

## Conservation subdivisions create opportunities for better stormwater management.

Nathan Walker, AICP

Community Planner, Natural Lands Trust, 1031 Palmers Mill Rd, Media, PA 19063, (610) 353-5587, nwalker@natlands.org

The *Growing Greener: Conservation by Design* model land use regulations help municipalities across Pennsylvania reach open space goals, but they also serves as a valuable tool to better manage stormwater. Conservation subdivisions, promoted by the *Growing Greener* program, offer a platform for implementing the BMPs recommended in the *Pennsylvania Stormwater BMP Manual*. This is accomplished through the adoption of land use regulations that results in compact neighborhoods surrounded by protected open space. This open space is identified before any development areas are designed so that sensitive natural features and recharge areas are protected. With significant areas of well-planned open space, efficient stormwater management can then be more easily accommodated. As the need for effective stormwater management on the landscape gains attention, site designers are using the *Growing Greener* program to better protect water resources.

### LAND USE REGULATIONS

Natural Lands Trust's *Growing Greener: Conservation by Design* program is one of the best ways to achieve local land use goals for protection of natural resources and landscape character within the parameters of Pennsylvania regulation and case law. The model zoning and subdivision regulations promoted by *Growing Greener* rearrange residential development during the site design process so that, in addition to constrained areas, half of the buildable land is set aside as open space (Figure 1). This is accomplished by using the Subdivision and Zoning Ordinances in tandem to protect the landscape features most important to the municipality.



**Figure 1.** The *Growing Greener* model land use regulations first delineate open space areas based on local protection priorities before development areas are designed.

## **Subdivision and Land Development Ordinance**

Good design, centered on the principle of determining the open space first, requires township involvement early in the design process. This is where the subdivision review process can be used in a more productive way. By working with a developer at the onset, so that municipal goals and priorities are communicated to the applicant, municipal conservation and development goals can be met.

The *Growing Greener* model subdivision ordinance adds the requirement that an applicant submit a Context Map, an Existing Resources/Site Analysis Plan, and conduct a site visit with municipal officials, consultants, and the applicant. Then, the plan review process follows a unique Four Step Design Process. This process requires that the delineation of open space occurs first, before any houses are sited or lot lines drawn. This sets the stage for the reservation of appropriate land for stormwater management facilities, as the best soils for managing stormwater can be reserved as open space.

## **Zoning Ordinance**

The model *Growing Greener* zoning ordinance permits the same number of homes as under conventional zoning, but built in a less land-consumptive manner. The model requires that all the natural features and at least 50% of the buildable land be preserved as part of a larger open space network. With little or no land acquisition cost by the municipality, this density neutral approach provides an equitable way to balance conservation and development objectives, while reserving acreage for stormwater management BMPs, both structural and non-structural.

## **STORMWATER MANAGEMENT**

As site designers give stormwater management greater priority in the land development process, conservation subdivision design allows for more innovative ways to manage the resource. The *Pennsylvania Stormwater BMP Manual* supports this innovation by specifically referencing *Growing Greener* as a non-structural BMP that helps reduce the need for structural BMPs (5.4.1 and 5.5.1). Open space in conservation subdivisions can also be used for any necessary structural BMPs, giving site designers flexibility in locating these facilities.

### **Non-structural BMPs**

The best BMP is not to need one. This is the essence of the first part of the recommended approach to managing stormwater found in the Pennsylvania manual. The following is a list of non-structural stormwater management methods site designers can use when implementing municipal land use regulations based on the *Growing Greener* model.

- **Minimize clearing, grading, and compaction** – Conservation subdivision limits earth disturbance to no greater than 50% of the site. Although some land included in the open space may require some grading if it is used for recreational areas or absorption fields, the bulk of each site is not disturbed.
- **Sensitive feature protection** – Wetlands, steep slopes, and floodplains are set aside as required open space early in the process. Further, dwellings are required to be set back 100 feet from these features, defined as Primary Conservation Areas.
- **Woodland and meadow preservation and maintenance** – In addition to Primary Conservation Lands, conservation subdivisions also set aside half of the buildable land on a site. This gives the municipality the opportunity to protect Secondary Conservation Features such as stream buffers, meadows, and woodlands. These features can be listed high on the

prioritized list of Secondary Conservation Areas to protect areas for groundwater recharge. Maintenance of woodlands and meadows is as important as preservation, so the *Growing Greener* model encourages applicants to submit a maintenance plan for such features to control invasive species and unauthorized uses.

