partnership
T.C.A. – Tennessee Code Annotated
TDEC – Tennessee Department of Environment and Conservation
TMDL – Total Maximum Daily Load
tsf – tons per square foot
TSS – Total Suspended Solids
O&M – Operation and Maintenance
U & O – Use and Occupancy
UIC – Underground Injection Control
USACE – U.S. Army Corps of Engineers
USGS – United States Geological Survey
WQA – Water Quality Act

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APPENDIX C
STORMWATER CONTROL MEASURE (SCM) MAINTENANCE DOCUMENT

- **Explanation of Maintenance Document**
- **Inspection and Maintenance Agreement**
- **Declaration of Restrictions and Covenants**
- **Long Term Maintenance Plan Instructions**
- **SCM Inspection Checklists (Templates)**

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Explanation of Maintenance Document

The Maintenance Document for a site is comprised of the following elements:

1. Either an Inspection and Maintenance (I&M) Agreement, which includes an easement requirement, or a Declaration of Restrictions and Covenants, whichever is appropriate as determined by Stormwater staff.
2. A long term maintenance plan prepared by the design engineer. The maintenance plan must include a description of the stormwater system and its components, inspection priorities and inspection schedule for each component, and SCM schematics for each SCM.
3. A system location map to enable MWS to locate SCMs as needed.

The Maintenance Document must be submitted for MWS review with the Grading Permit application. The property owner or owners are responsible for inspections and maintenance of SCMs and privately-owned stormwater system components outside of the right-of-way. The Maintenance Document is to be recorded at the Register of Deeds before a site is approved for a Pre-Construction Meeting. If the final configuration of the stormwater system components or SCMs differs from that described in the recorded Maintenance Document, a revised Maintenance Document must be recorded.

An Inspection and Maintenance Agreement and a Declaration of Covenants are contained in this Appendix, as are templates for inspection checklists for each type of structural SCM, including water quality buffers. As noted above, inspection priorities and schedules for each SCM type must be submitted as a component of the long term maintenance plan for the site. The inspection checklists can serve this purpose, as well as serving as inspection reports for each facility. The template checklists are a general guideline of inspection elements; however, engineers may modify checklists to include inspections and maintenance elements as needed.

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INSPECTION AND MAINTENANCE AGREEMENT FOR PRIVATE STORMWATER FACILITIES

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INSPECTION AND MAINTENANCE AGREEMENT
FOR PRIVATE STORMWATER MANAGEMENT FACILITIES

Grading Permit No.: _____ Map & Parcel No.:_____

Project Name & Address: _____
_____

THIS AGREEMENT, made this ____ day of _____, 20____, by and between _____, hereinafter referred to as the "OWNER(S)" of the following property and Metropolitan Government of Nashville and Davidson County, Tennessee, hereinafter referred to as the "METROPOLITAN GOVERNMENT",

WITNESSETH
WE, the OWNER(S), with full authority to execute deeds, mortgages, other covenants, do hereby covenant with the METROPOLITAN GOVERNMENT and agree as follows:

1. The OWNER(S) covenant and agree with the METROPOLITAN GOVERNMENT that the OWNER(S) shall provide for adequate long term maintenance and continuation of the stormwater control measures described in the Long Term Maintenance Plan and shown on the location map, deed of easement drawing or plat attached hereto to ensure that the facilities, are, and remain, in proper working condition in accordance with approved design standards, rules and regulations, and applicable laws. The OWNER(S) shall perform preventative maintenance activities at intervals described in the inspection schedule included in the Long Term Maintenance Plan along with necessary landscaping (grass cutting, etc.) and trash removal as part of regular maintenance.

2. The OWNER(S) shall submit to the METROPOLITAN GOVERNMENT an annual report by July 1st of each year. The report shall document the inspection schedule, times of inspection, remedial actions taken to repair, modify or reconstruct Systems and Facilities, the state of control measures, and notification of any planned change in responsibility for such Systems and Facilities.

3. The OWNER(S) shall submit to the METROPOLITAN GOVERNMENT a report every five years of an inspection performed by a qualified professional as specified by the METROPOLITAN GOVERNMENT. This report shall be submitted on July 1st and will substitute for the annual report detailed in item #3.

4. The OWNER(S) shall grant to the METROPOLITAN GOVERNMENT or its agent or contractor the right of entry at reasonable times and in a reasonable manner for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the facility.

5. The OWNER(S) shall grant to the METROPOLITAN GOVERNMENT the necessary easements and rights-of-way and maintain perpetual access from public rights-of-way to the facility for the METROPOLITAN GOVERNMENT or its agent and contractor.

6. If, upon inspection, the METROPOLITAN GOVERNMENT finds that OWNER(S) has failed to properly maintain the facilities, the METROPOLITAN GOVERNMENT may order the work performed within ten (10) days. In the event the work is not performed within the specified time, the OWNER(S) agrees to allow the METROPOLITAN GOVERNMENT to enter the property and take whatever steps it deems necessary to maintain the stormwater control facilities. This provision shall not be construed to allow the METROPOLITAN GOVERNMENT to erect any structure of a permanent nature on the land of the OWNER(S) without first obtaining written approval of the OWNER(S).

7. The METROPOLITAN GOVERNMENT is under no obligation to maintain or repair said facilities, and in no event shall this Agreement be construed to impose any such obligation on the METROPOLITAN GOVERNMENT. The OWNER(S) shall reimburse the METROPOLITAN GOVERNMENT upon demand the costs incurred in the maintenance of the facilities.

8. If the OWNER fails to pay the METROPOLITAN GOVERNMENT for the above expenses after forty-five (45) days written notice, the OWNER authorizes the METROPOLITAN GOVERNMENT to collect said expenses from the OWNER through appropriate legal action and the OWNER shall be liable for the reasonable expenses of collection, court costs, and attorney fees.

9. The OWNER(S) and the OWNER(S) heirs, administrators, executors, assigns, and any other successor in interest shall indemnify and hold harmless the METROPOLITAN GOVERNMENT and its officers, agents and employees for any and all damages, accidents, casualties, occurrences, claims or attorney's fees which might arise or be asserted, in whole or in part, against the METROPOLITAN GOVERNMENT from the construction, presence, existence, or maintenance of the stormwater control facilities subject to this AGREEMENT. In the event a claim is asserted against the METROPOLITAN GOVERNMENT, its officers, agents or employees, the METROPOLITAN GOVERNMENT shall notify OWNER(S) and the OWNER(S) shall defend at OWNER(S) expense any suit based on such claim. If any judgment or claims against the METROPOLITAN GOVERNMENT, its officers, agents or employees, shall be allowed, the OWNER(S) shall pay all costs and expenses in connection therewith. The METROPOLITAN GOVERNMENT will not indemnify, defend or hold harmless in any fashion the OWNER(S) from any claims arising from any failure, regardless of any language in any attachment or other document that the OWNER(S) may provide.

10. The OWNER(S) shall not be able to transfer, assign or modify its responsibilities with respect to this agreement without the METROPOLITAN GOVERNMENT's written prior consent. Nothing herein shall be construed to prohibit a transfer by OWNER(S).

11. No waiver of any provision of this AGREEMENT shall affect the right of any party thereafter to enforce such provision or to exercise any right or remedy available to it in the event of any other default.

12. The OWNER(S) shall record a plat showing and accurately defining the easements for stormwater control facilities. The plat must reference the Instrument Number where this AGREEMENT and its or attachments are recorded and contain a note that the OWNER(S) is responsible for maintaining the stormwater management facilities.

13. The OWNER(S) shall record this AGREEMENT in the office of the Register of Deeds for the county of Davidson, Tennessee, and the AGREEMENT shall constitute a covenant running with the land, and shall be binding upon the OWNER(S) and the OWNER(S) heirs, administrators, executors, assigns, and any other successors in interest.

REVIEWED BY: _____ FOR THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, DEPARTMENT OF WATER AND SEWERAGE SERVICES **PREPARED BY:** _____ FOR THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY, DEPARTMENT OF WATER AND SEWERAGE SERVICES	**ATTEST BY OWNERS(S):** _____ OWNER(S) NAME (PRINTED) BY: _____ TITLE: _____ _____ _____ _____ OWNER(S) ADDRESS AND PHONE NUMBER

STATE OF _____
COUNTY OF _____

Before me, _____ of the state and county mentioned, personally appeared _____, with whom I am personally acquainted (or provided to me on the basis of satisfactory evidence), and who, upon oath, acknowledged such person to be president (or other officer authorized to execute the instrument) of _____, the within named bargainor, a corporation, and that such president or officer as such _____, executed the foregoing instrument for the purpose therein contained, by personally signing the name of the corporation as _____.

Witness my hand and official seal at office in _____, this _____ day of _____, of the year _____.

_____
Notary Public

My Commission Expires: _____

STATE OF TENNESSEE
COUNTY OF DAVIDSON

Before me, _____ of the state and county mentioned, personally appeared _____, with whom I am personally acquainted (or provided to me on the basis of satisfactory evidence), and who acknowledge themselves to be the Director of Water Services of the Metropolitan Government of Nashville and Davidson County or his designee and as such, being authorized so to do, executed the foregoing instrument of the purposes therein contained.
Witness my hand and official seal at office in _____, this _____ day of _____

_____
Notary Public

My Commission Expires: _____

FOR GOVERNMENT USE ONLY

I, _____, do hereby make oath that I am a licensed attorney and/or the custodian of the electronic version of the attached document tendered for registration herewith and that this is a true and correct copy of the original documents executed and authenticated according to law.

This instrument has been reviewed and approved by Metro Water, Property Services.

_____
Signature

STATE OF TENNESSEE
COUNTY OF DAVIDSON

Personally appeared before me, the undersigned, a notary for this County and State, _____, who acknowledges that this certification of an electronic document is true and correct and whose signature I have witnessed.

_____
Notary Signature

MY COMMISSION EXPIRES: _____
Notary's Seal

DECLARATION OF RESTRICTIONS AND COVENANTS FOR STORMWATER FACILITIES AND SYSTEMS

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This instrument prepared by:
Metropolitan Department of Law
108 Metropolitan Courthouse
Nashville, Tennessee 37201

DECLARATION OF RESTRICTIONS AND COVENANTS

FOR

STORMWATER FACILITIES AND SYSTEMS

Grading Permit No.: _____

Being on the Property conveyed to _____, the deed for which is of record in Instrument No. _____, R.O.D.C., Tennessee.

_____(individually or collectively, the "Declarant"), the owner of the real property described in Exhibit A attached hereto and incorporated herein by reference (the "Property"), does hereby covenant, agree and declare as follows:

1. Declarant is lawfully seized of the Property and possessed of said land in fee simple and has good right to make the following declarations and covenants.

2. Declarant has prepared and submitted to Metro a Long Term Maintenance Plan (the "Plan") acceptable to Metro, a copy of which is attached hereto, and shall thereafter provide for adequate long term maintenance and continuation of the stormwater control measures described in the Plan to ensure that all stormwater facilities ("Facilities") and systems ("Systems") required by the Plan are and remain in proper working condition in accordance with the Plan and with all applicable rules, regulations and laws. Declarant shall perform preventative maintenance activities at intervals described in the inspection schedule included in the Plan along with necessary landscaping (grass cutting, etc.) and trash removal as part of regular maintenance.

3. Declarant shall submit to Metro an annual report by July 1st of each year. The report shall document the inspection schedule, times of inspection, remedial actions taken to repair, modify or reconstruct Systems and Facilities, the state of control measures, and notification of any planned change in responsibility for such Systems and Facilities.

4. Declarant shall submit to Metro a report every five years of an inspection performed by a qualified professional as specified by Metro. This report shall be submitted on July 1st and will substitute for the annual report detailed in item #3.

5. Declarant hereby accords to Metro and its employees, agents and contractors a perpetual right of entry at reasonable times and in a reasonable manner for the purpose of inspecting, operating, installing, constructing, reconstructing, maintaining or repairing the Systems and Facilities.

6. Declarant hereby accords to Metro and its employees, agents and contractors a perpetual right of entry for access from public rights-of-way to the Systems and Facilities.

7. If, upon inspection, Metro determines that Declarant has failed to properly maintain the Systems and Facilities in accordance with the Plan, the Declarant acknowledges that Metro will in that event have the authority to order Declarant to perform such maintenance within ten (10) days. In the event the maintenance is not performed within the specified time, Declarant shall allow Metro to enter the property and take all reasonable steps to maintain the Systems and Facilities. Declarant acknowledges that Declarant understands that Metro is under no duty or obligation to maintain or repair the Systems and Facilities. Declarant shall reimburse Metro in full and upon demand for all costs incurred by Metro in the maintenance or repair of the Systems and Facilities and shall be liable to Metro for the reasonable costs of collection, including without limitation court costs and attorney fees.

8. Declarant shall reimburse Metro in full upon demand in the amount of any judgment rendered against Metro due to Declarant's failure to perform the obligations created by this instrument.

9. The Property may be used for any lawful purpose desired after the construction of all of the Systems and Facilities, provided that structural change, in the opinion of Metro (the discretion to give such opinion on behalf of Metro may be exercised by the Director of Water and Sewerage Services, or the Director's designee), will not destroy, weaken or damage them or interfere with their operation or maintenance. Additionally, prior to any changes or additions to or relocation of the improvements, the Declarant, successors and/or assigns must demonstrate to the satisfaction of the Director of Water and Sewerage Services that any such proposed change, addition, or relocation will not eliminate the improvement or interfere with or significantly change its needed operation, or otherwise pose a danger to the public health or safety. A map depicting any approved change, addition, or relocation of the improvements shall be recorded with reference to this instrument number.

10. These restrictions and covenants under this instrument shall become void if the structures on the property are demolished, the property is prepared for redevelopment, and the Director of Water and Sewerage Services certifies that all portions of the public storm water system on or immediately adjacent to the property have been restored to the existing condition as of the day of the execution of this instrument.

The Declarant shall provide this executed document along with associated recording fees (payable to the Davidson County Register of Deeds) to Metro Water Services for the purpose of recording this Declaration. Upon the recording of this Declaration by Metro in the office of the Register of Deeds for the county of Davidson, Tennessee, the foregoing restrictions and covenants shall run with the land and shall be binding on Declarant and all subsequent owners of the Property (or any portion thereof) and shall inure to the benefit of and be enforceable by Metro, its successors and assigns (although Metro's failure to exercise its enforcement rights in any particular situation shall not be deemed a waiver of them). Declarant, for itself and its successors in interest, further covenants to warrant and forever defend Metro's enforcement rights regarding the foregoing restrictions and covenants against the adverse claims of all persons. Any plat recorded at or after the date of the filing of this Declaration shall reference the instrument number where this Declaration and its attachments are recorded and contain a note that the Declarant is responsible for maintaining the Systems and Facilities. The foregoing covenants and restrictions may not be modified or amended except by a recorded instrument signed by Declarant and Metro (the discretion to do so on behalf of Metro may be exercised by the Director), or their respective successors or assigns, and shall not be extinguished by merger of title or otherwise.

WITNESS my/our hand(s), this __ day of _____, 20__.

_____
Declarant

_____
Declarant

STATE OF TENNESSEE
COUNTY OF DAVIDSON

Before me, _____, a Notary Public of the State and County aforesaid, personally appeared_____ with whom I am personally acquainted, and who, upon oath, acknowledged_____ to be _____ the within named bargainer(s), _____and that _____, as such_____ being authorized to do so, executed the foregoing instrument for the purposes therein contained.

Witness my hand and seal this _____ day of _____, 20__.

_____, Notary Public

My Commission Expires _____.

FOR GOVERNMENT USE ONLY

I, _____, do hereby make oath that I am a licensed attorney and/or the custodian of the electronic version of the attached document tendered for registration herewith and that this is a true and correct copy of the original documents executed and authenticated according to law.

This instrument has been reviewed and approved by Metro Water, Property Services.

_____
Signature

STATE OF TENNESSEE
COUNTY OF DAVIDSON

Personally appeared before me, the undersigned, a notary for this County and State, _____, who acknowledges that this certification of an electronic document is true and correct and whose signature I have witnessed.

_____
Notary Signature

MY COMMISSION EXPIRES: _____
Notary's Seal

LONG TERM SCM MAINTENANCE PLAN

- **LONG TERM MAINTENANCE PLAN INSTRUCTIONS**

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Long Term Maintenance Plan Instructions

The Long Term Maintenance Plan is a component of the Maintenance Document for the development or site. One of the purposes of the Long Term Maintenance Plan is to inform property owners about the system components on their properties, so that they will know the locations and maintenance needs of the components and structural SCMs.

The Long Term Maintenance Plan must include or address the following elements:

- Description of the stormwater system components and a site map showing the location of each. For sites designed in accordance with the SWMM, Volume 5, the LID Manual, this includes a site map showing areas of open space that received credit for lowering the site weighted runoff coefficient. Ongoing site SCM inspection and maintenance compliance shall include verification that such areas remain as open space as indicated on the plans.
- Schedule of inspections and the techniques used to inspect and maintain the systems to ensure that they are functioning properly as designed. Documentation checklists are found in this appendix and should be included in the LTMP.SCM
- Where and how the trash, sediment and other pollutants removed from the stormwater system will be disposed.
- Schematics of SCMs located on the site. Landscape plans should also be included for bioretention areas.
- Person(s) and phone number(s) of who will be responsible for inspection and maintenance. If the organization that will be responsible is yet to be organized, list the name, address, and phone number of the person or entity with interim responsibility.
- Provisions for permanent access and maintenance easements.

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STORMWATER CONTROL MEASURE (SCM) CHECKLISTS
(COMPONENT OF LONG TERM MAINTENANCE PLAN)

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Metro Nashville Stormwater Control Measure (SCM) Inspection Report

SCM Site Information

Grading Permit Number	
Site Address	
Owner/ Responsible Party Name	
Owner Contact Phone	
Owner Contact Email	
Date of LAST inspection	

Inspector Information

Date of CURRENT inspection	
Name of Inspector	
Are you a third party inspector?	**Y / N If Yes, company contact :**

Document Review

Review associated documentation for the SCM, noting any differences with what you find on site.

Long Term Maintenance Plan: Reviewed Y / N _____

As-built plans: Reviewed Y /N _____

Landscape planting plans, if needed: Reviewed Y / N_____

Last inspection report: Have previously noted maintenance needs been addressed? Y /N

Comments:_____

_____

SCM Inspection Checklist

Complete one checklist per stormwater control measure. Submit checklists per site.

SCM TYPE: _____
(dry detention pond, wet detention pond, bioretention/rain garden, grass channel, water quality swale)

Date of Last Rain: _____

Please note whether feature is satisfactory, maintenance needed, unsatisfactory / non-functioning. Clarify with your own comments. Note locations of photographs.

Inspection Key *S= Satisfactory*: Feature is functioning as designed; *M= Maintenance needed*: Feature has mild to moderate routine maintenance needs, but is still functioning; *U= Unsatisfactory*: Feature requires immediate major remedial maintenance to restore function; *N/A*= Feature does not apply

Feature	**S-M-U Rating**	**Comments**
Inlet structure/headwall stable?		
Inlet sediment accumulation or erosion?		
Flow path vegetation per plans?		
Flow path bare soil/erosion?		
Banks/ Perimeter stable?		
Outlet Structure stable?		
Outlet orifice blocked?		
Outlet sediment accumulation or erosion?		
Emergency Spillway stable?		
Stormwater Detention volume		
Stormwater Infiltration rate		
Underdrain Cleanout		

General Comments:
_____
_____
_____
_____

Date of Next Inspection:_____

Inspector's Signature:_____ Date:_____

Owner's Signature:_____ Date:_____

Metro Nashville Stormwater Control Measure (SCM) Inspection Report for Underground Water Quality Units (WQU)

WQU Site Information

Grading Permit Number	
Site Address	
Owner/ Responsible Party Name	
Owner Contact Phone	
Owner Contact Email	
Date of LAST inspection	

Inspector Information

Date of CURRENT inspection	
Name of Inspector	
Are you a third party inspector?	**Y / N If Yes, company contact :**
Are you following any applicable Confined Space Entry requirements[1]?	

Document Review

Review associated documentation for the WQU, noting any differences with what you find on site.

Long Term Maintenance Plan: Reviewed Y / N _____

As-built plans: Reviewed Y /N _____

Manufacture's Maintenance Recommendations: Reviewed Y / N_____

Last inspection report: Have previously noted maintenance needs been addressed? Y /N

Comments:_____

_____

[1]**Please see https://www.osha.gov/Publications/osha3138.pdf for more information.**

Water Quality Unit/ Proprietary Device Inspection Checklist

Complete one checklist per stormwater control measure. Submit checklists together per site.

WQU Make and Model: _____
Number of Filter Cartridges, if present: _____

Date of Last Rain: _____

Please note whether feature is satisfactory, unsatisfactory, or non-functioning. Clarify with your own comments. Note locations of photographs.

Feature		**Comments**
Inlet structure stable?	Y / N	
Trash rack free of debris?	Y / N	
Area draining to WQU stable?	Y / N	
Outlet Structure stable?	Y / N	
Downstream of discharge point stable?	Y /N	
Is there associated Underground Detention?	Y / N	
Depth of accumulated sediment (note inches or feet)		
Depth of accumulated sediment in underground detention (note inches or feet)		
Manufacturer's recommended pump-out volume/ sediment depth		
Total volume of sludge removed (Attach copy of waste manifest for disposal)		

General Comments:
_____
_____
_____

Date of Next Inspection:_____

Inspector's Signature:_____ Date:_____

Owner's Signature:_____ Date:_____

APPENDIX D

- **METROPOLITAN CODE OF LAWS** §15.64.010 *et. seq.*: **STORMWATER MANAGEMENT**
- **STORMWATER MANAGEMENT ORDINANCE No.78-840**

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15.64.010 Definitions.

As used in this chapter, the following words and terms shall have the meanings ascribed herein:

"Channel" means a natural or artificial watercourse of perceptible extent, with definite bed and banks to confine and conduct continuously or periodically flowing water. Channel flow thus is that water which is flowing within the limits of the defined channel.

"Drainage basin" means a part of the surface of the earth that is occupied by and provides surface water runoff into a drainage system which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

"Erosion" means the disintegration or wearing away of soil by the action of water.

"Flood" means water from a river, stream, watercourse, lake or other body of standing water that temporarily overflows and inundates adjacent lands and which may affect other lands and activities through increased surface water levels, and/or increased ground water level.

"Floodplain" means the relatively flat or lowland area adjoining a river, stream, watercourse, lake, or other body of standing water which has been or may be covered temporarily by flood water. For administrative purposes, the "floodplain" is defined as the area that would be inundated by high water at the flood profile from which the flood protection elevation is established.

"Floodproofing" means a combination of structural provisions, changes, or adjustments to properties and structures subject to flooding primarily for the reduction or elimination of flood damages to properties, water and sanitary facilities, structures, and contents of buildings in a flood hazard area.

"Flood protection elevation" means the elevation which is one foot above the one-hundred-year flood high water profiles as developed by the corps of engineers for the Federal Flood Insurance Study for Davidson County. Until this study is completed and adopted, in areas where such one-hundred-year flood high water profiles are not developed the flood protection elevation is the March, 1975 flood for the Cumberland River and the Stones River, and two feet above the fifty-year developed flood for the tributary streams mapped by the U. S. Geological Survey prior to January 1, 1976.

"Floodway" means that portion of the stream channel and adjacent floodplain required for the passage or conveyance of a one-hundred-year flood discharge. The floodway boundaries are placed to limit encroachment in the floodplain so that a one-hundred-year flood discharge can be conveyed through the floodplain without materially increasing (less than one foot) the water surface elevation at any point and without producing hazardous velocities or conditions. This is the area of significant depths and velocities, and due consideration should be given to effects of fill, loss of cross-sectional flow area, and resulting increased water surface elevations.

"Floodway fringe" means that portion of the floodplain lying outside the floodway. This is the area of the floodplain that may be developed or encroached upon as long as the water surface elevation of the one-hundred-year flood is not increased by more than one foot at any point.

"Green infrastructure" means an approach to wet weather management that is cost-effective, sustainable, and environmentally friendly, which incorporates management approaches and technologies that infiltrate, evapotranspire, capture and reuse stormwater to maintain or restore natural hydrologies. Green infrastructure practices include, but are not limited to open space, rain gardens, porous pavements, green roofs, infiltration planters, trees and tree boxes, swales, and curb extensions.

"Green street" means a public right-of-way that utilizes green infrastructure to manage wet weather flows and enhance water quality.

"Human occupancy" means any portion of any enclosed structure wherein humans principally live or sleep, such as mobile homes, permanent residential activities, semitransient residential activities, health care community facilities, nursing home community facilities, orphanages, family care facilities, group care facilities, or transient habitation.

"Impervious area (IA)" means the portion of a parcel of property that is covered by any material, including without limitation roofs, streets, sidewalks and parking lots paved with asphalt, concrete, compacted sand, compacted gravel or clay, that substantially reduces or prevents the infiltration of storm water. Impervious area shall not include natural undisturbed surface rock.

"Impervious surface" means any ground or structural surface which water cannot penetrate or through which water penetrates with great difficulty.

"Infill (regulated residential)" means the creation of eight hundred to fifteen thousand square feet of additional net impervious area (IA) for a residential dwelling(s) through new development, redevelopment, or rehabilitation in existing neighborhoods.

