Chesapeake Bay Landscape Professional (CBLP) Certification

Level 1 Study Guide

May 2017

cblpro.org

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SECTION 1 – INTRODUCTION TO THE CBLP LEVEL 1 STUDY GUIDE

I. Statement of Program Purpose

To meet the growing market for qualified and consistently trained landscape professionals to be better environmental stewards and stormwater partners for protection and restoration of the Chesapeake Bay.

II. CBLP Bay-wide Certification Program

- Establishes the eight essential elements of conservation landscaping as a unifying set of guidelines for landscaping within the Chesapeake Bay Region
- Is driven by state, local and watershed stewardship, habitat restoration and stormwater/water quality activities to meet the regional Chesapeake Bay Program Goals
- Is a collaborative effort, based on the research and experiences of CBLP Consortium members and program partners, which incorporates existing materials and builds on established training and certification efforts
- Builds awareness of the growing market for qualified and consistently trained professionals to be better conservation and stormwater partners

III. Acknowledgements

Development of this project has been a highly collaborative effort of many dedicated individuals and organizations that have given tirelessly of their time and resources, fueled by a fundamental belief that it is incumbent upon those of us in the landscaping professions to work together to ensure sustainability in the Chesapeake region. We gratefully acknowledge the guidance of the CBLP Steering Committee and more than 40 partners across the Bay region that have supported the CBLP initiative, by providing technical advice and logistical support, and contributing over 3200 hours of volunteer time, to date. Maryland Sea Grant provided invaluable editorial and graphic design support for CBLP Study Guides and the Maintenance Manual. And, of course, none of this would be possible without the financial support of our funders. We offer many thanks for the grant support provided and to all who have worked to bring the certification to fruition.

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CBLP Funders
National Fish and Wildlife Federation
The Campbell Foundation
University of Maryland Sea Grant/ University of Maryland Extension*
Prince Charitable Trust
Virginia Department of Game and Inland Fisheries Habitat Partners*
Virginia Environmental Endowment
District of Columbia Department of Energy and the Environment
Chesapeake Conservation Landscaping Council*
Wetlands Watch*

*CBLP Consortium Partners

IV. How to Use the Guide and Key References

This CBLP Level 1 Study Guide is intended to assist professionals who are preparing to take the Level 1 exam. Each section includes learning objectives and topics that outline knowledge and skills that CBLP candidates should understand. Seven key references should be used by CBLP candidates to prepare for classes and the exam:

- **Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping**, 2013. http://www.chesapeakelandscape.org/resources/the-eight-essential-elements/
- **Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual**
- **United States Fish and Wildlife Service (USFWS) Native Plants, Chesapeake Bay Watershed Guide**, 2003. https://www.nps.gov/plants/pubs/chesapeake/pdf/chesapeakenatives.pdf
- **Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region**, 2016. https://cblpro.org/downloads/BasicPrinciplesWatershedRestoration.pdf
- **Anne Arundel Watershed Stewards Academy (WSA) Rainscaping BMP Manual** http://aawsa.org/wsa-rainscaping-manual-2
- **Habitat Gardening for Wildlife, Virginia Master Gardener Handbook**, 2015. https://cblpro.org/wp-content/uploads/2016/09/Habitat-Gardening-Stand-Alone-Final.compressed-1.pdf
- **Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed**, by Cheryl Corson, 2017. http:www.cblpro.org/downloads/CBLPMaintenanceManual.pdf

Links to all of these references, except the PLNA manual, are also found on our website, cblpro.org. Printed copies of the PLNA manual may be purchased through cblpro.org.

A list of additional suggested references is available on the website.

All CBLP Level 1 candidates are required to attend a two-day training class before sitting for the exam.

Beth Ginter, CBLP Coordinator
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SECTION 2 – BACKGROUND

Every landscape site is located within a watershed, and is part of an ecological and social community within the greater Chesapeake Bay Watershed and ecosystem. Landscape professionals should be familiar with the geographic, legal and policy background driving conservation landscaping efforts to manage stormwater and protect and restore water quality, watersheds and habitat. This section includes key terminology and concepts that are essential to developing an understanding of sustainable landscape practices. Professionals should be able to understand and apply environmentally sensitive design techniques and principles in order to create sustainable landscapes and diverse landscapes which support local biota, protect and conserve environmental resources (water, soils and air), and reduce waste, thus resulting in ecologically functional and aesthetically pleasing environments for humans and wildlife. CBLP-certified professionals should know how to seek information that they need to perform work effectively and legally, and they should know when it is appropriate to consult with other licensed professionals. Professionals should be able to articulate the differences between traditional and sustainable landscaping practices.

I. The Chesapeake Bay Watershed

Learning Objectives:

1. Know the physical boundaries of the Chesapeake Bay watershed and its major tributaries, and physiographic regions.
2. Be able to define ecosystem and watershed, and understand the functional capacity of each.
3. Understand the natural cycles (hydrologic, carbon, nitrogen, phosphorus) and components of the natural cycles that support the function of a healthy ecosystem.
4. Appreciate the human impacts of development, land-use, impervious surfaces and stormwater on natural systems, natural communities, the economy and human health in the Chesapeake Bay Watershed. Negative impacts include:
    - Loss of forested lands, wetlands, shoreline buffers, soils and their functions.
    - Increased impervious surfaces and compacted soils, reduced infiltration and groundwater recharge, increased amount of stormwater runoff and discharge, increased stream bank erosion and sedimentation.
    - Water quality degradation – non-point source pollution (chemicals, fertilizers, sediment, debris, pet waste), point source pollutions (from combined sewer overflows, wastewater treatment plants, industrial and commercial facilities).
    - Fragmented and lost habitats, fish and shell-fish declines and bans, reduced air quality, algal blooms, and decreased dissolved oxygen.
    - Air pollution.
    - Climate change: changing temperatures and growing seasons, increased flooding and coastal erosion, loss of critical habitat like tidal wetlands, and sea level rise.
    - Invasive plants and common species of concern.
    - Impacts of pesticides and other chemicals commonly used in the landscape.
5. Be familiar with the Chesapeake Bay Program goals and agreements that pertain to water quality, watershed and habitat restoration goals.

