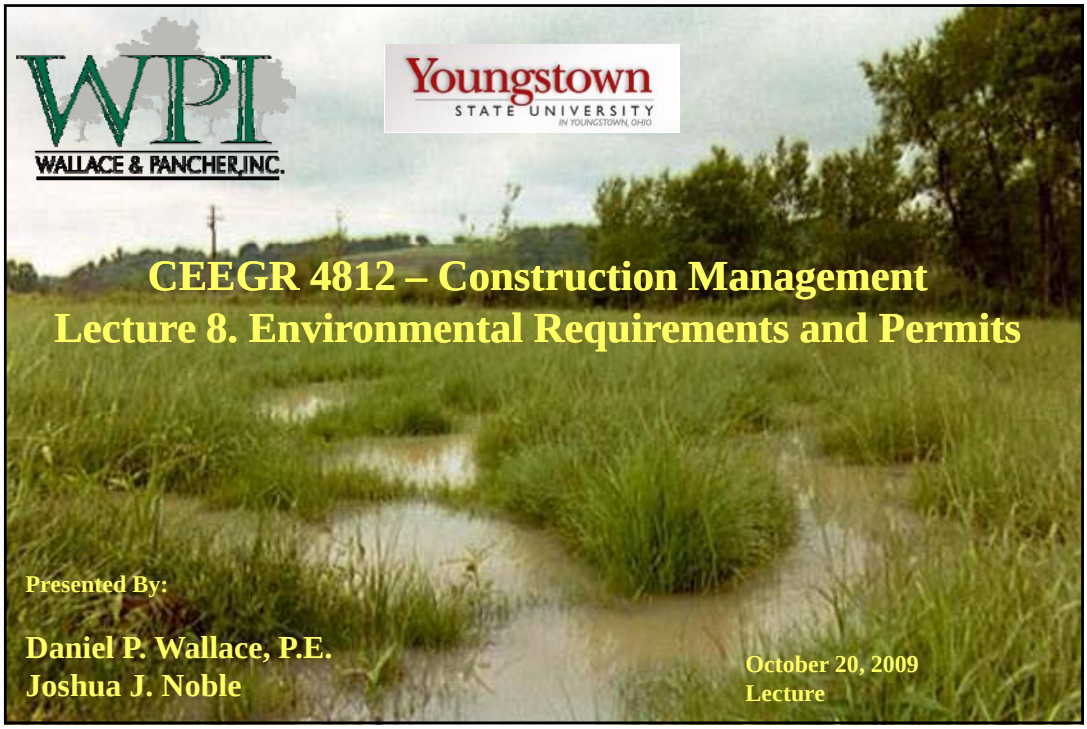

INTRODUCTION

Daniel P. Wallace, P.E.

Owner, principal engineer – Wallace & Pancher, Inc.

B.E. Civil Engineering – YSU, 1989

M.S. Civil Engineering – YSU, 1994

P.E. License – PA, OH, WV, IA

Publications:
Post-NEPA Monitoring of Environmental Impacts and Mitigation Commitments, TRB Record, 1998

Company comprised of biologists, engineers, construction personnel
Focus is Environmental Planning, Permitting, Construction ……
Engineering civil site design.

Natural Resources: stream and wetlands

dwallace@wallacepancher.com
(724) 981-0155 office

INTRODUCTION

Joshua J. Noble

Environmental Scientist – Wallace & Pancher, Inc.

B.S. Biology – YSU, 2000

M.S. Aquatic Ecology/Ichthyology – YSU, 2002

Publications Pending:

-Distribution and ecological characteristics of fish species-at-risk in the Great Lakes basin (2002), J.J. Noble & N.E. Mandrak.

-Little Beaver Creek Watershed Action Plan (2007). J.J. Noble, Little Beaver Creek Land Foundation.

Area of specialty:

Broad scope: **Community/ecosystem ecology, resource protection.**

Job Specific: **Project consultation, agency coordination, mitigation design, permitting, monitoring/sampling design.**

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ENVIRONMENTAL REQUIREMENTS

Goals and Objectives of this Lecture

Goal:

To enlighten the students to the existence of environmental laws and how important the environmental process is to any civil engineering project.

