



Chapter 3 Stormwater Management Performance Standards

3.1 Overview

The City of Chattanooga’s stormwater management program, as described in this manual, imposes requirements for new and redevelopment projects to manage stormwater runoff for **volume, water quality treatment, and peak flow rate**. LID practices and strategies such as conservation, preservation, restoration, and green infrastructure measures identified and described in Chapter 5 may be used to meet the stormwater management requirements.

The specific stormwater management requirements for a given project are determined by:

- The amount of land disturbed
- Whether the project is a new project or a redevelopment project
- Which major watershed the project is located in

Certain types of projects that incorporate beneficial land development practices (i.e., transit-oriented development or high-density development) may be eligible for reduced stormwater requirements. Additionally, certain stormwater practices – such as green roofs and pervious pavement – may provide further benefits (incentives) to the applicant when designing a stormwater management system.

A major new component of the City’s stormwater program is the requirement to manage the first inch of every rainfall event such that there is no surface water discharge from the project site. Projects that are able to meet this “volume management” requirement are considered to also meet the water quality treatment requirements. Throughout this manual, the required volume to be managed is referred to as the “stay-on-volume” or SOV, as discussed later in this chapter.

For project sites unable to meet 100 percent of the SOV, “...the remainder of the stipulated amount of rainfall must be treated prior to discharge with a technology documented to remove 80 percent of the total suspended solids (TSS).¹” Based on Chattanooga specific analysis of pollutant loadings, the stipulated rainfall has been determined to be the 1-year, 24-hour type II rainfall event for BMPs that treat flow rates and 2.1-inch rainfall for BMPs that treat volumes.

The treated runoff is still subject to peak rate control. For projects unable to meet SOV requirements, the City may allow an offsite mitigation project or fee-in-lieu payment in accordance with provisions in the

¹ City of Chattanooga MS4 Permit, TNS068063, 3.2.5.2 Pollutant Removal





MS4 Permit, Articles 3.2.5.2.3 and 3.2.5.2.4 (see Section 3.10). These provisions provide for “partial” volume management allowances and credits.

3.2 Design Approach

LID is a stormwater management and design strategy that is integrated into the design of development projects in order to conserve natural resources that provide valuable functions associated with controlling and filtering stormwater; minimizing and disconnecting impervious surfaces; directing runoff to natural and landscaped areas conducive to infiltration; and using distributed small-scale controls or integrated stormwater management BMPs to mimic a site’s pre-project hydrologic condition. To encourage LID practices, such as limited site disturbance and the protection of important (and beneficial) natural features, the SOV and water quality requirements apply only to those portions of a project site that are disturbed. Additionally, certain restorative LID practices – such as planting natural landscapes – provide volume management.

In addition to SOV and water quality requirements, projects are required to provide mitigation of the peak rate of runoff after development. The City recognizes that the new requirements to manage stormwater volume will also have benefits for reducing peak flow rates. This document provides guidance for volume management such that discharge rate control may be adjusted to reflect the volume reduction benefits of LID.

This chapter discusses the method for determining the applicable stormwater management and permitting requirements for a project. Specific technical requirements for calculations and documentation are provided in Chapter 7.

3.3 Determining Applicability

The three factors that determine stormwater management applicability are the amount of land disturbance, whether a project is a new or redevelopment project, and the watershed location of the project.

3.3.1 Land Disturbance

All new and redevelopment projects that disturb 1,000 square feet or more of land are subject to the requirements of the City of Chattanooga’s stormwater management program. The amount of land disturbance associated with a project is important in determining the level of design documentation, regulatory review, and permitting approval required for an individual project. For example, small projects with land disturbance of less than 1 acre (and more than 1,000 square feet) are required to obtain a Land Disturbing Permit from the City, acquire Erosion and Sediment Control Plan approval from the City, and





comply with City stormwater regulations, but are not required to obtain an NPDES Permit for Stormwater Discharges Associated with Construction Activities from TDEC. The specific stormwater management and permitting requirements based on the area of land disturbance are summarized in Table 3-1.

