Coastal Stormwater Supplement

to the

Georgia Stormwater Management Manual

First Edition April 2009



1.0 Meeting the Stormwater Management and Site Planning and Design Criteria

1.1 Overview

A comprehensive set of post-construction stormwater management and site planning and design criteria should be applied to new development and redevelopment activities occurring within the Coastal Georgia region. Satisfying these criteria requires the successful *integration* of natural resource protection and stormwater management with the site planning and design process (Figure 6.1).

This *integration* can be accomplished through the use of an approach to the site planning and design process that: (1) identifies and protects valuable natural resources; (2) limits land disturbance and the creation of new impervious and disturbed pervious cover; and (3) reduces and manages post-construction stormwater runoff rates, volumes and pollutant loads. This approach involves the use of two distinct, but complementary groups of natural resource protection and stormwater management techniques:

- Green Infrastructure Practices: Natural resource protection and stormwater management practices and techniques (e.g., better site planning and design techniques, low impact development practices) that can be used to help *prevent* increases in post-construction stormwater runoff rates, volumes and pollutant loads.

- Stormwater Management Practices: Stormwater management practices (e.g., wet ponds, swales) that can be used to *manage* post-construction stormwater runoff rates, volumes and pollutant loads.

The use of these natural resource protection and stormwater management techniques helps control and minimize the negative impacts of the land development process while retaining and, perhaps even enhancing, a developer's vision for a development site. When applied during the site planning and design process, they can be used to create more natural and aesthetically-pleasing development projects and create more cost-effective post-construction stormwater management systems (ARC, 2001). The use of these techniques, particularly the green infrastructure practices, can even reduce overall development costs while maintaining or increasing the resale value of a development project (MacMullan and Reich, 2007, US EPA, 2007, Winer-Skonovd et al., 2006).

Section 6.0 of the Coastal Stormwater Supplement (CSS) provides information about using these natural resource protection and stormwater management techniques during the site planning and design process (Figure 6.1). In doing so, it

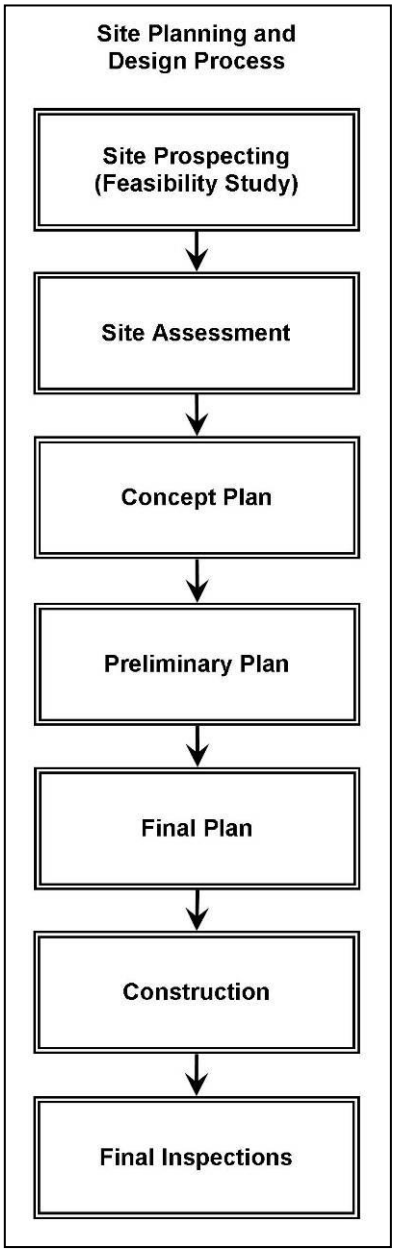

Figure 6.1: Site Planning and Design Process
(Source: Center for Watershed Protection)

provides guidance on an integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design that can be used to satisfy the stormwater management and site planning and design criteria presented in this CSS.

1.2 Site Planning and Design Process

Figure 6.1 depicts the site planning and design process that is typically used throughout coastal Georgia. Each phase of this process is briefly described below:

- Site Prospecting: During the site prospecting phase, some basic information is used to evaluate the feasibility of conducting a development or redevelopment project. A *feasibility study* is typically used to evaluate the many factors that influence the decision about whether or not to move forward with a potential development project, including information about site characteristics and constraints, applicable local, state and federal stormwater management and site planning and design requirements, adjacent land uses and access to local infrastructure (e.g., water, sanitary sewer).

