

Webinar Series: Part 1

Introduction and Design Concepts

Dr. Pamela Bailey

Research Botanist and Landscape Architect

Engineer Research and Development Center, Environmental Lab

2015

Based on

Design Manual:

Engineering

With Nature

Using

Native Plant

Communities



US Army Corps
Engineers®
Engineer Research and
Development Center



Overview

- This webinar series is based on the design manual, however this features some additional information in some sections.
- Documents the use of native plants to provide engineered design elements that consider the diverse range of Corps water resource projects.
- The goal of this webinar series is to describe how to utilize plant communities within the built environment to create sustainable landscapes.
- The advantage of this approach is to reduce construction and operating costs, while increasing benefits to the environment.
- This manual explores the idea of transforming the way in which native plant communities are thought about, and valued by the Corps.



Webinar Series Contents: Part 1, 2 and 3

- **PART 1: INTRODUCTION and DESIGN**
 - Why do we need to pay attention to our native plant communities?
 - Why are native plants communities important to the Corps mission?
 - How to use the plant resources available on Corps' lands nationwide.
 - How to incorporate native plant communities into projects by describing specific tools and techniques to survey, plan, design, construct, maintain, and monitor projects.
 - Design and scientific components are blended together into a holistic approach, so this manual is accessible to many people with varied professional backgrounds.

- **PART 2: SCIENCE and PLANTING TECHNIQUES**
 - National Vegetation Classification
 - Sources to Obtain Native Plant Materials
 - Conservation Methods
 - Planting Techniques, Site preparation, Seed Mixes and Seeds, Seed Treatments, Interseeding, Mosaic seeding and Planting

- **PART 3: CASE STUDIES**
 - List of specific uses incorporating native plant communities
 - Specific case studies that illustrate well-designed, well-built examples of elements using native plant communities.



Why Protect Native Plants?

Provisioning services

Food

Water

Raw materials

Genetic resources

Medicinal resources

Ornamental resources

Regulating services

Air quality regulation

Regulation of water flows

Moderation of climate

Moderation of extreme events

Maintenance of soil fertility

Waste treatment

Erosion prevention

Biological control

Pollination

Waste treatment

Habitat services

Maintenance of life cycles of migratory spp.

Maintenance of species diversity

Maintenance of genetic diversity

Cultural services

Aesthetic values

Spiritual experience

Inspiration for culture, and arts

Information for cognitive development

Opportunities for recreation and tourism

Adapted from: The Economics of Ecosystems and Biodiversity (TEEB) 2010. United Nations, the European Commission, and the German and UK government



The value of native plant communities to the Corps water resource projects and sustainable landscapes nationwide

- Provide wildlife habitats and migration routes
- Protection of water quality and water supply
- Produce oxygen and protect air quality
- Regulate temperatures
- Nutrient cycling
- Reduction of sedimentation and erosion into waterways
- Commercial uses (food, fiber, medicine, resins, and building supplies)



The value of native plant communities to the Corps water resource projects and sustainable landscapes nationwide (continued)

- Riparian buffers
- Phytoremediation and site clean up abandoned mine lands
- Stability of coastal, riparian and lake shorelines using plants
- Bio-engineering techniques
- Reduction of storm-related impacts
- Moderation of effects of climate change
- Reduction of operations and maintenance costs, such as mowing, and pesticide and herbicide use
- Monitoring efforts

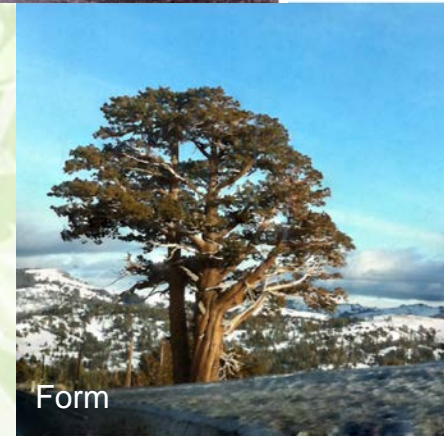
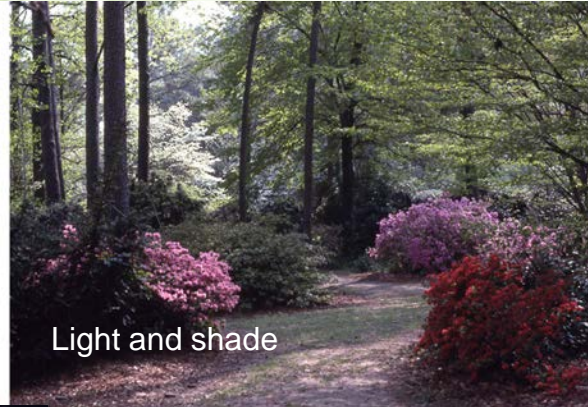