"Lot" means a tract, plot or portion of a subdivision or parcel of land intended as a unit for the purpose, whether immediate or future, for transfer of ownership or for building development.

Material Increase the Degree of Flooding. The term "material increase the degree of flooding" shall be defined by the following criteria:

1. The proposed development raises the one-hundred-year flood elevation more than one foot; or, when considered in conjunction with other potential developments within the watershed, would contribute disproportionately to increased flooding which when combined with other potential development would cumulatively increase the one-hundred-year flood elevation more than one foot.
2. The proposed development does materially increase the property damage caused by the one-hundred-year flood.

3. The proposed development conflicts with the master plan adopted by the stormwater management committee for reducing flood damage.

One-Hundred-Year Flood. A "One-hundred-year flood" is one that has an average frequency of occurrence of once in one hundred years, determined from an analysis of floods on a particular watercourse and other watercourses in the same general region. Statistically, it has a one percent chance of occurring in any given year.

"Stormwater" shall mean stormwater run-off, snow melt run-off, surface run-off, street wash waters related to street cleaning and maintenance, infiltration other than infiltration contaminated by seepage from sanitary sewers or other discharges and drainage.

"Stormwater master planning district" means a defined geographical area that will benefit from the use of green infrastructure to augment or replace conventionally engineered stormwater management solutions.

"Structure" means anything constructed or erected, the use of which requires a more or less permanent location on or in the ground. Such construction includes but is not limited to objects such as buildings, towers, smokestacks, overhead transmission lines, carports and walls.

1. Structure shall not include fences.

"Structure, permanent" means a structure which is built of such materials and in such a way that it would commonly be expected to last and remain useful for a substantial period of time.

"Structure, temporary" means a structure which is built of such materials and in such a way that it would commonly be expected to have a relatively short useful life, or is built for a purpose that would commonly be expected to be relatively short-term.

"Watercourse" means a channel, natural depression, slough, gulch, stream, creek, pond, reservoir, or lake in which storm runoff and flood water flows either regularly or infrequently. This includes major drainageways for carrying urban storm runoff.
(Ord. BL2014-910 § 1, 2014; Ord. BL2011-940 § 2, 2011; Ord. BL2009-407 § 10, 2009; Ord. BL2008-345 § 1, 2009; Ord. BL2007-1440 § 1, 2007; prior code § 40-1-226)

15.64.015 Stormwater division.
There is hereby created a stormwater division within the metropolitan department of water and sewerage services ("MWS"), which in coordination with the department of public works, the metropolitan finance director, the metropolitan department of codes administration and the metropolitan planning commission, shall have the responsibility for compliance with the Clean Water Act of 1977, as amended and the National Pollution Discharge Elimination System permit (NPDES) and applicable regulations for stormwater discharges; developing stormwater management plans; identifying capital requirements and developing necessary financing for maintenance and rehabilitation of existing and new stormwater facilities; collecting fees and charges for the division; educating the public on the importance of stormwater management and

pollution control; developing written regulations and technical guidelines as may be necessary to enforce the terms of this chapter; and other related duties as required by the director ("director") of MWS. Nothing in this chapter shall constitute a transfer of the authority from the department of public works to MWS regarding the design, construction, maintenance, repair, and cleaning of storm sewers, which authority is delegated to the department of public works by section 8.402 of the Charter.

MWS shall be responsible for plan approval and construction inspection of both private stormwater facilities and public stormwater facilities not owned by the metropolitan government. Additionally, MWS may accept the responsibility for the operation and maintenance of private stormwater facilities only pursuant to criteria defined and adopted by the stormwater management committee and upon a written agreement approved by the metropolitan council.
(Ord. BL2009-407 § 11, 2009; Ord. BL2007-1440 § 2, 2007)

15.64.020 Director of public works--Authority.

A. The director of public works, with the approval of the mayor, shall establish written regulations and technical guidelines as may be necessary to enforce the terms of this chapter. These regulations shall be filed in the metropolitan clerk's office.
B. Reserved.
C. The director of public works shall have the authority to inspect private drainage systems within the county, and to order such corrective actions to said private drainage systems as are necessary to maintain properly the major and minor drainage systems within the county.

(Ord. BL2009-407 § 12, 2009; prior code § 40-1-227)

15.64.030 Director of codes administration--Authority.

The director of codes administration, with the approval of the mayor, shall have the authority to establish such written regulations and technical guidelines as may be necessary to enforce the terms of this chapter. These regulations shall be filed in the metropolitan clerk's office.
(Prior code § 40-1-228)

15.64.031 - Reserved.

Editor's note— Ord. BL2009-407, § 13, passed March 17, 2009, repealed § 15.64.031, which pertained to funding and derived from Ord. BL2007-1440 § 3, 2007.

15.64.032 Stormwater fees.

A. Definitions. For purposes of this section,
   1. "Department" shall mean the department of water and sewerage services.
   2. "Director" shall mean the director of the department of water and sewerage services.
   3. "Impervious area" shall mean the portion of a parcel of property that is covered by any material, including without limitation roofs, streets, sidewalks and parking lots paved with asphalt, concrete, compacted sand, compacted gravel or clay, that substantially reduces or prevents the infiltration of storm water. Impervious area shall not include natural undisturbed surface rock.

4. "Residential property" shall mean any property whose primary use, as shown on the use and occupancy permit issued by the department of codes administration, is residential single-family or residential two-family.
5. "Non-residential property" shall mean a parcel of property that is not a residential property as defined in this section.
6. The "public system" shall mean and include storm water and flood control devices, structures, conveyances, facilities or systems, including natural watercourses, streams, creeks and rivers used wholly or partly to convey or control storm water or flood water within the jurisdictional boundaries of the metropolitan government. The public system shall include, without limitation, natural conveyances (a) for which the metropolitan government has assumed maintenance responsibility; (b) to which the metropolitan government has made improvements; (c) which have or may pose a threat to public property because of flooding; or (d) for which the metropolitan government is accountable under federal or state regulations governing protection of water quality.
7. "Qualified control structure" shall mean a device or structure meeting design standards and approved by the department that substantially limits the discharge of storm water from a parcel of property into or through any public system or that substantially improves the purity of storm water so discharged.
8. "User" shall mean the owner of record of a non-exempt residential or non-residential property or the person or entity in possession if other than the owner.

B. Storm Water Utility and User Fee Established. There is established a storm water utility and a system of storm water user fees for each parcel of property in Davidson County. The fees shall be used by the metropolitan government, acting through the department, exclusively for operation and management of the storm water utility and such storm water and flood control purposes as authorized in Tenn. Code Ann. § 68-221-1101, et seq.. The fees shall be owed jointly and severally by the property owner of record and the person or entity in possession of such property in the amounts shown in Table 15.64.032. For each property having multiple dwelling or commercial units and more than one water meter, the director shall fairly allocate the storm water user fees owed among users based on their actual or estimated proportionate contribution to the storm water discharged by that property.

C. Exemptions. The following properties shall be exempt from payment of the fees created by this section:
1. Residential properties zoned AG and AR2a of which half or more is used annually for the raising for sale of livestock or crops.
2. Properties from which no storm water is discharged into or through the public system.
3. Properties having no impervious area.
4. Properties wholly within the corporate boundaries of Belle Meade, Berry Hill, Forest Hills, Goodlettsville, Lakewood and Oak Hill. Provided, however, that each such city may, upon approval of its legislative body, enter into the contract attached as Exhibit A to this ordinance, such that all property within its boundaries will participate in the metropolitan government's storm water utility and system of storm water user fees in the same manner as the remainder of the area within the General Services District. Such contract between any of the above cities and the metropolitan government shall be filed with the metropolitan clerk upon being executed.

D. Adjustments.
   1. Properties on which a properly functioning qualified control structure has been installed shall be entitled to a downward adjustment in the fees established by this section in proportion to the improvement achieved by the qualified control structure in the purity of storm water discharged to the public system or the reduction achieved by the qualified control structure in rate or quantity of storm water discharged to the public system or both.
   2. A downward adjustment of not more than fifty percent in the fees established by this section shall be available to any entity exempt from taxation under state or federal law that provides to its students or members a regular and continuing program of education approved by the director and concentrating on stewardship of water resources and minimization of demand on the public system.
   3. The director shall develop regulations governing the fair and reasonable application of adjustments for properties entitled to one or more adjustment under the terms of this subsection. Prior to the adoption of such regulations governing adjustments in the fees, the regulations shall be published in a newspaper of general circulation and public comment thereon received and considered. Further, such regulations shall be approved by the stormwater management committee before becoming effective.

E. Application. Adjustments created under this subsection shall be granted by the director upon written application by the user of any qualifying property and submission of such supporting documentation as the director may reasonably require. The director may, upon not less than thirty written days' notice, revoke a previously granted adjustment or cease to recognize an exemption upon his determination that the affected parcel of property does not qualify for the adjustment or exemption.

F. Reports. Not later than the 15th day of October each year, the director shall deliver a report to the finance director and the metropolitan council providing the following information:
   1. A list of properties that are exempt or have been granted adjustments under this section. The report shall identify each property by street address and owner name, and shall state the adjustment amount granted or the basis for considering the property exempt.
   2. A list of all storm water projects completed within the previous year for each council district broken down by priority category (A, B and C).

G. Appeals.
   1. Appeals relating to exemptions shall be taken to the stormwater management committee within sixty days after the department issues a bill for storm water fees indicating that an applicable exemption has not been recognized.
   2. An appeal from any decision made by the director under this section, including a decision relating to an adjustment or allocation among users of a single property, shall be taken to the stormwater management committee within sixty days after issuance of the decision.
   3. Users shall be entitled to appeal the department's calculation regarding the amount of the user's impervious area to the stormwater management committee. In the event the stormwater management committee approves a reduction in the amount of billable impervious area, such user's storm water fee shall be adjusted accordingly on a prospective basis. Users shall not be entitled to a refund or credit of storm water fees paid prior to said appeal.

H. Collection. The director shall bill the fees established by this section to users who are retail customers of the department on their regular monthly water or sewer bills. The fees shall be shown as a separately identified line item. The director shall directly and at least semi-annually bill the fees created by this section to users not receiving water or sewer service from the department or shall contract for the inclusion of such fees on bills issued to the customers of other utilities operating in Davidson County, such contracts to be approved by resolution of the metropolitan council.

I. Remedies. In addition to any other remedy available to the metropolitan government under law or contract, the department shall discontinue water service to the property of any user who fails to pay the fees established by this section in accordance with the procedures regularly used by the department when customers fail to pay bills for water or sewer service. Fees established under this section shall constitute a lien against the property served, which lien shall run with the land. The metropolitan government may enforce the lien as prescribed by law.

J. Regulations. The director shall promulgate regulations to facilitate administration of this section. Prior to adoption, such regulations shall be published in a newspaper of general circulation and public comment thereon received and considered. The regulations further shall be approved by the stormwater management committee before becoming effective. Any material change in the regulations shall be made in accordance with the same process.

K. Review of impervious area. The department shall review all user properties at least every five years to ensure such users are being billed for the correct amount of impervious area. Upon completion of the periodic review, if a user's amount of impervious area has changed, the department shall adjust such user's storm water fee accordingly to reflect the updated amount of impervious area.

Table 15.64.032 GRADUATED STORM WATER USER FEE SCHEDULE

Property Type; Impervious Area (Square Feet)	Monthly Fee
All; Less than 400	$0.00
Residential; Between 400 and 2,000	$1.50
Residential; Between 2,000 and 6,000	$3.00
Residential; More than 6,000	$4.50
Non-Residential; Between 400 and 6,000	$10.00
Non-Residential; Between 6,000 and 12,800	$20.00
Non-Residential; Between 12,800 and 51,200	$40.00
Non-Residential; Between 51,200 and 300,000	$100.00
Non-Residential; Between 300,000 and 1,000,000	$200.00
Non-Residential; More than 1,000,000	$400.00

(Ord. BL2009-407 §§ 8, 9, 2009; Amdt. 1 to Ord. BL2007-1440 § 4, 2007; Ord. BL2007-1440 § 4, 2007)

Editor's note - Exhibit A to Ord. BL2009-407 is not set out herein, but is on file and available for inspection in the metropolitan clerk's office.

State Law Reference - The Tennessee legislature, in Public Chapter 1143, provided a new standard related to agricultural exemptions for the stormwater fee. Refer to T.C.A. 68-221-107, based on Public Chapter 1143.

15.64.033 Reserved.

Editor's note—Ord. BL2009-407, § 13, adopted March 17, 2009, repealed § 15.64.033, which pertained to collection of fees and derived from Ord. BL2007-1440 § 5, 2007.

15.64.034 Reports of stormwater division.

The director of MWS shall submit an annual written report to the metro council, and shall personally appear annually before a joint meeting of the council public works and budget and finance committees on the stormwater management program. Such report shall contain, at a minimum:

The status of the stormwater management program in metro.

The fee structure imposed to fund the implementation of the stormwater program and the adequacy of funds to implement the program.

Any long-range plans which have been developed to implement the provisions of this chapter.

The status of any projects to control stormwater run off.

Any other information deemed relevant by the director.

(Ord. BL2007-1440 § 6, 2007)

15.64.040 Stormwater management committee--Created.

A. There is created a metropolitan stormwater management committee which shall consist of seven members.

B. The membership of the committee shall be as follows:
   1. Four members who shall be registered professional engineers in the State of Tennessee with expertise in civil engineering, hydraulics, hydrology, and/or environmental sciences; and
   2. Three lay members from the community at large.

C. The members shall be appointed by the mayor and confirmed by a majority vote of the whole metropolitan council.

D. The members appointed by the mayor shall have been residents of the metropolitan government area for not less than one year, and shall continue to be so eligible as long as they shall serve.

E. Appointed members of the committee shall serve a term of four years. The terms of office of the first appointed members shall be staggered, two for a term of two years, two for a term of three years, and two for a term of four years.

(Ord. BL2012-127 § 1, 2012; Ord. 89-1017 § 1, 1990; prior code § 40-1-229(a))

Editor's note—Ord. No. BL2012-127, § 4, states that all current members shall remain in office and all current alternate members shall be converted to full members.

15.64.050 Stormwater management committee--Organization.
Within ten days after its appointment, the stormwater management committee shall organize itself by election of one of its members as chairman and another as vice-chairman, who shall serve for a period of one year or until his successor shall have been chosen. The director of the department of water and sewerage services shall appoint the secretary to the committee who shall be the custodian of the minutes and records of the proceeding of the committee. The director of law shall appoint a legal advisor to the committee.
(Ord. BL2012-127 § 2, 2012; Ord. BL2007-1440 § 7, 2007; prior code § 40-1-229(b))

15.64.060 Stormwater management committee--Compensation.
All appointed members of the committee shall serve without compensation, and may be removed from membership on the committee by the mayor for continued absence from meetings of the committee, physical disability, or other just cause.
(Prior code § 40-1-229(c))

15.64.070 Stormwater management committee--Replacement of members.
Replacement of any appointed member of the committee resigning or dismissed from the committee shall be appointed by the mayor and confirmed by the metropolitan council in the same manner as prescribed for regular appointees. Any member appointed as a replacement shall serve only for the remainder of the term of the member replaced, unless subsequently reappointed for an additional term.
(Prior code § 40-1-229(d))

15.64.080 Stormwater management committee--Regulations--Meetings--Duties.
The stormwater management committee shall adopt such rules and regulations as it may deem necessary to conduct its business. The committee, in open meeting, shall hear all appeals, under the provisions of this chapter. The committee shall meet at regular monthly intervals with the day and time to be determined by the chairman. In the event no appeals have been filed and there is no business pending, the chairman may cancel the meeting ten days before its scheduled date. The committee shall approve master plans for drainage basins and technical guidelines before they become binding under the terms of this chapter.
(Prior code § 40-1-229(e))

15.64.090 Stormwater management committee--Voting regulations.
Four members of the stormwater management committee shall constitute a quorum. A majority vote of members present shall be required for actions by the committee. In the event that a quorum is not present, an application shall be readvertised for the next regular meeting. No member of the committee shall act in any case in which he has a personal interest.
(Ord. BL2012-127 § 3, 2012; prior code § 40-1-229(f))

15.64.100 Appeals procedure.
A.
1. Whenever the director of the department of water and sewerage services or the director of codes administration shall reject or refuse to approve a plan for noncompliance with this

chapter, the owner or his authorized agent may appeal from the decision of the director to the stormwater management committee. An appeal must be filed within thirty days after said decision by the director of the department of water and sewerage services or the director of codes administration. The fee for filing an appeal shall be fifty dollars.

2. The stormwater management committee shall hear all appeals taken from any decision of the director of the department of water and sewerage services pursuant to Section 15.64.205. An appeal must be filed with the committee in writing within thirty days of any such decision by the director. The fee for filing an appeal shall be fifty dollars.

B. A decision of the stormwater management committee varying the application of any provision of this chapter or modifying an order of the director of the department of water and sewerage services shall be by resolution of the committee, which shall specify in what manner such variations or modifications shall be made, the conditions upon which they are to be made, and the reasons therefor.

C. Every decision of the committee shall be final; subject however, to such remedy as any aggrieved party or the metropolitan government may have at law or in equity. All decisions of the committee shall be in writing and shall indicate the vote of each member of the committee upon the decision. Every decision shall be promptly entered into the minutes of the meeting of the committee and filed in the office of the director of the department of water and sewerage services. The records of the committee shall be open to public inspection, and a certified copy of each decision shall be sent by mail or otherwise to the appellant.

D. The committee shall, in every case, render a decision without unreasonable or unnecessary delay.

(Ord. BL2007-1440 § 8, 2007; Ord. BL2001-642 § 1, 2001; prior code § 40-1-229(g))

15.64.110 Issuance of building and occupancy permits--Approval by director of the department of water and sewerage services.

A. Prior to the issuance of a use and occupancy permit for any structure within a development, unless exempted by Section 15.64.130, in which the drainage system is to be dedicated to the metropolitan government, the drainage system shall be inspected and accepted by director of the department of water and sewerage services personnel.

B. Prior to the issuance of a use and occupancy permit for any structure in a development, unless exempted by Section 15.64.130, where the drainage system is to remain private, a registered engineer shall submit to the director of the department of water and sewerage services a certificate that the drainage system is complete and functional in accordance with the plans approved by the director of the department of water and sewerage services.

C. No building permit, except for structures exempted in Section 15.64.130, shall be issued until grading, drainage and erosion control plans are approved by the director of the department of water and sewerage services.

D. Any nonpermitted drainage system or construction or fill located within a floodplain, shall upon written notice from the director of the department of water and sewerage services, be removed at the property owner's expense.

(Ord. BL2007-1440 § 9, 2007; prior code § 40-1-232)

15.64.120 Construction that may increase degree of flooding prohibited.

All construction, whether by private or public action, shall be performed in such a manner as to:

A. have no material increase in the degree of flooding in its vicinity or in other areas whether by flow restrictions, increased runoff or by diminishing retention capacity;
B. have no adverse impact for site design including, but not limited to, no rise in the 100-year base flood elevations on any project or development located in a documented floodplain as a result of development;
C. meet such other requirements as may be determined by the department of water and sewerage services.

The department of water and sewerage services shall promulgate regulations consistent with this section.

(Subst. Ord. BL2010-794 § 1, 2010; Prior code § 40-1-230(a))

15.64.130 Review of building permits-- Drainage control referrals--Exemptions.

The department of water and sewerage services shall have authority to review all building permit applications which shall be referred to it by the department of codes administration or by officials of the satellite cities within the general services district to determine whether there is a need for plans for drainage, grading and/or erosion control. In making permit referrals to the department of water and sewerage services, the department of codes administration shall exempt permits for the following:

A. Single-family to two-family individual residential dwellings in any given area that do not alter a drainage channel, do not alter the natural ground elevation or vegetation by an amount greater than specified in the technical guidelines to be issued by the metropolitan department of water and sewerage services, or do not meet the definition of regulated residential infill;
B. Commercial or industrial development that:
    1. Adds less than ten thousand square feet of impervious surface,
    2. Does not alter a drainage channel, and
    3. Does not alter the natural ground elevation by more than five feet.
C. The exemptions listed in subsections A and B shall not be construed as exempting these activities from on-site drainage improvements that may be required in accordance with adopted building and construction codes, nor from compliance with Sections 15.64.150 through 15.64.180 and Sections 15.64.200 and 15.64.210.

(Ord. BL2014-910 § 2, 2014; Ord. BL2007-1440 § 10, 2007; prior code § 40-1-230(b))

15.64.131 - Infill development—Applicability and requirements.

A. No project shall add impervious area without meeting the requirements of this section, unless otherwise specifically exempt from regulation pursuant to this section.
B. There shall be three tiers of infill development for projects that are subject to infill regulation by this section:
    1. Tier I - Projects creating between eight hundred and two thousand five hundred square feet of net additional IA and with the total lot IA exceeding 30.0% must treat, by means of capture of the first inch of rainfall runoff, an IA equal to the net increase of IA.

2. Tier II - Projects creating between two thousand five hundred and eight thousand square feet of net additional IA, without regard to total lot IA percent must treat, by means of capture of the first inch of rainfall runoff, an IA equal to the net increase of IA.
3. Tier III - Projects creating between eight thousand and fifteen thousand square feet of net added IA, without regard to total lot IA percent, must treat, by means of capture of the first inch of rainfall runoff an IA equal to the net increase of IA. Additionally, the project design must insure there is not an increase in the 10-year storm peak flow from the site, and be certified by a professional engineer.

C. Construction projects that meet the definition of regulated residential infill shall include provisions for the management of the first inch of rainfall runoff from an impervious area equal to the net added impervious area; and shall not be exempt from the provisions of Section 15.64.120 concerning prohibition of increase in the degree of flooding.

D. Prior to the net addition of at least eight hundred square feet of impervious area or issuance of a building permit, a sufficient development plan and supporting information required by the latest version of the regulated residential infill guidance document shall be submitted to and approved by the metropolitan department of water and sewerage services.

E. The net added impervious area shall be calculated by subtracting the IA present in the aerial photography data obtained by metro in March 2014 from the proposed post-development IA and maintaining the original property boundary as the regulated project boundary, regardless of subdivision, re-plat, horizontal property regime, or any other modification of property boundaries by deed or plat.

F. The owner/developer of a project meeting the definition of regulated residential infill shall endeavor to treat the first inch of rainfall runoff from net added impervious area using methods from the regulated residential infill guidance document. If this treatment proves impractical, analysis of the downstream management system to identify adequate drainage per the regulated residential infill guidance document or improving downstream drainage to mitigate a known flooding problem with assistance from a professional engineer may be considered for all or part of the one inch treatment requirement.

G. The metropolitan department of water and sewerage services shall have the authority to offer additional runoff volume reduction measures and incentives. Refer to the latest version of the regulated residential infill guidance document for details.

H. Notwithstanding other provisions of this section to the contrary, excluded from infill regulation are projects that:
   1. Add less than eight hundred square feet of net new IA,
   2. Add more than fifteen thousand square feet of net new IA,
   3. Are on lots larger than forty thousand square feet, or
   4. Are on lots with a grading permit previously filed with the metropolitan department of water and sewerage services, as long as the post-construction IA conforms to the original grading plan.

I. Projects on lots larger than forty thousand square feet may seek infill classification on a case-by-case basis.

(Ord. BL2014-910 § 3, 2014)

15.64.140 Property developments--Drainage and erosion control plans required when.

A. Persons responsible for property developments that are determined to have a significant hydrologic impact or materially increase the degree of flooding (refer to definitions) shall be required to submit detailed grading and drainage plans, with supporting calculations prepared by a registered engineer, to the public works department for review and approval prior to initiation of work. Where applicable, an erosion control plan prepared by a design professional or soil scientist shall be included in order to prevent sedimentation from reducing the flow carrying capacity of the downstream drainage system.

B. For purposes of this section, property developments that may have a significant hydrologic impact shall include the grading, excavation, clearance or other alteration of the landscape for other than agricultural purposes, whether or not a building application has been filed, and whether or not subdivision of the land or construction on the land is contemplated in the near future.

(Prior code § 40-1-230(c))

15.64.150 Application of Federal Water Pollution Control Act.

Approval by the metropolitan government does not relieve the developer of obtaining any permits required by Section 404 of the Federal Water Pollution Control Act.

(Prior code § 40-1-231(f))

15.64.160 Applicability of floodplain regulations.

A. Uses permitted within the floodplain shall be in accordance with Article V of Chapter 17.136 of this code. The regulations and controls set forth in this chapter shall be applied within the areas designated on the zoning map or on special overlays thereto which are made a part of this chapter, and may be viewed upon request at the office of the metropolitan clerk. However, nothing contained herein shall prohibit the application of the regulations in Article V of Chapter 17.136 to lands which can be demonstrated by competent engineering survey, using the adopted profiles from which the flood protection elevation is derived, to lie within any floodplain, and conversely, any lands which can be demonstrated by competent engineering to lie beyond the floodplain shall not be subject to the regulations in Article V of Chapter 17.36. Any lands within the areas designated as floodplains on the zoning map or special overlays thereto shall be subject to the regulations and controls pertaining to floodplains as set forth in this chapter.

