Green Infrastructure for Single Family Residences

Greenville County, South Carolina
Stormwater Guidelines
Background

- Land Development permanently alters the way in which stormwater flows across a site due to grading, compaction and impervious cover.
- Water Quality control is intended to reduce the impacts of development on the quality of the receiving water bodies.
- Greenville County is a Phase I MS4 Permittee which requires the County to support a post-construction permitting program for water quality.
- The County’s requirements superseded the state’s water quality requirements due to this permit.
Types of Single Family Residential

- Effects all current division of land that has already been divided once since 2003
- Single Family Lots (not a part of a larger common plan with a SWPPP) that increase flow by 1 cfs or over 1 acre of disturbance
- Summary Plat Submittals
  - Minor Subdivisions where Zero Lot Disturbance was chosen
  - Family Subdivisions
Managing stormwater

- Individual residential lots created by summary plats are not required to provide the same type of stormwater management as major subdivisions or commercial projects.
- Must ensure that stormwater runoff does not overwhelm stormwater infrastructure.
- Must ensure it does not impact water quality in our streams.
- Must ensure it does not impact adjacent property.
How many of you have gone to get a building permit from Building Codes and were told there is a hold on the lot and you needed to go to Land Development?
County Council felt the burden of permitting should be on the buyer of the newly created lot and not the seller of the lot.

Family Subdivisions allowed for the division of a parcel for family members & that they may not be ready to build on the lots at the time of minor subdivision’s creation.

A Zero Lot Land Disturbance Option is allowed under Section 3.5.6 of the Land Development Regulations.

But it also dictates that “A building and land disturbance hold will be placed on each lot until a land disturbance permit has been obtained.”
The Current Issues

- Some creators of lots did not want to prepare a SWPPP prior to creating a minor subdivision for the entire common plan prior to platting and selling the lots.
- Engineers are too busy & it’s costly to develop SWPPP’s for Summary Plat lots especially on a lot by lot basis.
- Recent past experience found those designed features approved did not get installed or did not get installed correctly.
- People who buy lots on Zero lot disturbance plats and family members who want to build on lots created under Family Subdivision plats need a cheaper and quicker way to meet federal, state and county regulations.
The Solution!

Green Infrastructure for Single Family Residences

Greenville County, SC
Stormwater Guidelines
Purpose

- The Guidelines provide guidance for selecting and installing appropriate stormwater management measures
- Employed simplified design standards more applicable to homeowner/builder experience
- Avoids the need for complex engineering calculations and analysis
- Allows the Building Contractor to provide minor calculations to locate and size the LID features
- Provides simple specifications for the installation of the features
Key Principles for management

- Green Infrastructure (GI)
- Reliance on infiltration where the water table or bedrock layer allows
- Proper Installation of downspouts, channels and features
- Proper Maintenance of downspouts, channels, features and other sources of concentrated flow
What is Green Infrastructure (GI)

- Another term is Low Impact Development (LID)
- Practices that reduce runoff & pollutant loading
- Encourages the interception, evapotranspiration, infiltration &/or capture and reuse of stormwater runoff
- Goal is to reduce the volume of runoff/pollutant loads generated & transported offsite
The Building Contractor & Owner will come to the Land Development Division to meet with a Plan Reviewer.

The Plan Reviewer will explain the guidelines and what is needed to issue a permit.

They will start a case in our tracking system and give the Contractor a permit number for future reference.

Using the guideline booklet and in discussion with the owner one or more of the LID features in the booklet will be chosen for use.
The LID Features

- Dry Well
- Modified French Drain
- Permeable Pavers
- Rain Gardens
- Vegetated Filter Strip
- Water Quality Buffer
Dry Well
Modified French Drain
Permeable Pavers
Rain Garden
Vegetated Filter Strip

Vegetated filter

Level Spreader
Alternate Level Spreader

- Plastic or recycled rubber playground/landscape barrier (minimum 6" height to provide necessary drop)
- Anchor barrier using manufacturer’s requirements to prevent movement. Typical anchoring utilizes metal stakes at a maximum of 2" spacing.
- Manufactured barrier level spreader (residential only) profile view
Water Quality Buffer
Infiltration Trench
Contractor Actions

- The Contractor will use the “tear-out” pages of the chosen feature from the booklet.
- The Contractor will show the necessary calculations for their chosen LID practice.
- The assigned permit number will be listed on the calculations sheets.
- The Contractor will bring those pages, along with a roof plan of the home, back to the Land Development Division for review and approval.
- The Residential Lot Plan Fee will be paid ($500).
Review Process

- These paper copies will be scanned into the permit tracking system.
- A plan reviewer will be assigned and this will start the plan review process.
- The plan reviewer has 10 days maximum to review and will either approve or deny (if additional questions exist).
- The calculations “tear-out” sheets will be stamped approved. This will serve as the permit.
- The Contractor will take these stamped sheets to Building Codes as proof of an approved permit.
Building Codes Process

• The Building Codes Permit Clerk will scan this document into their permit system & make these documents a part of their building permit

• The Permit Clerk will release the previous hold to allow for the issuance of the Building Permit

