



	PTS	HOW TO VERIFY
<p>1.0 IDENTIFY GOALS WITH YOUR TEAM</p> <ul style="list-style-type: none"> • Establish a knowledgeable team and communicate in writing. • Establish a “green development” mission statement. • Identify goals and objectives. • Identify team member roles and how they relate to various phases of development. • Provide training to onsite supervisors and team members on the green development practices that will be instituted onsite. • Create a checklist to be filled out onsite that contains only those targeted green development practices that will be implemented in this project (<i>see Guideline 4a for execution of this checklist</i>). 		<p>Written list of team members</p> <p>Written project mission statement</p> <p>Written project goals</p> <p>Written project team member roles</p> <p>Training materials information</p> <p>Checklist of green development practices that will be implemented</p>
<p>2.0 SELECT THE SITE</p> <p>Select the site to minimize environmental impact.</p> <ul style="list-style-type: none"> • Avoid environmentally “sensitive areas” as identified through site footprinting process or third party. • Choose an EPA-recognized brownfield (<i>see User Guide for definition</i>). • Choose a greyfield site (<i>see User Guide for definition</i>). • Choose an infill site (<i>see User Guide for definition</i>). 		<p>Any one of the following:</p> <ul style="list-style-type: none"> • Comprehensive plan • Wetland Institute • Local jurisdiction’s guidelines • Site footprinting process results • Set of site plans <p>Confirmation from a federal, state, or local brownfield site inventory list or representative that the site is a brownfield</p>

3.0 DESIGN THE SITE

Minimize environmental impact; protect, enhance, and restore the natural features and environmental quality of the site (points for each guideline are only rewarded upon execution of these plans).

- Conserve natural resources.
- Complete a natural resources inventory that is used to drive and create the site plan.
- Create a protection and maintenance plan for priority natural resources/areas during construction. *(See Section 4 for guidance in forming the plan.)*
- Locate roads, buildings, and other built features to conserve high-priority vegetation.
- Participate in a natural resource conservation program.
- Orient streets and configure lots to allow for the majority of homes to optimize solar potential *(see the Energy Efficiency module for guidance on solar resource optimization)*
- Minimize slope disturbance.
- Limit development footprint on steep slopes (slopes greater than or equal to 25%).
- Complete a hydrological/soil stability study for steep slopes, and use this study to guide the design of all structures onsite.
- Align roads with natural topography to minimize grade to reduce cut and fill.
- Reduce long-term erosion effects through the design and implementation of terracing, retaining walls, landscaping, and restabilization techniques.
- Minimize soil disturbance and erosion.
- Phase development to minimize exposed soils.
- Use alternative means to install utilities, such as tunneling instead of trenching, use of smaller equipment, shared trenches or easements, and placement of utilities under streets instead of yards.
 - Manage storm water properly.
 - Direct storm water to a locally approved regional storm water management and treatment facility that has been designed to address water quality.
 - Preserve and utilize natural water and drainage features.
 - Develop and implement storm water management plans that minimize concentrated flows and seek to mimic natural hydrology.

PTS

HOW TO VERIFY

Pre- and post-development natural resources inventory
 Protection and maintenance plan
 Certificate or letter indicating participation in a natural resources conservation program

House plans

Hydrological/soil stability study results
 Topographical map with contour lines

Sediment and erosion control plans

Storm water management plan

PTS

HOW TO VERIFY

- Minimize impervious surfaces, and utilize permeable materials for
 - Parking areas
 - Walkways
 - Streets—minimize street widths and rights-of-way as per recommendations in either local code or in *Residential Streets, 3rd Edition*:
 - a. No on-street parking: 18 feet
 - b. Parking on one side: 22–24 feet
 - c. Parking on both sides: 24–26 feet
- Use an advanced wastewater system as an alternative to the conventional septic system and drain field, where municipal sewage is not available. Examples include sand/media filters, aerobic treatment units, and community package plants.
- Devise landscape plans to limit water demand while preserving or enhancing the natural environment.
- Formulate a plan to restore or enhance natural vegetation that is cleared during construction or development. Within this plan, phase landscaping to ensure denuded areas are quickly vegetated.
- Select turf grass and other vegetation that are native or regionally appropriate species.
- Limit turf areas of landscaped area, selecting native and regionally appropriate trees and vegetation in a way that complements the natural setting.
- Group plants with similar watering needs (hydrozoning).
- Specify planting of trees to increase site shading and moderate temperatures (*see also Energy Efficiency Guideline 3.3.5.1 specifying siting of trees to reduce the energy consumption of the home*).
- Require onsite tree trimmings of regionally appropriate species to be used as protective mulch during construction or as a base for walking trails.
- Establish an integrated pest management plan to minimize chemical use in pesticides and fertilizers.
- Maintain wildlife habitat.
- Preserve open space as wildlife corridors where possible.
- Institute wildlife habitat measures
- Participate in a wildlife conservation program.
- Prepare operation and maintenance plan (manual) for transfer of common open spaces, utilities (storm water, wastewater), and environmental management.
- Disassemble existing buildings, and reuse or recycle the building materials (deconstruction) instead of demolishing.

