



## Level of Service, Valuation and Life-Cycle Costing for Natural Assets:

Approaches and examples from CVC-led projects

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1

## Acknowledgements



... and many agency, municipal and industry professionals who have taken the time to share information and data to inform this project

2

## Presentation Outline

- 1. Role of Natural Assets in Climate Resilience**
- 2. What are Natural Assets?**
- 3. Why do we need to estimate their Level of Service (LOS), Value and Life-cycle Costs?**
- 4. Levels of Service for Natural Assets:**
  - General LOS Process
  - Types of LOS
  - Challenges in identifying LOS for Natural Assets
  - Sample Metrics and Examples from CVC-led Projects
- 5. Valuation of Natural Assets:**
  - General Asset Valuation Approaches
  - Valuation for Asset Management Planning vs. Ecosystem Services Valuation
  - Challenges for Valuing Natural Assets
  - Sample metrics and examples from CVC-led projects

3

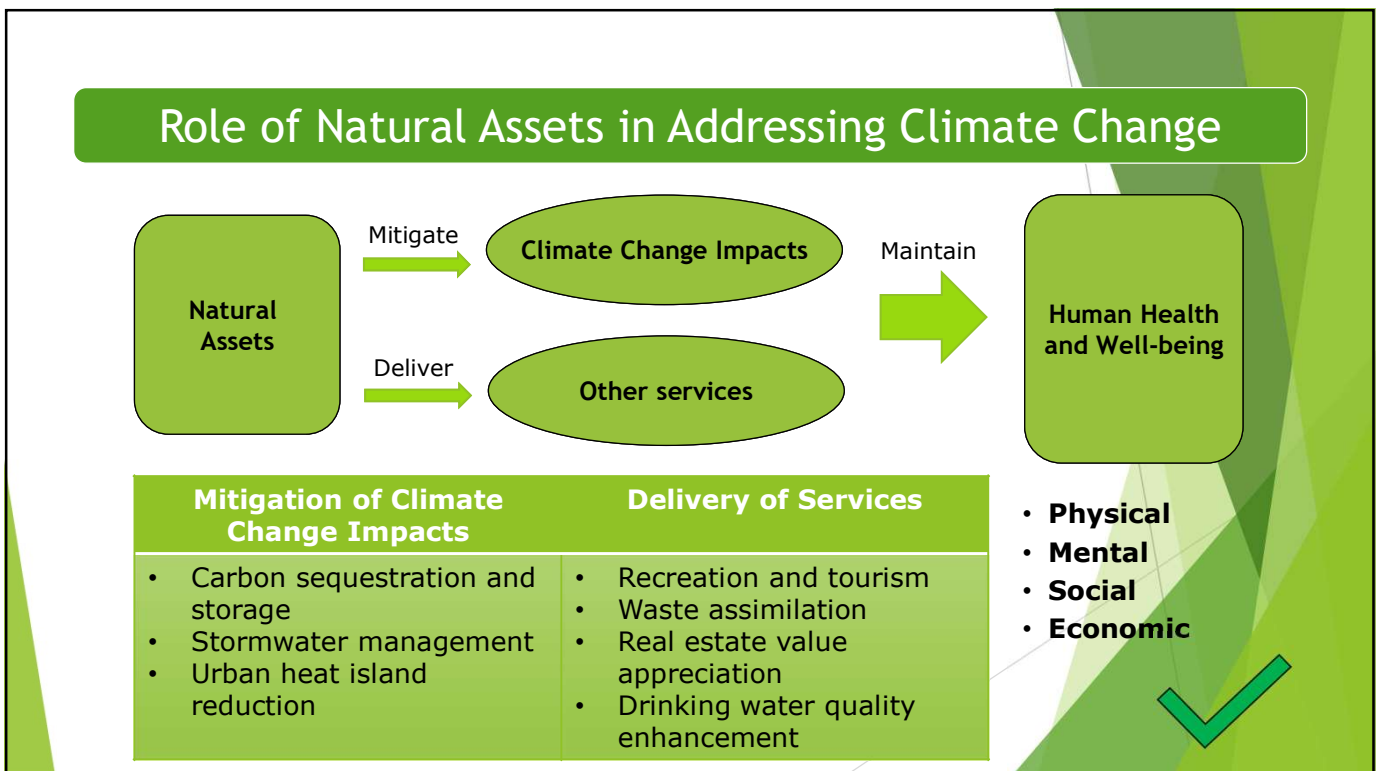
## Presentation Outline (contd.)

- 6. Life-cycle Costing for Natural Assets:**
  - Need for defensible Life-cycle Costing Data
  - Learning from the "Costing Natural Assets in Peel Region": Natural asset life cycle framework; Natural asset costing; Project results and their applications
- 7. Take Away Messages**
- 8. Upcoming Natural Asset Webinars**

4



5



6

## Natural Heritage System Protection and Climate Resilience

*Protecting and restoring the natural heritage system and its natural assets is one of the most important climate change actions we can undertake for local ecosystems.*



