

# Stormwater Wetlands Serve Multiple Purposes and Attract Alternative Funding

Great Lakes and St. Lawrence River  
Green Infrastructure Conference

June 1, 2017



## Stormwater Wetlands Serve Multiple Purposes

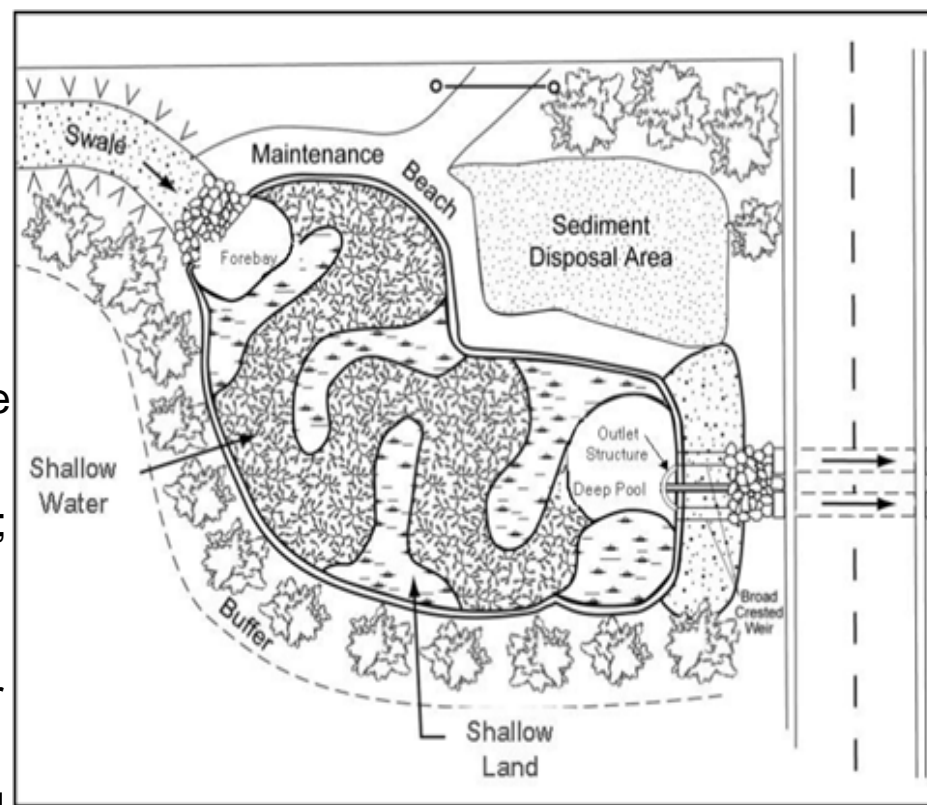
### Presentation Outline

- **Introduction**
- **Design Principles**
- **Water Quality Improvement**
- **Serving Multiple Functions**
- **Constructed Examples**
- **Conclusion**

## Stormwater Wetlands Serve Multiple Purposes

### DESIGN PRINCIPLES

- Forebay, Promotes Sedimentation
- Circuitous Wetland, Microbial Action
- Outlet Pool, Underwater outlet
- Control Structure, Manages discharge rate
- Size wetland to treat 90% of storm events; in Ohio = 0.75" storm
- Size wetland at 1-2% of drainage area, for example:
  - 2 acre wetland for 100 acre watershed
  - 5 acre wetland for 250 acre watershed



From NCEDNR Manual

## Stormwater Wetlands Serve Multiple Purposes

### Water Quality Improvement, Pollutant Removal Rates

Table 6 Projected Long Term Pollutant Removal Rates for Stormwater Wetlands in the Mid-Atlantic Region <sup>a,c</sup>	
<u>Pollutant</u>	<u>Removal Rate (%)</u>
Total Suspended Solids	75%
Total Phosphorus	45%
Total Nitrogen	25%
Organic Carbon <sup>b</sup>	15%
Lead	75%
Zinc	50%
Bacteria	2 log reduction

### Water Quality Improvement, Physical/Biological Processes

- **Sedimentation, largest pollutant process**
- **Adsorption to Sediment**
- **Physical Filtration by Plants**
- **Microbial Action**
- **Nutrient Uptake by Wetland Plants**
- **Uptake by Algae**



