Resilience, Water & Tools

NEWEA Spring Conference

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Mark P. Smith
Deputy Director, North America Water
The Nature Conservancy

The ESII (Ecosystem Services Identification & Inventory) Tool

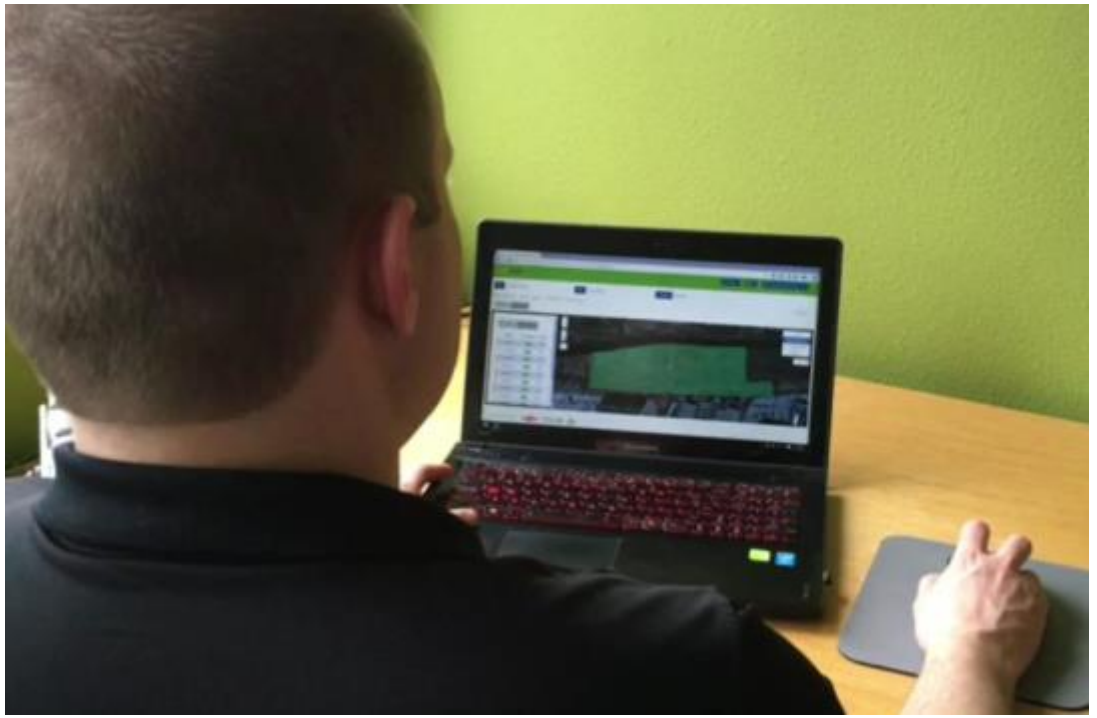
ESII tool

Understand the Benefits from Nature, Incorporate Nature into Your Decisions

The ESII Tool

A tool for decision makers to rapidly measure the benefits of nature (ecosystem services) on a site.

ESII Field App



ESII Project Workspace

ESII tool

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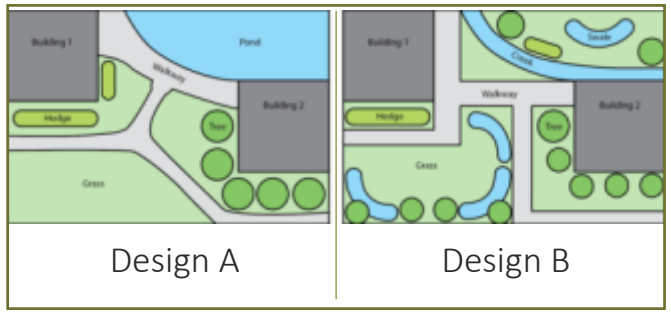
ESII can support many activities



Assess site designs and alternatives

Assist with restoration projects

Create an inventory of natural assets

Scope impact assessments

Compare green vs. gray infrastructure

Support dialogue and engagement with local communities

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Eight ecosystem services with additional sub-services*

- Aesthetics (visual screening and sound reduction)
- Air quality control (nitrogen and particulates)
- Climate regulation (carbon uptake and air temperature regulation)
- Erosion control (and mass wasting)
- Flood mitigation
- Water provisioning
- Water quality control (nitrogen, temperature, and sediment removal)
- Water quantity control

* Services included in the tool as of March 2016

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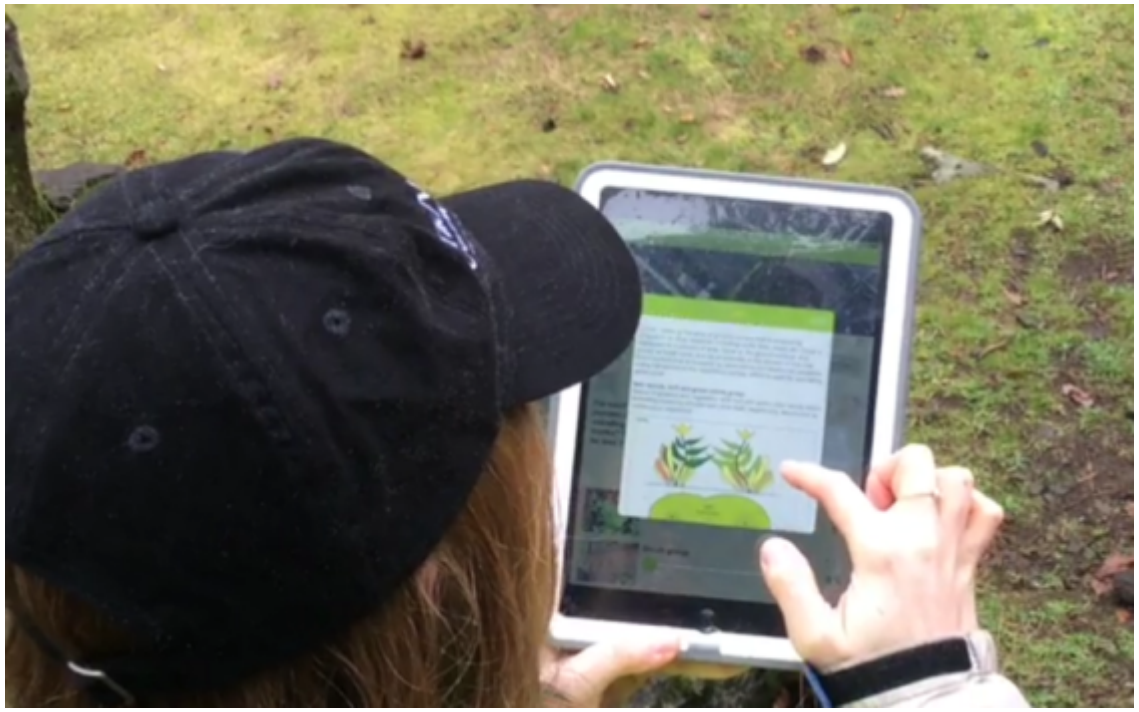
Site data collected using the ESII Field App



Walk a site and answer relatively simple questions about its physical attributes, such as presence and density of trees or presence and type of water flow.