Design Principles

- **Unity**
- **Sequence**
- **Proportion**
- **Rhythm**
- **Accent**
- **Repetition**
- **Variety**



Elements of Design



Elements of Design



Mass



Perspective



Texture



Scale



Time



Assessment of needs and constraints

- **Safety**
 - Greenways to allow for migratory and resident wildlife species safety
 - Vehicular and pedestrian safety in and around site
 - Zoning, ADA and other safety codes apply to all designs
 - Fencing
 - Signage
 - Sight Lines through the site
 - Buffers to provide privacy, noise reduction, and screening of site elements
- **Health**
 - Environmental enhancements that perform a number of functions on site
 - Provides more structure in the environment to support more diversity
 - Water, soil and air quality to support natural processes
 -
- **Welfare**
 - Enhance the visual aesthetics and natural processes on site
 - Provide more resiliency within the ecosystem
 - Provide wellbeing of all inhabitants



Assessment of needs and constraints

- **Site analysis**
 - Topography and landforms
 - Views
 - Soils
- **Existing plants communities**
- **Hydrology**
- **Man-made aspects:**
 - Circulation and transportation corridors on and through the site
 - Built structures
- **Climatic considerations**
 - Aspect
 - Light and shade patterns
 - Seasonal wind and microclimate conditions
 - Solar gain