System specifications

Landscape plan

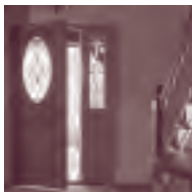


Certificate or letter indicating participation in a wildlife conservation plan

Copy of the manual

Catalogue reused or recycled building materials

	PTS	HOW TO VERIFY
<p>4.0 DEVELOP THE SITE</p> <p>Minimize environmental intrusion during onsite construction.</p> <ul style="list-style-type: none"> • Provide onsite supervision and coordination during clearing, grading, trenching, paving, and installation of utilities to ensure that targeted green development practices are implemented. • Conserve existing onsite vegetation. • Provide basic training in tree and other natural resource protection to onsite supervisor. • Minimize disturbance of and damage to trees and other vegetation designated for protection through installation of fencing and avoidance of trenching, significant changes in grade, and compaction of soil and critical root zones. • Prepare designated existing trees and vegetation for the impacts of construction through pruning, root pruning, fertilizing, and watering. • Improve the soil with organic amendments and mulch. • Minimize onsite soil disturbance and erosion. • Demarcate limits of clearing and grading. • Create construction “no disturbance” zones using fencing or flagging to protect vegetation and sensitive areas from construction vehicles, material storage, and washout. • Install and maintain sediment and erosion controls. • Stockpile and cover good soil for later use. • Reduce soil compaction from construction equipment through laying mulch, chipped wood, or plywood sheets. • Stabilize disturbed areas within the EPA-recommended 14-day period. 		<p>Protection and maintenance plan</p> <p>Protection and maintenance plan and/or set of site plans</p> <p>Sediment and erosion control plans</p>
<p>5.0 INNOVATIVE OPTIONS</p> <p>Seek to obtain waivers or variances from local development regulations to enhance green building.</p> <ul style="list-style-type: none"> • Cluster development to preserve meaningful open space. • Reduce street widths. • Share driveways or parking. • Other (specify). 		<p>Set of site plans</p> <p>Set of site plans</p> <p>Set of site plans</p>



1.0 IDENTIFY GOALS WITH YOUR TEAM

Establish a knowledgeable team, and communicate in writing.

Intent:

One of the earliest challenges for a builder in developing a green lot is assembling an effective team to help implement best green practices throughout the process. Those involved in the development phase must understand the mission of the site, what it means to be a green lot, and why green practices should be followed. Once this baseline is established, coordination and communication with and among the various team members are essential to successful development.

Information / How to Implement:

Before ground is broken, all parties involved in lot development (the team) should understand that the lot will be developed as a green site. Team members can include staff, site superintendents, utilities, excavators, landscape architects, wildlife biologists, ecologists, and arborists. Once the green intent of the builder is communicated to the lot development team, the builder should work with the team throughout the development process to identify and delegate responsibilities of team members, as well as facilitate coordination between the members to achieve best green practices.

Resources:

- American Society of Consulting Arborists, www.asca-consultants.org/why.html
- American Society of Landscape Architects, www.asla.org/members/pigroups.cfm
- International Society of Arboriculture, www.isa-arbor.com/home.asp
- Society of American Foresters, www.safnet.org/certifiedforester
- The Ecological Society of America, www.esa.org

Establish a green development mission statement.

Intent:

Communicate relevant, streamlined green goals into the field to ensure that they are put into practice

Information / How to Implement:

Post the mission statement for all project personnel to see.

Resources:

Information will be added in Version 2.

Identify goals and objectives.

Intent:

Those involved in the development phase must understand the site's goals and objectives, what it means to be a green development, and why they should follow green practices.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

Identify team member roles and how they relate to various phases of development.

Intent:

Before ground is broken, all parties involved in lot development (the team) should understand that the lot will be developed as a green site.

Information / How to Implement:

Examples of possible team members include staff, site superintendents, utilities, excavators, landscape architects, wildlife biologists, ecologists, and arborists.

Resources:

Information will be added in Version 2.

Provide training to onsite supervisors and team members on the green development practices that will be instituted onsite.

Intent:

The noblest intentions pursued in designing a site are practically achieved through onsite supervision during the lot development phase. A qualified member(s) of the builder's team should be onsite as these activities progress to ensure that each objective is achieved according to targeted green lot specifications.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

Create a checklist to be completed onsite that contains only those targeted green development practices that will be implemented in the project.