- Site Assessment: Once a potential development or redevelopment project has been deemed feasible, a more thorough assessment of the development site is completed. The site assessment, which is typically completed using site reconnaissance and surveying techniques, provides additional information about a development site's characteristics and constraints. Once the site assessment is complete, a developer can identify and analyze the natural, man-made, economic and social aspects of a potential development project, define the actual buildable area available on the development site, and begin making some preliminary decisions about the layout of the proposed development project.

- Concept Plan: The results of the site assessment are typically used to create a concept plan (also known as a *sketch plan*) for the proposed development project. A concept plan is used to illustrate the basic layout of the proposed development project, including lots and roadways, and is usually reviewed with the local development review authority before additional resources are used to create a more detailed plan of development. During this phase, several alternative concept plans can be created and compared with one another to craft a plan of development that best "fits" the character of the development site (Figures 6.2-6.4).

- Preliminary Plan: A preliminary plan presents a more detailed layout of a proposed development project, and typically includes information about lots, buildings, roadways, parking areas, sidewalks, conservation areas, utilities and other infrastructure, including the post-construction stormwater management system. After the preliminary plan has been reviewed and approved by the local development review authority, a final plan may be prepared. There may be several iterations of the preliminary plan between the time that it is submitted and the time that it is approved by the local development review authority.

- Final Plan: The final plan adds further detail to the preliminary plan and reflects any changes to the plan of development that were requested or required by the local development review authority. The final plan typically includes all of the information that was included in the preliminary plan, as well as information about landscaping, pollution prevention, erosion and sediment control and long-term operation and maintenance of the site's post-construction stormwater management system. There may be several iterations of

the final plan between the time that it is submitted and the time that it is approved by the local development review authority.

- Construction: Once the final plan has been reviewed and approved, performance bonds are set and placed, contractors are retained and construction begins. During the construction phase, a development project may be inspected on a regular basis by the local development review authority to ensure that all roadways, parking areas, buildings, utilities and other infrastructure, including the post-construction stormwater management system, are being built in accordance with the approved final plan and that all primary and secondary conservation areas are have been protected from any land disturbing activities.

- Final Inspections: Once construction is complete, final inspections take place to ensure that all roadways, parking areas, buildings, utilities and other infrastructure, including the post-construction stormwater management system, were built according to the approved final plan. As-built plans are also typically prepared and executed during this phase. If a development project passes all final inspections, an occupancy permit may be issued for the project.

1.3 Integrating Natural Resource Protection and Stormwater Management with the Site Planning and Design Process

In order to successfully *integrate* natural resource protection and stormwater management with the site planning and design process, developers and their site planning and design teams are encouraged to consider following questions:

- What valuable natural resources, both terrestrial and aquatic, can be found on the development site?

- How can better site planning techniques be used to protect these valuable natural resources from the direct impacts of the land development process?

- How can better site design techniques be used to minimize land disturbance and the creation of new impervious and disturbed pervious cover?

- What low impact development practices can be used to help preserve pre-development site hydrology and *reduce* post-construction stormwater runoff rates, volumes and pollutant loads?

- What stormwater management practices can be used to *manage* post-construction stormwater runoff rates, volumes and pollutant loads?

- Are there any site characteristics or constraints that prevent the use of any particular low impact development or stormwater management practices on the development site?

Although answering these questions is no easy task (e.g., answering these questions typically requires a solid understanding a development site's characteristics and constraints), answers to all of these questions can be readily obtained within the context of the six-step *stormwater management planning and design process* outlined below:

- Step 1: Pre-Application Meeting

- Step 2: Review of Local, State and Federal Stormwater Management and Site Planning and Design Requirements
- Step 3: Natural Resources Inventory
- Step 4: Prepare Stormwater Management Concept Plan
    - Step 4.1: Use Better Site Planning Techniques
    - Step 4.2: Use Better Site Design Techniques
    - Step 4.3: Calculate Stormwater Management Criteria
    - Step 4.4: Apply Low Impact Development Practices
    - Step 4.5: Check To See If Stormwater Management Criteria Have Been Met
    - Step 4.6: Apply Stormwater Management Practices
    - Step 4.7: Check To See If Stormwater Management Criteria Have Been Met
    - Step 4.8: Finalize Stormwater Management Concept Plan
- Step 5: Consultation Meeting
- Step 6: Prepare Stormwater Management Design Plan

Each step in this *stormwater management planning and design process* corresponds to a particular phase of the overall site planning and design process (Figure 6.5). Consequently, it can be used to *integrate* natural resource protection, stormwater management and site design and to satisfy the stormwater management and site planning and design criteria presented in this CSS.