Resources

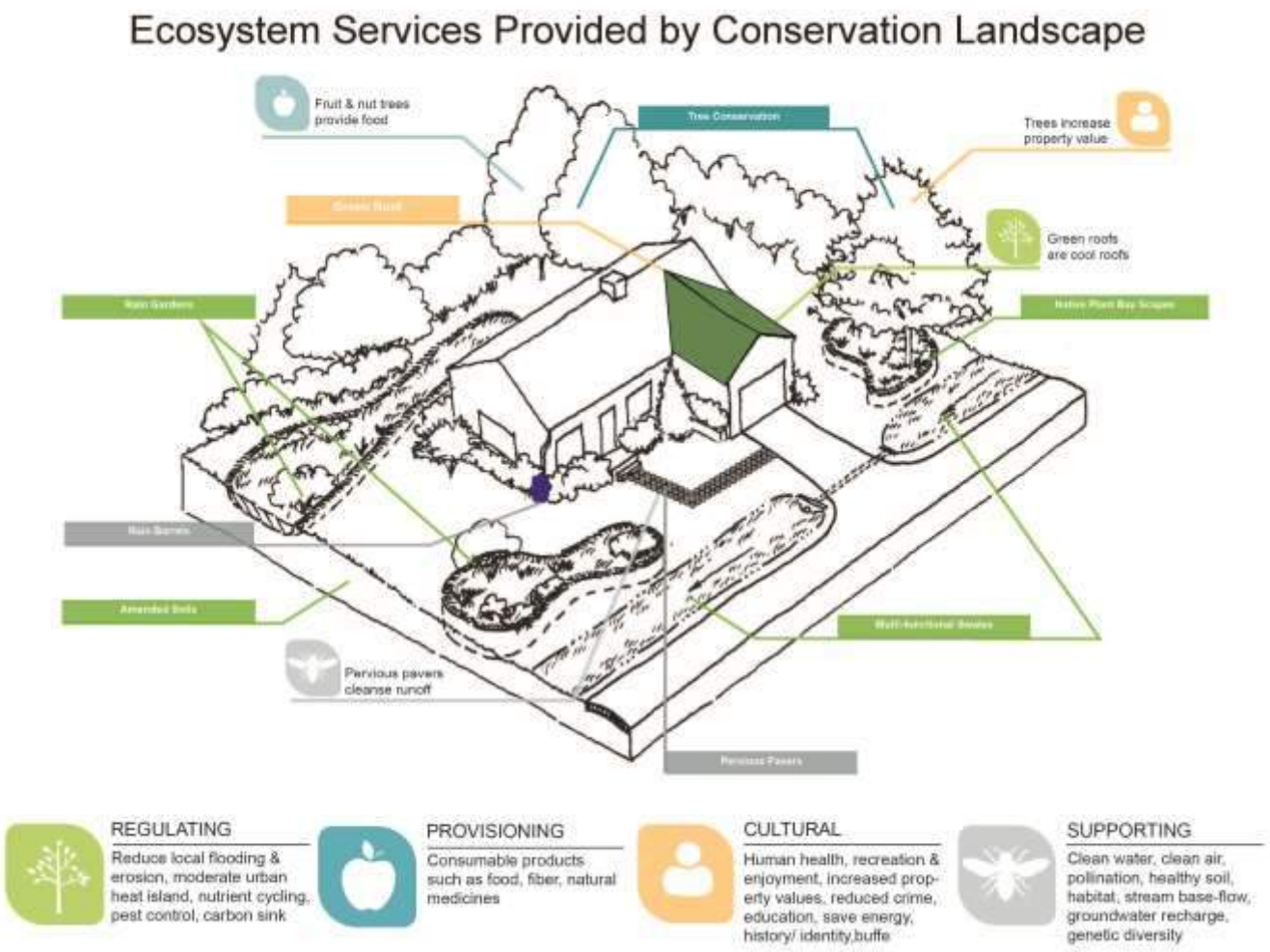
Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

II. Introduction to Sustainable Landscapes

Learning Objectives:

1. Be able to define sustainable landscapes, conservation landscaping, and ecological landscaping.
2. Understand the guiding principles of sustainable design, as defined by the Sustainable Sites Initiative.
3. Understand and practice the essential elements of conservation landscaping.
4. Understand various types of environmentally sensitive design and planning techniques implemented in the Bay Region.
   - Typical regional or community plans (large-scale, may dictate preferred actions and conservation and restoration areas that can be implemented on a landscape project)
     - Natural or green infrastructure (regional or locality wide, implemented at different scales),
     - Shoreline management,
     - Riparian buffer conservation and restoration,
     - Watershed restoration or management,
     - Floodplain management,
     - Habitat restoration and wildlife action,
     - Open space, parks and recreation, and greenway corridors,
     - Stormwater management through green infrastructure and green streets retrofit programs.
   - Typical site design techniques:
     - Environmental Site Design (ESD),
     - Low Impact Development (LID),
     - Better Site Design (BSD),
     - Green Area Ratio (GAR),
     - Sustainable Sites (SITES),
     - Leadership in Energy and Environmental Design (LEED),
     - Living Building Challenge,
     - Conservation Subdivisions.
5. Understand the primary driving forces behind, and benefits of sustainable landscapes.
6. Understand, appreciate and communicate the differences between conventional and sustainable landscape practices – see table below.
7. Understand how to practice environmental stewardship and be able to succinctly communicate the value of sustainable landscaping to clients and other professionals.



Comparison of Conventional and Sustainable Landscaping Approach

	Conventional Landscape	Sustainable Landscape
Team Culture or Philosophy	Nature and development may be perceived as being in opposition to one another. May incorporate sustainable practices if doing so does not increase time or immediate costs.	Values nature and the ecosystem services it provides. Accepts the responsibility of sustainability and providing meaningful quality of life to future generations. Strives to reverse the degradation of natural resources by creating regenerative and resilient systems.
Measure of Success	Economic success of the project.	Economic + environmental and human health benefits.
Site Assessment	Measures objective characteristics such as grades, light, soil, and existing vegetation	Inventories unique physical, biological, and cultural attributes to builds an understanding of the function and relationships on the site.

		Determines regional and local context of the site and recognizes ecologically and environmentally sensitive features to protect in the landscape.
Design Process	Compartmentalized approach. Landscape and building viewed as separate entities. Professionals work independently of one another.	Collaborative work between building and landscape design teams, engineers, builders, clients and others who work together to optimize performance of the site.
Aesthetics	May be homogenous and/or similar to sites from any region of the world.	Design solutions informed by the unique features of the site and are representative of local natural communities and culture.
Soils	Practices commonly degrade soils.	Healthy soils are protected by incorporating practices that minimize disturbance.
Vegetation	Plant selection based primarily on aesthetic preferences.	Maximizes integration of existing native species on the site and nearby areas. Plants are selected based on many factors: growing conditions, resiliency, ecological function, native range, habitat value, and maintenance requirements.
Water	Conveys stormwater and wastewater off-site. Designs rely heavily on potable water for irrigation.	Captures rainwater for reuse. Designs rely on precipitation and wastewater (eg, air conditioner condensate, greywater, or reclaimed water) resources.
Materials	Removes and disposes of existing materials indiscriminately. Reuse of materials is not considered in design process.	Maximizes re-use of structures, landscapes and materials. Local materials are used to the greatest extent possible. Sites are designed to minimize disposal of materials.
Maintenance	Individuals responsible for maintenance are not aware of project goals Maintenance occurs on a regular schedule and is not informed by performance of the site. Practices focus on keeping site static and limiting change.	Individuals responsible for maintenance understand and support goals of the project design/install. Crews are trained to ensure that maintenance optimizes site's ecological and cultural performance. Ongoing evaluations and monitoring guide practices. The site is managed to adapt/evolve to continually improve ecological function.
Continued Learning	No post-construction evaluations or monitoring is conducted.	Post-construction evaluation and monitoring is built into process. Information gathered is used to improve future projects.
Cost	Cost may be estimated using standard templates. Costs do not generally include long-range maintenance planning.	Cost estimating requires attention to long-term considerations. Collaborative design/install process may require additional hours. Over time, maintenance costs will be lower, but some inputs will be higher, especially initially. Additional training may be required to ensure that crews perform tasks correctly.

Adapted from Heather Venhaus*, Designing the Sustainable Site: Integrated Design Strategies for Small-Scale Sites and Residential Landscapes,* John Wiley & Sons, 2012.