• A hold will be placed on the Final Building Inspection of the residence and add that the Land Development Division must approve to allow the home to be occupied
Inspection Process

- Once the Land Development permit is approved a LID Inspector is assigned
- The LID Inspector will call the Contractor to set up a Pre-Con meeting to be held at the site of the new home
- The LID Inspector will explain the inspection approval process & close out process
- The Grading Permit will then be issued to the Contractor
Construction Process

- On the front side of the calculations are the specifications that outline the construction steps.
- Each feature has required steps where the Inspector must be called out to inspect/sign off.
- Each feature has required steps where the Contractor must take pictures to document proper installation.
Construction Certification Form

- Six different certifications depending of the feature chosen
- Includes need for materials receipts
- Includes steps for photos
- Includes steps for required inspections
- Areas draining to the LID must be 100% stabilized – sod preferred
- Must turn in with close out documents
Close Out Procedure

- The LID Inspector must be called for a final inspection
- The Certification Form must be provided
- The home owner must sign the SW Management Maintenance Agreement
- As-built Survey Required
- Both Survey and Agreement must be recorded at Register of Deeds
As-Built Survey Example
Building Permit Close Out

- Once the LID Inspector approves the final inspection and all the close out documents they will sign off on the Orange Grading Permit Card at the construction site.
- This will serve as a visual sign to the Building Inspector that the site is OK to close.
- The LID Inspector will release the hold on the Building Permit C/O.
- A new hold will be placed on the home for any future additions that could alter/remove the LID feature.
Post Construction Inspection

- The close out documents are handed over to the Post Construction BMP team and scanned into tracking system.
- The BMP Inspection Team is responsible for the long term function of all stormwater management features.
- A LID BMP Inspector will call the new owner of the home to set up a meeting to discuss how to maintain the feature.
- Educational Information will be given to them.
- The BMP Inspector will GPS the new LID into his field computer which downloads into our tracking system.
Annual Maintenance

- The tracking system will automatically set up an annual inspection date
- The new homeowner will receive a postcard in the mail reminding them of the need to inspect their LID feature(s)
- Self Reporting Inspection Forms are located on our Website
- The Homeowner will perform the inspection, take pictures and mail or e-mail them to the LID BMP Inspector

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### Single Family Residential LID - Self-Report

**Rain Garden Maintenance Inspection Report**

- **Inspection Date:** ______________________
- **Property Owner:** ___________________________________________
- **Address:** ___________________________________________
- **Inspector Name:** ______________________________________________________________

**Any storm water management feature element shall be corrected, repaired, and/or replaced immediately. These deficiencies can affect the integrity of and the efficiency of the storm water management feature.**

<table>
<thead>
<tr>
<th>BMP Element</th>
<th>BMP Deficiency</th>
<th>Deficient: (v) if Yes</th>
<th>Comments:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>The Inlet: pipe, stone, or grassed swale</strong></td>
<td>Trash/Debris Present.</td>
<td>If checked, remove trash and debris &amp; properly dispose to allow water to flow freely.</td>
<td></td>
</tr>
<tr>
<td>The pipe is clogged. (if applicable)</td>
<td></td>
<td>If checked, unplug pipe.</td>
<td></td>
</tr>
<tr>
<td><strong>Sediment Accumulation.</strong></td>
<td></td>
<td>If checked, remove sediment with shovel and dispose of outside of planter.</td>
<td></td>
</tr>
<tr>
<td>Eroded or undercut areas. (if applicable)</td>
<td></td>
<td>If checked, fill in eroded or undercut areas and reseed areas of erosion. May need to provide erosion control devices such as turf matting or river stone to avoid future problems with erosion.</td>
<td></td>
</tr>
<tr>
<td><strong>Weeds, Overgrowth, Large Woody Debris.</strong></td>
<td></td>
<td>If checked, remove all weeds, overgrowth, and large woody debris. (including trees).</td>
<td></td>
</tr>
<tr>
<td>The pipe is cracked or otherwise damaged. (if applicable)</td>
<td></td>
<td>If checked, replace the pipe.</td>
<td></td>
</tr>
<tr>
<td><strong>Rain Garden: Vegetation</strong></td>
<td>Pruning or vegetation maintenance is needed to maintain optimal plant health.</td>
<td>If checked, prune occasionally maintain vegetation to minimize clogging of the media. Remove dead tree material.</td>
<td></td>
</tr>
<tr>
<td>Plants are dead, diseased, or dying.</td>
<td></td>
<td>If checked, vegetation must be drought tolerant; watering could be required during prolonged dry periods after vegetation has been established.</td>
<td></td>
</tr>
<tr>
<td>Unwanted / Invasive vegetation, leaves, debris.</td>
<td></td>
<td>If checked, remove all weeds, invasive vegetation, leaves and debris (periodically). Conduct routine vegetation maintenance.</td>
<td></td>
</tr>
<tr>
<td>Tree stakes/wires are present six months after planting.</td>
<td></td>
<td>If checked, remove tree stakes/wires.</td>
<td></td>
</tr>
<tr>
<td>Trash/organic debris present.</td>
<td></td>
<td>If checked, remove trash, feces and leaf debris etc.</td>
<td></td>
</tr>
</tbody>
</table>
Questions