
4.10 Proprietary and Innovative (Green Infrastructure) BMPs

4.10.1 General Description

A proprietary BMP is a manufactured device designed using technology developed by an independent company/contractor that treats storm water before being discharged to another BMP or to a receiving stream. This is a broad category of BMPs with a variety of pollutant removal mechanisms and varying pollutant removal efficiencies. Many different proprietary devices, or manufactured BMPs, are available for the treatment of storm water. Many, though not all, proprietary BMPs can be classified into two major groups: separation devices and filtration devices. Separation devices can be further subdivided into two types: chambered and hydrodynamic. In chambered BMPs, runoff passes through several chambers where settling of sediment particles and flotation of hydrocarbons takes place. Hydrodynamic devices typically impart a swirling motion to the incoming flow that aids in settling of sediment particles. Filtration BMPs typically pass runoff through filter cartridges or filter media, thereby removing some fraction of the pollutants from the storm water.

An innovative BMP is a device designed using technology not presented in the Charlotte–Mecklenburg BMP Design Manual. Examples of innovative storm water solutions include green roofs, pervious pavement, and other practices that aim to infiltrate storm water runoff into the underlying soil.

4.10.2 Pilot BMP Program and Redevelopment Projects within Charlotte

Within the City of Charlotte and its extra-territorial jurisdiction, a limited number of proprietary and innovative BMPs may be approved for testing and acceptance into the BMP Pilot Program on a first-come, first-served basis by the Storm Water Administrator. Approval will be based on testing and data needs of the BMP Pilot Program and the project's ability to meet the design, monitoring, and administrative requirements of the BMP Pilot Program. This information can be found in the BMP Pilot Program documentation which is available at the following website:

[http://chameck.org/stormwater/StormWaterAgencies/Pages/PilotBMPPProgram\(City\).aspx](http://chameck.org/stormwater/StormWaterAgencies/Pages/PilotBMPPProgram(City).aspx)

4.10.3 Other Development and Redevelopment Projects

Other development and redevelopment projects that are not included in Section 4.10.2 above can apply for a permit to utilize proprietary or innovative BMPs to meet post-construction ordinance requirements. However, the site must have alternative storm water treatment measures readily available (as described below in the major design elements) if the proprietary or innovative device is shown to be or become incapable of meeting the pollutant removal requirements of the post-construction ordinance.

Since individual proprietary BMPs are extremely variable in design details, design concepts, and pollutant removal mechanisms, it is not currently possible to provide a category-wide set of detailed design parameters for proprietary or innovative BMPs. Charlotte-Mecklenburg Storm Water Services will approach review and approval requirements on a case-by-case basis, and will determine whether additional requirements are necessary in accordance with site conditions, the specifics of the device, the target pollutants, and the identified pollutant removal requirements for the governing regulatory program. These requirements may add additional time to the plan approval process. To obtain approval to install a proprietary or innovative BMP in the City of Charlotte and Mecklenburg County, the proposed BMP must meet all of the following Major Design Elements. Additional design elements may be required based on staff review.

- Hydrologic and hydraulic design principals presented in the Charlotte-Mecklenburg BMP Design Manual and Charlotte-Mecklenburg Storm Water Design Manual must be followed.
- Sizing shall take into account all runoff at ultimate build-out including off-site drainage that is not bypassed.

- BMP shall be located in a recorded drainage easement with a recorded access easement to a public ROW.
- The BMP may not be located within one mile of and draining to waters classified as HQW; including waters classified as ORW, WS-I, WS-II, SA, and Primary Nursery Areas (PNA).
- The BMP shall be installed with approved influent and effluent monitoring sites (Note: this design element is not required for BMPs included in Section 4.10.5 Innovative Devices)
- Third-party monitoring, to be paid for by the owner/developer, is required to verify the installed performance of the BMP in accordance with the monitoring protocols published in the BMP Pilot Monitoring Program (Note: this design element is not required for BMPs included in Section 4.10.5 Innovative Devices).
- At a minimum, the monitoring protocol will include monitoring of twelve (12) storm events of at least 0.1-inch intensity over a 24-hour period preceded by a minimum 72-hour dry period. Dry periods are durations during which there is no more than 0.10-inch of precipitation in any 24-hour period. (Note: this design element is not required for BMPs included in Section 4.10.5 Innovative Devices).
- Alternative storm water treatment measures (BMPs) must be designed and approved prior to issuance of the Storm Water Permit. These alternative BMPs must be available and must be installed, upon the Storm Water Administrator's determination that the BMP has failed (Note: this design element is not required for BMPs included in Section 4.10.5 Innovative Devices).
- An operation and maintenance plan is required.
- The BMP must be designed by a professional licensed in North Carolina. The design professional must also certify that the BMP was inspected during construction; that the installation conformed to the approved plans and specifications; and that the BMP meets the requirements of the rules.
- Additional design and performance monitoring requirements will be developed on a case-by-case basis by Charlotte-Mecklenburg Storm Water Services. (Note: this design element is not required for BMPs included in Section 4.10.5 Innovative Devices).

4.10.4 Preliminary Evaluation Period for Proprietary and Innovative Devices

Each permitted proprietary or innovative BMP installed in development projects that increase the built upon area as compared to pre-project site conditions shall be subject to a Preliminary Evaluation Period (PEP). The PEP program requires installation of the candidate technology at sites approved for testing by the Storm Water Administrator. For the candidate technology, Charlotte-Mecklenburg Storm Water Services will develop the PEP requirements applicable to the technology. Charlotte-Mecklenburg Storm Water Services will develop a device-specific project plan, a monitoring plan, and will interpret the collected data from the permitted site. The site owner/developer will pay all monitoring costs including data collection, analysis, and reporting. The monitoring protocols are published in the BMP Pilot program documentation which can be obtained from the Storm Water Administrator.