Intent:

A qualified member(s) of the builder's team should be onsite as these activities progress to ensure that each objective is achieved according to targeted green lot specifications. A checklist will facilitate the process of tracking progress.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

2.0 SELECT THE SITE

Select the site to minimize environmental impact.

Avoid environmentally sensitive areas as identified through site footprinting process or third party.

Intent:

Thoughtful site selection can be the first step in building a green home. By avoiding environmentally sensitive areas, a

builder can help preserve land that might function as a wildlife corridor, recreational open space, or habitat sanctuary. If a site is selected that at any time has been identified as an environmentally sensitive area, no credit will be given for this line item, regardless of the site's classification at the time of construction.

Information / How to Implement:

“Sensitive areas” may be identified within a comprehensive plan, by a wetland institute, or by the local jurisdiction. Other excellent sources of detailed environmental information about a site are professionals such as arborists, landscape architects, ecologists, and wildlife biologists. These experts can provide assistance in identifying a potential site's natural resources and environmentally sensitive areas.

Resources:

- American Society of Consulting Arborists, www.asca-consultants.org/why.html
- American Society of Landscape Architects, www.asla.org/members/pigroups.cfm
- International Society of Arboriculture, www.isa-arbor.com/home.asp
- Society of American Foresters, www.safnet.org/certifiedforester
- The Ecological Society of America, www.esa.org
- Choose an EPA-recognized Brownfield.

Choose an infill site.

Intent:

Remediation of a brownfield results in the environmental restoration of a polluted site, a transformation that makes an abandoned site habitable. Like greyfield and infill development, brownfield development provides an efficient use of land and infrastructure while allowing for the preservation of open space and wildlife habitat in the midst of growth.

Information / How to Implement:

The U.S. Environmental Protection Agency (EPA) characterizes brownfields as “real property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant.” The EPA estimates that there are 450,000 brownfield sites around the country. Grants, loans, and training are available through the EPA's Brownfield Initiative to assist builders and developers in the remediation and development of Brownfield sites.

Resources:

- U.S. EPA, *Brownfields Cleanup and Redevelopment*: www.epa.gov/Brownfields/index.html
- U.S. EPA has introduced two Web-based tools to give the public additional access to information about brownfield properties and cleanup efforts. The tools allow residents to locate brownfields and provide access to information about cleanup grants—www.epa.gov/Brownfields/bfwhere.htm

Choose a Greyfield site.

Intent:

Redevelopment of a greyfield site can provide an efficient use of land and infrastructure. Greyfield redevelopment allows for the preservation of open space and wildlife habitat in the midst of growth.

Information / How to Implement:

Within these guidelines, a greyfield is defined as “any site previously developed with at least 50% of the surface area covered with impervious material.” The development of a greyfield site can be daunting, but local or national incentives

may exist to reward builders who go through the process. Incentives may include the elimination of development-related fees, contribution from the local government in the development of offsite improvements, and tax breaks. For more information, see Resources.

Resources:

- Congress for the New Urbanism, www.cnu.org
- Urban Land Institute, www.uli.org
- American Planning Association, www.planning.org
- International Council of Shopping Centers, www.icsc.org
- Congress for the New Urbanism and PricewaterhouseCoopers, *Greyfields into Goldfields: from falling shopping centers to great neighborhoods* (February 2001), www.cnu.org/cnu_reports/Executive_summary.pdf
- Congress for the New Urbanism and PricewaterhouseCoopers, *Greyfield Regional Mall Study* (January 2001), www.cnu.org/cnu_reports/Greyfield_Feb_01.pdf

Choose an infill site.

Intent:

Building on an infill site can effectively conserve resources (e.g., infrastructure) and preserve open space that could be lost from “green field” development.

Information / How to Implement:

Infill areas are vacant or underutilized lots of land, served by existing physical installations such as roads, power lines, sewer and water, and other infrastructure.

Resources:

- Policy Link, Equitable Development Toolkit, Infill Incentives, www.policylink.org/EDTK/Infill
- Northeast-Midwest Institute and Congress for the New Urbanism, *Strategies for Successful Infill Development* (2001), www.nemw.org/infillbook.htm

3.0 DESIGN THE SITE

Minimize environmental impacts; protect, enhance, and restore the natural features and environmental quality of the site.

Conserve natural resources.

1. Complete a natural resources inventory that is used to drive/create the site plan.
2. Create a protection and maintenance plan for priority natural resources/areas during construction. (*See Section 4 for guidance in forming the plan.*)
3. Locate roads, buildings, and other built features to conserve high-priority vegetation.
4. Participate in a natural resources conservation program.