Objectives:

1. ***Not to make you an expert. It takes many years to understand the laws and how they apply to individual project circumstances.***
2. ***Begin to consider the environmental implications of a project. How that would effect project planning, design, and construction, including budgets.***
3. ***Awareness of an element of civil engineering as a profession.***

ENVIRONMENTAL REQUIREMENTS

LECTURE OUTLINE

1. ***Environmental Regulations***
2. ***Engineering Projects – environmental involvement (private vs. public)***
3. ***Environmental Process – resource analysis, impacts, permitting***
4. ***Environmental Mitigation – planning, design, and construction***

1. ENVIRONMENTAL REGULATIONS

Federal Regulations

1. National Environmental Policy Act (NEPA), 1969

www.epa.gov/compliance/nepa/index.html

2. Clean Water Act , 1972

http://www.epa.gov/region5/water/cwa.html

Growing public awareness and concern for controlling water pollution led to enactment of the Federal Water Pollution Control Act Amendments of 1972. As amended in 1977, this law became commonly known as the Clean Water Act.

- **Section 404 – Requires any federal action that proposes to place Dredged or Fill Material into a Water of the United States, including wetlands, to obtain a permit for the least environmental damaging, practicable project alternative.**
- **Section 401 – Water Quality Certification – A federal mandate which requires all states to develop narrative or quantitative water quality standards regulations specifically for wetlands (by 1993).**

Resource for website links:
http://www.itre.ncsu.edu/ADC10/default.htm

1. ENVIRONMENTAL REGULATIONS

Federal Regulations

National Environmental Policy Act (NEPA), 1969
www.epa.gov/compliance/nepa/index.html

Federal Agencies – decision making process

Interdisciplinary framework for environmental protection

Requires integration of natural sciences, social sciences, and environmental design arts.

Resource for website links:
http://www.itre.ncsu.edu/ADC10/default.htm

1. ENVIRONMENTAL REGULATIONS

Federal Regulations

National Environmental Policy Act (NEPA), 1969
www.epa.gov/compliance/nepa/index.html

Administering NEPA – 2 agencies

1. President's Council on Environmental Quality (CEQ)
   (http://www.whitehouse.gov/ceq/)

- NEPA assigns CEQ the task of ensuring that federal agencies meet their obligations under the Act.
- Reflects environmental policies of each respective president.

Resource for website links:
http://www.itre.ncsu.edu/ADC10/default.htm

1. ENVIRONMENTAL REGULATIONS

President's Wetland Initiative

President George W. Bush
Announcement of Wetlands Initiative on Earth Day
Wells National Estuarine Research Reserve
Wells, Maine, April 22, 2004

On Earth Day 2004, the President announced an **aggressive new national goal** - moving beyond a policy of **"no net loss"** of wetlands to achieve an overall **increase of wetlands in America** each year. To help meet that goal, the President said the Federal government will create, improve, and protect at least three million wetland acres over five years in order to increase overall wetland acres and quality. To meet this goal, the President has called on Congress to pass his FY 2005 budget request, which includes **$4.4 billion for conservation programs** that include funding for wetlands - an increase of $1.5 billion (53 percent) over FY 2001. The FY 2005 budget proposes to spend $349 million on our two key wetlands programs - the Wetlands Reserve Program and the North American Wetlands Conservation Act Grants Program - which is an increase of more than 50 percent over FY 2001 for those two programs. New figures released in April 2004 by USDA show that, for the first time in history, America has reversed the annual net loss of wetlands on our farms. **The United States was losing almost 500,000 acres of wetlands per year 30 years ago, but today, that loss is down dramatically**.

Resource for website links:
http://www.itre.ncsu.edu/ADC10/default.htm

1. ENVIRONMENTAL REGULATIONS

Federal Regulations

2. U.S. Environmental Protection Agency (USEPA)

Headquarters in Washington D.C.

Employs approximately 17,000 people

"Our staff are highly educated and technically trained; more than half are engineers, scientists, and policy analysts."

- Develop and enforce environmental regulations
- Offer financial assistance to states to implement the environmental regulations
- Perform environmental research
- Sponsor voluntary partnerships and programs
- Further environmental education
- Publish information

Resource for website links:
http://www.itre.ncsu.edu/ADC10/default.htm

1. ENVIRONMENTAL REGULATIONS

State Regulations

Section 401 – Water Quality Certification. Each state is responsible for implementing the provisions of the Clean Water Act.

