The Envision Sustainable Infrastructure Rating System

a Paradigm Shift for the Design of Sustainable Infrastructure

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April 18th, 2016

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Agenda

1 Sustainable Design & Asset Management

2 The Envision Framework

3 Case Study

4 Summary

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1 Sustainable Infrastructure Design and Asset Management

What is the connection?

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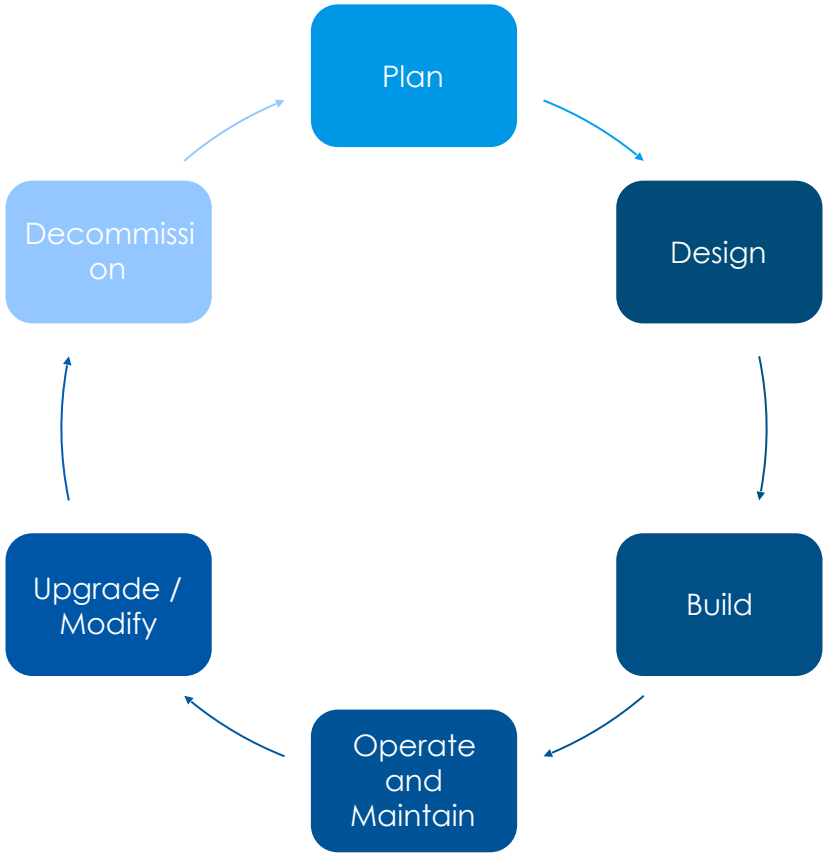
The Asset Management Cycle



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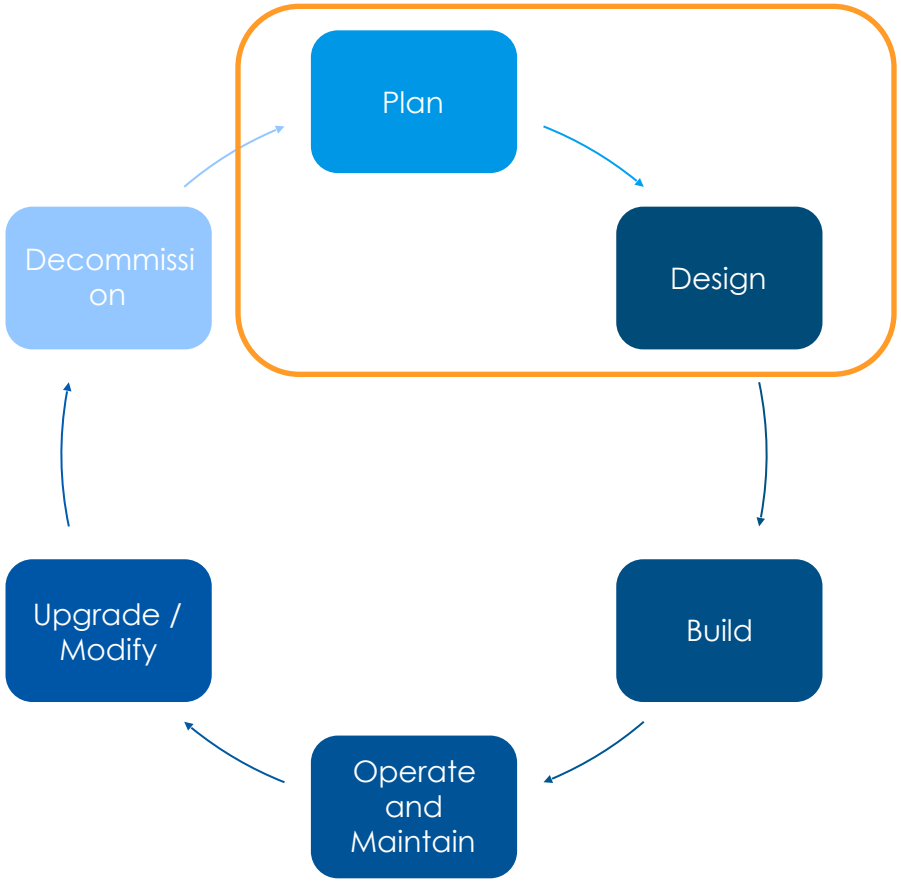
The Asset Management Cycle