Table 3-1. Permitting and Documentation Requirements Determined by Level of Land Disturbance

Note	Level of Disturbance	LDP	E&SC Plan	E&SC City Permit	Simple Method	Performance Method	TN NPDES Permit
3	≥ 1,000 square feet to 4,999 square feet disturbed area, or < 500 square feet impervious area	√	√	√			
1, 2, 3	≥ 5,000 square feet to 21,779 square feet (0.5 acre) disturbed area	√	√	√	√		
1, 2, 3	≥ 0.5 acre to < 1.0 acre disturbed	√	√	√	R	N	
	≥ 1.0 acre disturbed	√	√	√		√	√

Legend:

- 1) Simplified method must have peak rate attenuation for new development
- 2) Provided it is not part of a larger development
- 3) Combined sewer overflow (CSO) area must have peak rate attenuation for all additional impervious area as well as additional fixtures in buildings
- 4) LDP – Land Disturbing Permit
- 5) E&SC – Erosion and Sediment Control
- 6) R – Redevelopment
- 7) N – New development

Land Disturbing Activity

Chapter 31, Article VIII of the Chattanooga City Code defines Land Disturbing Activity as: “Any land change which may result in soil erosion from water and wind and the movement of sediments into community waters or onto lands and roadways within the community, including, but not limited to clearing, dredging, grading, excavating, transporting and filling of land.”

For the purposes of determining stormwater management requirements, the following activities are considered land disturbance:





- Land development
- Clearing and grubbing
- Grading
- Excavation
- Creation of embankments
- Moving, depositing, or stockpiling soil, rock, or earth materials
- Constructing private roads
- Constructing vehicle paths and rock construction entrances

Activities that are not considered land disturbance (and that are not subject to the stormwater management requirements) include:

- Individual home gardening, repairs, and maintenance
- Individual service and sewer connections for single- or two-family residences
- Certain agricultural practices
- Projects under the technical supervision of the U.S. Natural Resource Conservation Service
- Installation, maintenance, and repairs of aboveground utilities
- Construction, repair, or rebuilding of railroad tracks
- Milling and repaving of roads and pavement including full depth reclamation provided that the subbase is undisturbed

BMPs for erosion and sediment control are still required to be implemented for these activities.

3.3.2 New and Redevelopment

The second factor that determines the extent of stormwater management requirements is whether a project is a new development or a redevelopment project. Both new and redevelopment projects are subject to the stormwater requirements, but the volume of stormwater management required may differ.

Construction of a new building or structure on its own lot is considered new development. Redevelopment is the alteration of developed land. For example, removal of an existing parking lot for construction of a new building is considered redevelopment for the purposes of compliance with the stormwater requirements. The term redevelopment is not intended to include such activities as exterior remodeling, which would not be expected to cause adverse stormwater quality impacts. New buildings or structures constructed on a lot that already contains existing buildings, and which are not part of a phased project, may be considered redevelopment.





3.3.3 Project Watershed

The third factor determining the stormwater management requirements is the watershed location of a project. Both new and redevelopment projects, except those located in the South Chickamauga Creek watershed, must manage the first 1.0 inch of every rainfall event. The South Chickamauga Creek watershed is a TDEC-designated Exceptional Tennessee Water, and therefore, a higher performance standard has been set for protection of this watershed.

New development projects located in the South Chickamauga watershed must manage the first 1.6 inches of every rainfall event such that no runoff leaves the site (i.e., provide volume management). Redevelopment projects in the South Chickamauga watershed are required to manage only the first 1.0 inch of each rainfall event.

The standards applicable to different projects based on project type and watershed location are indicated in Table 3-2.

