

Water-Focused Green Infrastructure for Multiple Benefits

Western Michigan Green Infrastructure Conference

Grand Rapids, MI
August 5th, 2015



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Outline

- What is Green Infrastructure?
- Is GI effective?
- If so, then why isn't it more common?

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 - **Capital costs**
 - Maintenance concerns
 - Permitting/regulatory issues
 - Architect, civil engineer, landscape architect, MEP, other project team members unfamiliar or unexperienced with GI, unconvinced it will be effective to manage stormwater
 - Fear of change; complacency with status quo
 - “it looks funny, ugly, weedy, etc.”, i.e. cultural acceptance
 - “must be some sort of Communist plot, etc....”

Finance and Policy

Need to demonstrate GI adds value, practicality, and profitability to land management, development, and facility operations

Stormwater and Flood Management

Need to clarify water quality/flood attenuation/habitat enhancement through performance monitoring to align with modeling

GI at the Regional Scale

Need to integrate and incentivize multiple-benefit solutions that bridge site, street, and district-scale contexts for a range of land uses- urban, suburban, and rural

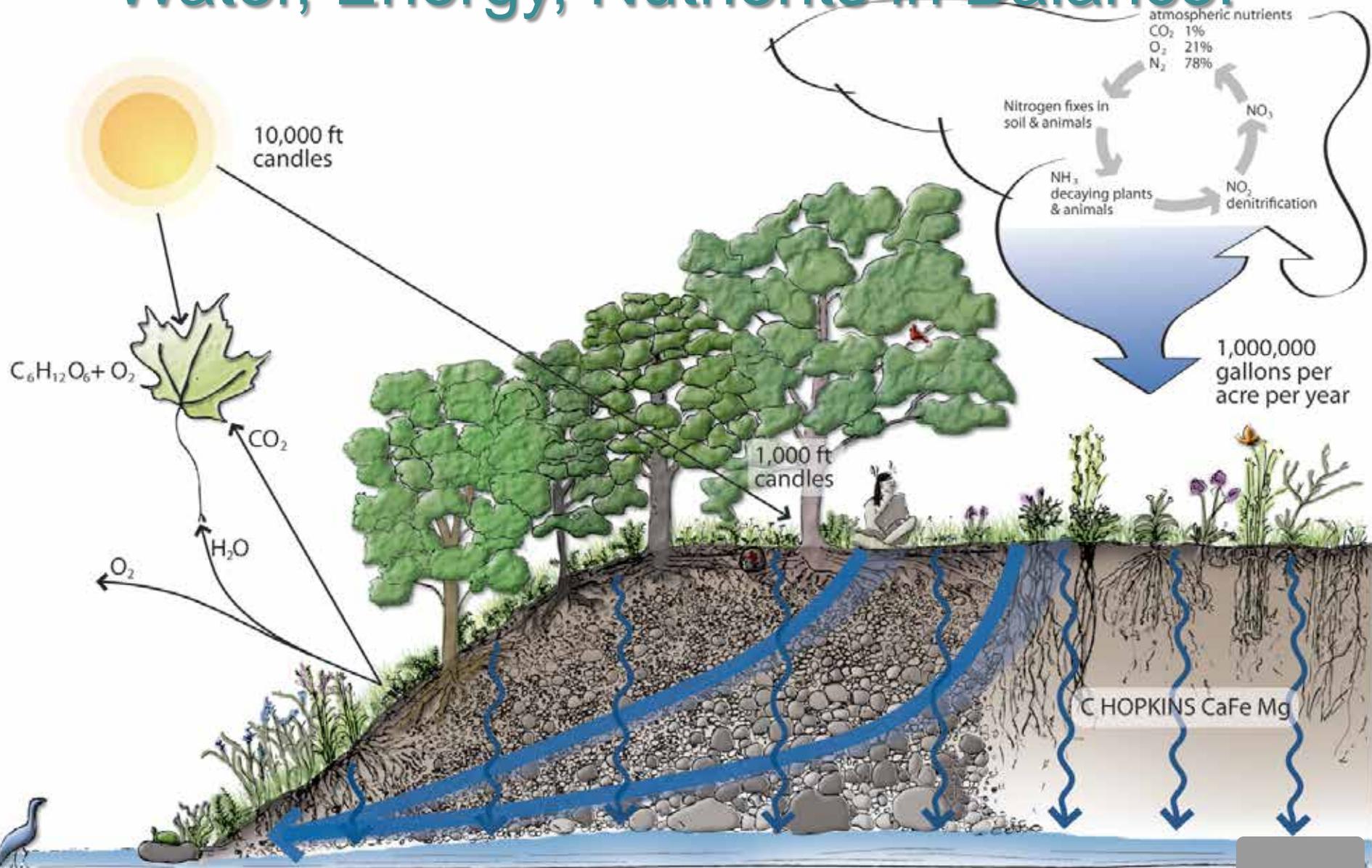


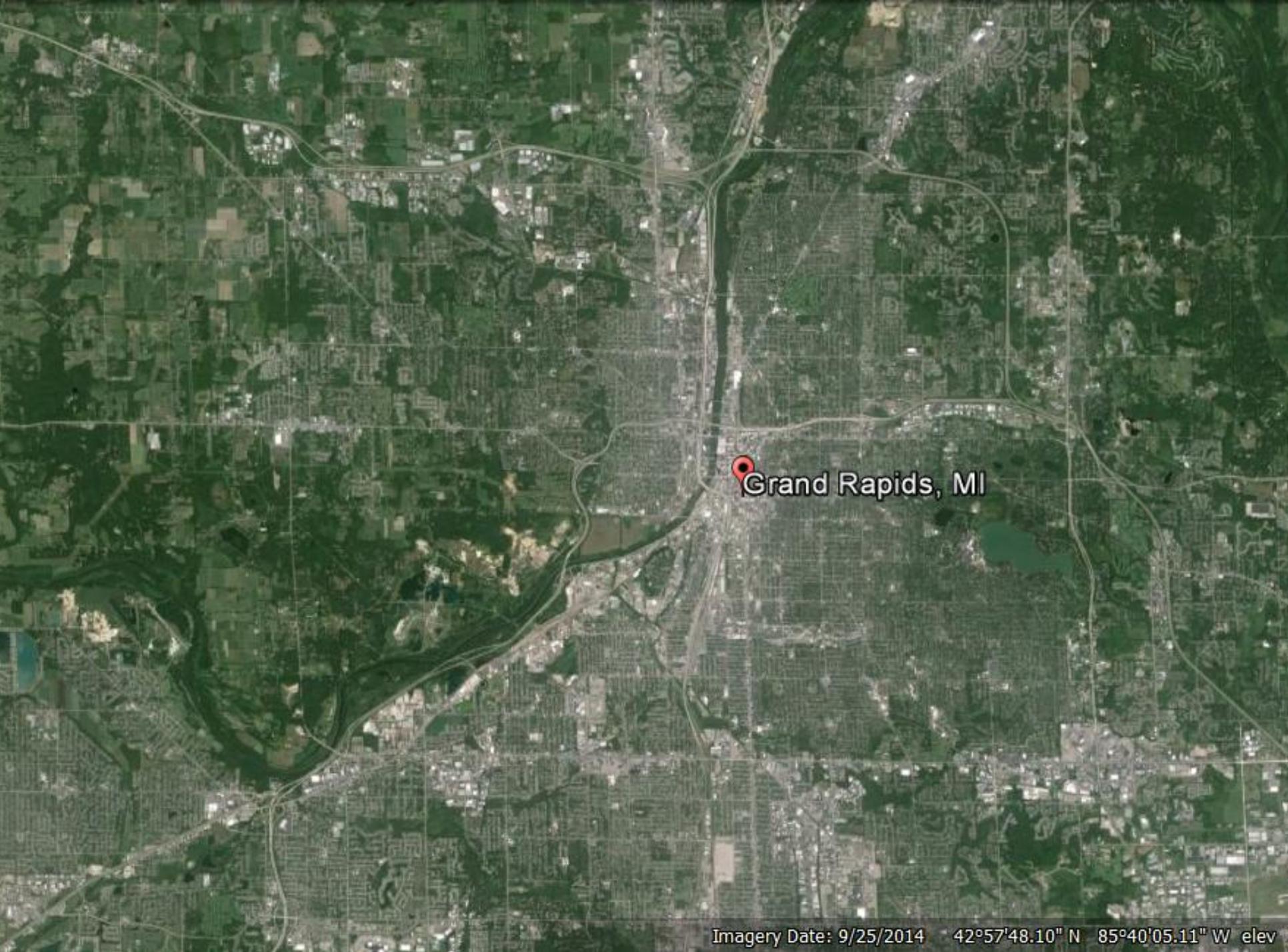
GREEN INFRASTRUCTURE

Living ecologies functioning cooperatively with technology to optimize the performance of an entire system to balance water, energy, and nutrients locally

Living Systems-Net Positive

Water, Energy, Nutrients in Balance:





Grand Rapids, MI



Traditional Stormwater Management Approach with Gray Infrastructure



Collect, convey, and discharge:

Move water off of a site as quickly and efficiently as regulations allow through enclosed storm sewer systems with concentrated points of discharge in combination with detention basins that generate a velocity and volume of flow that is expensive or impossible to mitigate.