Resources

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

III. Regulations, Laws, and Permitting

Learning Objectives:

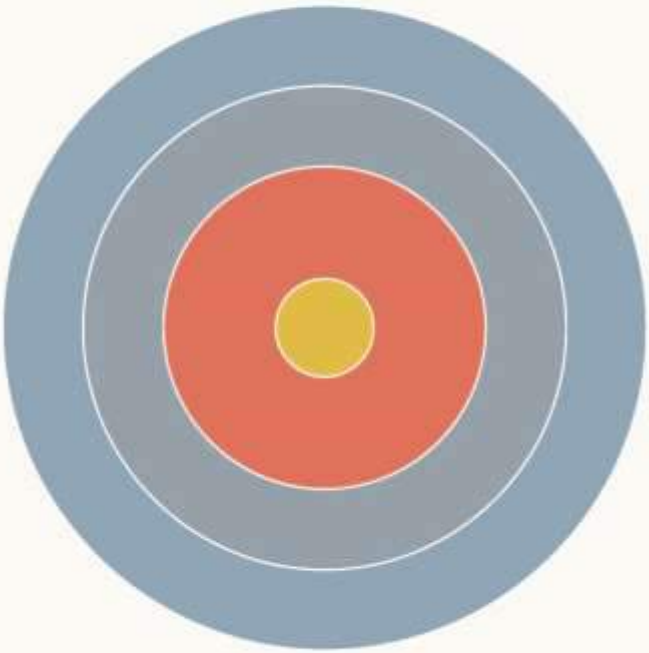
1. Understand the regulatory framework of stormwater management and water quality laws, regulations and permits designed to protect water quality and watersheds.
    - Clean Water Act
    - Water Quality Goals and Action Plans: Total Maximum Daily Loads (TMDL), Watershed Implementation Plans (WIPs)
        - The Chesapeake Bay TMDL covers nitrogen, phosphorus and sediment; however, there are other pollutants of concern in the Bay and its tributaries.
        - Bay pollution diet deadlines and strategies (Watershed Implementation Plans).
    - National pollutant discharge elimination system (NPDES), discharge permits, and water quality limits: wastewater, municipal separate stormwater sewer systems (MS4s), combined sewer systems, general permits regulated through state stormwater management programs.
    - Erosion and Sediment Control and required expertise or professional certification
    - Wetlands protection and permits
    - Fertilizer Laws and required certifications
2. Be familiar with other state and local environmental protection laws and ordinances including those that regulate activities in natural resources and their protective buffers.
3. Recognize local governments programs that fund and comply with state stormwater management regulations to meet water quality goals in their jurisdiction.

Resources

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

Polluted Runoff Regulation



- Some **municipalities** have their own *municipal separate storm sewer system* (MS4) permits and thus function like the Counties
- **Counties** implement MS4 permits. They require stormwater management on new development, retrofit existing developed areas to reduce polluted runoff and provide incentives for property owners to install retrofits to meet TMDLs. Small municipalities are covered by County programs
- **States** issue & enforce MS4 permits to control polluted runoff and set pollution diets (*total maximum daily loads or TMDLs*) for the Chesapeake Bay & rivers.
- **EPA** implements the federal *Clean Water Act* by writing regulations & setting water quality standards.

SECTION 3 – THE SUSTAINABLE LANDSCAPE

A sustainable landscape conserves, recycles, stores and cleans water using conservation landscaping techniques and "green" stormwater best management practices (BMPs) that preserve and mimic the natural water cycle, increase percolation of rainwater into the ground to recharge groundwater and retain, filter, recycle and reduce rainwater (stormwater) runoff. Plants and natural communities should promote biodiversity and provide food and shelter that are beneficial to wildlife and provide enjoyment to clients. Soils are another integral component of natural communities, play a key role in the hydrology of a site, and are the foundation of healthy plant materials and conservation landscapes. CBLP candidates should to develop an understanding of how these various components fit together, and should strive to create landscapes that mimic and support natural systems.

I. Water Protection, Management and Conservation

1. Understand the basics of hydrology and watershed restoration:
    - Terminology such as topography, drainage, soils, vegetation, impervious and pervious surfaces.
    - Processes and practices (natural and man-made) in stormwater management, water quality protection, groundwater recharge, water use and water conservation.
    - Preserve, protect and enhance environmentally sensitive features (healthy trees or forested areas, riparian or coastal buffers, native plant communities, healthy soils, waterways, wetlands).
    - On sites that do not require stormwater mitigation, employ practices to support and increase landscape health and productivity.
2. Understand that conservation landscapes treat water as a finite resource, and conserve, reduce and re-use water.
3. Know how stormwater was traditionally managed and regulated in the landscape, and the resulting water quality and watershed impacts.
4. Understand new design methodology that uses green infrastructure practices to:
    - Reduce runoff and treat stormwater at the source
    - Minimize disturbance of vegetation, environmentally sensitive features, and soils; minimize impervious surfaces and manage stormwater close to the site to reduce offsite impacts.
5. Be familiar with stormwater terminology and concepts including:
    - Pre-development hydrology, soils physical properties, design storm, water quantity, water quality, stormwater retention and detention, runoff volume, peak discharge, runoff reduction model, impervious surface model, erosion and sediment control.
6. Learn how to research, understand and comply with state and local ordinances, stormwater permits and regulatory approval processes.
    - Stormwater retrofits are BMPs implemented by local jurisdictions, non-governmental environmental groups, and private property owners to reduce stormwater runoff, nutrients and sediment from existing development to meet local and Chesapeake Bay water quality goals.
    - The Chesapeake Bay Program has approved certain BMPs as stormwater retrofits and established minimum standards and protocol that must be followed for localities to get nutrient and sediment reduction credits.
    - On-site retrofits and conservation landscapes, known as Residential Stewardship Practices, may be installed on residential, small-commercial, or institutional properties through non-regulatory, local stewardship incentive programs run by localities or environmental groups.

    - BMPs may be counted and tracked by localities to meet TMDL goals if practices meet minimum state stormwater standards.
    - Local incentive programs typically offer financial or technical assistance to encourage BMP installation on private property.
  - Other urban BMPs that restore hydrologic function, protect water quality, and reduce erosion include: stream restoration, reforestation, tree plantings and buffers, and shoreline management, urban filter strips, and urban nutrient management.
  - Some BMP designs must be stamped and sealed by a licensed professional (professional engineer or landscape architect).
  - Each state has minimum BMP design standards, implementation protocol (including inspections) and maintenance standards that must be followed.
  - All practices must have an approved plan and provision for long-term maintenance.
7. Recognize what critical factors influence BMP design and construction.
  - Design, size, and planting scheme are based on site-specific characteristics and limitations, as well as client preferences, knowledge and maintenance abilities.
  - Soils play an important role in water quality, infiltration and treatment in BMPs.
  - Improperly directed stormwater can create serious problems; therefore, recommended siting and protocol should be followed.
  - Design, installation and maintenance of stormwater BMPs requires a high level of technical expertise and may be more complex and entail greater risks than conventional landscaping practices.
  - BMPs must meet minimum design standards, be constructed according to protocol, be reported and tracked, and be properly maintained in order to qualify as a stormwater BMP to meet local TMDL goals.
8. Understand the difference between regulated versus non-regulated implementation of stormwater projects, and the roles of various professionals, including the appropriate role for CBLPs, in BMP design, installation, and maintenance.
  - CBLPs are responsible for determining which minimum BMP standards must be complied with for projects.
  - BMPs often need minor adjustments after construction.
  - Be aware that laws and regulations are often changing.
9. Be familiar with the design, installation, and maintenance (see Section 5) basics for typical stormwater BMPs implemented in the Bay region.
  a. Horticultural restoration practices: urban tree planting and reforestation, buffers – riparian, coastal, conservation landscaping with native plants, soil amendments
  b. Constructed horticultural BMPs that mimic natural systems: bioretention, rain gardens; bioswales (dry, grass, open channel or vegetated); filter strips; green roofs (extensive, semi-intensive, intensive); shoreline management (i.e. living shorelines); urban stream restoration; constructed wetlands; living walls
  c. Stormwater capture and reuse (rainwater harvesting) – eg, Rain barrels, cisterns, rain pillows
  d. Hardscape solutions: permeable hardscapes (pervious pavers, concrete, and asphalt); infiltration basins (sand filter); redirect downspouts (i.e. downspout or rooftop disconnection); impervious surface (cover) removal; dry wells
  e. Urban Nutrient Management
  f. Erosion and Sediment Control Practices
  g. Contour grading, berms, and terracing
10. Recognize the importance of selecting appropriate plants for BMPs, as many BMP failures occur when plantings are ill-suited to site conditions

