

## Chapter 2 The Permitting Process

### 2.0 Introduction

All development and redevelopment proposals that exceed 5,000 sf of soil disturbance, or increases impervious area by 1,000 sf (or greater), are subject to the requirements of the City of Charleston Stormwater Manual and require issuance of a Building Permit with the Land Disturbance Activity section completed. Areas larger than one (1) acre are subject to additional State permitting requirements. All City and State requirements must be satisfied prior to a permit being issued. City Permits will be allocated through the City Building Department, and are a required component of the final Building Permit.

Requirements will include management of erosion and sediment control related to stormwater during the construction process and installation of permanent stormwater management infrastructure and procedures for the completed project.

The permitting process covered by this manual has been created to comply with Charleston’s Municipal Separate Storm Sewer Systems MS4 General Permit, which is issued by the WVDEP. A copy of the MS4 General Permit can be obtained from the WVDEP website at <http://www.dep.wv.gov/WWE/Programs/stormwater/MS4/permits/Pages/default.aspx>

Development projects have been divided into five (5) categories. Each category, illustrated in Table 2-1, has a unique set of review requirements and permitting based on the proposed land use, design and location.

*It should be noted that any installation of new stormwater infrastructure or modification of existing infrastructure requires approval of the City Engineering Department on a case by case basis.*

Category	Description
A	<b>No Stormwater Permit Required</b> – Residential or commercial construction, renovation, or other activities that disturb less than 5,000 sf or result in less than 1,000 sf of new impervious area.
B	<b>Discharge/Diversion</b> – Any untreated discharge associated with cleaning, washing, dumping, drainage or any other potential water polluting activities, or diversion of water by installing underground pipe, constructing ditches or swales to channel water to a new location.
C	<b>Residential Construction</b> – Residential construction or renovation exceeding 5,000 sf but less than one (1) acre of land disturbance, and/or the addition of over 1,000 sf of impervious area. Residential construction exceeding one (1) acre triggers an additional requirement for infiltrating <sup>1</sup> the first one (1) inch of rainfall on the site.
D	<b>Commercial and Industrial Construction</b> – Commercial or industrial construction, or renovation disturbing 5,000 sf or more and/or increasing impervious area by 1,000 sf or more. This includes redevelopment projects. Commercial and industrial construction has additional State permitting requirements for projects disturbing over one (1) acre of land. Site disturbance over one (1) acre triggers an additional requirement for infiltrating <sup>1</sup> the first one (1) inch of rainfall on the site.
E	<b>Subdivisions Developments</b> – Subdivisions are divided into minor and major subdivision categories as defined in Section 3 of the City’s Subdivision Ordinance. Minor subdivisions are four (4) or more lots without extension of streets or infrastructure. Major subdivisions are four (4) or more lots and/or construction of new roadways and infrastructure. Site disturbance over one (1) acre triggers an additional requirement for infiltrating <sup>1</sup> the first one (1) inch of rainfall on the site. Please note industrial or business parks will also require review under Category D (described above).

<sup>1</sup>Extended filtration may also be used where infiltration is not feasible or may cause adverse side effects.



## 2.1 Defining Land Disturbance Activity

For purposes of this manual “ land disturbance activity” is defined as:

*Any activity that results in the movement or manipulation of soil, rock or other earth materials. This includes but is not limited to clearing and grubbing, grading, excavation, filling, embankment construction, road grading, ditch cleaning, mineral extraction, commercial timbering, and stockpiling of earth materials (definition except from the City’s Erosion and Sediment Control Ordinance).*

### 2.1.1 Exclusions

The following activities, illustrated in Table 2-2, are specifically excluded from the definition of disturbance with regard to stormwater permitting.