Intent:

Onsite natural resources concern features such as solar energy availability, flora, fauna, water, soil, and geological formations. A natural resources inventory should be completed to identify the site’s environmental attributes. A builder can identify high-priority resources for conservation (e.g., trees, waterways, snags, micro-habitats) and plan for the conservation of those resources during each stage of site development.

Information / How To Implement:

On complex sites, a natural resources inventory may be performed by a qualified professional such as an arborist, wildlife biologist, or landscape architect. Simpler sites, such as previously developed sites or farmland, might be adequately inventoried by knowledgeable but less qualified individuals. Whoever ultimately conducts the inventory should be able to discern invasive from regionally appropriate vegetation, understand how to site a house to take advantage of solar energy, be able to identify areas important to wildlife habitat, and understand how natural features can be used in managing storm water onsite.

A protection and maintenance plan should be drafted to detail how resources identified through the inventory will be protected throughout development. Section 4 of this module provides details on how to protect existing onsite vegetation and minimize soil disturbance and erosion through installation of fencing, identification of specified washout and material storage areas, laying of mulch to reduce soil compaction, and other means. In addition to protecting priority areas from invasive species intrusion during development, a maintenance plan should be created to ensure that priority vegetation survives development. Within the maintenance plan, include plans and information on fertilizing and watering trees as needed before, during, and after development.

One way to verify that the plan is implemented as planned is to create construction documents that explain how to implement the plan during construction.

Resources:

- American Society of Consulting Arborists, www.asca-consultants.org/why.html
- American Society of Landscape Architects, www.asla.org/members/pigroups.cfm
- International Society of Arboriculture, www.isa-arbor.com/home.asp
- Society of American Foresters, www.safnet.org/certifiedforester

Orient streets and configure lots to allow for the majority of homes to optimize solar potential (see the Energy Efficiency module for guidance on solar resource optimization).**Intent:**

Thoughtful orientation of a home can maximize solar heating potential in the heating season and minimize solar gains in the cooling season. By reducing non-renewable energy needs, orienting a home to optimize the solar resource reduces the life-cycle pollution caused by a home.

Information / How to Implement:

A builder should consider such issues such as slope, storm water management, local solar angles, and high-priority vegetation in determining the optimum site for each home. The final decision in siting a home will generally involve a compromise between these many factors.

Resources:

See Section 3.4 of this User Guide for resources.

Minimize slope disturbance.

1. Limit development footprint on steep slopes (slopes greater than or equal to 25%).
2. Complete a hydrological/soil stability study for steep slopes, and use this study to guide the design of all structures onsite.
3. Align roads with natural topography to minimize grade to reduce cut and fill.
4. Reduce long-term erosion effects through the design and implementation of terracing, retaining walls, and re-stabilization techniques.

Intent:

Leaving a slope undisturbed when siting a home reduces the chances of disturbing natural hydrological drainage and causing long- and short-term erosion, thereby reducing the potential to pollute water sources and damage local ecology.

Information / How to Implement:

Within these guidelines, steep slopes are defined as being greater than or equal to 25%. Note: Points should be awarded only if there are developable steep slopes in the area.

Reducing cut and fill practices can prevent unnecessary stripping of vegetation and loss of soils and reduce the need for additional resources to be brought in from offsite.

Resources:

- Prince George's County, Maryland, Department of Environmental Resources, *Low-Impact Development Design Strategies: An Integrated Design Approach* (EPA 841-B-00-003) (Largo, MD: June 1999), www.epa.gov/owow/nps/lid/lidnatl.pdf

Minimize soil disturbance and erosion.

1. Phase development in order to minimize exposed soils.
2. Use alternative means to install utilities, such as tunneling instead of trenching. Use smaller equipment, shared trenches or easements, and place utilities under streets instead of yards.

Intent:

Sediment and pollutants contained in the sediment are recognized as a reason that water bodies do not meet their intended uses. Exposed soils should be minimized to reduce erosion, promote water quality, and reduce damage caused to native vegetation. Heavy equipment and excessive digging can result in compaction or loss of topsoil along with the introduction of invasive and problematic flora. Minimizing soil disturbance and erosion can both reduce stressors on downstream water bodies and save valuable topsoil for the site.

Information / How to Implement:

NAHB's *Storm Water Permitting: A Guide for Builders and Developers* contains information about the federal Phase I and II storm water permitting program and the equivalent requirements for state storm water permits (see Resources section). *Storm Water Permitting* also contains technical information, including recommendations for use and cost estimates, on over 50 of the most commonly used best management practices; sample storm water pollution prevention plans; and tips on compliance, including how to handle visits from inspectors.