Resources

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

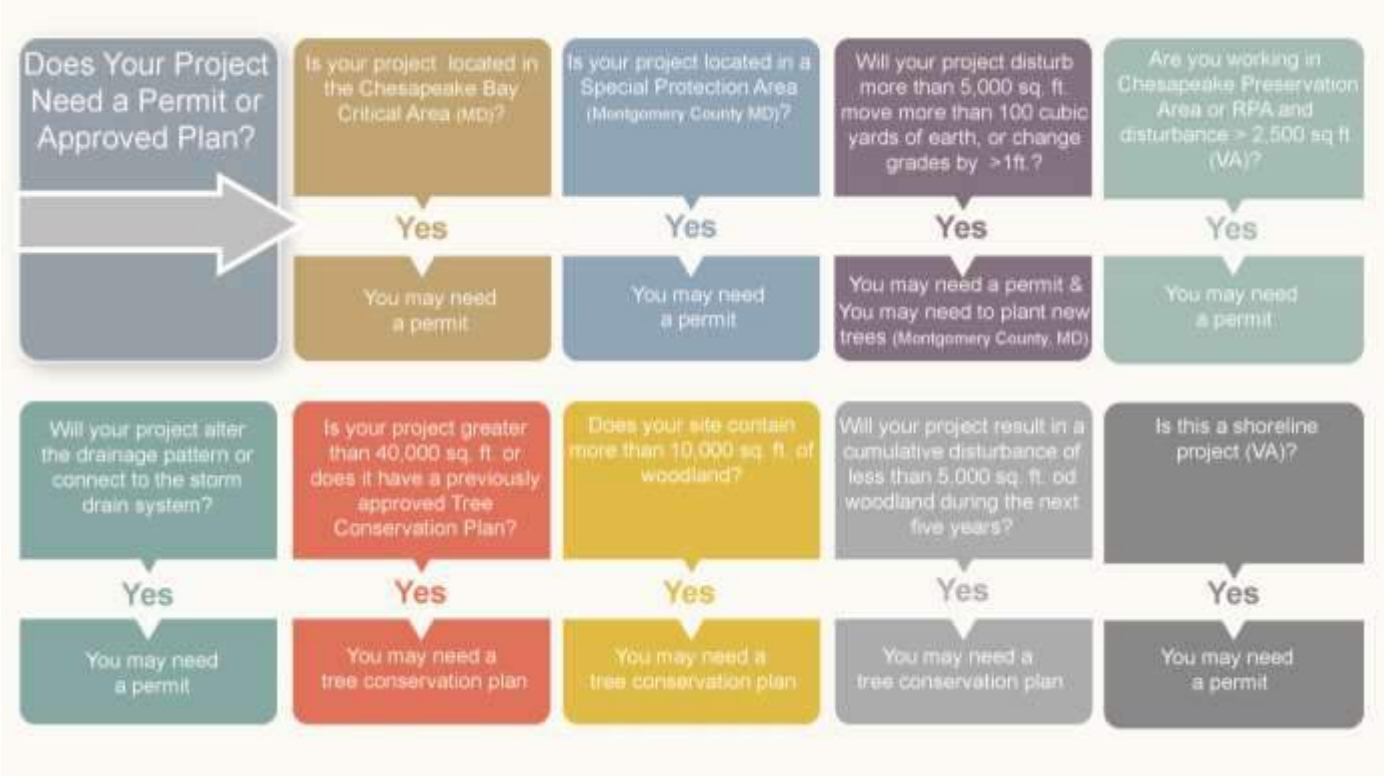
Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

Anne Arundel Watershed Stewards Academy (WSA) Rainscaping BMP Manual

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

When Does a Project Need a Permit or Approval?
This graphic shows some situations where a permit may be needed. Professionals should always research individual state and local requirements before beginning work.



II. Healthy Air Quality and Climate

Learning Objectives

1. Understand how to design and install landscapes to reduce maintenance

2. Know how to design, install, and maintain landscapes to improve energy conservation, reduce air pollutants and improve air filtration.
3. Understand the benefits of environmentally-friendly equipment, materials and techniques, and work to reduce use of gasoline-powered tools.

Resources

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

III. Natural Communities

Learning Objectives:

1. Understand how conservation landscapes work to support healthy, productive and resilient natural systems and natural communities, and rotect, conserve and/or restore natural communities throughout the design, installation and management phases of landscaping.
    - Strive for connectivity of natural communities to support landscape ecology, hydrology, wildlife corridors and habitat areas.
2. Recognize that public perceptions of designed natural communities are not always positive.
    - Communicate proactively about the value of native landscapes, and relate that to each client's personal goals/perceptions, in order to manage expectations and overcome common misconceptions.
    - Be aware of local codes/covenants/weed ordinances that may affect design and maintenance of naturalistic plantings
3. Understand that natural communities are an inter-related and complex system of living organisms (plants, soils, insects, microbes, wildlife) that have co-evolved to function and interact with natural processes as an ecosystem.
4. Know the types of natural communities found within the Chesapeake Bay Region and the general characteristics used to define those communities, including: dominant native plant community, soils, hydrologic setting, habitat value, wildlife/aquatic life, etc. See table below for some natural communities of this region.
5. Be able to identify characteristics of natural communities.
6. Avoid disturbing vegetative cover in natural communities like wetlands, natural forested areas, shoreline vegetated buffers, mature trees and associated understory.
    - To objectively assess the ecological integrity and potential for restoration, utilize the Plant Stewardship Index (http://www.bhwp.org/plant-stewardship-index.htm).
7. Understand the importance of biodiversity in the landscape.
    - The complex relationships between climate, hydrology, plants, soils and animals and connectivity in natural and designed landscapes can support biodiversity.
    - Biodiversity is a critical component and key indicator of a healthy and productive ecosystem.
    - Conservation practices may balance natural communities with the designed landscape.
8. Be able to describe how invasive plants and pests negatively impact and disrupt natural communities. Exotic invasive plant species:

- Degrade, change or displace native habitats and compete with native wildlife and are thus harmful to fish, wildlife and plant resources.
- Compete with native plants for resources (water, nutrients, light, space) and form monocultures, decreasing biodiversity.
- May negatively alter soil chemistry and erosion rates.

9. Know which plants are considered invasive in a given area (refer to state invasive species list) and avoid planting them.
10. Understand conditions that encourage or promote growth and spread of invasive plant species and know how to avoid creating those conditions.
    - Avoid or minimize disturbance that encourages colonization by invasives.
    - Don't leave soil bare
    - Use environmentally-sensitive techniques to remove or prevent the spread of invasive species.
11. Be familiar with the basic principles of integrated pest management (IPM), and non-chemical approaches to managing invasives.