Most states either modify the federal regulations or create their own to protect environmental resources

For Example:

OhioEPA – responsible for issuing 401 WQC and Permits to impact wetlands/streams

Perform reviews of all projects that propose to impact wetlands/stream over a specific amount (0.5 ac. for wetlands and 300 LF of streams). Isolated wetlands are regulated by the OhioEPA regardless of acreage.

Review requires coordination and project alternatives that avoid and/or minimize impacts to natural resources.

Mitigation for unavoidable impacts.

U.S. Army Corps of Engineers, Pittsburgh District (ACOE) – responsible for issuing Individual 404 Permits

Nationwide Permit Program – modified by State of Ohio

- ***Primary Concern of Federal Agency:*** **"No net loss" of aquatic resources.**
- ***Primary Concern of State Agency:*** **Improve or maintain water and habitat quality of aquatic resources, defined as "Surface Waters of the State".**

What Does This Mean to me as an Engineer??

National Environmental Policy Act (NEPA)

Federal Actions – need to comply with the provisions of NEPA

1. **Projects that are conducted by the Federal government**

- **National Park projects;**
- **U.S. Army Corps of Engineers (Dams, levees, canals, flood control, etc.)**

2. **Projects that are funded by the Federal government**

- **Funds provided to states – Department of Transportation**
- **State Parks, housing projects, highways and roadways, etc.**

Resource for website links:
http://www.itre.ncsu.edu/ADC10/default.htm

ENVIRONMENTAL REQUIREMENTS

LECTURE OUTLINE

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3. ***Environmental Process – resource analysis, impacts, permitting***
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2. ENGINEERING PROJECTS

Federally Funded Actions

NEPA requires a comprehensive analysis of environmental and social impacts for projects

Highway Project – funded 80% federal, 20% state
Lead Agency – typically the Federal Highway Administration
Cooperating Agencies – USEPA, U.S. Army Corps of Engineers, U.S. Fish and Wildlife Service, USDA, State Historic Preservation Office (SHPO)
Environmental Impact Statement – document outlining the decision making process

Studies include:

Wetland delineation,
Stream Assessments,
T&E Studies,
Historic and Archaeological,
Farmland Soils,
Environmental Justice,
Air & Noise,
Construction Impacts,
Agency Coordination Meetings

Public Involvement:

Public Meetings
Community Advisory Committee (CAC)
Public Hearing

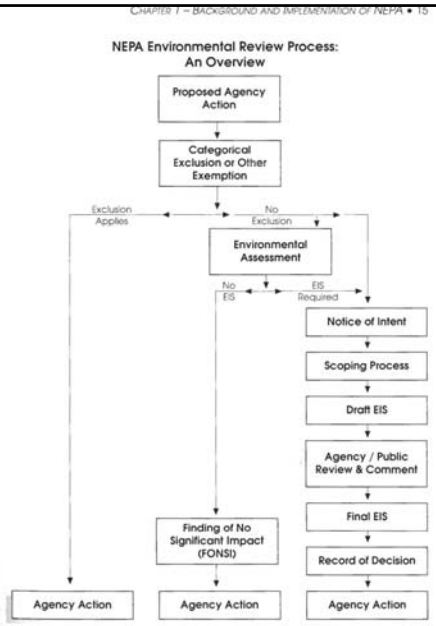

Figure 1-12

Federal Environmental Review and Consultation Requirements Which May Have to Be Integrated into the NEPA Process