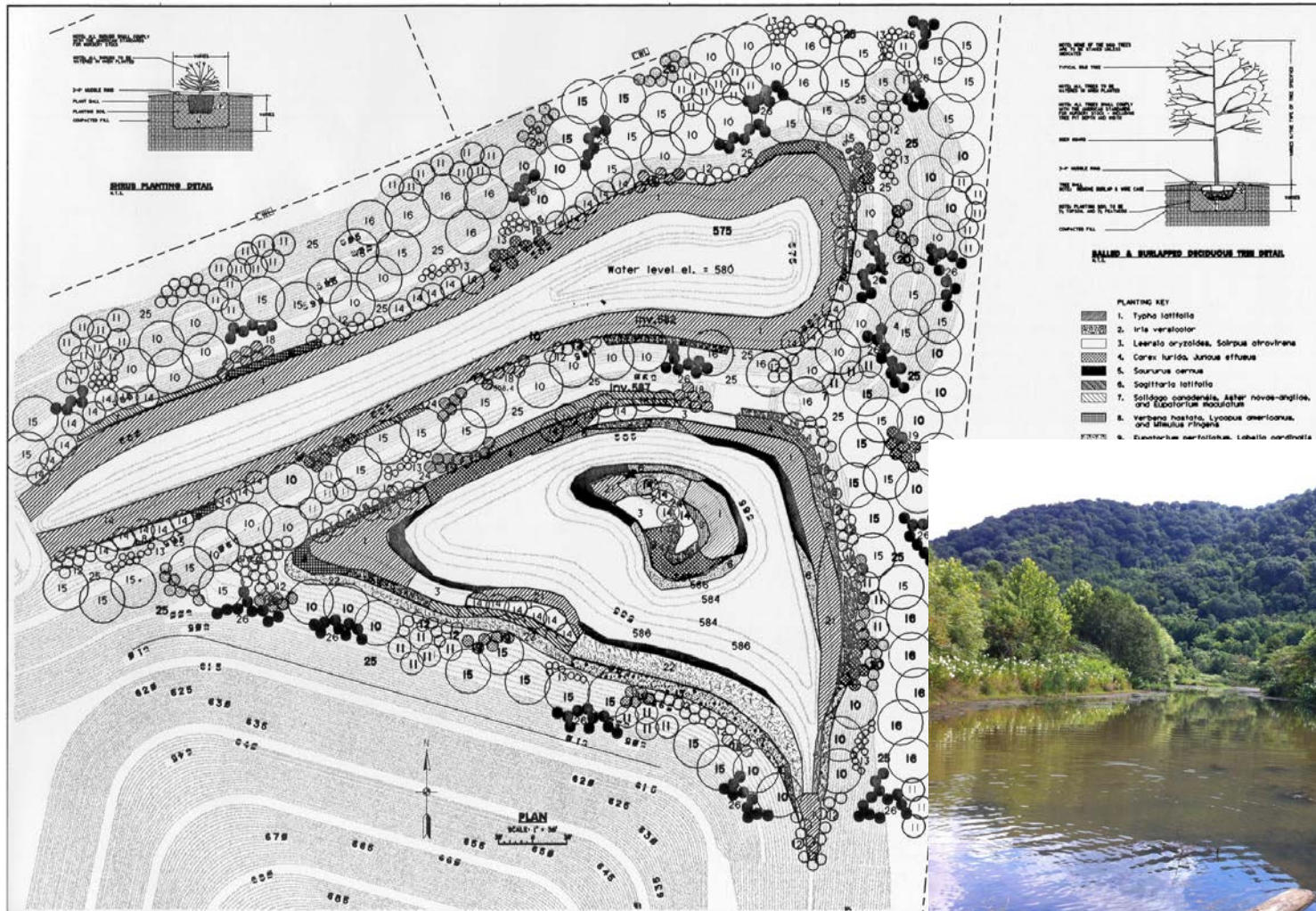


The Design Process

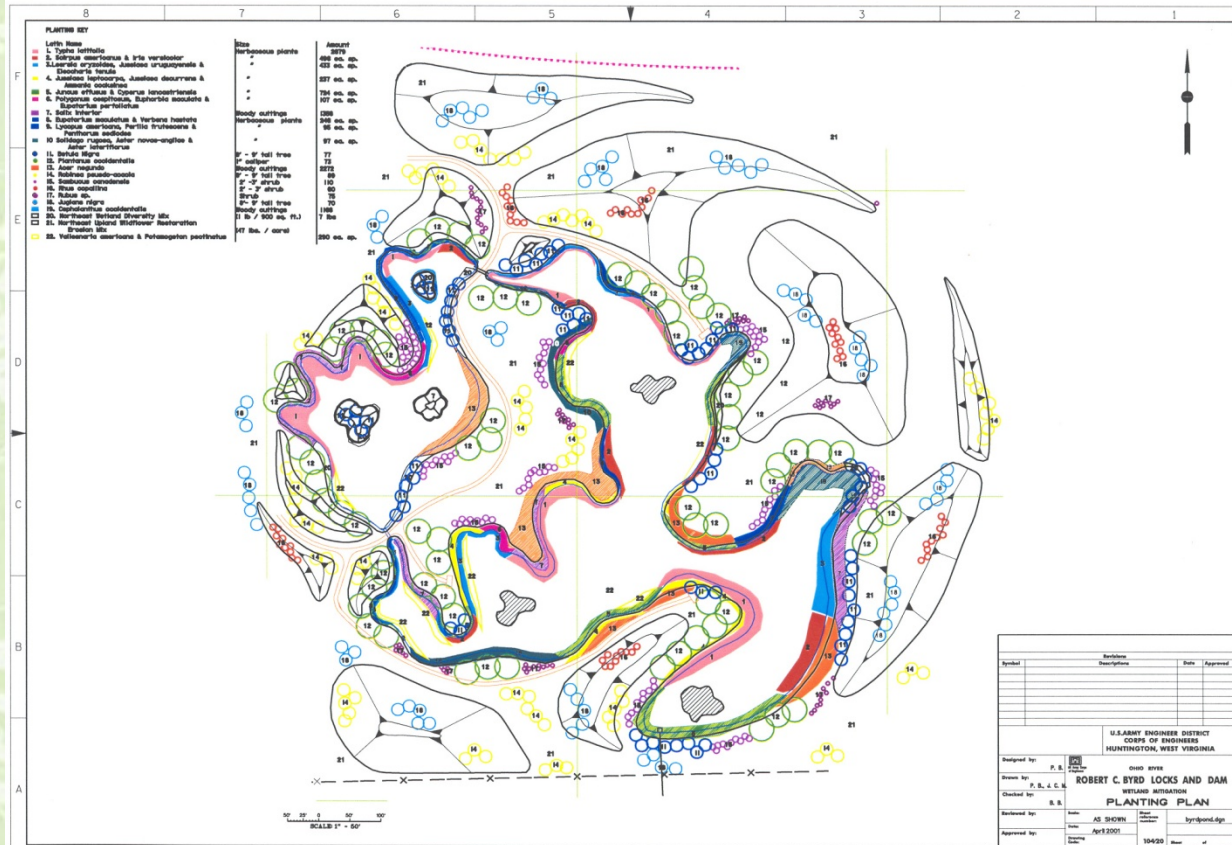
- **Develop a Site Plan**
- **Develop a Planting Plan**
- **Develop a Grading Plan**
- **Site specific details**
- **Construction specifications**
- **Monitoring plan**
- **Maintenance**