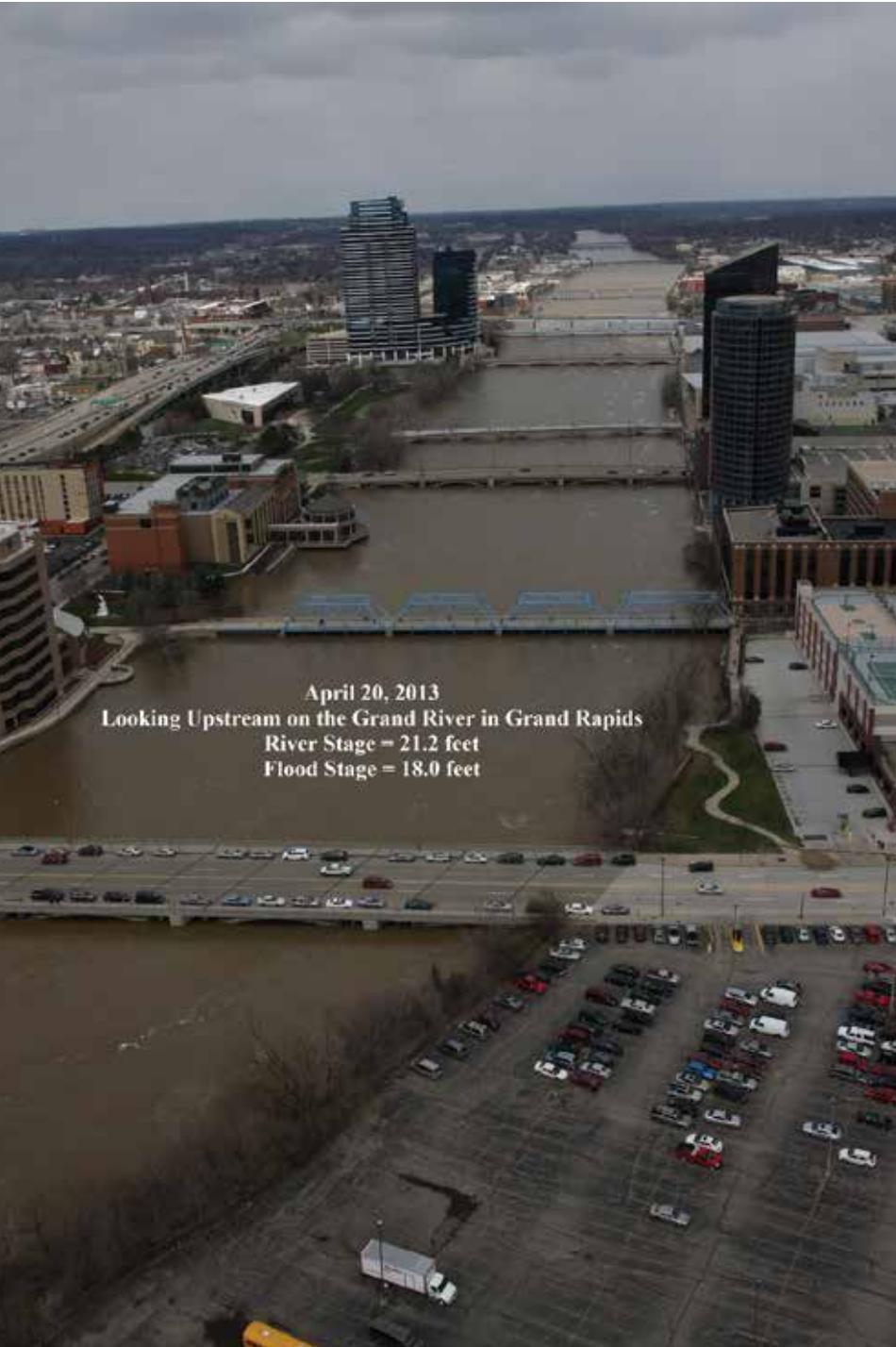




FLOOD ALERT

+ ONLY ON 8: AERIAL TOUR OF FLOOD

24hour
news 8
WOODTV.COM



Water-focused Green Infrastructure Strategies

System approach- slow, cool, cleanse, and infiltrate rainwater with GI to replicate natural hydrology AND optimize gray infrastructure components AND providing multiple benefits on all land use surfaces:

1. Green roof systems
2. Porous pavement systems
3. Bio-retention systems
4. Rainwater harvesting and re-use
5. Wastewater recycling and re-use
6. Native landscape systems



Community Issues

Environmental -

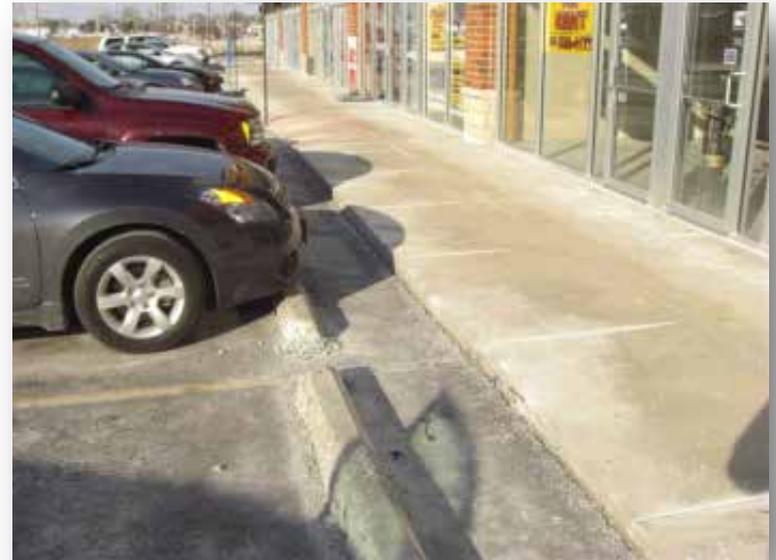
- Flooding
- Air and water quality decline
- Loss of habitat and bio-diversity
- Loss of soil health
- Other impacts associated with rapid climate change



Community Issues

Economic -

- Decaying roads, utilities, and municipal facilities
- Rising cost for maintenance and operations
- Declining revenue streams including tax base
- Need to bring jobs/projects to local/regional economies



Community Issues

Social -

- Aging populations/mobility
- Declines in health
 - Diabetes, heart disease, etc.
 - Childhood obesity
- (lack of) Connection to Outdoors



Opportunity

Virtually all of Michigan's infrastructure will need to be replaced, rebuilt, or substantially remodeled in the next few decades.



Community Well-Being

Sustainability through **Integrated** Green Infrastructure

Planning and managing community resources and facilities using GI
In a way that provides for health and prosperity today,
so that future generation's can be healthy and prosperous long-term...



Opportunity

How can we leverage dollars that will be spent on roads, utilities, and other infrastructure?

What is the most we can accomplish with the investments that will be made?



**How can widespread application of
Green Infrastructure strategies be
accelerated in Michigan?**

Grand R.A.P.I.D.S.



