BMP 5.4.1: Protect Sensitive and Special Value Features

To minimize stormwater impacts, land development should avoid affecting and encroaching upon areas with important natural stormwater functional values (floodplains, wetlands, riparian areas, drainageways, others) and with stormwater impact sensitivities (steep slopes, adjoining properties, others) wherever practicable. This avoidance should occur site-by-site and on an area wide basis. Development should not occur in areas where sensitive/special value resources exist so that their valuable natural functions are not lost, thereby doubling or tripling stormwater impacts. Resources may be weighted according to their functional values specific to their municipality and watershed context.

Key Design Elements

- Identify and map floodplains and riparian area
- Identify and map wetlands
- Identify and map woodlands
- Identify and map natural flow pathways/drainage ways
- Identify and map steep slopes
- Identify and map other sensitive resources
- Combine for Sensitive Resources Map (including all of the above)
- Distinguish between including Highest Priority Avoidance Areas and Avoidance Areas
- Identify and Map Potential Development Areas (all those areas not identified on the Sensitive Resources Map)
- Make the development program and overall site plan conform to the Development Areas Map to the maximum; minimize encroachment on Sensitive Resources.

Potential Applications

Residential:
Commercial: Ultra Yes Yes
Urban: Industrial: Yes Yes
Retrofit: Yes Yes
Highway/Road:

Stormwater Functions

Volume Reduction: Very High
Recharge: Very High
Peak Rate Control: Very High
Water Quality: Very High

Water Quality Functions

TSS: Preventive
TP: Preventive
NO3: Preventive

Description

A major objective for stormwater-sensitive site planning and design is to avoid encroachment upon, disturbance of, and alteration to those natural features which provide valuable stormwater functions (floodplains, wetlands, natural flow pathways/drainage ways) or with stormwater impact sensitivity (steep slopes, historic and natural resources, adjoining properties, etc.) Sensitive Resources also include those resources of special value (e.g., designated habitat of threatened and endangered species that are known to exist and have been identified through the Pennsylvania Natural Diversity Inventory or PNDI). The objective of this BMP is to avoid harming Sensitive/Special Value Resources by carefully identifying and mapping these resources from the initiation of the site planning process and striving to protect them while defining areas free of these sensitivities and special values (Potential Development Areas). BMP 5.4.2 Protect/Conserve/Enhance Riparian Areas and BMP 5.6.2 Minimize Soil Compaction in Disturbed Areas build on recommendations included in this BMP.

Variations

- BMP 5.4.1 calls for actions both on the parts of the municipality as well as the individual landowner and/or developer. Pennsylvania municipalities may adopt subdivision/land development ordinances which require that the above steps be integrated into their respective land development processes. A variety of models are available for municipalities to facilitate this adoption process, such as through the PADCNR *Growing Greener* program.

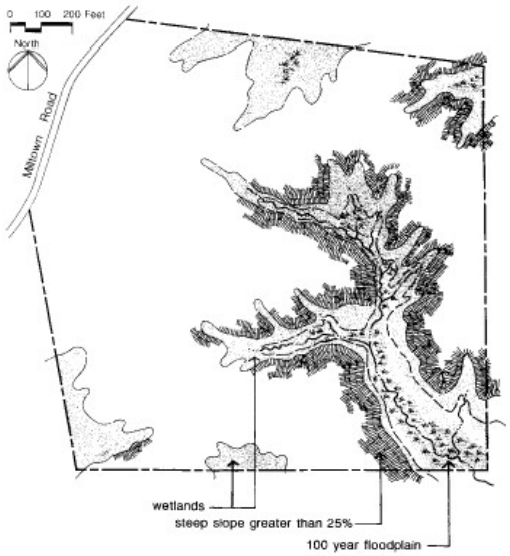

Figure 5.1-1. Growing Greener's Conservation Subdivision Design: Step One, Part One – Identify primary conservation areas.

