Low Impact Development Design & Implementation

Presented by:
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Presentation Components

- **LID Technologies**
  - Integrated Management Practices
  - LID on an Industrial Site
    - Earl Industries – Portsmouth, Virginia
    - LID Retrofit
      - NNPDC – Warsaw, Virginia
  - Case Studies
    - LID & LEED

LID Technologies: LID On Your Site

- Site Specific Objectives
  - Maintain Natural Hydrologic Patterns
  - Water Quality Enhancements
  - Protect Resources & Create Habitat
  - Community Connectivity
  - Harvest & Reuse
- Non-Structural
- Structural

LID Technologies: Non-Structural – Site Planning

- Resource Protection Areas - Preservation
- Buffer Enhancements – Revegetation
- Minimization of Disturbance
- Maintain Flow Paths
- Flatten Slope Grades
- Shared Parking
- Reduced Road Width
**LID Technologies:** Site Planning & Design Measures

- Riparian Corridors
- Maintains Habitat
- Disconnection of Impervious Surfaces
- Green Alleys / Backyards

**LID Technologies:** Integrated Management Practices

- Bioretention / Biofiltration
- Infiltration Trenches / Infiltration Basins
- Engineered Swales
- Filter Strips
- Pocket Wetlands
- Green Roofs

**LID Technologies:** Bioretention / Biofiltration

1. 6 INCH PONDING DEPTH
2. 3 INCH MULCH LAYER
3. 1-3 FEET ENGINEERED SOIL
4. 4 INCH PEA GRAVEL
5. 1 FT 31 STONE SUMP

**LID Technologies:** Infiltration Trenches

- Scarified underlying soils
- May be incorporated in swale
LID Technologies:
Engineered Swales
- Grassed Swales
- Vegetated Swales
- Infiltration Swales
- Storage Behind Check Dams
- Think about cost & treatment objectives

LID Technologies:
Filter Strips
- Functional Landscape

LID Technologies:
Pocket Wetlands
- 2 WQV in Wet Storage
- Low Marsh, High Marsh
- Emergent Pockets
- Hydrology, Soils, Veg

LID Technologies:
Green Roofs
- Decrease impervious surfaces
- Accessible green space
- Decrease urban heat island
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LID on an Industrial Site: North Shore Scott’s Creek - Portsmouth

- Guiding Principles
  - Sustainability
  - Diverse Uses
  - Compatibility
  - Consciousness
- Coordination
  - Industry
  - Community
  - Non-Profit
  - Consultants

LID on an Industrial Site: Project Components

- Demonstration Project
- Grant Funding – Limited Budget
- Sponsored by ERP – Award-winning grassroots community based Non-profit
  - www.elizabethriver.org
- Planning Component &
- Implementation Component

LID on an Industrial Site: Project Outline

- LID Masterplanning - Development
  - Feasibility
  - Conceptual Planning
  - Design
- LID Retrofit – Redevelopment
  - ID Problems
  - Constraints
  - Design Solutions
**LID on an Industrial Site:**

**LID Assessment**

- IMP SCREENING MATRIX
  Assess Appropriate Technologies
- ALTERNATIVES ANALYSIS
  Evaluated Alternate Approaches to SWM
- OVERLAY FOR SUITABILITY
  Evaluated Land Plan and Soil Suitability

**LID on an Industrial Site:**

**Conceptual Design - Development**

- 22 Acres Open Space Masterplanning
  - Sub Surface Investigations
  - High groundwater
  - Visibility
  - Architects / Landplanners / Engineers
- Mixed Use
- Buffer
- Community Trail
- Restoration
- Main Street

**LID on an Industrial Site:**

**Design & Recommendations**

- Buffer Enhancements
- Pocket Wetlands
- Biofiltration
- Vegetated Overflow Parking
- Green Roofs
- Tree Box Filters
- Engineered Swales
- Guiding Principles – Win/Win

**LID on an Industrial Site:**

**Calculation Procedures**

- Prince George County Method
  - Replicate Volume & Rate
- Water Quality / Performance Based
  - Simple Method
  - Water Quantity Considerations / Channel Adequacy
  - CN Adjustments
- Hybrid Approaches
  - Attenuation of Flood Events
LID on an Industrial Site

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LID Retrofit Scenarios

- Indicators: Ponding, Sediment, Erosion
  - *Look in the Streams*
- Hot Spots: High Potential to Generate Pollutants

LID on an Industrial Site: Managing Rooftop Runoff

- Industrial Setting Example for Future Development
- Multifunctional – Quality, Harvest, Stability
- Approved by City of Portsmouth

LID on an Industrial Site: Managing Rooftop Runoff

- Disconnection of Rooftop Runoff
- Prevents Sheet Flow with Contaminated Runoff
Presentation Components

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Northern Neck Planning District Commission LID Retrofit

- Developed Landscape Setting
- Example for Current Development
- Techniques Employed:
  - Bioretention
  - Infiltration Trench
  - Biofilter
  - Vegetated Filter Strip
  - Rain Barrel
  - Landscape Enhancement
  - Compost Amended Soils

Site Goals
- Create Demonstration Site for Various LID Techniques
- Develop Treatment Train of LID Features
- Design & Construct a Solution Within Grant Funding Limits
  - Remove Standing Water From Vehicular and Pedestrian Areas
  - Improve Water Quality
  - Enhance Site Aesthetics
Northern Neck Planning District Commission LID Retrofit

- Off-Line Rain Garden
Northern Neck Planning District Commission LID Retrofit

- Parking Island Biofilter

Northern Neck Planning District Commission LID Retrofit

- Parking Island Biofilter

Northern Neck Planning District Commission LID Retrofit

- Infiltration Trench

Northern Neck Planning District Commission LID Retrofit

- Infiltration Trench
Conclusions

- Created Treatment Train of LID Features that can be Viewed by Developers, Contractors, and Individuals.
- Accomplished Project Goals Within Grant Funded Budget
  - Reduced Drainage Issues and Minimized Onsite Standing Water by Using 7 Functional LID Technologies
  - Increase Aesthetics Onsite with the Addition of 5 Engineered Landscape Features

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Case Studies: USVI
RAINWATER HARVESTING

-USVI
-WATER SOURCE
-PREVENTS SEDIMENT TRANSPORT
**Case Studies: HAYMOUNT**
LID & LEED

- Planning & Preservation
  - (1400 Acres, >50%)
- Hybrid Stormwater
- New Urbanism Style Development (TND)

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**Innovative Water Quality Management:**
Full LID Implementation

- First Full LID Commercial Site in Stafford County
- Designed in Full accordance with PG County Methodology
- Approved by Stafford Co., 15 Acre Site, ½ Acre IMPs, ($20/S.F.)*

* LID Cost Comparison Available

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**Innovative Water Quality Management:**
Stream Restoration

- *LID Preserves Stream Hydrology*
- Lucas Creek: Jefferson Commons
- Natural Channel Design (1400 L.F.)
  - Rogen Principles
  - Tons of Sediment Removed From System

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**LID Design & Implementation:**
A Watershed Based Approach

Any Questions?

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