## Stormwater Wetlands Serve Multiple Purposes

### Serving Multiple Functions

- Provide Stormwater Storage, Flood Relief, Erosion Control
- Stormwater Filtration, Pollutant Breakdown, Water Quality,
- Wetland Mitigation potentials
- Open Space/Parks
- Public Education/Land Lab
- Grant Eligible
- Public/Private Partnership potentials

## Stormwater Wetlands Serve Multiple Purposes

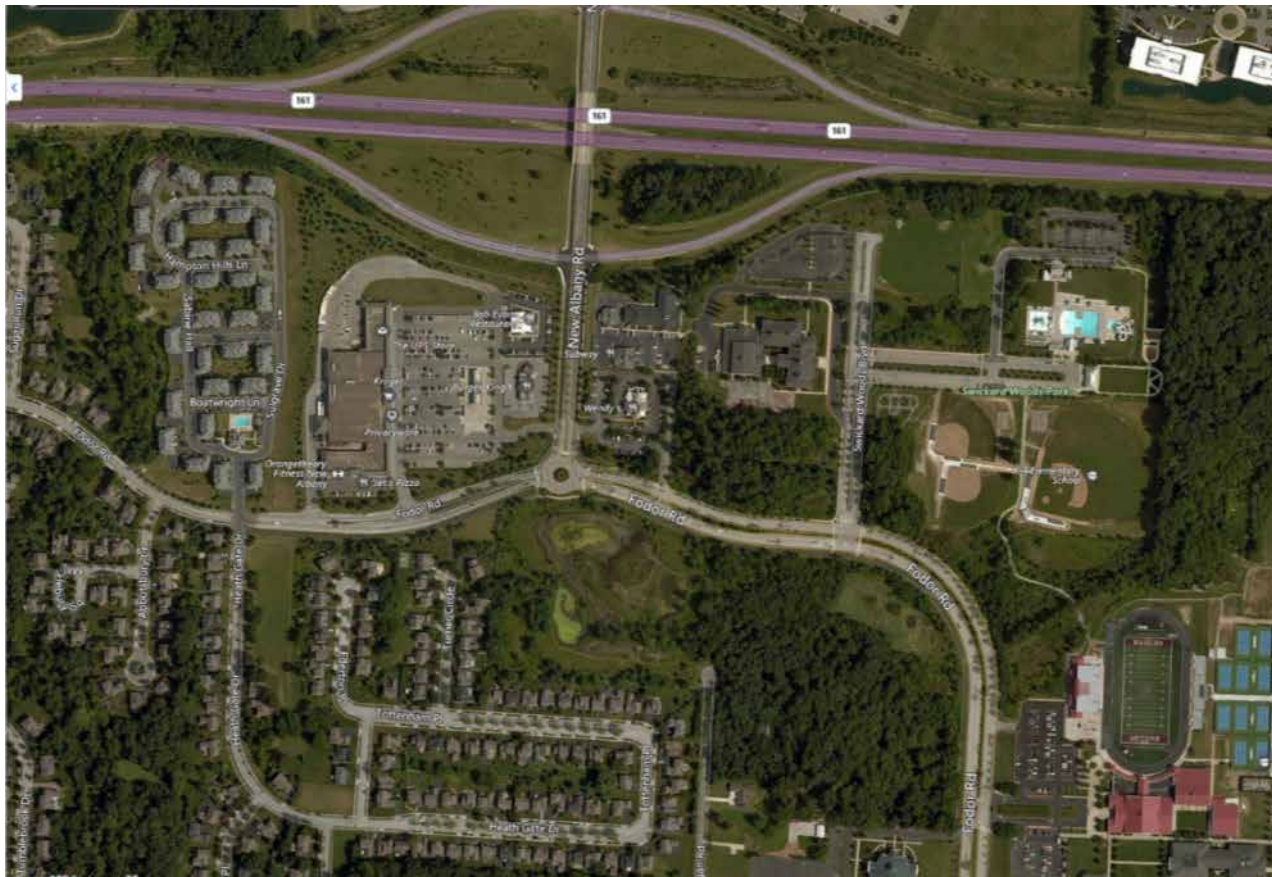
### Constructed Examples

- Wetland Conservation Area, NE of Columbus, Ohio
- Smith/Ghent Pond Rehabilitation, Akron, Ohio



