Colwood

Toward natural asset management in the

City of Colwood

British Columbia

Summary of inventory results and recommendations
May 2022

This document features interactive elements! Clicking on a heading or sub-heading in the Table of Contents (ToC) will take you directly to that page. Also, clicking on page numbers in the footer will bring you back to the ToC.

Municipal Natural Assets Initiative

MNAI.CA

Making Nature Count
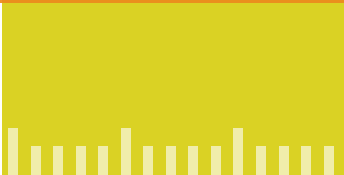
Invest in Nature

The Municipal Natural Assets Initiative (MNAI) is a Canadian not-for-profit that is changing the way municipalities deliver everyday services - increasing the quality and resilience of infrastructure at lower costs and reduced risk. The MNAI team provides scientific, economic and municipal expertise to support and guide local governments in identifying, valuing and accounting for natural assets in their financial planning and asset management programs, and developing leading-edge, sustainable and climate-resilient infrastructure.

Disclaimer

While reasonable efforts have been made to ensure the accuracy of the Report's content, any statements made are made only as of the date of the Report and such information and data are subject to uncertainties, inaccuracies, limitations and to changes based on future events. Municipal Natural Assets Initiative makes no representations, warranties or guarantees (express, implied, statutory or otherwise) regarding the data on which the information is based or the information itself, including quality, accuracy, usefulness, fitness for any particular purpose, reliability, completeness or otherwise, and assumes no liability or responsibility for any inaccuracy, error or omission, or for any loss or damage arising in connection with or attributable to any action or decision taken as a result of using or relying on the information in the Report.

Table of Contents

1 Purpose

This document summarizes the results of a project to develop a natural asset inventory for the City of Colwood, British Columbia, and documents steps the local government can take to proceed to a full natural asset management initiative.

2 Introduction

What are municipal natural assets

The term *municipal natural assets* refers to the stock of natural resources or ecosystems that a municipality, regional district, or other form of local government could rely upon or manage for the sustainable provision of one or more local government services[1].

Why manage natural assets

A growing number of local governments recognize that it is as important to understand, measure, manage and account for natural assets as it is for engineered assets. Doing so can enable local governments to better provide *core* services such as stormwater management, water filtration, and protection from flooding and erosion, as well as *additional* services such as those related to recreation, health, and culture. Outcomes of what is becoming known as *municipal natural asset management* can include cost-effective and reliable delivery of services, support for climate change adaptation and mitigation, and enhanced biodiversity.

How to manage natural assets

There are numerous ways for local governments to manage natural assets. The Municipal Natural Assets Initiative (MNAI) uses methodologies and tools rooted in standard asset management and provides a range of advisory services to help local governments implement them. MNAI has developed the methods and tools with significant investments, piloting, refinement, peer review, and documentation of lessons in multiple Canadian provinces. MNAI's mission is to make natural asset management a mainstream practice across Canada, and in support of this, for local governments to accept and use the methodologies and tools in standard ways across the country.

---

1   *mnai.ca/media/2018/02/finaldesignedsept18mnai.pdf*

What is a natural asset inventory?