Resources

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

United States Fish and Wildlife Service (USFWS) Native Plants, Chesapeake Bay Watershed Guide

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

Habitat Gardening for Wildlife, 2015

Natural Communities of the Chesapeake Region
(Maryland, Pennsylvania, Virginia)

Class	Definition*	
Plants for Forest or Woodland Plantings (Terrestrial Systems)		
Mesic Forests	Characterized by diverse forests throughout Maryland with moist, well-drained soils regimes often supporting lush vegetation. A variety of groups comprise this class which range from northern hardwoods at higher elevations in the mountains to basic mesic forests of the coastal plain.	Virginia - Low-Elevation Mesic Forests & High-Elevation Mountain Communities[1] Pennsylvania – Ridgetop Acidic Barrens? Coniferous, Coniferous-Broadleaf, and Broadleaf Woodlands and Forests[2]
Dry-Mesic Forests and Woodlands	Characterized by forests throughout Maryland with intermediate soil moisture regimes. Widespread and commonly comprised of oak and hickory species over a number of geological substrates (e.g., limestone, metabasalt, quartzites, sandstones, shale) accounting for a wide variety of groups in this class.	Virginia - Low-Elevation Dry and Dry-Mesic Forests and Woodlands[1] Pennsylvania – Coniferous, Coniferous-Broadleaf, and Broadleaf Woodlands and Forests[2]

Class	Definition*	
Dry Forests and Woodlands	Characterized by forests and woodlands consisting of extremely dry, drought-prone soils usually occupying exposed rocky or sandy areas such as ridges, crests, and slopes.	Virginia - Low-Elevation Dry and Dry-Mesic Forests and Woodlands[1] Pennsylvania – Shrublands[2]
Sandy Woodlands of the Coastal Plain and Outer Piedmont	Ecological community groups representing woodland vegetation of oligotrophic, fire-influenced or edaphically stressful, non-marine sandy habitats at very low elevations. [1]	Virginia only
Coniferous, Conifer-Broadleaf, & Broadleaf Forests	Pennsylvania resource and descriptions for natural plant communities is provided. [2]	Pennsylvania only
Coniferous, Conifer-Broadleaf, & Broadleaf	Pennsylvania resource and descriptions for natural plant communities is provided. [2]	Pennsylvania only
Broadleaf Shrublands	Pennsylvania resource and descriptions for natural plant communities is provided. [2]	Pennsylvania only
Plants for Dry Meadows (Terrestrial Systems)		
Glades, Barrens and Rock Outcrops	Widely variable class; Some groups susceptible to drought stress conditions due to shallow soils and impervious bedrock. Characterized by drought-adapted forbs, warm-season grasses and open canopies-historically maintained through natural fire cycles and grazing. Many community types recognized as globally rare. In Virginia "below 3,500 ft elevation and representing edaphically (or in one case, fire-) controlled woodland, scrub, herbaceous, and moss/lichen vegetation." [1]	Virginia = Low-Elevation Rock Outcrops and Barrens[1] Pennsylvania – Herbaceous Openings[2]
Plants appropriate for Bogs or Bog Gardens (Non-Tidal Wetlands or Palustrine Systems)		
Non-alluvial Wetlands	Widely variable class accommodates swamps, bogs, and fens controlled by groundwater seepage. Hydrological regimes vary from perennial to seasonal. Although non-alluvial wetlands in general are widespread throughout Maryland the composition and historical extent of many have been significantly altered.	Virginia – Non-Alluvial Wetlands or the Mountains[1] Pennsylvania – refer to resource for wetland sub communities[2]
Plants for Freshwater Wetlands & Other Wet Sites and Plants for Wet Meadows (Non-Tidal Wetlands or Palustrine Systems)		
Coniferous, Conifer-Broadleaf, & Broadleaf Forests	Pennsylvania resource and descriptions for natural plant communities is provided. [2]	Pennsylvania only

Class	Definition*	
Coniferous, Conifer-Broadleaf, & Broadleaf	Pennsylvania resource and descriptions for natural plant communities is provided. [2]	Pennsylvania only
Broadleaf Shrublands	Pennsylvania resource and descriptions for natural plant communities is provided. [2]	Pennsylvania only
Alluvial Wetlands	Consists of groups related to river and stream floodplains with non- tidal flooding regimes. Most groups within class are characterized by highly productive and diverse forests.	Virginia – Alluvial Floodplain Communities[1] Pennsylvania – refer to resource for wetland sub-communities[2]
Saturated Peatlands of the Coastal Plain	Ecological community groups of fire-influenced, groundwater controlled, non-alluvial, Coastal Plain wetlands with deep organic soils and saturated hydrologic regime. Represented in Virginia by woodland and forest vegetation, although shrublands are components further south. Extreme southeastern portion of the state. [1]	Virginia only
Non-alluvial Wetlands of the Coastal Plain and Piedmont	Ecological community groups of groundwater-controlled, non-alluvial wetlands in the Coastal Plain and Piedmont of Virginia. Structurally and compositionally diverse vegetation is represented. [1]	Virginia Pennsylvania – Basin Wetland and Coastal Plain[2]
Plants for Freshwater Wetlands and Other Wet Sites (Riverine Systems)		
Riverine Aquatic Beds	Characterized by submerged aquatic vegetation of Maryland's freshwater rivers and streams.	Virginia – Riverine Vegetation[1]
Plants for Saltwater or Brackish Water Marshes (Estuarine Systems)		
Tidal Wetlands	Includes wetlands associated with tributaries of Chesapeake Bay that are flooded twice daily by tides. Groups within this class are closely linked to salinity, elevation and the depth and duration of tidal flooding.	Virginia – Tidal Wetlands[1] Pennsylvania Tidal Wetlands and River Floodplain[2]
Plants for Coastal Dunes (Coastal or Maritime Systems)		
Non-tidal Maritime Wetlands	Characterized by groundwater-controlled wetlands along Atlantic coast exposed to salt spray and sand deposition from wind and wave action. A few community types extend into portions of the Chesapeake Bay.	Virginia – same
Coastal Beaches	Consists of high energy shorelines along the Atlantic coast that supports sparse vegetation.	Virginia – Marine Vegetation[1]

Class	Definition*	
Maritime Forests, Woodlands and Dunes	Represented by groups inextricably linked to coastal and marine processes such as salt spray and sand deposition derived from wind and waveaction. Occur primarily along Atlantic coast on barrier islands (e.g., Assateague Island) but also known to occur along portions of the Chesapeake Bay. In Virginia, "confined to narrow zones along both flanks of the Eastern Shore, the western shore of the Chesapeake Bay, and the Atlantic shore in extreme southeastern Virginia." [1]	Virginia - Maritime Zone Communities

*The primary source for this table is *The Natural Communities of Maryland 2016 Natural Communities Classification Framework* http://dnr2.maryland.gov/wildlife/Documents/Natural_Communities%20_Maryland_2016_Framework.pdf. The table was modified to create a comparison of natural communities of Pennsylvania, Virginia, and Maryland with the understanding that community nomenclature varies by state. Most descriptions provided are from the Maryland resource. The lighter shaded rows are a cross-reference to the *Plants with a Purpose Section* of US Fish and Wildlife Service Native Plants for Wildlife Habitat and Conservation Landscaping for the Chesapeake Bay Watershed.

[1]Virginia www.dcr.virginia.gov/natural-heritage/natural-communities/document/comlist07-13.pdf
www.dcr.virginia.gov/natural-heritage/natural-communities/document/ncoverviewphys-veg.pdf

[2]Pennsylvania www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_001872.pdf

Natureserve is another source to explore natural communities of the Mid Atlantic
www.explorenaturalcommunities.org/ecology-basics/patterns-nature/naming-and-mapping-patterns

IV. Native Plants and Vegetation

Learning Objectives

1. Develop an understanding of what defines *locally* native plants vs. cultivars, non-native, and invasive plants, and the ecological and environmental function (role and benefits) of native plants in a conservation landscape.
    - Native plants play a crucial role in our ecosystem and the food chain.
    - True native species are best-suited for use by native wildlife.
    - Insect species have co-evolved to specialize on particular native plant species and native plants support a higher abundance of insect species than non-native plants.
    - Planting non-natives (or cultivars) may contribute to the decline of insect diversity, bird species diversity and other wildlife in the food web. Conversely, using native plants benefits human, animal, and plant communities, and the Bay and its network of healthy rivers and streams.
    - A cultivar does not convey the same genetic diversity (biodiversity) as the open-pollinated true species because cultivars are genetically identical.
    - Genetic diversity enables plants to adapt with changes in climate.
    - Ongoing research is evaluating the food value of cultivars vs. native plants.
    - Native plants are highly-adapted to local conditions including soil and, once established, may require less human intervention
    - Choose and specify plants locally native to the region and appropriate for the site conditions
    - Use trusted resources to determine which plants are local and appropriate. (e.g. Online Databases, Regional Guides, State Guides)
    - Conduct careful site assessments to guide planting choices.
    - Select species native to your state and to your physiographic region.