Each step in the *stormwater management planning and design process* is described in more detail in the Coastal Supplement to the Georgia Stormwater Management Manual.

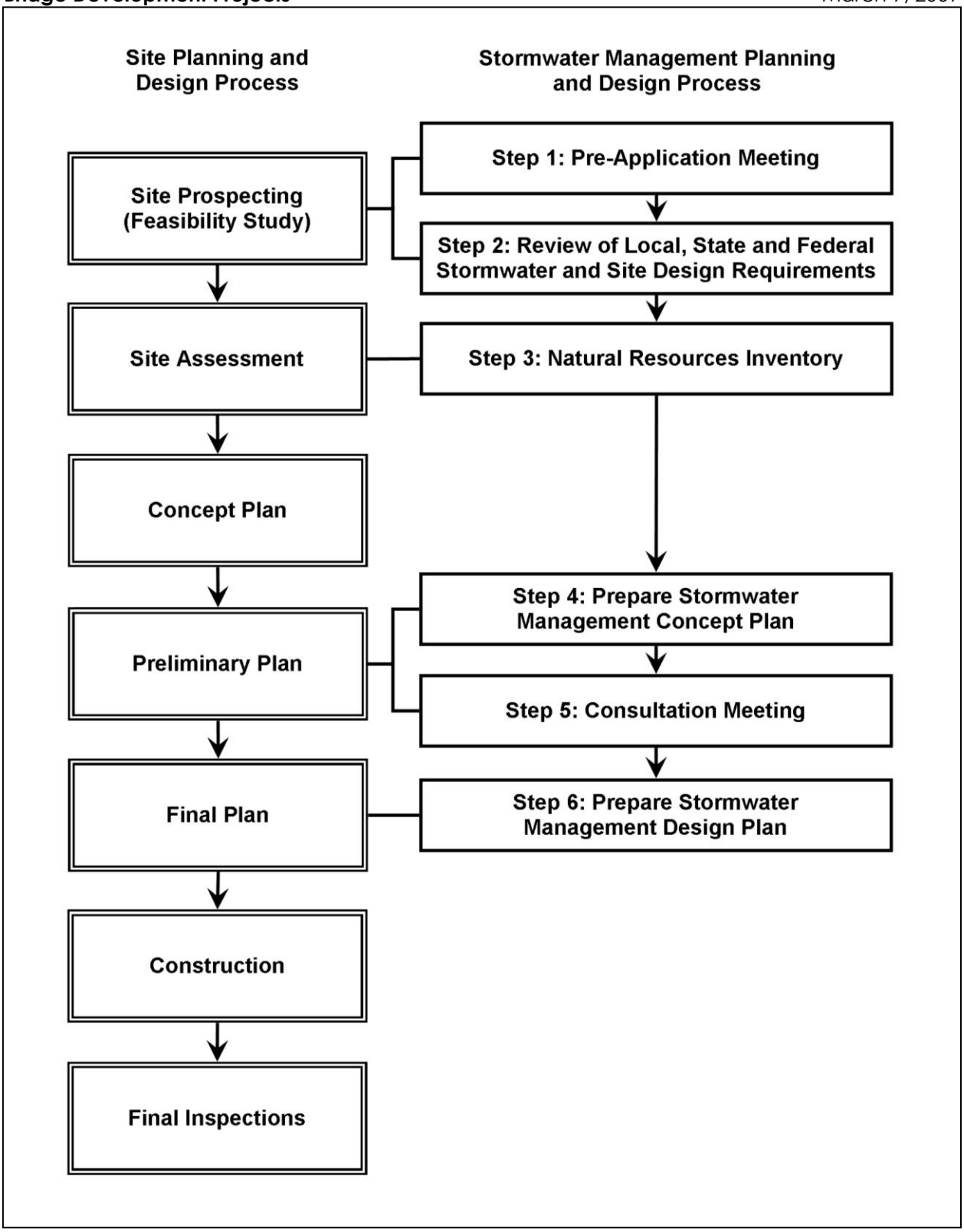

Figure 6.5: Integrating Natural Resource Protection and Stormwater Management with the Site Planning and Design Process
(Source: Center for Watershed Protection)