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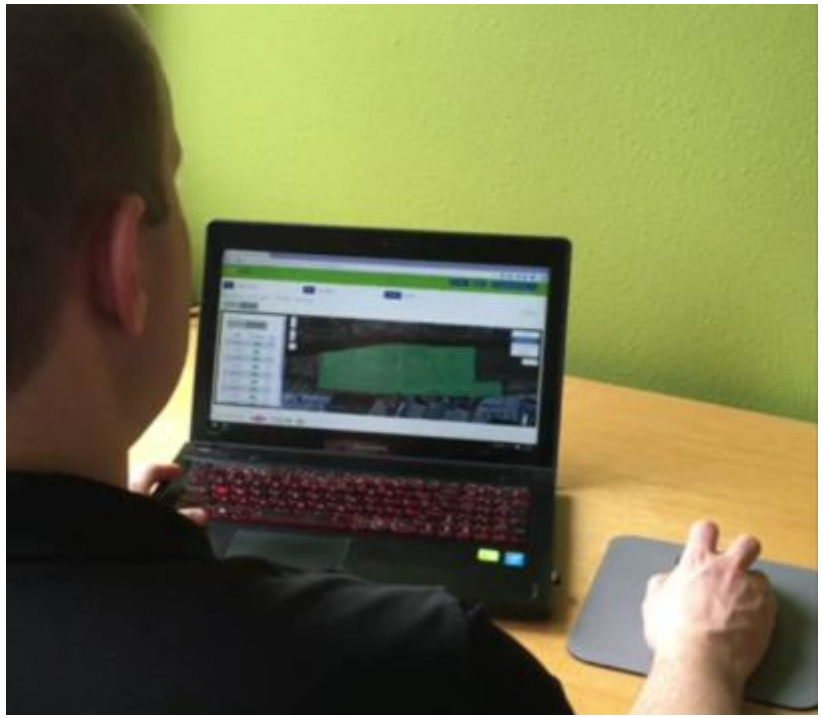
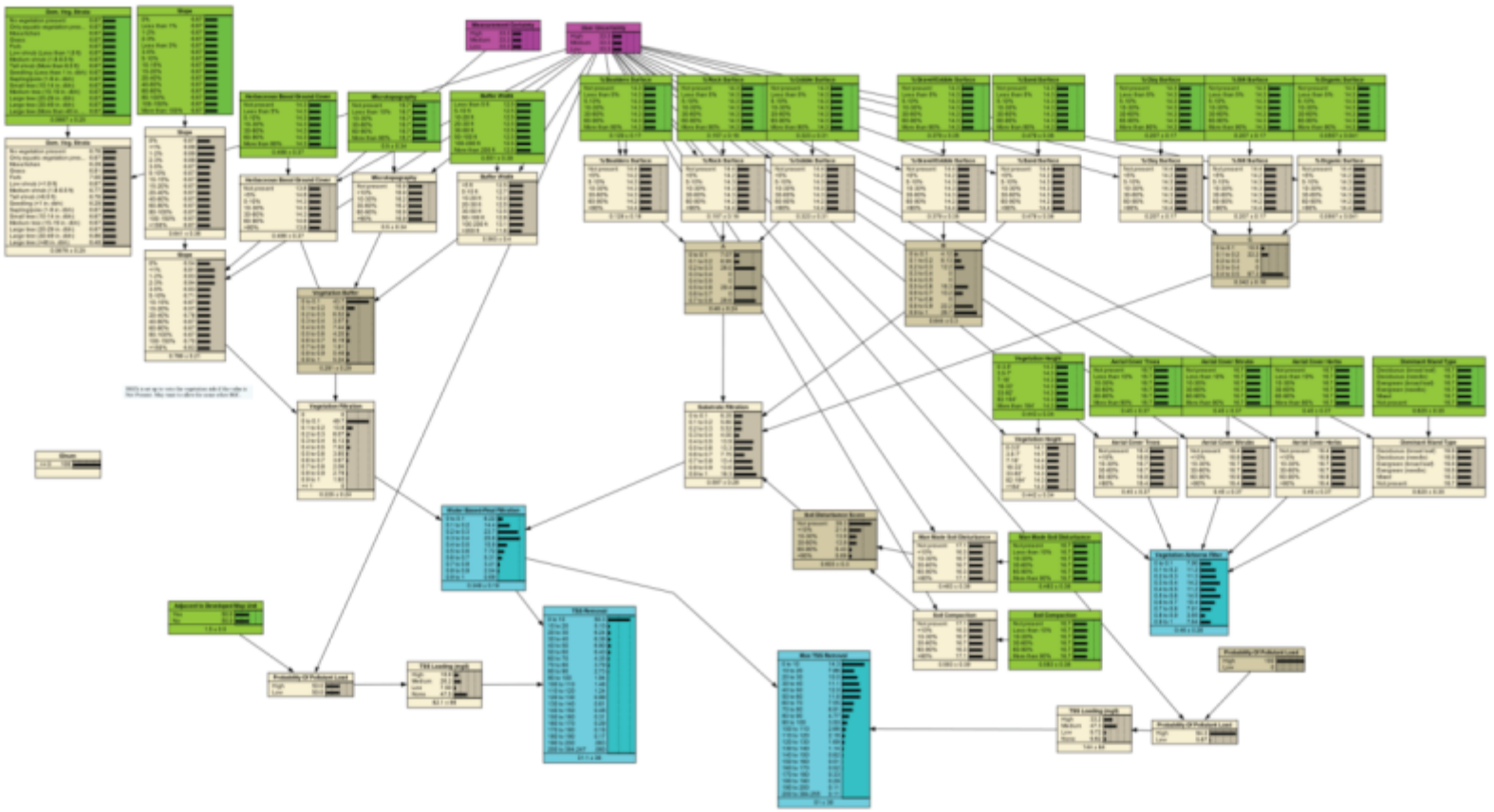
Uncertainty managed with Bayesian Belief Nets