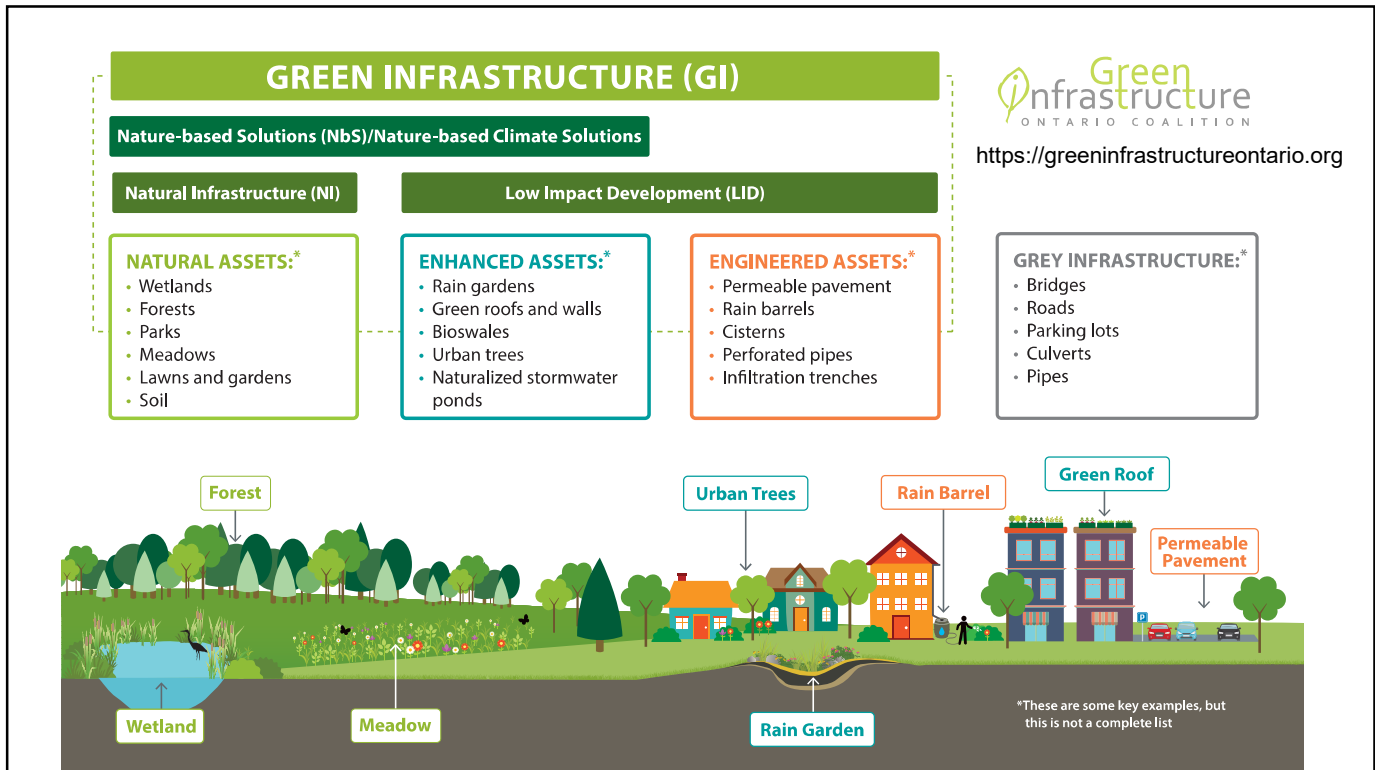
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## Defining Natural Assets

*... the stock of natural resources or ecosystems that are relied upon and managed, or could be managed, by a municipality for the sustainable provision of one or more local government services.*



8



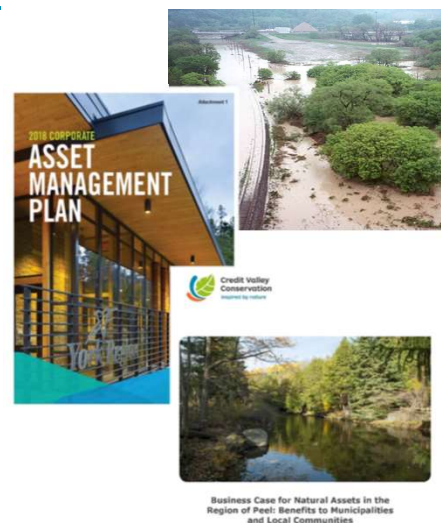
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## Rationale for Natural Asset Management

**Goal:** Help municipal partners to measure and manage the contribution of natural assets to municipal service delivery

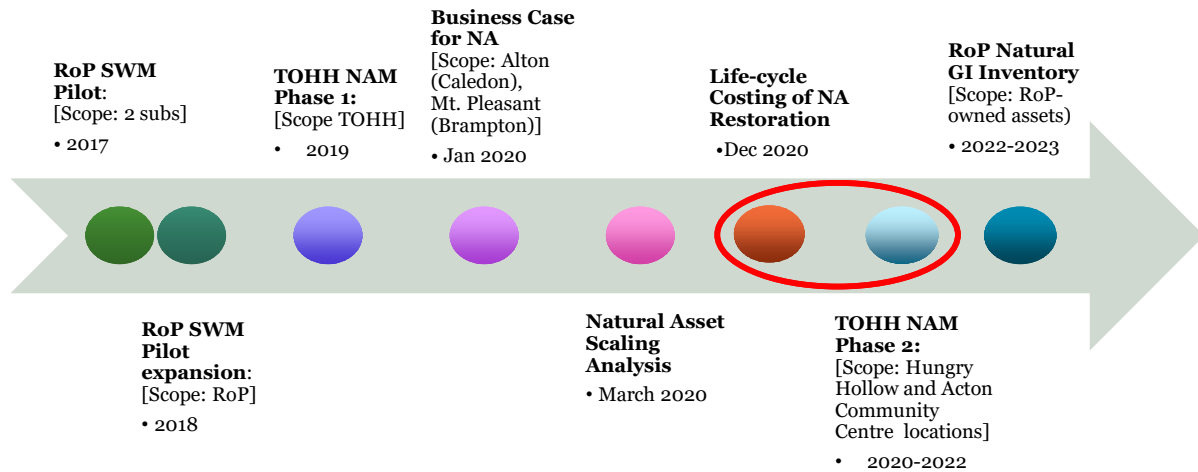
### Why include Natural Assets in AMP?

- Comply with the O.Reg.588/17
- Increase infrastructure asset portfolio resiliency to Climate Change
- Reduce the risk, capital and operating expenses of related grey infrastructure (as some natural assets can deliver equivalent services at lower cost/risk)
- Assist in maintaining the desired level of service