- Choose plants that are well-adapted to site conditions (soils, water, light, etc), rather than trying to change the site to suit desired plants.

2. Understand basic plant taxonomy, common v. scientific names, and know ways to identify plants.
    - Specify plants using full scientific names

Resources

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

United States Fish and Wildlife Service (USFWS) Native Plants, Chesapeake Bay Watershed Guide

Habitat Gardening for Wildlife, 2015

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

http://www.bhwp.org/plant-stewardship-index.htm

Tallamy, Douglas. Bringing Nature Home: How You Can Sustain Wildlife with Native Plants. Timber Press, 2009.

V. Soils

Learning Objectives

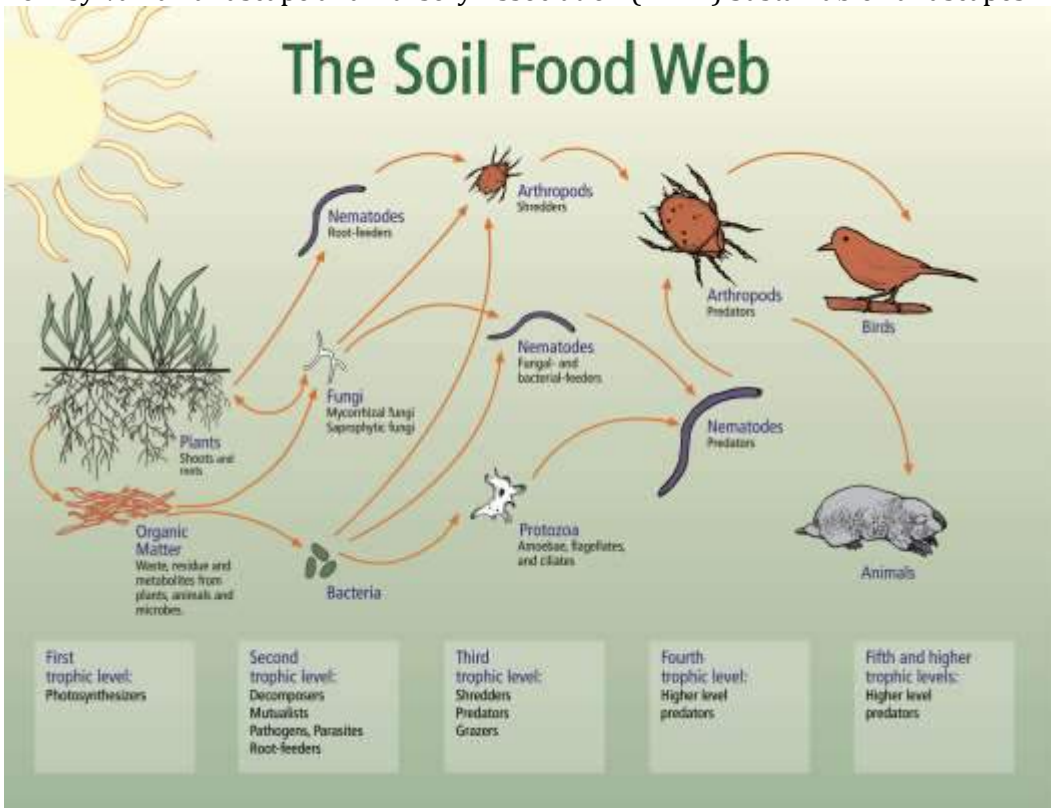
1. Be familiar with the concept of the soil food web, which serves ecological and hydrologic functions, and should be supported.
2. Understand the role of healthy soil in plant health and site hydrology.
3. Know how to minimize soil compaction caused by foot traffic and heavy equipment.
    - Use sturdy fencing to prevent access during construction and prohibit traffic within that area.
    - Prohibit staging of materials and equipment within protected zone.
    - Stockpile and re-install topsoil if it must be removed.
    - Move soil in lifts to minimize disturbance.
2. Recognize the potential negative impacts of sediment in local waterways and the Chesapeake Bay, and know the role of the landscape professional in ensuring compliance with regulations.
    - Sediment is regulated as a stormwater pollutant in the Chesapeake Bay TMDL
    - State erosion and sediment control (ESC) laws and local ordinances must be followed during site construction and maintenance.
    - The need for permits may depend on the amount of land being disturbed during construction.
    - Landscape professionals are responsible for determining and complying with local ordinances and requirements.
3. Develop knowledge and understanding of how and when soils should be amended.
    - Use site-specific data plus tactile and visual tests to determine whether and to what degree, organic compost or mulch amendments are needed.

- Follow protocol recommended by the U.S. Composting Council to determine whether or not (or when) amendments are appropriate.
- As a rule, do not amend the soil when planting trees.
- Many states have fertilizer laws that regulate the use of soil amendments for lawns and turf.
- Depending upon pH and other requirements of the target native plant species, additional soil amendments may be needed.
- Use low-intensity soil enhancement techniques prior to planting, if amendments are needed because of soil degradation, compaction, pH or other requirements for a target native plant species.
- Apply mulch, brush, leaf compost from a local source. Exclude diseased tree debris (e.g. emerald ash borer).
- Avoid use of mechanical soil restoration techniques such as 'soil ripping' since these disrupt existing tree roots and other residual biological communities in the soil
    - Aeration combined with spreading of mature compost is a preferred approach for soil quality improvement.
- In some jurisdictions, soil amendments are approved as a stormwater best management practice (BMP) and specific protocol must be followed.

Resources:

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual



From USDA Soil Biology Primer

VI. Habitats, Biodiversity and Wildlife

Learning Objectives

1. Understand that a conservation landscape should be designed to support the greatest diversity of species.
    - Wildlife habitats are an essential part of a healthy ecosystem.
    - Conservation landscapes that mimic natural plant communities, have multiple vegetative layers comprised primarily of native plants, and incorporate features with habitat elements, have the greatest ecological value for wildlife.
    - True native plant species are best-suited for use by native wildlife. Planting non-natives (or cultivars) may contribute to the decline of insect species diversity, bird species diversity, and other wildlife in the food web.
    - Common landscape practices (e.g. frequent mowing, tree removal, herbicide use) can negatively impact desirable and environmentally-sensitive and critical habitat features, especially in waterfront areas.
2. Be able to recognize elements of natural systems and natural communities that support wildlife: connectivity of natural communities, provision of food, water source, vegetative structure, cover.
    - Assess each site's current habitat quality based on existing plant composition and structure.
    - Survey, conserve, and protect existing native wildlife and their habitats.
    - In selecting plants as a direct food source, consider the seasonal and life cycle needs of the target wildlife species.
    - Dead trees are valuable for wildlife habitat and soil enrichment
3. Develop strategies and skills to balance the needs of wildlife with the needs and goals of people.
    - Design and manage the landscape to minimize or avoid potential human/wildlife conflicts. To avoid such conflicts:
        - Foster a general understanding of and appreciation for wildlife and its role in the environment;
        - Recognize that deer food preferences are highly variable, and lists of so-called "deer resistant plants" are not always a reliable predictor of plant success;
        - Avoid placement of bulb beds next to wooded areas (voles);
        - Know about your region's most problematic animal or insect species (deer, deer ticks, etc) and recognize how design can reduce potential problems with those species and promote more positive interactions between humans and wildlife;
        - Identify what wildlife is likely to be attracted to the planned landscape and provide habitat for desired wildlife
        - Plant and maintain buffers around ponds and lakes to deter geese, as they are averse to areas of tall vegetation adjacent to waterways and will avoid those buffers;
        - Install temporary protection to exclude wildlife until plant material is established
        - Educate clients about the beneficial role of tunneling creatures for soil health and infiltration.
4. Understand the impacts of invasive exotic plants and non-native plants on habitat quality and environmental health.
5. Recognize the roles played by pollinators in our ecosystem, and understand how pollinators benefit humans.
6. Be aware of endangered and protected species, and relevant national, state, and local laws, plans and programs that protect them.

