# *Water Quality Design Manual*

## *July 2024 Edition*

**Bioretention (aka Rain Garden)**

## Prepared by the Town of Huntersville
## &
## Mecklenburg County's Water Quality Program

**Previous Editions of the Manual Available Upon Request to**
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## Section 1. Purpose of Manual

The purpose of this document is to provide information for compliance with Section 8.17 of Huntersville's Zoning Ordinance henceforth referred to in this document as "the Ordinance" that was adopted by the Huntersville Town Board on February 17, 2003 and is provided at the following link: https://huntersville.municipalcodeonline.com/book?type=zoning#name=8.17_Water_Quality. Section 8.17.8 of the Ordinance references the document contained herein as the Huntersville Water Quality Design Manual henceforth referred to in this document as "the Manual" and specifies that the Stormwater Administrator as defined in Section 8 below shall use the policy, criteria, and information, including technical specifications and standards, in the Manual as the basis for decisions about Stormwater Management Permits and about the design, implementation and performance of structural and non-structural stormwater control measures (SCMs). The Ordinance specifies that this Manual includes acceptable SCMs for compliance with ordinance requirements, which are described in Tables 2.1 and 2.2. The design criteria for the SCMs identified in these table are contained in the Charlotte-Mecklenburg SCM Design Manual located at the following link: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/SCM-Design-Manual. SCMs that are designed and constructed in accordance with these criteria will be presumed to meet the minimum water quality performance standards of the Ordinance and the federal Phase II Stormwater Rules. The goal of the Ordinance and this Manual is to establish stormwater management requirements and controls to prevent surface water quality degradation to the extent practicable in the streams and lakes within the Town Limits and Extraterritorial Jurisdiction of Huntersville and to protect and safeguard the general health, safety, and welfare of its residents. Low Impact Development (LID) SCMs combined with conventional SCMs are the primary mechanisms discussed in this document for meeting this goal and complying with the Ordinance.

LID is a technology-based system for managing urban stormwater runoff that combines a hydrologically functional site design with pollution prevention measures to compensate for land development impacts on hydrology and water quality. To be most effective, LID should be applied to every phase of site planning, design, development, and post-construction control for the purpose of mimicking predevelopment site hydrology by storing, infiltrating, evaporating, and detaining stormwater runoff. Examples of the LID techniques include reducing impervious surfaces, managing stormwater closer to the source and avoiding large, centralized management devices, phased grading, and vegetated conveyances instead of storm drain piping. The principal goal of LID is to ensure maximum protection of the ecological integrity of the receiving waters by maintaining the watershed's hydrologic regime. In contrast, conventional stormwater management techniques seek to alter the watershed's hydrologic regime by conveying runoff into piping systems and centralized stormwater management devices to remove stormwater quickly and efficiently from the development site. Most development practices in Mecklenburg County follow this conventional approach to stormwater management.

The Ordinance combines LID and conventional stormwater management techniques to form a hybrid LID approach. One of the post-construction components of LID is the LID SCM, which is a structural device that utilizes the LID principles of infiltration, evaporation, retention, and detention as well as biological and physical processes to treat stormwater runoff. The use of LID

SCMs is required by this Ordinance unless mitigation practices are approved and implemented. It is recommended to use as many of the other LID techniques as possible in combination with LID SCMs as described in Section 4 of this document, which is the most effective and efficient combination for managing stormwater runoff and facilitating compliance with the purpose of this Ordinance as described in Section 8.17.1 of the Ordinance.

# Section 2. General Provisions

## 2.1 Performance Criteria Applicable to All Developments

Developments required to comply with the Ordinance that have less than or equal to 12% built-upon area are called "Low Density" developments and those with greater than 12% built-upon area are called "High Density" developments. Both Low and High Density developments are required to comply with the performance criteria specified below.

1. Built-Upon Area Setbacks. All built-upon area for development and redevelopment subject to the requirements of the Ordinance shall be at a minimum of 30 feet landward of all perennial and intermittent surface waters. This built-upon area setback can be located within the water quality buffer area. Surface water shall be delineated in the field by a certified professional using U.S. Army Corps of Engineers and/or N.C. Division of Water Quality methodology. When the presence of surface waters is in dispute, an onsite delineation performed by the Stormwater Administrator or designee shall dictate ordinance compliance.

2. Stream Buffers. The S.W.I.M. Stream Buffer requirements as described in Section 8.25 of the Huntersville's Zoning Ordinance shall apply to low density projects.

## 2.2 Performance Criteria Applicable to Low Density Developments

Low Density developments are required to comply with the performance criteria specified below.

1. Vegetated Conveyances. Stormwater runoff from the development shall be transported from the development by vegetated conveyances to the maximum extent practicable.

## 2.3 Performance Criteria Applicable to High Density Developments

The additional criteria described below apply to "High Density" developments, which as indicated in Section 2.1 include greater than 12% built-upon area. Tables 2.1 and 2.2 below contain a description of approved SCMs for meeting these criteria.

1. All SCMs used to meet these performance criteria shall be designed to achieve average annual 85% Total Suspended Solids (TSS) removal for the developed area of a site. LID SCMs or a combination of LID and Conventional SCMs as described in the Tables 2.1 and 2.2 shall be used to meet these criteria. If a combination of LID and Conventional SCMs is used, then at a minimum the first 50% of the runoff from the one (1) inch storm event must be treated using LID SCMs. The remaining 50% shall be treated using Conventional SCMs capable of achieving the above described pollutant removal efficiency. If a site has multiple outfalls that drain to a common point either on or off site, this 50% requirement can vary between the different drainages provided 50% treatment is achieved by volume for the entire site and for the first inch of runoff. No one bioretention SCM shall exceed 5,000 square feet of soil media surface area. At the

discretion of the Stormwater Administrator, the ratio of runoff treated using LID versus conventional SCMs can vary from the above when a hardship is demonstrated.

2. SCMs installed for compliance with the Ordinance shall be selected from Tables 2.1 and 2.2 below and shall be designed and constructed in accordance with the criteria contained in the Charlotte-Mecklenburg SCM Design Manual located at the following link: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/SCM-Design-Manual. Additional SCMs outside of these tables may be approved at the discretion of the Stormwater Administrator.

3. An Operation and Maintenance Agreement is required for all SCMs used for the control of water quantity, peak, and volume (see Section 2.3).

4. It is the policy of the Town of Huntersville that all SCMs be located in common open space and not on single-family residential lots or in public rights-of-ways. The Town believes this is necessary to ensure the long term maintenance of these devices. Any change to this policy requires approval from the Storm Water Administrator and the Town Engineer.

5. LID SCMs or a combination of LID and Conventional SCMs shall be used to control and treat the increase in stormwater runoff volume associated with post-construction conditions as compared with pre-construction (existing) conditions for the 2-year frequency, 24-hour duration storm event (3.12 inches) in the Rural and Transitional Zoning Districts. For all other Zoning Districts, LID SCMs or a combination of LID and Conventional SCMs shall be used to control and treat the increase in stormwater runoff volume associated with post-construction conditions as compared with pre-construction (existing) conditions for the 1-year frequency, 24-hour duration storm event (2.58 inches).

6. Where any SCM employs the use of a temporary water quality storage pool as a part of its treatment system, the drawdown time shall be a minimum of 48 hours and a maximum of 120 hours.

7. The peak stormwater runoff release rates leaving the site during post-construction conditions shall be equal to or less than the pre-development peak stormwater runoff release rates for the 2-year frequency, 24-hour duration storm event and 10-year frequency, 24-hour duration storm event. The emergency overflow and outlet structure for any pond or wetland constructed as a stormwater SCM shall be capable of safely passing a discharge with a minimum recurrence frequency of 50 years. For detention basins, the temporary storage capacity shall be restored within 72 hours. Requirements of the Dam Safety Act shall be met when applicable.

Table 2.1 Approved LID SCMs for Use in Huntersville

| SCM Name | Designs & Specifications (1) |
|---|---|
| Infiltration System | Chapter 4.1 |
| Bioretention (Rain Garden) | Chapter 4.2 |

| SCM Name | Designs & Specifications (1) |
|---|---|
| Permeable Pavement (2) | Chapter 4.5 |
| Sand Filter (3) | Chapter 4.6 |

(1) Designs & Specifications: All SCM designs and specifications are contained in the Charlotte-Mecklenburg SCM Design Manual in the specific chapter indicated in the above table unless otherwise noted.

(2) Permeable Pavement: The surface area of the permeable pavement will be allowed 100% credit as permeable area except this credit cannot be used in designated water supply watershed areas to exceed the Built-Upon Area (BUA) cap per Zoning Ordinance Section 3.3.

(3) Sand Filter: To be considered an LID SCM, the sand filter must be above ground with a native soil bottom that has been scarified and not compacted. A constant head permeability test of the bottom must show infiltration capabilities. In addition, the under drain must be designed to create minimum two-foot internal water storage layer above the bottom. Sand filters not meeting these criteria will be considered Conventional Stormwater SCMs.