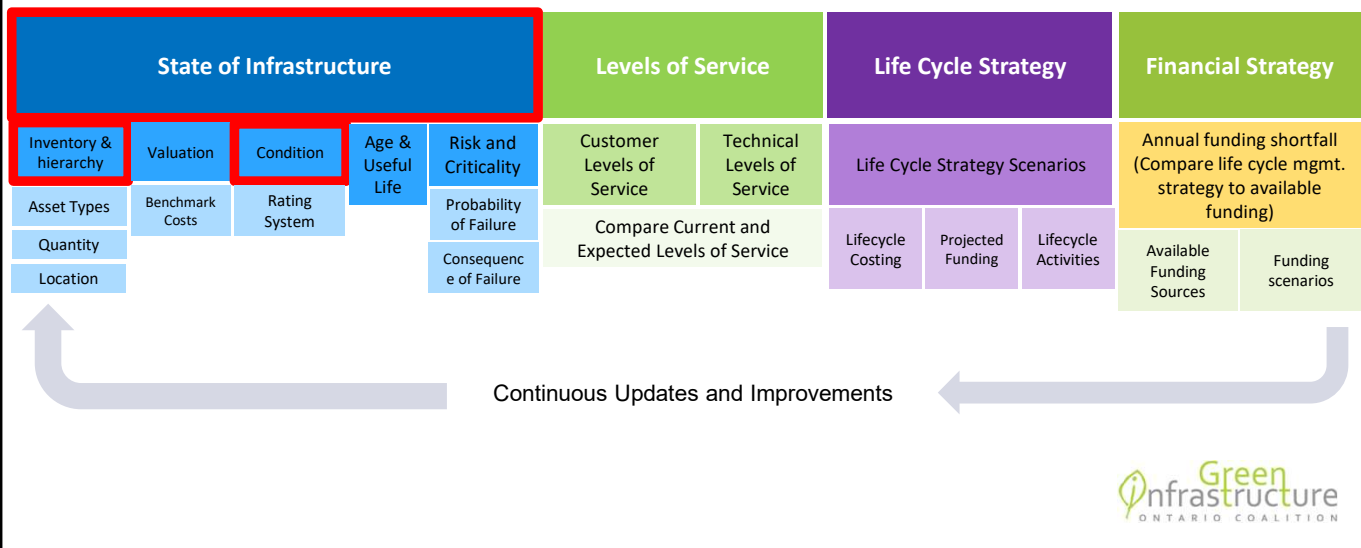
10

## CVC- led Municipal Natural Asset Management (NAM) Projects



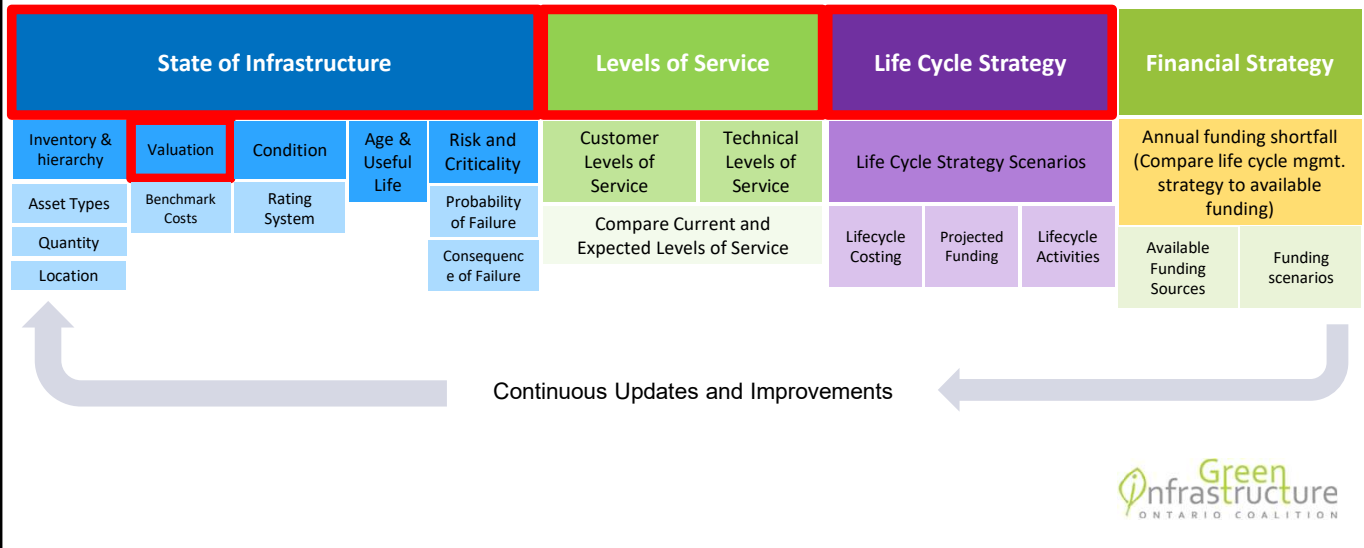
11

## Natural Asset Management



12

## Natural Asset Management



13

## Natural Assets: Levels of Service

14



## Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure

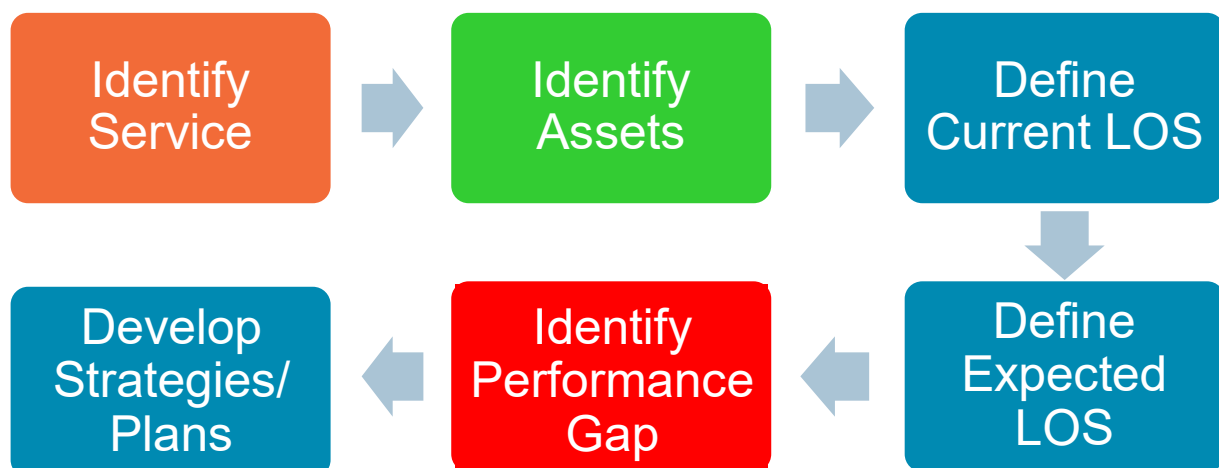
Every municipality must prepare an asset management plan for all its other municipal infrastructure assets (including Green Infrastructure) by July 1, 2024.