Charlotte-Mecklenburg Storm Water Services favorable interpretation of the first set of data allows the candidate technology to continue in the PEP program, but at another location. After a statistically-significant number of data sets are in hand, Charlotte-Mecklenburg Storm Water Services will establish the assigned pollutant removal rates, design loading limitations, and design particulars for the candidate proprietary or innovative technology and publish the design requirements in the Charlotte-Mecklenburg BMP Design Manual. The intent is that with the performance characterizations and constraints derived from the test locations, Charlotte-Mecklenburg Storm Water Services can then provide qualified city- and county-wide approval of the particular BMP.

To initiate a PEP for a proprietary or innovative treatment BMP, the Storm Water Administrator must receive a permit application for a project proposing to utilize the technology. Once an application is received by the Administrator, Charlotte-Mecklenburg Storm Water Services will begin research on the technology and develop appropriate permitting criteria. Note that the PEP development process may add additional time to the plan approval process depending on the quality of the permit application, availability of documentation, and availability of staff resources. Additionally, the facility will be responsible for

installation of another treatment method in the event that the technology fails to substantially fulfill the PEP requirements it was permitted to meet.

4.10.5 Innovative (Green Infrastructure) Devices

There are innovative Storm Water BMPs that are approved by the North Carolina Division of Water Quality (NCDWQ) and included in the latest edition of NCDWQ Storm Water BMPs Manual (State Manual) that are not included in the Charlotte-Mecklenburg BMP Design Manual, specifically permeable pavement, stormwater harvesting systems and rooftop runoff management systems (commonly referred to as green roofs). In addition to recent accepted direct water quality benefits, there can also be peak attenuation and volume capture benefits from these BMPs. These BMPs are allowed for installation in the Charlotte-Mecklenburg area subject to the approval of the Storm Water Administrator and the major design elements of the State Manual. Below is a summary of key performance criteria:

Permeable Pavement Systems

Permeable pavers and porous concrete systems will be allowed on a site when designed and installed in accordance with the latest revision of Chapter 18 of the NCDENR Stormwater BMP Manual with the following specific requirements for meeting local regulations:

- Water Quality Pollutant Removal – As specified in the NCDENR manual for sites designed for detention only, 70 or 85% TSS removal (depending upon presence of a geomembrane barrier) and 10% TP removal credit will be given. For sites designed for infiltration of the water quality volume (WQv), 85% TSS removal and 60% TP removal will be given.
- Peak Attenuation – Peak flow calculations may be routed through the system using infiltration rates determined onsite and using void space for storage..
- Volume Capture – Volume calculations may be routed through the system using infiltration rates determined onsite and using void space for storage.(must be designed infiltrate or drain within 120 hours).
- Built-Upon Area (BUA) Credit – The BUA credit will apply only to the area of permeable pavement and not to any additional BUA that drains to it. Permeable pavement systems can reduce built-upon area when determining applicability with low density/ high density requirements or with low density built-upon area limits within water supply watershed areas. Permeable pavement systems shall be considered 100% BUA when calculating percent high density built-upon area limits within water supply watershed areas. In other words, no allowance will be given to allow the 50% and 70% BUA thresholds to be exceeded within water supply watershed areas).
- Soil tests - shall be provided as specified in the State Manual.
- Maintenance/Inspections – Permeable pavement systems shall be properly maintained through routine sweeping/maintenance, and a yearly, certified inspection report shall be submitted to the Storm Water Administrator for permeable pavement system as required by the recorded Operation and Maintenance Covenant and Plan described in the Administrative Manual.

Green Roofs

- Water Quality Pollutant Removal – 85% TSS removal and 0% TP removal. Development and redevelopment projects within the City of Charlotte that utilize green roofs meeting the specifications in the most current Chapter 19 of the NCDENR Stormwater BMP Manual shall not be required to treat the WQv (1" storm) for the portion of the roof that has at least 4 inches of approved media with a water storage layer (reservoir cup system).
- Water Quality Volume - Reduction in rational coefficient "C" to $C = 0.65$
- Peak Attenuation – Reduction in curve number (Cn) to 84 for runoff calculations.
- Volume Capture – Reduction in curve number (Cn) to 84 for runoff calculations.
- Built-Upon Area – Green roofs do not reduce built-upon area when determining applicability

with low density / high density requirements or with built-upon area limits within water supply watershed areas. Green roofs must be considered 100% built-upon area when calculating percent built-upon area.

Since Permeable Pavement Systems and Green Roofs are approved for use by the State Manual, Charlotte-Mecklenburg Storm Water Services is not requiring an alternative treatment system design or monitoring of these BMPs as described in Section 4.10.3 and 4.10.4 of this manual.

Stormwater Harvesting Systems

Stormwater Harvesting Systems (cisterns) will be allowed on a site when designed and installed in accordance with NCDWQ's document entitled *Technical Guidance: Stormwater Treatment Credit for Rainwater Harvesting Systems*. To receive water quality volume (WQv) treatment credit, the minimum criteria contained within the Technical Guidance document must be met. The document is located on the following webpage: <http://portal.ncdenr.org/web/wq/ws/su/bmp-ch19>.

Credit as specified in the Technical Guidance document will be given to approved systems as meeting the WQv requirements. Additional measures may be needed to meet local channel protection volume requirements and peak flow requirements. Other portions of projects not draining to storm water harvesting systems will be required to meet WQv treatment requirements as well.