## Stormwater Wetlands Serve Multiple Purposes

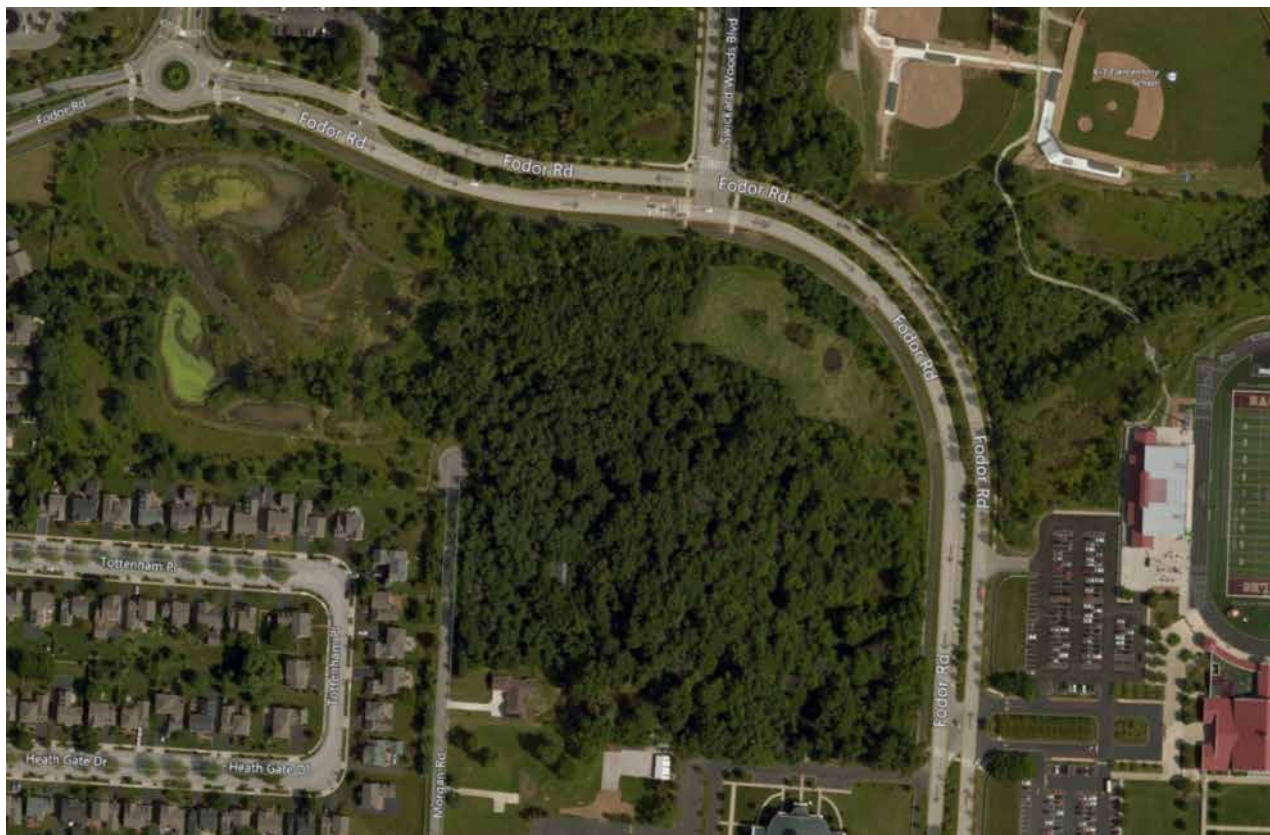
### Constructed Examples, Wetland Conservation Area





## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Wetland Conservation Area





## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Wetland Conservation Area





## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Wetland Conservation Area

- 25 acre Wetland Park
- Provides 13 ac wetland mitigation
- Stormwater Management for 120 ac watershed
- Reduces peak discharges by 60%
- Water Quality Filtration
- School Land Lab
- Community Open Space centerpiece
- Increased Property Values