Today we will be focusing on these topics – planning and design of infrastructure assets

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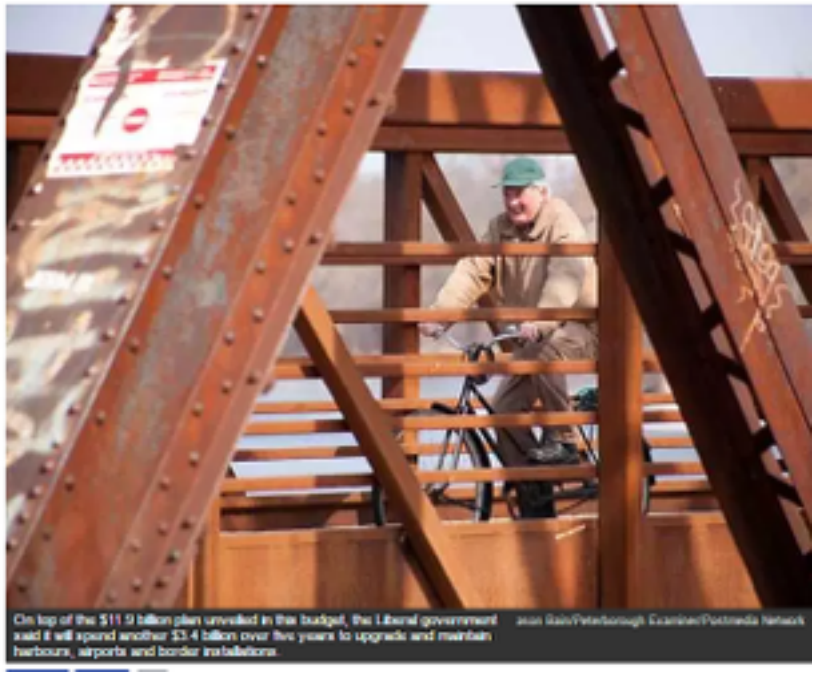
Funding = Investment = Legacy

Part of asset management is asset creation

How sustainable are we making our new investment / assets?

If we cannot afford what we already have in the ground today…how can we sustain our future investment?

Federal budget 2016: Liberals to spend $11.9 billion on infrastructure over two years



On top of the $11.9 billion plan unveiled in the budget, the Liberal government said it will spend another $3.4 billion over five years to upgrade and maintain harbours, airports and border installations.

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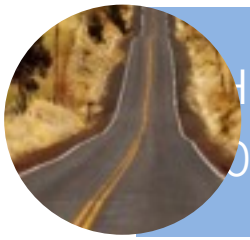
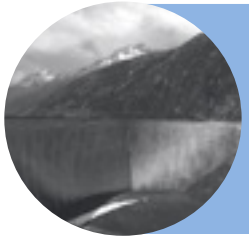
We're Building 2070 Today



Highways
0-50 years

Bridges
30-75 years

Pipelines
50-100 years



Dams
50-100 years

What are we committing to long-term?

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CANADIAN INFRASTRUCTURE REPORT CARD

FCM 2016 Infrastructure Report Card

Informing the Future
Key Messages

Key Highlights:

1. One third of national infrastructure rated **Very Poor – Fair**
2. Reinvestment rates are not keeping up with demand
3. Building for today's communities and tomorrow's Canada requires long-term planning to keep up with growth, technological change, and climate-related extreme weather

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The Infrastructure Challenge in Canada

Some Indicators of Risk…

$10 Billion
In lost productivity in Canada due to transportation infrastructure decay

~8 Million
Expected *additional* population in Canada by 2050; adding further strain on existing infrastructure

$700 million
Cost of annual potable water loss in Ontario due to failing infrastructure

$2 Billion
Infrastructure damages caused by the 2013 flooding in Alberta

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Problem:

Asset Management activities are traditionally focused on operations, maintenance, and renewal - **after** the infrastructure has been designed, installed and has been operating for some time.

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Evolution of sustainable design

Buildings → Infrastructure → Regional / Urban Planning

Where we have been:
Multiple Rating Systems
Building Scale
(e.g. LEED®)

Where we are:
Infrastructure
Project Scale

Where we are headed:
City-Scale sustainable planning

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What is Sustainable Infrastructure?

Infrastructure that is:

High Performing

Cost Effective

Resource Efficient

Environmentally Friendly

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Barriers to the 'New Paradigm' in the Design Process

- Reactive vs. proactive
- Difficulty in measuring/assessing qualitative features
- Focus on upfront capital costs vs. lifecycle
- Cost pressures
- Lack of useful tools

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2 The Envision Framework

A tool for infrastructure planning and design

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ENVISION™

www.sustainableinfrastructure.org

"Envision provides a holistic framework for planning, evaluating and rating the community, environmental, and economic benefits of all types and sizes of infrastructure projects…"

- Institute for Sustainable Infrastructure

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A Joint Collaboration

ISI Founding Organizations

ASCE
American Society of Civil Engineers

APWA
AMERICAN PUBLIC WORKS ASSOCIATION

ACEC
American Council of Engineering Companies
100 Years of Excellence

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Envision: Fast Facts

55 Credits across 5 Categories:

Quality of Life
13 credits

Leadership
10 credits

Resource Allocation
14 credits

Natural World
15 credits

Climate + Risk
8 credits

Envision applies to all sizes and types of infrastructure

ENERGY

WATER

WASTE

TRANSPORT

LANDSCAPE

INFORMATION

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Who is using Envision?

