Green Infrastructure in the Transportation Sector

Transportation Research Board Webinar

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What does GI mean for transportation organizations?
Presenters

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• Chief Counsel of the Federal Highway Administration (FHWA) from 2011 to 2014

Kris Hoellen
• Vice President of Sustainable Programs, Director of Conservation Leadership Network, The Conservation Fund
Agenda

1. GI overview
2. Legislation encouraging GI
3. Potential mandates
4. Similar regulatory efforts
5. GI programs and incentives
What is GI and why is it a priority?

Local GI

Source: www.epa.gov

Regional GI

Source: The Conservation Fund
Examples of GI

- Permeable pavement
- Bioswales
- Planter boxes
- Trees
- Ecosystem Services

Source: www.epa.gov
Enacted legislation incentivizing GI in the transportation sector

P.L. 112-141, Moving Ahead for Progress in the 21st Century Act (MAP-21)

- President Obama, July 6, 2012
- [http://www.dot.gov/map21](http://www.dot.gov/map21)
- Primary objective: Provide funding for “transportation alternatives”
Proposed legislation incentivizing GI in the transportation sector

Grow America Act

• U.S. DOT, March 31, 2015
• http://www.dot.gov/grow-america/fact-sheets/environment
• Expands eligibility for certain FHWA funds to include activities that support green stormwater infrastructure activities
• $1.25 billion a year in TIGER grants
Proposed legislation incentivizing GI in the transportation sector

Highway Runoff Management Act
- Senator Cardin, June 10, 2014
- https://www.govtrack.us/congress/bills/113/s2457/text
- Primary objective: Require states to analyze the hydrological impact of federal aid highways on water resources and develop approaches to reducing the impacts of heavy stormwater runoff
Proposed legislation incentivizing GI in the transportation sector

Innovative Stormwater Infrastructure Act (S. 896; H.R. 1775)

- Sen. Tom Udall (D-N.M.) and Rep. Donna Edwards (D-Md.), November 2013
- [https://www.govtrack.us/congress/bills/113/hr3449/text](https://www.govtrack.us/congress/bills/113/hr3449/text)
- **Primary objectives:**
  - Promote innovative stormwater infrastructure to states, local governments, and the private sector
  - Investment in community stormwater projects
  - Create up to 5 Centers of Excellence throughout the U.S.
  - Promote P3s
Regulatory initiatives encouraging GI in the transportation sector

1. Green Highways Partnership

2. EPA March 2015 Guidance on GI
Regulatory mandates?

- CWA Consent Decrees
- EPA deems GI “a better way”
Industry programs for GI

NCHRP best practices for reducing stormwater volume on urban highways

• Vegetated conveyances
• Dispersion
• Media filter drains
• Permeable shoulders with stone reservoirs
• Bioretention with and without underdrains
• Infiltration trenches, basins, and galleries
Industry programs for GI

NCHRP 5-step approach for incorporating volume reduction in urban highway projects:
1. Establish volume reduction goals
2. Characterize project site and watershed
3. Identify potentially suitable volume reduction approaches
4. Prioritize the volume reduction approaches from a screened menu
5. Select volume reduction approaches and develop conceptual designs
Industry programs for GI

• NARC’s “A Roadmap to Green Infrastructure in the Federal Agencies”
• Green Infrastructure & Forestry Toolkit (GIFT) website
• AASHTO resources
• TRB’s “Highway Design 2013”
Examples of GI Projects

**PlaNYC - A Green Greater New York**

- NYC susceptible to CSOs
- City-wide program striving to make NYC more sustainable
- PlaNYC contains NYC’s GI Plan, released in 2010, under which NYC DEP:
  - Constructed dozens of right-of-way bioswales and green streets
  - “Green Infrastructure Map” to increase transparency and promote the work

**Philadelphia’s “Green City, Clean Waters”**

- First EPA-approved GI plan, put in place in 2013
- Example of cost savings:
  - Grey infrastructure system was estimated to cost over $6 billion
  - Philly’s GI plan will cost only $1.2 billion over 25 years, $800 million of which will go directly to GI projects in the city
- Since 2011, constructed 102.4 acres of new pervious surfaces. A total of 450 acres of new green pervious surfaces are planned by the end of 2015.
Takeaways

- A growing number of resources and funding opportunities can facilitate the incorporation of GI in the transportation sector
- EPA has made GI a priority, incl. some GI mandates
- Incorporating GI in transportation planning can yield significant environmental and cost benefits
- There are several success stories transportation planners can consider when integrating GI into their own planning
Thank you!