Site Plan with construction details



Planting Plan for Wetland



BUILDING STRONG®

ERDC

Innovative solutions for a safer, better world

Monitoring



As the site develops, maintaining records of species diversity, percentages of cover, and other aspects of monitoring will aid in understanding site dynamics. A manager should ask the following questions regarding the site:

- Which of the planted species germinated and grew?
- What is the overall percentage of planting survivability?
- Which plants came in from wild sources verses specified plantings?
- What is the percentage of native species verses non native exotic species?
- How are treatment techniques working on any invasive species present?

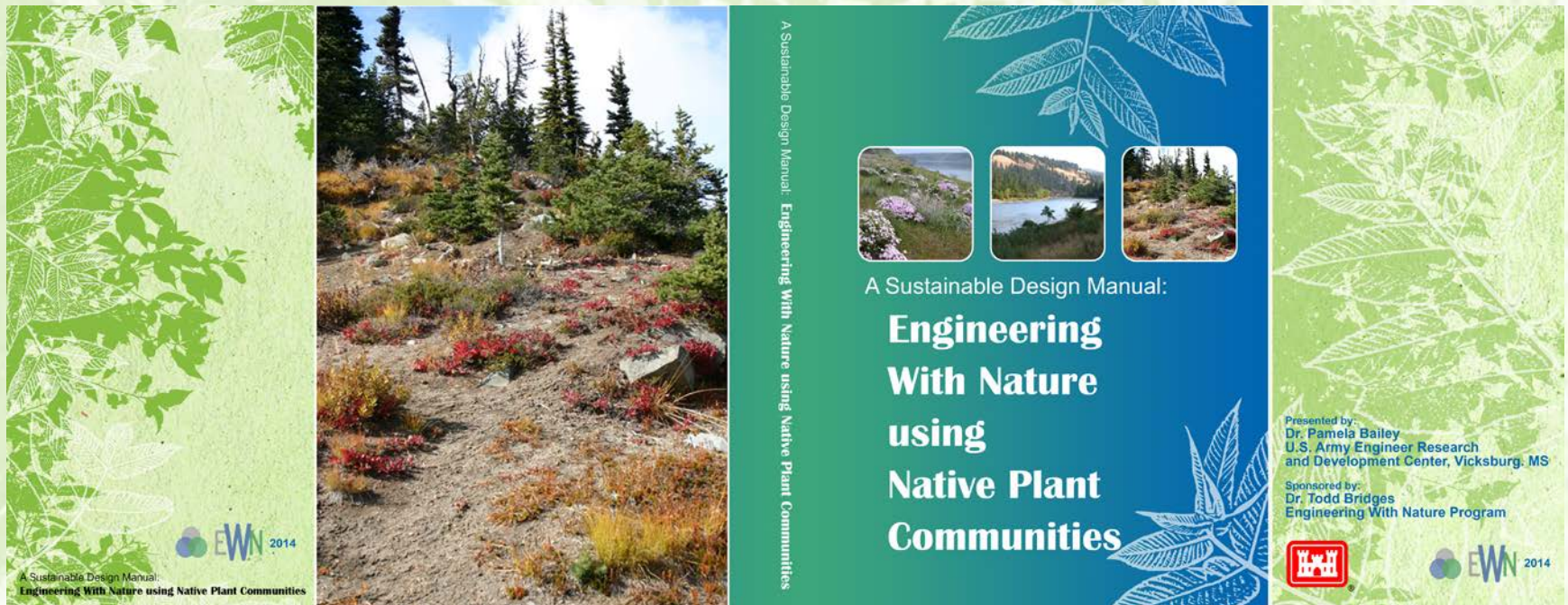


Maintenance

- The use of native plants will reduce maintenance costs such as irrigation, mowing, and the use of herbicides. This is a sustainable approach with shrinking maintenance budgets.
- Use natural processes to maximize benefits, thereby reducing demands on limited resources.
Example: Use of prescribed fire in a fire dependent ecosystem.
- There is beauty in a naturalized grass and wildflower planting, which provides for wildlife and pollinators, and offers a great opportunity to educate the public to appreciate the difference.



For a free download of the Design Manual;
<http://el.erdc.usace.army.mil/ewn/pdfs/EWN%20Design%20Manual.pdf>





BUILDING STRONG®


ERDC

Innovative solutions for a safer, better world

EWN Website





HOME ABOUT RESOURCES R&D TOOLS ACTION PROJECTS CONTACT US



WHAT IS ENGINEERING WITH NATURE?

The U.S. Army Corps of Engineers (USACE) Engineering With Nature (EWN) Program enables more sustainable delivery of economic, social, and environmental benefits associated with water resources infrastructure. EWN directly supports USACE's "Sustainable Solutions to America's Water Resources Needs: Civil Works Strategic Plan 2011 – 2015" and contributes to the achievement of its Civil Works Mission and Goals. EWN is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental, and social benefits through collaborative processes.

UPCOMING EVENTS	WHAT'S NEW	EWN NEWS
11-15 May Coastal Sediments 2015 San Diego, California	<ul style="list-style-type: none">• Natural and Nature-Based Features Report Newly Released• EWN and Buffalo District Collaborative Meeting December 2014• EWN and Galveston District Collaborative Meeting October 2014• Regional Sediment Management (RSM) and Engineering With Nature (EWN) Working Meeting July 2014	 <ul style="list-style-type: none">• Natural and Nature-Based Features Report Newly Released!• More EWN News
22-25 June Western Dredging Association and Texas A&M Dredging Summit and Expo Houston, Texas	More What's New	
19-22 October Dredging 2015 Conference Savannah, Georgia		

 US Army Corps of Engineers
Environmental Laboratory | Engineer Research & Development Center



BUILDING STRONG®

ERDC

Innovative solutions for a safer, better world

Engineering With Nature

The U.S. Army Corps of Engineers (USACE) initiative known as Engineering With Nature (EWN) is the intentional alignment of natural and engineering processes to efficiently and sustainably deliver economic, environmental and social benefits through collaborative processes (Figure 1). EWN seeks to apply science to our engineering to improve the decision-making process and expand the range of benefits that can be achieved through our projects. The projects and tool development through EWN directly supports a number of USACE plans and directives including the USACE Civil Works Strategic Plan, the USACE Campaign Plan, and USACE Environmental Operating Principles. As a leading practice, EWN is being pursued through innovative research, field demonstrations, communicating lessons learned, and active engagement with field practitioners and USACE partners and stakeholders.

Utilizing plant communities within the built environment to create sustainable landscapes

*For more information on EWN,
please contact:*

*Dr. Todd Bridges, EWN Coordinator
Todd.S.Bridges@usace.army.mil
601-634-3626*

*Dr. Pamela Bailey, Author
Pamela.bailey@usace.army.mil
601-634-2380*

*Ms. Cynthia J. Banks, DOTS Program Sponsor
Cynthia.J.Banks@usace.army.mil
601-634-3820*



<http://el.erdc.usace.army.mil/ewn/>

• www.EngineeringWithNature.org

Questions???



BUILDING STRONG®

ERDC

Innovative solutions for a safer, better world

Contact: Dr. Pamela Bailey
Engineer Research Development Center
601-634-2380 Pamela.Bailey@usace.army.mil



BUILDING STRONG®

ERDC

Innovative solutions for a safer, better world