Activities Requiring Review or Consultation	Agency	Legal Authority
Discharges into "waters of the U.S." (including wetlands)	U.S. Army Corps of Engineers	Section 404 of the Clean Water Act, 33 U.S.C. 1344. Executive Order 11990
Construction activities in "navigable waters"	U.S. Army Corps of Engineers	Section 10 of the Rivers and Harbors Act of 1899, 33 U.S.C. 403
Activities proposed in floodplains	Federal Emergency Management Agency	Executive Order 11988, Floodplain Management
Activities affecting endangered species	U.S. Fish and Wildlife Service or the National Marine Fisheries Service	Endangered Species Act, 16 U.S.C. 1536
Activities affecting historical and archaeological resources	Advisory Council on Historic Preservation	Section 106 of the National Historic Preservation Act, 16 U.S.C. 470
Transportation projects proposed in recreation areas and parks	Federal Highway Administration	Section 4(f) of the Transportation Act of 1966, 49 U.S.C. 303
Activities resulting in the conversion of farmlands	U.S. Department of Agriculture, Soil Conservation Service	Farmlands Protection Policy Act of 1981, 7 U.S.C. 4201
Projects in the coastal zone	National Oceanic and Atmospheric Administration	Coastal Zone Management Act, 16 U.S.C. 1451
Clean-up of hazardous waste sites	U.S. Environmental Protection Agency	Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 43 U.S.C. 9601
Solid or hazardous waste generation, storage, transportation, or disposal	U.S. Environmental Protection Agency	Resource Conservation and Recovery Act of 1976 (RCRA), 42 U.S.C. 6901

Figure 1-15

Private Projects

Commercial / Residential Development Project – funded 100% by a developer
Local Municipalities
Non-Profit Groups
Conservation Agencies
Property owner

Studies include:
Wetland delineation,
Stream Assessments,
T&E Studies,
Historic and Archaeological,

Public Involvement: (depending on nature of env. impacts)
Public Hearing

ENVIRONMENTAL REQUIREMENTS

LECTURE OUTLINE

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3. ENVIRONMENTAL PROCESS

Environmental Features Map - - - Alternatives Analysis - - -

Impact Avoidance

Minimization

Permitting (404, 401, 105 PA, NPDES, Post-Const. SWM)

Environmental Mitigation

Common Types of Mitigation:

Wetland,

Stream,

T&E,

Historic Structures and Archaeological.

Mitigation Hierarchy:

Resource Avoidance,

Impact minimization,

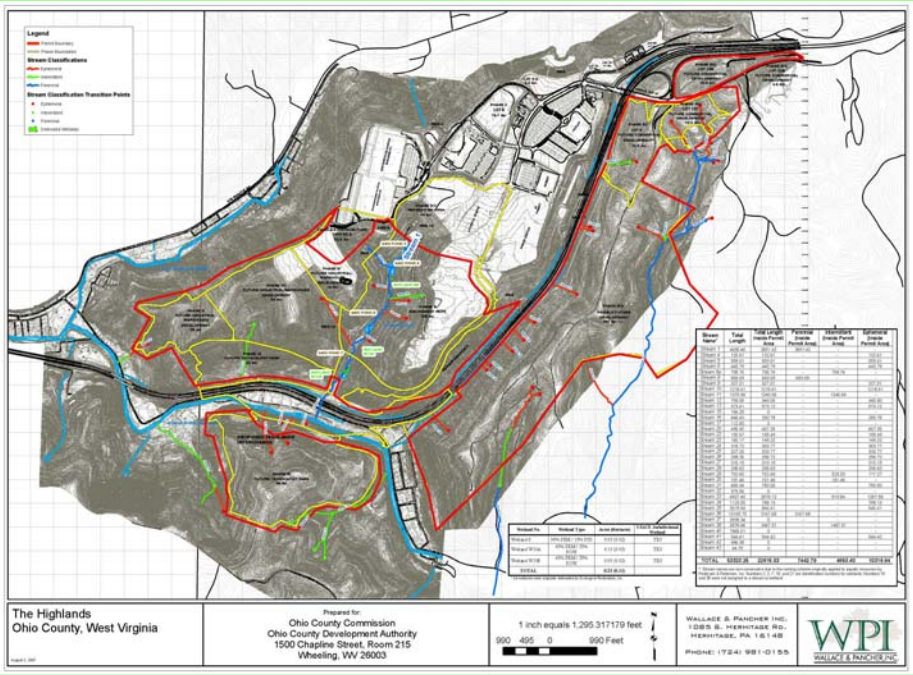
Mitigation Bank / In-lieu fee

In-Place, In-kind Mitigation,

Mitigation adjacent to impact location,

Within same watershed (out-of-kind),

Outside Watershed.