Table 2-2. Stormwater Permitting Exclusions*	
1	Interior renovations, roof repair and building façade maintenance.
2	Milling and repaving of existing asphalt or concrete streets, parking lots, sidewalks etc. provided the underlying subgrade is not impacted and milled material/debris is kept out of storm drains and inlets.
3	Maintenance of existing landscaping and gardens.
4	Cutting of trees and brush provided the area remains vegetated and no grubbing of the root systems occurs.
5	Maintenance of pervious sports fields such as replacement of the clay surface to baseball infields, turf plugging of golf fairways and greens, etc.; provided there is no construction of new amenities.
*These exclusions only apply for these activities as long as there is no untreated discharge associated with them. The individual(s) or business(es) are responsible if any adverse impact to stormwater is observed (e.g. dumping wash water with paint chips into a storm drain, etc.).	

### 2.1.2 Regulatory Jurisdiction - Physical Limits

Any project falling within or partially within the corporate limits of the City of Charleston is subject to compliance with the permitting process.

## 2.2 The Stormwater Review and Permitting Process

Depending upon the project specific review process, the owner or their authorized agent should either contact the City directly or visit ([www.charlestonstormwater.org](http://www.charlestonstormwater.org)) in advance of the desired construction start date. Residents are urged to contact the City Stormwater Department at (304) 348-8106 to assist in determining the appropriate regulatory process for their project. Users of this manual are also referred to the WVDEP stormwater manual at <http://www.dep.wv.gov/WWE/Programs/stormwater/MS4/Pages/StormwaterManagementDesignandGuidanceManual.aspx> for supplemental information.

Appendix B contains copies of the Residential Building Permit, Commercial Building Permit, Land Disturbance Activity Matrix, Stormwater Permitting Construction Activity Review and Approval Process and Land Disturbance Activity Inspection Matrix. The City Building Department will issue a packet to residents or developers containing pertinent applications and relevant information depending on the permit required. Table 2-1 (page 2-1) illustrates the initial Stormwater Permitting Construction Activity Permitting Process.

The goal of the review process is to create a functional and logical stormwater management plan for the proposed project that will protect City residents, water quality and promote overall environmental sustainability.

Permitting forms and associated information for Category A through E projects, as specified by the City, are available on the Charleston Stormwater website at <http://charlestonstormwater.org/>. Hard copies of this information is available at the City Engineering Office and City Building Department. Please note that the Land Disturbance Activity section is in conjunction with a city building permit.

### 2.2.1 Technical Review Process

Permits will be reviewed in the order that they are received. The official date of receipt for technical review is the date the application has been administratively completed.

Technical review will consist of reviewing site information, the proposed erosion and sediment control plan and permanent stormwater management plan, all supporting design calculations to the proposed site features, the Storm Water Pollution Prevention Plan (SWPPP) and other supporting documentation as applicable, see Table 2.3 (page 2-4). Technical comments will be prepared in writing and sent to the applicant via e-mail or regular mail (per applicant's request).

The initial technical review will be completed within the following timeline:

**Categories B, C, and D** – Within ten (10) business days of being deemed administratively complete.

**Categories E** – Subdivision requirement vary depending on the size, see Section 3 - 60 of the Charleston Subdivision Ordinance for timelines.

Applicants will be given 30 days to respond in writing to initial technical comments. If the applicant does not respond within that time, the application will be deemed “not approved” and the application and supporting information will be returned to the applicant. This timeline may be extended based upon mutual agreement of the applicant and City.

The City will review the comment response within ten (10) business days of receipt and notify the applicant of any outstanding issues. The applicant will have up to 30 days to respond to any follow up comments. Once

# The Stormwater Review and Permitting Process



Table 2-3 City of Charleston Stormwater Permit Review

	RESIDENTIAL			COMMERCIAL		SUBDIVISION		
	A	B	C MINOR	C MAJOR	D < 1 Acre	D > 1 Acre	E MINOR	E MAJOR
Building/Stormwater Permit Required		x	x	x	x	x	x	x
Use Erosion & Sediment Controls	x	x	x	x	x	x	x	x
Hand Sketch Plans Allowed		x	x		x			
WVDEP NPDES Permit or NOI Required				x		x	x (1)	x
Volume Control for First 1" of Rainfall			(2)	x	(2)	x	x (1)	x
Peak Flow Management (3)			x	x	x	x	x	x
Water Quality Considerations (4)		x	x	x	x	x	x	x
Conceptual Site Plans		(5)	(5)	(5)	(5)	x	(5)	x
Non Erosive Velocity at Discharge	x	x	x	x	x	x	x	x
Maintenance & Operation Agreements			x	x	x	x	x	x

(1) Required if disturbance is over 1 acre required. Less than 1 acre does not trigger this requirement.