Natural asset inventories provide details on the types of natural assets a local government relies upon[2], their condition, and the risks they face. As depicted in Figure 1 and explained in detail in the Annex, a natural asset inventory is the first component of the Assessment phase. The Assessment phase, in turn, is the first of three phases of a full natural asset management project. By itself, an inventory will not give a sense of asset value but is an essential first step in the full natural asset management project.
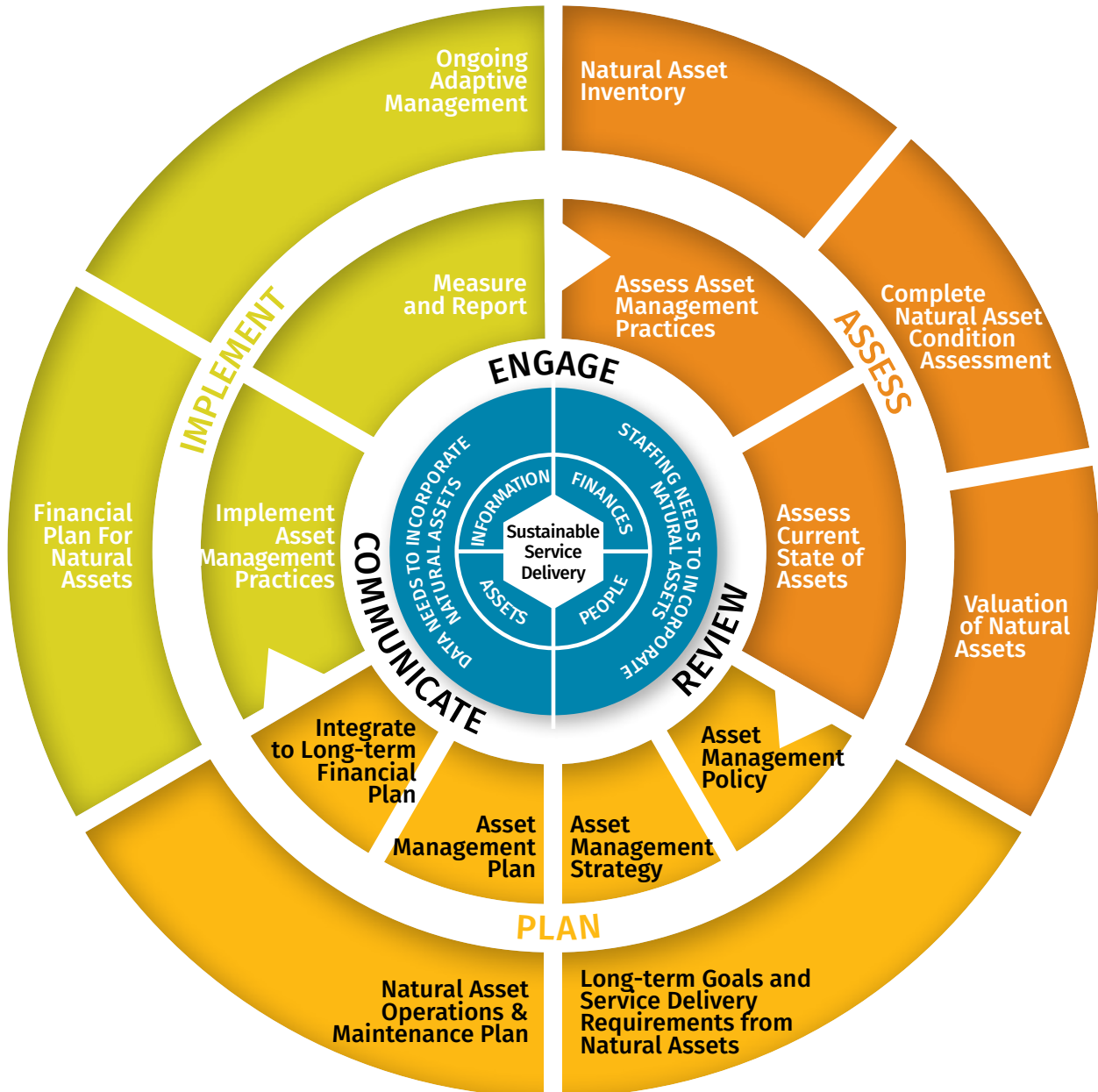

Figure 1: The Asset Management Process. MNAI has adapted this for use with natural assets.