A municipality's asset management plan must include the following:

- Current levels of service measured by standard metrics and/or the qualitative descriptions and technical metrics established by the municipality
- Costs to maintain levels of service
- Proposed levels of service

15

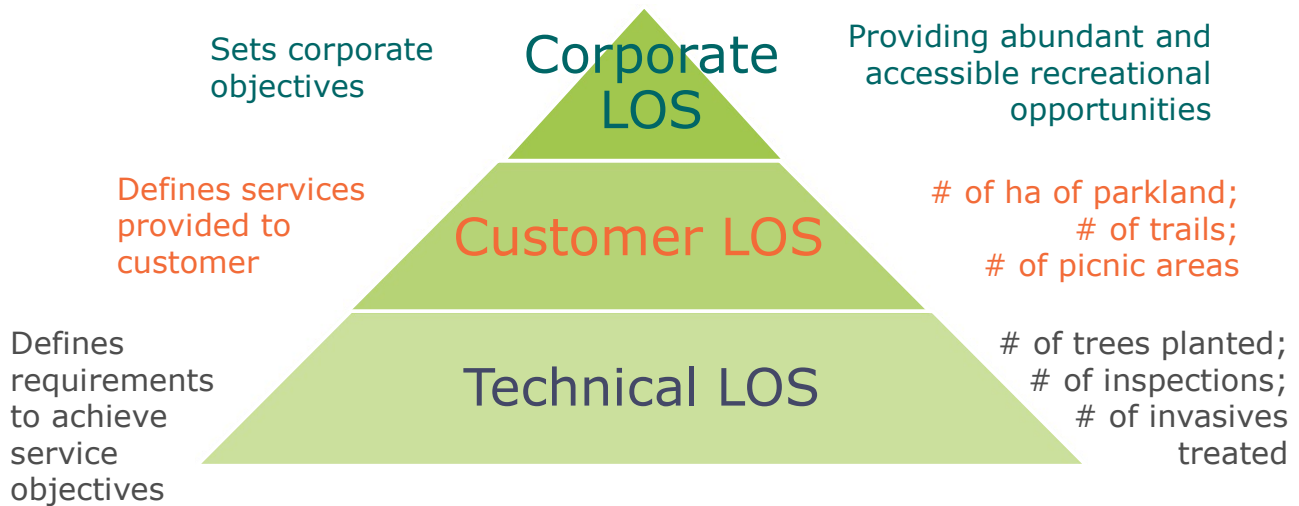
## Establishing Levels of Service



16



## Types of Levels of Service (LOS)



17

## Challenges in identifying LOS for Natural Assets

- A single Natural Asset provides **multiple** services
- Some services are not directly linked to the municipal/corporate objectives
- Relationship between a Natural Asset's Level of Service and its Condition is difficult to establish

18

## Linking Services to Relevant Assets

| Benefit Provided by Natural Assets          | Link to Municipal Services                                | Relevant Natural Assets                                      |
|---|---|--|
| Reduce stormwater impacts                   | Stormwater management                                     | Forests, wetlands, grassland                                 |
| Recreation provision and tourism attraction | Parks, recreation and tourism objectives<br>Public health | Forests, wetlands, grassland, greenspace                     |
| Reduction in urban heat                     | Public health and climate change adaptation objectives    | Forests, wetlands, greenspace, and other natural urban areas |
| Air quality improvement                     | Public health   | Forests, wetlands, greenspace, and other natural urban areas |
| Carbon sequestration                        | Climate change mitigation objectives                      | Forests, wetlands, grassland, pasture                        |
| Property value                              | Tourism objectives and property tax collection            | Forests, wetlands, grassland, greenspace                     |

19

## TOHH Natural Asset Management Phase 2 Natural Asset Ecosystem Services Valuation (DRAFT)

| Service                     | Biophysical Units   | Hungry Hollow | Acton    |
|-----------------------------|---|---------------|----------|
| Carbon sequestration        | Tonnes C sequestered per year                             | 386.3         | 20.7     |
| Recreation                  | Asset area (ha) with trails                               | 200.1         | 15.1     |
| Stormwater management       | Stormwater retention (m3)                                 | 66,564.0      | 11,461.7 |
|                             | Stormwater detention (m3)                                 | 516,996.5     | 83,032.6 |
| Property value appreciation | Count of houses within 250m of green space buffer         | 18,245        | 723      |
|                             | Count of houses within 250m to 500m of green space buffer | 68,085        | 2,896    |
| Air quality improvement     | CO removal (kg/yr)  | 1.34          | 0.05     |
|                             | O3 removal (kg/yr)  | 13,545.39     | 810.56   |
|                             | NO2 removal (kg/yr)                                       | 2,231.78      | 133.05   |
|                             | SO2 removal (kg/yr)                                       | 583.03        | 34.62    |
|                             | PM2.5 removal (kg/yr)                                     | 634.50        | 38.11    |
| Urban heat reduction        | Avoided mortality (Deaths/yr)                             | 0.10          | 0.008    |

Note: this analysis is in draft and numbers may change in the final report

20

## Natural Assets: Valuation



21

### **Ontario Regulation 588/17 Asset Management Planning for Municipal Infrastructure**

- Every municipality must prepare an asset management plan for all its other municipal infrastructure assets (including Green Infrastructure) by July 1, 2024.
- A municipality's asset management plan must report the current replacement cost per asset category

22

## Purpose of Asset Valuation in Asset Management Planning

- Provides a uniform measure for assets
- Allows to assess and compare asset investment level among service areas and asset categories
- Helps to allocate costs for asset management activities throughout assets' life-cycle
- Informs long-term asset management and financial management decisions

23

## General Valuation Approaches

**Historical:**  
original cost to purchase or  
construct the asset

**VS.**

**Current:**  
current cost of the asset in  
today's dollars

### Options for Identifying Current Cost

- **Replacement cost:** Costs of replacing an existing asset with a new asset that will provide the current required level of service
- **Inflated Historical Cost:** Historical cost inflated to current year dollars

24

## Challenges for Natural Asset Valuation in AMP

- A single Natural Asset provides multiple services
- Most Natural Assets do not have end of life and do not need to be replaced
- Desired service capacity can take long time to achieve
- No common practice in establishing a depreciation rate

25

## Asset Management Plan (AMP) Valuation vs. Ecosystem Service Valuation

### Ecosystem Services Valuation

- Economic Valuation
- Service-focused
- Useful for making a business case for protecting, restoring and managing natural assets
- Does not align with the valuation method used for built assets