Regulate

Amalgamate

Prioritize

Incentivize

Demonstrate

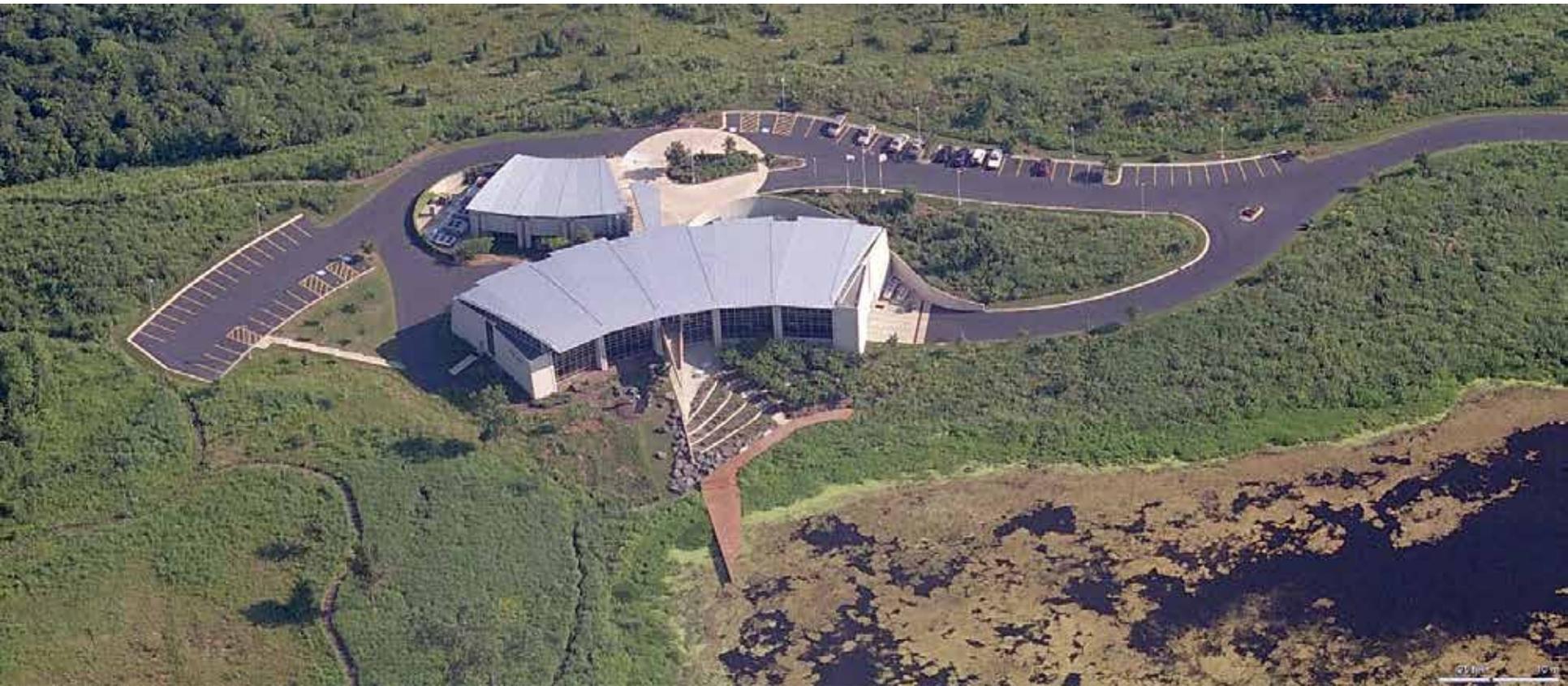
Sponsor

REGULATE

Bolster local regulations that address rainwater attenuation AND water quality.



*Morton Arboretum Visitor's Center Parking Lot
Lisle, IL*



*Tuthill Corporation
Headquarters and
Training Facility
Burr Ridge, IL*

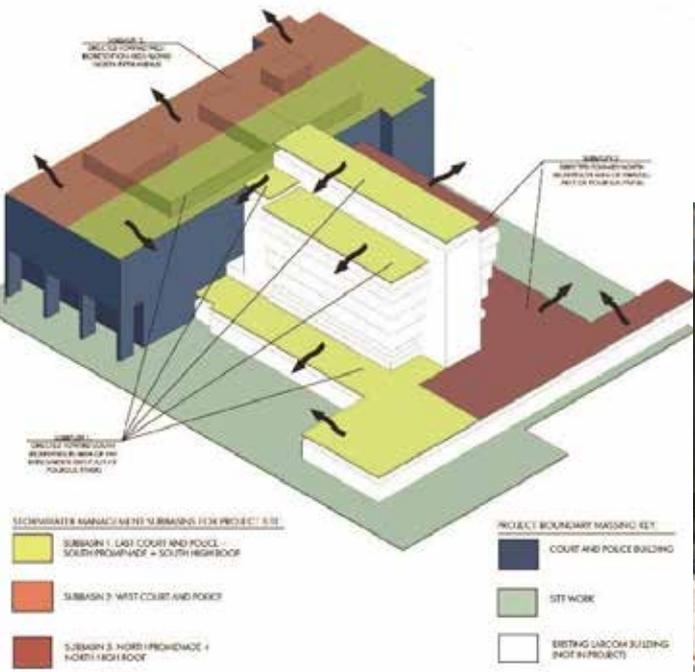


Biodiversity- measured with Floristic Quality Assessments

		# PLANTS INVENTORIED	PERCENT NATIVE	MEAN C	FQI
1996	Wetland A	91	80%	3.19	27.27
	Wetland B	82	85%	3.49	29.16
1998	Wetland A	65	74%	3.8	26
	Wetland B	110	71%	2.7	24
1999	Wetland A	134	77%	3.4	35
	Wetland B	115	76%	2.9	27
2000	Wetland A	131	74%	3.7	43
	Wetland B	84	73%	3.1	28
2001	Wetland A	207	76%	3.9	49
	Wetland B	136	75%	3.3	34

AMALGAMATE

Encourage methods to address a combination of issues/requirements with integrated solutions, thus accessing a broader range of funding and support



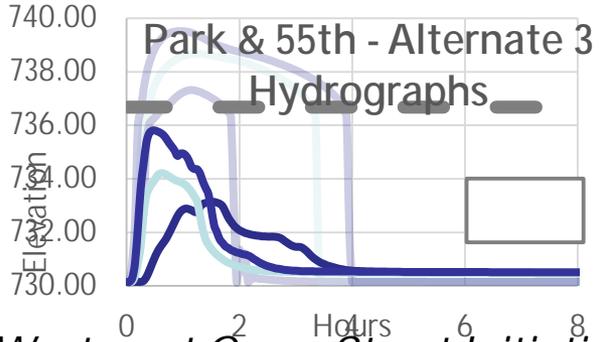
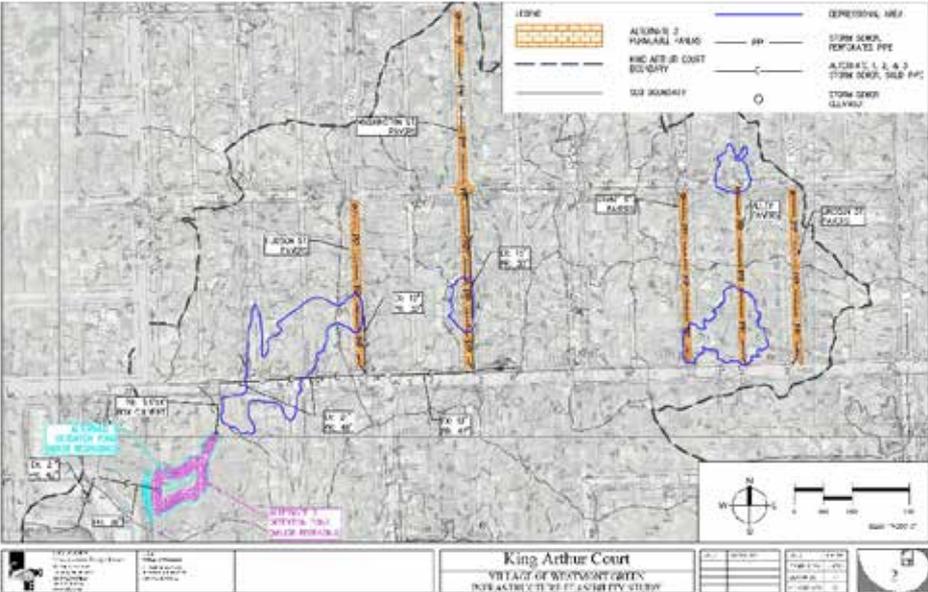
*Ann Arbor Municipal Complex
Ann Arbor, MI*