Resources

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

United States Fish and Wildlife Service (USFWS) Native Plants, Chesapeake Bay Watershed Guide

Habitat Gardening for Wildlife, 2015

Douglas Tallamy, *Bringing Nature Home: How You Can Sustain Wildlife with Native Plants,* Timber Press, 2009.

SECTION 4 – DESIGN AND INSTALLATION

The sustainable landscape design process begins with a deep understanding of each site and its unique attributes. CBLP candidates should perform a comprehensive site assessment before beginning work, and must use the information gathered to inform their work in designing and installing any project. This site assessment should be used to develop plans for ongoing maintenance. Professionals should seek to develop a collaborative practice approach to each project, in which each professional and client is part of a feedback loop – allowing designers to improve and correct designs, ensuring that sensitive site features are protected and the designs are properly installed and functional, and promoting effective long-term maintenance.

I. Understanding the Site (Site Assessment)

Learning Objectives

1. Know the process and components of a comprehensive site assessment and recognize the importance of performing an assessment.
2. Be able to recognize the ways in which site assessment and site analysis inform design, construction/installation, and management decisions, and recognize the impact that changes to design, construction or maintenance plans have upon the integrity and functionality of the landscape.
    - Use site analysis to identify opportunities and constraints of the site.
    - Engage the client and build support for environmental stewardship, to benefit long-term success of the project.

Resources

Appendix A- Components of a Site Assessment

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

II. Designing the Conservation Landscape

Learning Objectives

1. Know how to preserve existing features of value, and how to design new features that enhance the ecosystems. For example:
    - Design to preserve existing trees and other valuable environmental features; protect, expand, or enhance environmentally sensitive features; minimize site grading and/or compaction of soils; enhance connection to adjoining natural areas.
    - Include plants, materials, or features that are useful to wildlife.
    - Restore natural ecosystems where invasive materials may have caused degradation.
2. Follow a collaborative practice approach in working with other professionals.
    - Hold frequent meetings with installation contractors and subcontractors before, during, and after installation.
    - Work with contractors to clearly designate protected areas, and inspect protection measures during construction

- Encourage contractors to consult with the designer before making substitutions or adjustments during design installation or maintenance.
- Develop practices to ensure worker safety on site.

3. Educate clients about critical environmental features preserved through design, and actively engage clients in the design, installation, and maintenance of their site.
    - Interview clients carefully to understand goals, budget, and landscaping style.
    - Discuss sustainable landscape benefits, and encourage clients to be environmental stewards.
    - Using examples, help clients visualize the design at various stages from construction, through the first three growing seasons, to full maturity.
    - Educate clients on the purpose of BMPs, any local incentive programs that may be available for cost share or rebates, and the particular BMPS those programs promote.
4. Be able to define a maintenance standard (Landscape Maintenance Plan) as part of the design process.
    - Maintenance will not succeed without a clear, shared understanding of what "well-maintained" means for a given landscape.
    - When developing designs, consider how the landscape will be maintained and who will perform the maintenance. The amount of maintenance required should match the maintenance staff skill-level and resources.

Resources:

Appendix B –Components of Landscape Design

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

Habitat Gardening for Wildlife, 2015

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

III. Installing the Sustainable Landscape

Learning Objectives

1. Understand processes and techniques to properly install and construct a sustainable landscape, so that the landscape will function as intended.
2. Be familiar with applicable laws, permits, and approval processes for sustainable landscapes and stormwater BMPs.
    - Know how and where to locate regulatory and permit information for a given site. Check to see if any permits or approvals are needed for site disturbance or construction activities.
    - Utilities should be located and marked by utility companies prior to construction.
3. Know how to protect natural resources before and during construction, and make that a priority on each site.
    - Protect existing vegetation, soils, habitat, and water resources during construction.
    - Prevent contamination or damage during construction – keep machines in good working order, minimize erosion and sedimentation, clean up any spills or leaks.

- Ensure that installation team is trained in site protection measures.
- Clearly designate protected areas, enforce compliance within those areas, and inspect protection measures during construction.
- Perform any required "root pruning", pruning of canopy, or other preservation measures called for in the tree protection plan.
- Maintain required depth of mulch over tree roots, and provide supplemental water in accordance with preservation measures.
- Use appropriate construction machinery - use lightest, least destructive equipment and machinery possible.
- If topsoil must be disturbed, stockpile and reuse quality topsoil on site

4. Follow a collaborative approach where each professional and client maintains close communication throughout the project, and each is part of a feedback loop.
    - Hold frequent meetings with clients, designers and subcontractors before, during, and after installation.
    - Consult with designer before making substitutions or adjustments during design installation or maintenance.
    - Develop practices to ensure worker safety on site.

Resources:

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

Anne Arundel Watershed Stewards Academy (WSA) Rainscaping BMP Manual

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

SECTION 5 - Sustainable Landscape Maintenance

Level 1 CBLP-certified professionals understand that conservations landscapes and stormwater BMPs must be properly maintained in order to function as intended. Professionals will be able to recognize a set of common best management practices (BMPs) in the landscape and understand how these practices function, how they are constructed, and how to recognize performance problems. Professionals should be able to follow a maintenance plan and properly perform typical post-construction landscape maintenance tasks, and will know the proper chain of command for reporting functional or design issues. As more stormwater BMPs are installed in the landscape, there is a growing demand for landscape professionals who understand how BMPs function or fail, and understand the critical and evolving role of landscape maintenance crews and proper landscape maintenance in the successful long-term function of stormwater BMPs. BMPs that landscape crews may encounter include "living" BMPs and those typically considered "hardscapes".

I. Introduction

Learning Objectives:

1. Understand maintenance goals in context of design intent, client expectations, budget, possible regulatory requirements, ecological imperatives, budget, etc.
2. Realize that conservation landscapes and stormwater BMPs must be properly maintained in order to function as intended.
3. Understand maintenance and management in context of emerging trends in ecological landscape design (including habitat connectivity) and sustainable management practices for low maintenance landscapes.
4. Recognize the importance of learning by doing (hands-on work).

Resources:

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

II. Human Systems

Learning Objectives:

1. Understand regional, state, local, community and site-specific context of the site that impact management and maintenance decisions and actions. Be able to conduct an inventory of available information and resources for each site.
2. Be familiar with relevant federal and state natural resource protection laws, regulations and regulatory/permitting processes that influence and dictate landscape management and maintenance decisions and actions.
3. Be able to practice culturally responsible landscape maintenance for the appropriate era, when working with a historic site.
4. Understand the importance of developing and following a maintenance plan.
    - Follow design specifications and maintenance plans (and know how to read plans).
    - If no maintenance plan exists, identify appropriate maintenance tasks and establish a plan.
    - Refer to key local and state manuals for maintenance guidance.
    - Establish an overall inspection schedule.
    - Know how to prioritize maintenance and repair of BMPs.

- Understand optimal timing for landscape and BMP maintenance tasks and be able to design an appropriate schedule.
- Identify repair or other corrective measures and optimal response times.
- Document performance of landscape features, plant materials, and BMPs for adjustments and upgrades ("adaptive management strategy").
- Schedule routine site visits.
- Assess BMP performance during and after a heavy rainfall event.