### AMP Asset Valuation

- Current replacement cost (Restoration cost can be used)
- Asset focused
- Consistent across all assets in AMP

Source: Adapted from Green Infrastructure Ontario

26

## Value of Ecosystem Services: Methods

### Non-market Value

**Avoided damage costs, Substitute costs:** the cost of human-made technology to substitute for services performed by ecosystems

### Revealed preferences

- **Travel cost:** values associated with ecosystems used for recreation
- **Hedonic valuation:** values for ecosystem services that directly affect market prices, e.g., impact of environmental attributes on housing prices

### Stated preferences

**Contingent valuation/choice experiments:** estimates of Willingness to Pay (WTP) or Willingness to Accept (WTA)

27

## TOHH Natural Asset Management Phase 2 Level of Service Valuation(DRAFT)

| Service (annual)      | Hungry Hollow       | Acton              |
|-----------------------|---------------------|--------------------|
| Carbon sequestration  | \$73,000            | \$4,000            |
| Recreation            | \$737,000           | \$30,000           |
| Stormwater management | \$5,335,000         | \$874,000          |
| Property values       | \$4,776,000         | \$175,000          |
| Air quality           | \$38,000            | \$2,000            |
| Urban heat            | \$816,000           | \$62,000           |
| <b>Total</b>          | <b>\$11,775,000</b> | <b>\$1,147,000</b> |

Note: this analysis is in draft and numbers may change in the final report

28

## Replacement Cost Approach

- Based on the "Life Cycle Costing of Restoration and Environmental Management Actions: Costing Natural Assets in Peel Region" (CVC 2020)
- Each individual Natural Asset was assigned an associated replacement cost
- Focused on the life cycle costs associated with the establishment and maintenance of the assets (more details in upcoming slides on Life-cycle Costing)

29

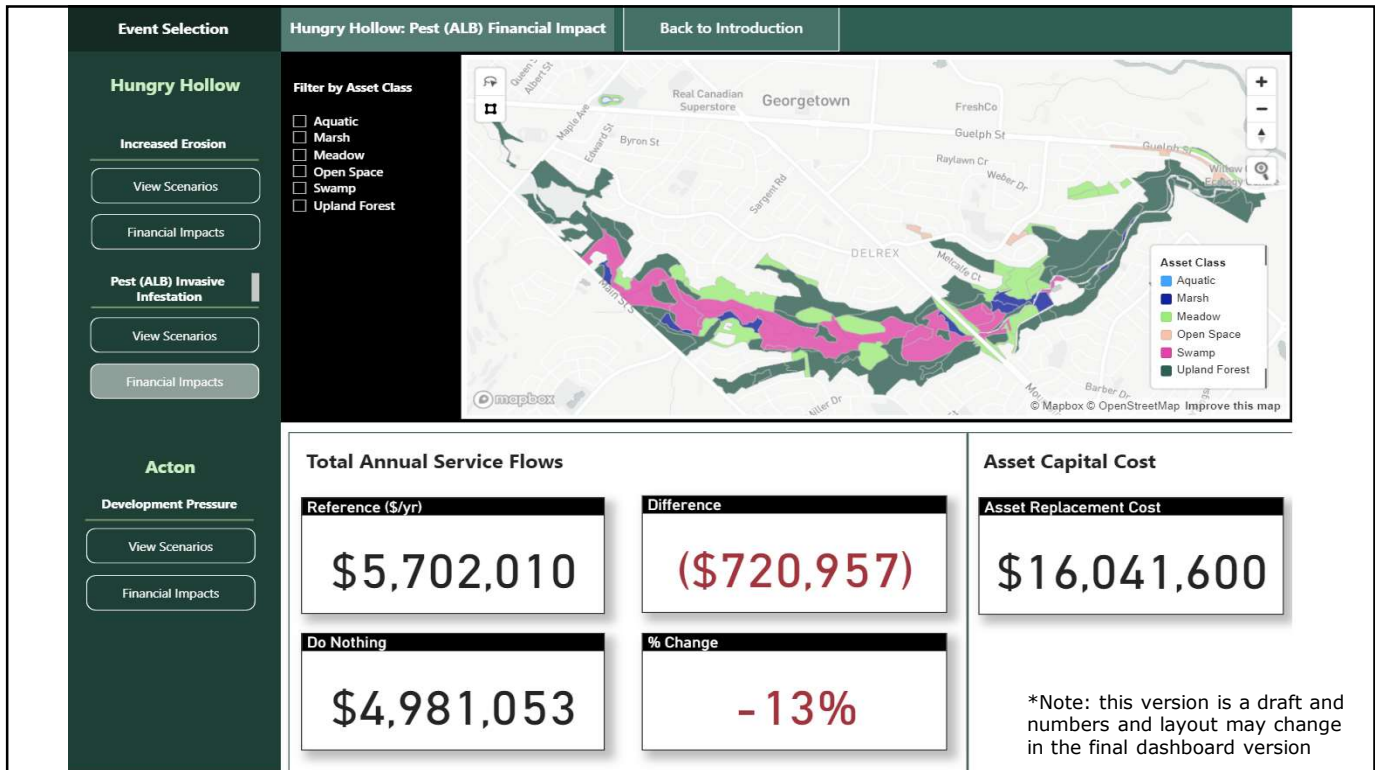
## TOHH Natural Asset Management Phase 2 Replacement Value Calculation(DRAFT)

| Asset Class         | Hungry Hollow |                      | Acton Community Centre |                    |
|---------------------|---------------|----------------------|------------------------|--------------------|
|                     | Area (ha)     | Replacement Cost     | Area (ha)              | Replacement Cost   |
| Aquatic             | 3.3           | \$1,166,000          | N/A                    | N/A                |
| Marsh               | 6.7           | \$2,356,000          | N/A                    | N/A                |
| Meadow Successional | 35.0          | \$7,179,000          | 2.7                    | \$550,000          |
| Open Space          | 23.6          | \$11,968,000         | 4.3                    | \$3,009,000        |
| Swamp               | 41.5          | \$15,425,000         | 1.5                    | \$541,000          |
| Upland Forest       | 102.1         | \$23,850,000         | 6.7                    | \$1,506,000        |
| Trees               |               | \$83,070,000         |                        | \$2,097,000        |
| <b>Total</b>        | <b>212.2</b>  | <b>\$145,014,000</b> | <b>15.1</b>            | <b>\$5,607,000</b> |

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30





31

## Natural Assets Life Cycle Costing:

**Life Cycle Costing of Restoration and Environmental Management Actions: Costing Natural Assets in Peel Region" (CVC 2020)**

32

## Need for life-cycle costing data for natural assets

### Driver: O. Reg. 588/17

- Requires municipalities in Ontario to have an asset management plan in place by July 1, 2024, including natural assets.
- Requires that municipalities consider options to reduce full life cycle costs of assets in the context of infrastructure and climate change challenges, including the potential use of green infrastructure solutions.