**Stormwater Wetlands Serve Multiple Purposes**

**Constructed Examples, Wetland Conservation Area**



Community Open Space Centerpiece,  
Surrounded by Homes, School



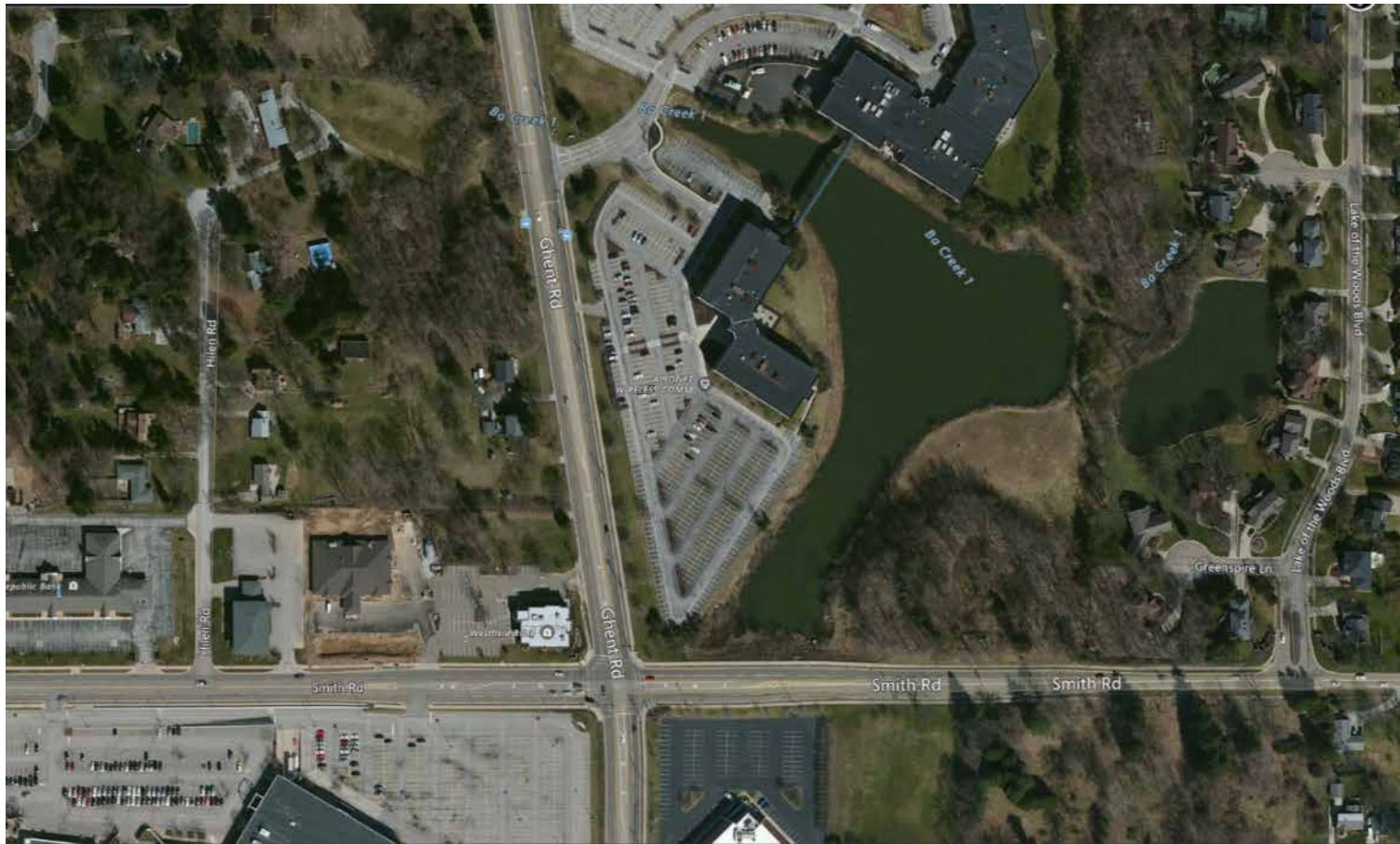
Community Trail System



School Land Lab

## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Smith/Ghent Pond Rehab





## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Smith/Ghent Pond Rehab



Conceptual Restoration Plan



## Stormwater Wetlands Serve Multiple Purposes

### Smith/Ghent Pond, Primary Project Goals

- **City of Akron project to support economic development**
- **Provide land area for Campus Expansion, job growth**
- **Shrink pond, but increase storage capacity**
- **Retrofit 6 acre regional detention basin serving 1200 ac watershed**
- **Manage increased campus runoff**
- **Reduce downstream flooding**

### Secondary Project Goals

- **Enhance Water Quality**
- **Deter Nuisance Geese**
- **Campus Beautification**
- **Sustainability**
- **Office Employee Wellness**



## Stormwater Wetlands Serve Multiple Purposes

### Conceptual Plan Summary



- **Fill Portion of Pond creates 5 acre developable area**
- **Additional 0.4 acre Pond area behind Executive Wing added to increase storage, replace lost open water area**
- **Lower Water Elev by 5.5', Creates 50 ac/ft more storm storage capacity**
- **Forebay traps sediment, debris from Mall runoff**
- **Wetland fringe to pond more stable, less erosion, uptakes nutrients, geese deterrent.**
- **Storm Sewer splitters diffuse concentrated flows**
- **More “pond like”, more open water than earlier options,**
- **Islands, sinuous edge adds visual interest,**
- **Fitness Trail loop around pond**

## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Smith/Ghent Pond, Hydraulic Modeling

- **Increased storage capacity reduces peak discharge rates by 25%**
- **Fulfill stormwater management requirements for future campus expansion,**
- **Discharge velocities, erosive potentials from Smith Road outlet diffused by outfall splitter,**
- **Downstream flood elevations are decreased by an average of 1.4' for a 10 year storm**
- **Channel velocities reduced by an average of 2 feet per second**