---

2   *Note that many local governments rely on services from natural assets they do not own.*

3 Local government context

3.1. General
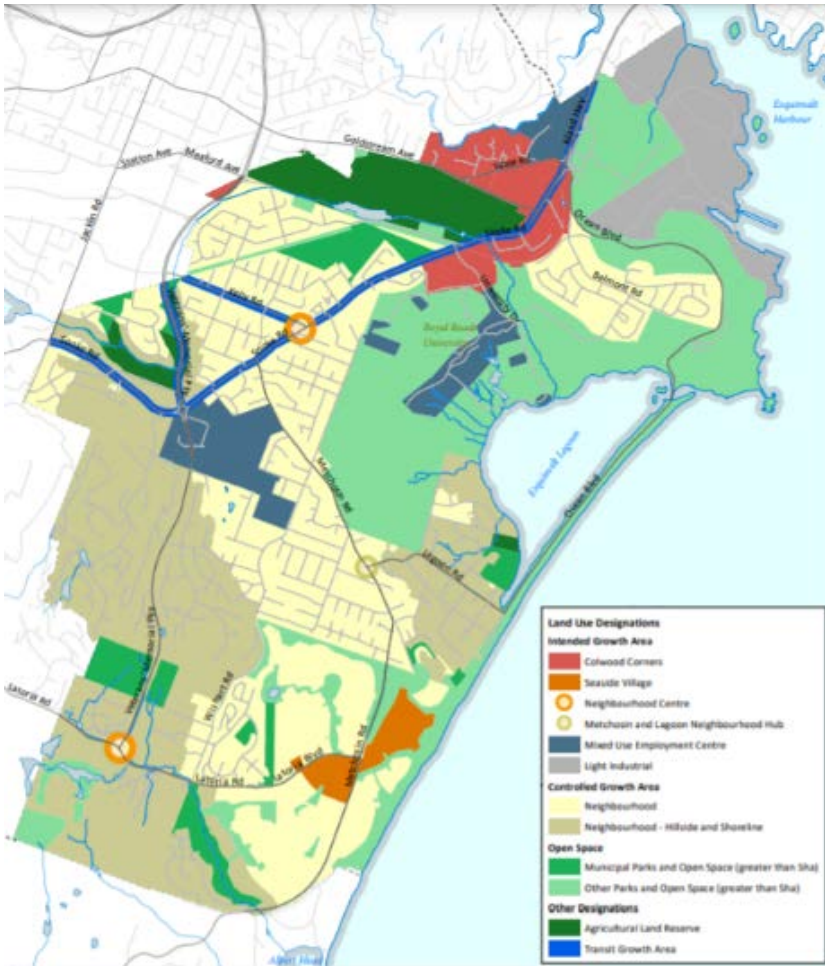
Figure 2: The City of Colwood[3].

The City of Colwood (population ~19,000) is on Vancouver Island, southwest of the City of Victoria in the province of British Columbia. The City of Colwood lies within British Columbia's Capital Regional District and is one of the 13 component municipalities of Greater Victoria[4].

The City of Colwood's Official Community Plan (2018)[5] emphasizes natural features as valuable assets and contains objectives and policies to protect, maintain and enhance them. The City of Colwood's *Sustainable Infrastructure Replacement Plan*[6] provides quantitative and condition assessment information about its natural resources. It also explores opportunity costs, or the cost of building capital infrastructure to provide the same level of service that ecosystems currently provide.

The City of Colwood considers its trees, forested, riparian and waterfront areas as amongst its highest priority natural assets. The highest priority municipal services from its natural assets include drainage, infiltration, flood prevention, recreational services, and habitat protection. Furthermore, gravel deposits in parts of the City of Colwood facilitate the use of septic tanks instead of wastewater mains and a treatment plant. Urban forests and boulevard trees provide bank stability, shelter from heat and ocean winds, and co-benefits such as a positive effect on community well-being, improved mental health, and the City of Colwood's sense of place.

---

3   *City of Colwood - Official Community Plan. (2020, December 14). Retrieved August 2021 from* colwood.civicweb.net/document/131567

4   *Wikipedia. Retrieved August 2021 from* en.wikipedia.org/wiki/Colwood,_British_Columbia

5   *City of Colwood - Official Community Plan. (2020, December 14). Retrieved August 2021 from* colwood.civicweb.net/document/131567

6   *City of Colwood - Sustainable Infrastructure Replacement Plan. (2019). Retrieved August 2021 from* colwood.civicweb.net/document/136144

The City of Colwood is currently undertaking coastal flood inundation mapping to address sea level rise and tsunami risk. It is proposing a coastal adaptation plan and new coastal flood construction level regulations for 2021[7]. The City also plans to extend this inventory project to undertake a full condition assessment. This will help prioritize areas that require restoration and refine its valuation approach to help with annual budgeting processes.