**Gap:** lack of defensible life-cycle costing estimates for natural assets

33

## Project Objectives

1. **Develop a life cycle framework for natural assets**
2. **Define natural asset types and life-cycle management activities for costing**
3. **Generate defensible life cycle cost estimates for each of these assets** based on:
  - a. consulting team's in-house knowledge and expertise
  - b. input from CVC staff, and
  - c. engagement with municipal, agency and industry professionals



34

## Assets Included in the Scope of Work

**Manicured Lawn  
(Open Space)**



**Individual Trees  
(Outside Natural Areas)**



**Stream Corridors**



**Wetlands**



**Grasslands/Meadows**



**Upland Forests**



35

## Assets Excluded from the Scope of Work

**Shorelines & Lakes**



**Groundwater & Aquifers**



**Natural & SWM Ponds**



**Rain Gardens & Other LIDs**



**Green Roofs**



**Trails & Boardwalks**



36

### Hypothetical Natural Assets Selected (15)

| Asset Sub-type  | Existing Community   | Target Community  |
|---|--|---|
| <b>1a. Created Manicured Lawn</b>                             | 1 ha cultural meadow or old field  | 1 ha monoculture of healthy manicured lawn  |
| <b>2a. Trees in Softscape</b>                                 | 30 m x 3 m open soil or grassed area   | 3 healthy deciduous trees in a grassed area 8 - 10 m apart, mulch under dripline                            |
| <b>2b. Trees in Hardscape</b>                                 | built space able to accommodate a 30 m x 3 m x 1 m pit, 20 m height                    | 3 healthy deciduous trees in continuous trench soil cell installation (90 m³) 8 - 10 m apart, mulched       |
| <b>3a. Stream Corridor Small System</b>                       | 500 m corridor segment, 20 m wide, bankfull width up to 5 m, in need of rehabilitation | 500 m stable stream corridor with natural channel form, bankfull width up to 5 m, 20 m width well-vegetated |
| <b>3b. Stream Corridor Large System</b>                       | 500 m corridor segment, 30 m wide, bankfull width 5-20 m, in need of rehabilitation    | 500 m stable stream corridor with natural channel form, bankfull width 5-20 m, 30 m width well-vegetated    |
| <b>3c. Stream Corridor Erosion Control for a Small System</b> | same as 3a but focus on erosion protection works for 20% of the reach                  | same as 3a with on erosion protection works installed and maintained for 20% of the reach                   |
| <b>3d. Stream Corridor Erosion Control for a Large System</b> | same as 3b but focus on erosion protection works for 20% of the reach                  | same as 3b with on erosion protection works installed and maintained for 20% of the reach                   |

37

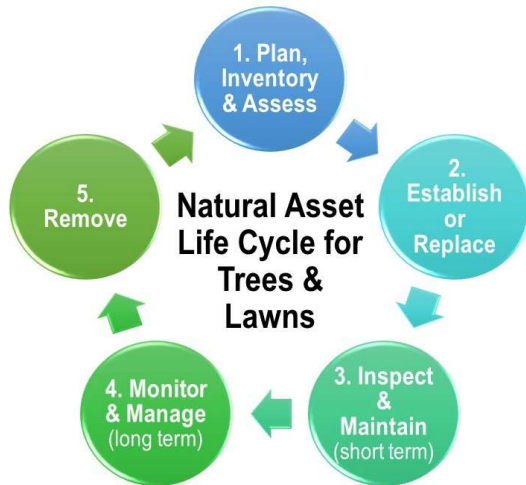
### Hypothetical Natural Assets Selected (15)

|  |  |   |
|--|--|---|
| <b>4a. Wetland - Meadow Marsh - Created</b>            | 1 ha cultural meadow or old field where existing or created hydrology can support wetland creation | 1 ha meadow marsh wetland, well-managed             |
| <b>4b. Wetland - Meadow Marsh - Acquired</b>           | 1 ha meadow marsh requiring some limited (20%) management  | 1 ha meadow marsh wetland, well-managed             |
| <b>4c. Wetland - Thicket Swamp - Acquired</b>          | 1 ha swamp thicket requiring targeted (20%) management   | 1 ha swamp thicket, well-managed                    |
| <b>5a. Upland Meadow - Created</b>                     | 1 ha open soil or manicured lawn   | 1 ha upland cultural meadow, well-managed           |
| <b>5b. Upland Meadow - Acquired</b>                    | 1 ha upland meadow habitat requiring targeted (20%) management                                     | 1 ha upland cultural meadow, well-managed           |
| <b>6a. Upland Deciduous or Mixed Forest - Creation</b> | 1 ha lawn or cropped field or upland meadow  | 1 ha upland deciduous or mixed forest, well-managed |
| <b>6b. Upland Deciduous Forest - Acquired</b>          | 1 ha deciduous forest requiring targeted (20%) management  | 1 ha upland deciduous forest, well-managed          |
| <b>6c. Upland Plantation - Acquired</b>                | 1 ha coniferous plantation requiring management to mixed forest (30-50%)                           | 1 ha upland mixed forest, well-managed              |