"The Envision rating system is rapidly gaining acceptance throughout the water industry in North America as well as internationally." (AWWA)

4,200 people in 20 countries

Sample Agencies/Municipalities:

- NYC DDC, MTA, DEP
- Los Angeles County
- Port Metro Vancouver
- Société de Transport de Montréal
- Metro Vancouver
- Kansas City, MO
- Atlanta, GA
- Multiple state DOT's
- Inter-American Development Bank

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Implementation in Canada

”With significant investments that are coming in over the next decade through the new Building Canada plan, there is a good opportunity to look at how we assess sustainability. That's why…we refer to sustainability rating tools such as Envision. It gives us some metrics and standards that we may want to look to. That tool in particular our organization looks to adopt and adapt where possible…”

- Ms. Kealy Dedman, CPWA President, Head Engineer City of Guelph
Federal Transportation, Infrastructure, and Communities Committee Testimony

“Project should reference the Envision system… proponents who provide an ENV SP as a key project measure may be assessed more favorably.”

- City of Revelstoke, British Columbia RFP

“Proponent must select design elements for consideration based on application of Envision framework and integrate them into architecture and engineering design.”

- Société de Transport de Montreal RFP

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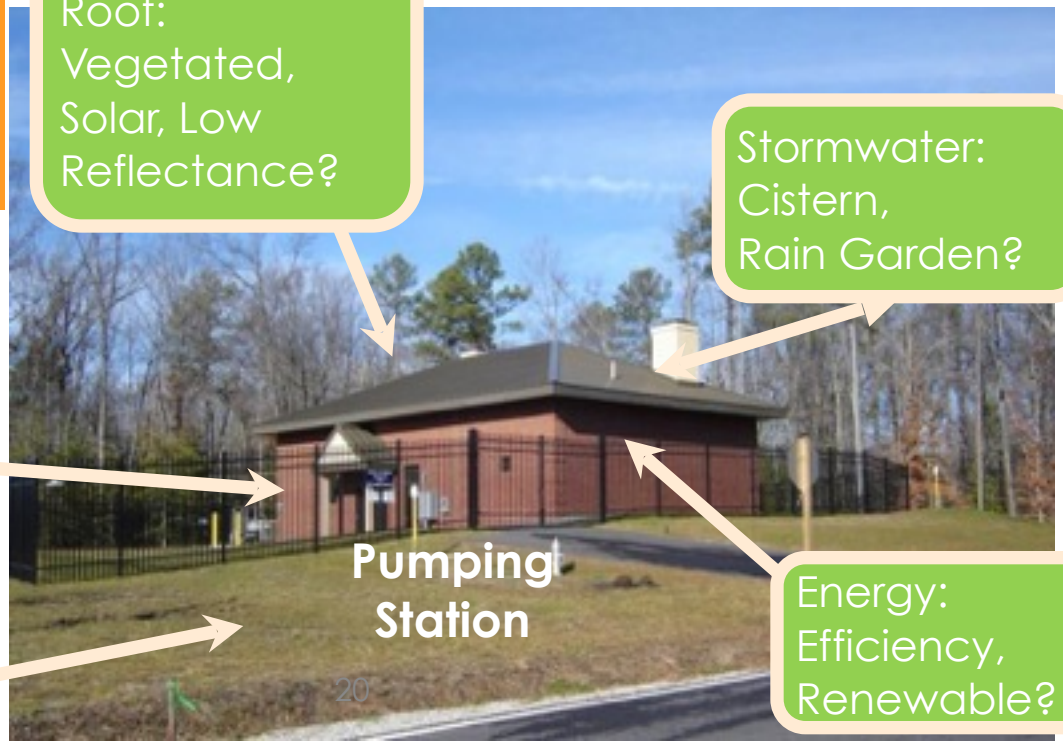
How Can Envision be Used?