3.2. Asset management readiness assessment

As part of inventory development, MNAI helps local governments determine their overall state of asset management maturity. To do this, MNAI has adapted the Federation of Canadian Municipalities (FCM)'s asset management readiness assessment tool[8] to help local governments measure their progress on both asset management and natural asset management in four competency areas, with each area describing outcomes based on five levels of progress or maturity.

The completed readiness assessment helps local governments prioritize actions that increase their effectiveness in managing all assets, including natural ones.

Competency 1: Policy & Governance

The City of Colwood is at an early stage of asset management with respect to policy and governance as it does not yet have a formal asset management policy or strategy in place, or a formal asset management program. Senior management and Council are clearly aware of the need to formalize an asset management program, as evidenced by the creation of its Sustainable Infrastructure Replacement Plan.

Competency 2: People & Leadership

When the City of Colwood created its Sustainable Infrastructure Replacement Plan, it used a cross-functional asset management approach. Staff from different departments worked collectively to update new and existing assets and prepare five-year financial plans. Presently, the City of Colwood does not have any staff who are solely dedicated to Asset Management administration. The City of Colwood team performs asset management practices and uses consultants for detailed assessments. The City is aware of the importance of asset management and does not yet have a formal asset management program that would help organise priority actions for improvements.

---

7   *Sea Level Rise & Tsunami Risk. Retrieved August 2021 from www.colwood.ca/city-services/emergency-planning/sea-level-rise-tsunami-risk*

8   *See fcm.ca/sites/default/files/documents/resources/tool/asset-management-readiness-scale-mamp.pdf for details*

Competency 3: Data & Information

The City of Colwood has a base level inventory of most engineered assets, including ArcGIS maps showing where assets are located. However, it does not have ArcGIS attribute tables for assets. It does have databases that can be linked to GIS. This would enable it to associate information in its asset register with the mapped assets. There are different levels of detail about assets depending on the service and the information contained in different Master Plans. This natural asset inventory project is the City of Colwood's first step in documenting information about natural assets.

In terms of financial information available on its assets, the City of Colwood is meeting Public Sector Accounting Board PS-3150 reporting requirements. At a high level, it can demonstrate gaps between forecasted infrastructure needs and current spending levels. The City of Colwood does not currently have financial information about natural assets.

Competency 4: Planning & Decision-making

The City of Colwood does not have formal asset management plans and is, instead, guided by separate service plans including its Sewer Master Plan 2013, Stormwater Master Plan 2018, Pavement Condition Assessment 2018, Vehicle Equipment Replacement Plan 2018, Parks Master Plan 2020, Esquimalt Lagoon Bridge Inspection and Assessment 2018, Pedestrian Bridge and Culvert Inspections 2015, and Street Light Upgrades and Condition Assessment 2018.

The City of Colwood uses a five-year financial plan to address long- and short-term issues and priorities. It deals with new unforeseen needs reactively; it has a 10-year Capital Plan and a 20-year prioritization plan. These plans do not yet include natural asset management-related needs.

4 Natural asset inventory

4.1. Inventory overview

MNAI's natural asset inventories have two main components to express natural asset information: an asset registry (which is a tabular representation of the data) and an online dashboard. MNAI provided the registry to Colwood in an Excel file and the dashboard as a website address. Information on the condition of the assets is a subset of the inventory and is depicted in both the registry and dashboard.

4.2. Inventory data

The inventory was created based on LiDAR data obtained from the City of Colwood.