(2) Quantity control is encouraged in projects falling under this category, but is not required unless a potential for adverse impact is determined to downstream or adjacent properties or structures.

(3) Projects falling within a watershed requiring a connection, to a combined sewer system will also require compliance with Chapter 9 of this manual.

(4) For purposes of water quality, the infiltration of the first inch of storm rainfall will be considered in compliance with this requirement. For projects not performing infiltration engineered controls or other BMP's, such as filters and vegetated buffers must be proposed. Industrial development, fueling stations, etc. are required to propose adequate BMP's for known contamination potential. The adequacy of the BMPs is decided by the City of Charleston.

(5) Strongly suggested but not required.

## General Requirements

the application is deemed technically complete, the land disturbance activity approval will be forwarded to the Building Department.

For projects over one (1) acre that also require a NPDES construction stormwater permit, applicants are urged to coordinate and incorporate comment responses from both the WVDEP and the City into a common comment submittal to avoid the confusion of having multiple versions of plans and permitting documents.

**NOTE:** *Based on the City's past experience, larger projects often undergo more than one round of comments. This happens as the result of new information that is received during in the commenting process. It is the intent of the City to review all applications expeditiously, however, the completeness of the plan and its protection of downstream infrastructure, landowners and the environment will be the overriding goal of the technical review process.*

### 2.2.2 Inspections

Once a permit is issued, the City may inspect any phase of the construction process to determine if the erosion and sediment control plan submitted for the permit is being followed. This will include review of erosion and sediment control practices, uncontrolled runoff, construction methods of permanent stormwater management features and general compliance with the stormwater pollution prevention plan, see Construction and Sediment Control Plan in Appendix B.

**Through submission of a permit application and issuance of that permit, the permittee agrees to allow access to the site during reasonable hours of construction and/or operation, or immediately upon report of an emergency or visible violation of the Clean Water Act that is a threat to the health and welfare of City residents or the environment.**

Inspections will be conducted on both a scheduled and complaint response basis.

All specified permanent controls must be installed and maintained after completion of the project. Temporary erosion and sediment control must be kept operational and maintained until the construction phase of the site is released by the City and by the WVDEP if a construction NPDES permit was required. The City Stormwater Compliance Officer may require the installation of additional temporary or permanent BMPs if the installed BMPs are not functioning at a satisfactory level to protect the environment.

### 2.2.3 Other Penalties

The City Stormwater Compliance Office has the ability to issue a "Stop Work" order. Further, the City may impose monetary penalties for continuing violations of the permit, lack of facility maintenance, imminent or anticipated threats to downstream properties, violation of state and federal water quality standards and City ordinances. "Stop Work" orders will remain in place until violations are resolved to the satisfaction of the City and monetary penalties are remitted. Penalties will be assessed according to current City Statutes.



## 2.2.4 Other Permits

Many projects will require several permits from various governmental agencies to be approved for construction. For purposes of stormwater permitting within the City of Charleston, the following permits or approvals must be received prior to a final building permit being issued by the City:

- NPDES Notice of Intent (1-3 acres) or Construction Stormwater Permit (3+ acres) from the WVDEP.
- City of Charleston Planning Department Approval(s).
- Charleston Sanitary Board Approval(s).
- United States Army Corp of Engineers (USACE) – Nationwide or Individual Permits for impacts to waterways and wetlands.

Although not regulated by the City, project developers are reminded that multiple other permits are often encountered. These include:

- West Virginia Department of Highways (WVDOH) – Roadway Encroachment Permits.
- West Virginia State Historic Preservation Office (SHPO) Clearance.
- West Virginia Department of Natural Resources (WVDNR) – Rare, Threatened and Endangered Species Clearance.
- WVDNR – License and Right of Entry for Work in Streams.