Table 2.2 Approved Conventional SCMs for Use in Huntersville

| SCM Name | Designs & Specifications (1) |
|---|---|
| Wet Pond | Chapter 4.3 |
| Extended Dry Pond | Chapter 4.12 |
| Stormwater Wetland | Chapter 4.4 |
| Proprietary SCMs | Chapter 4.13 |
| Rainwater Harvesting | Chapter 4.7 |

(1) Designs & Specifications: All SCM designs and specifications are contained in the Charlotte-Mecklenburg SCM Design Manual in the specific chapter indicated in the above table unless otherwise noted.

## 2.4 Operation and Maintenance of SCMs

### 2.4.1 Operation and Maintenance Agreement

The owner of an SCM is responsible for its proper operation and maintenance through the establishment, recordation and proper execution of an Operation and Maintenance Agreement. Prior to final approval of any SCM design plans and the issuance of the Stormwater Management Permit, an Operation and Maintenance Agreement must be submitted along with the other documents required as part of the Stormwater Permit Application, approved by the Stormwater Administrator or their designee, and recorded at the Mecklenburg County Register of Deeds. The Operation and Maintenance Agreement template (also referred to as a Covenant) is available at the following link: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/County-Town-PC-Permit-Forms (select Operation and Maintenance Agreement/Declaration of Covenants, Form #PCO19). A SCM Maintenance Plan is attached as Exhibit A to the Operation and Maintenance Agreement which identifies the specific SCMs covered by the plan, maintenance activities to be performed, inspection and reporting activities to be performed, and an estimated annual budget for maintenance and replacement. A spreadsheet for estimating the maintenance and replacement budget is provided at the link above by selecting BMP Maintenance Costs, Form #PCO42. The agreement must be signed by the owner and notarized, signed by the Stormwater Administrator or their designee, recorded at the Mecklenburg County Register of Deeds Office, and an electronic copy of the recorded document submitted prior to approval of the Stormwater Management Permit.

### 2.4.2 Maintenance Access

Adequate access must be provided into all SCM areas for inspection, maintenance, and landscaping upkeep. A 20-foot wide permanent maintenance access easement from a public right-of-way must be provided for all SCMs and recorded on final plats. Driveways can serve as the 20-foot maintenance access for SCMs provided the owner of the driveway and SCM are one in the same. The cleared access area within this easement must have a minimum stabilized width of 12 feet, maximum longitudinal grade of 15 percent, and maximum cross slope of 5 percent. In addition, a 10-foot wide permanent maintenance access easement must be provided around the perimeter of all SCMs to allow for adequate maintenance and repair.

### 2.4.3 Description of Maintenance Requirements

The Operation and Maintenance Agreement requires that each SCM be inspected by a qualified professional on an annual basis. A "qualified professional" is defined as a registered North Carolina professional engineer, registered landscape architect, or a person certified by North Carolina State University's SCM Inspection and Maintenance Certification program. An annual compliance inspection report must be completed for each SCM indicating the status of each item inspected and any maintenance that was conducted. The inspection report must be completed on the required form that is available at the following website: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/County-Town-PC-Permit-Forms (select BMP Maintenance & Inspection Checklists, Form #PCO21). The first inspection report is due within one (1) year from the date of as-built certification and each year thereafter. The annual compliance inspections shall occur within 45 days prior to the anniversary date of the as-built certification. The Stormwater Administrator has the flexibility to change the annual compliance inspection date for specific SCMs. For example, in situations where a multiple SCMs within a subdivision have different annual inspection dates, the Stormwater Administrator can select one inspection date for all SCMs to make it easier for owners to keep track of the annual inspections. The inspector shall certify on the Maintenance and Inspection Checklist that the SCM has been inspected and that at the time of the inspection the SCM was performing properly and was in compliance with the terms and conditions of the approved Operation and Maintenance Agreement and Maintenance Plan required by the Post-Construction Stormwater Ordinance.

The owner of the SCM shall keep records of inspections, maintenance, and repairs for at least five (5) years from the date of creation of the record and shall submit the same upon reasonable request to the Stormwater Administrator. All annual inspections shall be submitted to the Storm Water Administrator at the location indicated below. Based upon the results of the inspection, the Stormwater Administrator may elect to perform follow-up inspections to ensure compliance.
Mecklenburg County Land Use and Environmental Services (LUESA)
Attention: Stormwater Administrator at 2145 Suttle Avenue, Charlotte, N.C. 28208-5237
Phone: 980-314-3217
Email: rusty.rozzelle@mecklenburgcountync.gov

## 2.5 Final Plats

Enforceable restrictions on property usage are required to run with the land to ensure that future development and redevelopment maintains the site in compliance with Ordinance requirements. This is achieved through specific notations on final plats as described in Section 6.3 (#4), which shall be reviewed and approved prior to recordation. The surveyor shall include applicable restrictions from the recorded final plat on each lot survey, which is provided to the purchaser at the time of closing to make them aware of the measures necessary to ensure compliance with the Ordinance.

# Section 3. Mitigation Approved in Huntersville's Ordinance

## 3.1 Mitigation Options

The Ordinance allows two (2) types of mitigation, including LID Mitigation for new developments with greater than or equal to 50% impervious area and Development and Redevelopment Mitigation. LID Mitigation allows a development to substitute Conventional SCMs for LID SCMs on the development site. Two (2) LID Mitigation options are available, including off-site and buy-down mitigation. Both options will result in the construction of retrofit projects in the same river basin (Catawba or Yadkin) as the development site for the purpose of removing the increased pollutants discharged to surface waters at the development site as a result of the use of Conventional instead of LID SCMs. Off-site mitigation requires the developer or their designee to construct and maintain the mitigation project. Buy-down mitigation requires the developer to provide funding to the jurisdiction toward the construction and maintenance of a mitigation project for up to 20 years. Both LID Mitigation options are based on achieving a pollutant load reduction calculated as described in Section 3.2. Sections 3.3 and 3.4 describe the criteria for fulfilling the off-site and buy-down LID Mitigation options, respectively.

Two (2) Development and Redevelopment Mitigation options are available, including an option for lots less than one (1) acre that applies to the entire jurisdiction and an option for projects located in the Town Center Zoning District. Development and redevelopment projects on lots less than one (1) acre are allowed by right to forego meeting the requirements of the Ordinance when mitigation requirements are fulfilled as described in Section 3.5, provided the following criteria are met:

1. The lot has been described by metes and bounds in a recorded deed or shown on a recorded plat prior to July 1, 2007.
2. Development and redevelopment on the lot are not part of a larger common plan of development or sale, even though multiple, separate or distinct activities take place at different times on different schedules.
3. Stream Buffer requirements are fulfilled as described in Section 8.25 of the Ordinance.

Redevelopment projects in the Town Center Zoning District are allowed by right to forego meeting the requirements of the Ordinance when mitigation requirements are fulfilled as described in Section 3.5, provided the stream buffer requirements are fulfilled. If there is no net increase in existing built-upon area, including built-upon area that is removed as part of the redevelopment, and there is no decrease in existing stormwater controls, then there is no limit on the amount of disturbed area. If either of these provisions is not satisfied, then the amount of total disturbed area on the site must be less than one (1) acre. These provisions exist to ensure compliance with minimum State requirements for post-construction stormwater controls.

## 3.2 Pollutant Load Required for LID Mitigation

The Ordinance requires that all SCMs be designed to achieve an average annual 85% Total Suspended Solids (TSS) removal for the first one (1) inch of rainfall from the developed area of the site. LID SCMs or a combination of LID and Conventional SCMs can be used to meet this

requirement. It is estimated that a combination of LID and Conventional SCMs will achieve an average annual 85% TSS and 60% Total Phosphorus (TP) removal efficiency whereas Conventional SCMs alone achieve an estimated 85% TSS and 50% TP removal efficiency. For both mitigation options, a Conventional SCM must be constructed on the development site and mitigation must be provided to achieve a net mass removal of TP greater than or equal to the TP load associated with the difference between LID versus Conventional SCMs at the development site treating runoff from the first one (1) inch of rainfall. As described above, this is the difference between 60% and 50% TP removal, which is 10%. The TP load represented as lb./ac./year varies between land use types. The TP load associated with the land use applicable to the development site is multiplied by 10% to obtain the pollutant load required for mitigation for each acre of the site as illustrated in Table 3.1.