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Green Infrastructure in the Transportation Sector

Transportation Research Board Webinar

Kris Hoellen
Vice President, Sustainable Programs
The Conservation Fund
May 2015
The Conservation Fund works at the intersection of conservation and community—we believe that environmental protection and economic vitality are inseparable.
A strategically planned and managed network of natural lands, working landscapes, and other open spaces that conserves ecosystem values and functions and provides associated benefits to human populations.

Benedict & McMahon 2006
The Green Infrastructure Approach

Green infrastructure helps us answer...

• Which lands to conserve?

• Where to permit development?

• Where to build roads and utilities?

• Where & how to select mitigation projects?

Green infrastructure benefits...

• **Proactive** not reactive;

• **Systematic** not haphazard;

• **Multi-functional** not Single Purpose;

• **Multiple Scales** not Single Scale, and

• **Scientifically defensible**, transparent decision-making process

What is a region’s common vision?
An Agenda for Metropolitan Conservation Planning

Health | Livability | Economic Vitality | Resiliency

Urban Green | Active Living | Local Food | Flood Control
Regional Green Infrastructure Vision

PROTECT
RESTORE
CONNECT

MULTIPLE BENEFITS
Human well-being
Material needs, health, security, social relations, “quality of life”

Ecosystem Services
- Regulating Services
- Supporting (Natural processes that maintain other ecosystem services)
- Cultural experiences
- Products

Ecological Capital

Adapted from 2010 Ecological Footprint Atlas
The GIV 2.1 is a refinement of the 2004 Chicago Wilderness Resource Protection Areas (RPAs), which serve as a regional Green Infrastructure Vision. Please see the GIV 2.1 final report for information on the development of the GIS data layers included on the map. The codes correspond to GIS layers referenced in the methodology.

Financial support for the GIV 2.1 was provided by the Chicago Metropolitan Agency for Planning and the Gaylord and Dorothy Donnelley Foundation.
6 services mapped within the CMAP 7-county region:
- Water flow regulation/flood control
- Water purification
- Groundwater recharge
- Carbon storage
- Native flora and fauna
- Recreation and ecotourism

More than $6B/per year in economic value!

Extensive literature review of 9 ecosystem services

The Conservation Fund  
Chicago Metropolitan Agency for Planning  
Chicago Wilderness
• The thirteen H-GAC counties currently provide an estimated $15 billion per year of water quality, air quality, water supply, flood protection, and carbon sequestration benefits.

• Green Infrastructure core areas, hubs, and corridors comprise 62% of land but provide approximately 91% of these benefits.
Take-away for Transportation

- Use to guide existing planning efforts;

- Use for Avoidance and Minimization in both long-range planning and project development; calculate and quantify trade-offs;

- Use to evaluate conservation and restoration opportunities that support preserving and managing the network (estimate ROI for conservation capital);

- Places value on DOT owned and managed lands
1. Use suitability analysis to ‘right-size’
   - Re-adjust built environment to match current and projected population and development trends

2. Identify opportunities for income generating uses
   - Agriculture
   - Aquaponics / Greenhouse
   - Carbon Bank

3. Fulfill regulatory requirements
   - Stormwater (US EPA MS-4/CSO)

4. Reduce gray infrastructure costs
   - Water treatment
Vacant and Underutilized Lands Example: Amigos de los Rios – (non-vehicular transportation)
The Issue:

NiSource
- Natural gas transmission company
- Operation and maintenance activities impact endangered species

U.S FWS
- Enforce Endangered Species Act
- Streamline project review while enhancing species protection

NiSource pipeline network
- 14 States
- 15,500 linear miles
- 6.4 million acres
Incidental Take Permit, Implementing Agreement, and Record of Decision were issued on September 13, 2013 for the NiSource Multi-Species Habitat Conservation Plan.