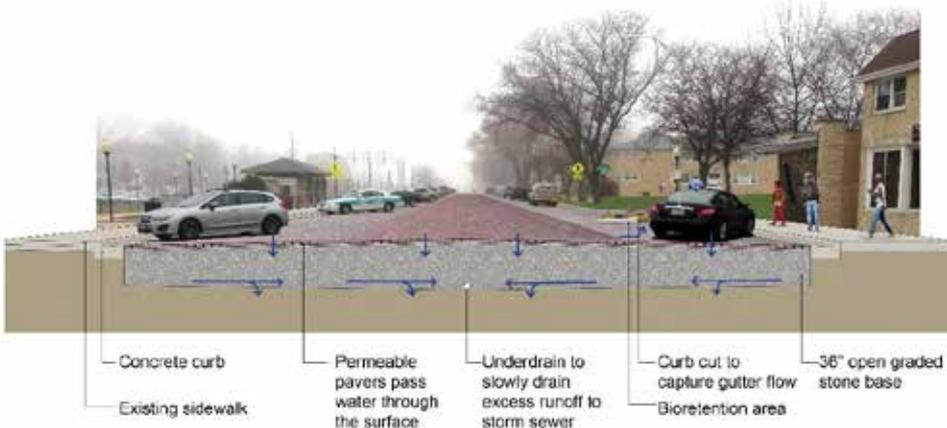
*Kingsley Rain Garden
Ann Arbor, MI*

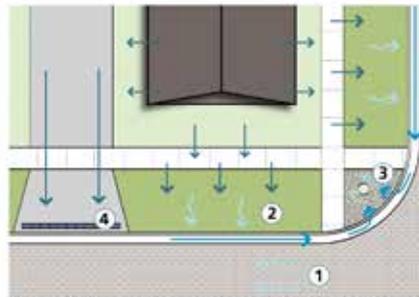
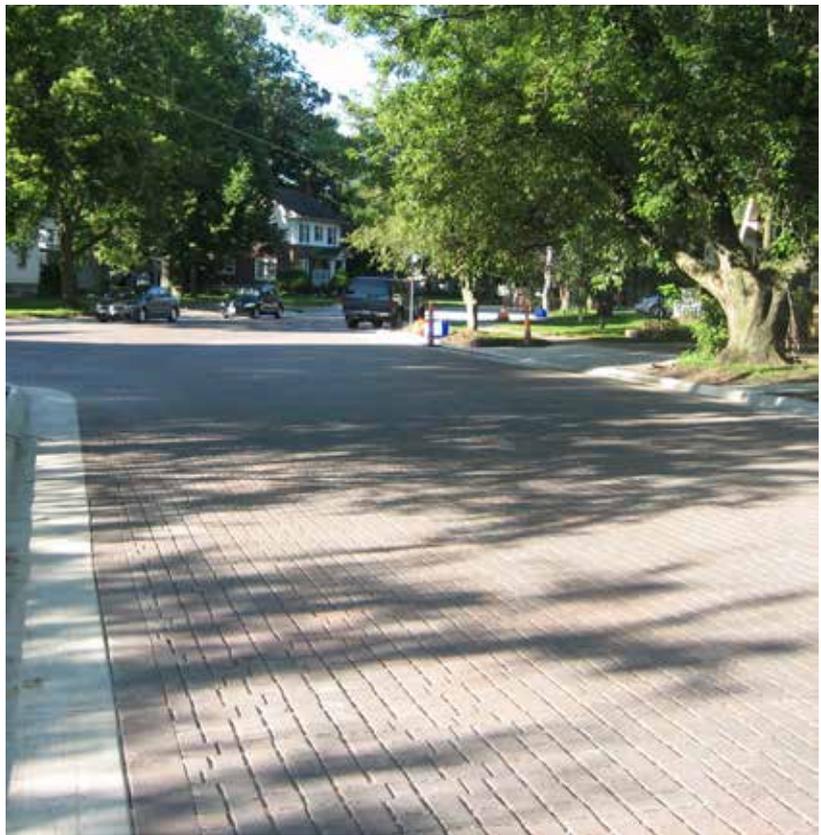
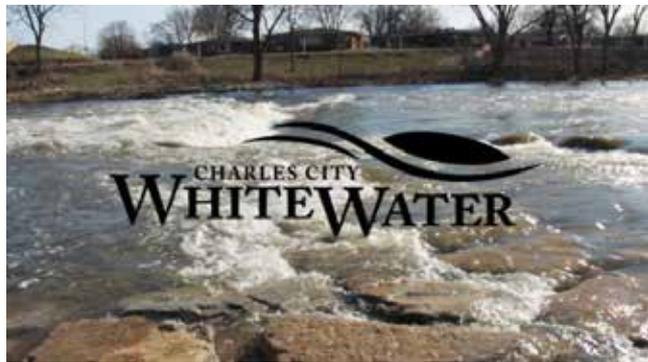
PRIORITIZE

Facilitate the implementation of GI through prioritization of public funds/resources for projects that best adapt these practices.