ENVIRONMENTAL REQUIREMENTS

LECTURE OUTLINE

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WETLAND MITIGATION
WHAT DOES A WETLAND DO?

Wetlands Provide Many Functions And Values:

Biotic:

- **Habitat for Animals**
- **Shelter for Animals**
- **Resting / Rearing**
- **Food Supply**

Abiotic:

- **Sediment/Toxicant Retention**
- **Flood Control**
- **Groundwater Recharge/ Discharge Area**
- **Nutrient Removal/Transformation**
- **Water Quality Improvement**
- **Shoreline Stabilization**
- **Production Export**

Wetland Design presentation

Stream Design presentation

Homework

Paragraph on NEPA's development (how it came about) and the CEQ's creation/responsibility

Name 3 programs and a short paragraph on each, that President Bush has either implemented or built upon from a previous administration.

In a paragraph, consider a recent civil engineering project and discuss and consider some of the environmental implications and permitting issues that would occur with that project.

WHAT IS A WETLAND?

A "wetland" is an area of land that is wet (e.g. being inundated or having saturated soils) for at least 21 days per year during the growing season.

- ***3 Required Indicators***
  - ***Wetland hydrology***
  - ***Hydric soils***
  - ***50% dominance of hydrophytic vegetation***

WHAT DOES A WETLAND DO?

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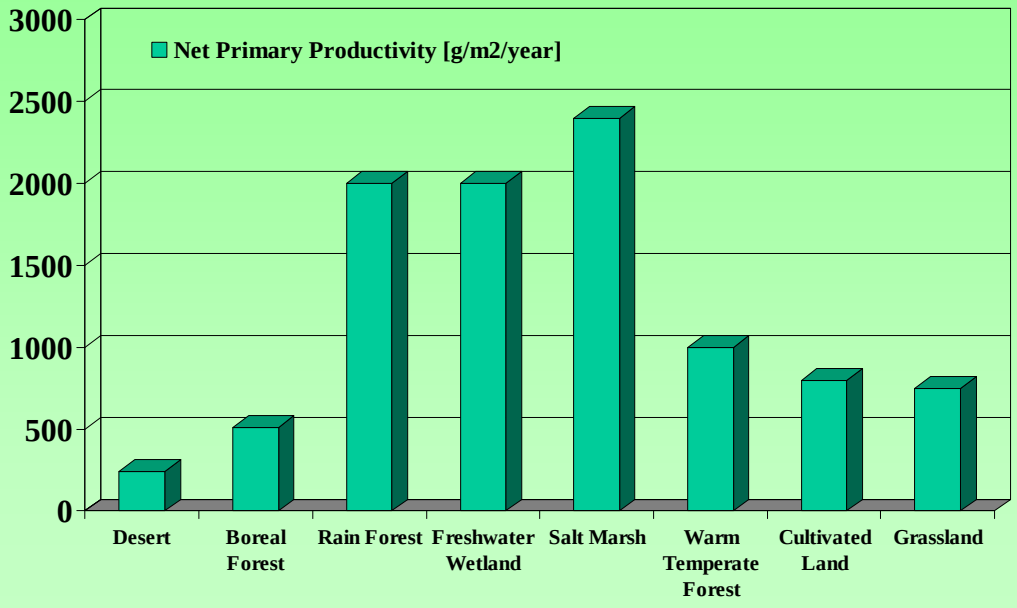
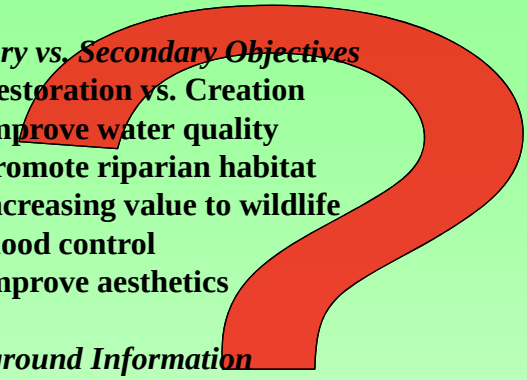
- **Water Quality Improvement**
- **Shoreline Stabilization**
- **Production Export**