ESII Project Workspace

Filtration



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ESII Tool outputs

- Percent performance of functions and services: measure of how well an area performs relative to optimal conditions
- Functional/service acres: measure of the total amount of functional performance or service benefit provided by an area
- Engineering unit: absolute measure of benefit in units specific to the benefit

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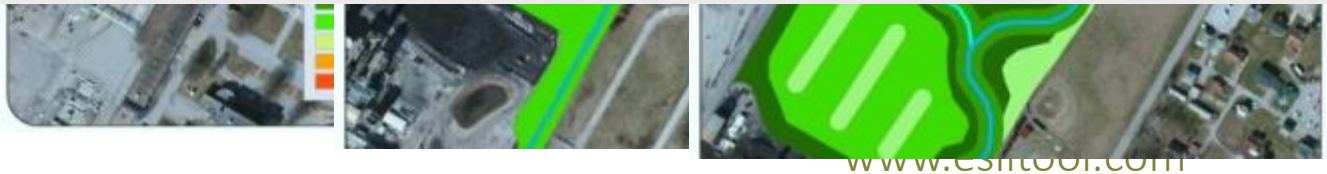
Multiple uses for ESII Tool outputs

Scientifically robust, screening-level characterizations of ecosystem services useful for:

- Reporting
- Educating employees and stakeholders
- Assessing alternative designs for development, restoration, or conservation

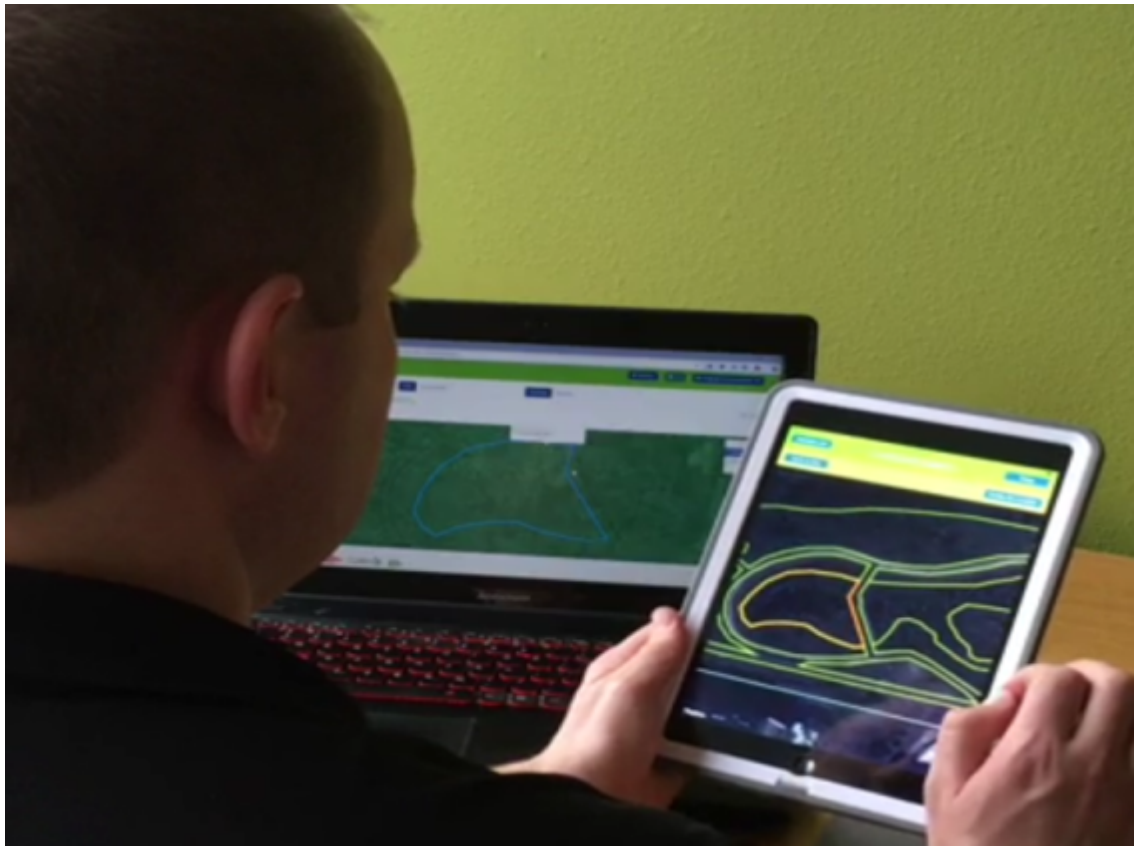
ESII Tool Tabular Results

Services	Baseline	Option A	Option B
Aesthetics – Noise	8%	31%	75%
Aesthetics - Visual	13%	37%	66%
AQ - Nitrogen Removal	3%	19%	19%
AQ - Particulate Removal	64%	66%	71%
Climate - Air Temp. Reg.	16%	49%	71%
Climate - Carbon Uptake	10%	14%	14%
Erosion Regulation	59%	72%	74%
Erosion Regulation - Mass Wasting	9%	9%	9%
Water Provisioning	1%	4%	4%
WQ - Water Filtration	25%	51%	56%
WQ - Nitrogen Removal	15%	31%	31%
WQ - Water Temp. Reg.	7%	13%	13%
Water Quantity Control	79%	79%	82%



ESII tool

Outputs available in engineering units



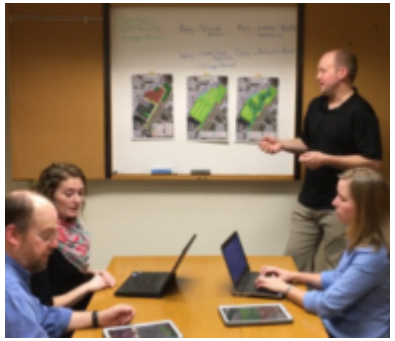
- Air NOx removal (lbs/year)
- Air PM removal (lbs/year)
- BTU reduction shade (BTU/sf/hr)
- BTU reduction shade (BTU/hr)
- Max water quality TSS removal (mg/l)
- Water quality TSS removal (mg/l)
- Max water quality NOx removal (mg/l)
- Water quality NOx removal (mg/l)
- Water provisioning (gallons/sf)
- Water provisioning (gallons)
- Water quantity runoff (inches of runoff across site)
- Water quantity runoff (gallons)