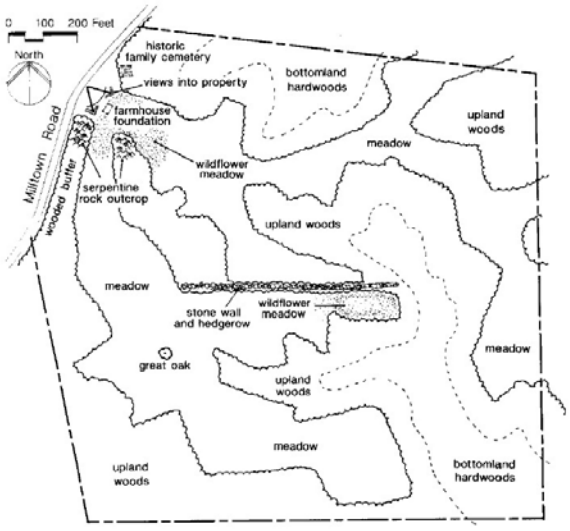

Figure 5.1-2. Growing Greener's Conservation Subdivision Design: Step One, Part Two – Identify secondary conservation areas.

Source: Growing Greener: Putting Conservation Into Local Codes; Natural Land Trusts, Inc. 1997

- The above steps use the *Growing Greener* Primary Conservation Areas and Secondary Conservation Areas designations and groupings. Identify and map the essential natural resources, including those having special functional value and sensitivity from a stormwater perspective, and then avoid developing (destroying, reducing, encroaching upon, and/or impacting) these areas during the land development process. Additionally, it is possible that Primary and Secondary can be defined in different ways so as to include different resources.

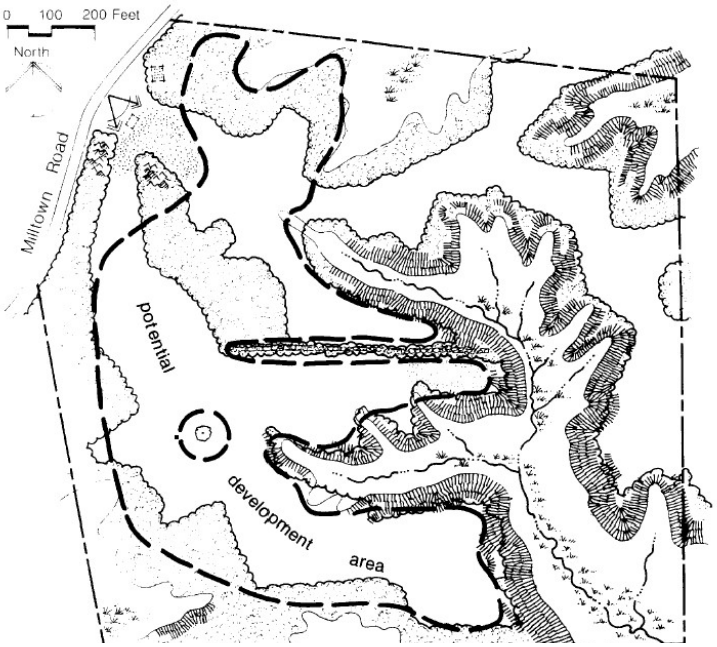

Figure 5.1-3. Growing Greener's Conservation Subdivision Design: Step One, Part Three – potential development areas.

Source: Growing Greener: Putting Conservation Into Local Codes; Natural Land Trusts, Inc. 1997

- Definition of the natural resources themselves can be varied. The definition of Riparian Buffer Area varies. Woodlands may be defined in several ways, possibly based on previous delineation/definition by the municipality or by another public agency. It is important to note here that Wooded Areas, which may not rank well in terms of conventional woodland definitions, maintain important stormwater management functions and should be included in the delineation/definition. Intermittent streams/swales/natural flow pathways are especially given to variability. Municipalities may not only integrate the above steps within their subdivision/land development ordinances, but also define these natural resource values as carefully as possible in order to minimize uncertainty.

- The level of rigor granted to Priority Avoidance and Avoidance Areas may be made to vary in a regulatory manner by the municipality and functionally by the owner and/or developer. A municipal ordinance may prohibit and/or otherwise restrict development in Priority Avoidance Areas and even Avoidance Areas. All else being equal, the larger the site, the more restrictive these requirements may be.

Applications

A number of communities across Pennsylvania have adopted ordinances that require natural resources to be identified, mapped, and taken into account in a multi-step process similar to the Growing Greener program. These include:

BUCKS COUNTY
Milford Township SLDO (Sep. 2002)

CHESTER COUNTY
London Britain Township (1999)
London Grove Township (2001)
Newlin Township (1999)
North Coventry Township (Dec. 2002)
Wallace Township (1994)
West Vincent Township (1998)

MONTGOMERY COUNTY
Upper Salford Township (1999)

MONROE COUNTY
Chestnuthill Township (2003)
Stroud Township SLDO (2003)

YORK COUNTY
Carroll Township (2003)

Figure 5.1-4. Steep slope development with woodland removal

BMP 5.4.1 applies to all types of development in all types of municipalities across Pennsylvania, although variations as discussed above allow for tailoring according to different development density/intensity contexts.