RELATIVE PRODUCTIVITY OF VARIOUS ECOSYSTEMS



DEVELOPING A WETLAND MITIGATION PLAN



1) ***Primary vs. Secondary Objectives***
   - **Restoration vs. Creation**
   - **Improve water quality**
   - **Promote riparian habitat**
   - **Increasing value to wildlife**
   - **Flood control**
   - **Improve aesthetics**

2) ***Background Information***
   - **What are the hydrologic inputs?**
   - **Does a wetland belong here?**
   - **What are the past land uses (ditching, tiling)?**
   - **Can I replace lost functions and values?**
   - **What are the limitations of the potential site?**

WHO IS INVOLVED WITH RESTORATION AND CREATION OF WETLANDS?

1. **Landowners – Key to Long-Term Success**

2. **State/Federal Environmental Agencies** →
   - **U.S. Army Corps of Engineers**
   - **U.S. Fish & Wildlife Service**
   - **State DEP/DNR**
   - **State EPA**

3. **Permit Applicants**
   - **Land Developers – Residential/Commercial**
   - **State Agencies (e.g. DOT)**
   - **Private Citizens**
   - **Commercial/Industrial Developers**

Preliminary Considerations

- **Wetland Type**
  - **palustrine emergent/scrub-shrub/forested**
  - **degree of open water and habitat interspersion**
- **Wetland Evolution**
  - **Wetlands are dynamic systems**
  - **Over-engineering often leads to failure**
  - **Keep objectives in mind**