ESII tool

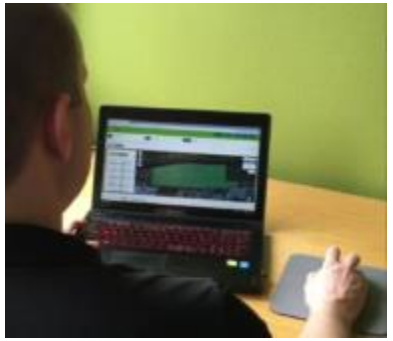
Demonstration of the ESII Project Workspace and Field App

ESII tool

The ESII Tool workflow

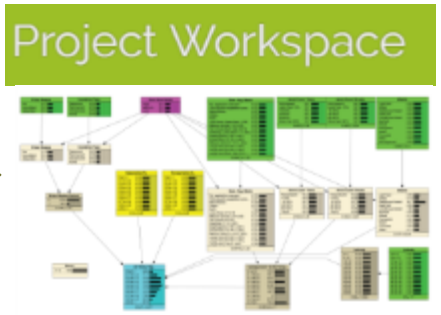


A project for the ESII Tool is identified…

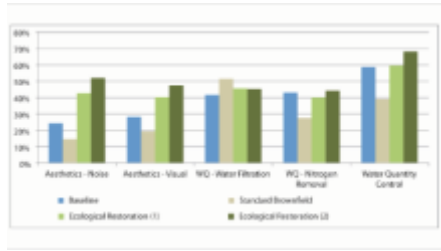


…and set up in the ESII Project Workspace.

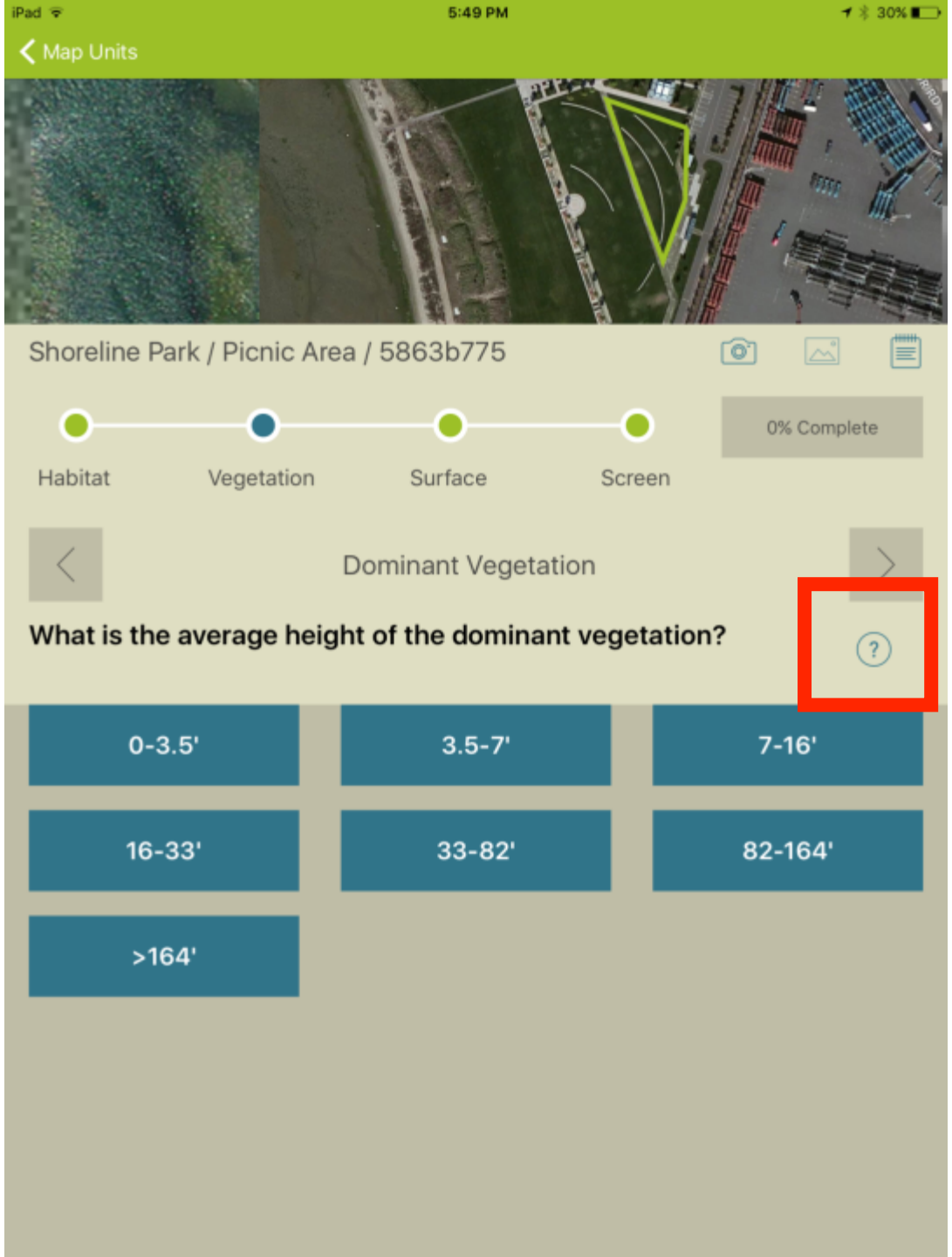
Physical attribute data is collected at the site using the ESII Field App.