This manual is intended to provide technical direction on stormwater management practices to meet the requirements of the City's MS4 NPDES Permit, and as codified in the City of Chattanooga Code, Chapter 31, Article VIII. **THESE CRITERIA MAY BE SUBJECT TO LATER CHANGE AND PROJECTS LOCATED IN WATERSHEDS DESIGNATED AS EXCEPTIONAL TENNESSEE WATERS OR AS IMPAIRED WATERS BY TDEC MAY BE SUBJECT TO MORE RESTRICTIVE REQUIREMENTS DETERMINED BY THE CITY.** The applicant is responsible for determining the current applicable stormwater requirements as defined by the tables and figures provided by the City at <http://www.chattanooga.gov/public-works/city-engineering-a-water-quality-program>.





Table 3-2. Applicable Rainfall Depth for Stormwater Management Based on Project Type and Watershed Location

PROJECT TYPE		RAINFALL DEPTH
REDEVELOPMENT		1.0-inch
NEW DEVELOPMENT	ALL OTHER	1.0-inch
	SOUTH CHICKAMAUGA WATERSHED (INCLUDING FRIAR BRANCH AND MACKEY BRANCH)	1.6-inches

3.4 Performance Standards

Projects that are subject to the City’s stormwater management requirements must address three components of stormwater management. These performance standards include:

1. Volume Management (SOV)
2. Water Quality Treatment
3. Peak Rate Control

1. Volume Management or Stay-on-Volume

The City’s MS4 Permit requires “all new and redevelopment projects to incorporate runoff reduction measures designed, constructed, and maintained to manage (infiltrate, evapotranspire, harvest and/or reuse), at a minimum, the first inch of water from every rainfall event preceded by 72 hours of no measurable precipitation with no discharge from the project site to surface waters.”

SOV is the volume of stormwater (in cubic feet) that must be captured and managed onsite as required by the City’s stormwater regulations with no discharge to surface waters or City storm sewers. SOV is calculated based on the rainfall depth and the land cover types within the project area. The first step in determining a site’s numerical SOV requirement is to determine the depth of rainfall that must be managed, as discussed previously in this chapter and as indicated in Table 3-2. Unless otherwise stipulated, SOV will be calculated using a 1-inch rainfall event.





The methodology to calculate SOV, using rainfall depth and project land use data, is based on the Small Storm Hydrology Method. Detailed information on the methodology, as well as guidance and worksheets on calculating SOV, is provided in Chapter 7 in of this manual.

Projects that manage the SOV from 100 percent of the disturbed area are assumed to have met all water quality (pollutant removal) requirements pursuant to Section 3.2.5.2.2 of the City's MS4 Permit.

Management of SOV may be accomplished through evapotranspiration, harvesting, reuse, infiltration, or any combination thereof. Specific techniques and practices (BMPs) that can be used to manage the SOV are described in detail in Chapter 5 of this manual. Projects that implement practices to reduce the amount of site disturbance (protective BMPs) can reduce the required SOV. Practices that restore important natural features (restorative BMPs) also provide direct and quantifiable SOV benefits. The specific guidance on the design requirements for BMPs, including protective, structural, and restorative BMPs, is provided in Chapter 5.

SOV and Infiltration:

Infiltration of runoff into the soil mantle is one of a number of techniques available to manage the SOV. There are numerous water quality benefits to infiltration; however, the capacity of a project site to incorporate infiltration must be determined, and the BMPs designed accordingly. Not all project sites will be suitable for infiltration. For projects proposing infiltration of any portion of the SOV, technical documentation must be provided indicating that infiltration is feasible, and that the BMPs are appropriately designed for site conditions.

Guidance regarding infiltration testing methods, procedures, and design guidelines is provided in Protocols 3 and 4 of this manual. For permitting purposes (as described in Chapter 4), during the **concept stormwater management plan phase**, a desktop analysis is sufficient and detailed testing is not required. Detailed testing is required for final plan approval.

While more detailed guidance is provided in Protocols 3 and 4 regarding infiltration testing, feasibility, and design practices, important infiltration considerations include the following:

- Infiltration is generally not feasible or recommended on slopes greater than 15 percent.
- Infiltration is not recommended on soils consisting of fill material. Compaction of fill will impede infiltration.
- Runoff from hot spot areas cannot drain to proposed infiltration areas.
- The bottoms of proposed infiltration strategies must be separated by at least 2 feet (vertically) from any limiting layer (seasonal high water table, bedrock, etc.).