Stormwater permitting at the City level will not be impacted by these other agency permitting processes. However, it is the sole responsibility of the project owner and developer to obtain all applicable permits and clearances for their project. Issuance of a building permit for stormwater impacts does not relieve the applicant of any responsibility for compliance with other requirements.

If any of the other required permits are denied or revoked by another agency, it is the responsibility of the permittee to notify the City of Charleston Stormwater Department and any other relevant City agency to remedy the situation before continuation of construction.

## 2.2.5 Mitigation in lieu of

The City of Charleston recognizes that complete on-site stormwater management may not be feasible for some projects. The MS4 permit issued by the WVDEP to the City also recognizes this.

The City will be developing technical guidance with regard to the implementation of a “mitigation bank” for projects within the City of Charleston. This “mitigation bank” will identify existing stormwater management issues and needs within the City. New or redevelopment projects that cannot reasonably meet the requirements for on-site infiltration or attenuation of the post development peak flow may be allowed to conduct a parallel watershed improvement project as identified in the “mitigation bank” in conjunction with development of their site to offset the anticipated stormwater impacts.

### 2.2.6 Operation and Maintenance

Stormwater management features must be property operated and maintained in perpetuity, unless otherwise agreed to in writing by the City. In the event a property owner fails to operate or maintain these structures after adequate notice, the City may perform this work and invoice the property owner for the cost of these services. Failure to pay these costs will result in liens being attached to the property.

Maintenance will include, but is not limited to:

- Cleaning and repair of culverts, storm sewers, pond risers, spillways and inlets.
- Removal of sediments and trash from ponds, rain gardens, infiltration areas, buffer strips, etc.
- Reseeding, mulching and replacement of plant and vegetative material.
- Cleaning of filters, pervious pavements, oil/water separators, etc.
- Other items as required.

### 2.2.7 Record Drawings – “As-Built”

Projects utilizing permanent post construction stormwater management features will be required to submit final “as-built” drawings of the structures to the Stormwater Department.

Horizontal and Vertical Locations;

- Unless otherwise agreed upon by the City Engineer and/or Stormwater Manager, these drawings shall present values of actual NAD83 WV State Plane South Zone, Grid Coordinates (US Feet units) for Horizontal Positioning and elevations to be based on NAVD88 Vertical Datum (US Feet units). These drawings shall also reflect any modifications made between permitting and final construction.

Record drawings are required for all category D and E projects. A written description of any modifications is acceptable for Category B and C projects.

Permittees for Category C, D, and E projects shall provide positioning as stated above of all permanent structures and inlets and outlets. Infiltration features such as bio-retention structures shall have the location taken at the approximate center of the area.



## 2.3 Developing the Stormwater Management Plan

All qualifying category C, D and E projects within City limits will be required to submit a detailed stormwater plan of the proposed work for review by the City. Conceptual plan submittals are encouraged to expedite the formal review process. However, conceptual plans are not required unless the applicant is requested to do so due to specific circumstances, or if the project exceeds three (3) acres of disturbance. Each project will also be required to implement erosion and sediment control practices that are appropriate for the site location and amount of disturbance, see Chapter 5. A SWPPP is required for qualifying permit projects disturbing 5,000 sf. or greater and/or 1,000 sf of impervious surface. The final method for permanently controlling stormwater from the site will then be established to provide sustainable protection for adjacent landowners, downstream water quality and the environment. The stormwater control measures to be installed and maintained after construction will vary greatly depending upon the size of the project, increase to impervious area, and type and location of the project, see Chapter 6 for details.

### 2.3.1 Conceptual Review

The conceptual review is generally a voluntary opportunity (however, is mandatory for three plus (3+) acres of disturbance) for the permittee to ask the City to give initial input into a project prior to extensive planning or design efforts. It also gives the City staff and project representatives a chance to discuss the project in person, and to identify existing site constraints, potential challenges and downstream issues that the project owner may not be aware of. Chapter 3 provides general guidance on initial site planning and Low Impact Development (LID) design.