B. Not later than August 1, 2011, the department shall develop a new volume of its Stormwater Management Manual to address best practices, incentives and implementation strategies for green/low impact stormwater infrastructure and infill development (the "LID Manual"). Such LID Manual shall be consistent with the requirements of this chapter and shall include, at a minimum, provisions addressing the following:
   1. Management of floodplain development including the use of wetlands, floodplain storage, and environmental features;
   2. The concept of "no adverse impact" for site design;
   3. Removing barriers to the utilization of LID in existing Metro Codes and Departmental Standard Operating Procedures;

4. "In-lieu of" programs that might increase overall LID utilization on development projects within Nashville and Davidson County; and
5. Minimum floor elevation requirements for residential and nonresidential development.

(Subst. Ord. BL2010-794 § 2, 2010; Prior code § 40-1-231(a))

Note—Section 3 of Subst. Ord. BL2010-794 states the department shall establish a stakeholder committee to assist in development of the LID Manual. The stakeholder committee shall include, but not be limited to, professional engineers, environmental structural design professionals, department employees, a representative of the mayor, and three members of the Metropolitan Council appointed by the Metropolitan Vice Mayor. All meetings of such committee shall be open to the public and advertised in accordance with the Tennessee Open Meetings laws. The department shall provide monthly progress reports to the Metropolitan Council until the LID Manual is complete.

15.64.170 Development within floodways--Restrictions.

A. No new structure shall be constructed within the floodway. Notwithstanding the foregoing, a structure located in the floodway as of the effective date of this ordinance may be maintained and may be repaired in the event of a casualty loss not exceeding fifty percent of appraised value of improvements on the property, provided that no such existing structure located in the floodway shall be enlarged or expanded beyond its existing height or building footprint.
B. Notwithstanding the provisions of subsection A. to the contrary, the stormwater division may allow the construction of the following types of structures within the floodway, provided the structure is designed and engineered, in such a manner so as to have no adverse impact:
   a) Grade-level surface parking areas, paths and hiking trails.
   b) Temporary structures, defined in Section 15.64.010 as "structure, temporary", that are one hundred square feet in size or less and are not used as a dwelling unit for humans.
   c) Water-related features such as bridges, wharfs, docks, and boat ramps.
   d) Public infrastructure installed by or for the benefit of the metropolitan government.
   e) Rebuilding of an existing residential structure in the floodway that has sustained cumulative casualty loss in excess of fifty percent, provided the rebuilt structure is within the same building footprint as the damaged or destroyed structure and is elevated in accordance with the requirements of the Metro Stormwater Manual.
   f) Athletic fields used for recreational purposes, including facilities associated with the recreational athletic fields such as dugouts, bleachers, concession stands, storage buildings, and other similar structures or facilities.
   g) Modification or enlargement of an existing building or other structure located partially or entirely within the floodway of the Cumberland River, so long as such building or structure was in active commercial or industrial use as of July 1, 2012. No such modification or enlargement shall be permitted within the floodway of any Cumberland River tributary or undertaken without the approval of the stormwater management committee.

(Ord. BL2012-257 § 1, 2012; Amdt. 1 to Ord. BL2011-3 § 2, 2011; Ord. BL2011-3 §§ 1, 2, 2011; Ord. BL2011-940 § 1, 2011; Subst. Ord. BL2010-794 § 4, 2010; prior code § 40-1-231(d))

15.64.180 Alterations of floodplains and drainage channels--Requirements.

No alterations of floodplain land and drainage channels may be made without the written approval of the director of the department of water and sewerage services. All applicable requirements of this title and, in addition, the following conditions must be met before such approval may be granted:

A. The construction of a levee, earth fill, building or other structure which alters the floodplain area shall only be permitted based on a plan prepared by a registered and licensed professional engineer of Tennessee, showing existing and proposed elevations, existing and proposed drainage channels, and existing and proposed structures, and the plan shall be approved by the director of the department of water and sewerage services of the metropolitan government certifying that the alteration and construction as proposed would not materially increase the degree of flooding in other areas, and that any structures proposed to be constructed in the floodplain shall meet the following special conditions:
   1. The minimum floor elevation of that portion of any structure intended for human occupancy shall be either equal to or higher than three feet above the flood protection elevation. Those portions of such structures not intended for human occupancy shall be either equal to or higher than the flood protection elevation. All other related facilities thereto such as electrical equipment, water service and sanitary sewer connections shall be either equal to or higher than the flood protection elevation, or shall be floodproofed to the flood protection elevation.
   2. The minimum floor elevation of any structure not intended for human occupancy, as defined, shall be either equal to or higher than the flood protection elevation. Floodproofing of these structures will only be authorized by the director of the department of water and sewerage services as specific individual exceptions to minimum floor elevation requirements where it can be shown that the proposed floodproofing is acceptable from an engineering standpoint.

B. The proposed excavation, filling or change of alignment of any existing channel under the jurisdiction of the U.S. Corps of Engineers shall be approved by the corps of engineers.

C. The plan is approved by the metropolitan planning commission taking into account the above conditions as well as any other pertinent factors. Any duly approved alteration of the floodplain will be so noted on the official zoning map as a matter of information. This notation will be made upon certification by the director of the department of water and sewerage services to the planning commission that such alteration has been completed in accordance with the approved plan.

(Ord. BL2007-1440 § 11, 2007; prior code § 40-1-231(b))

15.64.190 Responsibility for off-site drainage improvements.

The construction and financing of any required off-site drainage improvement necessitated by private development within the watershed shall be the responsibility of the developer. (Prior code § 40-1-234)

15.64.195 Stormwater master planning district.

A. There is hereby created a stormwater master planning district within the geographical limits of the Metropolitan Government of Nashville and Davidson County and co-terminus with the

area currently served by the combined sanitary sewer system, as described by lines, words and figures on the maps on file with the department of water and sewerage services, which are incorporated herein by reference.

B. In cooperation with the metropolitan planning department, the metropolitan development and housing agency, and the department of public works, the metropolitan department of water and sewerage services ("MWS") shall be responsible for developing a plan for the installation of green infrastructure within the stormwater master planning district. At the discretion of the director of metro water services, the stormwater master planning district may be subdivided into appropriate study areas.

C. Such plan for a stormwater master planning district should include general location and type of installation and its estimated impact on the CSS.

D. The initial plan shall be submitted to the metropolitan council not later than November 1, 2009, and shall be updated annually as part of the report by the director of MWS pursuant to section 15.64.034 of this chapter.

E. Funding.
   1. The director of MWS shall submit to the mayor and the director of finance a list of green infrastructure projects within the stormwater master planning district(s) for suggested inclusion as part of the capital improvements budget not later than four months prior to the end of the fiscal year, as provided in Section 6.13 of the Metropolitan Charter.
   2. Not less than thirty days after the adoption of the capital improvements budget each year, the director of MWS shall further submit to the mayor and the director of finance a prioritized list of green infrastructure projects within the stormwater master planning district(s) for recommended inclusion as part of the next capital spending plan. Such recommendation shall include estimated construction and maintenance costs as well as anticipated benefit to water quality and water treatment.

F. The department of water and sewerage services, working in conjunction with the department of public works, shall be responsible for the maintenance of any publicly funded green infrastructure projects within the stormwater master planning district(s). Such maintenance shall be done in accordance with specifications and standards established by MWS.

G. Notwithstanding the geographical limitations imposed by the stormwater master planning district, the department of water and sewerage services shall have the authority to promulgate and enforce rules and regulations for the implementation of green infrastructure techniques to address stormwater issues associated with private development.

H. Subsequent to the enactment of this section, additional areas within the Metropolitan Government of Nashville and Davidson County may be designated as stormwater master planning districts by a resolution of the metropolitan council receiving twenty-one affirmative votes.

(Ord. BL2009-461 § 1, 2009; Ord. BL2008-345 § 2, 2009)

15.64.200 Floodproofing measures.

Floodproofing measures such as the following shall be designed consistent with the flood protection elevation for the particular area, and flood velocities, forces and other factors associated with the flood protection elevation. The director of the department of water and sewerage services shall require that the applicant submit a plan or document certified by a

registered professional engineer or architect that the floodproofing measures are consistent with the flood protection elevation for the particular area:

A. Anchorage to resist flotation and lateral movement;
B. Installation of watertight doors, bulkheads and shutters;
C. Reinforcement of walls to resist water pressures;
D. Use of paints, membranes or mortars to reduce seepage of water through walls;
E. Addition of mass or weight to structures to resist flotation;
F. Installation of pumps to lower water levels in structures;
G. Construction of water supply and waste treatment systems to prevent the entrance of floodwaters;
H. Pumping facilities for subsurface drainage systems for buildings to relieve external foundation wall and basement floor pressures;
I. Construction to resist rupture or collapse, caused by water pressure or flotation debris.

(Ord. BL2007-1440 § 12, 2007; prior code § 40-1-231(c))

15.64.205 Non-stormwater discharges.

A. Definitions.

"Community waters" means any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wetland, wells and other bodies of surface or subsurface water, natural or artificial, lying within or forming a part of the boundaries of the metropolitan government of Nashville and Davidson County.

"Contaminant" means any physical, chemical, biological or radiological substance or matter.

"Director" means the Director of the Metropolitan Government of Nashville and Davidson County's Department of Water and Sewerage Services, or his designee.

"Discharge" means any substance disposed, deposited, spilled, poured, injected, seeped, dumped, leaked, or placed by any means, intentionally or unintentionally, into community waters, the waters of the state, or any area draining directly or indirectly into the municipal stormwater system of the metropolitan government.

"Metropolitan government" means the metropolitan government of Nashville and Davidson County.

"Municipal separate storm sewer system of the metropolitan government" means a conveyance, or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, and storm drains) designed or used for collecting or conveying stormwater; provided, however, that sanitary and combined sewers are not included in the definition of the municipal separate storm sewer system.

"Non-stormwater discharge" means any discharge to the municipal separate storm sewer system except as permitted by subsection C of this section.

"Waters of the state" means any water, surface or underground, lying within or forming a part of the boundaries of the metropolitan government of Nashville and Davidson County, over which the Tennessee Department of Environment and Conservation exercises primary control with respect to stormwater permits.

B. Except as hereinafter provided, all non-stormwater discharges into community waters, into the waters of the state, or into the municipal separate storm sewer system of the metropolitan government are prohibited and are declared to be unlawful.

C. Unless the director has identified them as a source of contaminants to community waters, the waters of the state, or the municipal separate storm sewer system of the metropolitan government, the following discharges are permitted:
   1. Stormwater as defined in TCA Section 68-221-1102(5);
   2. Water line flushing;
   3. Landscape irrigation;
   4. Diverted stream flows;
   5. Rising groundwaters;
   6. Uncontaminated groundwater infiltration (as defined at 40 CFR 35.2005(20)) to separate storm sewers;
   7. Uncontaminated pumped groundwater;
   8. Discharges from potable water sources;
   9. Foundation drains;
   10. Air conditioning condensate;
   11. Irrigation water;
   12. Springs;
   13. Water from crawl space pumps;
   14. Footing drains;
   15. Lawn watering;
   16. Individual residential car washing;
   17. Flows from riparian habitats and wetlands;
   18. Dechlorinated swimming pool discharges;
   19. Street wash waters resulting from normal street cleaning operations;
   20. Discharges or flows from emergency fire fighting activities.

D. The director, with the approval of the mayor, shall have authority to implement this section by appropriate regulations. Such regulations may include but are not limited to provisions for inspection of points of origin of known or suspected non-permitted discharges by appropriate personnel of the metropolitan government.

E. Discharges pursuant to a valid and effective NPDES permit issued by the state of Tennessee are not prohibited by this section.

F. The provisions of this section, including subsection C of this section, shall not apply to sanitary or combined sewers, which are governed by Chapter 15.40 of the Metropolitan Code of Laws.

G. Violation of this section shall subject the violator to a civil penalty of not less than fifty dollars nor more than five thousand dollars per day for each day of violation. Each day of

violation may constitute a separate violation. (Ord. BL2007-1440 § 13, 2007; Ord. BL2001-642 § 2, 2001; Ord. 97-1016 §§ 1—7, 1998)

15.64.210 Liability limitation.
The degree of flood protection intended to be provided by this chapter is considered reasonable for regulatory purposes, and is based on engineering and scientific methods of study. Larger floods may occur on occasions, or the flood height may be increased by manmade or natural causes, such as bridge openings restricted by debris. This chapter does not imply that areas outside floodplain zoning district boundaries or land uses permitted within such district will always be totally free from flooding or flood damages. Nor shall this chapter create a liability on the part of, or a cause of action against the metropolitan government or any officer or employee thereof for any flood damages that may result from implementation of this chapter.
(Prior code § 40-1-231(e))

15.64.215 Stormwater plan and permit review charge.
Notwithstanding any other provision of the Metropolitan Code of Laws, the department shall develop a schedule of charges for services provided in reviewing permit applications, variance requests or reviewing plans submitted by private entities for proposed projects that must comply with the metropolitan government's stormwater management regulations. The schedule of charges shall reflect the department's actual costs incurred in providing such services. A copy of the schedule of charges shall be filed with the metropolitan clerk, furnished to each member of the metropolitan council and made available on request to any citizen of Davidson County. The department shall bill and collect in accordance with the schedule of charges, which may be amended from time to time to reflect changes in the department's actual costs of providing the services contemplated herein.
(Ord. BL2007-1457 § 15, 2007)

15.64.220 Violations--Penalties.
A. Any violation of this chapter shall be punishable by a civil penalty in an amount not to exceed five hundred dollars; provided, however, that any violation of Section 15.64.205 shall be punishable by a civil penalty of not less than fifty dollars nor more than five thousand dollars. For purposes of assessing civil penalties under this chapter, each day of violation shall constitute a separate violation.
B. In assessing a civil penalty, the following factors may be considered:
   1. The harm done to the public health or the environment;
   2. Whether the civil penalty imposed will be substantial economic deterrent to the illegal activity;
   3. The economic benefit gained by the violator;
   4. The amount of effort put forth by the violator to remedy this violation;
   5. Any unusual or extraordinary enforcement costs incurred by the municipality;
   6. The amount of penalty established by ordinance or resolution for specific categories of violations; and
   7. Any equities of the situation which outweigh the benefit of imposing any penalty or damage assessment.

C. The department may also assess damages proximately caused by the violator to the municipality which may include any reasonable expenses incurred in investigating and/or enforcing violations of this part, or any other actual damages caused by the violation.
D. In addition to all other remedies provided by law, the metropolitan government shall have the right to injunctive relief for any violation of this chapter.

(Ord. BL2010-639 § 1, 2010; Ord. BL2001-642 § 3, 2001; Ord. 95-1329 § 11, 1995)

15.64.230 Notification to property owners upon amendments to flood maps.

Within thirty days after the publication of new flood maps for Davidson County prepared by the federal government are received by metro, the metropolitan planning department will attempt to provide written notice to every property owner, to the address on record at the property assessor's office at the time of the mailing, whose property is included within the 100-year floodplain or floodway for the first time. These mailings are intended to be informational only, sent for the convenience of the owners, and the metropolitan government will not be liable for failing to notify a property owner or if the information in the notice is incorrect or incomplete.

(Amdt. 1 to Ord. BL2011-803 § 1, 2011; Ord. BL2011-803 § 1, 2011)

STORMWATER MANAGEMENT ORDINANCE NO. 78-840

Amendment No. 1 to Substitute Ordinance No. 78-840

Mr. President:

I move to amend Substitute Ordinance No. 78-840 by adding to the first sentence of Section 5, subsection b., after the word "administration" the following:

"or by officials of the satellite cities
within the General Services Districts."

Introduced by:

Robert L. Reasoner_____
Member of Council

(original signed by said
Member of Council)

ADOPTED:

August 15, 1978

An Ordinance for Stormwater Management

WHEREAS, an ordinance is needed to control storm drainage facilities, grading, excavation, clearance, and other alteration of the land in order to limit the dangers of personal injury or property damage that may be caused by stormwater runoff; and

WHEREAS, an ordinance is needed in order to secure eligibility for flood insurance under Public Law 1016, 84th Congress, and thereby to promote the public health, safety, and general welfare of the citizens of Nashville and Davidson County, Tennessee;

BE IT ENACTED BY THE COUNCIL OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY:

Section 1. Definitions.

Channel - A natural or artificial watercourse of perceptible extent, with definite bed and banks to confine and conduct continuously or periodically flowing water. Channel flow thus is that water which is flowing within the limits of the defined channel.
Drainage Basin - A part of the surface of the earth that is occupied by and provides surface water runoff into a drainage system which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

Erosion - The disintegration or wearing away of soil by the action of water.

Flood - Water from a river, stream, watercourse, lake or other body of standing water that temporarily overflows and inundates adjacent lands and which may affect other lands and activities through increased surface water levels, and/or increased groundwater level.

Flood Plain - The relatively flat or lowland area adjoining a river, stream, watercourse, lake, or other body of standing water which has been or may be covered temporarily by flood water. For administrative purposes, the flood plain is defined as the area that would be inundated by high water at the flood profile from which the flood protection elevation is established.

Floodproofing - A combination of structural provisions, changes, or adjustments to properties and structures subject to flooding primarily for the reduction or elimination of flood damages to properties, water and sanitary facilities, structures, and contents of buildings in a flood hazard area.

Flood Protection Elevation - The elevation which is one foot above the 100-year flood high water profiles as developed by the Corps of Engineers for the Federal Flood Insurance Study for Davidson County. Until this study is completed and adopted, in areas where such 100-year flood high water profiles are not developed the flood protection elevation is the March 1975 flood for

the Cumberland River and the Stones River, and two (2) feet above the 50-year developed flood for the tributary streams mapped by the U.S. Geological Survey prior to January 1, 1976.

Floodway - That portion of the stream channel and adjacent flood plain required for the passage or conveyance of a 100-year flood discharge. The floodway boundaries are placed to limit encroachment in the flood plain so that a 100-year flood discharge can be conveyed through the flood plain without materially increasing (less than one foot) the water surface elevation at any point and without producing hazardous velocities or conditions. This is the area of significant depths and velocities and due consideration should be given to effects of fill, loss of cross sectional flow area, and resulting increased water surface elevations.

Floodway Fringe - That portion of the flood plain lying outside the floodway. This is the area of the flood plain that may be developed or encroached upon as long as the water surface elevation of the 100-year flood is not increased by more than one foot at any point.

Human Occupancy - Any portion of any enclosed structure wherein humans principally live or sleep such as mobile homes, permanent residential activities, semitransient residential activities, health care community facilities, nursing home community facilities, orphanages, family care facilities, group care facilities or transient habitation.

Impervious Surface - A term applied to any ground or structural surface which water cannot penetrate or through which water penetrates with great difficulty.

Major Drainage System - That storm drainage system which carries the runoff from a 100-year frequency storm. Although damage may occur, runoff will be carried by the major system whether or not it has been planned and designed, and whether or not improvements are situated wisely in respect to it.

The major system usually includes many features such as streets, gulches, and major drainage channels. Storm sewer systems may reduce the flow in many parts of the major system by storing and transporting water underground. Good planning and designing of a major system should eliminate major damage and loss of life from storms having a one percent chance of occurring in any given year.

Materially Increase the Degree of Flooding - Shall be defined by the following criteria:

a. The proposed development raises the 100-year flood elevation more than one (1) foot; or when considered in conjunction with other potential developments within the watershed, would contribute disproportionately to increased flooding which when combined with other potential development would cumulatively increase the 100-year flood elevation more than one (1) foot.
b. The proposed development does materially increase the property damage caused by the 100-year flood.

c. The proposed development conflicts with the master plan adopted by the stormwater management committee for reducing flood damage.

Minor Drainage System - That storm drainage system which is frequently used for collecting, transporting, and disposing of snowmelt, miscellaneous minor flows, and storm runoff up to the capacity of the system. The capacity should be equal to the maximum rate of runoff to be expected from the initial design storm which has statistical frequency of occurrence of once in ten years, or as specified by the stormwater management committee.

The minor system is sometimes termed the "convenience system," "initial system," or the "storm sewer system."

The minor system may include many features ranging from curbs and gutters to storm sewer pipes and open drainageways.

One Hundred-Year Flood - Is one that has an average frequency of occurrence of once in one hundred (100) years determined from an analysis of floods on a particular watercourse and other watercourses in the same general region. Statistically, it has a one percent chance of occurring in any given year.

Structure - Anything constructed or erected, the use of which requires a more or less permanent location on or in the ground. Such construction includes but is not limited to objects such as buildings, towers, smokestacks, overhead transmission lines, carports and walls.

Structure, Permanent - A structure which is built of such materials and in such a way that it would commonly be expected to last and remain useful for a substantial period of time.

Structure, Temporary - A structure which is built of such materials and in such a way that it would commonly be expected to have a relatively short useful life, or is built for a purpose that would commonly be expected to be relatively short-term.

Watercourse - A channel, natural depression, slough, gulch, stream, creek, pond, reservoir, or lake in which storm runoff and floodwater flows either regularly or infrequently. This includes major drainageways for carrying urban storm runoff.

Section 2. Authority of Director of Public Works.

a. The director of public works with the approval of the mayor shall establish written regulations and technical guidelines as may be necessary to enforce the terms of this ordinance. These regulations shall be filed in the metropolitan clerk's office.

b. The director of public works shall have the authority to prepare, or have prepared, master plans for drainage basins and such details as may be needed to carry out said master plans.

c. The director of public works shall have the authority to inspect private drainage systems within Davidson County, and to order such corrective actions to said private drainage systems as are necessary to maintain properly the major and minor drainage systems within Davidson County.

Section 3. Authority of the Director of Codes Administration.

The director of codes administration, with the approval of the mayor, shall have the authority to establish such written regulations and technical guidelines as may be necessary to enforce the terms of this ordinance. These regulations shall be filed in the metropolitan clerk's office.

Section 4. Metropolitan Stormwater Management Committee.

a. Created: number, qualifications, appointment and terms of office of members.

There is hereby created a metropolitan stormwater management committee which shall consist of five (5) members and two alternate members.

The membership of the committee shall be as follows:

(1) The chairman of the public works committee of the metropolitan council,

(2) Three members and one alternate who shall be registered civil engineers, and

(3) One lay member and one lay alternate from the community at large.

The latter four members and two alternates shall be appointed by the mayor and confirmed by a majority vote of the whole metropolitan council.

The members and alternate members appointed by the mayor shall have been residents of the Metropolitan Government area for not less than one year and who shall continue to be so eligible as long as they shall serve. Appointed members and alternate members of the committee shall serve a term of four (4) years. The terms of office of the first appointed members shall be staggered, two for a term of two years, two for a term of three years, and two for a term of four years.

b. Organization.

Within ten days after its appointment, the stormwater management committee shall organize itself by election of one of its members as chairman and another as vice chairman. The director of public works shall appoint the secretary to the committee who shall be the custodian of the minutes and records of the proceedings of the committee. The director of law shall appoint a legal adviser to the committee.

c. Compensation.

All appointed members of the committee shall serve without compensation and may be removed from membership on the committee by the mayor for continued absence from meetings of the committee, physical disability or other just cause.

d. Replacement of Members.

Replacement of any appointed member of the committee resigning or dismissed from the committee shall be appointed by the mayor and confirmed by the metropolitan council in the same manner as prescribed for regular appointees. Any member appointed as a replacement shall serve only for the remainder of the term of the member replaced, unless subsequently re-appointed for an additional term.

e. Duties and Procedures.

The stormwater management committee shall adopt such rules and regulations as it may deem necessary to conduct its business. The committee, in open meeting, shall hear all appeals, under the provisions of this section. The committee shall meet at regular monthly intervals with the day and time to be determined by the chairman. In the event no appeals have been filed and there is no business pending, the chairman may cancel the meeting ten days before its scheduled date. The committee shall approve master plans for drainage basins and technical guidelines before they become binding under the terms of this ordinance.

f. Quorum, Voting and Conflict of Interest.

Three members of the stormwater management committee shall constitute a quorum. A majority vote of members present shall be required for actions by the committee. No member of the committee shall act in any case in which he has a personal interest. The alternate member shall replace any member who has a conflict of interest or is unable to attend due to illness or extended absence from the Metropolitan Nashville area.

g. Appeals to Committee.

(1) Whenever the director of public works or the director of codes administration shall reject or refuse to approve a plan for noncompliance with this ordinance, the owner or his authorized agent may appeal from the decision of the director to the

stormwater management committee. An appeal must be filed within thirty (30) days after said decision by the director of public works or the director of codes administration. The fee for filing an appeal shall be $50.00.

(2) A decision of the stormwater management committee varying the application of any provision of this section or modifying an order of the director of public works shall be by resolution of the committee, which shall specify in what manner such variations or modifications shall be made, the conditions upon which they are to be made and the reasons therefor.

(3) Every decision of the committee shall be final, subject however, to such remedy as any aggrieved party or the Metropolitan Government may have at law or in equity. All decisions of the committee shall be in writing and shall indicate the vote of each member of the committee upon the decision. Every decision shall be promptly entered into the minutes of the meeting of the committee and filed in the office of the director of public works. The records of the committee shall be open to public inspection and a certified copy of each decision shall be sent by mail or otherwise to the appellant.

(4) The committee shall, in every case, render a decision without unreasonable or unnecessary delay.

Section 5. Review of Building Permit Applications and Development Plans.

a. Limitation of Flooding.

No construction, whether by private or public action, shall be performed in such a manner as to materially increase the degree of flooding in its vicinity or in other areas whether by flow restrictions, increased runoff or by diminishing retention capacity.

b. Building Permit Applications.