AS A DESIGN FRAMEWORK

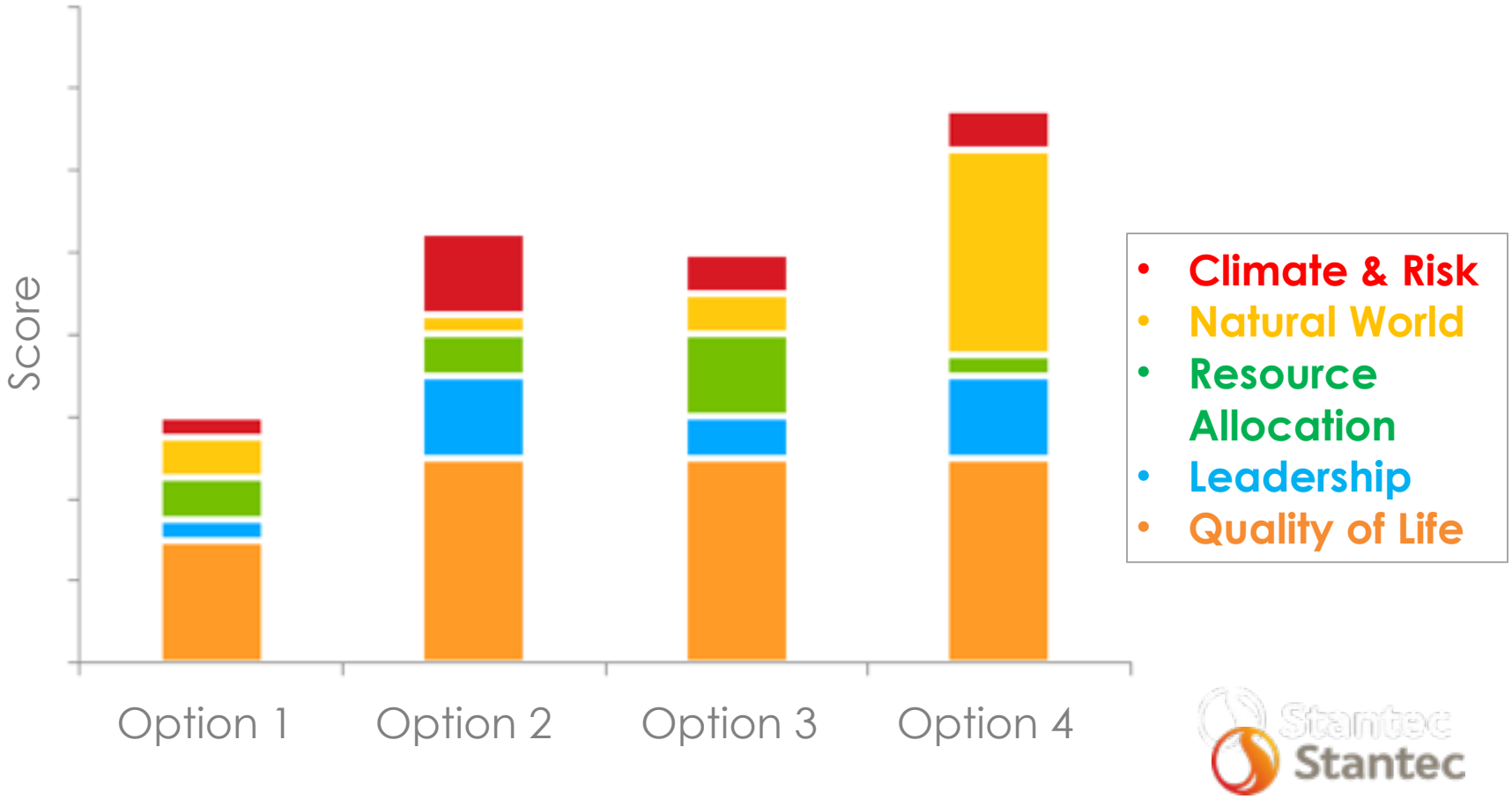
Inherent to Project:
- Noise and Odor Control
- Stakeholder Involvement
- Infrastructure Renewal
- Capacity Enhancement
- Flexible Operations
- Resiliency

Identify opportunities for incremental improvements in sustainable performance



How Can Envision be Used?

METRIC FOR SELF ASSESSMENT OF DESIGN ALTERNATIVE



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How Can Envision be Used?

THIRD PARTY ACCREDITATION

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3 Case Study

How does this play out in practice?

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Example Envision Verified Project

Grand Bend Area Wastewater Treatment Facility

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Project Overview

- Tertiary treatment plant with Biological Nutrient Removal and constructed wetland
- Facility designed to provide a simpler solution with lower capital and operating costs
- Commitments made to restore native wildlife species and to open the facility to public uses as part of broader community strategy