### 2.3.2 Erosion and Sediment Control

Projects that create soil disturbance can result in the erosion of the soil and sedimentation of the drainage path and receiving stream if improperly handled. As such, the City requires all projects to utilize Best Management Practices (BMPs) for erosion and sediment control that are appropriate for the level of disturbance and location of the site. Smaller projects can often be designed with simple and readily available materials, such as silt fence and/or inlet protection. Larger projects may include sediment traps, filter bags and other project specific design features. Chapter 5 of this manual gives direction as to the specific requirements for preparation of a suitable erosion and sediment control plan for the project. The level of effort for preparation of these plans should also reflect the size of the project. Smaller residential projects should, in most cases, be able to demonstrate proposed erosion and sediment control with a hand sketch of the project. Larger projects will require engineering drawings, details, site specific design, and designated staging of erosion and sediment control devices, see Chapter 3 for details.

All projects within the City that exceed one (1) acre of disturbance are required to obtain, a City permit as well as a National Pollutant Discharge Elimination System (NPDES) Construction Stormwater Permit from the WVDEP. The WVDEP requires that all sites with a projected disturbance of at least one (1) acre but less than three (3) acres to file a Notice of Intent (NOI). This NOI covers the basics of the project and requires the permittee to create a SWPPP. For projects over three (3) acres in size, a full site registration application must be made to the WVDEP, including a Storm Water Pollution Prevention Plan (SWPPP) that is discussed in the fol-



lowing section (Section 2.3.3). This includes performing and submitting design calculations for the stormwater features and requires more specific project information. For projects impacting over 100 acres or that will have disturbance lasting more than one (1) year, the WVDEP also requires the project to be advertised for public comment. Details of the exact requirements for NPDES Construction Stormwater permitting can be found at [www.dep.wv.gov/wwe/programs/stormwater](http://www.dep.wv.gov/wwe/programs/stormwater).

Please note that it is the desire of the City to avoid duplication of effort whenever possible. As such, the City strongly recommends that the permit drawings for the NPDES permit be prepared after the Conceptual Review so that they can include City specific requirements. The drawing(s) can be used for both the City and WVDEP permitting processes and therefore, having multiple erosion and sediment control plans is avoided.

### 2.3.3 Storm Water Pollution Prevention Plan

A SWPPP that discusses project specifics, waste management training, monitoring and maintenance is required for all category D, and E projects. “Developing Your Stormwater Pollution Prevent Plan: A guide for Construction Sites” This SWPPP guideline can be downloaded from the WVDEP website at <http://www.dep.wv.gov/WWE/Programs/stormwater/MS4/guidance/Documents/Developing%20your%20SWPPP%20A%20Guide%20for%20Construction%20Sites.pdf>

### 2.3.4 Post-Construction Stormwater Management

The permanent stormwater management plan for a proposed project will depend upon several factors including the project review classification (e.g. C, D, or E,), increase in impervious area, potential downstream stormwater or flooding issues and adjacent land uses. Consideration of impacts to existing combined sewers and separate storm sewers will also be considered by the City. The Charleston Sanitary Board has independent requirements for tie-ins to combined sewers. Please reference Chapter 9 for specifics on these requirements. The City will consider sites on a case-by-case basis depending upon the potential for causing impacts to downstream or adjacent properties. Permanent Stormwater Management will include some or all of the following techniques:

**A. Peak Flow Management** – The calculation of peak flow rates, in cubic feet per second (cfs), of stormwater coming off of the site for typical rainfall events for the existing condition of the site and for the proposed final site conditions. The maximum flow rate coming off of the site after development must be designed to be equal to or less than the calculated maximum flow rate coming off of the existing site. Existing conditions will be considered to be the primary land use for the previous year prior to construction.

This management technique minimizes the potential for downstream erosion of receiving streams and the possibility of overwhelming existing storm sewers and culverts located off of the property, and helps protect against increased street flooding. In areas where stormwater has been documented by the City to be a significant concern due to frequent flooding, excessive stream bank erosion, lack of infrastructure, etc., the requirements for peak flow management are at the discretion of the City Engineer. For sites where it is not feasible to limit the post development flow rate to the pre development rate, the developer must demonstrate that the additional runoff will not have any adverse impacts downstream.