Table 3.1 TP Loading Rates for Selected Land Uses

| Land Use | TP Load (lb./ac./year) | Required Mitigation Load (lb./ac./year) |
|---|---|---|
| Multi-Family High (70% impervious) | 1.83 | 0.183 |
| Commercial – High (85% impervious) | 2.85 | 0.285 |
| Office-Industrial High (70% impervious) | 1.86 | 0.186 |
| Industrial (65% impervious) | 2.39 | 0.239 |
| Mixed Use (60% impervious) | 2.24 | 0.224 |
| High Density Mixed Use (70% impervious) | 2.49 | 0.249 |
| Ultra-Mixed Use (90% impervious) | 2.97 | 0.297 |

## 3.3 Criteria for Off-Site LID Mitigation Option

For off-site mitigation, a legally valid instrument must be attached to the Application for LID Mitigation demonstrating that the applicant has legal title to the property where the mitigation will be performed. A Phase I environmental site assessment must also be attached identifying areas of concern on or immediately adjacent to the site. At the discretion of the Stormwater Administrator, the requirement for a Phase I environmental site assessment may be waived. An Operation and Maintenance Agreement and Maintenance Plan must be attached to the application form for each SCM included in the mitigation project. The criteria for approval of an Application for LID Mitigation using the Off-Site Mitigation Option are provided below. Failure to satisfy these conditions will result in disapproval and at the discretion of the Stormwater Administrator approval can be granted with specific conditions attached.

1. Conventional SCM(s) shall be designed, constructed, and maintained on the development site to achieve an average annual 85% Total Suspended Solids (TSS) removal for the developed area of the site in accordance with the criteria and specifications in the Design Manual.
2. The development site shall achieve full compliance with the Performance Criteria contained in Section 8.17.12(b) 1, 2, 3, 5, 6, and 7 of the Ordinance.
3. LID SCM(s) shall be designed, constructed, and maintained on property other than the development site to at a minimum achieve the pollutant load required for mitigation described in Table 3.1.
4. SCM(s) shall be sized for the corresponding watershed area according to the design standards in the Design Manual.

5. SCM(s) shall be inspected by the Stormwater Administrator and found to be in compliance with all approved plans and specifications prior to the release of occupancy permits for the development site.
6. All off-site mitigation SCMs shall be subject to the maintenance requirements as well as installation and maintenance performance securities specified in the Ordinance and the Manual.

### 3.4 Criteria for Buy-Down LID Mitigation Option

Table 3.2 provides the Huntersville LID buy-down mitigation costs per acre based on land use type. This cost is applied by selecting the cost applicable to land use type and multiplying by the number of acres to be treated. For example, for 10 acres of multi-family development (70% impervious) to be treated the rate of $25,438.83 is multiplied by 10 to arrive at a mitigation cost of $254,388.30.

Table 3.2 Huntersville LID Buy-Down Cost per Acre for Select Land Uses

| Land Use | TP Load (lb./ac/year) | LID Buy-Down Cost/Acre |
|---|---|---|
| Multi-Family High (70% impervious) | 1.83 | $25,438.83 |
| Office-Industrial High (70% impervious) | 1.86 | $34,036.45 |
| Mixed Use (60% impervious) | 2.24 | $25,691.70 |
| Industrial (65% impervious) | 2.39 | $30,159.09 |
| High Density Mixed Use (70% impervious) | 2.49 | $28,894.74 |
| Commercial – High (85% impervious) | 2.85 | $31,002.00 |
| Ultra-Mixed Use (90% impervious) | 2.97 | $35,047.94 |

The LID buy-down mitigation costs by land use type described in Table 3.2 are based on the estimated cost for the construction, maintenance, and administration of an LID SCM (bioretention system) over its anticipated 20 year life span that is designed to remove the pollutant load required for mitigation as described in Table 3.1 for an ultra-mixed use development at 90% impervious. This example was selected because it represents the highest LID construction, maintenance and administrative costs that will occur in the Town of Huntersville. It is important to note that the cost for the land necessary to construct the bioretention system is not included in this calculation. For this analysis, it was estimated that a one acre ultra-mixed use development at 90% impervious would generate 2,793.6 $ft^3$ of runoff from a one (1) inch rain event (required design storm), which established the water quality volume or Wave. The Ordinance requires that the first 50% of this runoff be treated with a bioretention system or other LID measure, which equates to a volume of 1,396.8 $ft^3$. Based on the standard in the N.C. SCM Design Manual, 1,397 $ft^2$ of bioretention area would be required to treat this volume. The cost to construct bioretention in Mecklenburg County is estimated at $16/$ft^2$ of the surface area of the bioretention device. The estimated cost to construct 1,397 $ft^2$ of bioretention area is therefore $22,352 (1,397$ft^2$ x $16/$ft^2$). As described in Section 3.2 above, mitigation must be provided to achieve a net mass removal of TP greater than or equal to the TP load associated with the difference between LID versus Conventional SCMs at the development site, which is estimated at 10%. The buy-down mitigation cost for all land use types is set at $3,763/lb./acre that was established by dividing the estimated construction cost of $22,352 by the

20-year total pollutant load for the required 10% TP mitigation load for ultra-mixed use shown in Table 3.1 ($22,352 ÷ (0.297 x 20)). This set mitigation rate of $3,763/lb./acre is multiplied by the required 10% TP mitigation load for the different land use types provided in Table 3.1 multiplied by 20 to establish the bioretention per acre cost for each land use type. This cost is added to an annual maintenance cost of 32 cents a square foot of bioretention surface are times 20 years ((1,397 ft2 x 0.32) x 20) for a total of $8,940.80/acre plus a 12% administrative fee to arrive at the totals presented in Table 3.2.

The criteria for approval of an Application for LID Mitigation using the Buy-Down Mitigation Option are provided below. Failure to satisfy these conditions will result in disapproval and at the discretion of the Stormwater Administrator approval can be granted with specific conditions attached.

1. Projects and/or properties shall be available for mitigation at the time the "Application for LID Mitigation" is received.
2. Conventional SCM(s) shall be designed, constructed, and maintained on the development site to achieve an average annual 85% Total Suspended Solids (TSS) removal for the developed area of the site in accordance with the criteria and specifications in the Manual.
3. The development site shall achieve full compliance with the Performance Criteria contained in Section 8.17.12(b) 1, 2, 3, 5, 6, and 7 of the Ordinance.
4. Payment shall be made to the Town of Huntersville prior to the issuance of the Stormwater Management Permit based on the developments predominant land use and the associated LID Buy-Down Cost per acre illustrated in Table 3.2. On a case-by-case basis, the Stormwater Administrator may allow an LID Buy-Down Cost to be calculated for a unique land use using the criteria described above and forgo the use of the established costs provided in Table 3.2. However, this calculation will be based on the TP loading rates established by the Stormwater Administrator for this unique land use and not the rates contained in Table 3.1.

The Town of Huntersville shall use money accrued through buy-down mitigation payments to install structural SCMs and/or perform stream restoration projects. The Stormwater Administrator has the discretion to allow buy-down mitigation payments to be applied to other projects. All projects paid for with buy-down mitigation funds shall be designed and installed to remove a pollutant load equal to or greater than the increased load allowed to discharge from the development site as a result of the mitigation option. Projects should occur in the same watershed (Yadkin or Catawba) as the development that was allowed the mitigation option to the extent practicable as determined by the Stormwater Administrator. There is no time constraint for the Town of Huntersville to spend mitigation money; however, the Town shall strive to spend buy-down monies in a timely and efficient manner such that a net improvement in water quality results. In addition, all projects constructed by the Town of Huntersville as part of this mitigation option shall be maintained by the Town of Huntersville or its designee into perpetuity.

## 3.5 Criteria for Development and Redevelopment Mitigation Options

One (1) of the following three (3) criteria must be fulfilled to satisfy the mitigation requirement for development and redevelopment projects on less than one (1) acre and for redevelopment in

the Town Center Zoning District as described in Section 3. 1:

1. Stormwater Quality Treatment requirements met on site as described in Section 8.17.12(b)(3), (4) and (5) of the Ordinance with LID or Conventional SCMs allowed.
2. Stormwater Volume and Peak Control requirements met on site as described in Section 8.17.12(b)(6) and (7) of the Ordinance.
3. The Town is paid a mitigation fee prorated at $60,000 per acre for all projects except single-family residential that will be prorated at $45,000 per acre for the untreated post-project built-upon-area. This fee shall be used to cover the cost for installation by the Town or its designee of a mitigation project(s) capable of achieving a net mass removal of pollutants greater than or equal to the pollutant removal that would have been achieved by SCMs installed at the development site in full compliance with Ordinance requirements. The mitigation project(s), as determined by the Town, must be located in the same named lake or stream watershed that is receiving stormwater discharge from the development site, including Lake Norman, Mountain Island Lake, McDowell Creek, Gar Creek, Ramah Creek, and Clarke Creek. An exception can be made if the Stormwater Administrator determines there are no viable mitigation projects in that watershed.

## 3.6 Administration and Approval of Mitigation Requests

The Stormwater Administrator is responsible for approving and tracking all Mitigation Applications as well as working with the Town of Huntersville to spend the monies received on viable water quality projects that comply with the intent of the Ordinance. For all the above described mitigation options, the approval process begins with the submittal to the Stormwater Administrator of a completed "Application for LID Mitigation" with the desired Mitigation Option selected. This application is available at the following website: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/County-Town-PC-Permit-Forms (select Huntersville Mitigation Form). The application must be completed, and all applicable plans, calculations and documents described on page 2 must be attached before the application will be considered complete and accepted for review. Applications shall be submitted at the time Concept Plans are submitted for review. Application approval will occur in conjunction with the Concept Plan review and approval process.