Methods for preventing erosion include silt fences, sediment traps, vegetated buffer areas, and mulching. More permanent solutions include biomechanical devices such as swales and vegetated buffers. Another highly effective, environmentally responsible method to prevent erosion is to use compost filter berms, compost erosion socks, and/or surface application of compost erosion control. The compost should be from organic sources like bioshields, yard waste, and wood chips. Turf and plant material—which help to facilitate the reestablishment of a natural environment—are established more quickly when organic compost is used.

Resources:

- National Association of Home Builders (NAHB), *Storm Water Permitting: A Guide for Builders and Developers*, 2005, store.builderbooks.com or 800-368-5242 x8163
- King County Department of Natural Resources, King County, Washington *Surface Water Design Manual Appendix D: Erosion and Sediment Control Standards* (Seattle: September 1998), <ftp://ftp.metrokc.gov/ddes/acrobat/esa/kcswdm-d.pdf>

- Dr. James R. Fazio, National Arbor Day Foundation, *Trenching and Tunneling: A Pocket Guide for Qualified Utility Workers* (Nebraska City, Nebraska: 1998), www.arborday.org/shopping/merchandise/merchdetail.cfm?id=62

Manage storm water properly.

1. Direct storm water to a locally approved regional storm water management and treatment facility that has been designed to address water quality.
2. Preserve and utilize natural water and drainage features.
3. Develop and implement storm water management plans that minimize concentrated flows and seek to mimic natural hydrology.
4. Minimize impervious surfaces, and utilize permeable materials for
 - a. Parking areas
 - b. Walkways
5. Minimize street widths and rights-of-way as per recommendations in either local code or in Residential Streets, 3rd Edition:
 - a. No on-street parking: 18 feet
 - b. Parking on one side: 22 to 24 feet
 - c. Parking on both sides: 24 to 26 feet

Intent:

Percolation through soil is one of the most effective means for filtering pollutants carried by storm water. By using natural water and drainage features, minimizing impervious surfaces, and distributing storm water flows, builders can reduce harmful pollutants carried offsite while safely and effectively managing much of their storm water load onsite.

Information / How to Implement:

Use open space and natural systems such as vegetative swales, french drains, wetlands, dry wells, and rain gardens that promote water quality and infiltration.

Resources:

- The Practice of Low Impact Development, U.S. Department of Housing and Urban Development (HUD); www.huduser.org/publications/destech/lowimpactdevl.html
- Tom Schueler, Center for Watershed Protection, *Site Planning for Urban Stream Protection*, Ellicott City, MD, 1995, www.cwp.org/SPSP/TOC.htm
- Lisa Austin, Washington State Department of Ecology Water Quality Program, *Stormwater Management Manual for Western Washington* (Publication 99-12), September 2001, www.ecy.wa.gov/pubs/9912.pdf
- Betty Rushton, Southwest Florida Water Management District, *Low Impact Parking Lot Design Reduces Runoff and Pollutant Loads: Annual Report # 1.*, Brooksville, Florida, 1999

Where municipal sewage is not available, use an advanced wastewater system as an alternative to the conventional septic system and drain field. Examples include sand/media filters and aerobic treatment units.

Intent:

Refer to the Water Efficiency section of the User Guide for details on this topic.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

Devise landscape plans to limit water demand while preserving or enhancing the natural environment.

1. Formulate a plan to restore or enhance natural vegetation that is cleared during construction or development. Within this plan, phase landscaping to ensure denuded areas are quickly vegetated.
2. Select turf grass and other vegetation that are native or regionally appropriate species.
3. Limit turf areas of landscaped area, selecting native and regionally appropriate trees and vegetation in a way that complements the natural setting.
4. Group plants with similar watering needs (hydrozoning).
5. Specify planting of trees to increase site shading and moderate temperatures (see also Energy Efficiency Guideline 3.3.5.1 specifying siting of trees to reduce the energy consumption of the home).
6. Require onsite tree trimmings of regionally appropriate species to be used as protective mulch during construction or as a base for walking trails.
7. Establish an integrated pest management plan to minimize chemical use in pesticides and fertilizers.

Intent:

Landscaping water use accounts for approximately 50% of a home's total water needs. Conservation of this valuable resource through such techniques as hydrozoning, reducing turf area, and selecting regionally appropriate plants is a key component to responsible building. Thoughtful selection and placement of plants can also reduce heating/cooling loads of a home, provide habitat for native fauna, and minimize the heat-island effect of developments.

Information / How to Implement:

Select landscaping materials and vegetation to fit site conditions. Regionally appropriate plants are hardy plants that can withstand local water and temperature conditions such as freeze, heat, drought, and rain. Regionally appropriate plants will also not be overly prolific or invasive, and will be able to coexist with other native plants over time. Other benefits of landscaping with native plants: minimizes maintenance (reduces emissions of equipment); fosters wildlife habitat. See EPA's Mid-Atlantic Region Green Landscaping <http://www.epa.gov/reg3esd1/garden/what.htm> for more information.