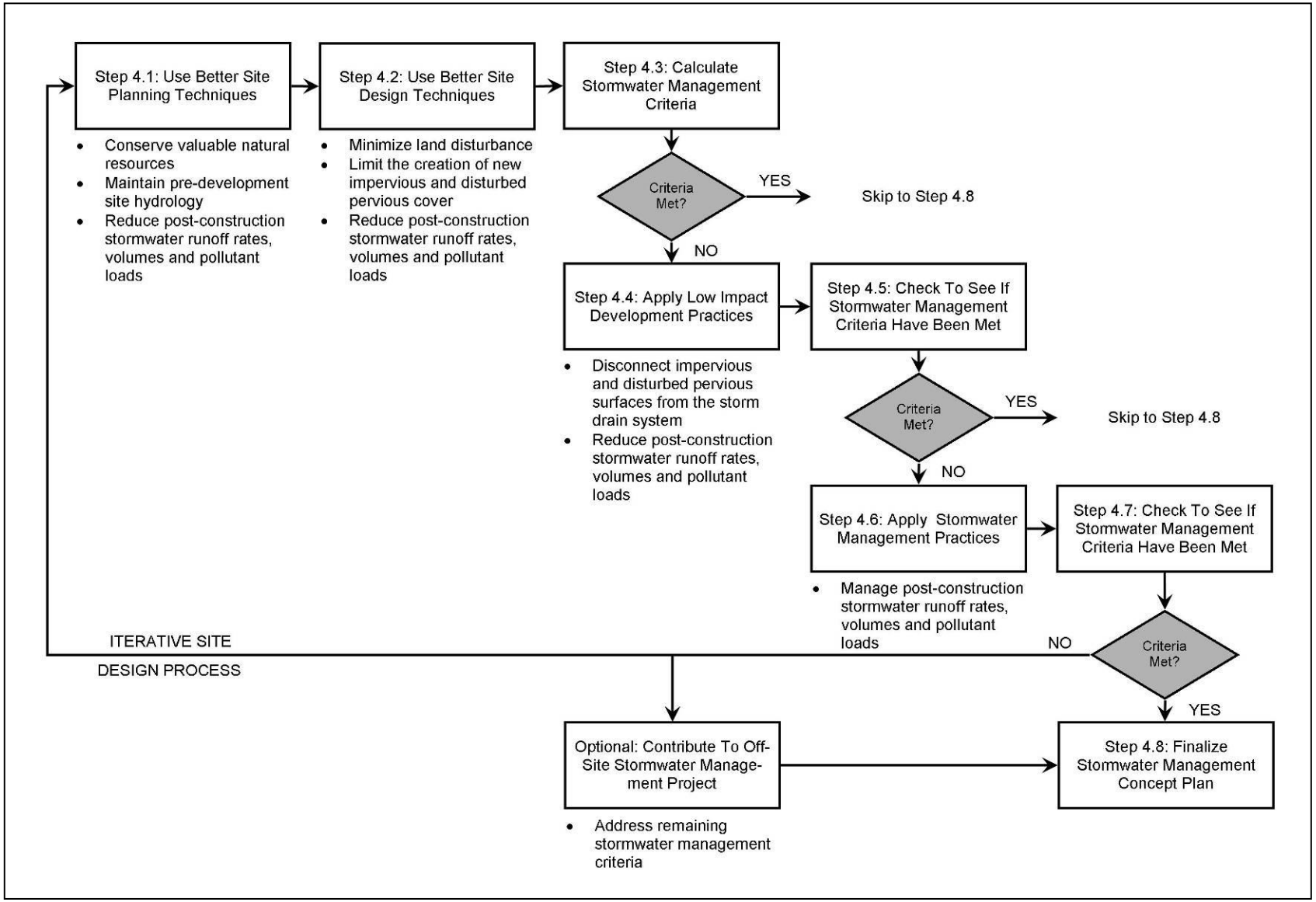

Figure 6.8: Developing a Stormwater Management Concept Plan
(Source: Center for Watershed Protection)

1.4 Meeting the Stormwater Management and Site Planning and Design Criteria on Local Road, Highway and Bridge Development Projects

Since they are often designed to discharge stormwater runoff directly into streams, wetlands and other aquatic resources, local road, highway and bridge development projects can have significant negative impacts on the valuable aquatic resources of coastal Georgia. Without an effort to control and minimize these impacts, these development projects have the potential to impair the natural resources that contribute so greatly to the region's natural beauty, economic well-being and quality of life.