07/16/2003

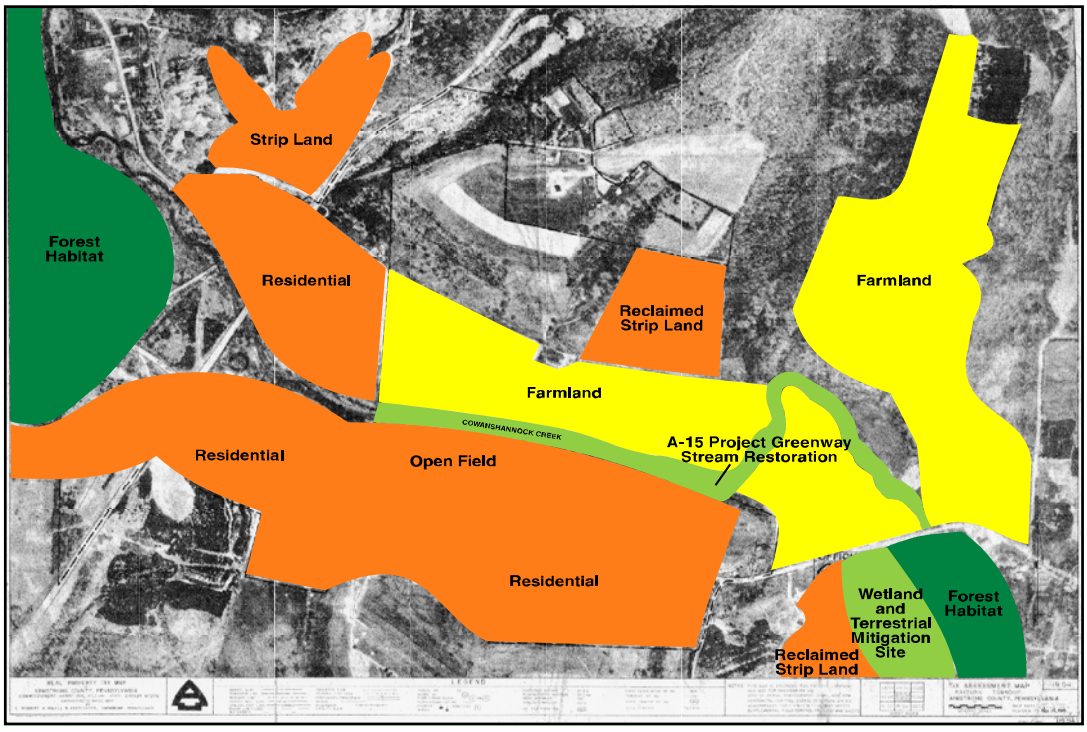

07/09/2003

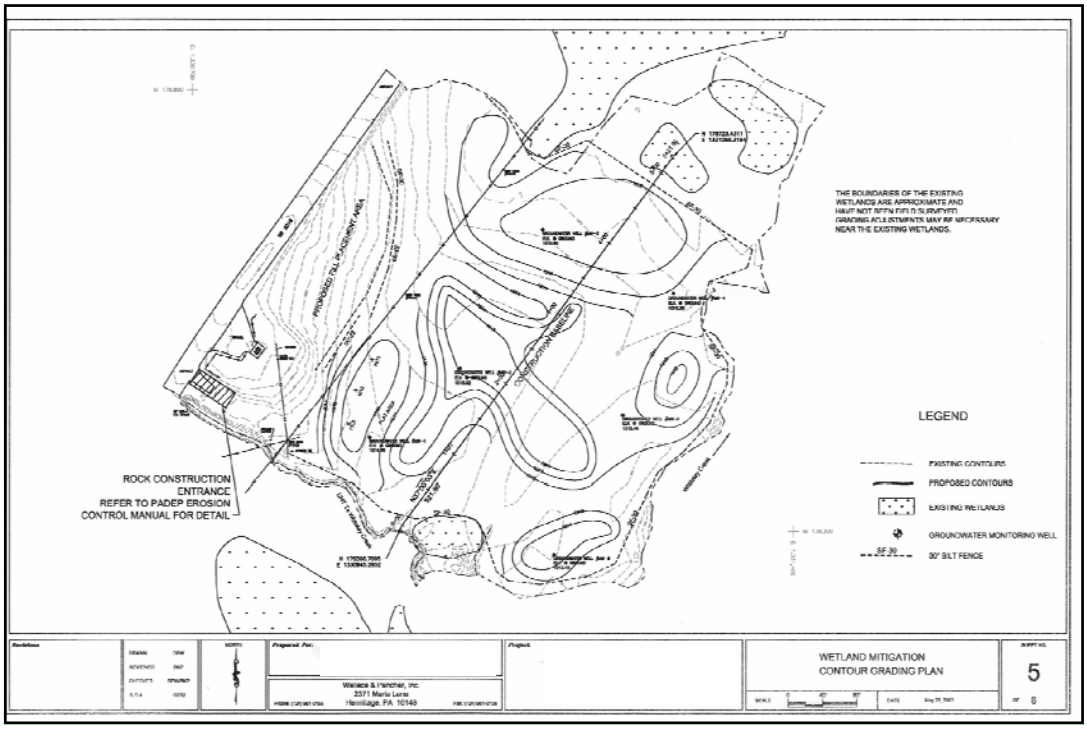
Design and Design Plan Development Engineering Phase