When planning for the revegetation of a site, consider the multiple services that natural areas can provide: natural habitat, storm water processing, shading, windbreak, etc. Trees that shade the streets can keep a neighborhood cool while also increasing the neighborhood's attractiveness. Properly selected plants can be grouped to serve as a bioretention zone. Deciduous trees allow the sun's rays through in winter and provide shade in the summer. Evergreens can provide an effective windbreak. Careful selection and integration of trees and vegetation can reduce a developer's initial costs while providing value to a development/neighborhood later. When planting trees, several factors should be taken into account such as the value of shading (trees shading asphalt will mitigate a site's temperature more than trees shading landscaped areas), maintaining a safe distance from the house (especially in areas prone to natural disasters), ultimate tree size, etc.

Developers may wish to consider enforcing guidelines for the protection of onsite vegetation. Some developers even fine builders for damage to areas designated for protection.

If grinding and scattering cleared plants, care should be taken to grind only regionally appropriate plants. Grinding of invasive species can increase their propagation and result in the ultimate destruction of native species.

One of the best ways to reduce energy consumption is through passive solar design of a home—using orientation, overhangs, fenestration, etc. Landscaping to reduce energy consumption is only part of the whole effort.

It is good practice to limit the ratio of turf area to total landscaped area due to maintenance requirements of turf versus native plants and regionally appropriate vegetation. In some areas, there may be restrictions on the percentage of turf that the front yard must contain. Research has shown that homeowners are comfortable with having as little as 50% of the front yard composed of turf. Fewer regulations are imposed on turf-to-landscaping ratio in the backyard, so good gains might be made more easily there. For research on turf and landscape of front yards with native species, see Nassauer, Joan, 1995. Messy Ecosystems, Orderly Frames. *Landscape Journal*, 14 (2), 161-170.

In areas with low annual rainfall, one way to account for water usage is through the development and implementation of a water budget.

Resources:

- Center for Plant Conservation, www.mobot.org/CPC
- Lady Bird Johnson Wildflower Center, Native Plant Information Network National Suppliers Directory, www.wildflower2.org/NPIN/Suppliers/suppliers.html
- New England Wildflower Society, *Native Plant Societies of the United States and Canada*, www.newfs.org/nps.htm
- NAHB Research Center Inc., Onsite Grinding of Residential Construction Debris: The Indiana Grinder Pilot, February 1999

Maintain wildlife habitat.

1. Preserve open space as wildlife corridors where possible.
2. Submit evidence of wildlife habitat preservation and improvements to the green development guidelines' administrator for review.
3. Participate in a wildlife conservation program.

Intent:

As the frontier of home building continues to expand, sharing the land with wildlife becomes an increasing challenge to builders. Through individual initiative or participation in a wildlife conservation program, home builders can work to create a habitat where both wildlife and humans can thrive—whether in an urban, suburban, or rural setting.

Information / How to Implement:

Examples of programs: USDA National Resources Conservation Service's Backyard Conservation Plan, the Audubon Cooperative Sanctuary System's Treasuring Home Initiative, or the National Wildlife Federation's Backyard Wildlife Habitat Program

Enhance quality of habitat, including food sources, diversity of habitat, and protective areas, through selective plantings and site design.

Leave snags (dead tree or portion that's left for habitat). Birdhouses.

Resources:

- Audubon International, *Audubon Cooperative Sanctuary System*, www.audubonintl.org/programs/acss. Audubon Cooperative Sanctuary System's Treasuring Home Initiative.
- Become a certified participant in the National Wildlife Federation's Backyard Wildlife Habitat Program. <https://secure.nwf.org/backyardwildlifehabitat/certify/page1.cfm>

Prepare operation and maintenance plan (manual) for transfer of common open spaces, utilities (storm water, wastewater), and environmental management.

Intent:

Green land use features often require ongoing maintenance so that they can continue to function as designed. Planning for such operations and maintenance prior to implementing the features is important and can help the long-term viability of such features.

Information / How to Implement:

Many manufacturers and distributors of green land use features and technologies also sell annual and/or long-term maintenance plans. Ask the manufacturers and/or distributors of the particular technology you're planning on implementing for such a service plan.

Resources:

Information will be added in Version 2.

Disassemble existing buildings, and reuse or recycle the building materials (deconstruction) instead of demolishing.

Intent:

See the Resource Efficiency section for details on this topic.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

4.0 DEVELOP THE SITE

Minimize environmental intrusion during onsite construction.

Provide onsite supervision and coordination during clearing, grading, trenching, paving, and installation of utilities to ensure that targeted green development practices are implemented.