The inventory project defined a total of 62,164 individual assets covering 1,463 hectares (ha) as noted in Table 1. An asset is defined as a continuous area of the same land cover type. For example, an intact forested area would be defined as one asset, but a forested area that is bisected by a road would constitute two assets. Most of the asset area in the City of Colwood was forest, followed by water. Table 1 summarizes the natural assets within the City of Colwood.

TABLE 1: SUMMARY OF NATURAL ASSETS BY TYPE		
NATURAL ASSET TYPE	**NUMBER OF ASSETS**	**TOTAL AREA (HA)**
Agriculture	13	0.1
Aquatic vegetation	26	0.1
Grass	3,430	173
Herbaceous	4,050	41
Lakes	50	7
Ocean	65	333
Pond	18	0.8
Shoreline bedrock	221	3
Shoreline gravel / sand	271	23

TABLE 1: SUMMARY OF NATURAL ASSETS BY TYPE

NATURAL ASSET TYPE	NUMBER OF ASSETS	TOTAL AREA (HA)
Shrub dominant <3m	25,959	163
Tree (Coniferous)	4,903	438
Tree (Deciduous)	23,158	280
Total	**62,164**	**1,463**

4.3. Asset registry

Each asset within the inventory has a unique identification number that allows individual assets to be selected, analyzed, and the corresponding data manipulated as required. For example, changes in condition can be noted for individual assets. Information on each asset is housed in an asset registry. Table 1 is an excerpt from the City of Colwood's online registry showing natural asset characteristics and details as contained in the natural asset inventory.

TABLE 2: EXCERPT FROM THE REGISTRY

Natural Asset Registry

Asset Series ID	Asset Type	Asset Class	Asset Class ID	Area (ha)	Neighborhood Name	Street Trees Count	Mean Tree Height (m)	Stream Length (km)	Trail Length (km)	NAI Version Boundary	Park Area (ha)	Zoning Name	Subcatchment Name
AGR1	Agriculture	Vegetated	VEG10414	0.02		0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Comprehensive Development 2	Birdie / Ruby Creek
AGR10	Agriculture	Vegetated	VEG5424	0.00	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Milburn Drive / Lagoon Road
AGR11	Agriculture	Vegetated	VEG5424	0.00	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Milburn Drive / Lagoon Road
AGR12	Agriculture	Vegetated	VEG5424	0.00	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Milburn Drive / Lagoon Road
AGR13	Agriculture	Vegetated	VEG5424	0.00	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Milburn Drive / Lagoon Road
AGR2	Agriculture	Vegetated	VEG10414	0.02		0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Comprehensive Development 2	Birdie / Ruby Creek
AGR3	Agriculture	Vegetated	VEG11876	0.00		0		0	0.00	Areas Exclusive to LiDAR NAI	0.00		Birdie / Ruby Creek
AGR4	Agriculture	Vegetated	VEG11877	0.00		0		0	0.00	Areas Exclusive to LiDAR NAI	0.00		Birdie / Ruby Creek
AGR5	Agriculture	Vegetated	VEG11878	0.00		0		0	0.00	Areas Exclusive to LiDAR NAI	0.00		Birdie / Ruby Creek
AGR6	Agriculture	Vegetated	VEG11859	0.01		0		0	0.00	Areas Exclusive to LiDAR NAI	0.00		Birdie / Ruby Creek
AGR7	Agriculture	Vegetated	VEG5424	0.01	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Milburn Drive / Lagoon Road
AGR8	Agriculture	Vegetated	VEG13136	0.04	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Selleck Creek
AGR9	Agriculture	Vegetated	VEG5424	0.02	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 2	Milburn Drive / Lagoon Road
AQV1	Aquatic Vegetation	Vegetated	VEG4676	0.00	Colwood Corners	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Parks and Open Space	Joe's Creek
AQV10	Aquatic Vegetation	Vegetated	VEG5425	0.00	Colwood Lake	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Parks and Open Space	Colwood Creek
AQV11	Aquatic Vegetation	Vegetated	VEG4741	0.00	Colwood Lake	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 1	Colwood Creek
AQV12	Aquatic Vegetation	Vegetated	VEG7299	0.00	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Lagoon Estates CD6	Selleck Creek
AQV13	Aquatic Vegetation	Vegetated	VEG12239	0.00	Seaside	0		0	0.00	Areas Within Boundary of Previous NAI	0.00		Selleck Creek
AQV14	Aquatic Vegetation	Vegetated	VEG7456	0.00	Royal Roads	0		0	0.00	Areas Within Boundary of Previous NAI	0.00	Agricultural 1	Royal Roads
Total				1,462.95		6,960	44,120.16	6	33.52		135.59		