- Infiltration strategies must be located in accordance with the TDEC Division of Water Resources to ensure compliance with setbacks from any water supply well.
- Infiltration setbacks from buildings and structures must be maintained as required to be consistent with the City's Building Code and Protocol 1.

Whenever the SOV from the project area cannot be managed or achieved onsite, the applicant/owner must provide appropriate documentation to the City detailing why SOV cannot be managed.

2. Water Quality Treatment

The City's MS4 Permit requires projects that are unable to manage 100 percent of the SOV to provide water quality treatment to unmanaged water volume before it may be discharged. Projects that manage the SOV from 100 percent of the disturbed area are assumed to have met all water quality (pollutant removal) requirements. Unmanaged runoff volume must achieve 80 percent TSS reduction.

The water quality of the City's streams and waterways is adversely impacted by TSS, which originates from two primary sources. The first source is "runoff" from the land surface during storm events. This runoff conveys pollutants washed from the land surface, including TSS and pollutants that are attached to the TSS particles. The second source of TSS is stream channel erosion (hydro-modification). Stream channel erosion is a result of the increased volume of runoff from development during small and moderate rainfall events. As the channel widens and deepens to carry the increased runoff, the stream channel itself is eroded. For this reason, volume management (SOV capture) provides water quality benefits.

If 100 percent of the SOV cannot be managed, treatment of the water quality volume must be provided, and the treated water released in accordance with peak discharge requirements. Further discussed in Chapter 7, the water quality volume (WQv) is defined as the runoff resulting from the 1-year, 24-hour type II rainfall event for BMPs that treat flow rates and 2.1-inch rainfall for BMPs that treat volumes. The specific requirements for capture, treatment, and release of the WQv are also provided in Chapter 7, and can be met by BMPs described in Chapter 5.

3. Peak Rate and Flood Control Standards

Projects proposing land disturbance must implement measures as necessary to mitigate the post-development peak runoff rates to no greater than pre-development peak runoff rates for the 2-, 5-, 10-, and 25-year 24-hour storm events. In addition to peak rate attenuation for the 2-, 5-, 10-, and 25-year 24-hour storms, the peak flow rate and maximum water surface elevations must be calculated for the 100-year storm event. Please see Table 3-1.





Projects up to ½ acre of disturbance may be eligible for the Simplified Approach for stormwater calculations, as described later in this chapter.

The performance requirements for new and redevelopment projects are summarized on Figure 3-1.