- **Protect and maintain streams and wetlands** – The *Growing Greener* model requires a 100-foot setback for structures from streams and wetlands. In addition to this, applicants are required to submit a Riparian Buffer Management Plan that describes invasive species management and habitat restoration for degraded areas. Ongoing maintenance is agreed upon to ensure that the riparian buffer maintains its function to filter runoff and shade streams.
- **Less impervious cover per unit** – When land is developed in a compact way, impervious cover per unit often decreases as roads and driveways are shorter. This is the result of the compact development pattern, reduced front yard setbacks, and smaller lot widths that are found in conservation subdivisions.
- **Reduce street width and length** – The *Growing Greener* model includes design standards for streets to help create safe and attractive neighborhoods. This includes promoting properly scaled streets and alleys that can reduce impervious cover, reduce speeds, and increase safety.
- **Manage runoff at its source** – The incorporation of internal village greens, tree lawns, and depressed cul-de-sac islands, as promoted by *Growing Greener*, adds to the aesthetic of conservation subdivisions and can be designed to reduce the amount of runoff that becomes concentrated.

By incorporating these practices in the design of conservation subdivisions, the site designer can greatly reduce the amount of stormwater infrastructure required on the site.

### **Structural BMPs**

Treat what you make. This is the second part of the recommend approach in the Pennsylvania manual. In addition to minimizing the volume of runoff that requires treatment, it is important to infiltrate as much as possible. With 50% or more of each site preserved, site designers have options to site structural BMPs in optimal locations. The following structural techniques function well in conservation subdivisions.

- **Save the best soils** – Using the Four-Step Design Process, soils with the best infiltration rates can be set aside as open space. Placement of infiltration BMPs on the best soils leads to more efficient design.
- **Low berms not deep basins** – In large open spaces with good soils, infiltration structures can be designed that have little visual impact on the landscape. Using existing topography, small berms several hundred feet long can blend with the landscape, accommodate trail routes, and be used for small multi-purpose fields.
- **Swales not curbs** – Conservation subdivisions strive to offer direct access to open space from most dwelling units, often resulting in single-loaded streets. Therefore, on the open space side of the street, there is great flexibility to use swales instead of storm sewers. Another method of stormwater conveyance available in conservation subdivisions is the ability to allow detention and infiltration features to outlet into meadows, where more infiltration can occur.
- **Use of common greens for stormwater treatment** – Open space interspersed within the developed residential area can provide opportunities for structural BMPs. These can include collection and treatment areas in the interior of loop lanes, rain gardens in cul-de-sac islands, and underground detention in community greens.

## CONCLUSION

Each time a residential subdivision is developed, opportunity exists for adding land to a community-wide network of open space. In a conventional subdivision, this opportunity is lost as entire parcels are lotted out into one or two acre lots. However, municipalities that adopt the model *Growing Greener* ordinances preserve an average of 62% of each development parcel as permanently protected open space. With careful site planning, the open space in conservation subdivisions can be used to achieve both stormwater management and land conservation goals.

Specific to stormwater issues, conservation subdivisions, as promoted by the *Growing Greener* program, provide stormwater management designers with three advantages.

1. Development impact is lessened as at least 50% of each site is preserved as open space.
2. Compact development keeps land disturbance away from sensitive natural features and can reduce impervious cover per unit.
3. Large open spaces allow designers to work with the landscape to find optimal locations for innovative BMPs.

As supported by the BMP Manual and gaining attention across the state, *Growing Greener* can help municipalities better protect their water resources. Improved water quality is just one way that land conservation makes communities better places to live. The principles and standards promoted by Natural Lands Trust's *Growing Greener: Conservation by Design* program can assist municipalities in establishing land development regulations that preserve land, enhance aesthetics, improve the review process, and reduce impacts on water resources.