Design Considerations

Not applicable.

Detailed Stormwater Functions

Impervious cover and altered pervious covers translate into water quantity and water quality impacts as discussed in Chapter 2 of this manual. Additional impervious area may further eliminate or in some way reduce other natural resources that were having especially beneficial functions.

Water quality concerns include all stormwater pollutant loads from impervious areas, as well as all pollutant loads from the newly created maintained landscape (i.e., lawns and other). Much of this load is soluble in form (especially fertilizer-linked nitrogen forms). Clustering as defined here, and combined with other Chapter 5 Non-Structural BMPs, minimizes impervious areas and the pollutant loads related to these impervious areas. After Chapter 5 BMPs are optimized, “unavoidable” stormwater is then directed into BMPs as set forth in Chapter 5, to be properly treated. Similarly, for all stormwater pollutant load generated from the newly-created maintained landscape, clustering as defined here, and

combined with other Chapter 5 Non-Structural BMPs, minimizes pervious areas and the pollutant loads related to these pervious areas, thereby reducing the opportunity for fertilization and other chemical application. Water quality prevention accomplished through Non-Structural BMPs in Chapter 5 is especially important because Chapter 6 Structural BMPs remain poor performers in terms of mitigating/removing soluble pollutants that are especially problematic in terms of this pervious maintained landscape. See Appendix A for additional documentation of the water quality benefits of clustering.

See Chapter 8 for additional volume reduction calculation work sheets, additional peak rate reduction calculation work sheets, and additional water quality mitigation work sheets.

Construction Issues

Clearly, application of this BMP is required from the start of the site planning and development process. In fact, not only must the site developer embrace BMP 5.4.1 from the start of the process, the BMP assumes that the respective municipal officials have worked to include clustering in municipal codes and ordinances, as is the case with so many of these Chapter 5 Non-Structural BMPs.

Figure 5.1-5. Example of steep slope development.

Maintenance Issues

As with all Chapter 5 Non-Structural BMPs, maintenance issues are of a different nature and extent, when contrasted with the more specific Chapter 6 Structural BMPs. Typically, the designated open space may be conveyed to the municipality, although most municipalities prefer not to receive these open space portions, including all of the maintenance and other legal responsibilities associated with open space ownership. In the ideal, open space reserves ultimately will merge to form a unified open space system, integrating important conservation areas throughout the municipality. These open space segments may exist dispersed and unconnected. For those Pennsylvania municipalities that allow for and enable creation of homeowners associations or HOA's, the HOA may assume ownership of the open space. The HOA is usually the simplest solution to the issue.

In contrast to some of the other long-term maintenance responsibilities of a new subdivision and/or land development (such as maintenance of streets, water and sewers, play and recreation areas, and so forth), the maintenance requirements of "undisturbed open space" by definition should be minimal. The objective is conservation of the natural systems, including the natural or native vegetation, with little intervention and disturbance. Nevertheless, some legal responsibilities must be assumed and need to be covered.

Cost Issues

Clustering is beneficial from a cost perspective in several ways. Development costs are decreased because of less land clearing and grading, less road construction (including curbing), less sidewalk construction, less lighting and street landscaping, potentially less sewer and water line construction, potentially less stormwater collection system construction, and other economies.

Clustering also reduces post construction costs. A variety of studies from the landmark *Costs of Sprawl* study and later updates have shown that delivery of a variety of municipal services such as street maintenance, sewer and water services, and trash collection are more economical on a per person or per house basis when development is clustered. Even services such as police protection are made more efficient when residential development is clustered.

Additionally, clustering has been shown to positively affect land values. Analyses of market prices of conventional development over time in contrast with comparable cluster developments (where size, type, and quality of the house itself is held constant) have indicated that clustered developments with their proximity to permanently protected open space increase in value at a more rapid rate than conventionally designed developments, even though clustered housing occurs on considerably smaller lots than the conventional residences.

Figure 5.1-6. Woodland removal for steep slope development with retaining walls

Specifications

Clustering is not a new concept and has been defined, discussed, and evaluated in many different texts, reports, references and sources detailed in the References for BMP 5.5.1