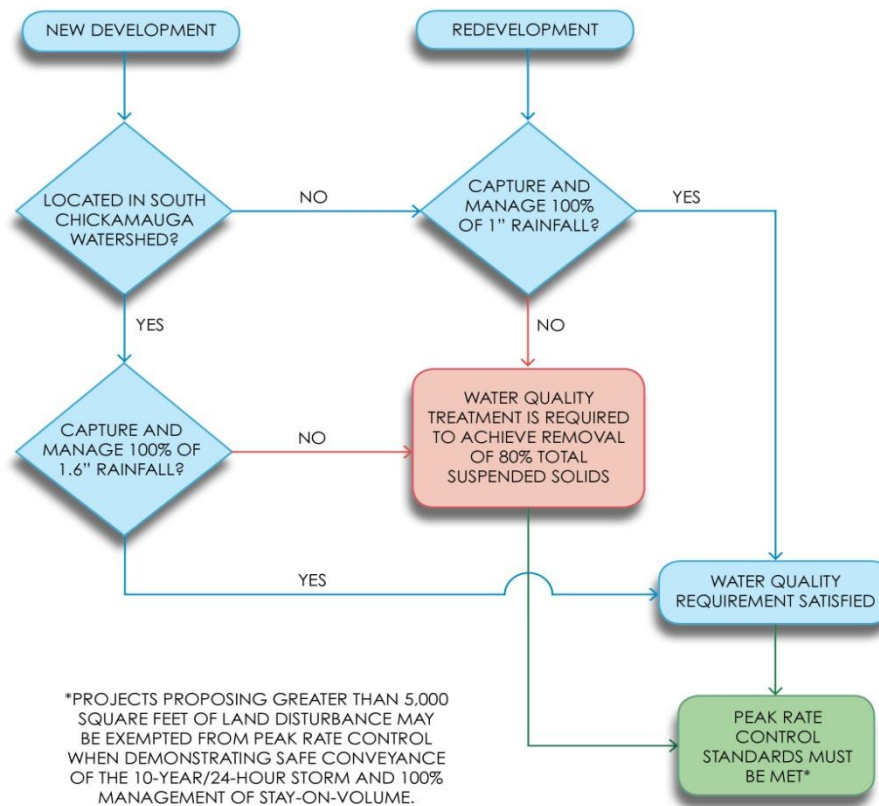


Figure 3-1. Stormwater Performance Requirements for New and Redevelopment Projects

Because BMPs and SOV practices can directly reduce the peak rate of runoff from a project site, guidance is provided in Chapter 7 regarding calculation methodologies that the applicant can use to quantify this benefit when calculating peak flow rates.





3.5 Simplified Approach

Applicants/owners seeking Land Disturbing Permits for small projects may demonstrate management of the required SOV using a Simplified Approach, with City approval.

Small Project:

A small project (see Table 3-1) is any project where less than ½ acre of land disturbance is proposed.

Simplified Approach:

The Simplified Approach to demonstrating SOV requirements allows applicants/owners proposing qualifying small projects (CSO area excluded) to construct and maintain specific LID practices without detailed engineering SOV calculations of the proposed BMPs. Small projects that do not fully meet SOV requirements must meet water quality requirements. The Simplified Approach requires applicants/owners to provide detailed site information, technical design, and performance information to demonstrate compliance with all other stormwater management regulations as also identified in Table 3-1. This is also discussed in Chapter 4.

Applicants/owners must obtain City approval to use the Simplified Approach prior to submitting a Land Disturbing Permit Application by attending a concept plan meeting with the City. The City is not required to grant the use of the Simplified Approach to any applicant/owner and may, at its discretion, deny approval to use the Simplified Approach and require adherence to the Performance Approach outlined in Section 3.6 below.

3.6 Performance Approach

Projects for which the proposed area of land disturbance is equal to or greater than ½ acre, and projects that have not received City approval to use the Simplified Approach, must implement the Performance Approach to stormwater management. The Performance Approach requires applicants/owners to provide detailed site information, technical design, and performance information to demonstrate compliance with all stormwater management regulations, including peak rate mitigation to pre-development flow rates for the 2-, 5-, 10-, and 25-year storm 24-hour events. Chapter 7 provides specific guidance.

Applicants/owners must complete and submit the supporting documentation with all preliminary and final subdivision plans and with all land development plan submissions. The City may require any applicant/owner to submit additional calculations and/or supporting documentation as necessary.





3.7 Incentives

Certain redevelopment projects may be eligible for a reduction in the required volume of stormwater that must be managed based on the City's incentive standards for redeveloped sites. Redevelopment credits will be determined by the City at the concept stormwater management phase.

The City's MS4 Permit allows incentive standards for redeveloped sites. The City **may** allow a 10 percent reduction in the volume of rainfall to be managed for the following types of development:

- Redevelopment within certain areas as defined by the City
- Brownfield redevelopment
- High density (> 7 units per acre)
- Vertical density (floor to area ratio [FAR] of 2 or > 18 units per acre)
- Mixed-use and transit-oriented development (within ½ mile of transit)

The 10 percent volume management reduction may be cumulative up to 50 percent for sites that meet multiple incentives. The approval of any incentive reduction is at the discretion of the City to determine if the site meets the intent of the incentives. The applicant/owner must demonstrate that the proposed project meets the intent of the incentives.

