

Protection of Natural Features



Practice Description

Undeveloped sites often have natural features such as wetlands, riparian areas, floodplains, aquifer recharge areas, mature trees, woodlands, and other wildlife habitat, which provide environmental, aesthetic, and recreational benefits if preserved and protected from the impacts of construction and development. Restricted areas such as floodplains and steep slopes should also be protected from possible impacts from construction activities. Natural area protection is not limited to undeveloped land; properties that are being redeveloped might have attractive open space, well-drained soils, or riparian areas that should be identified and considered for preservation early in the planning process. The Better Site Design Handbook provides guidance on how a development can protect a site's natural features by reducing street lengths. It emphasizes the need for clearing and grading, applying open space design, promoting tree conservation, and taking advantage of conservation incentives (CWP, 1998).

Natural features and open space can be protected both during the development process and after a site is occupied through a combination of

- (1) Site planning techniques,
- (2) Construction site BMPs, and
- (3) Measures employed after the site is in use.

Planning Considerations

Natural area preservation has been achieved in numerous developments nationwide that have been both environmentally and economically successful. For example, the Chapel

Run residential development in Sussex County, Delaware, was initially proposed as a conventional residential development containing 142 half-acre lots. Site designers chose to preserve a wooded area with highly permeable soils as a means to control stormwater. To accommodate this open space, lot sizes were reduced from a half-acre to a quarter-acre and condensed into a cluster design, resulting in the preservation of approximately 68 percent of the site. Total capital costs for the clustered development were estimated to be \$1,174,716, whereas a traditional design would have cost \$2,460,200, yielding an estimated cost savings of \$1,285,484 (Delaware DNREC, 1997). Many developments with open, shared areas have seen a greater increase in property value than those in comparable, traditional developments.

Additional examples of successful open space preservation, as reported by the National Association of Homebuilders, are summarized in the table below (NAHB, 2006).

Location	Description	Result
Garnet Oaks, Bethel Township, PA	80 homes on 58 acres	51% of the land preserved as open space, including woodlands, tree specimens, and structures from the property's original estate Housing price premiums are based in part on the lots' proximity to open space
Newpoint, Beaufort, SC	124 single-family homes on 54 acres	Site layout preserved small wetlands and saved large existing trees, some in the greenway between street and sidewalk The Riverside green and community dock provide neighborhood access
Prairie Crossing, Grayslake, IL	337 single-family homes on 667 acres	350 acres devoted to prairies, pastures, farms, fields, gardens, marshes, lakes Community-supported organic garden The community is the western anchor of the Liberty Prairie Reserve, a 2,500-acre preserve of forest, marshes, prairies, and farmland
The Fields of St. Croix, Lake Elmo, MN	90 homes on 226 acres	60 percent of the community's land preserved as permanent open space Home sites are clustered near a wooded ridge overlooking the site's ponds and open space Historic Civil War-era barn was preserved and used as a community center Thirty acres of prairie restoration featuring native plants indigenous to the area Existing wooded slopes, which are home to oak trees and provide excellent wildlife habitat, preserved The open space is permanently guaranteed by a conservation easement granted to the Minnesota Land Trust

Cost consideration comparisons for preserving natural areas and open space versus traditional development are difficult to determine because the quantity and type of natural features vary from site to site. In general, however, additional costs can be incurred when

preserving natural areas because additional planning and inspections might be needed to meet local regulatory requirements using innovative site designs. Also, the need for smaller construction equipment could increase costs if equipment operators need to maneuver around trees and other protected features. These increased costs can be offset by decreased costs for clearing, grading, temporary erosion control, seeding, and landscaping because less area is disturbed. Savings can be substantial; the cost of clearing, grading, and installing stormwater control measures is estimated to be up to \$5,000/acre, with annual maintenance costs adding an additional \$800 to \$1,500 (Schueler, 1997). Additionally, reduced infrastructure costs can be realized in developments that use clustering because of shorter road lengths, elimination of curbs and gutters, and the use of vegetated areas and swales instead of structural stormwater controls. Finally, long-term costs for landscape maintenance can be reduced because natural areas do not require the same level of maintenance as turf grass; eliminating the need to mow, fertilize, and perform other lawn maintenance activities can save a homeowner \$1,000 to \$1,500 annually (Delaware DNREC, 1997).

Developers can use conservation easements to maintain open space over the long term. This easement ensures that the land will not be developed and will remain protected.

Design Criteria

Developments can be planned around significant environmental features, which can then be marketed as amenities. In *Conservation Design for Subdivisions* (1996), Randall Arendt describes a process to delineate a “development envelope” where buildings and infrastructure can be placed to avoid impacting natural features. The first step in this process is to assemble background information, which includes the following:

- Determine the local context: is the area agricultural, forested, etc.?
- Map significant features as candidate conservation areas, including floodplains, slopes, soils, wildlife habitats, woodlands, farmland, historical/cultural sites, views, aquifer recharge areas, and others.
- Rank conservation areas based on how special, unique, irreplaceable, environmentally valuable, historic, or scenic they are.
- Identify areas where buildings and infrastructure should be placed that would minimally impact conservation areas.
- Establish the layout of buildings and infrastructure, employing such techniques as clustering buildings and using smaller lots, shared driveways, and narrower streets (Arendt, 1996).