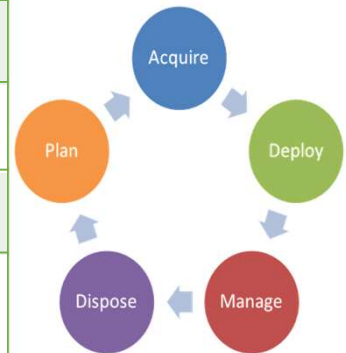
38



## Natural Asset Life Cycle Framework: Street Trees



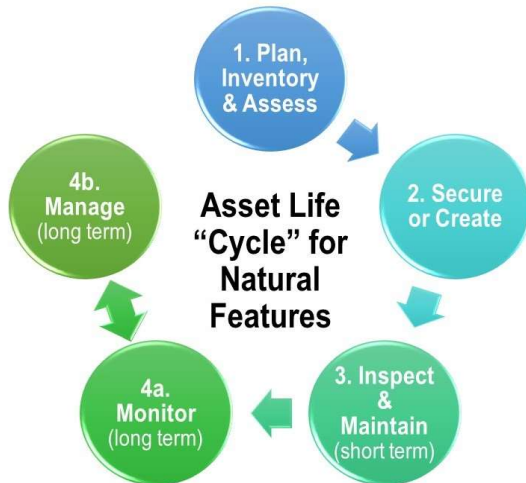
| PHASE  | DURATION                   |
|--|----------------------------|
| 1. PLAN, INVENTORY & ASSESS                          | Years 1 to 2 (two years)   |
| 2. SECURE or CREATE / ESTABLISH                      | Years 3 to 5 (three years) |
| 3. INSPECT & MAINTAIN                                | Years 6 to 10 (five years) |
| 4. MONITOR & MANAGE (including targeted restoration) | Years 11 to 49 (39 years)  |
| 5. REMOVE  | Year 50 (the final year)   |



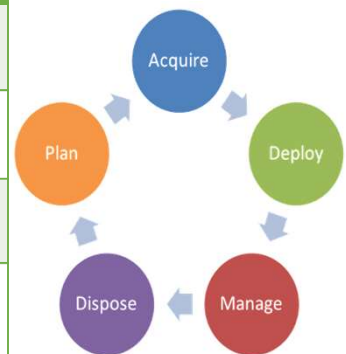
Example of an Asset Life Cycle for Grey Infrastructure (Credit: Voskuil 2020)

39

## Natural Asset Life Cycle Framework: All Other Natural Assets



| PHASE                                       | DURATION                   |
|---|----------------------------|
| 1. PLAN, INVENTORY & ASSESS                 | Years 1 to 2 (two years)   |
| 2. SECURE / CREATE / ESTABLISH              | Years 3 to 5 (three years) |
| 3. INSPECT & MAINTAIN                       | Years 6 to 10 (five years) |
| 4. MONITOR & MANAGE (including restoration) | Years 11 to 50 (40 years)  |
| 5. REMOVE                                   | Not applicable             |



Example of an Asset Life Cycle for Grey Infrastructure (Credit: Voskuil 2020)

40

## Natural Asset Costing Inputs and Considerations

Based on:

- actual projects completed in Peel Region / GTA
- current values (e.g., 2017- 2020)
- scale set for hypothetical asset (e.g., 1 ha)
- experience and judgement

Not accounting for:

- inflation or discounting over the 50-year period
- "opportunity costs" from alternative land uses
- contingencies related to risk of feature failure
- economies of scale



41

| PHASE  | Assets Management Actions/Components   | Stream Corridor Erosion Control up to 100 m (up to 5 m bankfull)  |
|--|--|---|
| <b>1. PLAN, INVENTORY AND ASSESS</b><br><br><b>2-year (YEARS 1 to 2)</b>   | <ul style="list-style-type: none"> <li>• Planning for acquisition or creation*</li> <li>• Existing assets: inventory and assessment</li> <li>• Asset creation: costs for design development</li> <li>• Permitting and approvals*.</li> <li>• Consultations with stakeholders*</li> </ul> | <b>Planning and Design</b> <ul style="list-style-type: none"> <li>• Planning for acquisition or creation*</li> <li>• Environmental Assessment (EA) and related engagement*</li> <li>• Site-specific plans and/or designs</li> </ul> <b>Site Assessment</b> <ul style="list-style-type: none"> <li>• Assessment of existing conditions</li> <li>• Assessment of landscape context and upstream / downstream reach connectivity</li> </ul>  |
| <b>2. SECURE OR CREATE (AND ESTABLISH)</b><br><br><b>Establishment Phase</b><br><br><b>3-year (YEARS 3 to 5)</b> | <ul style="list-style-type: none"> <li>• Creation: site preparation to vegetation establishment</li> <li>• Basic maintenance associated with asset creation and/ or establishment, e.g., watering and mulching</li> </ul>  | <b>Acquisition and Securement</b> <ul style="list-style-type: none"> <li>• Planning, legal, purchase*</li> </ul> <b>Site Preparation</b> <ul style="list-style-type: none"> <li>• De/Mobilization (access, staging)</li> <li>• Fencing (erosion and sediment, tree protection, pedestrian movement)</li> <li>• Clearing, grubbing, herbiciding</li> <li>• Grading (channel, offline/online wetlands)</li> <li>• Soil removal or import</li> </ul> <b>Temporary Water Management</b> <ul style="list-style-type: none"> <li>• Flow management during construction (e.g., dam and pump, diversion channel)</li> </ul> <b>Planting:</b> <ul style="list-style-type: none"> <li>• Seeding, Erosion blanket, Live stakes, Shrub/trees</li> </ul> |

42

### Example: Life-cycle Costing Stream Corridor Erosion Control up to 100 m (up to 5 m bankfull)

#### LIFE CYCLE PHASE 1: PLAN, INVENTORY and ASSESS (Years 1 - 2)

| #                          | Action   | Est Qty | Unit | Unit Cost Range | Unit Cost | Frequency (per yr) | Cost (per yr) | Total Cost | Assumptions  |
|----------------------------|--|---------|------|-----------------|-----------|--------------------|---------------|------------|--|
| <b>Planning and Design</b> |  |         |      |                 |           |                    |               |            |  |
| 1                          | Planning for acquisition or creation*  | na      | na   | na              | na        | na                 | na            |            | User defined                                       |
| 2                          | Environmental Assessment (EA) and engagement*  | na      | na   | na              | na        | na                 | na            |            | User defined                                       |
| 3                          | Site-specific plans and/or designs   | 1       | l.s. | \$15K - \$25K   | \$19,502  | na                 | \$9,751       | \$19,502   | 10% of life cycle Ph2 costs                        |
| <b>Site Assessment</b>     |  |         |      |                 |           |                    |               |            |  |
| 4                          | Assessment of existing conditions (e.g., topography, soils, geomorphology, drainage and hydrology) | 1       | l.s. | \$10K - \$20K   | \$15,000  | na                 | na            | \$15,000   | Lump sum for 20% of 500 m long corridor, 20 m wide |
| 5                          | Assessment of landscape context and upstream / downstream reach connectivity                       | 1       | l.s. | \$15K - \$25K   | \$20,000  | na                 | na            | \$20,000   | Lump sum for up to 200 m upstream and downstream   |
| 6                          | Coordination of access and permissions*  | na      | na   | na              | na        | na                 | na            |            | User defined                                       |
| <b>Total</b>               |  |         |      |                 |           |                    |               |            |  |