# Section 4. Low Impact Development Site Planning

## 4.1 Introduction

This Section focuses on the LID planning strategies and techniques that can be used in addition to the required General Provisions described in Section 2 toward achievement of the LID approach described in Section 8.17.13 of the Ordinance. The General Provisions described in Section 2 must be met to comply with ordinance requirements; however, the use of the strategies and techniques contained in this Section to advance the LID approach is optional, but strongly encouraged for the added protection of downstream water quality. The goal of LID site planning is to allow for the maximum reasonable utilization of the property while maintaining the pre-development hydrologic regime (volume, peak runoff rate for a given frequency). The LID approach combines a hydrologically functional site design with pollution prevention measures (SCMs) to reduce development impacts on hydrology and water quality. The goal is to maintain the pre-development stormwater runoff volume, peak runoff rates, and to mimic pre-development runoff conditions. Stormwater is managed in small, source control landscape features rather than in large, end-of-pipe pond structures located at the downstream extent of drainage areas. However, ponds may be required in addition to LID SCMs to create a "treatment train" affect designed to meet the Performance Criteria described in Section 2. Through LID, hydrologic functions such as infiltration, reduced peak and volume of discharges, and ground water recharge can be maintained with the use of reduced impervious surfaces, functional grading, open channel sections, disconnection and utilization of runoff, and bioretention/filtration landscape areas.

## 4.2 LID Goals

The goal of LID is to develop site design techniques, strategies, SCMs, and criteria to store, infiltrate, evaporate, transpire, retain, and detain runoff on the site to replicate pre-development runoff characteristics and mimic the natural and unique hydrology of the site. Since every aspect of site development affects the hydrologic response of the site, LID runoff control techniques also can address every aspect of site development. There is a wide array of impact reduction and site design techniques that allow the site designer to create stormwater control mechanisms that function in a similar manner to natural control mechanisms. The net result will be to mimic the watershed's natural hydrologic functions or water balance between runoff, infiltration, storage, ground water recharge, and evapotranspiration. With the LID approach, receiving waters experience little change in the volume, frequency, or quality of runoff or in the base flows fed by ground water. The key components of the LID approach involve utilizing concepts, technologies, and objectives for stormwater management such as micromanagement and multi-functional landscape features (bioretention, swales, and conservation areas) to mimic or replicate hydrologic functions and maintain the ecological/biological integrity of receiving streams. LID planning and techniques will reduce impervious areas, reduce the need for conventional pipe and pond technology, and reduce or limit clearing and grading. LID techniques integrate stormwater controls throughout the site in small, discrete units. SCMs are distributed across each site, reducing the need for a centralized SCM. These approaches should be incorporated into stormwater site design in the Town of Huntersville where possible.

## 4.3 Key Considerations for LID Site Planning

Examples of the LID site planning techniques that should be utilized in the Town of Huntersville where possible include, but are not limited to:

1. Maintaining natural drainage ways and patterns and directing runoff to depression areas.
2. Preserving as many trees as possible, especially those located on soils with the highest permeability rates.
3. Reducing the percentage of impervious area.
4. Locating SCMs in soils with the highest permeability rates.
5. Disconnecting impervious areas.
6. Limiting clearing and grading, particularly in areas containing soils with the highest permeability rates.
7. Locating impervious areas on less permeable soils.
8. Maintaining existing natural topography and terrain. Avoiding disturbance of, and construction in, steep slope areas (>15%).
9. Limiting clear-cutting and mass-grading through "site fingerprinting" techniques. Selectively clear wooded lots to preserve the tree canopy, understory vegetation, and natural vegetative buffers.
10. Flattening slopes only within existing cleared and graded areas, where feasible, to facilitate on-lot storage and infiltration.
11. Dispersing stormwater flow to the natural drainage ways rather than concentrating it in swales, pipes, or channels.

The appropriate combination of these techniques to maintain the curve number (CN) and time of concentration (Tc) will result in a design that maintains the pre-development runoff volume, peak rate, and frequency that is consistent with the LID approach.

# Section 5. Erosion and Sediment Control Considerations for LID

## 5.1 Introduction

Erosion and sediment control and storm water management are interrelated. In conventional practice, the design of erosion and sediment controls tend to follow the design of storm water management control SCMs. It is not uncommon to find all of the site area directed to a large sediment control pond, located at the low point of the site. After the site is stabilized, the sediment pond is cleaned out and converted to a storm water management pond. Mass grading operations often disturb more area than is necessary and negative water quality impacts can result from increased soil erosion.

In the application of LID technology, the designer must be careful and conscious to carry the LID concepts through to the erosion and sediment control elements of resource protection. If this aspect is overlooked, erosion and sediment control problems will be encountered. The application of LID concepts and the associated emphasis on minimizing the areas disturbed, as well as breaking up drainage areas into small manageable sub-catchment areas, is consistent with the basic principles of erosion and sediment control outlined below.

## 5.2 Erosion and Sediment Control Principles

The following five (5) principles govern the development and implementation of a sound erosion and sediment control plan for any land development activity.

1. Planning. Plan the operation to fit the existing site features including, topography, soils, drainage ways, and natural vegetation.
2. Scheduling of Operations. Schedule grading and earthmoving operations to expose the smallest practical area of land for the shortest possible time.
3. Soil Erosion Control. Apply soil erosion control practices as a first line of defense against offsite damage.
4. Sediment Control. Apply sediment control practices as a second line of defense against offsite damage.
5. Maintenance & Inspection. Implement a thorough maintenance program before, during and after development is completed. All erosion and sediment control structures must be inspected at least once a week and within 24 hours (weekends and holidays included) after any storm event greater than 1 inch of rain per 24 hour period. Additional inspection of the area covered by the plan after each phase has been completed and temporary ground cover established (see Town of Huntersville Soil Erosion and Sedimentation Ordinance).

The following sections describe key elements of the above principles in detail.

## 5.3 Principle One: Planning

The first principle of erosion and sediment control is to plan the development to fit the site features, including topography, soils, drainage ways, and natural vegetation. It should be

observed that this principle is very similar to the planning guidelines provided for LID in Section 4 of this Design Manual. Listed below are key considerations of the planning element.

Topography. The primary considerations are slope steepness and slope length (see Example 5.1). Due to the runoff effects, longer and steeper slopes provide for the greatest erosion potential. The percent of slope can be determined from site topography. Areas of similar slope can be grouped together to produce a slope area map, which identifies areas of similar steepness. Slope steepness can be grouped into three or more general ranges of erosion potential as listed below:

0 - 7 % - Low erosion hazard (buildable, no constraints)
7 - 15 % - Moderate erosion hazard (moderate building constraints, selective clearing)
15 % or over - High erosion hazard (do not disturb, preserve)

Within these slope ranges, the greater slope length results in a greater the erosion hazard. Therefore, in determining potential critical areas the site planner should be aware of excessively long slopes. As a general rule, the erosion hazard will become critical if slope lengths exceed the following values:

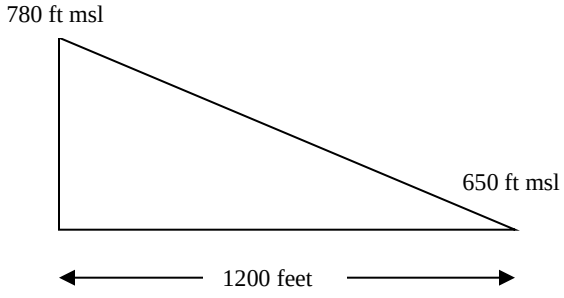
| | | |
|---|---|---|
| 0 - 7 % | - | 300 feet |
| 7 - 15 % | - | 150 feet |
| 15 % or over | - | 75 feet |

Example 5.1: Calculation of Slope Steepness and Slope Length

In the sample cross section through a development site at right, the elevation change is 130 feet (780 – 650) and the slope length is 1200 feet. The slope steepness is calculated as follows:

$$\frac{(780-650)}{1200} = 0.025*100 = 10.8\%$$

This example results in a moderate erosion potential. However, when the slope length is taken into account, the erosion hazard is considered critical because slope steepness values from 7 – 15 % with slope lengths in excess of 150 feet indicate a critical erosion hazard.




Drainage ways. Natural drainage patterns existing on the site should be identified in order to plan around these critical areas where water will concentrate. Where it is possible natural drainage ways should be used to convey runoff over and off the site to avoid the expense and problems of constructing an artificial drainage SCM. These natural drainage ways should be protected with vegetative buffers whenever possible or required.

Man made ditches, diversions, and waterways will erode if they are not properly stabilized. Care should also be taken to be sure that increased runoff from the site will not erode or flood the existing natural drainage feature.

Soils. Major soil considerations from an erosion and sediment control standpoint include erodibility, permeability, depth to water table and bedrock, and soils with special hazards including shrink/swell potential or slippage tendencies. The Mecklenburg County Soil Survey provides data on these properties for the soils found in the county.