- B. Stormwater Volume Management** – The calculation of the total volume, in cubic feet (cf), of stormwater coming off of the existing site compared to the proposed site. The intent of this requirement is for post development runoff volumes to be comparable to the existing runoff conditions.

The current standard for the EPA mid-Atlantic region, and as required by the WVDEP, is to keep and manage on-site the first 1-inch of rainfall from an average 24-hour storm preceded by 48 hours of no measurable precipitation. Extended filtration practices that are designed to manage one inch of rainfall may discharge through an underdrain. This rule applies only to newly disturbed or newly created impervious areas on the site. See Chapter 6 for acceptable management techniques.

- C. Stormwater Quality Management** – This involves the utilization of BMPs for the protection of downstream water quality. Stormwater runoff from impervious areas and developed sites can include a wide variety of contaminants including sediment, suspended solids, oils and greases, metals, pesticides, herbicides, fertilizers (nitrates and phosphates), fecal coliforms and trash.

This management technique is primarily centered on the reduction of sediment, suspended solids and the removal of oils/greases and trash. As data is collected on constructed and operational projects, the City will update techniques to improve the removal of other contaminants. *The City will utilize capture and infiltration of the first one (1) inch of rainfall as the standard for water quality. On projects where the one (1) inch capture and infiltration cannot be accommodated, the applicant shall propose alternative quality management devices for consideration by the City.*

Projects that present special contaminants of concern (e.g. fueling stations, concrete plants, recycling facilities, etc.) will be required to install additional water quality devices such as trash grates, oil skimmers, sumps or the introduction of flocculates, and a settling basin.

Table 2-4 (page 2-11) summarizes the project categories and specific design requirements.

Chapter 6, Post Construction Runoff Control, gives specific guidance with the regard to the design of permanent stormwater management facilities. Users of this manual are urged to consider sustainable stormwater design options. Chapter 3 of this manual discusses Integrated Site Design and Low Impact Development (LID). Innovative techniques that can be utilized by various projects to meet the permanent stormwater management goals are discussed in this chapter.

Table 2-4 City of Charleston Stormwater Design Requirements

Design Requirements	RESIDENTIAL			COMMERCIAL		SUBDIVISION	
	A	B	C	D	D	E	E
		MINOR	MAJOR	< 1 Acre	> 1 Acre	MINOR	MAJOR
Peak Flow Management	(1)	(1)	1yr 24hr Storm	(1)	1,2,10 24hr Storm (2)	(1)	1,2,10 and 25yr- 24hr Storm (2)
Pond Spill Ways (Detention, Wet Ponds, Constructed Wetlands)			10yr 24hr Principal Spillway 100yr 24hr Combined Principal and Emergency		10yr 24hr Principal Spillway 100yr 24hr Combined Principal and Emergency		10yr 24hr Principal Spillway 100yr 24hr Combined Principal and Emergency
Volume Control (3) (i.e. Infiltration)		<1 inch (4)	1 inch	<1 inch (4)	1 inch	1 inch (4) (5)	1 inch
On Site Channels and Storm Lines		10yr 24hr	10yr 24hr	10yr 24hr	25yr 24hr (2)	10yr 24hr	25yr 24hr (2)
Storm Lines Under Public Roads			50yr 24hr	50yr 24hr	50yr 24hr	50yr 24hr	50yr 24hr

(1) Recommended but not required, unless there is a documented structure downstream of the project that cannot handle increased flow, or there is an imminent threat to adjacent property from the increased flows will be handled at the discretion of the City Engineer.

(2) If permittee cannot comply with the requirements, contact the Stormwater Department immediately to discuss available options.

(3) Brownfield's and redevelopments may qualify for up to a 60% reduction of this requirement

(4) Permittees are encouraged to reduce stormwater volume to the maximum extent practical using low impact design or BMP's such as rain barrels or rain gardens.

(5) Required if disturbance is over one (1) acre.