43

### Summary of Estimated Moderate Life Cycle Costs

| ASSET SUB-TYPE  | COSTS BY PHASE |             |            |                  |         | TOTALS      |
|---|----------------|-------------|------------|------------------|---------|-------------|
|   | PHASE 1        | PHASE 2     | PHASE 3    | PHASE 4          | PHASE 5 |             |
|   | Yrs 1 - 2      | Yrs 3 - 5   | Yrs 6 - 10 | Yrs 11 - 49 / 50 | Yr 50   |             |
| 1a. Manicured Lawn – Creation (1 ha)                                    | \$1,313        | \$202,575   | \$79,800   | \$693,579        | NA      | \$977,267   |
| 2a. Individual Trees in Softscape (3 trees)                             | \$873          | \$6,481     | \$6,525    | \$24,512         | \$7,500 | \$45,891    |
| 2b. Individual Trees in Hardscape (3 trees)                             | \$4,373        | \$41,481    | \$6,525    | \$42,647         | \$7,500 | \$102,526   |
| 3a. Stream Corridor for a Small System – Rehabilitation (500 m x 20 m)  | \$109,100      | \$741,000   | \$58,500   | \$206,000        | NA      | \$1,114,600 |
| 3b. Stream Corridor for a Large System – Rehabilitation (500 m x 30 m)  | \$145,050      | \$1,050,500 | \$83,500   | \$306,000        | NA      | \$1,585,050 |
| 3c. Stream Corridor Erosion Control for a Small System (100 m x 20 m)   | \$54,502       | \$195,020   | \$58,500   | \$206,000        | NA      | \$514,022   |
| 3d. Stream Corridor Erosion Control for a Large System (100 m x 30 m)   | \$74,920       | \$349,200   | \$83,500   | \$306,000        | NA      | \$813,620   |
| 4a. Wetland - Meadow Marsh – Creation (1 ha)                            | \$27,863       | \$357,250   | \$13,750   | \$254,000        | NA      | \$652,863   |
| 4b. Wetland - Meadow Marsh – Acquisition (1 ha)                         | \$11,675       | \$67,000    | \$11,250   | \$262,000        | NA      | \$351,925   |
| 4c. Wetland - Thicket Swamp – Acquisition (1 ha)                        | \$11,775       | \$71,000    | \$11,250   | \$278,000        | NA      | \$372,025   |
| 5a. Cultural Meadow – Creation (1 ha)                                   | \$15,935       | \$168,700   | \$15,250   | \$127,500        | NA      | \$327,385   |
| 5b. Cultural Meadow – Acquisition (1 ha)                                | \$8,540        | \$41,600    | \$15,250   | \$127,500        | NA      | \$192,890   |
| 6a. Deciduous or Mixed Forest – Creation (1 ha)                         | \$22,439       | \$192,520   | \$63,000   | \$198,000        | NA      | \$475,959   |
| 6b. Deciduous Forest – Creation (1 ha)                                  | \$20,450       | \$84,500    | \$20,250   | \$98,000         | NA      | \$223,200   |
| 6c. Cultural Plantation to be managed as Mixed Forest – Acquired (1 ha) | \$21,080       | \$90,800    | \$24,750   | \$120,000        | NA      | \$256,630   |

44



## Some interesting findings

- The life cycle costs for establishing and maintaining 1 ha of lawn over 50 years;
  - 2-4 times more expensive than creating / establishing and maintaining 1 ha of wetland, upland meadow or forest
  - comparable to rehabilitating a 500 m reach of a 20 m wide stream corridor
- For all created natural assets ~50% of the costs were for Phases 1 and 2 (i.e., planning, assessment, creation or initial restoration) in the first 5 years
- Creation of natural assets is approximately twice as expensive as maintaining the good condition of an existing asset through restoration and management
- The costs for created assets in the second 50-year life cycle would be approximately halved and would be comparable to acquired assets

45

## Project Outcomes

The framework and the database developed for this project:

- informs the business case for municipal investment in natural assets
- provides tools for municipalities to track their natural asset activities from a life cycle perspective,
- provides solid basis for calculating replacement costs for natural assets for AMPs, and
- helps broaden recognition and acceptance of natural assets as important contributors to critical municipal services that help reduce risks and enhance services in a context of climate change



46

## Key Take Away Messages

- Natural assets are important for climate change mitigation and provide critical municipal services
- Establishing an inventory for natural assets is first key step followed by condition and risk assessment, valuation, life-cycle costing and LOS assessments. All these are critical components required for a comprehensive asset management strategy.
- Natural assets and their services do not always fit easily in the AMP process. Assumptions will have to be made, and it is ok.
- Ecosystem valuation is not a requirement under the AMP, but can be a useful tool for building a business case for Natural Assets

47

## 2022 STEP Webinar Series

- March 31 – Overview of the Ecological Land Classification System
- April 7 – Natural Asset Inventory and Condition Assessment (Part 1)
- April 28 – Fish and Wildlife Passage at Bridges and Culverts
- May 5 – Level of Service, Valuation and Life-Cycle Costing for Natural Assets (Part 2)
- June 2 – Climate Considerations for Management of Natural Features
- June 23 – CVC Ecosystem Offsetting Guidelines
- September 8 – Building Business Case for Natural Assets (Part 3)
- September 29 – Biodiversity Matters in Managing Natural Assets

<https://sustainabletechnologies.ca/events/2022-webinar-series/>

48

## questions?

Link to the life-cycle costing report:

[https://cvc.ca/wp-content/uploads/2021/09/2020-12-15\\_CVC\\_NatAssetLifeCycleReport\\_220046\\_FINAL.pdf](https://cvc.ca/wp-content/uploads/2021/09/2020-12-15_CVC_NatAssetLifeCycleReport_220046_FINAL.pdf)

Costing spreadsheet can be provided by CVC on request

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