5. Incorporate appropriate training for maintenance staff.

Resources:

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

Anne Arundel Watershed Stewards Academy (WSA) Rainscaping BMP Manual

Appendix B- Components of a Site Assessment

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

III. Tools and Working Methods

Learning Objectives:

1. Develop knowledge of appropriate tools and equipment, and hone skills for using them.
2. Understand the importance of worker safety and working collaboratively with clients, other landscape professionals and experts from other related disciplines to ensure the landscape functions as designed and provide feedback to improve landscape and BMP performance.
3. Be able to use & procure materials sustainably

Resources:

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

IV. Natural Systems

Learning Objectives:

1. Know how to manage water use sustainably in the landscape and how to ensure that conservation landscapes and BMPs function to slow down, spread out, capture, infiltrate, and clean water.
2. Appreciate the significance of soils and the role soils play in a healthy site, and strive to protect and enhance soils.
3. Understand how to prevent erosion & control sediment on site.
4. Be able to practice Integrated Pest Management (IPM)

Resources:

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

V. Plant Materials

Learning Objectives:

1. Know how to manage all landscapes to be healthy and functioning ecosystems that maximize plant health and diversity.
2. Understand and practice sustainable maintenance methods to control or minimize the spread and impact of aggressive native and non-native species.
3. Understand appropriate turf care methods for urban nutrient management

Resources:

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

Chesapeake Conservation Landscaping Council (CCLC) Eight Essential Elements of Conservation Landscaping, 2013

Pennsylvania Landscape and Nursery Association (PLNA) Sustainable Landscapes Manual

United States Fish and Wildlife Service (USFWS) Native Plants, Chesapeake Bay Watershed Guide

VI. BMP Maintenance

Learning Objectives:

1. Know how to read BMP design specifications and maintenance plans

2. Recognize BMPs in the field and know the typical landscape maintenance tasks associated with the individual BMPs.
3. Understand appropriate water management strategies for BMPs
4. Recognize and be able to perform typical landscape maintenance tasks for "Living" BMPs following appropriate protocol.
    - Horticultural Restoration Practices
        - Urban tree planting and Reforestation,
        - Buffers – riparian, coastal (regulated buffers, forested buffer BMPs),
        - Conservation landscaping with native plants (ensuring finished grade including mulch is lower than surrounding surfaces),
        - Soil amendments (as a BMP, specifications and protocol may apply).
    - Constructed horticultural BMPs that mimic natural systems
        - Bioretention, rain gardens, urban planters,
        - Bioswales (grass, vegetated, dry, open channel),
        - Filter strips,
        - Vegetated or Green Roofs,
        - Living walls,
        - Shoreline management (e.g. living shorelines),
        - Stream restoration,
        - Wet ponds,
        - Wetlands, constructed wetlands.
5. Recognize and be able to perform typical landscape maintenance tasks for Hardscape and Infiltration type BMPs and comply with protocol and certification requirements.
    - Pervious paving and paving systems.
    - Water harvesting/storage devices.
    - Downspout redirection.
    - Impervious surface (cover) removal.
    - Underdrains.
    - Gabion walls.
    - Infiltration basins or trenches.
    - Drywells.

Resources:

Sustainable Landscapes Maintenance Manual for the Chesapeake Bay Watershed, by Cheryl Corson, 2017

Basic Principles of Watershed Restoration and Stormwater Management in the Chesapeake Bay Region, 2016

Anne Arundel Watershed Stewards Academy (WSA) Rainscaping BMP Manual

Appendix A - Components of a Site Assessment and Analysis

1. Background Research:
    a. Regional Context: watershed, cultural assets, physiographic region, identify typical natural communities, water quality, water supply, vulnerability to natural disasters, existing and planned greenways and wildlife corridors.
    b. Climate and Energy - average precipitation, humidity, temperature, and zone
    c. Cultural Assets
        i. Research site history and prior use
        ii. Document existing site uses
        iii. Identify and map historical, cultural or unique landscape features and views
        iv. Identify existing undesirable features
        v. Assess relationship of site to community and public infrastructure.
2. Natural Resource Assessment
    a. Microclimate
        i. Identify sun exposure and sun tracking
        ii. ID microclimates established by site features
        iii. Research prevailing winds
    b. Water Resources
        i. Topography and hydrology – map steep slopes, site grades, surface water flow paths and ponding area
        ii. Watershed identification
        iii. Drainage area delineation
        iv. Surface drainage assessment
        v. Identify potential regulatory requirements
        vi. Map hundred year floodplain
        vii. Riparian buffer locations
        viii. Locate and delineate regulatory buffer locations and the wetlands and surface waters they protect (RPAs, Critical Buffer Areas)
        ix. Stormwater drains, outfalls and structures
        x. Determine depth to groundwater and seasonal fluctuations in the water table.
        xi. Map existing surface water bodies, associated shorelines, wetlands, vegetated buffer zones (RPAs and Critical Buffer Areas) as well as bank conditions, habitat value, man-made structures and restoration opportunities.
        xii. ID impaired water bodies downstream of site. Determine contaminants of concern for impaired water bodies.
    c. Soils
        i. Geology & subsoils
        ii. Determine soil types, characteristics, conditions (healthy, compacted, degraded) through soils analyses and on-site observations and testing.
        iii. Identify prime agricultural soils and/or A/B soils
        iv. Areas where soil is exposed and/or eroding
    d. Vegetation:

i. Type: Native, non-native, invasive
ii. Identify dominant natural community types that may be associated with specific site conditions onsite and in vicinity of site
iii. Condition, location & species of existing vegetation
iv. Identify unique and specimen plants
v. Research and identify common invasive plants, and species of concern, for each state in the Chesapeake Bay region
vi. Existing Trees – (all phases of planning and tree work best performed by ISA-Certified Arborist)
1. Preliminary Tree Survey – determine what size to include in survey –may be based on requirements of local jurisdiction – Check local regulations prior to removing any tree.
2. Common Name + Botanical Name
3. Size – Diameter Breast Height (DBH) + Critical Root Zone (CRZ) shown both graphically on plan and in measurements on survey. Know the difference between CRZ and canopy, as well as how to calculate CRZ
4. Condition of tree
5. Value of tree on site proposed for development/redesign
6. Preservation measures needed to save or recommend removal

e. Wildlife
i. Identify critical habitat, value and condition onsite and in the surrounding landscape
ii. Check local, regional and state plans and websites for endangered or protected species onsite and in the vicinity of the site.
iii. Identify desirable and undesirable wildlife (including insects) that is likely to be attracted to the planned landscape

f. Uses & Design Elements
i. Views
ii. Focal points
iii. Circulation paths

3. Basemap of Existing Conditions shall include: Legal Boundaries (property and any easements); Buildings and Structures, Pavement and other hardscape materials, Walls and Fences, Utilities, Site Access Points, Slope, Slope Aspect, Circulation and Access, Water Related Features

Appendix B - Components of Landscape Design

1. Concept Plan: Developed to convey design elements and possible features to the client, and allow for feedback.
    a. Based on information gathered during client interview and site assessment.
    b. Provides visual illustration of the design
    c. Several concept options may be created to show various approaches to design.
    d. Provides an opportunity to create a design that achieves environmental goals and is culturally sustainable and financially accessible in the minds of those who will use the site, and those who are responsible for its maintenance.
2. Landscape/Planting Plan: Once the concept plan has been completed and approved, landscape and planting plans are prepared.
    a. May show entire site or a portion of the site or for an individual practice.
    b. Should be a scaled drawing with hardscape features and plants clearly identified on the plan
    c. Plant and materials specified and listed.
    d. May provide a phased plan for installation.
3. Demolition, Grading Plans: Illustrate how the existing site will be changed and graded.
4. Tree, Soil, and Habitat Protection Plans: A critical component of a sustainable design, these drawings specify how and where key existing natural resources will be protected during construction
5. Construction Drawings: Details show exact specifications for site feature construction.