This process of site evaluation and design can allow significant features to be preserved while maintaining the desired overall site density (although density in localized parts of the development will be higher when open space is set aside). Some negative perceptions are associated with protecting natural features. Developers want to achieve a particular development density when building subdivisions or commercial sites. Also, for residential developments, lot size is an important factor in determining lot prices. Setting aside natural areas can take up space that would otherwise be used for yards, parking, transportation infrastructure, and other built features. Developers can accommodate

overall site density using clustering techniques, smaller lots, and more efficient street layouts. To offset lost premiums from smaller individual lots, developers can market a lot's proximity to natural areas and attractive views as amenities.

Implementation

When areas of the property with environmental significance have been identified for protection, extra care is needed during site preparation to protect these features. Developers should indicate a limit of disturbance and the location of protected areas in construction site stormwater pollution prevention plans (SWPPPs) and on site maps. Also, they should post signs with prohibitions and educate workers about the importance of and special considerations for the protected areas. Without training and explicit signage, areas slated for protection could be damaged by vehicle traffic, stored materials, and other construction-related activities. Construction operators should check areas regularly to identify problems and determine if additional controls such as more training, more explicit signage, and more obvious barriers are needed. Operators should also look for signs of unintended consequences of construction activities on the natural areas, such as changes in hydrology, flooding, or accidental spills, and take appropriate actions to mitigate the damage.

The following sections describe specific practices that developers and construction site operators can employ to protect each type of resource.

Mature Trees or Woodlands

Surround the area to be protected with bright orange fencing placed at or beyond the tree's dripline. Prohibit clearing and grubbing, limit heavy equipment traffic, and prohibit material storage inside the barrier. Include signage that details specific prohibitions and educate employees. Visually monitor vegetation to ensure that it is not being damaged by construction activities (e.g., soil compaction from heavy equipment traffic might cause localized flooding in nearby natural areas).

Steep Slopes

Steep slopes and related vegetation should be protected. Fence off these areas and assess whether additional erosion control is needed to prevent erosion. Check erosion controls on upslope areas that will be cleared and graded, and ensure that runoff from these areas is diverted away from or around the slope, using either a pipe slope drain or a diversion placed at the top of the slope. Post signs prohibiting heavy vehicle traffic and educate crews about the sensitivity of steep slopes to erosion.

Well-Drained Soils and Aquifer Recharge Areas

Areas with well-drained soils and those that feed aquifers should be protected from compaction. Maintain vegetation if possible, or if the area is cleared, minimize heavy traffic by fencing the area and posting signs. Before planting permanent vegetation, aerate the soil to ensure that runoff infiltrates. These areas may be critical later to the success of post-construction BMPs by limiting the volume of runoff that needs to be treated.

Wetlands and Riparian Areas

Establish a buffer around marshes, swamps, or other wetlands and along stream corridors in which no construction activity occurs. Avoid stream crossings wherever possible.

When absolutely necessary, set up perimeter sediment controls (e.g., silt fence) and visually monitor the protected areas, especially after each storm, to check for damage from flooding and for signs of impacts from the construction activity, including sedimentation, vegetation dieback, erosion, dumping, or fish kills. Set up stream crossings to minimize disturbance of streamside vegetation and in-stream habitat. Post signs and educate workers about the sensitive nature of the area and include prohibitions for storing or dumping materials.

Wildlife Habitat

Contact a local wildlife authority if you find nests, dens, or other animal habitat on the property. These can be removed or relocated before construction begins.

The presence of threatened or endangered species or habitats critical to their survival on the site might require a consultation with the U.S. Fish and Wildlife Service or the National Marine Fisheries Service. You should ensure that you are in compliance with all regulations, including the Endangered Species Act.

Floodplains

The placement of buildings in floodplains is typically restricted because of the risk of safety concerns and property damage, so these areas should remain outside the limit of disturbance. (Restrictions will vary from one municipality to the next, so check with local authorities about floodplain restrictions in your area.) Establish perimeter controls, including fencing, and post signage that prohibits dumping and material storage in these areas. Inspect protected areas on a regular basis to ensure that vegetation has not been disturbed and that no dumping has occurred.

Common Problems

Concerns about cost and local ordinances are the most likely barrier to implementing a site plan that protects existing natural features. Education about the many cost savings associated with this strategy as well as techniques to achieve the desired number of units while protecting natural areas may be helpful to overcoming developers' reluctance. Local zoning codes should also be reviewed for provisions that restrict the use of clustering, reduced road widths, and other techniques for natural area preservation. Developers should work with local regulatory agencies to determine whether they can obtain waivers to protect natural features.

Maintenance

Once a site is developed and occupied, natural areas become amenities for the site's occupants. These natural areas also become the responsibility of the owner or occupant. Developers should provide information about each natural area or protected feature, to describe the area's importance and outline the activities that should be prohibited to adequately protect the resource.

Developers should also provide guidance to occupants on how these areas should be maintained. For example, a preserved prairie or riparian stream buffer should not be mown or manicured like turf. Homeowners or maintenance crews would need to employ special procedures to preserve native species, such as using integrated pest management

practices like hand-weeding and limiting chemical use. The same practices should be used in areas where traditional landscape maintenance activities could threaten water quality, such as in or adjacent to wetlands and riparian areas or where endangered species are present. Interpretive signage can be posted to educate occupants and visitors about the significance of the features and to describe prohibited activities such as mowing, dumping, and vehicle traffic. Barriers can be installed to protect the natural areas from damage without detracting from their aesthetics and function. These barriers can include strategic placement of low fences, walls, bollards, or large rocks that unobtrusively limit access to the areas.