The department of public works shall have authority to review all building permit applications which shall be referred to it by the department of codes administration to determine whether there is a need for plans for drainage, grading and/or erosion control. In making permit referrals to the public works department, the department of codes administration shall exempt permits for the following:

(1) Single to two family individual residential dwellings in any given area that do not alter a drainage channel, and do not alter the natural ground elevation or vegetation by an amount greater than specified in the technical guidelines to be issued by the department of public works.

(2) Commercial or industrial development that:

(a) Adds less than 10,000 square feet of impervious surface,
(b) Does not alter a drainage channel, and
(c) Does not alter the natural ground elevation by more than five (5) feet.

(3) The exemptions listed in Sections 5b(1) and 5b(2) shall not be construed as exempting these activities from onsite drainage improvements that may be required in accordance with adopted building and construction codes, nor from compliance with Section 6 of this ordinance.

c. Property Developments.

Persons responsible for property developments that are determined to have a significant hydrologic impact or materially increase the degree of flooding (refer to definitions) shall be required to submit detailed grading and drainage plans, with supporting calculations prepared by a registered engineer, to the public works department for review and approval prior to initiation of work. Where applicable, an erosion control plan prepared by a design professional or soil scientist shall be included in order to prevent sedimentation from reducing the flow carrying capacity of the downstream drainage system. For purposes of this section, property developments that may have a significant hydrologic impact shall include the grading, excavation, clearance or other alteration of the landscape for other than agricultural purposes whether or not a building application has been filed, and whether or not subdivision of the land or construction on the land is contemplated in the near future.

Section 6. Flood Plain Requirements

a. Flood Plain Regulations.

Uses permitted within the flood plain shall be in accordance with Article 7 of the Metropolitan Zoning Ordinance. The regulations and controls set forth in this Article shall be applied within the areas designated on the zoning map or on special overlays thereto which are made a part of this ordinance and may be viewed upon request at the office of the metropolitan clerk. However, nothing contained herein shall prohibit the application of the Article 7 regulations to lands which can be demonstrated by competent engineering survey, using the adopted profiles from which the flood protection elevation is derived, to lie within any flood plain, and conversely, any lands which can be demonstrated by competent engineering to lie beyond the flood plain shall not be subject to the Article 7 regulations. Any lands within the areas designated as flood plains on the zoning map or special overlays thereto shall be subject to the regulations and controls pertaining to flood plains as set forth in this ordinance.

b. Alterations of Flood Plain Land and Drainage Channels.

No alterations of flood plain land and drainage channels may be made without the written approval of the director of public works. All applicable requirements of this ordinance and, in addition, the following conditions must be met before such approval may be granted:

(1) The construction of a levee, earth fill, building or other structure which alters a flood plain area shall only be permitted based on a plan prepared by a registered and licensed professional engineer of Tennessee, showing existing and proposed elevations, existing and proposed drainage channels, and existing and proposed structures, and the plan shall be approved by the director of public works of the Metropolitan Government certifying that the alteration and construction as proposed would not materially increase the degree of flooding in other areas, and that any structures proposed to be constructed in the flood plain shall meet the following special conditions:

(a) The minimum floor elevation of that portion of any structure intended for human occupancy shall be either equal to or higher than three (3) feet above the flood protection elevation. Those portions of such structures not intended for human occupancy shall be either equal to or higher than the flood protection elevation. All other related facilities thereto such as electrical equipment, water service and sanitary sewer connections shall be either equal to or higher than the flood protection elevation or shall be flood proofed to the flood protection elevation.

(b) The minimum floor elevation of any structure not intended for human occupancy, as defined, shall be either equal to or higher than the flood protection elevation. Flood proofing of these structures will only be authorized by the director of public works as specific individual exceptions to minimum floor elevation requirements where it can be shown that the proposed flood proofing is acceptable from an engineering standpoint.

(2) The proposed excavation, filling or change of alignment of any existing channel under the jurisdiction of the U.S. Corps of Engineers shall be approved by the Corps of Engineers.

(3) The plan is approved by the metropolitan planning commission taking into account the above conditions as well as any other pertinent factors. Any duly approved alteration of the flood plain will be so noted on the official zoning map as a matter of information. This notation will be made upon certification by the director of public works to the planning commission that such alteration has been completed in accordance with the approved plan.

c. Floodproofing Measures.

Floodproofing measures such as the following shall be designed consistent with the flood protection elevation for the particular area, and flood velocities, forces and other factors associated with the flood protection elevation. The director of public works shall require that the applicant submit a plan or document certified by a registered professional engineer or architect that the floodproofing measures are consistent with the flood protection elevation for the particular area.

1) Anchorage to resist flotation and lateral movement.

2) Installation of watertight doors, bulkheads and shutters.

3) Reinforcement of walls to resist water pressures.

4) Use of paints, membranes or mortars to reduce seepage of water through walls.

5) Addition of mass or weight to structures to resist flotation.

6) Installation of pumps to lower water levels in structures.

7) Construction of water supply and waste treatment systems to prevent the entrance of floodwaters.

8) Pumping facilities for subsurface drainage systems for buildings to relieve external foundation wall and basement floor pressures.

9) Construction to resist rupture or collapse, caused by water pressure or flotation debris.

10) Cutoff valves on sewer lines or the elimination of gravity flow basement drains.

d. Development within floodways.

No development will be allowed within floodways that would impair their capability to carry and discharge a 100-year flood except where it can be shown by a registered professional engineer that the effect on flood heights is fully offset by stream improvements.

e. Degree of Flood Protection.

The degree of flood protection intended to be provided by this ordinance is considered reasonable for regulatory purposes, and is based on engineering and scientific methods of study. Larger floods may occur on occasions, or the flood height may be increased by man-made or natural causes, such as bridge openings restricted by debris. This ordinance does not imply that areas outside flood plain zoning district boundaries or land uses

permitted within such district will always be totally free from flooding or flood damages. Nor shall this ordinance create a liability on the part of, or a cause of action against the Metropolitan Government or any officer or employee thereof for any flood damages that may result from implementation of this ordinance.

f. Application of Federal Water Pollution Control Act.

Approval by the Metropolitan Government does not relieve the developer of obtaining any permits required by Section 404 of the Federal Water Pollution Control Act.

Section 7. Permit Issuances and Controls within Drainage Systems.

a. Prior to the issuance of a use and occupancy permit for any structure within a development, unless exempted by Section 5b, in which the drainage system is to be dedicated to the Metropolitan Government of Nashville and Davidson County, the drainage system shall be inspected and accepted by department of public works personnel.

b. Prior to the issuance of a use and occupancy permit for any structure in a development, unless exempted by Section 5b, where the drainage system is to remain private, a registered engineer shall submit to the director of public works a certificate that the drainage system is complete and functional in accordance with the plans approved by the department of public works.

c. No building permit, except for structures exempted in Section 5b, shall be issued until grading, drainage and erosion control plans are approved by the department of public works.

d. Any nonpermitted drainage system or construction or fill located within a flood plain shall, upon written notice from the director of public works, be removed at the property owner's expense.

Section 8. Penalties and Injunctions.

a. Any violations of this ordinance shall be punishable by a fine of not more than fifty ($50.00) dollars for each and every violation. Every day that said violation continues shall be a separate offense.

b. Injunctions. In addition to all other remedies provided by law, the Metropolitan Government of Nashville and Davidson County shall have the right to injunctive relief for any violation of this ordinance.

Section 9. Responsibility for Offsite Drainage Improvements.

The construction and financing of any required offsite drainage improvement necessitated by private development within the watershed shall be the responsibility of the developer.

Section 10. Validity of Ordinance.

a. If any section, subsection, sentence, clause, phrase or portion of this ordinance is for any reason held invalid or unconstitutional by any court of competent jurisdiction, such portion shall be deemed a separate, distinct and independent provision, and such holding shall not affect the validity of the remaining portions of this ordinance. The purpose of the metropolitan council is that this ordinance shall stand, notwithstanding the invalidity of any section, subsection, clause, phrase or portion hereof.

b. If any provisions of this ordinance and any other provisions of law impose overlapping or contradictory regulations, or contain any restrictions covering any of the same subject matter, that provision which is more restrictive or imposes higher standards or requirements shall govern.

Section 11.

This ordinance shall take effect on January 1, 1979, the welfare of the Metropolitan Government of Nashville and Davidson County requiring it.

The original document is signed by the following:

Introduced by:

Robert L. Reasoner
Member of Council

RECOMMENDED BY:

W.D. Lamb
Director of Public Works

Elmer Young
Director of Codes Administration

APPROVED AS TO FORM AND LEGALITY:

J.R. Slobey
Metropolitan Attorney

APPROVED FOR SUBMISSION TO COUNCIL:

Richard Fulton
Metropolitan Mayor

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APPENDIX E

- **FLOODPLAIN OVERLAY DISTRICT ORDINANCE NO. 78-843**
- **METROPOLITAN CODE OF LAWS §17.36.170 *et. seq.***

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Appendix E
FLOODPLAIN OVERLAY DISTRICT
ORDINANCE NO. 78-843

Second Substitute Bill No. _78-843_

By Amending the Codification of the Code of the Metropolitan Government of Nashville and Davidson County, Chapter 43, "Zoning Regulations", by Amending the Text of the Zoning Regulations as it Relates to the Floodplain Overlay District, all of Which is More Particularly Described Herein.

NOW, THEREFORE, BE IT ENACTED BY THE COUNCIL OF THE METROPOLITAN GOVERNMENT OF NASHVILLE AND DAVIDSON COUNTY:

Section 1

That the codification of the Code of the Metropolitan Government of Nashville and Davidson County, particularly Chapter 43, "Zoning Regulations", be and the same is hereby amended by amending the text of the zoning regulations as it relates to the Floodplain Overlay District, as follows:

1. By deleting from Section 12.10 the following terms and their definitions:

   Flood base elevation
   Floodplain
   Flood table

   And by substituting in lieu thereof the following:

   Flood: Water from a river, stream, watercourse, lake, or other body of standing water that temporarily overflows inundating adjacent lands and which may affect other lands and activities through stage elevation, backwater, and/or increase groundwater level.

   Floodplain: The relatively flat or lowland area adjoining a river, stream, watercourse, lake, or other body of standing water which may be covered temporarily by floodwater. For administrative purposes, the floodplain is defined as the area that would be inundated by high water at the flood profile from which flood protection elevation is established.

   Flood Protection Elevation: The elevation which is one foot above the 100-year flood high water profile as developed by the Corps of Engineers for the Federal Flood Insurance Study for Davidson County. Until this study is completed and adopted, in

areas where such 100-year flood high water profiles are not developed, the flood protection elevation is the March 1975 flood for the Cumberland River and the Stones River, and two (2) feet above the 50-year developed flood for the tributary streams mapped by the U. S. Geological Survey prior to January 1, 1976.

Human Occupancy: Any portion of any enclosed structure wherein humans principally live or sleep such as mobile homes, permanent residential activities, semitransient residential activities, health care community facilities, nursing home community facilities, orphanages, family care facilities, group care facilities, or transient habitation.

2. By deleting Article VII, Chapter 1, in its entirety and by substituting in lieu thereof the following:

Article VII
Floodplain District
Chapter I Floodplain Use

71.00 General provisions.

The development of land subject to flooding shall be regulated by special controls set forth in this article which are established in order to prevent the creation of obstruction in floodplains along any natural watercourse, and thus protect the lives and property of persons living in such vicinity and any use of land subject to severe damage by flooding, thereby promoting public health, safety, and general welfare, and securing to the citizens of Nashville and Davidson County the eligibility for flood insurance under Public Law 1016, 84th Congress, or subsequent laws or regulations promulgated.

71.10 Permitted uses.

Only the following activities are permitted, in the districts indicated, within that portion of any zone district indicated which lies within a floodplain, notwithstanding the previous sections of permitted uses; however, the regulations not altered by this article for any zone district shall continue in full force and effect. All structures included with the following activities shall be allowed only under the applicable provisions of Section 103.60 through 103.62 of this ordinance.

Agricultural and Extractive Activities

Crop and animal raising[1]	AR2a, R2a, R40, R20, R15, R10, R8, RM8, R6, RM6, MRO, MO, OP, CH, CSL, CS, CG, CF, IR, IG
Plant nursery	AR2a, MRO, MO, OP, CH, CSL, CS, CG, CF, IR, IG

71.20 Conditional uses.

Those activities located in a portion of any zone district which lies within a floodplain and is otherwise allowed as a permitted or conditional use within the district in which it is located and is not included in Section 71.10 of this ordinance may be authorized as a conditional use in accordance with the applicable provisions of Article X, Chapter 3, Sections 103.60 through 103.62.

71.30 Official floodplain map.

The regulations and controls set forth in this article shall be applied within the areas designated as floodplain on the zoning map or on special overlays thereto which are made a part of this ordinance and may be viewed upon request at the office of the metropolitan clerk; however, nothing contained herein shall prohibit the application of these regulations to lands which can be demonstrated by competent engineering survey to lie within any floodplain; conversely, any lands which can be demonstrated by competent engineering to lie beyond the floodplain shall not be subject to these regulations. Any alterations to the floodplain authorized by "An Ordinance for Stormwater Management" (Metropolitan Code 78-840) shall be so noted as an alteration to the floodplain on the zoning map.

71.40 Alterations of floodplain land and drainage channels.

Alterations of floodplain land and drainage channels shall be in accordance with the applicable provisions of "An Ordinance for Stormwater Management" (Metropolitan Code 78-840). Any duly approved alterations of the floodplain will be so noted on the official zoning map as a matter of information. This notation shall be made upon certification by the director of public works to the planning commission that such alteration has been completed in accordance with an approved plan.

3. By deleting Section 103.60 in its entirety and by substituting in lieu thereof the following:

[1] Except swine

103.60 Specific standards for activities within the floodplain.

In addition to the requirements of the applicable zoning district, a conditional use permit shall be granted for those activities and structures within the floodplain as required by Article VII of this ordinance only when the applicable special conditions in Sections 103.61 and 103.62 are met.

103.61 Special conditions for structures for residential, community facility, commercial, manufacturing, and agricultural and extractive activities.

The Board of Zoning Appeals may grant a conditional use permit for the construction of structures and accessory structures thereto of residential, community facility, commercial, manufacturing, and agricultural and extractive activities within the floodplain only under the following conditions:

a) The approval must be based on a plan prepared by a registered engineer or architect.

b) The minimum floor elevation of that portion of any structure intended for human occupancy shall be either equal to or higher than three (3) feet above the flood protection elevation. Those portions of such structures not intended for human occupancy shall be either equal to or higher than the flood protection elevation. All other related facilities thereto such as electrical equipment, water service, and sanitary sewer connections shall be either equal to or higher than the flood protection elevation or shall be floodproofed to the flood protection elevation.

c) The minimum floor elevation of any structure not intended for human occupancy, as defined, shall be either equal to or higher than the flood protection elevation. Floodproofing of these structures will only be authorized by the director of public works as specific individual exceptions to minimum floor elevation requirements where it can be shown that the proposed floodproofing is acceptable from an engineering standpoint.

d) Structures shall be placed on the site so as to minimize obstruction to the flow of floodwaters.

e) Structures shall be firmly anchored to prevent flotation and lateral movement.

f) The plan shall be approved by the director of public works in accordance with the applicable provisions of "An Ordinance for Stormwater Management" (Metropolitan Code 78-840) certifying that the construction as proposed would not materially increase the degree of flooding of other areas.

g) The plan is first approved by the metropolitan planning commission taking into account the above conditions as well as other pertinent factors.

h) A permanent notation of flooding conditions of the site shall be made on the deed to the property.

103.62 Special conditions for non-structural uses for residential, community facility, commercial, manufacturing, and mining and quarrying activities.

The Board of Zoning Appeals may grant a conditional use permit for non-structural uses within the floodplain only under the following conditions:

a) The approval must be based on a plan prepared by a registered engineer or architect.

b) The proposed use will have a low damage potential.

c) The plan shall be approved by the director of public works in accordance with the applicable provisions of "An Ordinance for Stormwater Management" (Metropolitan Code 78-840) certifying that the construction as proposed would not materially increase the degree of flooding in other areas and is consistent with the required approval of the alteration to floodplain land and drainage channels as provided by law.

d) The plan is first approved by the metropolitan planning commission taking into account the above factors as well as any other pertinent factors.

Section 2

BE IT FURTHER ENACTED, That the effective date of this ordinance shall be January 1, 1979, and such change be published in a newspaper of general circulation, the welfare of the Metropolitan Government of Nashville and Davidson County requiring it.

The original document is signed by the following:

Introduced by:

Earl C. Shacklett
Member of Council

_____
Member of Council

APPROVED AS TO LEGALITY OF
FORM AND COMPOSITION:

_____
Metropolitan Attorney

_____
Assistant Metropolitan Attorney

Metropolitan Code of Laws Chapter 17 Article V. Floodplain Overlay District

17.36.170 General provisions.
In addition to the floodplain and floodway protection provisions of Chapter 17.28, the alteration or development of land subject to flooding shall be regulated by Chapter 15.64 of the Metropolitan Code of Laws ("An Ordinance for Storm Water Management"), the purposes being to prevent the obstruction of watercourses and the protection of lives and property from the hazards of flooding. Regulation of flood-prone properties further allows for the reasonable protection of this community's natural ecosystems and wetlands areas, and qualifies metropolitan Nashville and Davidson County for flood insurance under Public Law 1016, 84th Congress (as amended or superseded). (Ord. 96-555 § 9.5(A), 1997)

17.36.180 Official floodplain map.
The Federal Emergency Management Agency Flood Insurance Rate Maps, along with specific basin studies that have been approved by the director of the department of public works shall constitute the official floodplain map for the metropolitan government of Nashville and Davidson County. In addition, the floodplain regulations of this title and Chapter 15.64 of the Metropolitan Code of Laws shall apply to lands which can be demonstrated to lie within a floodplain. Conversely, any lands which can be demonstrated by competent engineering to lie beyond the floodplain shall not be subject to these regulations. In cases of discrepancy, the official floodplain map maintained by the department of public works shall take precedence over generalized floodplain boundaries referenced on the official zoning map. (Ord. 96-555 § 9.5(B), 1997)

17.36.190 Permitted land uses.
Land uses permitted within the floodplain overlay district shall be established by the underlying base zone district according to the district land use table (Section 17.08.030) or an adopted PUD master development plan (if applicable). (Ord. 96-555 § 9.5(C), 1997)

17.36.200 Development standards.
All development within the floodplain overlay district shall be in conformance with Chapter 17.28, Article I of this title, Chapter 15.64 of the Metropolitan Code of Laws, and the subdivision regulations of Nashville and Davidson County. (Ord. 96-555 § 9.5(D), 1997)

17.36.210 Floodplain alterations.
Alterations of floodplain land and drainage channels shall be in accordance with the applicable provisions of Chapter 15.64, "An Ordinance for Storm Water Management." (Ord. 96-555 § 9.5(E), 1997)

17.36.220 Report to stormwater management appeals board.
A request for a variance to the requirements of "An Ordinance for Storm Water Management" shall be considered by the stormwater management appeals board according to the provisions of Chapter 15.64 of the Metropolitan Code of Laws. Prior to consideration of a variance, the stormwater management appeals board shall solicit a report from the zoning administrator and

the planning department regarding the applicability of Chapter 17.28, Article I, or any other provision of this title. (Ord. 96-555 § 9.5(F), 1997

APPENDIX F
STORMWATER MANAGEMENT COMMITTEE

- **Internal Operating Rules and Procedures**
- **Application for Variance or Appeal**

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Appendix F
STORMWATER MANAGEMENT COMMITTEE INTERNAL OPERATING RULES AND REGULATIONS

F1.1 Stormwater Management Committee Internal Operating Rules and Regulations

The Metropolitan Stormwater Management Committee, pursuant to the authority vested in it by the Metropolitan Code of Laws (hereinafter M.C.L.) §15.64.080, does hereby establish these rules and regulations to govern the procedures by which it conducts business.

F1.1.1 Filing of Appeals and Variance Requests

An applicant may appeal an adverse decision of the Director of the Metropolitan Department of Water and Sewerage Services (MWS) or the Director of Codes Administration to the Stormwater Management Committee. An applicant may also request a variance from the stormwater regulations.

All appeals and variance requests must be filed on a form provided by MWS, which shall provide:

1. The name of the property owner or his authorized agent;

2. The name of the appellant's/applicant's representative, if any;

3. The case number, the map number, and the parcel number, if any;

4. The location of the property;

5. The specific action requested of the Committee; and

6. The reasons justifying such action.

All appeals must be filed within 30 days after an adverse decision by either the Director of MWS or the Director of Codes Administration. A filing fee shall be charged to each applicant payable to MWS.

All appeals and variance requests will be filed with the secretary to the Committee. It shall be the duty of the secretary to the Committee to:

1. Accept all appeals and variance requests on behalf of the Committee.

2. Assign each appeal or variance request a case number.

3. Number each appeal or variance request consecutively in order of receipt (beginning on January 1 of each year).

4. Ensure that appeals or variance requests are heard in the order that they appear on the calendar, unless they are advanced for hearing for good cause shown.

5. Prepare an agenda and distribute it to each member of the Committee at least one week before each meeting.

6. Send a copy of the agenda to the Executive Director of the Metropolitan Planning Commission and the Director of the Department of Codes Administration.

7. Include on the agenda an identification of each appeal or variance request to be heard and the information required above.

8. In the event that there are no appeals or variance requests pending and no other business for the Committee to consider, notify the chairman of that fact ten days prior to the time scheduled for the meeting, so the chairman may cancel said meeting pursuant to M.C.L §15.64.080.

9. Ensure that adequate notice of all meetings and agenda is given to the public.

F1.1.2 Variance Considerations

1. In approving variances for applications, the Stormwater Management Committee shall consider all technical evaluations, all relevant factors, all standards specified in other sections of these regulations, and:

   a. The danger that materials may be swept by floodwaters or streams onto other lands to the injury of others.

   b. The danger to life and property due to flooding or erosion damage.

   c. The susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner.

   d. The importance of the services provided by the proposed facility to the community.

   e. The necessity of the facility to a waterfront location, in the case of a functionally dependent facility.

   f. The availability of alternative locations, not subject to flooding or erosion damage, for the proposed use.

   g. The compatibility of the proposed use with existing and anticipated development.

h. The relationship of the proposed use to the comprehensive plan and master drainage plans for that area.

i. The safety of access to the property in times of flood for ordinary and emergency vehicles.

j. The expected heights, velocity, duration, rate of rise, and sediment transport of the floodwaters and the effects of wave action, if applicable, expected at the site.

k. The costs of providing governmental services during and after flood conditions including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

l. The following evaluation criteria will apply to appeals involving modification of the buffer.

   i. Modifications to the buffer area shall be the minimum necessary to achieve a reasonable buildable area, as decided by the Committee. Other requirements for building in the floodway shall still apply.

   ii. Where possible, an area equal to the encroached area or equivalent stormwater management practices shall be established elsewhere on the lot or parcel in a way to maximize, or provide equivalent, storm water quality enhancement and protection.

   iii. Variances for reducing the no-disturbance buffer require a written recommendation, positive or negative, from the Greenways Commission.

   iv. Redevelopment, as defined in Appendix B of this volume, within intensely developed areas may be exempt from all or a portion of the requirements of this subsection, provided feasible alternatives or BMPs to benefit storm water quality are applied.

2. Upon consideration of the factors listed above, and the objectives of these regulations, the Stormwater Management Committee may attach such conditions to the granting of variances as it deems necessary to further the objectives of these regulations.

3. Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.

4. Conditions for variances:

   a. Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief; and in the instance of a historical building, a determination that the variance is the minimum necessary so as not to destroy the historic character and design of the building.

b. Variances shall only be issued upon (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the variance would result in exceptional hardship, and (iii) a determination that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; create nuisance; cause fraud on or victimization of the public; or conflict with existing local laws or ordinances.

c. Any applicant to whom a variance is granted shall be given written notice specifying the difference between the base flood elevation and the elevation to which the structure is to be built, and stating that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

d. The Stormwater Management Committee shall maintain the records of all appeal actions and report any variances to the Federal Emergency Management Agency upon request.

5. Variances may be issued for the reconstruction, rehabilitation, or restoration of structures listed on the National Register of Historic Places or the State Inventory of Historic Places without regard to the procedures set forth in this section, except for Items 4a and 4d above, and provided the proposed reconstruction, rehabilitation, or restoration will not result in the structure losing its historical designation.

F1.1.3 Open Meetings

All meetings of the Committee shall be open to the public as required by T.C.A. §8-44-101, *et seq* and M.C.L. §2.68.020. The Committee shall meet at regular monthly intervals with the day and time to be determined by the chairman.

Notice of such regular meetings shall be provided to the public as provided by law.

F1.1.4 Hearing Procedure

Prior to the testimony in each case, the secretary shall read a brief introductory statement setting forth the elements specified in Sec. F1.1.1. The Metropolitan Planning Commission or the Director of Codes Administration shall be permitted to submit an advisory opinion on any matter before the Committee and such opinion should be read into the record before the introduction of any other evidence in each case.