Existing Site

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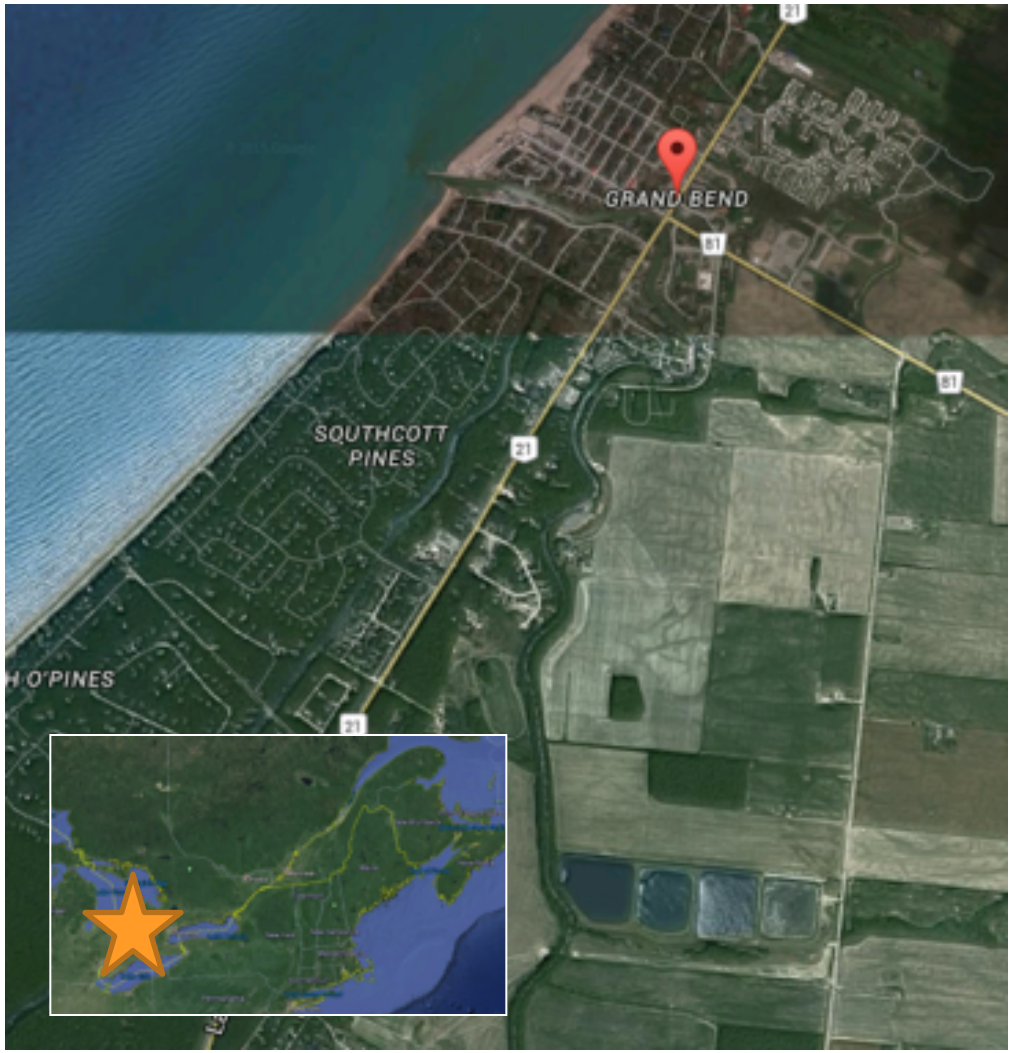
Grand Bend WWTF

Site Context



- Existing facility consisted of 4 sewage lagoons (common in area)
- Site surrounded by productive farmland
- Water quality of paramount importance – region popular with tourist and cottage owners

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Grand Bend WWTF

Project Planning

Goal:

- High quality and efficient treatment that is responsive to demand, financially viable long-term, and a fit for the community

Challenges:

- Community expectations
- Stakeholder engagement
- Redesign process
- Sustainably engineered solution
- Need for flexibility/scalability
- Financial limitations

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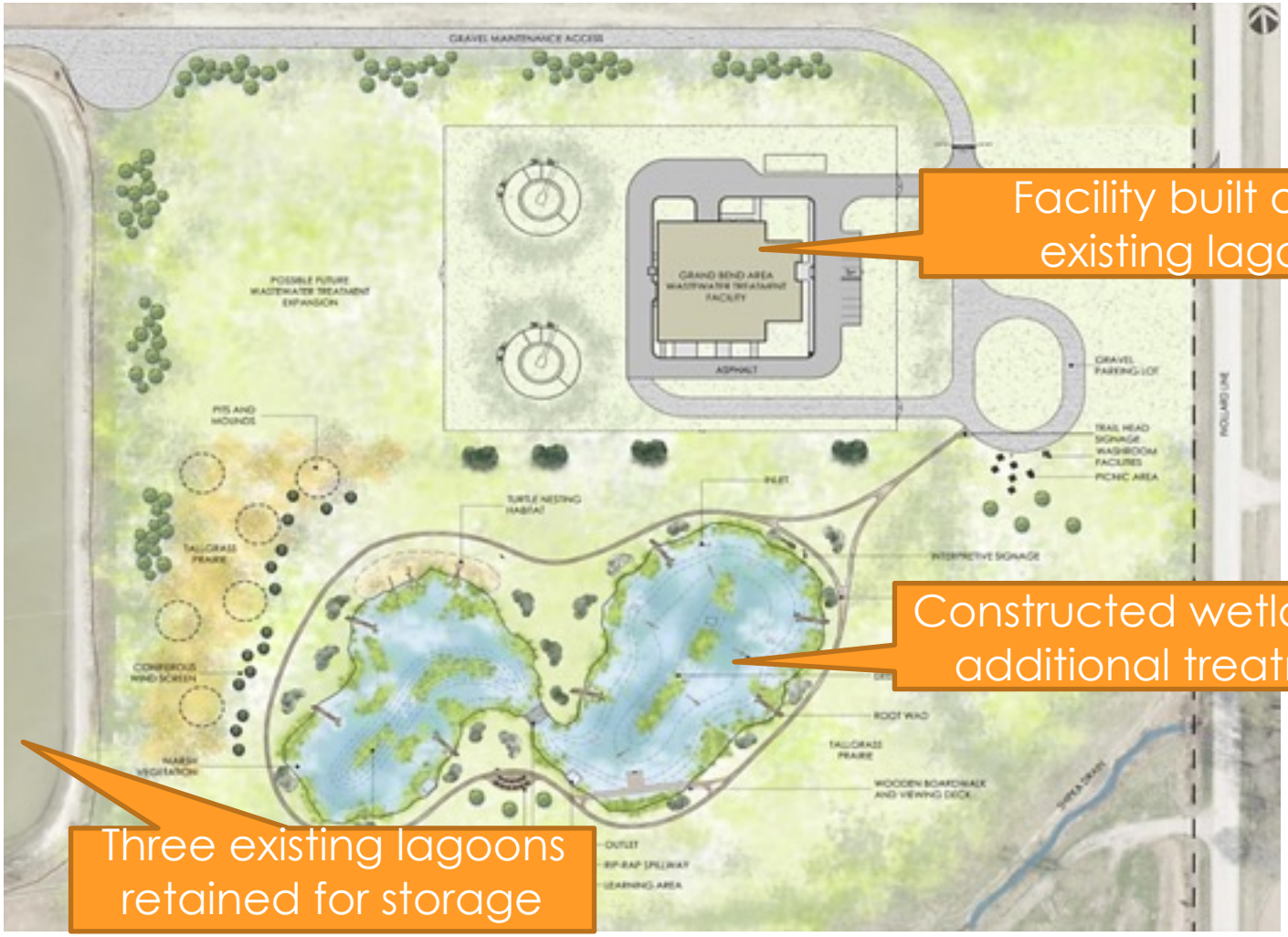
Grand Bend WWTF