## Smith/Ghent Stormwater Pond Rehabilitation

### Smith/Ghent Pond, Public/Private Partnership

- **City collaborated with corporate campus to accommodate future campus growth and attract future job growth.**
- **Project resulted in land sale of 5 acre parcel suitable for future development.**
- **Additional Corporate goals met for stabilized slopes, campus beautification, employee fitness, nuisance geese deterrence, and reduced maintenance.**
- **Agreement reached for Corporate partner to finance stormwater improvements.**
- **Contract Administration by Corporate partner.**

## Stormwater Wetlands Serve Multiple Purposes

### Constructed Examples, Smith /Ghent Pond



Wetland Fringe to uptake nutrients,  
Native Vegetation stabilizes slopes



Restored stream channel,  
Fitness trail



**Stormwater Wetlands Serve Multiple Purposes**

**Constructed Examples, Smith /Ghent Pond**



Pond Elevation lowered 5.5',  
Creates 50 ac/ft more storage



Contrast of native vs manicured landscape,  
Permeable Concrete trail



## Stormwater Wetlands Serve Multiple Purposes

### Project Benefits, Smith/Ghent Pond

- **Public/Private Partnership**
- **Creates space for Campus Growth, Economic Development**
- **Reduced peak discharges, relieves downstream flooding,**
- **Stabilizes eroding banks**
- **Enhances Water Quality**
- **Reduces nuisance geese**
- **Pond Beautification**
- **Fitness Trail**



## Stormwater Wetlands Serve Multiple Purposes

### Conclusion

- **Stormwater Wetlands serve Multiple purposes**
- **Stormwater Wetlands effectively manage both Stormwater Quantity and Water Quality**
- **Provide Open Space and Parks, Trails, linkages**
- **Provide for Public Education, School Land Lab**
- **Low Maintenance**
- **Candidate Sites include: retrofit existing basins, parks, golf courses, office campuses, subdivisions.**



## Stormwater Wetlands Serve Multiple Purposes

### **Economic, Cost Effective**

- **Public/Private Funding Partnership potentials**
- **Passive Open Space Increases property values, increases tax base**
- **Grant funding eligibility**
- **Fulfill Wetland Mitigation Requirements**