The order of the proof shall be as follows at the conclusion of the secretary's introductory remarks:

1. The Director of MWS or his designee shall furnish reasons for the rejection of the permit and/or development plans by way of written statement setting forth the reasons for the rejection and/or an oral presentation if so desired by MWS.

2. The appellant shall go forward with his case at the conclusion of the presentation by the Director of MWS or his designee, offering by way of written documentation or oral testimony any evidence which he may have in support of his appeal.

The Committee members may at any time ask questions of the Director of MWS or his designee or the appellant. Any document submitted before the Committee shall be received into the record and identified as an exhibit thereto, and be numbered by the secretary. The secretary shall record the proceedings and the minutes of the meetings of the Committee and shall be the custodian of the minutes and the records of the proceedings before the Committee.

Every person before the rostrum shall abide by the order and direction of the chairman. Discourtesy or disorderly or contemptuous conduct shall be regarded as a breach of the Committee and shall be dealt with as the chairman deems proper.

F1.1.5 Decision of the Committee

At the conclusion of all of the evidence in all cases heard at that hearing session, the Committee shall discuss the cases and render decisions in executive session on that date or defer decisions for no longer than 30 days thereafter.

Any action taken by the Committee shall be by motion which shall state the reasons therefor with particularity. All the decisions of the Committee shall be by resolution, must be in writing, and must indicate the vote of each member of the Committee upon the decision, and shall specify in what manner such variation or modifications shall be made, the conditions upon which they are to be made, and the reasons therefore. Unless otherwise stated, every decision of the Committee shall be final and valid for one (1) year from the date of the decision unless a grading permit or building permit is issued within that period, in which case, the variance expiration date will run concurrent with that permit expiration date.

An order containing the resolution of the Committee on each case shall be promptly entered on the minutes of the meeting of the Committee by the secretary and filed in MWS.

F1.1.6 Rehearings

No rehearing of the decision by the Committee shall be had except:

1. On motion to reconsider that vote by a member of the majority of the Committee on the preceding vote, or

2. On a written request by the appellant for a rehearing.

If the motion or written request to reconsider receives three affirmative votes, the Committee shall hold a rehearing, subject to such conditions as the Committee may by resolution in each case stipulate.

No request other than by a Committee member to grant a rehearing will be entertained unless new evidence is submitted which could not reasonably be presented at the previous hearing. If the request for a rehearing is granted, the case shall be put on the calendar for a rehearing. In all cases, the request for a rehearing shall be in writing, reciting the reasons for the request, and shall be duly verified and accompanied by the necessary data and diagrams. The person requesting the rehearing shall be notified to appear before the Committee on a date to be set by the Committee. Such notification shall be by the secretary.

F1.2 Conflict of Interest

No member of the Committee shall act in any case in which he/she has a personal interest, whether it be a direct or indirect financial interest in the property itself, or by virtue of family relationship with the appellant.

F1.3 Terminology

All parties before the Committee must phrase their presentations employing the terminology and definitions set out in the Metropolitan Code of Laws §15.64.010 where applicable.

F1.4 Special Meetings

The chairman may in emergency situations call special meetings at a time and place of his choosing. Whenever such a special meeting is called, the public shall be notified in the same manner as provided for by Section F1.1.3.

F1.5 Amendment of Internal Operating Rules and Regulations

These rules may be amended at any time by a majority of the members of the Committee and shall be in writing and filed in the office of the Metropolitan Clerk.

F1.6 Time of Effect of Internal Operating Rules and Regulations

These rules shall take effect immediately upon their approval and adoption by the Committee and the filing of same in the office of the Metropolitan Clerk.

F1.7 Appeals From Decisions of the Committee

A decision of the Committee is reviewable by writ of certiorari in a court of competent jurisdiction as provided by state statute.

F1.8 Election of Officers

The Committee shall elect one of its members as chairman and another as vice-chairman, who shall serve for a period of two (2) years or until their respective successors shall have been chosen.

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METROPOLITAN STORM WATER MANAGEMENT COMMITTEE
STORMWATER DIVISION
800 2ND AVE SOUTH
NASHVILLE, TENNESSEE 37210

APPLICATION TO APPEAR BEFORE STORM WATER MANAGEMENT COMMITTEE

APPLICANT INFORMATION
APPLICANT/OWNER OR AGENT OF OWNER:

_____

REPRESENTED BY:_____

VARIANCE OR
APPEAL NO._____

MAP NO._____

PARCEL NO._____

DEVELOPMENT INFORMATION

ENGINEER _____
DEVELOPER _____
PROPERTY OWNER _____

PROPERTY ADDRESS:
_____
_____

PLEASE SELECT ONE OF THE FOLLOWING:

1. VARIANCE REQUEST - The applicant requests a variance from the requirements of the Stormwater Regulations. Please state the regulation and the requested variance from:

   _____

   _____

   _____

   _____

   Applicant would show that the variance request is justified for the following reasons (check all that apply):

   ☐ The variance is the minimum necessary, considering the flood hazard, to afford relief; and in the instance of a historical building, the variance is the minimum necessary so as not to destroy the historic character and design of the building.
   Provide Explanation:_____
   _____
   _____
   _____

   ☐ The variance request meets the following conditions: (i) a showing of good and sufficient cause, (ii) a determination that failure to grant the variance would result in exceptional hardship, and (iii) a determination

that the granting of a variance will not result in increased flood heights, additional threats to public safety or extraordinary public expense; create nuisance; cause fraud on or victimization of the public; or conflict with existing local laws or ordinances.

Provide Explanation:_____

_____

_____

_____

For Variance Request – Please return this completed application along with the additional materials in the Variance Checklist on MWS' Stormwater website

2. APPEAL - The applicant hereby appeals an adverse decision of the Director of the Metropolitan Department of Water and Sewerage Services (MWS) and/or Director of Codes Administration. Please describe the adverse decision and justification for the appeal:

_____

_____

_____

_____

For Appeal Only – Please return this completed application along with the filing fee made payable to Metro Water Services..

All specifications, plans and other supporting documents heretofore filed with the Director of MWS and/or the Director of Codes Administration are incorporated herein by reference and made a part of this application.

_____
Signature of Property Owner

_____
Street Address

_____
City State Zip Code

_____
Phone No. Email Address

THIS WILL ALSO SERVE AS RECEIPT OF THE FILING FEE TO PARTLY COMPENSATE FOR EXPENSES UNDER THIS APPEAL.

APPENDIX G
MEMORANDUM OF UNDERSTANDING

Metropolitan Department of Public Works and Metropolitan Department of Water and Sewerage Services

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MEMORANDUM OF UNDERSTANDING

THIS MEMORANDUM OF UNDERSTANDING is made and entered into this 10th day of May, 2002, by and between the Metropolitan Department of Water and Sewerage Services ("MWS") and the Metropolitan Department of Public Works ("MPW").

WITNESSETH

WHEREAS, pursuant to Metropolitan Charter § 8.402, MPW is responsible for the design, construction, maintenance, repair and cleaning (collectively, the "Stormwater Responsibilities") of storm sewers and related structures (the "Stormwater Facilities"); and

WHEREAS, the parties have determined that the public interest will be best served by developing a closer connection between the personnel and operational activities associated with the Stormwater Responsibilities and the personnel and operational activities of the Metropolitan Government relating to the design, construction, maintenance, repair and cleaning of sanitary sewer facilities; and

WHEREAS, pursuant to the terms of this instrument, the parties have proposed that the public interest will best be served by placing the personnel and operational activities relating to the Stormwater Responsibilities with MWS.

NOW, THEREFORE, THE PARTIES AGREE AS FOLLOWS:

1. The term of this memorandum shall be indefinite. Either party may terminate this memorandum with written notice delivered to the director of the other department to be effective not sooner than 90 days after delivery.
2. After April 1, 2002, all MPW personnel (the "Stormwater Employees") currently involved in activities relating to the Stormwater Responsibilities shall, together with their materials and equipment relating to such activities, transfer to offices under the administration of MWS.
3. After their transfer to MWS, the Stormwater Employees shall become employees of MWS and shall abide by and be subject to the employment rules and regulations that apply to MWS employees and further shall be subject to the supervision and direction of the MWS director or others he may designate.
4. After the effective date of this memorandum, Stormwater Employees or others that may be assigned to such work by the MWS director shall carry out the Stormwater Responsibilities.
5. MWS shall keep separate accounting records pertaining to the Stormwater Responsibilities and shall provide copies of such records to the MPW director annually, or more frequently if he so requests, for his review and approval.
6. MWS shall recommend to and coordinate with the MPW director in seeking approval for necessary amendments to stormwater management rules and regulations that the MPW is responsible for enforcing under federal, state or local law. Further, MWS shall enforce such stormwater management rules and regulations on behalf of MPW. The MPW director shall assist MWS in its enforcement activities, including participating in enforcement proceedings as necessary.
7. MWS shall prepare relevant applications and coordinate with the MPW director in the acquisition of permits or other approvals relating to the Stormwater Responsibilities, including adminstration of the NPDES program, from other governmental entities.
8. Yearly on the anniversary of the effective date of this memorandum, the MWS director shall submit to the MPW director a detailed report of activities

1

undertaken and funds expended in connection with the Stormwater Responsibilities during the preceding year. The report shall also detail projects expected to be proposed in the following year's Capital Improvements Budget, together with estimated budgets and proposed sources of funding. Before MWS submits that portion of the Capital Improvements Budget relating to the Stormwater Responsibilities for approval by the Metropolitan Council it must first have the MPW director's approval, which shall not be unreasonably withheld.

9. Each month during the term of this memorandum, one or more MWS employees designated by the MWS director and one or more MPW employees designated by the MPW director shall meet to discuss the status of projects undertaken and funds expended in connection with the Stormwater Responsibilities. Reports of such meetings shall be developed and delivered to both directors, who shall confer as necessary to resolve problems arising in connection with the subject of this memorandum.
10. To the extent the MPW director is required to attend meetings, generate reports or make presentations relating to the Stormwater Responsibilities, the MWS director shall in his stead attend such meetings, generate such reports or make such presentations upon the MPW director's reasonable request.
11. Funds appropriated by the Metropolitan Council or otherwise made available for carrying out the Stormwater Responsibilities shall be assigned as necessary to MWS. The parties agree to execute such instruments as may be necessary to effect the provisions of this paragraph.
12. In the event this memorandum is terminated for any reason, the employees then involved in activities relating to the Stormwater Responsibilities shall, together with their materials and equipment relating to such activities, transfer to offices under the administration of MPW, become employees of MPW, abide by and be subject to the employment rules and regulations that apply to MPW employees and subject to the supervision and direction of the MPW director or others he may designate.
13. Nothing in this memorandum shall be construed as a transfer of or a limitation on the authority of MPW to issue permits for the construction of streets, roads and sidewalks. The parties shall cooperate in the development of procedures governing the plan review and approval process to assure that the Stormwater Responsibilities and other functions contemplated by the Metropolitan Code and Charter are performed.
14. The parties recognize the likelihood that unanticipated problems may arise during the term of this memorandum and agree to work cooperatively to resolve such problems for the benefit of the Metropolitan Government.
15. The responsibilities established in this memorandum may not be assigned.

Metropolitan Department of Water and Sewerage Services

Recommended by:

Scott Potter, Director

Metropolitan Department of Public Works

Recommended by:

John W. Lynch, Acting Director

2

Approved:

Bill Purcell, Mayor

Approved:

Thomas G. Cross, Metropolitan Attorney

Approved:

David Manning, Director of Finance

Filed with the Metropolitan Clerk:

Marilyn S. Swing 5/10/02
Marilyn S. Swing Date
Metropolitan Clerk

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APPENDIX H
REGULATED RESIDENTIAL INFILL GUIDANCE

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Introduction

This document was produced based upon the City of Atlanta's *Green Infrastructure for Single Family Residences*.

Background and Purpose

Land development permanently alters the way in which stormwater flows across a site due to grading, compaction, and the installation of impervious cover. In order to mitigate these impacts, Metro Nashville requires, in accordance with Municipal Code 15.64.010 et seq., post development stormwater management measures be utilized when constructing a new home or an addition that meets the criteria outlined in the Stormwater Management Manual Volume 1 Chapter 8, *Regulated Residential Infill Requirements and Procedures*.

The purpose of this document is to provide a guideline for selecting and installing the appropriate stormwater management measures when constructing a home.

This guideline employs simplified design standards more applicable to the homeowner/builder experience, thus avoiding the necessity for complex engineering calculations and analysis.

Which projects are included and what is required?

Projects that create 800 to 15,000 square feet of additional net impervious area though new development, redevelopment, or rehabilitation of a residential structure in existing neighborhoods are included in the regulations below.

Tier I - Projects creating between **800** and **2,500** square feet of net additional impervious area and with the total lot impervious area percentage exceeding 30% must treat, by means of capture of the first inch of rainfall runoff, an impervious area equal to the net increase of added impervious area.

Tier II - Projects creating between **2,500** and **8,000** square feet of net additional impervious area, without regard to total lot impervious area percent must treat, by means of capture of the first inch of rainfall runoff, an impervious area equal to the net increase of added impervious area.

Tier III – Projects creating between **8,000** and **15,000** square feet of net added I impervious area, without regard to total lot impervious area percent, must treat, by means of capture of the first inch of rainfall runoff, an impervious area equal to the net increase of added impervious area. Additionally, the project design must insure there is no increase in the 10-year storm peak flow from the site, and a professional engineer must certify the design.

What are the exemptions?

Exemptions from Regulated Residential Infill regulation are projects that:

(1) add less than 800 square feet of net new IA,
(2) add more than 15,000 square feet of net new IA,
(3) are on lots larger than 40,000 square feet, or
(4) are on lots with a grading permit previously filed with the Metropolitan Water Services (MWS), as long as the post-construction IA conforms to the original grading plan.

Note:

1. The presence of a grading permit does not automatically result in an exemption. There may be sites that have had a grading permit in the past but the drainage system is currently inadequate to handle design discharges. The existence of a past grading permit allows the developer to omit use of the one-inch criteria in favor of use of any designed, constructed and maintained competent drainage system already in existence. The developer must still insure the downstream system is competent to handle the increased discharge. If the system is not competent, the developer may choose to follow normal Tier I, II or III steps, or may choose simply to restore and/or improve the drainage system to handle the increased discharge from the infill site. For Tier III sites detention of the 10-year storm peak flow will still be required.
2. Projects on lots larger than 40,000 square feet may seek infill classification on a case-by-case basis at the discretion of MWS

Alternatives to One-Inch Capture

With each Tier classification, there are alternative pathways for the project to meet MWS's infill requirement. The alternatives presented below are not MWS's preference for meeting the requirement of one-inch capture, but are offered to the owner/developer if using the stormwater management practices listed in this document prove to be impractical.

A) Tier 1 Alternatives (Net addition of between 800 and 2,500 square feet of impervious area)
   1. Demonstrate that an adequate drainage system is present downstream by using the Simple Method described Section D of this document.
   2. If an adequate drainage system does not exist downstream, work with MWS and a licensed engineer to devise a solution to improve the drainage downstream to accommodate the increase in flow resulting from the added impervious area.

B) Tier 2 Alternatives (Net addition of between 2,500 and 8,000 square feet of impervious area)
   1. Demonstrate that an adequate drainage system is present downstream by analyzing the on and off site drainage for the 10 year peak flow (requires a licensed engineer).
   2. If an adequate drainage system does not exist downstream, work with MWS and a licensed engineer to devise a solution to improve the drainage downstream to accommodate the increase in flow resulting from the added impervious area.

C) Tier 3 Alternatives (Net addition of between 8,000 and 15,000 square feet of impervious area)
   1. Demonstrate that an adequate drainage system is present downstream by analyzing the on and off site drainage for the 10 year peak flow (requires a licensed engineer).
   2. If an adequate drainage system does not exist downstream, work with MWS and a licensed engineer to devise a solution to improve the drainage downstream to accommodate the increase in flow resulting from the added impervious area.

What portions of residential projects require Stormwater Management?

These requirements intend to capture the main portions of residential impervious areas. Impervious cover is defined as the portion of a parcel of property that is covered by any material, including without limitation roofs, streets, sidewalks and parking lots paved with asphalt, concrete, compacted sand, compacted gravel or clay, that substantially reduces or prevents the infiltration of storm water. Impervious area shall not include natural undisturbed surface rock. Only the major impervious areas of the property need to be treated. This includes the rooftop of the main structure and garage, parking areas and paved patio areas. It excludes minor out buildings, walkways, small miscellaneous paved areas, and the entry driveway area leading from the road to parking and turn around areas.

The area draining to any practice is called the "contributing drainage area" and normally consists of 100% impervious area, though for rain gardens and filter strips incidental small pervious areas can be included if unavoidable, and the areas are stabilized to eliminate soil erosion.

What are the principles for managing stormwater on residential developments?

Residential developments are not required to provide the same types of stormwater management as commercial projects; however, certain requirements must be met to ensure that stormwater runoff does not overwhelm stormwater infrastructure; impact water quality in our streams; or impact adjacent property. The key principles for managing stormwater from a residential lot are:

- Proper grading techniques and Erosion Control BMPs during construction;
- Runoff Reduction (see section below);
- Reliance on infiltration only where the water table or bedrock layer is at least two feet below the bottom of the practice in use; and,
- Proper installation and maintenance of downspouts, channels, or any other sources of concentrated flow.

What is Runoff Reduction?

The term 'Runoff Reduction' means the interception, evapotranspiration, infiltration or capture and reuse of stormwater runoff. Examples of runoff reduction techniques on a single-family residential development include any appropriate combination of the following techniques termed Green Infrastructure Practices:

1. installing a rain garden or bioretention area,
2. replacing traditionally impervious surfaces (driveways, patios, etc.) with pervious paving,
3. routing downspouts to underground dry wells,
4. routing downspouts to modified French drains,
5. using cisterns for reuse or irrigation, or
6. directing sheet flow to adequately sized vegetated filter strips, or any appropriate combination of techniques.

The goal of these techniques is to reduce the volume of runoff generated by the first one-inch of rainfall runoff.

How are Runoff Reduction techniques sized on residential developments?

The amount of volume to be reduced on site is directly related to the drainage area contributing runoff to the treatment technology.

What needs to be submitted?

Applicants must develop a site plan using the checklist available in the Development Services Center. The checklist items relevant to stormwater management include the following:

- Location, configuration and finished elevations for existing and proposed impervious areas;
- Proposed drainage infrastructure in ROW
- Lot/building layout with dimensions;
- Existing and proposed ground contours and elevations;
- Sanitary and storm sewer, structures and easements;
- Erosion and sediment control practices in conformance with the Stormwater Management Manual Volume 4;
- Selected Green Infrastructure Control & Practice Tear Sheets
- All points where stormwater leaves the site (if applicable);
- Locations of buffer (stream, floodway) zones (if applicable);
- 100-year floodplain boundary (if applicable);
- Proof of zero increase in 10-year peak runoff (if applicable);
- Proof of competent downstream drainage (if applicable); and
- Previously assigned grading permit (if applicable).

What is in the rest of this document?

The remainder of the document contains:

1) A set of six information/specification sheets, one for each of the six Green Infrastructure Controls recommended for use. For each, the last two pages are a tear-off set of specifications that can be filled in and stapled to construction plans.
2) Section A that describes how the preservation of trees can be credited.
3) Section B that describes how to conduct infiltration testing.
4) Section C that describes the types of vegetation recommended for use for those Controls that feature vegetation as part of the treatment approach.
5) Section D that describes the simple method to determine adequate drainage for Tier 1 infill projects.

CISTERN

Cisterns are low impact development practices that store rainwater for later use. Rain is collected from a downspout system, screened to remove trash and leaves and conveyed to a storage container for subsequent use. Unless an advanced filtration system is used, water stored in the cistern is for non-potable water use only. If properly sized, they can provide significant reductions in stormwater runoff rates, volumes and pollutant loads from residential sites. Rain barrels may be part of an overall stormwater management system; however, by themselves they may not be sufficient to meet the requirements of this ordinance.

1,500 Gallon Cistern
Source: LID Urban Design Tools

LOCATION

- Consider the size of the contributing drainage areas, and projected water needs, to determine how large a storage tank is needed. Cisterns should drain only impervious areas – preferably rooftops.
- Pick a location keeping in mind: (1) ease in connecting roof drains, (2) overflow to downslope areas, (3) level area, (4) location relative to intended water uses, (5) other utility conflicts, (6) electrical connections if applicable, (7) residential emergency ingress/egress, (8) leaf screen option,
- (9) location of hoses or other water distribution components, and (10) aesthetic considerations.

DESIGN

- To fully meet the Metro Nashville standard, cistern capacity must be designed for a 1 inch storm. A good rule of thumb is that when sizing a cistern for the one inch rain standard, each square foot of rooftop will contribute 0.6 gallons of runoff. A one-hundred square foot roof surface will fill a 55 gallon barrel.
- Cisterns come in sizes from a 55 gallon rain barrel to a 1,500 gallon cistern. If the cistern cannot hold the full inch one alternative is to divert overflow to another low impact development structure such as a filter strip, or rain garden.
- Measure contributing roof area width from the drip line of the overhang to the roof peak ignoring the slant, and the length. The width times the length in feet is the drainage area. Multiply that by 0.6 gallons and that is the size of the cistern you will need to fully meet the one-inch rainfall standard.
- All holding tanks should be opaque to prevent algae growth.
- Pretreatment of water entering the cistern will remove debris, dust, leaves, and other material. Pretreatment options are illustrated on the specification sheet. One or more options should be chosen.
- The cistern should have an overflow pipe so that when the tank reaches capacity, the rainwater will be directed

Example In-Line Screen - Leaf Beater by Rain Harvest Systems

away from adjacent buildings. More than one cistern can be linked to increase storage capacity.

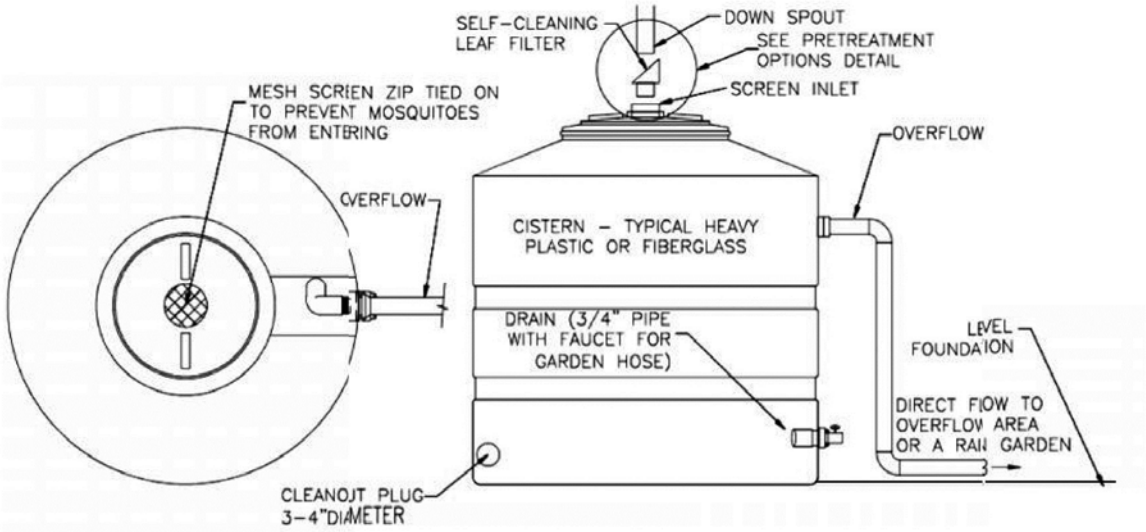
- Drainage system components leading to the cistern should have a minimum slope of 2% for gravity drainage to the cistern.
- For more complex designs a rainwater-harvesting model is provided by the North Carolina State University at http://www.bae.ncsu.edu/topic/waterharvesting.
- Gravity feed drip irrigation kits are available from several suppliers as well as complete instructions how to design an irrigation system for the low pressure of a cistern system without a pump.

Example Rain Barrel

MAINTAIN

- To maintain the storage capacity of the cistern rainwater should be used regularly and a draw down plan initiated.
- Routine checks of the intake and leaf screening components should be done once in the spring and periodically during the fall if leaves fall on the contributing roof area.
- Insure mosquito screen is tight.
- Inspect and if necessary clean out tank annually by scrubbing and letting water drain through low flow plug.
- Check connections for leaks; and inspect overflow for erosion.