Site Layout



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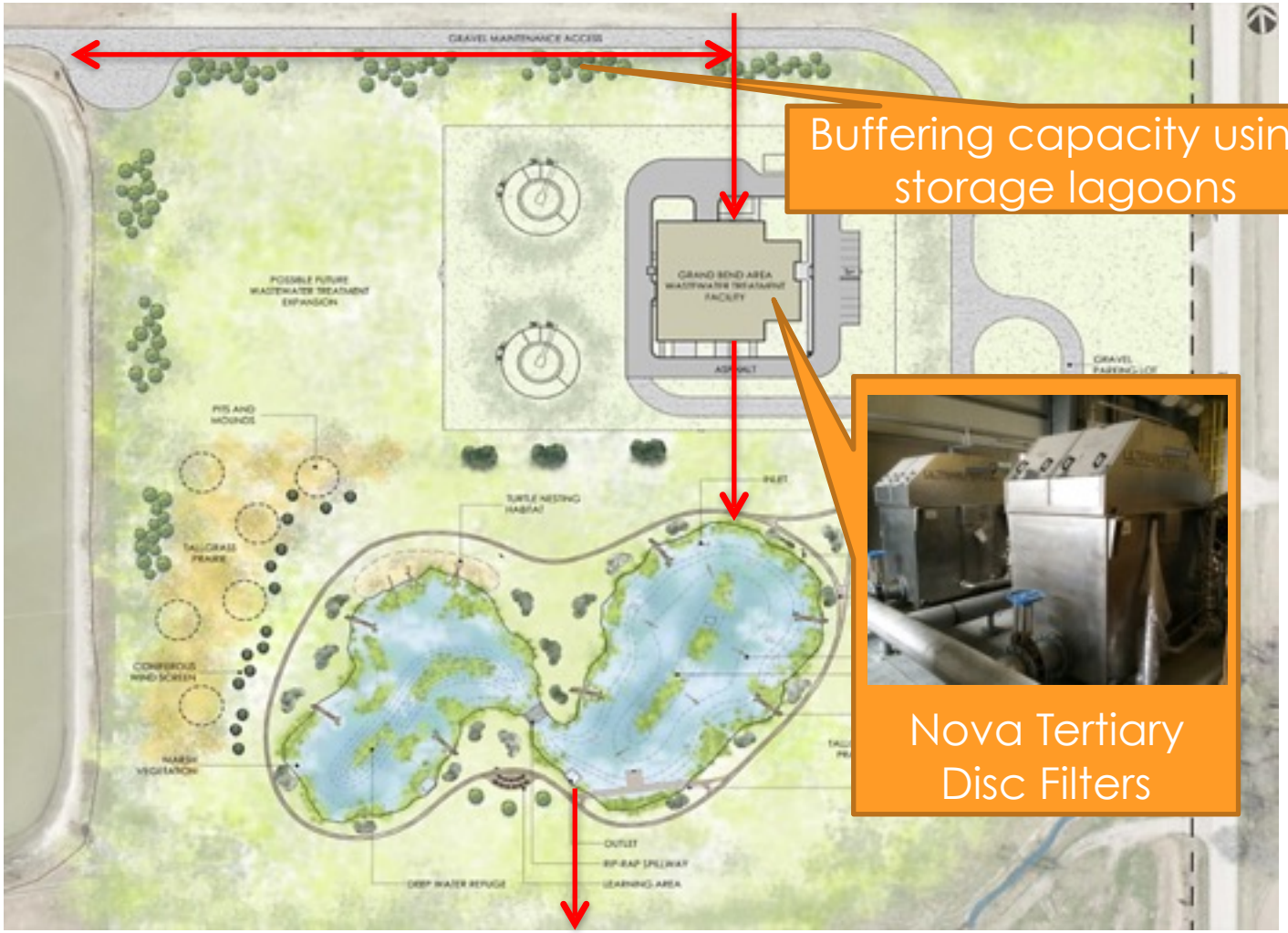
Sewage Flows