Although the integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design detailed in this Section can be used to help balance the protection of coastal Georgia's valuable terrestrial and aquatic resources with local road, highway and bridge development projects, managing post-construction stormwater runoff on these projects typically presents some challenges for site planning and design teams, including:

- The need to manage the significant stormwater runoff volumes generated on impervious roadway surfaces
- The need to locate stormwater management practices in a limited amount of space (e.g,. rights-of-way)
- The need to manage stormwater runoff while maintaining safe driving conditions
- The need to manage and contain potential spills

Despite these challenges, many of the natural resource protection and stormwater management practices and techniques discussed above can be successfully applied on local road, highway and bridge development projects. However, there are a number of site characteristics and constraints that should be considered when planning and designing of one of these projects to ensure that the prescribed green infrastructure and stormwater management practices will continue to function, as designed, over time (PA DEP, 2006):

- Roadway runoff typically contains higher pollutant loads than the runoff from other urban land uses (Bannerman et al., 1993, Steuer et al., 1997). Sediment loads can be especially high on dirt and gravel roads. Consequently, roadway runoff should *not* be managed with infiltration practices, unless pretreatment is used to reduce sediment loads before stormwater runoff reaches them. Infiltration practices that are applied to local road, highway and bridge development projects must be preceded by green infrastructure or stormwater management practices that can significantly reduce sediment loads, including:

    - Undisturbed Natural Areas
    - Vegetated Filter Strips
    - Grass Channels
    - Swales
    - Bioretention Areas
    - Filtration Practices

    Using green infrastructure and stormwater management practices that reduce sediment loads upstream of infiltration practices helps reduce the risk of clogging and practice failure.

- Grass channels and swales can be highly effective at providing both stormwater conveyance and stormwater runoff reduction. Because they can typically be designed to fit within the right-of-way, they are ideal for use on local road, highway and bridge development projects. However, they must be properly designed to prevent erosion and reduce the amount of maintenance that they will require over time. Additional information about these practices, including information about their proper application and design, is provided in Sections 7.8 and 8.6 of this CSS.

- The potential for spills should be considered during the planning and design process for local road, highway and bridge development projects. While it is not practical to design for spill containment on all local roads and highways, the site designer should at least consider the potential for spills and the remedial actions that will become necessary should a spill occur.

  Many green infrastructure and stormwater management practices, including filter strips, swales, filtration and infiltration practices and bioretention areas, will require significant maintenance or complete replacement after a spill occurs. While this may discourage the site designer from using these practices on local road development projects where spills are a concern, the relatively minor cost of replacing these stormwater management practices is worth the spill protection they do provide. The alternative to using these green infrastructure and stormwater management practices is conveying the pollution generated by spills directly to streams, wetlands or other aquatic resources through the storm drain system, which could result in very high clean up and remediation costs.

- Increased stormwater runoff temperatures can result from local road, highway and bridge development projects. As stormwater runoff moves over these impervious surfaces, it increases in temperature. As documented in Section 3.3.2, when this "heated" stormwater runoff is conveyed into a river, stream, wetland or other aquatic resource, it can decrease the amount of dissolved oxygen contained within the water column, which reduces the amount of oxygen available to the aquatic organisms living within. Consequently, site planning and design teams working on local road, highway and bridge development projects should consider the use of green infrastructure and stormwater management practices that promote infiltration and reduce stormwater runoff temperatures, including:

  - Protect Primary Conservation Areas
  - Protect Secondary Conservation Areas
  - Reduce Clearing and Grading Limits
  - Soil Restoration
  - Site Reforestation/Revegetation
  - Vegetated Filter Strips
  - Grass Channels
  - Swales
  - Bioretention Areas
  - Infiltration Practices

There are certain green infrastructure and stormwater management practices that work particularly well on local road development projects, others that work particularly well on local highway development projects and still others that work particularly well on local bridge development projects. The green infrastructure and stormwater management practices that

can be most readily applied to each of these different types of development projects are briefly described below.

1.4.1 Local Highway Development Projects

Local highways are often designed with grass shoulders and often include vegetated medians, providing plenty of room for the use of green infrastructure and stormwater management practices. Opportunities to use infiltration practices on highway development projects, however, may be limited due to extensive grading and earthwork, as highway rights-of-way are often subject to significant compaction. However, the use of infiltration practices should not automatically be ruled out on local highway development projects, and should be considered on a case-by-case basis.

