Site Planning and Infrastructure
Jeff Cox, ASLA
Rick Tomkins, PE
Agenda

- Site Planning and Infrastructure
  - Brief Overview of Site Planning Considerations
  - Review of 3 Completed LID Projects
    - Site Planning Considerations
    - LID Elements
    - Infrastructure
    - Lessons Learned
- Questions and Answers
Traditional Site Planning Considerations

- Project Context: Land Use, Zoning, and Development Regulations, Cultural Constraints
- Physical and Natural Constraints
- Storm Water Management
- Circulation Requirements for Vehicles, Bicycles, and Pedestrians
- Utility Availability and Location
- Integrating Park and Open Space
- Costs
Additional Considerations for LID Projects

- For LID Projects, the Following Principles Must Be Emphasized Early in the Site Planning Process:
  1. Understanding of Development Goals
  2. Conserve Natural Areas
  3. Minimize Site Disturbance
  4. Minimize Impervious Coverage
  5. Disconnect Impervious Areas
  6. Maintain Site Hydrology
LID Site Planning Principles

1. Conserve Natural Areas
   ✓ Protect Sensitive Resources
   ✓ Cluster Improvements
   ✓ Retain Trees, Native Vegetation
   ✓ Create Connected Open Spaces

2. Minimize Site Disturbance
   ✓ Reduce Disturbance Envelope
   ✓ Minimize Cuts / Fill
   ✓ Avoid Site’s More Pervious Areas
   ✓ Consolidate Construction Activities
LID Site Planning Principles

3. Minimize Impervious Coverage
   ✓ Reduce Pavement Width / Sidewalk
   ✓ Incorporate Permeable Surfacing
   ✓ Soil Amendments
   ✓ Green Roofs

4. Disconnect Impervious Areas
   ✓ Reduce Effective Impervious Area
   ✓ Minimize Closed Pipe Conveyance
   ✓ Utilize Multiple Small-Scale Facilities
   ✓ Dispersion not Point Discharge
LID Site Planning Principles

5. Maintain Site Hydrology
   ✓ Reduce Runoff Leaving the Site
   ✓ Discharge at the Natural Location
   ✓ Distribute Flows in Sheet Fashion
   ✓ Provide for Recharge
   ✓ Promote Drainage Contact w/ Soil and Vegetation
LID and Infrastructure Design

Project Infrastructure Constraints
• Integrate into Existing Built Environment
• Influence of Road Design
• Site Plan Dictates
• Storm Water Management
Review of Three Completed LID Projects

• Danielson Grove, City of Kirkland
  Cottage Company, Ross Chapin

• Kirkland Bungalows, City of Kirkland
  CamWest Development, Mithun Partners

• Shamrock Heights, King County
  CamWest Development, Dahlin Group
Danielson Grove
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Danielson Grove

Site Plan

Road Section
Danielson Grove

Composite Utility Plan
Sanitary Sewer and Water Plan
Lessons Learned
Kirkland Bungalows
Kirkland Bungalows
Kirkland Bungalows
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Kirkland Bungalows
Kirkland Bungalows
Kirkland Bungalows
Alternative Street Section

Driveway Infiltration Trench Detail

Trench to Swale Detail

Low Impact Road Section
Kirkland Bungalows

Road and Storm Drainage Plan
Kirkland Bungalows

Water and Sewer Plan
Lessons Learned
Lessons Learned
Lessons Learned
Shamrock Heights, King County

- 34.5 acres
- 25 acres developed
- 73 LID lots
- 129 total # of Lots
Plan View

SHAMROCK
A LOW IMPACT DEVELOPMENT (L.I.D.)
DEMONSTRATION PROJECT
Rain Garden

Rain Garden Section
Rain Garden
Rain Garden
Rain Garden
Rain Garden
Rain Garden
Bioretention Swale

Bioretention Swale Profile

Bioretention Swale Section
Bioretention Swale
Bioretention Swale
Bioretention Swale
Curb Drop

Road Section

Grass-Lined Conveyance Swale

Low Impact Flow Through Curb
Curb Drop
# Shamrock Heights Monitoring

| Sampling Period | • Begins at 75% occupancy  
|• 3 years of data |
|---|---|
| Water Quality (Grab Samples at Inlet) | • Turbidity  
• Total Suspended solids  
• Dissolved zinc  
• Hardness |
| Water Quantity | • Continuous recording of flow at outfall of both ponds |
LID Benefits Realized

• Enhanced water quality
• Relatively high densities achieved
• Reductions in infrastructure footprint and cost
• Differentiation in the market place.
Site Planning and Infrastructure

Questions?