4.4. Online dashboard

Inventories may provide more insights when characterized visually in a dashboard, which enables users to explore different aspects of the data. For instance, natural asset information can be quickly summarized by watershed area, or, if users want to dive into the specifics of forest assets, they can quickly filter the data to focus on that particular asset. Figure 4 is a screenshot from the dashboard that MNAI provided to the City of Colwood. The full version of the inventory and the dashboard can be accessed at *go.greenanalytics.ca/Colwood_v2*.
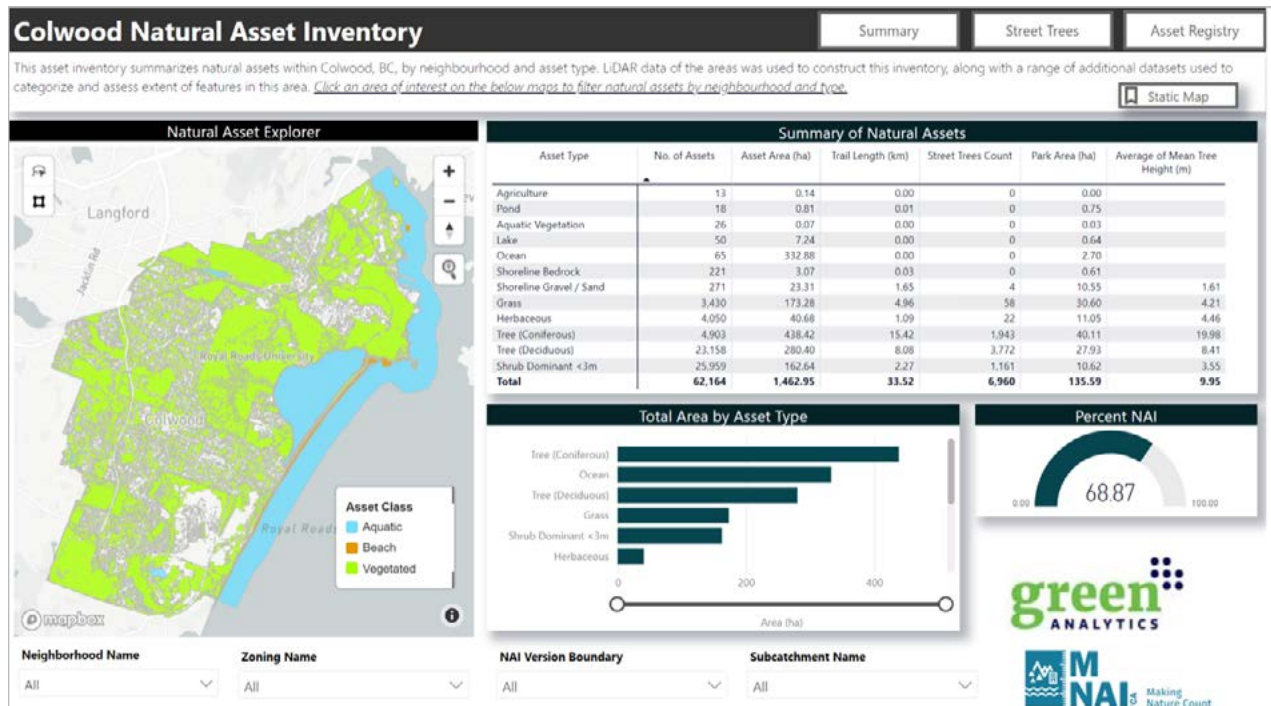
Colwood Natural Asset Inventory

| Summary | Street Trees | Asset Registry |

This asset inventory summarizes natural assets within Colwood, BC, by neighbourhood and asset type. LiDAR data of the areas was used to construct this inventory, along with a range of additional datasets used to categorize and assess extent of features in this area. *Click an area of interest on the below maps to filter natural assets by neighbourhood and type.*