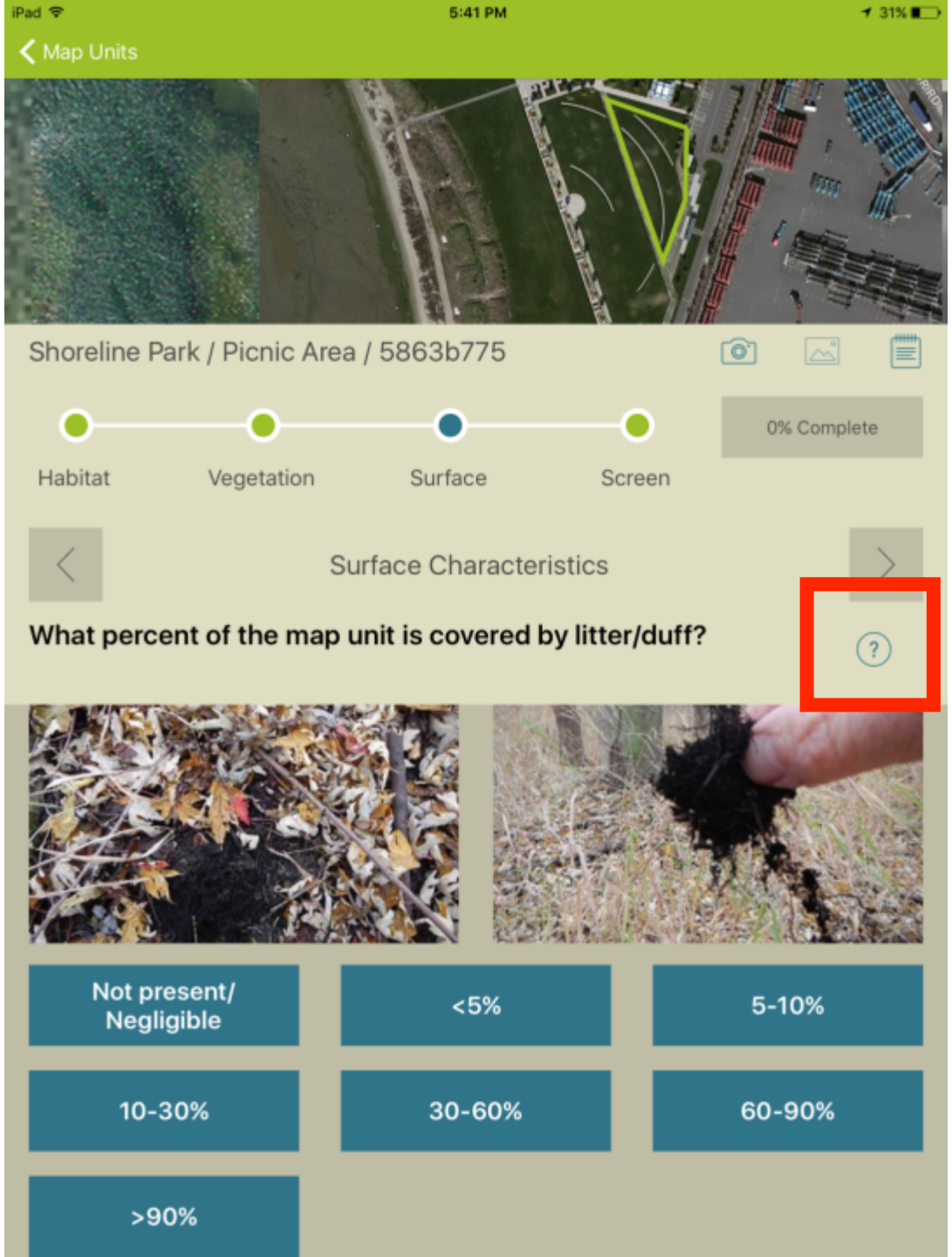


Data is synced with the Project Workspace, where ecological models process the results.



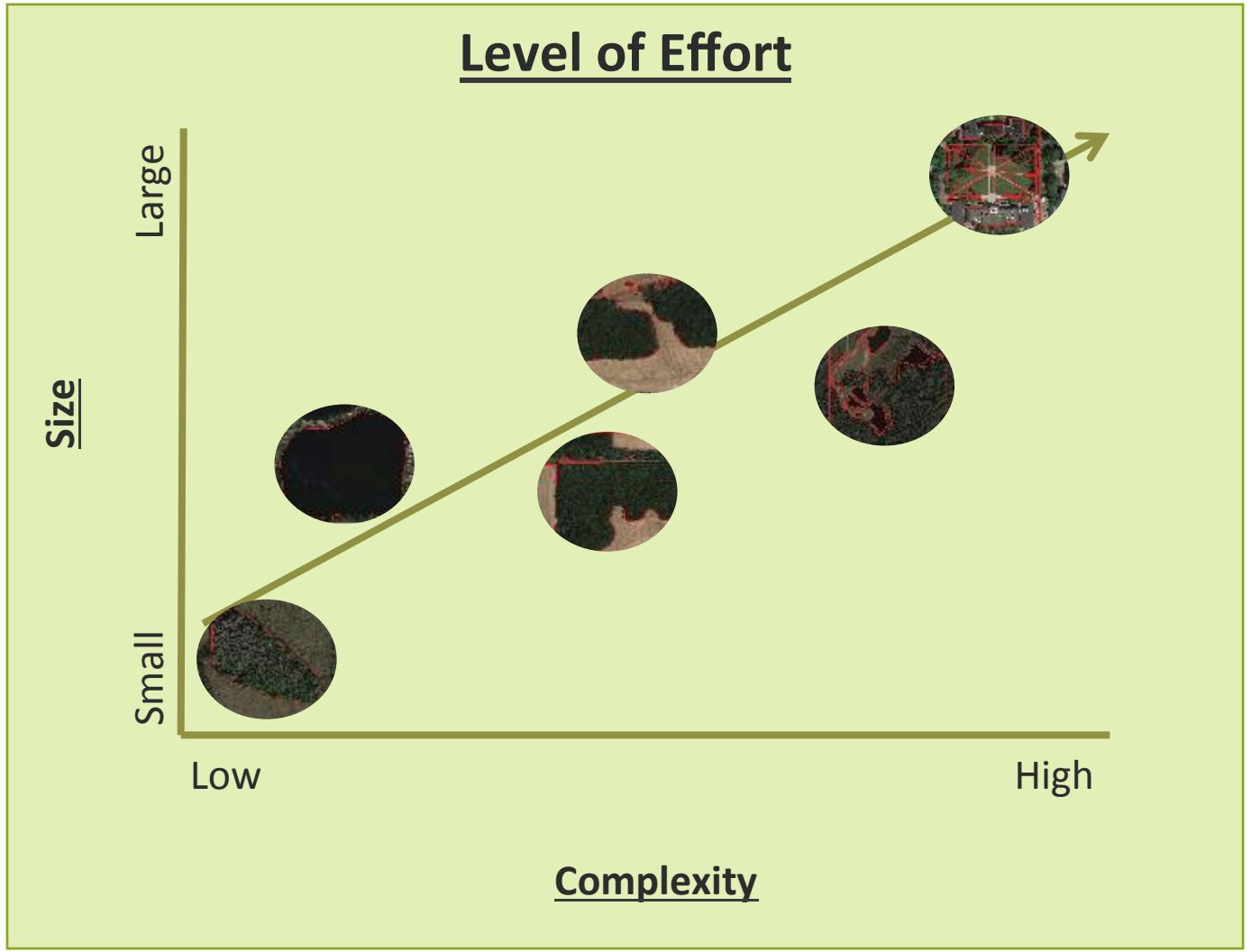
Outputs can be downloaded and used for different purposes.