Because they can typically be designed to fit within medians and shoulders, swales, grass channels and vegetated filter strips are ideal for use on local highway development projects. They can be combined with bioretention areas located within the right-of-way to provide additional runoff reduction or with larger stormwater management practices, such as stormwater ponds and stormwater wetlands, to manage the peak stormwater runoff rates and volumes generated by larger, less frequent storm events.

1.4.2 Local Bridge Development Projects

Since bridges are built directly over streams and other aquatic resources, there is often little opportunity to use green infrastructure and stormwater management practices on these development projects. However, the use of filtration practices, particularly perimeter sand filters, as well as proprietary water quality management practices should be considered, as these stormwater management practices can be used to treat stormwater runoff before it is discharged directly from a bridge deck into a stream, wetland or other aquatic resource.

1.4.3 Local Street and Roadway Development Projects

Local street and roadway development projects provide a great opportunity for the use of green infrastructure and stormwater management practices. Although the goal of applying these natural resource protection and stormwater management practices and techniques on local street and roadway development projects is not just to minimize the creation of new impervious and disturbed pervious cover, a number of better site design techniques do work particularly well on these development projects, including:

- Reduce Clearing and Grading Limits
- Reduce Roadway Lengths and Widths
- Reduce Sidewalk Lengths and Widths
- Use Fewer or Alternative Cul-de-Sacs

Unfortunately, the use of some of these better site design techniques may be restricted by local "development rules." Site planning and design teams are encouraged to identify any local restrictions that would preclude the use of any of these better site design techniques on local street and roadway development projects.

Another site design technique that works particularly well on a local street and roadway development projects is to use the right-of-way, rather than curbs and gutters, to reduce or

manage stormwater runoff rates, volumes and pollutant loads. Open section roadways can be used instead of closed section roadways to allow stormwater runoff to sheet flow off of the pavement surface and into grass channels, dry swales, vegetated filter strips or conservation areas, all of which provide significant reductions in post-construction stormwater runoff rates, volumes and pollutant loads. Other green infrastructure and stormwater management practices that can be applied on local street and roadway development projects include:

- Permeable Pavement
- Bioretention Areas
- Filtration Practices
- Infiltration Practices
- Wet Swales

1.4.4 Local Back (Dirt and Gravel) Road Development Projects

A significant portion of the coastal Georgia is served by unpaved dirt and gravel roads. These roads, and their associated stormwater conveyance systems (e.g., ditches, culverts), are prone to erosion and can generate significant stormwater pollution. In fact, the sediment generated on local dirt and gravel roads ranks second only to row cropping as a source of sediment in the state of Georgia. Consequently, it is important to manage post-construction stormwater runoff on these local back roads to help protect the streams, wetlands and other aquatic resources of coastal Georgia from the negative impacts of the land development process.
One of the simplest ways to control and minimize the negative impacts of local back road development projects is to use better site planning and design techniques during the design of these projects. By working with existing topography and natural drainage divides and patterns, roadway planning and design teams can minimize the need for earthwork, as well as the need for culverts and stream crossings.

Another simple technique that can be used to reduce the negative impacts of local back road development projects is to crown the roadways to prevent water from ponding on the roadway surface itself. On these crowned dirt and gravel roadways, stormwater runoff can be allowed to sheet flow off of the roadway surface and into conservation areas, vegetated filter strips, grass channels, or dry swales, all of which provide significant reductions in post-development stormwater runoff rates, volumes and pollutant loads. Moving stormwater off of the surface of these roads also helps prevent the formation of erosive conditions.

Care should be taken to ensure that the green infrastructure and stormwater management practices that are designed to "receive" stormwater runoff from dirt and gravel roadways are properly designed and maintained. Any vegetation that is planted within these green infrastructure and stormwater management practices should be maintained over time, as it helps stabilize soils and prevent soil erosion. Because of the significant sediment loads that these roadways can generate, runoff from dirt and gravel roadways *should not* be managed with infiltration practices, unless pretreatment is used to reduce sediment loads before stormwater runoff reaches these infiltration practices.

6.4 Meeting the Stormwater Management and Site Planning and Design Criteria on Local Road, Highway and Bridge Development Projects

Since they are often designed to discharge stormwater runoff directly into streams, wetlands and other aquatic resources, local road, highway and bridge development projects can have significant negative impacts on the valuable aquatic resources of coastal Georgia. Without an effort to control and minimize these impacts, these development projects have the potential to significantly impair the very natural resources that contribute so greatly to the region's natural beauty, economic well-being and quality of life.