Intent:

The noblest intentions when designing a green site are practically achieved through onsite supervision during the lot development phase. A qualified member(s) of the builder's team should be onsite as these activities progress to ensure that each objective is achieved according to targeted green lot specifications.

Information / How to Implement:

The information for this line item should link to the plans and any documents produced in line item 1.3.5.

Resources:

Information will be added in Version 2.

Conserve existing onsite vegetation.

1. Provide basic training in tree and other natural resource protection to onsite supervisor.
2. Minimize disturbance of and damage to trees and other vegetation designated for protection through installation of fencing and avoidance of trenching, significant changes in grade, and compaction of soil and critical root zones.

3. Prepare designated existing trees and vegetation for the impacts of construction through pruning, root pruning, fertilizing, and watering.
4. Improve the soil with organic amendments and mulch.

Intent:

After a builder has identified (during the planning stage) the existing vegetation that will be conserved onsite, practical steps must be taken during the development stage to achieve the intended conservation. Such steps include pre-development preparation of the vegetation and protection of the foliage, soil, and root system of designated vegetation.

Information / How to Implement:

See Resources section.

Resources:

- National Arbor Foundation, *Building With Trees*, www.arborday.org/programs/Buildingwithtrees/index.cfm
- Phillip A. Pratt and Michael W. Schnelle, Oklahoma State University, Oklahoma Cooperative Extension Service, *Site Disturbance and Tree Decline* (OSU Extension Facts F-6429), September 2003, <http://osuextra.com/pdfs/F-6429web.pdf>

Minimize onsite soil disturbance and erosion.

1. Demarcate limits of clearing and grading.
2. Create construction “no disturbance” zones using fencing or flagging to protect vegetation and sensitive areas from construction vehicles, material storage, and washout.
3. Install and maintain sediment and erosion controls.
4. Stockpile and cover good soil for later use.
5. Reduce soil compaction from construction equipment by laying mulch, chipped wood, or plywood sheets.
6. Stabilize disturbed areas within the 14-day period recommended by EPA.

Intent:

This guideline seeks to ensure the field implementation of conservation plans. Each measure identifies a practical way to foster water quality and conserve onsite ecological habitat through reducing soil disturbance and erosion.

Information / How to Implement:

Soil stabilization may be temporary or permanent.

Keep in mind that while the use of stockpiled onsite soil is a preferred method, excavation, stockpiling, grinding, and screening destroy the ecological microsystem of the soil. Rejuvenation of the unimproved soil to its original form will take several years. To offset this phenomenon, the incorporation of compost and sand is an effective method for more rapidly rebuilding the structure and ecosystem of the topsoil and allowing turf and plants to establish more quickly. As indicated above, compost is recommended for this purpose.

When additional soil must be brought in, there are environmental advantages of using industrial by-products as ingredients in topsoil including foundry sand, biosolids compost, and other EPA-approved by-products. In addition to keeping these materials out of community landfills, processing techniques produce superior topsoil.

The use of organic mulch is an excellent way to conserve water in landscape beds and build soil quality. Ideally, use mulch that results from onsite recycling efforts such as yard waste, processed pallets, and other clean wood from construction waste.

Resources:

- King County Department of Natural Resources, King County, Washington *Surface Water Design Manual Appendix D: Erosion and Sediment Control Standards* (Seattle: September 1998), <ftp://ftp.metrokc.gov/ddes/acrobat/esa/kcswdm-d.pdf>

5.0 INNOVATIVE OPTIONS

Seek to obtain waivers or variances from local development regulations to enhance green building.

Cluster development to preserve meaningful open space.

Intent:

Preserve meaningful open space, and reduce infrastructure and long-term maintenance costs.

Information / How to Implement:

During the past 50 years, a steady migration from urban to suburban areas and into the countryside has constituted a significant trend throughout much of the United States. In response to this phenomenon, planners, developers, and elected officials have created a number of tools designed to balance growth with the preservation of community environmental and financial assets. One tool that has received an increasing amount of attention lately is cluster development. This approach may be termed open-space development, conservation development, hamlet style, farm village, or other unique names coined by proponents and developers. Regardless of the title used to describe it, cluster development is an important tool community planners should consider as they look to the future. The purpose of this fact sheet is to describe cluster development, its history, potential, and limitations.

Resources:

- U.S. Environmental Protection Agency, Development, Community, and Environment Division, *Our Built and Natural Environments* (EPA 231-R-01-002) (Washington, DC: 2001), www.epa.gov/smartgrowth/pdf/built.pdf
- Urban Land Institute, www.uli.org/DK/index.cfm?CFID=526893&CFTOKEN=67483350

Reduce street widths.

Intent:

Reduce the amount of impervious surface and storm water runoff in the development.