iPad
5:49 PM
30%
Map Units
Shoreline Park / Picnic Area / 5863b775
Habitat
Vegetation
Surface
Screen
0% Complete
Dominant Vegetation
What is the average height of the dominant vegetation?
0-3.5'
3.5-7'
7-16'
16-33'
33-82'
82-164'
>164'


iPad
5:41 PM
31%
Map Units
Shoreline Park / Picnic Area / 5863b775
Habitat
Vegetation
Surface
Screen
0% Complete
Surface Characteristics
What percent of the map unit is covered by litter/duff?
Not present/ Negligible
<5%
5-10%
10-30%
30-60%
60-90%
>90%

Data collection effort

Site Complexity	Field Data Collection (approx. min/acre)
Simple (relatively homogeneous)	5-10 min
Moderate (mix of habitat types)	10-20 min
High (diverse with streams, mosaics)	30-45 min



Case Study

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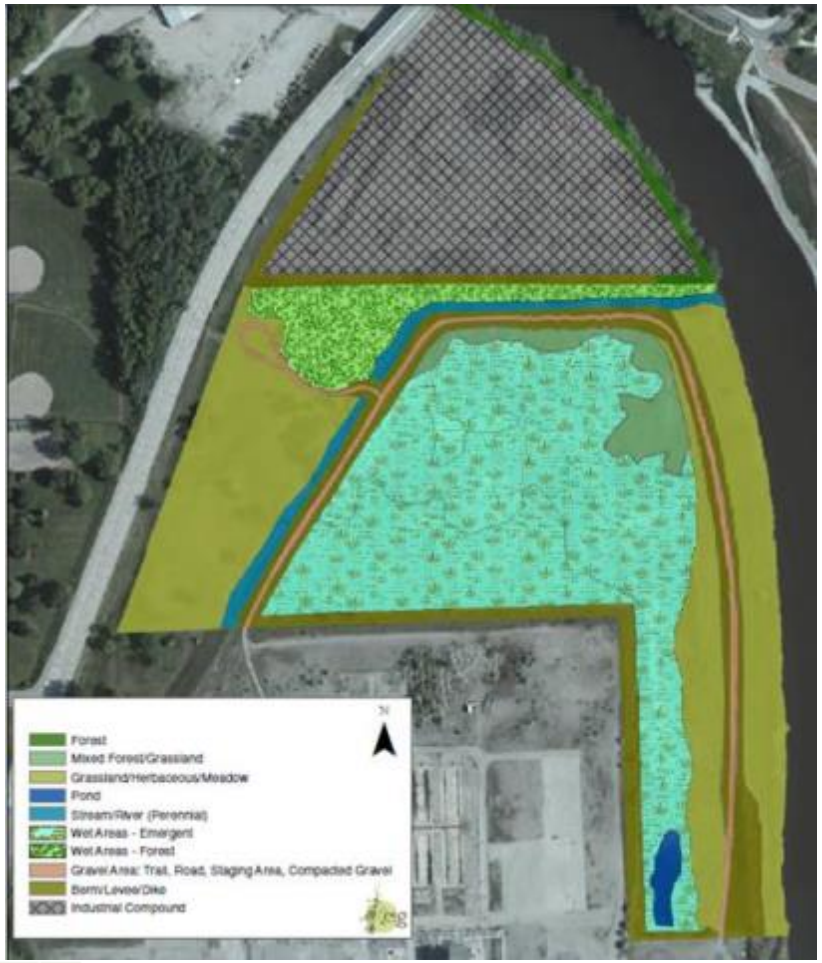
Greenbelt restoration

Baseline



- 37 acre parcel located on river, adjacent to city-owned brownfield site and park
- Standard restoration: cap the site and plant grasses
- Dow's challenge: explore whether alternative restoration options could reduce O&M costs and enhance water quality and noise reduction
- List of priority ecosystem services were identified by Dow