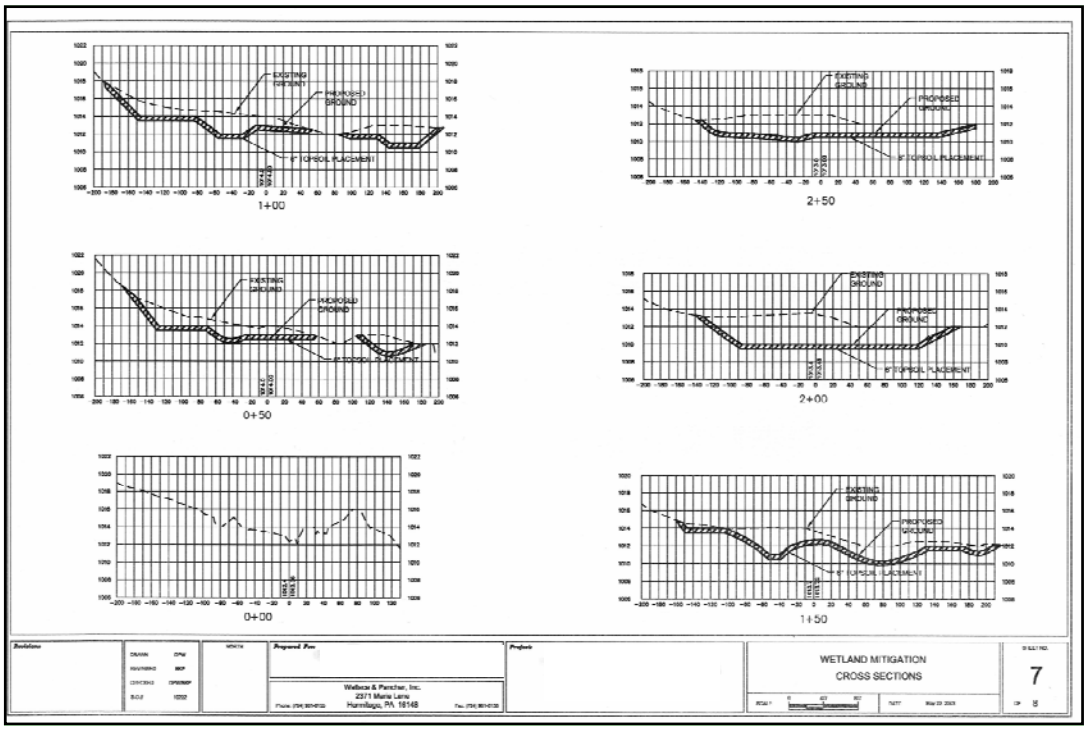
***Common Problems*:**

- **Lack of proper training**
  - **wetland ecology – soils, hydrology, vegetation**
  - **wetland development**
- **Lack of practical experience**
- **Appropriate educational background**
  - **Engineer, ecologist, planner**
- **Lack of construction knowledge**
  - **construction access requirements**
  - **equipment types and sizes**
  - **materials handling**


85
LEGEND
GROUNDWATER MONITORING WELL
WETLAND PLANTING ZONE
TERRESTRIAL PLANTING ZONE
WETLAND PLANTS
TERRESTRIAL PLANTS
EXISTING WETLANDS
PROPOSED CONTOURS
KITTANING BYPASS WETLANDS AND TERRESTRIAL MITIGATION PLAN
DENTON-GOOD SITE
ARMSTRONG COUNTY, PENNSYLVANIA


Strip Land
Forest Habitat
Residential
Reclaimed Strip Land
Farmland
Farmland
COWANSHANNOCK CREEK
A-15 Project Greenway Stream Restoration
Residential
Open Field
Residential
Wetland and Terrestrial Mitigation Site
Forest Habitat
Reclaimed Strip Land


PROPOSED FILL PLACEMENT AREA
CONSTRUCTION ENTRANCE
ROCK CONSTRUCTION ENTRANCE
REFER TO PADEP EROSION CONTROL MANUAL FOR DETAIL
THE BOUNDARIES OF THE EXISTING WETLANDS ARE APPROXIMATE AND HAVE NOT BEEN FIELD SURVEYED. GRADING ADJUSTMENTS MAY BE NECESSARY NEAR THE EXISTING WETLANDS.
LEGEND
EXISTING CONTOURS
PROPOSED CONTOURS
EXISTING WETLANDS
GROUNDWATER MONITORING WELL
SF 30
30' SILT FENCE
Wallace & Pancher, Inc.
2371 Mario Lane
Harrisburg, PA 16148
WETLAND MITIGATION
CONTOUR GRADING PLAN
5


EXISTING GROUND
PROPOSED GROUND
9' TOPSOIL PLACEMENT
1+00
2+50
0+50
2+00
0+00
1+50
Wallace & Pancher, Inc.
2371 Mario Lane
Harrisburg, PA 16148
WETLAND MITIGATION
CROSS SECTIONS
7

CONSTRUCTION CONSIDERATIONS

1. Contractor Access – minimize disturbance;

2. Availability of materials onsite for construction – plants, logs, etc.

Preconstruction Conference

3. Recognize sensitive areas and review emergency responses;

4. Review final design plans and permits;

5. Right-of-entry agreements and utility locations;

6. Assess staging operations and material transport routes;

7. Review erosion and sediment control plans

To ensure an effective project, the project designer should be on-site during construction!!!!


07/28/2003


07/29/2003

Summary

- **Wetland Experience (training, eng/ecol, design plans, etc.)**
- **Hydrology (groundwater, direct precipitation, etc.)**
- **Surveying**
- **Materials and Supplies**
- **Functions and Values**
- **Construction Sequencing**
- **Post-construction monitoring**
- **Contractors attitude**