Erodibility is a term that describes the vulnerability of a soil to erosion. Soil erodibility is influenced by the average particle size and gradation (texture), percentage of organic matter, and soil structure. The most erodible soils generally contain high proportions of silt and very fine sand. The presence of clay or organic matter tends to decrease soil erodibility. Clays are sticky and tend to bind soil particles together, which along with organic matter helps to maintain stable soil structure (aggregates). By combining the soils information with the topography, drainage, and vegetation on the site, the planner can determine the critically erodible and sensitive areas that should be avoided if possible, during construction.

Natural Vegetation**.** Ground cover is the most important factor in terms of preventing erosion. Any existing vegetation that can be saved will help prevent erosion. Vegetative cover shields the soil surface from raindrop impact and the root mass holds soil particles in place. Vegetation can "filter" sediment from runoff. Thus grass "buffer strips" can be used to remove sediment from surface runoff. Vegetation also slows the velocity of runoff and helps maintain the infiltration capacity of a soil. Trees and unique vegetation protect the soil as well as beautifying the site after construction. Where existing vegetation cannot be saved, the planner should consider staging construction, temporary seeding, or temporary mulching.

## 5.4 Principle Two: Scheduling of Operations

The second erosion and sediment control principle is to expose the smallest practical area of land for the shortest possible time.

The clearing, grubbing, and scalping (mass clearing or grading) of excessively large areas of land at one time promotes erosion and sedimentation problems. As previously described in Section 4, these initial earth disturbing activities should be kept to a bare minimum. On the areas where disturbance takes place the site designer should consider staging construction, temporary seeding and /or temporary mulching as a technique to reduce erosion. Staging construction involves stabilizing one part of the site before disturbing another. In this way the entire site is not disturbed at once and the duration of soil exposure is minimized. Temporary seeding and mulching involve seeding or mulching areas that would otherwise lie open for long periods of time. The time of exposure is limited and therefore the erosion hazard is reduced. Effort should be made not to uncover more than 20 acres at any one time. If more than 20 acres are to be uncovered at any one time, the plan shall contain additional items per the Huntersville Soil Erosion and Sedimentation Control Ordinance.

## 5.5 Principle Three: Soil Erosion Control Practices

The third important principle is to apply soil erosion control practices as a first line of defense against offsite damage. This principle relates to using practices that control erosion on a disturbed area to prevent excessive sediment from being produced. Control does not begin with the perimeter sediment trap or basin, rather it begins at the source of the sediment and extends down to the control structure.

Soil particles become sediment when they are detached and moved from their initial resting place. This process, which is called erosion, is accomplished for the most part by the impact of falling raindrops and the energy exerted by moving water and wind. A reduction in the rate of soil erosion (Soil Loss) is achieved by controlling the vulnerability of the soil to erosion processes, or the capability of moving water to detach soil particles. In humid regions, such as Mecklenburg County, this is accomplished through the use of "soil stabilization" and "runoff control practices".

Soil stabilization practices include a variety of vegetative, chemical, and structural measures used to shield the soil from the impact of raindrops, or to bind the soil in place, thus preventing it from being detached by surface runoff or wind erosion. Approved soil stabilization practices in the North Carolina Erosion and Sediment Control Design Manual under Section 6.10, Surface Stabilization, include the following:

- Temporary Seeding
- Permanent Seeding
- Sodding
- Trees, Shrubs, Vines, and Ground Covers
- Mulching
- Riprap
- Rolled Erosion Control Products

Runoff control practices, in contrast, include a number of measures designed to reduce the amount of runoff that is generated on a construction site, prevent offsite runoff from entering the disturbed area, or slow the runoff moving through and exiting the disturbed area. Drainage system outlet velocities shall not exceed 5 feet per second (fps), per the Huntersville Erosion and Sediment Control Ordinance. Approved runoff control practices are provided in the following Sections of the North Carolina Erosion and Sediment Control Planning and Design Manual:

- Section 6.20 – Runoff Control Measures - Provides standards for the following practices: 1) temporary diversions; 2) permanent diversions; 3) diversion dikes (perimeter protection); and 4) right-of-way diversions (water bars).
- Section 6.30 – Runoff Conveyance Measures - provides standards for the following practices: 1) grass lined channels; 2) riprap channels; and 3) temporary slope drains.
- Section 6.40 – Outlet Protection - provides standards for the following practices: 1) level spreader; and 2) outlet stabilization structure.

Additional design criteria and standard details are available in the Huntersville Engineering Standards and Procedures Manual.

## 5.6 Principle Four: Sediment Control Practices

The fourth principle is to apply sediment control practices as a second line of defense against offsite damage. Even with the best erosion control plan, some sediment will be generated and controlling it is the objective of this principle. Whereas soil erosion control practices are designed to prevent soil particles from being detached, sediment control involves using practices that prevent the detached particles from leaving the disturbed area and getting to receiving waterways. This is accomplished by reducing the ability of surface runoff to transport sediment and by containing the sediment onsite.

Sediment control practices are designed to slow the flow of water by spreading, ponding, or filtering. By so doing, the ability of the water to transport sediment is reduced, and sediment settles out of suspension. Commonly used control practices include: 1) the preservation or installation of vegetated buffer areas down slope of the disturbed area to slow and filter the runoff, 2) the construction of small depressions or dikes to catch sediment (particularly coarse-textured material) as close to its point of origin as possible; and 3) the construction of sediment traps or basins at the perimeter of the disturbed area to capture additional sediment from the runoff.

The amount of sediment removed from the runoff is mostly dependent upon (1) the speed at which the water flows through the filter, trap or basin; (2) the length of time the water is detained; and (3) the size, shape and weight of the sediment particles.

Approved sediment control practices in the North Carolina Erosion and Sediment Control Design Manual under Section 6.10, Surface Stabilization, include the following:

- Temporary Sediment Trap
- Sediment Basin
- Sediment Fence
- Rock Dam
- Skimmer Sediment Basin

Approved inlet protection practices are provided in the following Sections of the North Carolina Erosion and Sediment Control Planning and Design Manual:

> Section 6.50 – Inlet Protection - Provides standards for the following practices: 1) Excavated Drop Inlet Protection, 2) Fabric Drop Inlet Protection, 3) Block and Gravel Inlet Protection, 4) Sod Drop Inlet Protection, 5) Rock Doughnut Inlet Protection, and 6) Rock Pipe Inlet Protection.

Additional design criteria and standard details are available in the Huntersville Engineering Standards and Procedures Manual.

Currently, the most frequently used approach to sediment control is simply to direct all surface runoff into a large sediment basin, which is later cleaned out and converted to a storm water management pond. While this approach is arguably the simplest and lowest cost method to control sediment, it often fails to address the other principles described above and thus may not represent the best way to prevent and control sediment.

One of the underlying concepts of LID technology involves breaking up the drainage areas of a given site into very small catchment areas and to provide opportunities to increase the time of concentration and thus reduce peak discharges. Accordingly, this approach will benefit sediment control efforts by diffusing surface flow into many directions and providing more flexibility in the use of a variety of sediment control practices.

This approach will provide more opportunity to use silt fences and small traps to control small catchment areas generally in the range of one to three acres in size. It will also allow more opportunity to integrate the use of vegetative buffers in sediment control.

## 5.7 Principle Five: Maintenance and Inspection

The final important control principle is to implement a thorough maintenance and inspection plan to follow up operation. This principle is vital to the success of an erosion and sediment control program. A site cannot be controlled effectively without thorough, periodic checks of all erosion and sediment control practices. When inspections reveal problems, modifications, repairs, cleaning or other maintenance operations must be performed expeditiously.

Particular attention must be paid to water-handling structures such as; 1) diversions, 2) sediment traps, 3) grade control structures, 4) sediment basins, and 5) areas being revegetated. Breaches in the structures or areas being revegetated must be repaired before the next rainfall.

# Section 6. Plan Submittal/Review

## 6.1 Introduction

Plan submittal requirements will remain the same for all commercial and residential projects. Storm Water Management Permit Application plans demonstrating compliance with Section 2, General Provisions, are required for all projects, unless exempted under Applicability of the Huntersville Post-Construction Ordinance.

## 6.2 Site Evaluation Tool

The Site Evaluation Tool (SET) is a water quality model that assesses pre-development runoff and pollutant loading rates and provides a methodology for implementing LID best management practices (SCMs) into a development for achieving the established Performance Criteria (Section 2). The SET is not required to be submitted; however, it can be used to assist in design. A copy of the SET as well as detailed documentation and a user manual are available at the following link: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/HuntersvilleLID.