Buffering capacity using storage lagoons

Nova Tertiary Disc Filters

Ultimately discharged to Lake Huron

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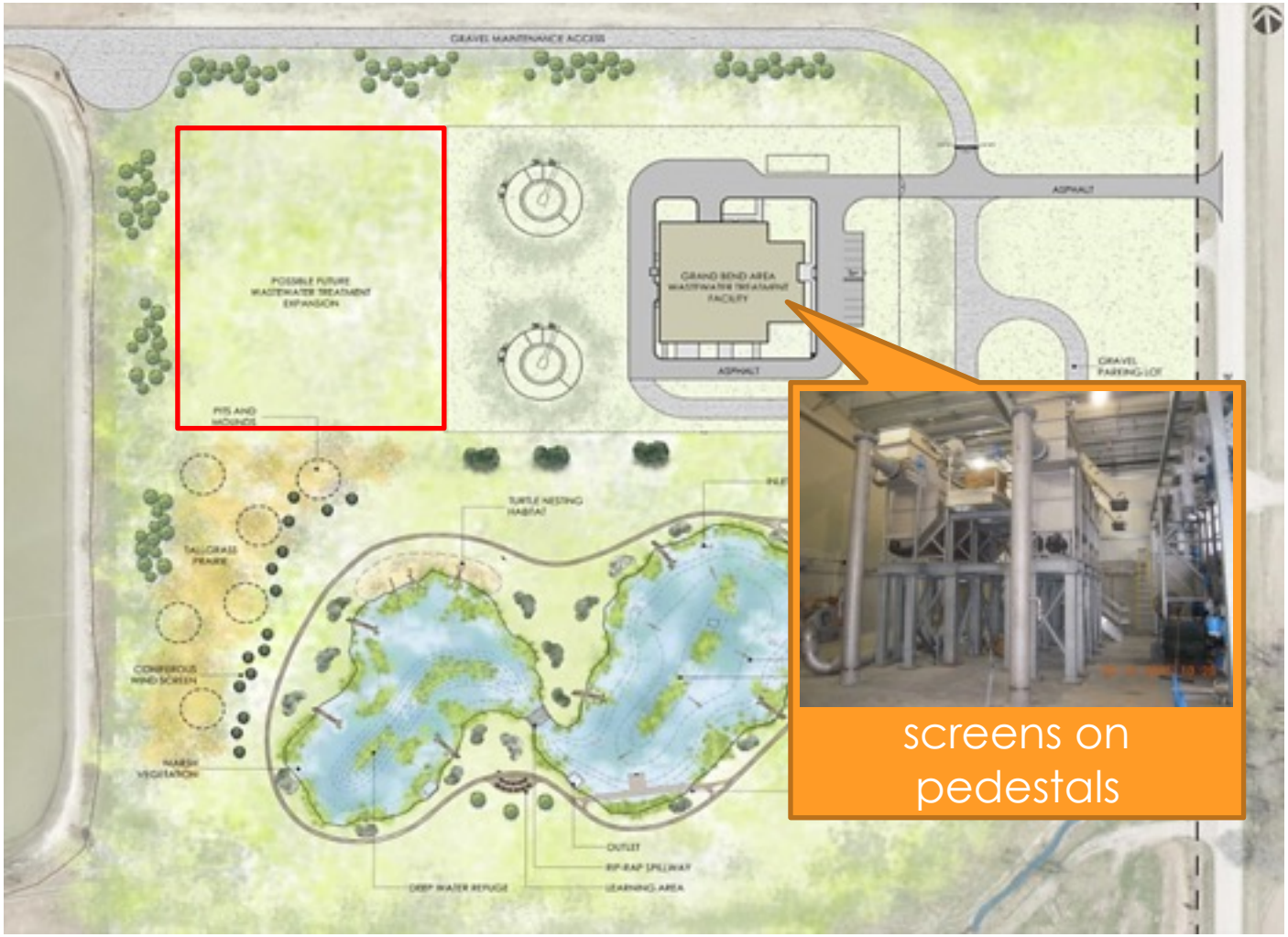
Expansion Capacity