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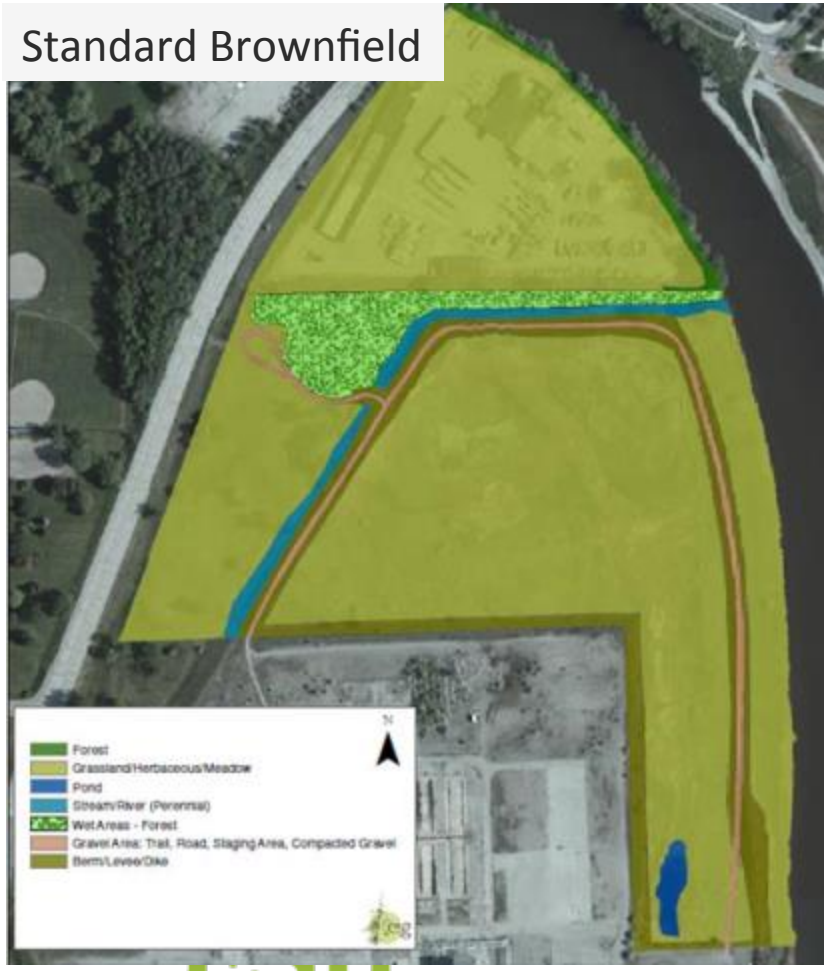
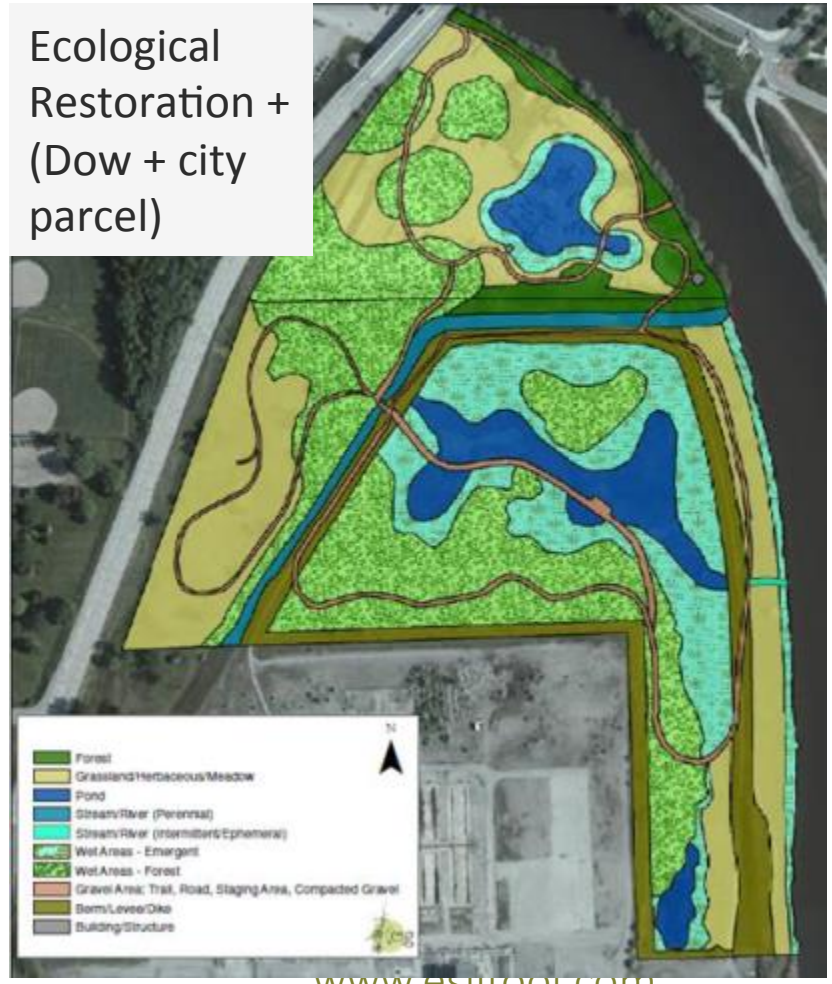
Three restoration options

Standard Brownfield

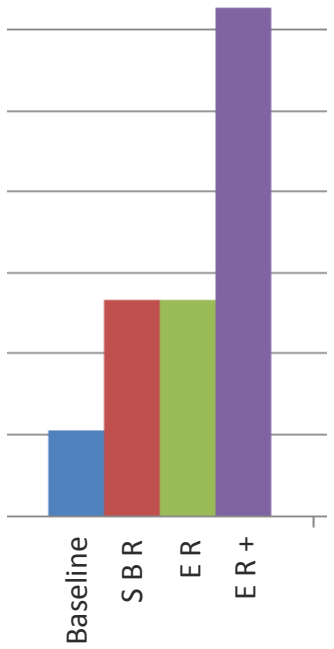


Ecological Restoration (Dow parcel only)

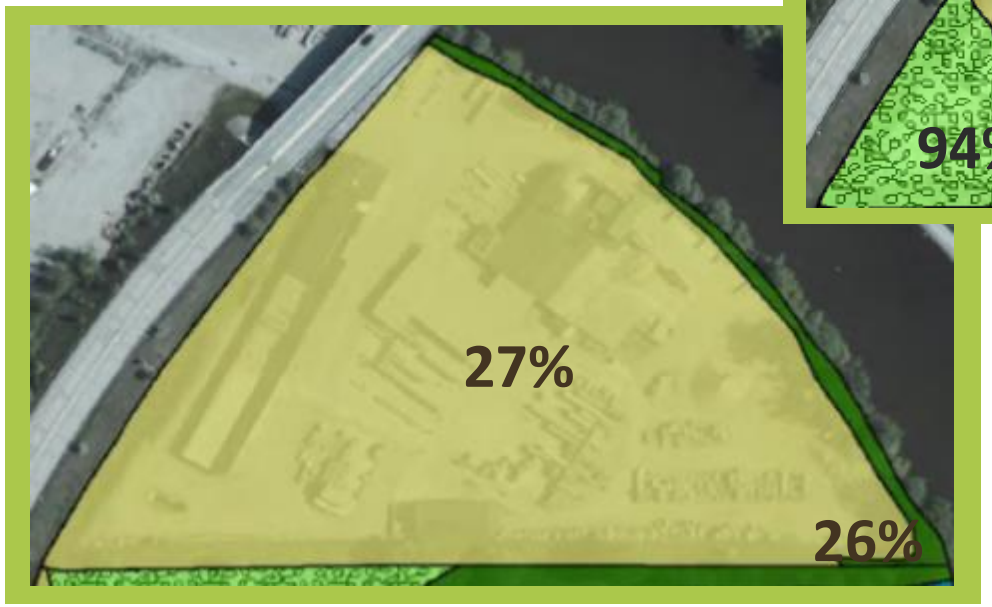
Ecological Restoration + (Dow + city parcel)