“This plan is an efficient and effective mechanism to address the conservation needs of listed species on a landscape scale, and it gives NiSource the ability to plan its activities in the long term.” said Tom Melius, the Service’s Midwest Regional Director
- Take of 10 listed species in 14 states over a 50-year period!

- The permit covers activities that NiSource uses to maintain and expand their pipelines and pipeline right-of-ways (routine maintenance – mowing, trimming; upgrade and replacement; forced relocations; expansion projects)

- Covered lands includes a 1-mile wide corridor around existing pipeline facilities, plus 12 counties with existing storage fields – equates to over 9 million acres of land in 14 states – captures @ 95% of future operation, maintenance, & new construction projects!
- NiSource MSHCP provides a framework for integrating NG pipeline activities with the conservation and recovery goals of the species—reduces conflicts b/w species protection and NiSource’s operations while streamlining the ESA consultation process.

- NiSource MSHCP analyzes impacts of 42 species: 1) take species (10); 2) species for which NiSource would avoid take through AMMs (9); and 3) ‘no effect’ species (23).

- NiSource developed a Best Management Practices Guidebook outlining all AMMS and BMPS for each species affected by the HCP. A Consultation Implementation Guidance was also developed by NiSource and the FWS to guide the section 7 process.
1. Maintenance portion: 7 year cycle to coincide with PHMSA; Calculated potential take for maintenance (tree trimming, mowing, etc.) over a 50-year period. = $1M (paid in installments over first 7 years). No additional consultation or fees for covered activities on covered lands.

2. New Construction/Expansion/ROW: NiSource to pay $100k into fund held by NFWF; NiSource to ensure fund never falls below $100k. Estimated cost over 50 year period: $10 - $12M. No additional consultation for activities within 1 mile covered lands (use BMPs); for activities that extend beyond the 1 mile border, a streamlined consultation for that portion only (plus any mitigation).

3. Research Funds: NiSource to contribute 50k/year over a 3-year period to support I-Bat research (150K)
Strategic Mitigation Framework: NiSource MSHCP

- Provides a framework for conservation and recovery actions of species across the HCP area extending beyond covered lands
- Evaluates potential mitigation opportunities within a strategically planned, interconnected network using consistent methodology & criteria
- Identifies other ecosystem benefits associated with potential mitigation projects
Identify a Network Design
Identify Mitigation Opportunities Spatially
Identify the Mitigation Opportunities within the Context of a Spatially Explicit Network Design
LSP Example: NiSource MSHCP Partnership with SEAS

- LSP Attribute Trees generated for 9 take species
  - Indiana Bat
  - Bog Turtle
  - Nashville Crayfish
  - Madison Cave Isopod
  - Freshwater Mussels (5)

- Incorporates species habitat requirements, green infrastructure value, and other criteria outlined by US FWS, NiSource, and the States
LSP scores generated for potential mitigation projects

Use LSP tools to select highest scoring project or highest Cost: Benefit ratio

Use optimization tools to select best portfolio of projects based on budget

LSP ranking according to the overall value yields justifiable selection of the best alternative(s)

### NiSource MSHCP

**Optimize Conservation Portfolio**

**Madison cave isopod potential mitigation projects**

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<th>Project_ID</th>
<th>LSP Score</th>
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**Optimization Decision Support Tool**

- Indiana bat – 89
- Mussels – 67
- Bog Turtle – 61
- Nashville crayfish – 12
- Madison cave isopod – 5
**Additional Information**

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<tr>
<th>RESULTS</th>
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<tr>
<td>Acres Protected to Date</td>
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<tr>
<td>Conservation Programs</td>
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<td>Fundraising Costs</td>
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