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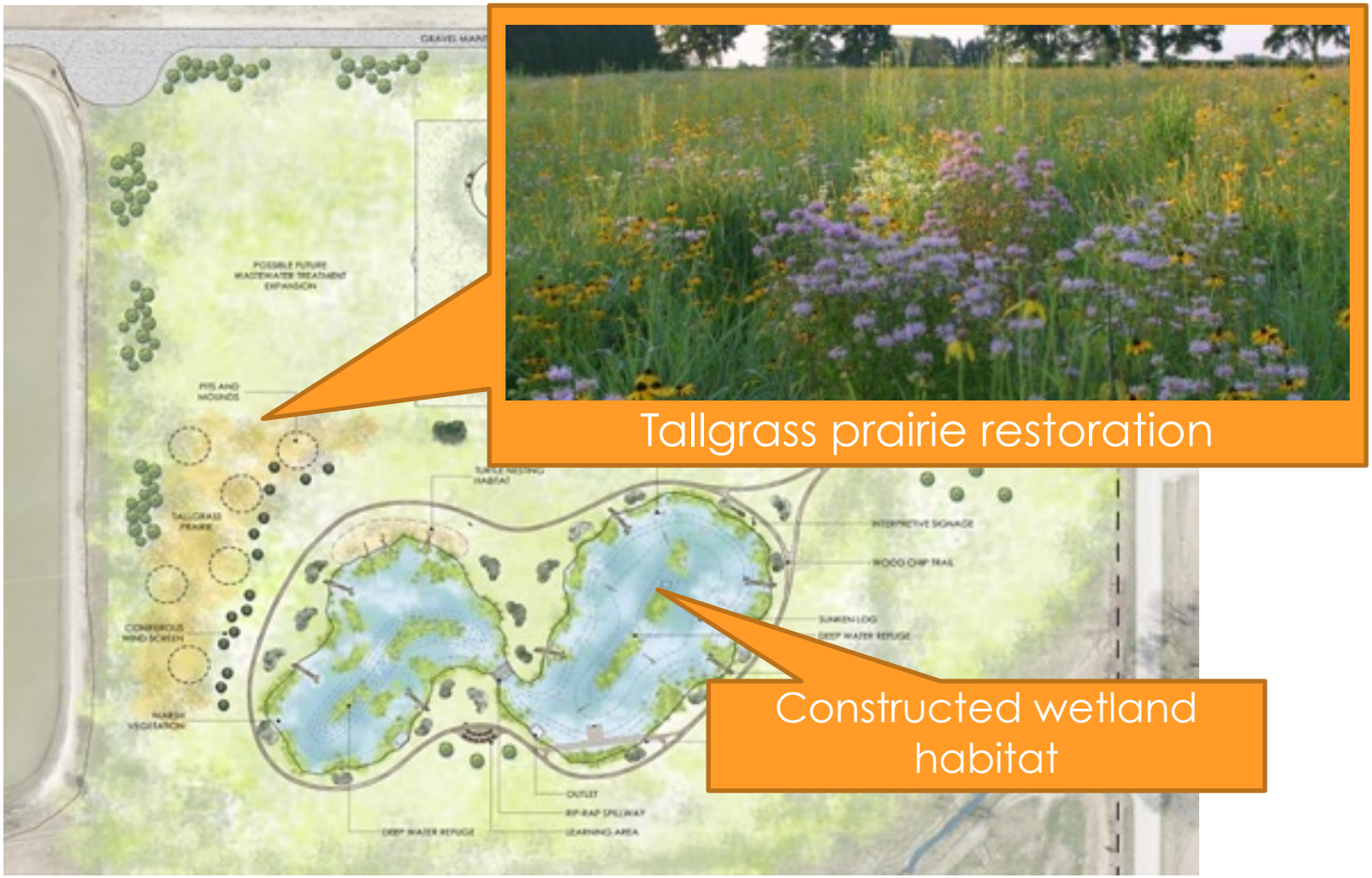
Environmental/Habitat



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Social and Educational

Natural Walking Path

Public parking and amenities

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Social and Educational

Outdoor Classroom & Observation Platforms

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Key Elements of Sustainability

QUALITY OF LIFE

Purpose, Community, Wellbeing

- Incorporated odor elimination systems to address community concerns
- Minimized negative impacts from noise and vibration in construction and operations
- Created a new amenity for local community

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Key Elements of Sustainability

LEADERSHIP

Collaboration, Management, Planning

- Extensive public consultation and collaboration with stakeholders
- Repurposed waste materials - municipal wood chip trimmings for the trail and reuse of lagoon biosolids as onsite fertilizer
- Selected design options/materials contribute to extended useful life of facility

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Key Elements of Sustainability

RESOURCE ALLOCATION

Materials, Energy, Water

- Sourced 73% of materials locally
- Eliminated 2,000 m^3 of concrete and reduced asphalt requirements from original design
- Sourced fill requirements from existing site
- Designed facility to reuse treated (but non-potable) effluent waters for process requirements, reducing potable water consumption by 98%

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Key Elements of Sustainability

NATURAL WORLD

Siting, Land & Water, Biodiversity

- Construction entirely within an existing greyfield site, preserving prime farmland
- With guidance from local conservation groups, selected native species that do not require pesticides or fertilizers
- Eliminated onsite invasive species and created new habitat to support four at-risk native species

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Key Elements of Sustainability

CLIMATE AND RISK

Emissions, Resilience

- Built in flexible features so that the facility may be operated differently in the future
- Redesign contributes to long-term financial sustainability by reducing capital cost burden on municipalities
- Facility designed to work in extreme flood scenarios and to be resilient to seismic risks

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Results

AFFORDABLE … FASTER … SUSTAINABLE

Key Project Features:

Performance
- Flexible facility that can scale to demand – innovation in design

Cost
- Affordable. Tender price under budget

Resources
- Local sourcing
- Community engagement
- Less concrete

Environment
- Re-establishing native habitats
- Net value vs. no harm




Summary

Method for integrating asset management priorities into the design process

Method to 'operationalize' municipal policies

Mechanism to facilitate cross-discipline collaboration

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Questions?

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Thank You

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