3.8 Offsite Mitigation and Mitigation Fee (Fee-in-Lieu)

Offsite Mitigation:

Where the SOV from 100 percent of the project area cannot be managed or achieved onsite, the applicant/owner may elect to propose offsite mitigation for City approval. Applicants/owners that have obtained City approval must manage 1.5 times the unmanaged SOV offsite at another location within the same United States Geological Survey (USGS) 12-digit Hydrologic Unit Code (HUC). Offsite mitigation projects may be located on private or public property, as approved by the City, and are subject to all Land Disturbing Permit requirements.

Mitigation Fee (Fee-in-Lieu):

Where the SOV from 100 percent of the project area cannot be managed or achieved onsite, the applicant/owner may, instead of offsite mitigation, propose to make payment into a public stormwater project fund established by the City. Payment of this fee in lieu of managing 100 percent of the SOV must be approved by the City and, at a minimum, be equal to 1.5 times the estimated cost of onsite runoff reduction controls.





Applicants/owners must obtain City approval for payment of a mitigation fee in lieu of managing stormwater. The City may at its discretion deny the use of the mitigation fee to any applicant/owner if stormwater management may be more fully implemented on a site.

Peak Rate Control:

Projects approved for offsite mitigation or fee-in-lieu must meet peak rate control and mitigation requirements for discharges from the project site as discussed in this chapter.

Considerations for Offsite Mitigation or Mitigation Fee (Fee-in-Lieu):

Whenever the SOV from 100 percent of the project area cannot be managed or achieved onsite, the applicant/owner must provide appropriate documentation to the City detailing why SOV or WQv cannot be managed. Economic hardship, site program density (lack of space for BMPs), and other similar conditions are not presumed as a basis for site inability to meet SOV and/or peak rate control requirements.

Acceptable reasons for **not** managing all of the SOV from 100 percent of the project area onsite may include:

- The depth from the existing ground surface to seasonal high groundwater or other limiting layer (i.e., till or bedrock) is less than 2 feet, or the depth from the base of a proposed infiltration SOV management strategy to seasonal high groundwater or other limiting layer is less than 2 feet **and** other volume reduction measures (i.e., reuse, restoration) cannot be implemented to meet full SOV requirements.
- Contaminated soils or other site constraints **and** other volume reduction measures (i.e., reuse, restoration) cannot be implemented to meet full SOV requirements.
- The City has identified a preferred stormwater project or location in lieu of management at the site.
- Conditions as identified and approved at the discretion of the City.

3.9 Requirements for Construction Site Runoff (Erosion and Sedimentation)

Erosion and Sediment Control Plan:

Chattanooga City Code defines an Erosion and Sediment Control Plan (E&S Plan) as a written plan, including drawings or other graphic representations, for the control of soil erosion and sedimentation resulting from a land disturbing activity. In accordance with Chattanooga City Code, an E&S Plan shall apply BMPs in accordance with the latest adopted manual for that purpose and as specified in the City Code,





Chapter 31, Article VIII. The E&S Control Plan shall be approved by the manager prior to the issuance of the Land Disturbing Permit.

3.10 Resources

1. City of Chattanooga MS4 Permit Number TNS068063, accessed at: <http://www.tn.gov/environment/wpc/stormh2o/TNS068063.pdf>
2. EPA Green Infrastructure, accessed at: <http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm>
3. TDEC Green Development, accessed at: http://tennessee.gov/environment/greendev/green_links.shtml
4. Low Impact Development Center Urban Design Tools for Low Impact Development, accessed at: <http://www.lid-stormwater.net/index.html>
5. Natural Resources Development Council Low Impact Development, accessed at: <http://www.nrdc.org/water/pollution/storm/chap12.asp>
6. American Rivers, Clean Water for Maryland Local Ordinances for Environmental Site Design, accessed at: <http://www.americanrivers.org/assets/pdfs/clean-water-/clean-water-for-maryland.pdf>
7. 4th Edition of the [Tennessee Erosion & Sediment Control Handbook](#); Editable [standard drawings](#)
8. City of Chattanooga GIS maps at: <http://www.chattanooga.gov/searchresults?q=gis+maps>