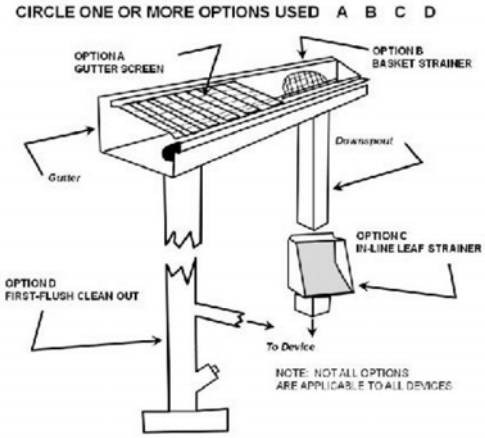
Example Linked Cisterns
Source: http://www.djc.com



TYPICAL COMPONENTS (ATTACH MANUFACTURER'S SPECIFICATIONS)

CONSTRUCTION STEPS:

1. Locate cistern for: (1) ease in connecting roof drains, (2) overflow to downslope area, (3) level area, (4) location relative to intended water uses, (5) other utility conflicts, (6) electrical connections if applicable, (7) emergency ingress/egress, (8) leaf screen option, (9) location of hoses or other water distribution components, and (10) aesthetic considerations.
2. Depending on use review and follow applicable plumbing code.
3. Provide level foundation of compacted earth, blocks, gravel or other hard long lasting surface.
4. Place cistern tank and review all connections for layout and sizing.
5. Cut and route downspouts or other rainwater delivery components, leaf screen option(s) chosen (circle selected options in Pretreatment Options Detail figure), and mosquito screen as applicable. Strap and support as needed.
6. Install water outlet connections including pumps as applicable. Follow manufacturer's specification for all connections and fittings including inlet, overflow, and clean out.
7. Extend overflow to adequate non-eroding discharge point no less than 10 feet from any common property line.
8. Test cistern by filling with water and testing all components in turn – including spraying water on the roof and observing flow.
9. Consider appearance and final landscaping and screening. Complete construction, landscaping, etc.



PRETREATMENT OPTIONS DETAIL

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	NAME/ADDRESS:	CISTERN SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN AND ELEVATION VIEWS OF CISTERN AND HOUSE SHOWING ROOF AREA DIRECTED TO CISTERN AND KEY DIMENSIONS AND CONNECTIONS AND OVERFLOW RELATIVE TO PROPERTY LINE.

NOTES:
1. ATTACH MANUFACTURER'S SPECIFICATIONS AND OTHER DETAILS

SIZING CALCULATION:

0.6 GALLONS * SQ FT OF ROOF AREA DIRECTED TO CISTERN

ROOF AREA DIRECTED TO CISTERN= _____ SQ FT
CISTERN SIZE= _____ GAL

TYPE OF CISTERN/MANUFACTURER:

_____

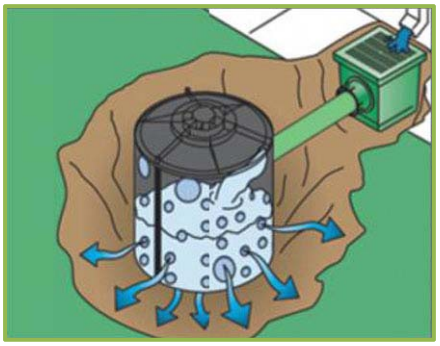
MAINTENANCE:
1. TO MAINTAIN THE STORAGE CAPACITY OF THE CISTERN RAINWATER SHOULD BE USED REGULARLY
2. ROUTINE CHECKS OF THE INTAKE AND LEAF SCREENING COMPONENTS SHOULD BE DONE ONCE IN THE SPRING AND PERIODICALLY DURING THE FALL IF LEAVES FALL ON THE CONTRIBUTING ROOF AREA.
3. INSPECT AND IF NECESSARY CLEAN OUT TANK ANNUALLY BY SCRUBBING AND LETTING WATER DRAIN THROUGH LOW FLOW PLUG. CHECK CONNECTIONS FOR LEAKS; AND INSPECT OVERFLOW FOR EROSION.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	ATTACHED THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	CISTERN SPECIFICATIONS PAGE 2 OF 2

DRY WELL

Dry wells are comprised of seepage tanks set in the ground and surrounded with stone that are designed to intercept and temporarily store stormwater runoff until it infiltrates into the soil. Alternately the pit can be filled with stone with water entering via a perforated pipe with a perforated standpipe in place of the tank.

Dry wells are particularly well suited to receive rooftop runoff entering the tank via an inlet grate (shown right) or direct downspout connection (below right). When properly sized and laid out dry wells can provide significant reductions in stormwater runoff and pollutant loads.



Source: www.earthcontactproducts.com

LOCATION

- Dry wells must be located at least 10 feet from building foundations and 10 feet from property lines.
- To reduce the chance of clogging, dry wells should drain only impervious areas, and runoff should be pretreated with at least one of the leaf removal options to remove debris and larger particles.
- The height of the tank should not exceed 45 inches unless infiltration testing has been done to insure a drain time of 72 hours or less.
- Dry wells should be located in a lawn or other pervious (unpaved) area and should be designed so that the top of the dry well is located as close to the surface as possible.
- Dry wells should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a
water table or bedrock less than two feet below the trench bottom; (3) over other utility lines; or, (4) above a septic field. Always call 811 to locate utility lines before you dig.

CONSTRUCTION

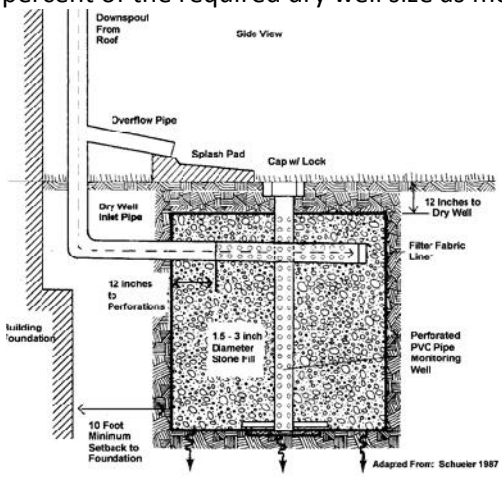
- Consider the drainage area size and the soil infiltration rate when determining the size of the dry well, (see table on next page).
- The sides of the excavation should be trimmed of all large roots that will hamper the installation of the permeable drainage fabric used to line the sides and top of the dry well.
- The dry well hole should be excavated 1 foot deeper and two feet larger in diameter than the well to allow for a 12 inch stone fill jacket.
- The native soils along the bottom of the dry well should be scarified or tilled to a depth of 3 to 4 inches.
- Fill below and around dry well approximately 12 inches of clean, washed #57 stone. #57 stone averages ½ inch to 1-1/2 inches.
- Fill the final 6 inches of the excavation with native soil.
- Optionally pea gravel or #8 stone can be carried to the surface.
- For rooftop runoff, install a leaf screen in the gutter or down spout prior to entering the dry well to prevent leaves and other large debris from clogging the dry well. For non-rooftop runoff,

precede dry well with an in ground sump grate inlet leaf trap.

- An overflow, such as a vegetated filter strip or grass channel, should be designed to convey the stormwater runoff generated by larger storm events safely bypassing the dry well.
- The optional design involves placement of a vertical standpipe connected to the inlet pipe. See figure below.

The table below can be used to size a dry well system. Given the tank height and diameter the contributing drainage area in square feet treated can be read. For example, if a 10 by 50 foot roof is to be treated the total roof area is 10*50 = 500 square feet. This could be handled by one tank 60” high, 30” diameter. It can also be handled by two tanks 30” high and 24” in diameter.

If you elect to measure infiltration rate and find it is higher than 0.5 in/hr length of the dry well size can be reduced. For every 0.5 in/hr increase in measured infiltration rate above 0.5 in/hr subtract ten percent of the required dry well size as measured in square feet captured.



Gravel Bed Depth (inches)	Tank Height (inches)	Tank Inside Diameter (inches)				
		24	30	36	42	48
		Contributing Area Captured (square feet)				
6	30	258	345	447	563	692
12	30	285	380	490	615	755
6	60	461	622	809	1022	1263
12	60	489	657	852	1075	1325

Hole Depth (inches)	6" Perforated Standpipe Gravel Filled Hole Diameter (inches)				
	24	30	36	42	48
	Contributing Area Captured (square feet)				
24	30	46	65	88	114
30	38	58	82	110	142
36	46	69	98	132	171
42	53	81	114	154	199
48	61	92	130	176	228
60	76	115	163	219	285

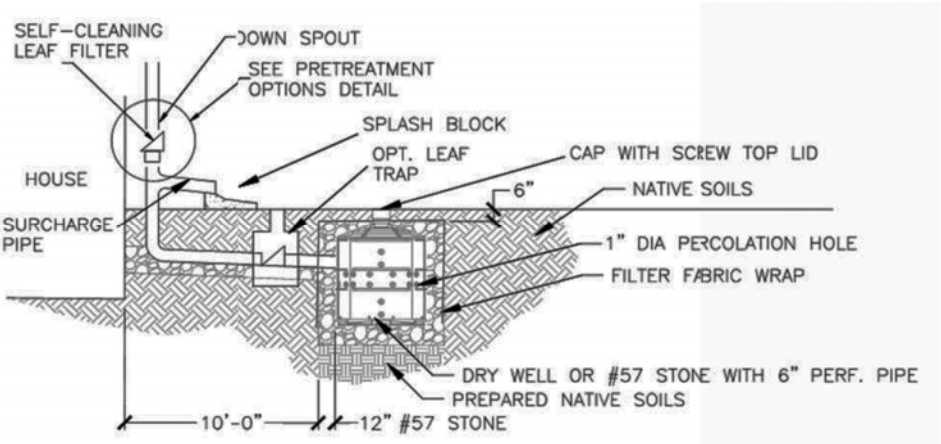
VEGETATION

- The landscaped area above the surface of a dry well should be covered with pea gravel when water enters a dry well through surface features rather than the pipe. This pea gravel layer provides sediment removal and additional pretreatment upstream of the dry well and can be easily removed and replaced when it becomes clogged.
- Alternatively, a dry well may be covered with an engineered soil mix, and planted with managed turf or other herbaceous vegetation.

MAINTENANCE

Annual maintenance is important for dry wells, particularly in terms of ensuring that they continue to provide measurable stormwater management benefits over time.

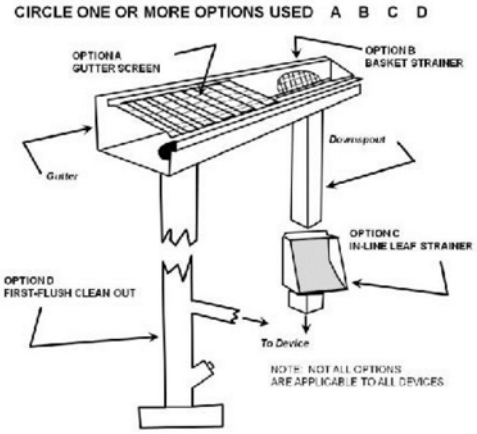
- Inspect gutters and downspouts removing accumulated leaves and debris.
- Inspect dry well following rainfall events.
- If applicable, inspect pretreatment devices for sediment accumulation. Remove accumulated trash and debris.
- Inspect top layer of filter fabric for sediment accumulation. Remove and replace if clogged.



TYPICAL COMPONENTS (ATTACH MANUFACTURER'S SPECIFICATIONS)

CONSTRUCTION STEPS:

1. Review potential dry well areas and layout. Dry wells should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a water table or bedrock less than two feet below the trench bottom; (3) over other utility lines; or, (4) above a septic field. Insure outlet daylights at least ten feet from property line.
2. Measure the area draining to the dry well and determine required size from the table on the next page.
3. If soil is a concern perform infiltration test according to Section B. If the rate is less than 0.25 in/hr this method cannot be used. If the rate is more than 0.50 in/hr the storage volume may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
4. Measure elevations and dig the hole to the required dimensions. Scarify the bottom soil surface 3".
5. Place and tamp 6" to 12" of #57 gravel in bottom. Pea gravel can be substituted for leveling purposes in the upper three inch layer below the tank.
6. Place and secure filter cloth down sides of the excavation leaving enough to fold over the top below the soil and turf.
7. Place tank and install piping. Bond top of tank in place.
8. Cut and route downspouts or other rainwater delivery components, leaf screen option(s) chosen (circle selected options in Pretreatment Options Detail figure). Strap and support as needed.



PRETREATMENT OPTIONS DETAIL

9. Create a safe overflow at least 10 feet from your property edge and insure it is protected from erosion.
10. Test connections with water flow.
11. Fill with gravel jacket around tank and place permeable fabric above between gravel and soil.
12. Backfill with soil/sod or pea gravel.
13. Consider aesthetics as appropriate and erosion control for overflow.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	NAME/ADDRESS:	DRY WELL SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN AND ELEVATION VIEWS OF DRY WELL AND HOUSE SHOWING ROOF AREA DIRECTED TO DRY WELL AND KEY DIMENSIONS, CONNECTIONS AND OVERFLOW RELATIVE TO PROPERTY LINE.

SIZING CALCULATION:

Gravel Bed Depth (inches)	Tank Height (inches)	Tank Inside Diameter (inches)				
		24	30	36	42	48
		Contributing Area Captured (square feet)				
6	30	258	345	447	563	692
12	30	285	380	490	615	755
6	60	461	622	809	1022	1263
12	60	489	657	852	1075	1325

Hole Depth (inches)	6" Perforated Standpipe Gravel Filled Hole Diameter (inches)				
	24	30	36	42	48
	Contributing Area Captured (square feet)				
24	30	46	65	88	114
30	38	58	82	110	142
36	46	69	98	132	171
42	53	81	114	154	199
48	61	92	130	176	228
60	76	115	163	219	285

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

CONTRIBUTING DRAINAGE AREA= _____ SQ FT
TANK DIAMETER= _____ INCHES
TANK HEIGHT= _____ INCHES
GRAVEL BED DEPTH= _____ (6 OR 12 INCHES)
ALTERNATIVE STANDPIPE DESIGN
HOLE DIAMETER= _____ INCHES
HOLE DEPTH= _____ INCHES

MAINTENANCE:

1. INSPECT GUTTERS AND DOWNSPOUTS REMOVING ACCUMULATED LEAVES AND DEBRIS, CLEANING LEAF REMOVAL SYSTEM(S).
2. IF APPLICABLE, INSPECT PRETREATMENT DEVICES FOR SEDIMENT ACCUMULATION. REMOVE ACCUMULATED TRASH AND DEBRIS.
3. INSPECT DRY WELL FOLLOWING A LARGE RAINFALL EVENT TO INSURE OVERFLOW IS OPERATING AND FLOW IS NOT CAUSING PROBLEMS.

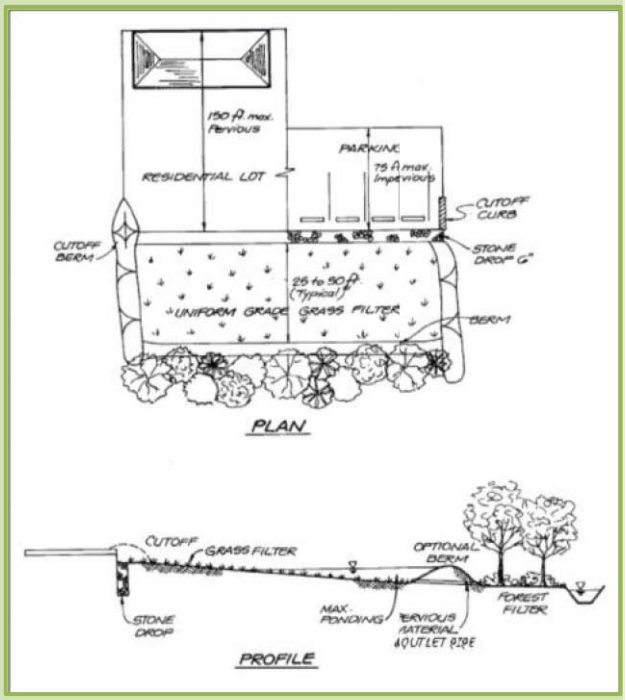
METRO NASHVILLE DEPARTMENT OF WATER SERVICES	ATTACHED THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	DRY WELL SPECIFICATIONS PAGE 2 OF 2

VEGETATED FILTER STRIPS

A vegetated filter strip can be attractive and functional addtion to your home landscape. Vegetated filter strips (also known as grass filters) are uniformly graded, vegetaed areas of land designed to receive rainwater as sheet flow and slow and filter stormwater runoff from roof downsprouts or parking areas. Vegetated filter strips can provide significant reductions in stormwater runoff and pollutant loads in your local watershed.

LOCATION

- Take note of the drainage patterns to determine the best location for a vegetated filter strip. Assess the drainage area flow paths on your property, and the slope of the drainage area. Ideal locations are places where there is a gentle slope away from the structure or paved area, the area is relatively flat, and where the flow can be evenly disbursed along the top of the filter area.
- The ideal slope of the vegetated filter strip is between 1 and 5%. Greater slopes would encourage the formation of concentrated flow within the filter strip, while lesser slopes would encourage unplanned ponding. If the slope is greater, terracing can be used with level spreaders between each terrace.
- Placing a filter strip over utilities is acceptable except where the amended soil option is used. In that case insure utility locations are noted and care is taken in soil amendment actions. Amended or bermed filter strips should not be placed over a septic field.



Source:
Center for Watershed Protection. 2009. Coastal Stormwater Supplement to the Georgia Stormwater Management Manual.

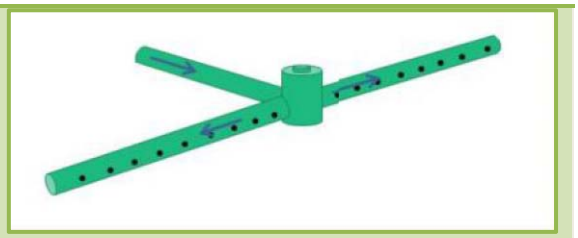
- The length of the vegetated filter strip should be no less than 25 feet. If there is a permeable berm at the lower end, the length of the vegetated filter strip should be no less than 15 feet. Natural forested areas on site can be counted in the filter strip length total.
- The surface impervious area to any one discharge location cannot exceed 5,000 square feet.

CONSTRUCTION

Level Spreader

- A level spreader must be used at the upstream end of the filter strip to evenly distribute stormwater runoff. A level spreader is a small trench filled with pea gravel or # 8 stone installed along a level contour.
- The level spreader should be 12’ to 18” wide and 6” to 12” deep depending on the amount of

expected flow. Larger diameter stone may be required to stabilize entry points for larger contributing impervious areas.



- To help insure more even discharge of flow into the filter strip, notches can be cut in the level spreader at intervals allowing overflowing water to enter at several locations ahead of general overflow.
- The level spreader can be connected to the downspout through a T-connection to perforated pipes embedded in the flow spreader trench (see figure).
- Insure the overflow points are protected from erosion and not blocked by vegetation.
- If the impervious drainage area to any one entry point (e.g. a downspout) is less than 1,000 square feet appropriate level spreaders may be waived if flow will flow as a sheet through the strip area. In this case simple splash blocks (see figure) can be used to introduce flow into turf (yard) areas.

Amended Soil Design Option

- Increased infiltration and a doubling of the ability to meet the one inch standard can be achieved by amending the soil within the filter strip by tilling the existing soil 12” deep and mixing 4” of compost.

Berm Design Option

- A greater ability to meet the one-inch standard can be achieved through the use of a permeable berm at the bottom end of the filter strip. The permeable berm is used to temporarily store stormwater runoff within the filter strip, which increases the infiltration and reduces the required width of the filter strip.
- Permeable berms should be constructed of well drained soils (sand, gravels, and sandy loams) that support plant growth and should be no more than 12” high.
- Appropriately sized outlets should be provided within permeable berms to ensure that vegetated filter strips will drain within 24 hours following the end of a rainfall event.
- A stone-protected overflow area through the berm may be used to manage the stormwater runoff generated by large storm events. The overflow point must be at least ten feet from the property line if flow is onto adjoining property. Erosion protection is critical.

Contributing Drainage Area (square feet)	Filter Strip Type		
	Conventional	Amended Soil	Berm
	Filter Strip Area (sq ft)		
100	200	70	50
500	1000	350	250
1000	2000	670	500
2000	4000	1400	1000
3000	6000	2700	1500
4000	8000	5400	2000
5000	10000	6700	2500

Design Table

Measure the rooftop and any other area that is going to be directed to the filter strip. From the site layout select the size and type of filter strip from the table to meet the one inch design standard. For example, for a 1,000 square foot rooftop conventional filter strip the filter strip surface area must be at

least 2,000 square feet with a minimum flow length of 25 feet. Built with a berm it can have a surface area of 500 square feet and have a minimum flow length of 15 feet.

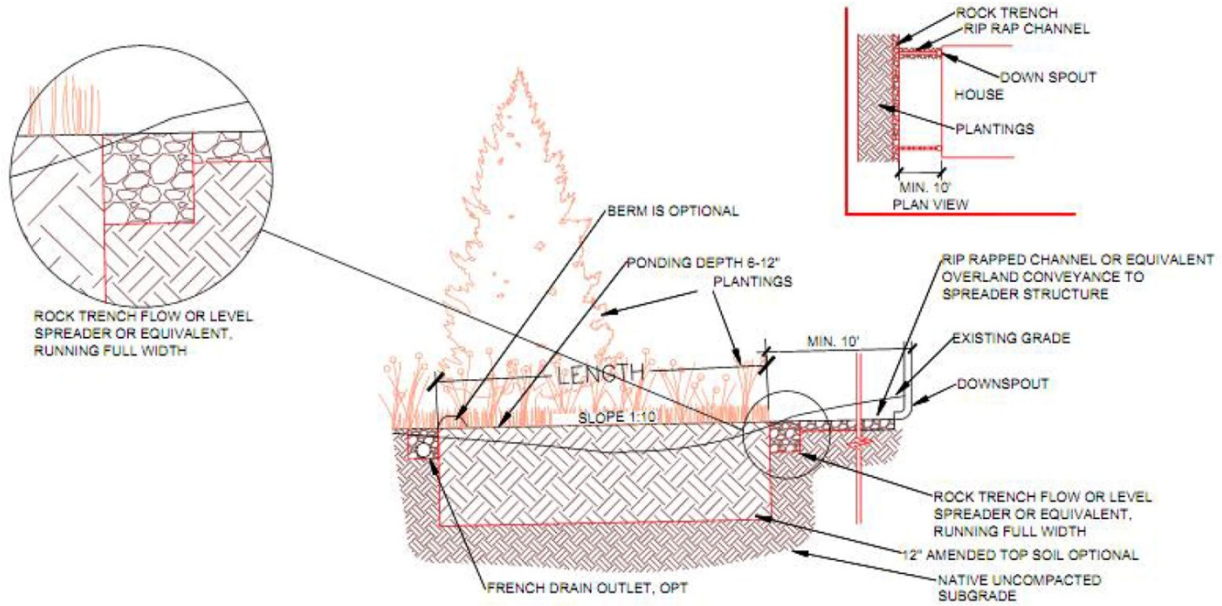
VEGETATION

- Vegetation commonly planted on vegetated filter strips includes turf, shrubs, trees, and other herbaceous vegetation.
- Choose grasses and other vegetation that will be able to tolerate the stormwater runoff rates and volumes that will pass through the vegetated filter strip.
- Vegetation used in filter strips should be able to tolerate both wet and dry conditions.
- Refer elsewhere within this document for more guidance.

MAINTENANCE

- Maintain the vegetated filter strip so that it will continue to provide measurable stormwater management benefits over time.
- Water as needed to promote plant growth and survival especially in the first two seasons.
- Provide normal turf or garden maintenance - mow, prune, and trim as needed.
- Inspect the vegetated filter strip following rainfall events. Fix erosion issues immediately.
- Remove accumulated trash, sediment and debris.

TYPICAL COMPONENTS



CONSTRUCTION STEPS:

1. Review potential filter strip areas and layout. Filter strips should slope between 1% and 5% away from the structure and should not be located above a septic field. Placing a filter strip over utilities is acceptable except where the amended soil option is used. In that case insure utility locations are noted and care is taken in soil amendment actions. If there is a concentrated overflow insure it is at least ten feet from adjacent property.
2. Measure the area draining to the filter strip and determine required surface area and minimum length from the table on the next page. Determine the desired filter strip and flow spreader options.
3. Lay out and mark filter strip area, flow spreader line and inlets.
4. Construct flow spreader filling trench with appropriate gravel and noting overflow points.
5. Construct filter strip option, prepare soil.
6. Construct erosion control at the flow entrance and exit points as applicable.
7. Plant dense vegetation according to plan, or sod/seed. Insure an irrigation plan is in place.
8. Insure temporary erosion control is in place as needed until vegetation establishment.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	NAME/ADDRESS:	FILTER STRIP SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN AND ELEVATION VIEWS OF FILTER STRIP AND HOUSE SHOWING ROOF AREA DIRECTED TO FILTER STRIP AND KEY DIMENSIONS, CONNECTIONS AND OVERFLOW RELATIVE TO PROPERTY LINE.

SIZING CALCULATION:

Contributing Drainage Area (square feet)	Filter Strip Type		
	Conventional	Amended Soil	Berm
	Filter Strip Area (sq ft)		
100	200	70	50
500	1000	350	250
1000	2000	570	500
2000	4000	1400	1000
3000	6000	2700	1500
4000	8000	5400	2000
5000	10000	6700	2500

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN FILTER TYPE.