Information / How to Implement:

Street widths have the largest impact on runoff and on costs. Unfortunately, most communities have ordinances requiring excessively wide streets. Developers may be able to negotiate changes for a particular development but will likely have to seek changes to local land development standards to change street-width requirements more generally. The publication, *Proposed Model Land Development Standards and Accompanying Model State Enabling Legislation* (HUD and NAHB Research Center, 1993), includes recommendations for minimum street widths that recognize the cost and environmental benefits of narrower versus wider streets (see below) and other cost-effective development strategies. It also includes recommendations for turnarounds, another location where the pavement area can be reduced.

Recommendations for Minimum Street Widths

Widths of Traveled Way

Minimum Width of Traveled Way (ft.)

Street Type	Both On- and Off-Street Parking (1)	One-Way Street (2)
Major Collector	20 (3)	10
Collector	36 (4)	26
Subcollector	26–28 (4, 5)	26
Access	18–22 (5)	18

Where no off-street parking is provided, the minimum width of traveled way for collector streets shall be 36 feet, and 34 feet for subcollector and access streets (two 9- or 10-foot travel lanes and two 8-foot parking lanes). Major collectors do not typically accommodate on-street parking. Access street width can be reduced to 26 feet if parking needs are met on one side of the street and restricted to that side only.

Where on-street parking is not permitted, the one-way street width may be reduced to 10 feet.

Parking is not allowed on major collector streets. Travel lanes may be added in accordance with traffic requirements.

Width can be reduced to 20 feet if on-street parking is not permitted.

Minimum street width shall be selected by taking into consideration the size of fire and emergency equipment that will serve the development.

Resources:

- Better Site Design Fact Sheet: Narrower Residential Streets, www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool4_Site_Design/narrow_streets.htm

Install an advanced wastewater treatment system.

Intent:

See the Water Efficiency section of the User Guide for more details on this topic.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

Install an advanced storm water treatment system.

Intent:

Percolation through soil is one of the most effective means for filtering pollutants carried by storm water. By using natural water and drainage features, minimizing impervious surfaces, and distributing storm water flows, builders can reduce harmful pollutants carried offsite while safely and effectively managing much of their storm water load onsite.

Information / How to Implement:

This line item would be over and above what is done for line item 1.3.5. Use open space and natural systems such as vegetative swales, french drains, wetlands, dry wells, and rain gardens that promote water quality and infiltration.

Resources:

- *The Practice of Low Impact Development*, U.S. Department of Housing and Urban Development (HUD); www.huduser.org/publications/destech/lowimpactdevl.html
- Tom Schueler, Center for Watershed Protection, *Site Planning for Urban Stream Protection* (Ellicott City, MD: 1995), www.cwp.org/SPSP/TOC.htm
- Lisa Austin, Washington State Department of Ecology Water Quality Program, *Stormwater Management Manual for Western Washington* (Publication 99-12) (September 2001), <http://www.ecy.wa.gov/pubs/9912.pdf>
- Betty Rushton, Southwest Florida Water Management District, *Low Impact Parking Lot Design Reduces Runoff and Pollutant Loads: Annual Report # 1*. (Brooksville, Florida: 1999)

Institute wildlife habitat measures.

Intent:

As the frontier of home building continues to expand, sharing the land with wildlife becomes an increasing challenge to builders. Through individual initiative or participation in a wildlife conservation program, home builders can work to create a habitat where both wildlife and humans can thrive—whether in an urban, suburban, or rural setting.

Information / How to Implement:

Examples of programs include the USDA National Resources Conservation Services Backyard Conservation Plan, the Audubon Cooperative Sanctuary System,s Treasuring Home Initiative, and the National Wildlife Federations Backyard Wildlife Habitat Program.

Enhance quality of habitat, including food sources, diversity of habitat, and protective areas, through selective plantings and site design.

Leave snags (dead tree or portion that's left for habitat).

Resources:

- Audubon International, *Audubon Cooperative Sanctuary System*, www.audubonintl.org/programs/acss. Audubon Cooperative Sanctuary System,s Treasuring Home Initiative.
- Become a certified participant in the National Wildlife Federation,s Backyard Wildlife Habitat Program. <https://secure.nwf.org/backyardwildlifehabitat/certify/page1.cfm>

Minimize grading.

Intent:

Excessive grading can disturb a site's natural drainage, vegetation, and ecological habitat. If topsoil removed during grading is not replaced, the health of the site's future ecological system may be compromised as well.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

Share driveways or parking

Intent:

Sharing driveways or parking can reduce the amount of impervious material on a lot, thereby decreasing storm water and pollution runoff.

Information / How to Implement:

Information will be added in Version 2.

Resources:

Information will be added in Version 2.

Other (specify).

Information will be added in Version 2.



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