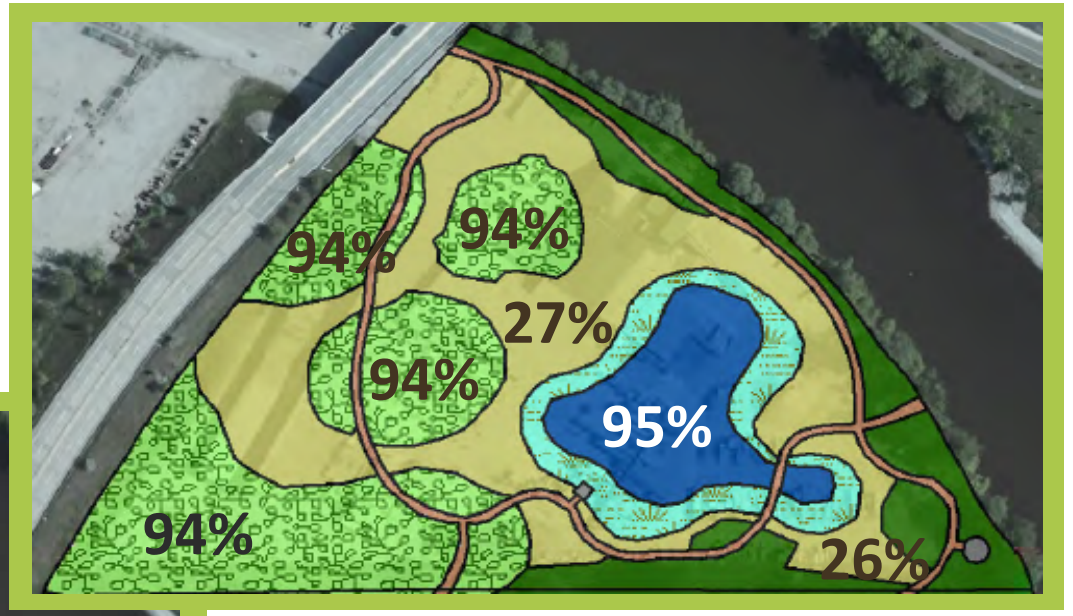


Applying the ESII Tool



Water quantity scores on the city portion of the site for the four alternatives





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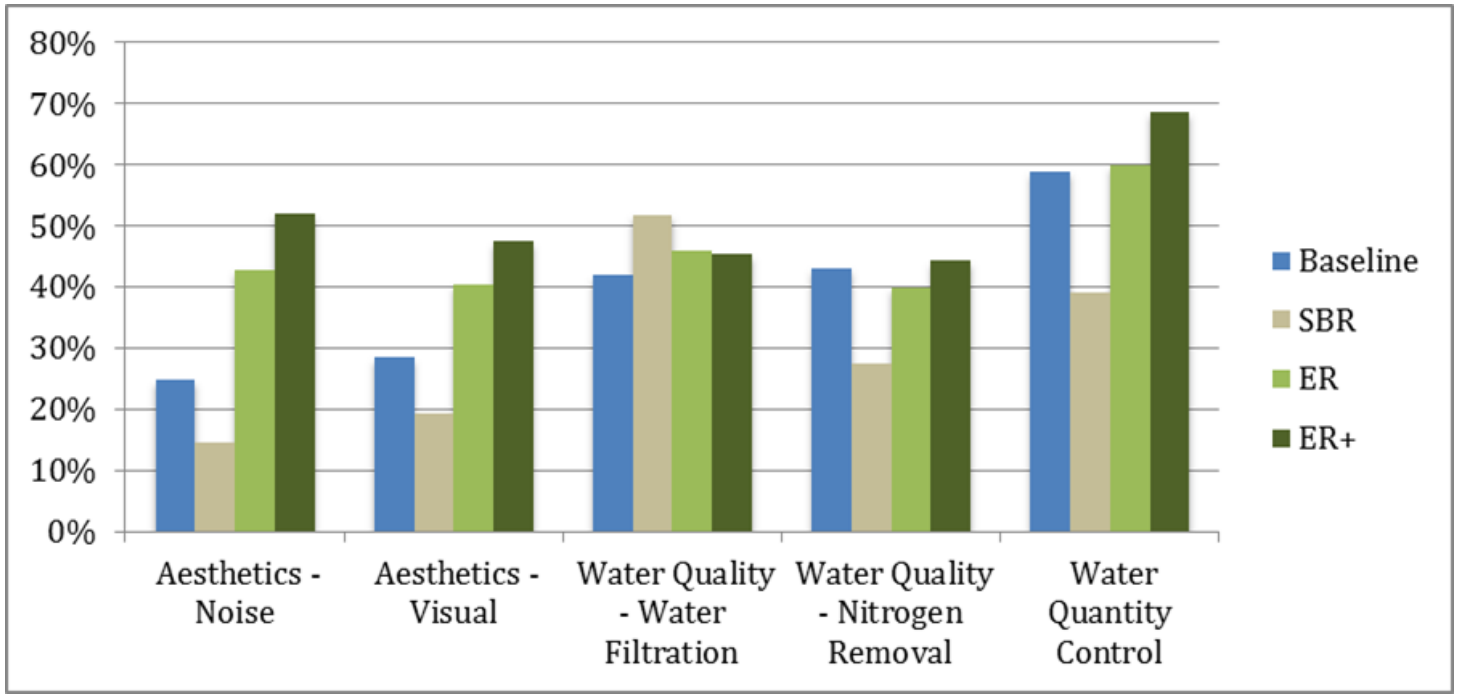
Key findings



- Standard brownfield restoration would result in lower performance for majority of ecosystem services than under baseline or ecological restoration
- ER+ would result in higher performance for all priority services (except water filtration) than under baseline or standard brownfield restoration
- ER+ alternative would save Dow estimated $2 million in O&M costs over 10 years

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Questions?

Contact Us:

support@esiitool.com

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