CONTRIBUTING DRAINAGE AREA= _____ SQ FT
FILTER STRIP AREA= _____ SQ FT
CONVENTIONAL – 25' MINIMUM LENGTH
BERM OPTION – 15' MINIMUM LENGTH

MAINTENANCE:

1. INSPECT GUTTERS AND DOWNSPOUTS REMOVING ACCUMULATED LEAVES AND DEBRIS, CLEANING LEAF REMOVAL SYSTEM(S).
2. IF APPLICABLE, INSPECT PRETREATMENT DEVICES FOR SEDIMENT ACCUMULATION. REMOVE ACCUMULATED TRASH AND DEBRIS.
3. WATER AS NEEDED TO PROMOTE PLANT GROWTH AND SURVIVAL ESPECIALLY IN THE FIRST TWO SEASONS.
4. PROVIDE NORMAL TURF OR GARDEN MAINTENANCE - MOW, PRUNE, AND TRIM AS NEEDED.
5. INSPECT THE VEGETATED FILTER STRIP FOLLOWING RAINFALL EVENTS. FIX EROSION ISSUES IMMEDIATELY.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	ATTACHED THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	FILTER STRIP SPECIFICATIONS PAGE 2 OF 2

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MODIFIED FRENCH DRAIN

Modified French Drains (MFD) are shallow trench excavations filled with stone that are designed to intercept and temporarily store stormwater runoff until it infiltrates into the soil. MFDs can provide significant reductions in stormwater runoff and pollutant loads. They are particularly well suited to receive rooftop runoff, but can also be used to receive stormwater runoff from other small impervious areas. In Nashville only the daylighted French Drain version is allowed in residential applications. The perforated pipe is daylighted at its end allowing for overflow of larger storms and a failsafe mechanism should infiltration not be as anticipated.

LOCATION

- MFD trenches should be located at least 5 feet from building foundations and 10 feet from buildings with basements and property lines. The top end of the MFD can be adjacent to the building to connect downspouts but should be directed away from the structure.
- MFDs should slope away from the structures. The slope of the MFD pipe should be between 0.5% and 6%. It can be serpentine or multi-pronged in construction if sufficient slope is available.
- To reduce the chance of clogging, MFDs should drain only impervious areas, and runoff should be pretreated with at least one of the leaf removal options to remove debris and larger particles.
- MFD gravel depths should be at least 18 inches and no more than 36 inches.
- MFDs should be located in a lawn or other pervious (unpaved) area and should be designed so that the top of the MFD is located as close to the surface as possible to reduce digging.
- MFDs should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a water table or bedrock less than two feet below the trench bottom; (3) over other utility lines; or, (4) above a septic field. Always call 811 to locate utility lines before you dig.
- The downstream end of the pipe must daylight for overflows more than ten feet from the property line.
- The desirable soil infiltration rate suitable for a MFD is 0.50 inches per hour (in/hr) or greater. If there is concern due to tight soils when digging, an infiltration test should be done as per Section B.

CONSTRUCTION

- As a rule-of-thumb there should be about 23 cubic feet of stone for every 100 square feet of rooftop. The table provides MFD length requirements for different depths.
- The assumed width in the table is 24 inches. The width can be from 18 to 32 inches. Required lengths should be adjusted proportionately if other widths are used.

Rooftop Area (square feet)	Depth of Gravel From Top of Pipe (inches)			
	18	24	30	36
	Required Linear Feet of MFD			
100	6	5	4	3
500	30	25	20	15
1000	60	45	40	35
2000	120	95	75	65
3000	185	140	115	100
4000	245	190	155	130
5000	305	235	195	165

- The sides of the excavation should be trimmed of all large roots that will hamper the installation of the permeable drainage fabric used part way down the sides and above the gravel layer on top of the MFD.
- The native soils along the bottom of the MFD should be scarified or tilled to a depth of 3 to 4 inches.
- Fill the MFD with clean, washed #57 stone embedding a six inch diameter perforated pipe in the top of the stone such that the stone covers the top of the pipe. #57 stone averages ½ inch to 1-1/2 inches.
- The pipe should have 3/8 inch perforations, spaced 6 inches on center, and have a minimum slope of 0.5% and a maximum slope of 6%.
- The perforated pipe must daylight at the downstream end of the trench.
- An overflow, such as a vegetated filter strip or grass channel, should be designed to convey the stormwater runoff generated by larger storm events safely out of the downstream end of the MFD.
- Place permeable landscape fabric over gravel to keep soil or pea gravel from migrating into the gravel and filling the pore spaces, and leave four to six inches above the pipe to the ground surface.
- Cover with top soil and sod or with pea gravel.
- For rooftop runoff, install one or more leaf screen options prior to entering the MFD to prevent leaves and other large debris from clogging the MFD. For driveway or parking runoff a screened inlet grate over a sump or pea gravel pit can be used to settle out material prior to entering the pipe.

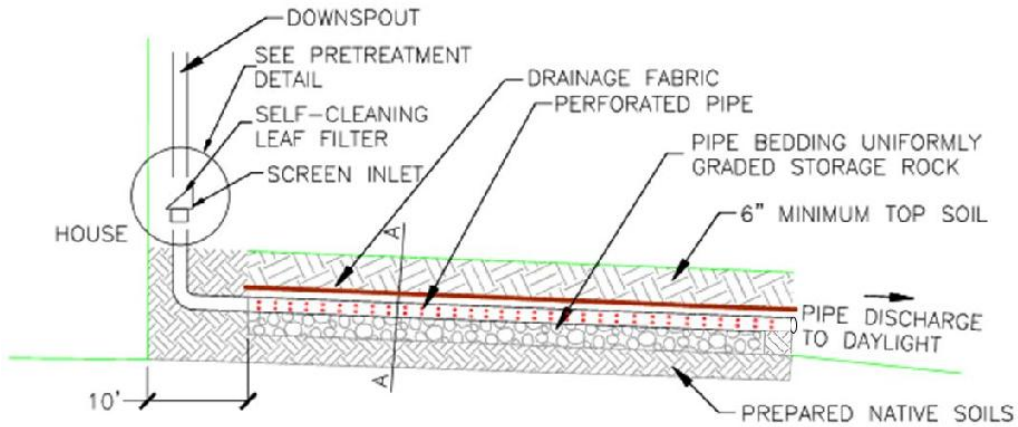
VEGETATION

- A MFD is normally covered with topsoil and managed turf or other herbaceous vegetation.
- As an alternative, the area above the surface of a MFD may be covered with pea gravel (or larger depending on the inflow rates) to allow for incidental lateral inflow along the edge of ground level impervious surfaces.
- The downstream end of the pipe must be stabilized and can be landscaped for aesthetics.

MAINTENANCE

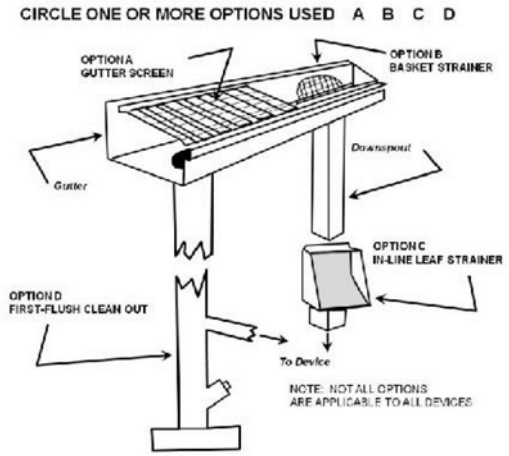
Annual maintenance is important for MFDs.

- Inspect gutters/downspouts removing accumulated leaves and debris, cleaning leaf removal system(s).
- Inspect any pretreatment devices for sediment accumulation. Remove accumulated trash and debris.
- Inspect MFD following a large rainfall event to insure overflow is operating and flow is not causing problems.



CONSTRUCTION STEPS:

1. Review potential MFD areas and layout. MFDs should slope between 0.5% and 6% away from the structure and should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a water table or bedrock less than two feet below the trench bottom; (3) over other utility lines; or, (4) above a septic field. Insure outlet daylights at least ten feet from property line.
2. Measure the area draining to the MFD and determine required length from the table on the next page using assumed width and gravel depth, and plan route and excavation depth.
3. If soil is a concern, perform infiltration test according to Section B. If the rate is less than 0.25 in/hr this method cannot be used. If the rate is more than 0.50 in/hr the length of the ditch may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
4. Measure elevations and lay out the MFD to the required dimensions marking the route and required excavation depths. Often a level line (torpedo level) is used.
5. Remove sod using a sod cutter if appropriate. Excavate ditch to the depth of the gravel plus six inches for topsoil/pea gravel and three additional inches to accommodate half the pipe depth. Be careful not to compact soils in the bottom. Level the bottom laterally as much as possible to maximize infiltration area. Roughen bottom to a depth of at least three inches and trim roots.
6. Place and tamp gravel in ditch to planned depth placing the pipe three inches deep in the upper portion of the gravel. Then place and gently tamp gravel until it covers the pipe.
7. Place drainage fabric over top of pipe and stone.
8. Place topsoil and sod or pea gravel.
9. Cut and route downspouts or other rainwater delivery components, leaf screen option(s) chosen (circle selected options in Pretreatment Options Detail figure). Strap and support as needed.
10. Create a safe overflow at least 10 feet from your property edge and insure it is protected from erosion.



PRETREATMENT OPTIONS DETAIL

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	NAME/ADDRESS:	MODIFIED FRENCH DRAIN SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN AND ELEVATION VIEWS OF MFD AND HOUSE SHOWING ROOF AREA DIRECTED TO MFD AND KEY DIMENSIONS, CONNECTIONS AND OVERFLOW RELATIVE TO PROPERTY LINE.

SIZING CALCULATION:

Rooftop Area (square feet)	Depth of Gravel From Top of Pipe (inches)			
	18	24	30	36
	Required Linear Feet of MFD			
100	6	5	4	3
500	30	25	20	15
1000	60	45	40	35
2000	120	95	75	65
3000	185	140	115	100
4000	245	190	155	130
5000	305	235	195	165

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

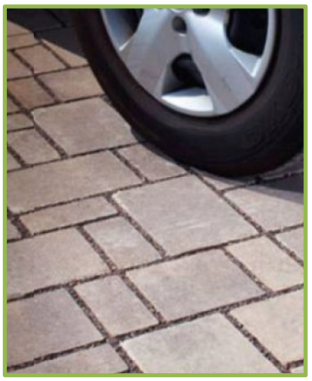
CONTRIBUTING DRAINAGE AREA= _____ SQ FT
DEPTH OF STONE MEDIA= _____ INCHES
WIDTH OF TRENCH= _____ INCHES
LENGTH OF MFD= _____ FT

MAINTENANCE:

1. INSPECT GUTTERS AND DOWNSPOUTS REMOVING ACCUMULATED LEAVES AND DEBRIS, CLEANING LEAF REMOVAL SYSTEM(S).
2. IF APPLICABLE, INSPECT PRETREATMENT DEVICES FOR SEDIMENT ACCUMULATION. REMOVE ACCUMULATED TRASH AND DEBRIS.
3. INSPECT MFD FOLLOWING A LARGE RAINFALL EVENT TO INSURE OVERFLOW IS OPERATING AND FLOW IS NOT CAUSING PROBLEMS.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	ATTACHED THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	MODIFIED FRENCH DRAIN SPECIFICATIONS PAGE 2 OF 2

PERMEABLE PAVERS



Permeable pavers are an alternative to traditional paving surfaces that can decrease stormwater runoff around your home. They are well suited for use when constructing sidewalks, parking areas, patios, and driveways. Permeable pavers consist of permeable interlocking or grid concrete pavers underlain by a drainage layer. A permeable paver system allows stormwater runoff to pass in between the paver surface and into an underlying stone reservoir, where it is temporarily stored and allowed to infiltrate into the underlying soils. Permeable pavers can provide significant reductions in stormwater runoff and pollutant loads in your watershed.

LOCATION

- Maximum contributing drainage area ratio to surface area is 4:1.
- Permeable paver systems should be located at least 5 feet from building foundations and 10 feet from buildings with basements.
  Permeable pavers should not be located: (1) above an area with a water table or bedrock less than two feet below the gravel bottom; (2) over other utility lines; or, (3) above a septic field. Always call 811 to locate utility lines before you dig.
- Permeable pavers should drain only impervious areas. Drainage from other areas onto the pavers will eventually clog them.
- The desirable soil infiltration rate suitable for a paver system is 0.50 inches per hour (in/hr) or greater. If there is concern due to tight soils when digging an infiltration test should be done as per the guidance provided in Section B. If the rate is less than 0.5 in/hr an underdrain leading to daylight should be provided. Professional assistance should be obtained in this case.
- Permeable paver systems should be installed on slopes less than 6% to help insure even distribution of runoff over the infiltration surface, and should slope away from structures.

CONSTRUCTION

The table at the right provides Permeable Paver area size requirements for different depths of the #57 stone layer. This stone averages in size from ½ inch to 1-1/2 inches. Example: A roof top is 1000 square feet. For a stone depth of 8 inches the required area of permeable pavers 280 sq ft.

Contributing Drainage Area (square feet)	Depth of Lower Stone Storage Layer (inches)				
	3	4	5	6	8
	Area of Pavers (square feet)				
100	54	45	39	34	27
500	280	230	200	170	140
1000	550	460	390	340	280
2000	1090	910	780	680	550
3000	1630	1360	1170	1020	820
4000	2180	1810	1560	1360	1090
5000	2720	2270	1940	1700	1360

- Permeable paver systems require multiple layers. Manufacturer's instructions, if they exist, should be followed in lieu of these guidelines.
- The top course consists of the pavers and a crushed aggregate material swept between the paver joints, such as #8 stone or 1/8" to 3/8" pea gravel. The thickness of this layer varies depending upon the depth of the paver.
- The bedding course consists of 2 to 3 inches of #8 stone or 1/8" to 3/8" pea gravel. The bedding course provides a level bed for setting the pavers evenly.
- The aggregate base course consists of #57 stone, a minimum of 3 inches. The aggregate base course acts as a reservoir to provide stormwater storage capacity and must be compacted.
- As an option, a permeable drainage fabric can be used to separate the aggregate base course

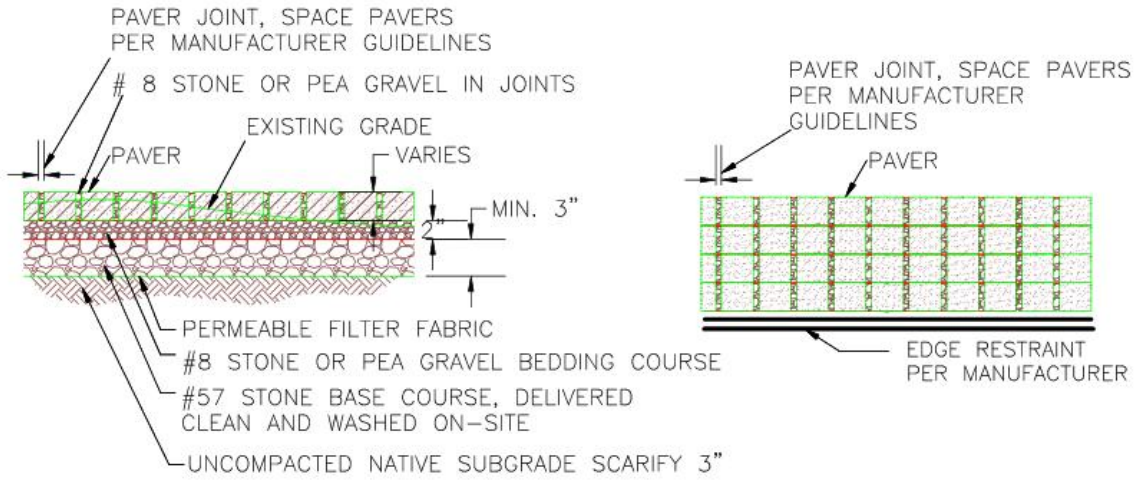
and the subgrade. The permeable drainage fabric must have a flow rate greater than 125 gpm/sq ft.

- The subgrade layer is the layer of native soils below the gravel and the permeable drainage fabric (if used). The subgrade soil layer should be prepared by scarifying or tilling to a depth of 3 to 4 inches.

MAINTENANCE

Maintenance is very important for permeable pavers systems, particularly in terms of ensuring that they continue to provide measurable stormwater management benefits over time.

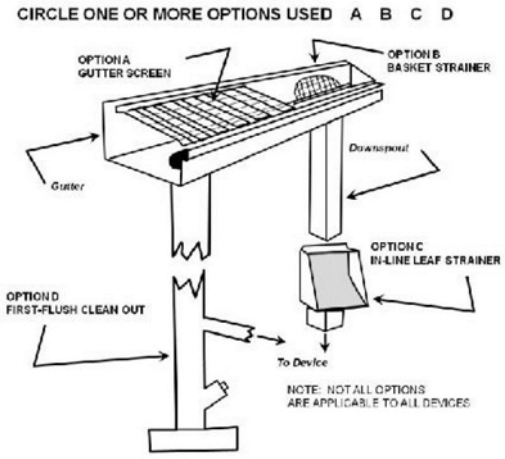
- Remove accumulated sediment and debris from joint space monthly.
- Observe the permeable paver system for excessive ponding during storm events and repair as needed.
- Vacuum, sweep, or blow permeable paver surface quarterly to keep the surface free of sediment.
- New #8 stone may need to be swept into the space between stones as needed. Inspect permeable paver surface for deterioration annually. Repair or replace any damaged areas as needed.



TYPICAL COMPONENTS (ATTACH MANUFACTURER'S SPECIFICATIONS)

CONSTRUCTION STEPS:

1. Review potential paver areas and layout. Pavers should slope less than 6% away from the structure and should not be located: (1) above an area with a water table or bedrock less than two feet below the trench bottom; (2) over other utility lines; or, (3) above a septic field.
2. Measure the area draining to the pavers and determine required paver area from the table on the next page based on the depth of the lower stone storage layer.
3. If soil is a concern perform infiltration test according to Section B. If the rate is less than 0.25 in/hr this method cannot be used. If the rate is more than 0.50 in/hr the pave area may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
4. Excavate area to appropriate depth and scarify soil to 3-4".
5. Place, level and compact gravel to planned depth in no more than 6" lifts. Three inch minimum depth.
6. Place, level and compact #8 stone or pea gravel bedding layer. Two inch minimum depth.
7. Lay paving stone one at a time or using mechanical placement as applicable. Cut stone at edges to fit.
8. Install edge restraints per manufacturer's specifications.
9. Sweep more #8 stone or pea gravel into stone joints until filled and even.
10. Cut and route downspouts or other rainwater delivery components, leaf screen option(s) chosen (circle selected options in Pretreatment Options Detail figure). Strap and support as needed.



PRETREATMENT OPTIONS DETAIL

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	NAME/ADDRESS:	PERMEABLE PAVER SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN AND ELEVATION VIEWS OF PERVIOUS PAVER AND HOUSE SHOWING ROOF AREA DIRECTED TO PAVERS AND KEY DIMENSIONS, CONNECTIONS AND ANY APPLICABLE OVERFLOW RELATIVE TO PROPERTY LINE. ATTACH MANUFACTURER'S SPECIFICATIONS IF APPLICABLE.

SIZING CALCULATION:

Contributing Drainage Area (square feet)	Depth of Lower Stone Storage Layer (inches)				
	3	4	5	6	8
	Area of Pavers (square feet)				
100	54	45	39	34	27
500	280	230	200	170	140
1000	550	460	390	340	280
2000	1090	910	780	680	550
3000	1630	1360	1170	1020	820
4000	2180	1810	1560	1360	1090
5000	2720	2270	1940	1700	1360

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

CONTRIBUTING DRAINAGE AREA= _____ SQ FT
DEPTH OF STONE MEDIA= _____ INCHES
PAVER AREA= _____ SQ FT

MAINTENANCE:

1. REMOVE ACCUMULATED SEDIMENT AND DEBRIS FROM JOINT SPACE MONTHLY.
2. OBSERVE THE PERMEABLE PAVER SYSTEM FOR EXCESSIVE PONDING DURING STORM EVENTS AND REPAIR AS NEEDED.
3. VACUUM, SWEEP, OR BLOW PERMEABLE PAVER SURFACE QUARTERLY TO KEEP THE SURFACE FREE OF SEDIMENT. NEW STONE MAY NEED TO BE SWEPT INTO THE JOINTS AS NEEDED.
4. INSPECT PERMEABLE PAVER SURFACE FOR DETERIORATION ANNUALLY. REPAIR OR REPLACE ANY DAMAGED AREAS AS NEEDED.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	ATTACHED THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	PERMEABLE PAVER SPECIFICATIONS PAGE 2 OF 2

RAIN GARDENS

Rain gardens are small, landscaped depressions that are filled with a mix of native soil and compost, and are planted with trees, shrubs and other garden-like vegetation. They are designed to temporarily store stormwater runoff from rooftops, driveways, patios and other areas around your home while reducing runoff rates and pollutant loads in your local watershed. A rain garden can be a beautiful and functional addition to your landscape.

LOCATION

- Rain gardens should be located to receive the maximum amount of stormwater runoff from impervious surfaces, and where downspouts or driveway runoff can enter garden flowing away from the home.
- Swales, berms, or downspout extensions may be helpful to route runoff to the rain garden.
- Locate at least 10 feet from foundations, not within the public right of way, away from utility lines, not over septic fields, and not near a steep bluff edge. Call 811 before you dig to locate the utility lines on your property.
- Rain gardens on steep slopes (>10%) may require an alternative design with terracing.

DESIGN

- The size of the rain garden will vary depending on the impervious surface draining to it and the depth of the amended soils. Use the table to determine the required surface area.
- A maximum ponding depth of 6 inches is allowed within rain gardens. On average, rain gardens drain within a day, which will not create a mosquito problem.
- Design rain garden entrance to immediately intercept inflow and reduce its velocity with stones, dense hardy vegetation or by other means.

Contributing Drainage Area (square feet)	Depth of Amended Soil (inches)			
	18	24	30	36
	Area of Rain Garden (square feet)			
100	6.6	5.7	5.1	4.6
500	35	30	25	23
1000	65	60	50	45
2000	135	115	100	90
3000	200	170	150	140
4000	260	230	200	185
5000	330	290	255	230

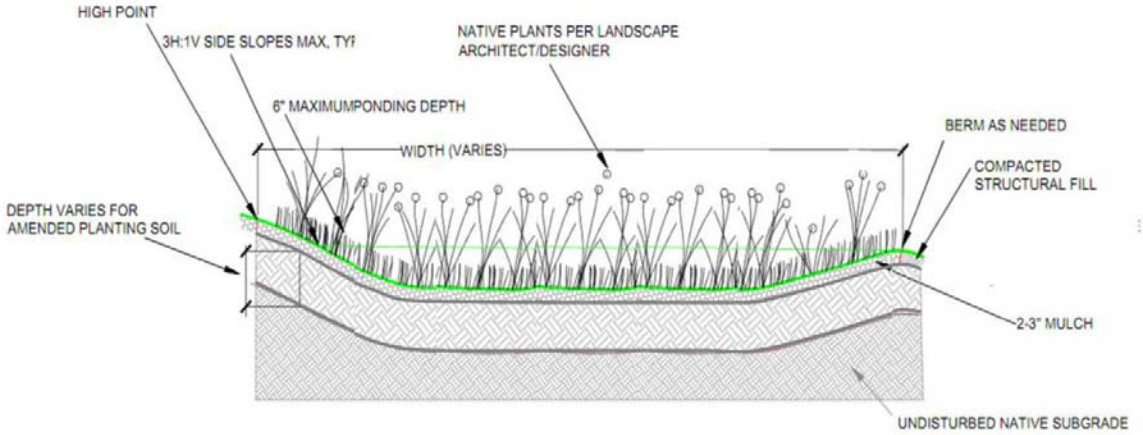
- If sides are to be mowed rain gardens should be designed with side slopes of 3:1(H:V) or flatter.
- For best results, it is suggested to test your soil characteristics as you would for a garden, or contact your local County Extension Service for help (https://ag.tennessee.edu/spp/Pages/soiltesting.aspx).
- Soils for rain gardens should be amended native soils containing: 2/3 native soils and 1/3 compost.
- A mulch layer consisting of 2-3 inches of non-floatable organic mulch (fine shredded hardwood mulch, pine straw, or leaf compost) should be included on the surface of the rain garden. Pine bark and wood chips should not be used.
- Often rain gardens have a better appearance and can be more easily maintained if they have defined edges similar to a normal garden.
- The overflow from the rain garden should be non-eroding and can consist of a small berm or even an inlet grate set at the proper elevation in the garden. The grate should be set at a slant or be domed to allow clogging debris to fall off.

VEGETATION

- Vegetation commonly planted in rain gardens includes native trees, shrubs and other herbaceous
  vegetation. When developing a landscaping plan, you should choose vegetation that will be able to stabilize soils and tolerate the stormwater runoff rates and volumes that will pass through the rain garden.
- Vegetation used in rain gardens should also be able to tolerate both wet and dry conditions. Please refer elsewhere within this document for additional information on plants appropriate for rain gardens.
- As with any garden in the first season the vegetation may require irrigation to become well established. It may be appropriate to plant more densely than a normal garden to obtain the benefit of plant soil stabilization and evapotranspiration as soon as possible.

MAINTAIN

Routine garden maintenance should include weeding, deadheading, replacing dead plants, and replenishing mulch when depleted. Catching areas of erosion is also important as is correcting standing water problems. If standing water persists it may be necessary to place a perforated underdrain in the garden daylighting downstream.