## 6.3 Plan Submittal Requirements

Plan submittal procedures will remain as described in the Town of Huntersville Zoning and Subdivision Ordinances, with the following additions:

1. Concept Plan: A Concept Plan meeting is required with Town staff prior to a formal plan submittal. The plan shall be on a topographical map showing original contours at intervals of not less than two feet and existing tree lines. *It should show in sketch form the proposed layout of streets, lots, and other features in relation to existing conditions* **as well as how the layout minimizes the impact to steep slopes, natural drainage ways and wooded areas. This Low Impact Design shall include the following:**
   - The boundary/property lines of the property being developed as well as the location of property lines that intersect the property being developed;
   - Water courses on the land to be subdivided or developed;
   - Impervious area calculations;
   - The location, names, and rights-of-way of any existing streets on or within 300 feet of the land to be subdivided or developed;
   - The location of all property lines which intersect the boundaries of the property being subdivided or developed;
   - Limits of all wooded areas (locate all trees 6-inches in diameter or larger for special or conditional uses);
   - Soils type (HSG) and limits;
   - Contour map at two (2) foot intervals extending 100 feet beyond the property boundary;
   - Slope Analysis showing ( 0% - 10%, 10% - 15%, 15% - 25%, >25% );
   - Natural drainage ways (woodland swales, concentrated flows), ponds;
   - Wetlands limits (copy of appropriate Federal and State permits/verification to be submitted with preliminary plans);

- Rough finished grades, the location of proposed streets, lots, parks or other open spaces, building lines, street cross-sections, number and type of buildings, and the location of any building restriction flood lines;
- Zoning information for the proposed project site and adjacent properties;
- Proposed front, rear, and side yard dimensions for each building type along each street type;
- The location and width of required S.W.I.M. buffers;
- Proposed LID SCMs and locations;
- The location and width of any S.W.I.M. stream buffers;
- The location of general buffers or screens required for the project area, as a whole;
- The scale of the plan, which shall not be smaller than 100 feet to the inch (**A**ll plans and details for SCMs must be drawn to scale for clarity and to aid in construction. Drawings not to scale often lead to construction problems and field errors, or simply cannot be built. Standard NCDOT details do not require a specific scale.)
- North point; date; and
- A small scale vicinity map.

2. Preliminary Plan: Preliminary Plans shall include all listed information needed for the Concept Plan, all information needed for the Storm Water Management Permit (below), in addition to the Preliminary Plan submittal requirements outlined in the Huntersville Zoning Ordinance.

3. Storm Water Management Permit: A Storm Water Management Permit must be obtained by submitting an application demonstrating compliance with the Performance Criteria (see Section 2) and containing the following information:
   - SCM summary table, which lists all SCMs on the site and corresponding NAD 83 (feet) coordinates;
   - Calculations and design drawings with detailed SCM plans at 1 inch = 2 feet with 1-foot contours and spot elevations for each SCM and overall site hydrology calculations illustrating compliance with Section 2, Performance Criteria. All special details shall be drawn to a specified scale for clarity.
   - Report(s) for a soil investigation performed at each proposed SCM location, following the guidance in Section A-2 of the SCM Design Manual.
   - Planting plan/schedule for each SCM illustrating plant location, species, and quantities; and
   - A Maintenance Covenant and Plan for all SCMs. This plan shall include the responsible party for each SCM and a schedule of routine maintenance activities to ensure proper performance. Prior to the approval of the Preliminary Plan and Storm Water Permit, an approved signed copy of the Maintenance Covenant and Plan that has been stamped by the Register of Deeds Office must be submitted to LUESA.

Upon approval of the Storm Water Management Permit, a record plat is required on all SCM structures and where improvements are not complete, a means of financial security must be posted as required by the Huntersville Post-Construction Ordinance. Upon completion of SCM structures and prior to the release of the financial security, the SCM is required to hold a Maintenance Bond for a period of at least two years.

4. Plat Submittal: In addition to typical Final Plat requirements in the Huntersville Zoning Ordinance, the following additional requirements shall apply:
   - All SCMs shall be named and recorded on the final plat and applicable deeds, with their corresponding NAD 83 (feet) coordinates. The following naming convention should be used for all SCMs: "Project or subdivision name – SCM Type – Number." For example, "Birkdale Phase V – Bioretention Garden – 1".
   - Any vegetation, tree save areas, open space or site conditions that contribute to the project's compliance with Section 2, Performance Criteria, shall be called out, protected, and recorded through the plat and applicable deeds.
   - Show all storm drainage easements leading to the SCM.
   - Show a 12-foot wide stable maintenance access route. The access route must be contained within a 20-foot wide maintenance access easement from the SCM facility to a public right-of-way.
   - Dimensions of SCM easement area with the corresponding SCM identification name/number should be illustrated on the plat.
   - Show storm drainage easements around SCM or leading to SCM including access easement.
   - Show the maximum impervious for watershed protection areas.
   - The following statements must be included on the plat:

     "The purpose of the SCM is to treat/reduce the pollutants associated with storm water runoff in order to minimize negative effects to downstream receiving waters. The easement around the SCM is to allow storm water conveyance and system maintenance. Any buildings and/or obstructions which impede storm water flow or maintenance are prohibited."

     "This plat contains water quality features that must be maintained in accordance with the recorded Maintenance Covenant as specified in Section 8.17.13(a) of the Huntersville Zoning Ordinance. Removal of plants or disturbance of the SCM structure or otherwise affecting the overall functionality of the SCM for reasons other than maintenance is prohibited."

     Prior to approval of the plat, an approved, signed copy of the Maintenance Covenant and Plan that has been stamped by the Register of Deeds Office must be submitted to the Town of Huntersville and LUESA.

5. As-Built Surveys: As-Built SCM surveys are required for all SCMs. As-built surveys must be approved prior to issuing an occupancy permit or releasing a performance bond.

Occupancy Permit: Prior to the issuance of an Occupancy Permit for any building within a permitted development served by a SCM, the applicant or owner of the SCM shall establish a formal Maintenance Covenant, approved by the Mecklenburg County Land Use and Environmental Services Agency, and recorded in the Office of the Register of Deeds in which the owner acknowledges the duty of the owner and all subsequent owners of the property to maintain the SCM in accordance with the terms of the Covenant. This Maintenance Covenant is

available on the following website: https://www.charlottenc.gov/Services/Stormwater/Stormwater-Regulations/County-Town-PC-Permit-Forms (select Operation and Maintenance Agreement/Declaration of Covenants, Form #PCO19).

## 6.4 Bonding

In extenuating circumstances when SCM construction cannot reasonably be completed before the building is ready for occupancy, a Performance Guarantee shall be required. The Guarantee shall be for a time period of one year. Once the Land Development Guarantee and bond agreement have been accepted by the Town, the Water Quality Hold on the building permit can be released.

All applicable forms can be found on the Town of Huntersville website at the following link: https://www.huntersville.org/3060/Bond-Administration.

### 6.4.1 Posting Performance Guarantee

A guarantee must be posted for the SCMs on each plat. The purpose of the performance guarantee is to ensure that in the absence of required completed work, a means of financial security is posted to ensure the completion of work. Performance guarantees provide the Town with financial resources to complete required public improvements in the event of developer/builder default. Guarantees will be considered in default and will be called by the Town of Huntersville if SCMs are not fully constructed, and as-builts approved within 3 years from the date the Guarantee was first secured. A Guarantee estimate must be submitted on the Town's Guarantee Estimate form and include complete construction, materials, and installation costs for each SCM. Estimates will only be accepted by the design engineer or by a contractor in the form of a Certified Contractor Bid in detailed line item format. Estimates without adequate detail will not be accepted. The Guarantee amount will be 125% of the certified bid + $10,000. The Guarantee amount will also include contingencies and legal fees and are subject to change. A Performance Guarantee for the SCM may be posted together with other required subdivision or zoning improvements or may be posted separately.

The developer may choose from the following options regarding bonds:

- Surety Bond – Prepared by and obtained from an insurance entity.
- Letter of Credit – Prepared by and obtained from a banking institution.
- Cash Bond – A certified bank check or money order, made payable to "Town of Huntersville."

### 6.4.2 Performance Guarantee Reduction / Release

A one-time bond reduction is permitted on Performance Guarantees upon approval from the inspector. Guarantees are administered through the Town of Huntersville and reduction requests must be made to this office, with completed forms and fees, no later than 60 days before the Guarantee renewal date.

### 6.4.3 Sureties for Maintenance

SCM Maintenance Bonds are required for all structural SCM installed for both residential and commercial developments. SCM Maintenance Bonds are not required for SCMs installed for public facilities, per Section 9.4.4. The purpose of these bonds is to ensure that funds are secured to maintain SCMs if the developer/owner should fail to do so, in which case the Town of Huntersville would call the bond to obtain the money to perform the necessary maintenance. The value of the bond shall be determined by the Bond Administrator in consultation with the Town Engineer and Town Inspector. For residential development projects, the same entity who secured the Storm Water Permit and initial Performance Guarantee must also obtain and hold the Maintenance Bond until a passing, joint, inspection is received, unless otherwise approved by the Storm Water Administrator. Once the SCM Maintenance Bond is released, the residential management company (i.e., HOA/COA) becomes responsible for the long-term maintenance of the SCM.