## Developing the Stormwater Management Plan

## 2.3.5 Special Design Considerations

Stormwater management has become a major consideration for municipalities, as new requirements created by the Municipal Separate Storm Sewer System (MS4) permit process has required a change in the approach of stormwater management. *It is the intent of the City that the new stormwater management requirements will be implemented in such a way that the creation of other adverse design issues are minimized. Some special design considerations are outlined in this section.*

**A. Geologic Setting** – Charleston sits in a unique location at the confluence of the Elk and Kanawha Rivers. At this location four major geologic groups and their associated soils converge. Each of the following areas have distinct characteristics related to slope, soil properties and geotechnical considerations that need to be considered with any stormwater design. The groups include:

- The Conemaugh Group – This formation consists of cyclic sequences of red and gray shale, limestone and coal. Soils at the surface of this formation tend to be gently sloping to very steep, well drained, slightly acidic soils and lime influenced soils on uplands and foot slopes. The hillsides and ridgetops in the Fort Hill area and in the vicinity of Edgewood on the West Side of Charleston are typical of this formation.
- The Allegheny Formation – This formation consists of cyclic sequences of sandstone, siltstone, shale, limestone and coal. Soils at the surface of this formation are typically strongly sloping to very steep, well drained acidic soils on upland areas. The hillsides along the eastern side of the Elk River and in the vicinity of the South Side Bridge are typical of this formation.
- The Kanawha Formation – This formation consists predominantly of sandstone (greater than 50%) with shale, siltstone and coal. The soils at the surface of this formation are typically strongly sloping to very steep, well drained, acidic soils on rugged uplands. The hillsides and ridgetops surrounding Kanawha City are typical of this formation.
- Quaternary Alluvium – This is a general description of areas where rivers have deposited material over time. The general description of this group is alluvial deposits of sand, gravel, silt and clay. The surface soils are nearly level to gently sloping, well drained, lime influenced on high flood plains. The flat areas that make up Downtown Charleston, West Side, North Charleston, East End and Kanawha City are typical of this geology.

**B. Landslide Prone Areas** – Charleston has landslide prone slopes throughout the City. Landslide prone areas were identified by the West Virginia Geological and Economic Survey in 1976 in a document and associated maps entitled “West Virginia Landslides and Slide Prone Areas – Environmental Geology Bulletin No. 15. Scanned reproductions of these maps are contained in Appendix F. The combination of steep slopes, clayey soils and landslide prone areas create a situation where the use of infiltration practices for storm water volume management could create unstable subgrades and create slips if not designed and constructed properly.

**The City strongly urges potential developments to consider the use of Low Impact Development (LID) Practices, particularly for projects located in the steeper and less permeable areas of the City. LID practices are discussed in Chapter 3 of this manual.**

**C. Presence of Basements, Vaults, and Underground Infrastructure** - Underground facilities may not be readily apparent at the surface. Due diligence in locating and avoiding these impacts must be practiced.

### 2.3.6 Watershed Specific Requirements

Within the City there are numerous rivers, streams, creeks and drains that are impacted by stormwater runoff. Some of these locations have documented stormwater flooding or water quality related issues. Future development may create the need for special restrictions at a later date (i.e. streams may be given strict Total Maximum Daily Loads [TMDL's] by the WVDEP). As such, these requirements are reserved for documentation of specific watershed issues within the City and special provisions for protection of water quality within those watersheds. Until a written policy can be established for these areas, the City will identify areas or watersheds of concern on a case by case basis.

### 2.3.7 Public Health and Safety Considerations

The City has a complex system of public stormwater channels, storm sewer systems, and combined sewer systems. The City has the responsibility for maintaining roadways and sidewalks, bridges, and other infrastructure used by the public. This infrastructure has been developed over decades and, in many cases, development has occurred that could have never been anticipated by the original designers. Design standards have also changed over the years, becoming more restrictive than when infrastructure was originally installed. This requires that all new development and redevelopment within the City consider the downstream impacts that will be created both locally and regionally. For example, there are known limitations of certain combined sewers and storm culverts. There are also known flood elevations and floodplain limits that have been established for major streams and rivers within the City limits. No development can be established where a threat to public health and safety will be created or as stated by State and Federal Laws or by City Ordinance.



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