CONSTRUCTION STEPS:

1. Locate rain garden(s) where downspouts or driveway runoff can enter garden flowing away from the home. Locate at least 10 feet from foundations, not within the public right of way, away from utility lines, not over septic fields, and not near a steep bluff edge.
2. Measure the area draining to the planned garden and determine required rain garden surface area from the table on the next page and your planned excavation depth.
3. Optionally, perform infiltration test according to Section B. If the rate is less than 0.25 in/hr an underdrain will be necessary. If the rate is more than 0.50 in/hr the size of the garden may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
4. Measure elevations and stake out the garden to the required dimensions insuring positive flow into garden, the overflow elevation allows for six inches of ponding, and the perimeter of the garden is higher than the overflow point. If the garden is on a gentle slope a berm at least two feet wide can be constructed on the downhill side and/or the garden can be dug into the hillside taking greater care for erosion control at the garden inlet(s).
5. Remove turf or other vegetation in the area of the rain garden. Excavate garden being careful not to compact soils in the bottom of the garden. Level bottom of garden as much as possible to maximize infiltration area.
6. Mix compost, topsoil, and some of the excavated subsoil together to make the 'amended soil'. The soil mix should be 1/3 compost, 2/3 native soil (topsoil and subsoil combined).
7. Fill rain garden with the amended soil, leaving the surface eight inches below your highest surrounding surface. Eight inches allows for 6 inches ponding and 2" of mulch. The surface of the rain garden should be as close to level as possible.
8. Build a berm at the downhill edge and sides of the rain garden with the remaining subsoil. The top of the berm needs to be level, and set at the maximum ponding elevation.
9. Plant the rain garden using a selection of plants from elsewhere in this manual.
10. Mulch the surface of the rain garden with two to three inches of non-floating organic mulch. The best choice is finely shredded hardwood mulch. Pine straw is also an option.
11. Water all plants thoroughly. As in any new garden or flower bed, regular watering will likely be needed to establish plants during the first growing season.
12. During construction build the inlet feature as a pipe directly connected to a downspout or use a rock lined swale with a gentle slope. Use of an impermeable liner under the rocks at the end of the swale near the house is recommended to keep water from soaking in at that point. Test the drainage of water from the source to the garden prior to finishing.
13. Create an overflow at least 10 feet from your property edge and insure it is protected from erosion.

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	NAME/ADDRESS:	RAIN GARDEN SPECIFICATIONS PAGE 1 OF 2

SKETCH LAYOUT

PROVIDE PLAN VIEWS OF RAIN GARDEN AND HOUSE SHOWING DRAINAGE AREA DIRECTED TO RAIN GARDEN AND KEY DIMENSIONS AND OVERFLOW AREA RELATIVE TO PROPERTY LINE.

SIZING CALCULATION:

Contributing Drainage Area (square feet)	Depth of Amended Soil (inches)			
	18	24	30	36
	Area of Rain Garden (square feet)			
100	6.6	5.7	5.1	4.6
500	35	30	25	23
1000	65	60	50	45
2000	135	115	100	90
3000	200	170	150	140
4000	260	230	200	185
5000	330	290	255	230

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

CONTRIBUTING DRAINAGE AREA= _____ SQ FT
DEPTH OF SOIL MEDIA= _____ INCHES
AREA OF RAIN GARDEN= _____ SQ FT

MAINTENANCE:

1. IRRIGATE VEGETATION AS NEEDED IN FIRST SEASON
2. REMOVE WEEDS
3. REPLACE UNSUCCESSFUL PLANTINGS
4. REPLENISH MULCH
5. REPAIR ERODED AREAS
6. RAKE CLOGGED SURFACE TO RESTORE INFILTRATION
7. MONITOR RAIN GARDEN FOR APPROPRIATE DRAINAGE TIMES IF GARDEN DOES NOT DRAIN AN UNDERDRAIN MAY BE NECESSARY

METRO NASHVILLE DEPARTMENT OF WATER SERVICES	ATTACHED THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	RAIN GARDEN SPECIFICATIONS PAGE 2 OF 2

SECTION A

Residential Infill Stormwater Credit for Existing Trees

Each tree with a Diameter at Breast Height (DBH) of 6 inches or greater that is protected can reduce the impervious area requiring treatment by 50 square feet. The following conditions shall be met:

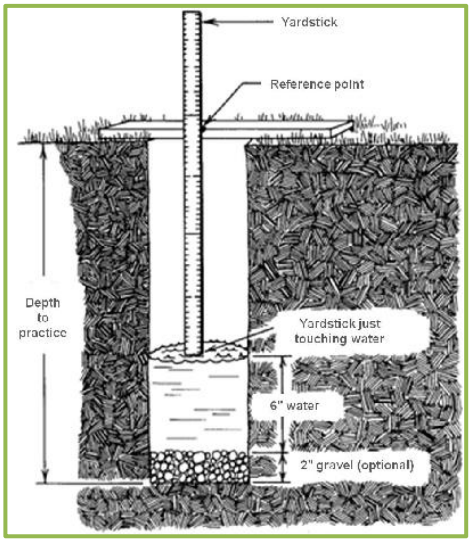
- No more than 20% of the net added impervious area can be mitigated with the credit.
- The location, species, and size of each tree being counted for credit is shown on the plan of record. A picture of the tree should also be included with the application.
- The tree is protected during construction in accordance with M.C.L. §17.24.110 or the *Saving Trees During Construction* guidance document.
- Bradford Pears and Ash trees will not be counted for credit.
- With the exception of the Vegetated Filter Strip Green Infrastructure Control, trees that are located within the boundaries of constructed stormwater infrastructure features cannot be counted for Infill Stormwater Credit.

If the protected tree(s) dies or is removed, the property owner may be subject to enforcement and will be responsible for providing impervious area treatment. This may include planting and maintaining additional trees or installing Green Infrastructure Controls.

SECTION B

Testing Infiltration: the Simple Approach

It is assumed that an infiltration rate of 0.25 to 0.50 inches per hour exists on residential sites. The sizing criteria are set for this rate. However, if the soils have a higher infiltration rate the size of the features could be reduced. At the discretion of the property owner the following infiltration test can be conducted, and if it returns a higher infiltration ate than 0.50 inches per hour suitable reductions in the size of the infiltration-based facilities can be made. See each practice for the adjustment procedure.



Source: modified from www.ag.ndsu

1. Infiltration features (rain gardens, dry wells, permeable paver gravel layers) should reliably drain within the recommended time limit. Here is how to test if your soils can handle this type of feature.
2. Locate the approximate center of the area where you expect to build your feature.
3. Dig an access pit down to the bottom of the amended soils or gravel layer in the feature.
4. At that elevation dig a narrow test hole at least eight inches deep. You can optionally place 2” of course gravel in the bottom. The test hole can be excavated with small excavation equipment or by hand using a spade shovel or post-hole digger.
5. If you run into a hard layer that cannot be penetrated with a shovel or, you come across water in the whole, stop. Infiltration features should not be sited over impenetrable rock surfaces or over high water tables, so your site is inappropriate.
6. Place a flat board across the hole to serve as a measuring point (see figure).
7. Fill the hole with water to a depth of six inches. Measure from the flat board to the water surface. Record the exact time you stop filling the hole and the height of the water every 10 minutes for fast draining soils for a minimum of one hour or every 30 minutes for slow draining soils for a minimum of two hours.
8. Refill the hole again and repeat step 5 twice more. The third test will give you the best measure of how quickly your soil absorbs water when it is fully saturated.
9. If on the third test the water is dropping at least ½” per hour the soil will work for the infiltration features.

Source: www.learntogrow.com

SECTION C

Recommended Plants

Plants for rain gardens and other vegetated stormwater practices must be able to tolerate both wet and dry conditions. This list, while not exhaustive, includes many plants that will tolerate conditions in rain gardens. The plants in this list do have different preferences for both moisture and light, as shown in the columns labeled 'Moisture' and 'Sun'. Additionally, the majority of these plants are native to central Tennessee and thus contribute the added benefit of providing habitat and food for native pollinators and wildlife. Native plant species are preferred over non-native species, but some ornamental species may be used for landscaping effect if they are not aggressive or invasive.

Table 1. is for use only when plants are spaced equidistant from each other as shown in **Figure 1.**, below.

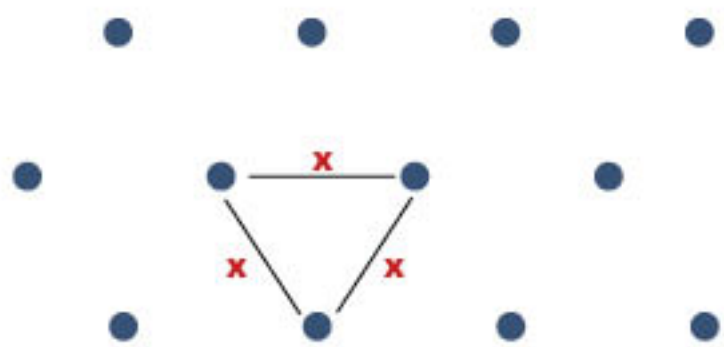


Figure 1. Typical plant spacing where x equals distance on center (O.C.) of plant species.

Table 1. Plant Spacing for Perennials, Grasses, Sedges and Shrubs	
Spacing (O.C.)	**Plants per 100 sq.ft.**
18" o.c.	51.2
24" o.c.	29
28" o.c.	22
30" o.c.	18.5
36" o.c.	12.8
42" o.c.	10
4' o.c.	7.23
5' o.c.	4.61
6' o.c.	3.2
8' o.c.	1.8

Table 2: Popular Native Perennials – Full Sun						
Latin Name	**Common Name**	**Size**	**Spacing**	**Moisture**	**Color**	**Height**
Asclepias incarnate	Marsh milkweed	Plugs – 1 gal.	1 plant/24" o.c.	Wet	Pink	3-4'
Asclepias	Purple milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Purple	3'
Asclepias syriaca	Common milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Orange	2-5'
Asclepias tuberosa	Butterfly milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Dry-moist	Orange	2'
Asclepias verdis	Green milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Green	2'
Asclepias verdicillata	Whorled milkweed	Plugs – 1 gal.	1 plant/18" o.c.	Moist	White	2.5'
Aster laevis	Smooth aster	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Blue	2-4'
Aster novae-angliae	New England aster	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Blue	2-5'
Aster sericeus	Silky aster	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Purple	1-2'
Chamaecrista	Partridge pea	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Yellow	1-2'
Conoclinium	Mist flower	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Blue	1-2'
Coreopsis lanceolata	Lance-leaf coreopsis	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	6-8'
Echinacea pallida	Pale purple coneflower	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Purple	2-3'
Echinacea purpurea	Purple coneflower	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	3-4'
Eupatorium	Boneset	Plugs – 1 gal.	1 plant/24" o.c.	Wet	White	3-5'
Eupatorium	Sweet Joe-Pye Weed	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	3-6'
Iris virginica	Flag Iris	Plugs – 1 gal.	1 plant/18" o.c.	Moist-Wet	Blue	2'
Liatris aspera	Rough blazingstar	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	2-5'
Liatris microcephalla	Small-headed	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	3'
Liatris spicata	Dense blazingstar	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	1.5'
Liatris squarrulosa	Southern blazingstar	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	2-6'
Lobelia cardinalis	Cardinal flower	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Red	2-4'
Monarda didyma	Bee balm	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Red	3'
Monarda fistulosa	Wild bergamot	Plugs – 1 gal	1 plant/18" o.c.	Moist	Purple	1-3'
Oenethera fruticosa	Sundrops	Plugs – 1 gal	1 plant/18" o.c.	Moist-dry	Yellow	
Penstemon digitalis	Smooth white	Plugs – 1 gal	1 plant/24" o.c.	Wet	White	2-3'
Penstemon hirsutus	Hairy beardtongue	Plugs – 1 gal	1 plant/18" o.c.	Dry	White	1-3'
Penstemon smallii	Beardtongue	Plugs – 1 gal	1 plant/18" o.c.	Moist	Purple	1-2'
Pycanthemum	Slender mountain mint	Plugs – 1 gal	1 plant/18" o.c.	Moist	White	1.5-2.5'
Ratibida piñata	Gray-headed	Plugs – 1 gal	1 plant/18" o.c.	Moist	Yellow	2-5'
Rudbeckia hirta	Black-eyed Susan	Plugs – 1 gal	1 plant/18" o.c.	Moist-dry	Yellow	3'
Salvia lyrata	Lyre-leaf sage	Plugs – 1 gal	1 plant/18" o.c.	Moist	Purple	1-2'
Solidago nemoralis	Gray goldenrod	Plugs – 1 gal.	1 plant/18" o.c.	Dry	Yellow	2'
Solidago rugosa	Rough-leaved	Plugs – 1 gal.	1 plant/18" o.c.	Wet	Yellow	1-6'
Veronacastrum	Culver's root	Plugs – 1 gal.	1 plant/24" o.c.	Dry	White	3-6'
Veronia veboracensis	Tall ironweed	Plugs – 1 gal.	1 plant/24" o.c.	Wet-moist	Purple	3-4'

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1

Table 3: Popular Native Perennials – Shade

Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
Aquilegia canadensis	Wild columbine	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Pink	1-2.5'
Athyrium filix-femina	Lady Fern	1 gal.	1 plant/18" o.c.	Moist	Green	3'
Arisaema triphyllum	Jack-in-the-pulpit	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Green	1.5-2.5'
Arisaema dricontium	Green dragon	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Green	3'
Asarum canadense	Wild ginger	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Red-brown	0.5-1'
Aster cardifolius	Blue wood aster	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Blue	1-3'
Aster novae-angliae	New England aster	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Blue/ purple	3-4'
Aster oblongifolius	Aromatic Aster	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Blue/ purple	1.5-3'
Coreopsis major	Tickseed coreopsis	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Yellow	3'
Dryopteris marginalis	Shield Fern	1 gal.	1 plant/18" o.c.	Moist	Green	2-3'
Geranium maculatum	Wild geranium	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Pink	2'
Heuchera americana	Alumroot	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	1'
Iris cristata	Dwarf crested iris	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Purple	4"
Lobelia siphilicata	Great blue lobelia	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Blue	1.5-3'
Lobelia cardinalis	Cardinal flower	Plugs – 1 gal.	1 plant/18" o.c.	Wet-moist	Red	2-4'
Mertensia virginica	Virginia bluebells	Plugs – 1 gal.	1 plant/18" o.c.	Moist	Blue	1.5'
Osmunda cinnamomea	Cinnamon Fern	1 gal.	1 plant/24" o.c.	Wet-moist	Green	3-4'
Phlox divericata	Blue phlox	Plugs – 1 gal.	1 plant/18" o.c.	moist	Blue	0.5-2'
Polemonium reptans	Jacob's ladder	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Blue	15"
Polystichum acrostichoides	Christmas fern	Plugs – 1 gal.	1 plant/24" o.c.	Moist-dry	Evergreen	2'
Stylophoru diphyllum	Wood poppy	Plugs – 1 gal.	1 plant/18" o.c.	Wet -moist	Yellow	1.5'

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table 4: Popular Native Grasses and Sedges

Latin Name	Common Name	Size	Spacing	Moisture	Color	Height
Carex grayi	Gray's Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3'
Carex muskingumensis	Palm Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3'
Carex stricta	Tussock Sedge	1 gal.	1 plant/24" o.c.	Moist	Green	3-4'
Chasmanthium latifolium	Upland Sea Oats	Plugs – 1 gal.	1 plant/18" o.c.	Moist-dry	Green	4'
Equisetum hyemale	Horsetail	Plugs – 1 gal.	1 plant/18" o.c.	Wet	Green	3'
Juncus effesus	Soft Rush	Plugs – 1 gal.	1 plant/24" o.c.	Wet-dry	Green	4-6'
Muhlenbergia capallaris	Muhly Grass	1 gal.	1 plant/24" o.c.	Moist	Pink	3'
Panicum virgatum	Switchgrass	1-3 gal.	1 plant/48" o.c.	Moist-dry	Yellow	5-7'
Schizachyrium scoparium	Little Blue Stem	1 gal.	1 plant/24" o.c.	Moist-dry	Yellow	3'
Sporobolus heterolepsis	Prairie Dropseed	1 gal.	1 plant/24" o.c.	Moist-dry	Green	2-3'

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table 5: Popular Native Small Trees

Latin Name	Common Name	DT-FT	Light	Moisture	Notes	Flower Color	Height
Ameleanchier Canadensis	Serviceberry		Sun-pt shade	Moist-wet	Eatable berries	White	*15-25'*
Asimina triloba	Paw Paw		Sun-pt shade	Moist	Eatable fruits	Maroon	*15-30'*
Cercus Canadensis	Redbud	DT	Sun-shade	Moist	Pea-like flowers, seed pods	Purple	*20-30'*
Chionanthus virginicus	Fringetree		Sun-pt shade	Moist	Panicled, fragrant flowers	White	*12-20'*
Cornus florida	Flowering Dogwood		Part Shade	Moist	Red fruit, wildlife	White	*15-30'*
Magnolia virginiana	Sweetbay Magnolia		Sun-pt shade	Moist-wet	Evergreen	White	*10-60'*
Rhamnus caroliniana	Carolina Buckthorn		Sun	Moist	Black fruit		*15-30'*

Size: min. 2" caliper DT: Drought Tolerant FT: Flood Tolerant

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table 6: Popular Native Medium-Large Trees

Latin Name	Common Name	DT-FT	Light	Moisture	Notes	Flower Color	Height
Acer rubrum	Red Maple	DT-FT	Sun-shade	Dry-wet	Fall Color		*50-70'*
Acer saccharum	Sugar Maple		Sun-pt shade	Moist	Fall Color		*50-75'*
Betula nigra	River Birch	FT	Sun-pt shade	Moist-wet	Exfoliating bark		*40-70'*
Carpinus caroliniana	Ironwood		Sun-pt shade	Moist		White	*40-60'*
Carya aquatica	Water Hickory	FT-DT	Sun	Moist	Fall Color		*35-50'*
Cladratis lutea	Yellowwood	DT	Sun	Dry-moist	Fall Color	White	*30-45'*
Ilex opaca	American Holly	DT	Sun-pt shade	Moist	Evergreen	White	*30-50'*
Liquidambar styraciflua	Sweetgum	DT-FT	Sun-pt shade	Dry-moist	Spiny fruit		*60-100'*
Nyssa sylvatica	Black Gum		Sun-shade	Moist	Fall Color		*35-50'*
Oxydendrum arboretum	Sourwood		Sun-pt shade	Dry-moist	Wildlife	White	*20-40'*
Platanus occidentalis	Sycamore	FT	Sun-pt shade	Moist	White mottled bark		*70-100'*
Quercus bicolor	Swamp White Oak	DT	Sun-pt shade	Moist-wet	Acorns		*50-60'*
Quercus nuttalli	Nuttal Oak	DT	Sun	Dry-moist	Acorns		*40-60'*
Quercus lyrata	Overcup Oak	FT	Sun	Moist	Acorns		*40-60'*
Quercus shumardii	Shumard Oak	DT	Sun	Moist	Acorns		*40-60'*
Salix nigra	Black Willow	FT	Sun-pt shade	Moist-wet	White catkins	Yellow	*40-60'*
Ulmus americana	American Elm	DT-FT	Sun-pt shade	Moist			

Size: min. 2" caliper DT: Drought Tolerant FT: Flood Tolerant

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table 7: Popular Native Small-Medium Shrubs

Latin Name	Common Name	DT-FT	Light	Moisture	Spacing	Notes	Flower Color	Height
Buddleia davidii	Butterfly Bush	DT	Sun-pt shade	Dry-moist	4'	Non-native	*Blue*	*5'*
Callicarpa Americana	American Beautyberry	DT	Sun-pt shade	Dry-wet	5'	Showy purple fruit	*Lilac*	*4-6'*
Clethra alnifolia	Sweet Pepper Bush		Sun-pt shade	Dry-moist	3'	Hummingbird	*White*	*5-8'*
Hibiscus moscheutos	Swamp Mallow	FT	Sun	Moist-wet	30"	Cold-hardy	*White-red*	*4-7'*
Hydrangea quercifolia	Oakleaf Hydrangea	DT	Pt shade-shade	Moist	4'	Winter texture	*White*	*3-6'*
Hypericum frondosum	Golden St. John's Wort	DT	Sun-pt shade	Dry-moist	30"	Semi-evergreen	*Yellow*	*2-3'*
Hypericum prolificum	Shrubby St. John's Wort	DT	Sun-pt shade	Dry-moist	3'	Semi-evergreen	*Yellow*	*3'*
Ilex glabra	Inkberry	DT	Sun-pt shade	Moist-wet	3'	Evergreen		*4-8'*
Itea virginica	Virginia Sweetspire	DT-FT	Sun-Shade	Moist-wet	4'	Fall color	*White*	*4-8'*
Viburnum dentatum	Arrowwood Viburnum		Sun-shade	Dry-wet	6'	Wildlife	*White*	*6-8'*

Size: min. 3 gal. container or equivalent. DT: Drought Tolerant FT: Flood Tolerant

This list provides plant species; there are multiple varieties within each species.

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

Table 8: Popular Native Large Shrubs								
Latin Name	**Common Name**	**DT-FT**	**Light**	**Moisture**	**Spacing**	**Notes**	**Flower Color**	**Height**
Aronia arbutifolia	Red Chokeberry	FT	Sun-pt shade	Dry-wet	4'	Red berries, wildlife	*White*	*6-12'*
Cephalanthus occidentalis	Button Bush	FT	Sun-shade	Moist-wet	5'	Attracts wildlife	*White*	*6-12'*
Cornus amomum	Silky Dogwood		Sun-shade	Moist-wet	6'	Blue berries, wildlife	*White*	*6-12'*
Corylus americana	American Hazelnut		Sun-pt shade	Dry-moist	8'	Eatable nuts, wildlife	*Yellow*	*8-15'*
Hamemelis virginiana	Witch-hazel		Sun-pt shade	Dry-moist	8'	Winter bloom	*Yellow*	*10'*
Ilex decidua (dwarf var.)	Possumhaw Viburnum	DT	Sun-pt shade	Moist	4-6'	Red berries		*6-14'*
Illex verticillata	Winterberry Holly	FT	Sun-pt shade	Moist-wet	3'	Red berries		*10'*
Lindera benzoin	Spicebush	DT	pt shade-shade	Moist-wet	8'	Butterflies, wildlife	*Yellow*	*6-12'*

Size: minimum 3 gal. container or equivalent. DT: Drought Tolerant FT: Flood Tolerant

This list provides plant species; there are multiple varieties within each species.

Plant material size and grade to conform to "American Standards for Nursery Stock" American Association of Nurserymen, Inc. latest approved revision, ANSI Z-60-1.

SECTION D

The Simple Method of Determining Adequate Flow Area

This method is only to be used to determine adeqate flow area required for projects that are classified as a Tier 1 development.

Step 1: Determine flow patterns on your project site, specifically where flow exits the project.

Step 2: Where flow exits the site determine existing flow area of the exiting drainage channels on your site using the schematic and equation below in Figure 1. Mark on the plans where flow area was determined.

Step 3: Once flow area has been calculated, determine the impervious area (IA) of the project and the nearest lot area to determine the required flow area for your site.

Step 4: A) If the result of **Step 2** is *less* than **Step 3** adequate drainage is not present and the developer must follow Tier 2 guidelines. B) If the result of **Step 2** is *greater* than **Step 3** adequate drainage is present. If B, then the developer must submit calculations and site plan to the Development Services Center for verification.

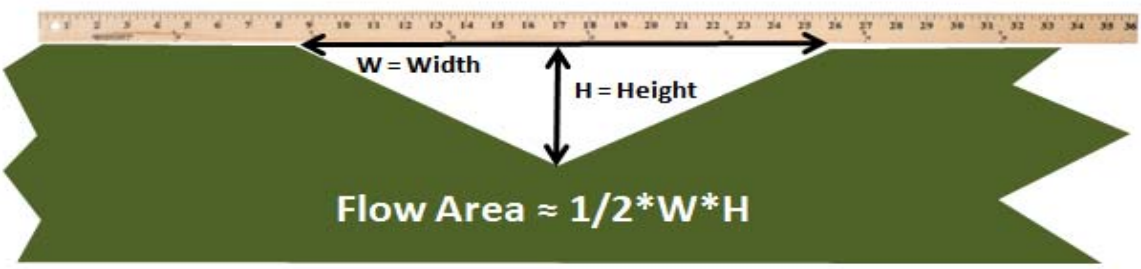


Figure 1 Simple Method Flow Area Calculation

Table 1 Simple Method Flow Area Required

Flow Area in Square Feet

	Total lot area -->		1/4 Acre		1/2 Acre		1 Acre
IA (sq ft).	1,000	5,000	10,890	15,000	21,780	30,000	40,000
1,200	0.12	0.19	0.29	0.36	0.48	0.62	0.80
2,500	0.23	0.30	0.40	0.47	0.59	0.73	0.91
3,000	0.27	0.34	0.44	0.51	0.63	0.78	0.95
4,000	0.35	0.42	0.53	0.60	0.72	0.86	1.03
5,000	0.44	0.51	0.61	0.68	0.80	0.94	1.12
7,500	0.65	0.72	0.82	0.89	1.01	1.15	1.33
10,000	0.86	0.93	1.03	1.10	1.22	1.36	1.54
30,000	2.53	2.60	2.71	2.78	2.90	3.04	3.21
40,000	3.37	3.44	3.54	3.62	3.74	3.88	4.05

Read impervious area on the left then read across to right the nearest TOTAL lot size

Concrete channel flow area is 2/3 of the vegetated channel