*Westmont Green Street Initiative
Westmont, IL*





Rainwater falling within the project area is collected and treated by the four rainwater system BMPs. See below for a description of each system component.

- ① Porous Unit Paving
- ② Amended Soil Infiltration Areas
- ③ Cobble Infiltration Areas
- ④ Alley Trench Grate



*Charles City Green Street Project
Charles City, IA*

INCENTIVIZE

Overcome economic and other obstacles through incentives that help accelerate acceptance of GI and foster local capacity.



OUR MISSION FOCUSES ON
**HELPING YOUR COMMUNITY
 GROW AND PROSPER**

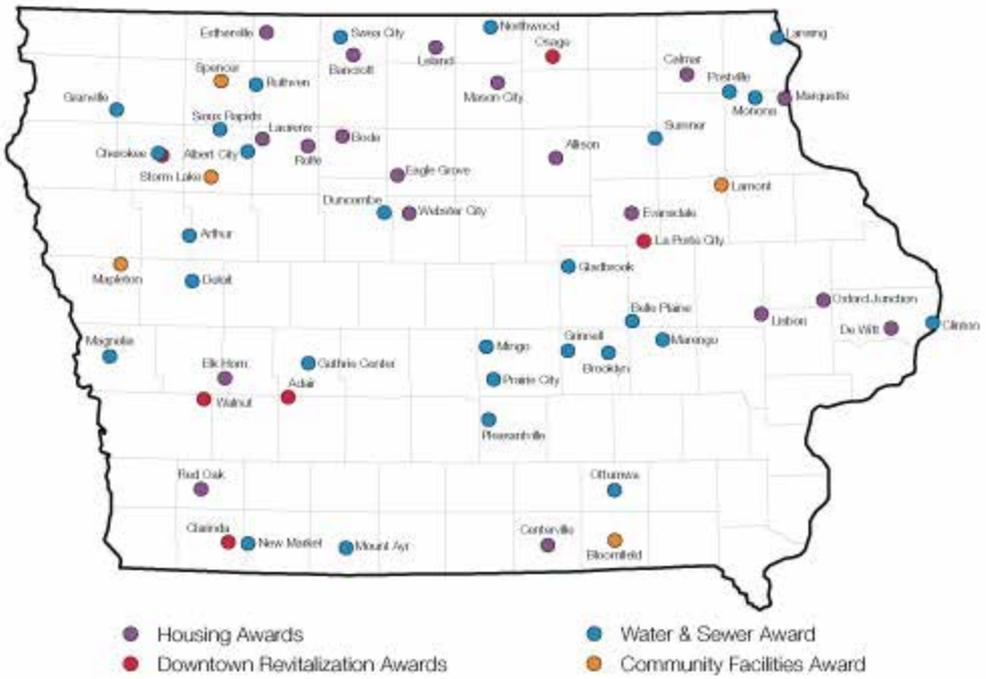
Iowa's communities are its backbone. From large to small, each one is unique and has its own set of challenges and opportunities. But, all across our state, people in Iowa communities of all sizes are actively working to transform Iowa's future.

To assist with that transformation, the Iowa Economic Development Authority (IEDA) administers various state and federal programs designed to help community leaders reinvest in core infrastructure, recover from natural disasters when they occur and revitalize to make each community's vision a reality.

SINCE 2010, COMMUNITY DEVELOPMENT INVESTMENTS
**HAVE LEVERAGED OVER
 \$538 MILLION
 IN ADDITIONAL FUNDING.**



GEOGRAPHICAL SPREAD OF THE 2015 CDBG AWARDS



*Iowa Economic Development Authority
 Green Streets and other Programs
 State of Iowa*

DEMONSTRATE

Provide built examples of GI strategies to illustrate how these practices can work best in each locality.



*Chicago City Hall Rooftop Garden
Chicago, IL*



*Woodlawn Neighborhood
Affordable Housing Redevelopment
Chicago, IL*



SPONSOR

Encourage mutually-beneficial partnerships between public interests and privately-held organizations and foundations; help bridge market/economic gaps to achieve regional/community benefits.

POS Performed 2010
Center for the Built Environment,
University of California, Berkeley

89% of Staff Expressed
Overall Satisfaction with
their Workplace
Environment

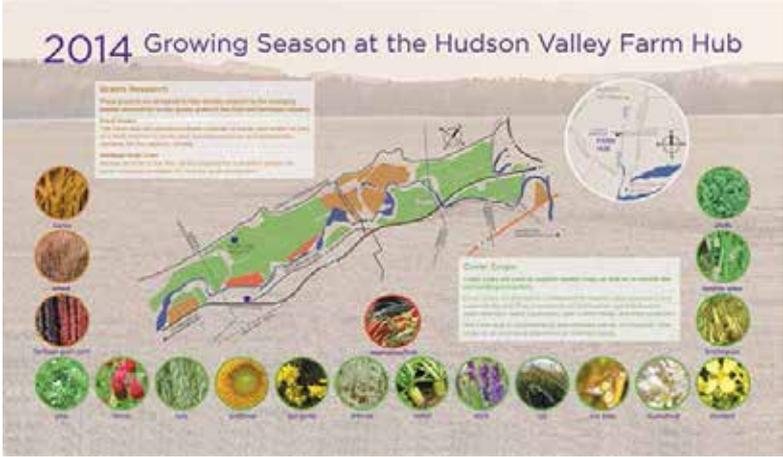


*Kresge Foundation Headquarters
Troy, MI*

Restorative Agriculture

Food system planning integrated with GI:

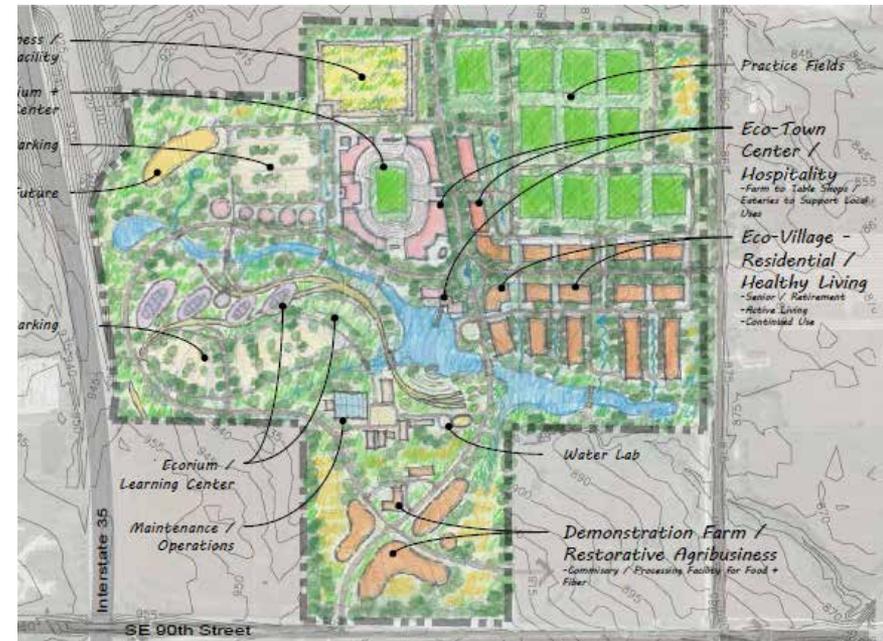
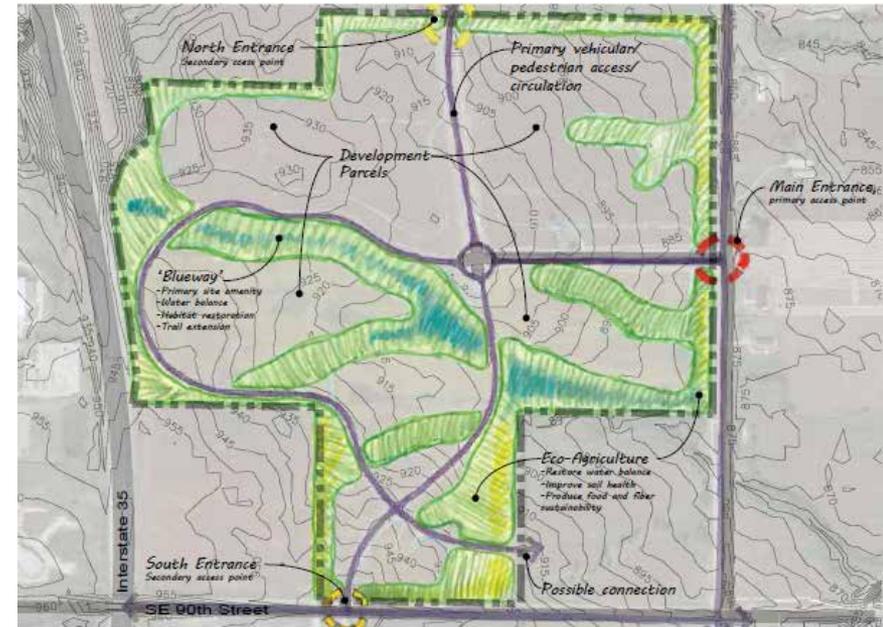
- Improved Economy/Revenue for Ag. Land
- Enhanced Ecology/Water Balance
- Healthy Food and Ag. Products for Local Markets



GI Planning Framework

Build soil health and restore natural hydrological function:

- food/fiber
- recreation
- habitat
- connection to nature



West Union, IA Green Street Demonstration

Greening the Public Realm

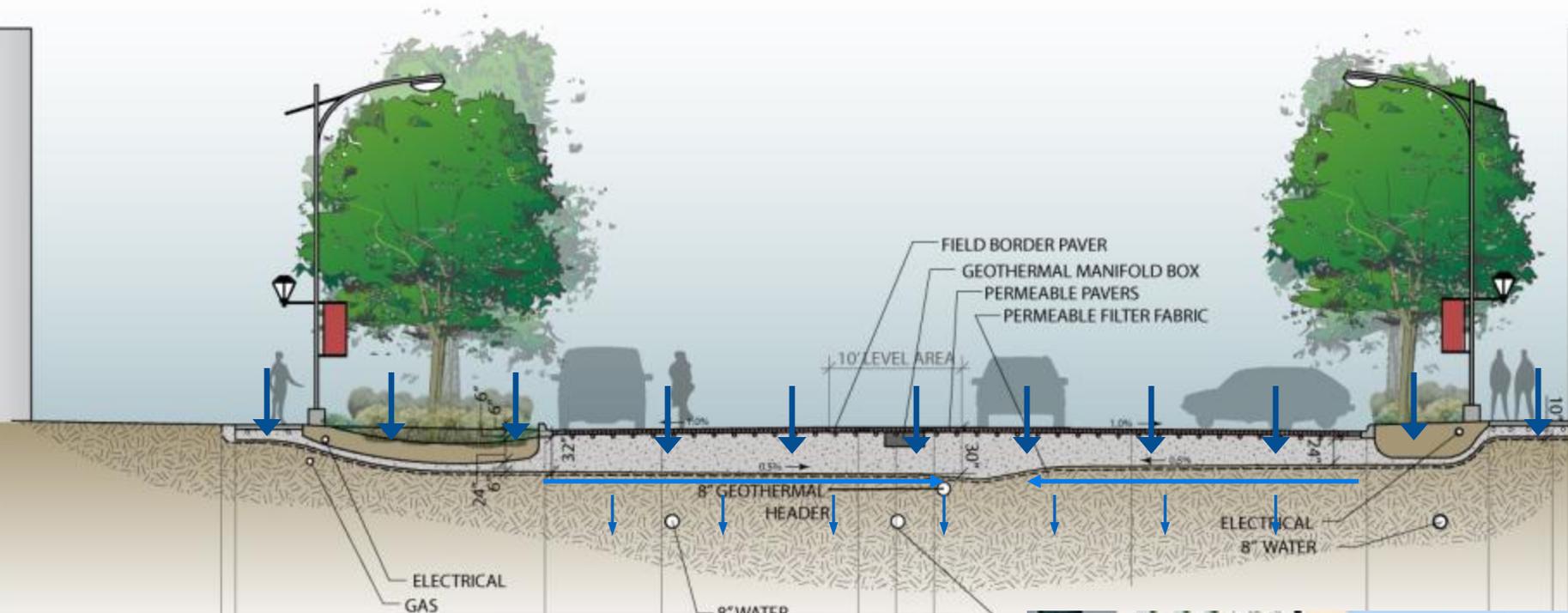


The entire 6-block downtown district was retrofit with high-performance green infrastructure adapted to local conditions and culture that combined help ensure community resiliency and economic prosperity for business owners and residents.