The bonds shall be posted by the owner for a period of not less than two (2) years from the final approval of the SCM by the Storm Water Administrator. The owner is responsible for all repairs and/or material replacement required to ensure the operation of the SCM in accordance with approved plans and specifications. After the two (2) year period, the owner may request that the Bond Administrator release the bond. Before the bond is released, the Water Quality inspector shall conduct a field evaluation of the SCM to ensure proper operation and maintenance. If this field evaluation reveals that the SCM is not being maintained, the inspector may choose to extend the maintenance bond for an additional year. If it is confirmed that the SCM is being properly maintained, the Bond Administrator will contact the owner with instruction on releasing the bond. If a SCM is to be maintained by the jurisdiction, a recorded copy of the Transfer of Maintenance Responsibility Form (see Appendix 7-4, Form #PCO22) must be accepted by the Storm Water Administrator before Maintenance Bonds shall be released.

### 6.4.4 Bonds for Public Entities

Public entities are not required to obtain sureties for either the installation or maintenance of water quality SCMs provided a letter signed by the manager or director of the project provides suitable assurances that the necessary improvements will be installed and maintained in accordance with Ordinance requirements. Public entities shall include but not be limited to Charlotte-Mecklenburg Schools, City of Charlotte, Charlotte-Mecklenburg Utilities, Charlotte-Mecklenburg Storm Water Services, Mecklenburg County and all the Towns as well as the State and Federal government. The letter of assurance shall be addressed to the Storm Water Administrator and, upon their approval, the surety requirement will be waived and all holds/ approvals for the project released.

# Section 7. Inspection and Enforcement

## 7.1 Introduction

This Section establishes inspection and enforcement guidelines to be followed for this manual and corresponding Ordinance. The guidelines are to be applied uniformly for inspection of private and public water quality measures.

## 7.2 Authority

The provisions of the Huntersville Post-Construction Ordinance shall be enforced by the Town of Huntersville Land Development. Staff shall be authorized by the Huntersville Town Manager to perform the following functions:

1. Conduct inspections and file reports as necessary during construction of water quality SCMs to ensure compliance with the approved plans and permits.
2. Furnish the permitting agent or owner of the property the results of the inspection in a timely manner (See Section 10.6).
3. Issue a Field Inspection Report (FIR) to the permitting agent or owner when any portion of the work does not comply with the approved plans and/or permits.
4. Issue a Notice of Violation in accordance with these guidelines as the result of unsatisfactory work or progress, failure to comply with approved plans and permits, and any non-compliance of the requirements of the Huntersville Post-Construction Ordinance.
5. Issue a Stop Work Order or Revocation of Permit as the result of unsafe conditions, working without a permit, unsatisfactory work or progress, or other non-compliance.
6. Issue Civil Citations(s), Civil Actions(s), or Criminal Action(s) listed in Section 10.7 due to unsafe conditions, non-compliance with a Stop Work Order, unsatisfactory work or progress, or other non-compliance (see appropriate Section of the Huntersville Zoning Ordinance).
7. Perform a final inspection upon the completion of water quality structures to determine if the completed work is constructed in accordance with the approved Storm Water Management Plan and associated plans/documents.

## 7.3 Inspection Responsibilities

Both Town staff and property owners shall be responsible for performing all inspection activities described in this Section under authorization of the Huntersville Town Manager.

## 7.4 Inspection Requirements During Construction

Inspections will be conducted by Town staff at the request of the owner/developer and at specified stages of construction for each water quality SCM and/or technique described below. Final inspections/approvals are required for all SCMs, but additional inspections/ approvals are required during the construction phase of Drywell/Infiltration Trenches and Bioretention SCMs, as specified in Section 7.4.1 and 7.4.2. The inspectors will also make unscheduled inspections to ensure compliance with the requirements of this manual and corresponding Ordinance as they deem necessary. The inspector will be authorized to accept minor field changes proposed by the owner/contractor. Inspections shall be requested at least 24 hours in advance. When requesting

an inspection, the permit number, type of inspection, contact name and phone number must be provided.

### 7.4.1 Drywell or Infiltration Trench

The following inspections are required to be conducted by Town staff for construction of a Drywell or Infiltration Trench. The inspector may require additional inspections.

1. Excavation Inspection - An inspection must be conducted after excavation and immediately prior to the final topsoil installation. During this inspection, the inspector shall verify the following:
   a. Trench dimensions comply with approved plans.
   b. Adequate sediment control protection has been installed.
   c. Approved filter fabric has been cut and installed to cover the trench beneath the underdrain(s). A six-inch minimum overlap is required between strips of cloth. Extruding tree roots or other obstacles must be removed from the trench base to prevent the fabric from tearing.
   d. Observation well or inlet has be installed as specified on plans prior to stone placement. Perforations shall not extend beyond gravel trench.
   e. Installation of 1 1/2 inch to 3 inch washed stone. Care must be used when dumping the stone to ensure the filter cloth does not tear.
   f. Installation of the inlet pipe for Drywells.
   g. Placement of topsoil on-site (but not installed).

2. Final Inspection - During this inspection, the inspector will verify the following:
   a. Gravel surface must be completely covered with cloth and backfilled with topsoil for Drywells and Infiltration Trenches. For Dry wells. surface inlets must be installed as per approved plans and the observation well must be capped.

Upon stabilization of the area, if the above items have been completed satisfactorily, a final inspection report will be issued and approved by the inspector. The final inspection is required before requesting a Final Certificate of Occupancy.

### 7.4.2 Bioretention SCMs

The following inspections are required for construction of a bioretention SCM. The inspector may require additional inspections.

1. Excavation and Underdrain Inspection - An inspection shall be conducted after excavation and underdrain installation and immediately prior to the final stone and topsoil installation. During this inspection, the inspector shall verify the following:
   a. Trench dimensions comply with approved plans.
   b. Adequate sediment control protection has been installed.
   c. Stone, underdrain choking stone, and sand layer have been installed as per the approved plan.
   d. Proper grade has been establishment.

e. Placement of topsoil on-site (but not installed).

2. Final Inspection - During this inspection, the inspector shall verify the following:
   a. Proper topsoil installation.
   b. Proper plant installation (native plants, size) and plant health as per the approved plan.
   c. Maintenance agreement/covenant complete.
   d. Outlet properly installed.
   e. Proper placement of ground cover/mulch.
   f. Drainage area completely stabilized.
   g. Drainage area conforms to approved plan.

Upon stabilization of the area, if the above items have been completed satisfactorily, a final inspection report will be issued and approved by the inspector. The final inspection is required before requesting a Final Certificate of Occupancy.

## 7.5 Approvals and Reports

Approvals and inspection reports shall be maintained by the inspector to insure proper notification of construction approvals and failure to comply with the approved plans to the owner, contractor or developer.

### 7.5.1 Field Inspection Report

The purpose of the Field Inspection Report (FIR) is to notify the owner and or contractor/developer of construction deficiencies noted by the inspector, and to direct repairs and corrections.

FIRs will be issued when the permittee or agent is directed to make changes to their work to satisfy this manual and corresponding Ordinance, approved storm water design plans, or specifications. The notice shall set forth the nature of the corrections required and the time allotted to make the necessary corrections. FIRs shall be issued when the following has occurred:

1. Failure to comply with the design plan. Incorrect measurements, using improper materials or failing to follow proper procedures can prompt the issuance of a FIR. FIRs shall be issued in writing except when a verbal notice would result in immediate compliance as the work is being completed. Verbal notices shall be noted in the project file.
2. Failure to provide certification for water quality structures. The inspector shall issue a FIR to the owner/developer requesting certifications and/or as-builts. A compliance date and a mailing address for sending needed information shall be supplied.

## 7.6 Administration and Enforcement

If an application for a Building Permit, Grading Permit, Storm Water Permit, Zoning Land Use Permit or Certificate of Occupancy is denied because of non-compliance with the Huntersville Post-Construction Ordinance, the inspector shall provide notification of the denial and of the reasons therefore.

If the owner fails to comply with the FIR during construction, the inspector shall provide notification of the denial and of the reasons therefore.

### 7.6.1 Right to Appeal

If a request for a permit is disapproved or if a ruling of the Zoning Administrator is questioned, any aggrieved party may appeal such ruling to the Huntersville Board of Adjustment as provided in Section 10.3 of the Huntersville Zoning Ordinance. An appeal or variance to the Board of Adjustment, lawfully and completely filed **within 30 days of the date of the decision**, shall stay enforcement action and penalties until a hearing has been held and a decision rendered by the Board of Adjustment.

### 7.6.2 Penalties

In case any water quality SCM is installed, constructed, reconstructed, altered, repaired, converted or maintained in violation of these regulations, an action for injunction, mandamus, or other appropriate action or proceeding to prevent such violation may be instituted by the Storm Water Administrator or other authority designated by the Board of Commissioners as enforcement agent(s) for the Huntersville Post-Construction Ordinance. Remedies and penalties are stated in Section 8.17.25 of the Huntersville Zoning Ordinance and as listed below:

1. Withholding of Certificate of Occupancy. The Storm Water Administrator or other authorized agent may refuse to issue a certificate of occupancy for the building or other improvements constructed or being constructed on the site and served by the storm water practices in question until the applicant or other responsible person has taken the remedial measures set forth in the notice of violation or has otherwise cured the violations described therein.