Although the integrated, green infrastructure-based approach to natural resource protection, stormwater management and site design detailed in this CSS can be used to help balance the protection of coastal Georgia's valuable terrestrial and aquatic resources with local road, highway and bridge development projects, managing post-construction stormwater runoff on these projects typically presents some challenges for site planning and design teams, including:

- The need to manage the significant stormwater runoff volumes generated on impervious roadway surfaces
- The need to locate stormwater management practices in a limited amount of space (e.g,. rights-of-way)
- The need to manage stormwater runoff while maintaining safe driving conditions
- The need to manage and contain potential spills

Despite these challenges, many of the natural resource protection and stormwater management practices and techniques discussed above can be successfully applied on local road, highway and bridge development projects. However, there are a number of site characteristics and constraints that should be considered when planning and designing of one of these projects to ensure that the prescribed green infrastructure and stormwater management practices will continue to function, as designed, over time (PA DEP, 2006):

- Roadway runoff typically contains higher pollutant loads than stormwater runoff from other urban land uses (Bannerman et al., 1993, Steuer et al., 1997). Sediment loads can be especially high on dirt and gravel roads. Consequently, roadway runoff should *not* be managed with infiltration practices, unless pretreatment is used to reduce sediment loads before stormwater runoff reaches them. Infiltration practices that are applied to local road, highway and bridge development projects must be preceded by green infrastructure or stormwater management practices that can significantly reduce sediment loads, such as:

    - Undisturbed Natural Areas
    - Vegetated Filter Strips
    - Grass Channels
    - Swales
    - Bioretention Areas
    - Filtration Practices

    Using green infrastructure and stormwater management practices that reduce sediment loads upstream of infiltration practices helps reduce the risk of clogging and practice failure.

- Grass channels and swales can be highly effective at providing both stormwater conveyance and stormwater runoff reduction. Because they can typically be designed to

fit within the right-of-way, they are ideal for use on local road, highway and bridge development projects. However, they must be properly designed to prevent erosion and reduce the amount of maintenance that they will require over time. Additional information about these practices, including information about their proper application and design, is provided in Sections 7.8 and 8.6 of this CSS.

- The potential for spills should be considered during the planning and design process used for local road, highway and bridge development projects. While it is not practical to design for spill containment on all local roads and highways, the site designer should at least consider the potential for spills and the remedial actions that will become necessary should a spill occur.

  Many green infrastructure and stormwater management practices, including filter strips, swales, filtration and infiltration practices and bioretention areas, will require significant maintenance or complete replacement after a spill occurs. While this may discourage the site designer from using these practices on local road development projects where spills are a concern, the relatively minor cost of replacing these stormwater management practices is worth the spill protection they provide. The alternative to using this green infrastructure and stormwater management practices is conveying the pollution generated by spills directly to streams, wetlands and other aquatic resources through the storm drain system, which can result in very high clean up and remediation costs.

- Increased stormwater runoff temperatures can result from local road, highway and bridge development projects. As stormwater runoff moves over these impervious surfaces, it increases in temperature. As documented in Section 3.3.2, when this "heated" stormwater runoff is conveyed into a river, stream, wetland or other aquatic resource, it can decrease the amount of dissolved oxygen contained within the water column, which reduces the amount of oxygen available to aquatic organisms. Consequently, site planning and design teams working on local road, highway and bridge development projects should consider the use of green infrastructure and stormwater management practices that promote infiltration and reduce stormwater runoff temperatures, including:

  - Protect Primary Conservation Areas
  - Protect Secondary Conservation Areas
  - Reduce Clearing and Grading Limits
  - Soil Restoration
  - Site Reforestation/Revegetation
  - Vegetated Filter Strips
  - Grass Channels
  - Swales
  - Bioretention Areas
  - Infiltration Practices

There are certain green infrastructure and stormwater management practices that work particularly well on local road development projects, others that work particularly well on local highway development projects and still others that work particularly well on local bridge development projects. The green infrastructure and stormwater management practices that can be most readily applied to each of these different types of development projects are briefly described below.

6.4.1 Local Highway Development Projects

Local highways are often designed with grass shoulders and often include vegetated medians, providing plenty of room for the use of green infrastructure and stormwater management practices. Opportunities to use infiltration practices on highway development projects, however, may be limited due to extensive grading and earthwork, as highway rights-of-way are often subject to significant compaction. However, the use of infiltration practices should not automatically be ruled out on local highway development projects, and should be considered on a case-by-case basis.