Strategies include:

**permeable unit pavements,
bioretention/rain garden planters and street trees,
LED lighting, complete-streets traffic calming,
Locally authentic art and craft,
and an innovative district-scale renewable geothermal energy system.**

Integrated water , energy, and utility systems



Expanded Support Resources

West Union Green Street Pilot Project Funding Sources (rounded figures)

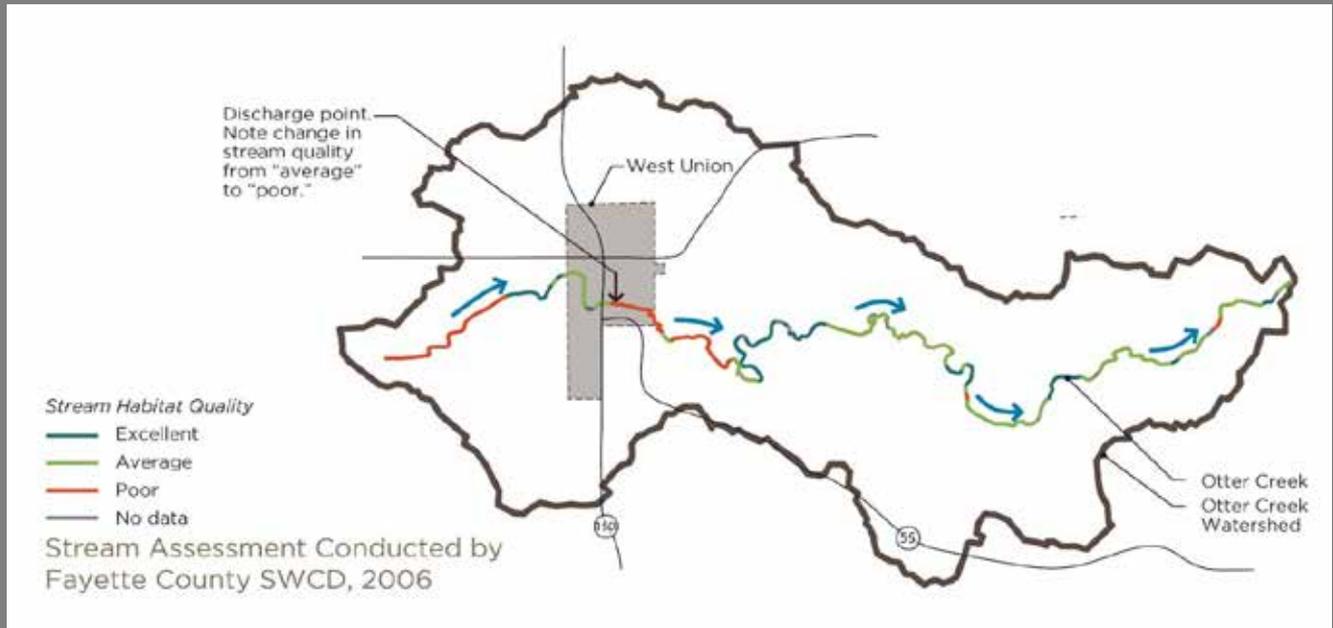
-DOT	\$2.3M
-CDBG	\$1.0M
-DNR	\$0.1M
-IDALS	\$0.5M
-EPA	\$0.5M
-DOE	\$1.0M
-I-JOBS	\$1.2M
-IA Great Places	\$0.2M
-IDED	\$0.3M
<u>-Local</u>	<u>\$2-3M</u>
TOTAL	\$9-10M



Regional Water Quality Benefits



The Iowa Department of Natural Resources is monitoring the water quality of local streams. Calculations performed by the landscape architecture firm's civil engineers, the project reduced peak stormwater flows by 80%, reduced annual runoff volumes by 60%, and eliminated stormwater discharge for rainfall events under 1 inch.



District Energy System and High Performance Lighting



The payback period that the design team projected for the city to recover the initial capital investment is about 15 years. The team also projected that the cumulative savings to downtown businesses could exceed \$100 million dollars within 50 years. The new hybrid LED street lights also help to reduce carbon emissions have an expected life of 50 years. With a presumed electric rate increase of 4% annually the new hybrid LED's will save the town \$270,614 in energy costs over the life of the system as compared to the old lighting fixtures.

Authentic Art/Craft Supports Local Economy



The landscape architecture team coordinated with the local high school's art and shop programs to develop designs for the light pole banners, bike racks and trash receptacle covers which were then fabricated by a local metal shop.

Enhanced Use of the Public Realm



A new Halloween festival hosted by local businesses and service organizations was launched in 2014. The event brought more than 400 people into the town center – almost 20% of the town’s population. The Iowa Economic Development Authority is funding a study to track potential changes in behaviors and attitudes about downtown West Union. Study methodology will include the Irvine Minnesota Inventory (a built-environment auditing tool), pedestrian and vehicle observations, and residential and business surveys.

New Investment in Underutilized Properties in the City



Before and after images of the historic downtown buildings show how infrastructure improvements and redesign of the streetscape has led to building improvements and greater occupancy of commercial properties.

Conclusions



MICHIGAN

7LFF22

MI 7LFF22
JUL
2014 263C059

Spectacular Peninsulas

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