2. Disapproval of Subsequent Permits and Development Approvals. As long as a violation of this ordinance continues and remains uncorrected, the Storm Water Administrator or other authorized agent may withhold and the Town of Huntersville may disapprove, any request for permit or development approval or authorization provided for by this ordinance or the zoning, subdivision, and/or building regulations for the land on which the violation occurs.

3. Injunction, Abatements, etc. The Town of Huntersville may institute an action in a court of competent jurisdiction for a mandatory or prohibitory injunction and order of abatement to correct a violation of this ordinance. Any person violating this ordinance shall be subject to the full range of equitable remedies provided in the General Statutes or at common law.

4. Correction as Public Health Nuisance, Costs as Lien, etc. If the violation is deemed dangerous or prejudicial to the public health or public safety, the Town of Huntersville may cause the violation to be corrected and the costs to be assessed as a lien against the property.

5. Stop Work Order Issuance and Revocation of Permits. The Storm Water Administrator may issue a stop work order to the person(s) violating this ordinance. The stop work order shall

remain in effect until the person has taken the remedial measures set forth in the notice of violation or has otherwise corrected the violation or violations described therein. The stop work order may be withdrawn or modified to enable the person to take the necessary remedial measures to correct such violation(s).

The Zoning Administrator may revoke any permit (e.g. building, grading, storm water, zoning use, certificate of occupancy) by written notification to the permit holder and/or owner when violations of this manual or corresponding Ordinance have occurred. Permits may be revoked when false statements or misrepresentations were made in securing the permit, work is being or has been done in substantial departure from the approved application or plan, there has been a failure to comply with the requirements of this manual or corresponding Ordinance, or a permit has been mistakenly issued in violation of this manual or corresponding Ordinance.

Failure to comply with the proper construction sequence as outlined in the Huntersville Post-Construction Ordinance may cause a Notice of Violations/ Stop Work Orders to be issued in such cases as described below:

a. Failure to notify the Department before beginning any work to implement the water quality SCM (including not requesting a pre-construction meeting):
   Any work that has been placed without a required inspection approval shall be certified in writing by a registered professional engineer before the next phase of construction begins. The inspector reserves the right to require investigative materials testing on all un-inspected facilities or devices at the sole expense of the permittee/owner. Any deficiencies that need to be corrected for work already started shall be listed and given a compliance date. The permittee shall be notified to call for future inspections as required, as well as any additional inspections required by the inspector.
b. Failure to have work inspected and approved before continuing work:
   It is required that inspection point(s) not approved be certified in writing by a registered professional engineer. The inspector reserves the right to require investigative or materials testing on all un-inspected facilities or devices at the sole expense of the permittee/owner.
c. Failure to call for a final inspection:
   The inspector shall list all deficiencies that need to be corrected, give a compliance date, and request a letter of certification and/or as-builts (if required) be submitted. The owner or contractor/developer shall request a re-inspection after completing the corrections so another final inspection can be made.
d. Failure to provide certification for completed water quality SCMs:
   If an engineer's certification and/or as-built is not received by the compliance date as required by a previously issued FIR, a Notice of Violation to the owner and/or developer shall be sent requesting certification and/or as-builts.

6. Civil Penalty. Violation of the post-construction ordinance may subject the violator to a civil penalty up to the full amount of penalty to which the Town of Huntersville is subject for violations of its Phase II Storm Water Permit. If the violator does not pay the penalty within 30 days after notice of the violation is issued by the Storm Water Administrator, the violation shall be recovered in a civil action in the nature of a debt.

## Section 8. Definitions

Provided below are the definitions contained in Section 8.17.6 of the Ordinance along with additional definitions for clarification in ensuring compliance.

Administrative Manual. A Manual developed by the Stormwater Administrator and distributed to the public to provide information for the effective administration of this ordinance, including but not limited to application requirements, submission schedule, fee schedule, operation and maintenance agreements, criteria for recordation of documents, inspection report forms, requirements for submittal of bonds, and a copy of this ordinance.

Stormwater Control Measure (SCMs). A structural or nonstructural management based practice used singularly or in combination to reduce non-point source input to receiving waters in order to achieve water quality protection goals.

1. Non-structural SCMs - Non-engineering methods to control the amount of non-point source pollution. These may include land-use controls and vegetated buffers.
2. Structural SCMs - Engineered structures that are designed to reduce the delivery of pollutants from their source or to divert contaminants away from a water body.

Built-Upon Area (BUA). That portion of a development project that is covered by impervious or partially impervious surface including, but not limited to, buildings; pavement and gravel areas such as roads, parking lots, and paths; and recreation facilities such as tennis courts. “Built-upon area” does not include a wooden slatted deck or the water area of a swimming pool. The specific methodology for calculating BUA is contained in the Charlotte-Mecklenburg SCM Design Manual.

Charlotte-Mecklenburg SCM Design Manual. A document that contains designs for SCMs. The Manual and/or this ordinance indicate the designs from the Charlotte-Mecklenburg SCM Design Manual that are approved for use in the Town of Huntersville for compliance with this ordinance. The Charlotte-Mecklenburg SCM Design Manual shall be approved for use in the Town of Huntersville by the North Carolina Department of Environment and Natural Resources and shall be at least as stringent as the stormwater design Manual approved for use in Phase II jurisdictions by the Department for the proper implementation of the requirements of the federal Phase II stormwater program. All references herein to the Charlotte-Mecklenburg SCM Design Manual are to the latest published edition or revision.

Conventional SCMs. Stormwater treatment devices that are not LID SCMs as defined below in “Definitions.”

Detain. To store and slowly release stormwater runoff following precipitation by means of a surface depression or tank and an outlet structure. Detention structures are commonly used for pollutant removal, water storage, and peak flow reduction.

Manual. The document that contains the approved SCM designs and other information necessary for compliance with this ordinance. The Manual shall be approved for use in the Town of Huntersville by the North Carolina Department of Environment and Natural Resources and shall

be at least as stringent as the stormwater design Manual approved for use in Phase II jurisdictions by the Department for the proper implementation of the requirements of the federal Phase II stormwater program. All references herein to the Manual are to the latest published edition or revision.

Hydrologic Abstractions. Physical processes of interception of rainfall or overland stormwater flow by vegetation, evaporation from land surfaces and upper soil layers, transpiration by plants, infiltration of water into soil surfaces, and storage of water in surface depressions.

Low Impact Development (LID) Approach. A technology-based system for managing urban stormwater runoff that combines a hydrologically functional site design with pollution prevention measures to compensate for land development impacts on hydrology and water quality. To be effective, the LID approach must be applied to every phase of site planning, design, development, and post-construction control for the purpose of mimicking predevelopment site hydrology by storing, infiltrating, evaporating and detaining stormwater runoff. Examples of the LID Approach include reducing impervious surfaces, managing stormwater closer to the source and avoiding large, centralized management devices, phased grading, and vegetated conveyances instead of storm drain piping.

Low Impact Development (LID) SCMs. Decentralized, structural stormwater treatment devices that utilize infiltration, evaporation, retention and detention as well as biological and physical processes to more closely replicate pre-development hydrology characteristics and reduce negative water quality impacts. Examples of LID SCMs include bio retention systems, sand filters, and vegetated filter strips.

Mecklenburg County Land Use and Environmental Services Agency (LUESA). The department or division of Mecklenburg County government (regardless of the title given to it by Mecklenburg County) which has responsibility for stormwater and water quality matters, acting as the agent of the Town of Huntersville for various purposes in connection with the enforcement of this ordinance.

National Pollution Discharge Elimination System (NPDES) Permit. A permit issued pursuant to the federal Clean Water Act for the purpose of controlling discharges of pollutants to surface waters and protecting water quality. In North Carolina, NPDES Permits are issued by the N.C. Department of Environment and Natural Resources.

Non-Point Source (NPS) Pollution. Forms of pollution caused by sediment, nutrients, organic and toxic substances originating from land use activities and carried to lakes and streams by surface runoff.

Retain. To capture and hold stormwater runoff following precipitation by means of surface depression allowing the water to infiltrate into the soil, thus reducing the hydrologic and pollution impacts downstream. Retention structures are commonly used for pollutant removal, water storage, and peak flow reduction.

Stormwater Administrator. The Mecklenburg County Water Quality Program Manager that has

been designated by the Town of Huntersville Board of Commissioners to administer and enforce this ordinance.

Stormwater Management Permit. A permit required for all development and redevelopment unless exempt pursuant to this ordinance, which demonstrates compliance with this ordinance.

Surface Water. Any body of water found on the earth's surface, including streams, wetlands, ponds, lakes, and rivers.

Total Suspended Solids (TSS). Total suspended matter in water, which is commonly expressed as a concentration in terms of milligrams per liter (mg/l) or parts per million (ppm).