Because they can typically be designed to fit within medians and shoulders, swales, grass channels and vegetated filter strips are ideal for use on local highway development projects. They can be combined with bioretention areas located within the right-of-way to provide additional runoff reduction or with larger stormwater management practices, such as stormwater ponds and stormwater wetlands, to manage the peak stormwater runoff rates and volumes generated by larger, less frequent storm events.

6.4.2 Local Bridge Development Projects

Since bridges are built directly over streams and other aquatic resources, there is often little opportunity to use green infrastructure and stormwater management practices on these development projects. However, the use of filtration practices, particularly perimeter sand filters, as well as proprietary water quality management practices should be considered, as these stormwater management practices can be used to treat stormwater runoff before it is discharged directly from a bridge deck into a stream, wetland or other aquatic resource.

6.4.3 Local Street and Roadway Development Projects

Local street and roadway development projects are ideal for the use of green infrastructure and stormwater management practices. Although the goal of these natural resource protection and stormwater management practices and techniques is not just to minimize the creation of new impervious and disturbed pervious cover, a number of better site design techniques do work particularly well on these development projects, including:

- Reduce Clearing and Grading Limits
- Reduce Roadway Lengths and Widths
- Reduce Sidewalk Lengths and Widths
- Use Fewer or Alternative Cul-de-Sacs

Unfortunately, the use of some of these better site design techniques may be restricted by local "development rules." Site planning and design teams are encouraged to identify any local restrictions that would preclude the use of any of these better site design techniques on local street and roadway development projects.

Another site design technique that works particularly well on local street and roadway development projects is to use the right-of-way, rather than curbs and gutters, to manage post-construction stormwater runoff. Open section roadways can be used in place of closed section roadways to allow stormwater runoff to sheet flow off of the pavement surface and into grass channels, dry swales, vegetated filter strips or undisturbed pervious areas, all of which provide significant reductions in post-construction stormwater runoff rates, volumes and pollutant loads. Other green infrastructure and stormwater management practices that can be applied on local street and roadway development projects include:

- Permeable Pavement
- Bioretention Areas
- Filtration Practices
- Infiltration Practices
- Wet Swales

6.4.4 Local Back (Dirt and Gravel) Road Development Projects

A significant portion of coastal Georgia is served by unpaved dirt and gravel roads. These roads, and their associated stormwater conveyance systems (e.g., ditches, culverts), are prone to erosion and can generate significant amounts of stormwater pollution. In fact, according to the Georgia Department of Natural Resources Environmental Protection Division (GA EPD), the sediment generated on local dirt and gravel roads ranks second only to row cropping as a source of sediment in the state of Georgia (Pine Country RCDC, 2008). Consequently, it is important to manage the post-construction stormwater runoff generated on these unpaved surfaces to help protect the streams, wetlands and other aquatic resources of coastal Georgia from the negative impacts of the land development process. Although all of the techniques discussed below can be used to manage the stormwater runoff generated on these unpaved surfaces, additional guidance on managing local dirt and gravel road development projects can be obtained through the Georgia Better Back Roads Program. Additional information about this program can be found on the following website: http://www.tworiversrcd.org/GABBR.htm.

One of the simplest ways to control and minimize the negative impacts of local back road development projects is to use better site planning and design techniques during their design. By working with existing topography and natural drainage divides and patterns, roadway planning and design teams can minimize the need for earthwork, as well as the need for culverts and stream crossings.

Another simple technique that can be used to reduce the negative impacts of local back road development projects is to crown the roadways to prevent water from ponding on the roadway surface itself. On these crowned dirt and gravel roadways, stormwater runoff can be allowed to sheet flow off of the roadway surface and into undisturbed natural areas, vegetated filter strips, grass channels and dry swales, all of which provide significant reductions in post-development stormwater runoff rates, volumes and pollutant loads. Moving stormwater off of the surface of these roads also helps prevent the formation of erosive conditions.

Care should be taken to ensure that the green infrastructure and stormwater management practices that are designed to "receive" stormwater runoff from dirt and gravel roadways are properly designed and maintained. Any vegetation that is planted within these green infrastructures and stormwater management practices should be maintained over time, as it helps stabilize soils and prevent soil erosion. Because of the significant sediment loads that these roadways can generate, runoff from dirt and gravel roadways *should not* be managed with infiltration practices, unless pretreatment is used to reduce sediment loads before stormwater runoff reaches these infiltration practices.