Natural Asset Explorer

Summary of Natural Assets

Asset Type	No. of Assets	Asset Area (ha)	Trail Length (km)	Street Trees Count	Park Area (ha)	Average of Mean Tree Height (m)
Agriculture	13	0.14	0.00	0	0.00	
Pond	18	0.81	0.01	0	0.75	
Aquatic Vegetation	26	0.07	0.00	0	0.03	
Lake	50	7.24	0.00	0	0.64	
Ocean	65	332.88	0.00	0	2.70	
Shoreline Bedrock	221	3.07	0.03	0	0.61	
Shoreline Gravel / Sand	271	23.31	1.65	4	10.55	1.61
Grass	3,430	173.28	4.96	58	30.60	4.21
Herbaceous	4,050	40.68	1.09	22	11.05	4.46
Tree (Coniferous)	4,903	438.42	15.42	1,943	40.11	19.98
Tree (Deciduous)	23,158	280.40	8.08	3,772	27.93	8.41
Shrub Dominant <3m	25,959	162.64	2.27	1,161	10.62	3.55
Total	**62,164**	**1,462.95**	**33.52**	**6,960**	**135.59**	**9.95**

Asset Class
- Aquatic
- Beach
- Vegetated

Total Area by Asset Type

Tree (Coniferous)
Ocean
Tree (Deciduous)
Grass
Shrub Dominant <3m
Herbaceous

Area (ha)

Percent NAI

68.87

green ANALYTICS

M NAI Making Nature Count

| Neighborhood Name | Zoning Name | NAI Version Boundary | Subcatchment Name |
| All | All | All | All |

Figure 3: Screenshot of main inventory summary

4.5. Condition of natural assets

Documenting the condition of natural assets is a key aspect of natural asset inventories. A natural asset condition assessment provides an understanding of both the ecological health of natural assets, and the ability of natural assets to provide services. This information, in turn, can support the effective management of natural assets, be reflected in the registry and the dashboard, and updated over time.

MNAI completed a desktop-based condition assessment and discussed the results with the City of Colwood. MNAI can add the material into the inventory should the City of Colwood request they do so.

4.6. Maintaining the inventory

Inventories are not static. Both the registry and the dashboard can be expanded as new information becomes available. New data can be reflected in the asset registry and subsequently in the online dashboard as it becomes available. Furthermore, the level of desired detail may evolve as asset management readiness increases or as areas of natural asset management focus emerge. That said, inventories should grow in detail and sophistication only insofar as they remain aligned with the capacity of the communities to maintain them and the uses to which they will be put. Their evolution and development should be a function of the monitoring, reporting and lessons of the asset management cycle and be driven by the imperative of ensuring sustainable, cost-effective delivery of services to the community, which is the core of asset management.

5 Risk identification

5.1. Risk identification tool overview

Identifying risks facing natural assets can help local governments prioritize their management of natural assets. To this end, MNAI provides local governments with a tool entitled *Risk Identification Process in the Development of Natural Asset Inventories* and guidance in self-administering it.

Risk management is a four-stage process that includes risk identification, analysis of probability and consequence, development of risk mitigation strategies, and control and documentation. The use of the risk identification tool informs the first and second stages of risk management through the identification of top risks to natural assets and their associated services, and a high-level analysis of impacts and consequences.

Risk types relevant to natural asset management typically include:

- **Service risk:** the risk of an asset failure that directly affects service delivery.
- **Strategic risk:** the risk of an event occurring that impacts the ability to achieve organizational goals.
- **Operations and maintenance risk:** risks related to poor asset controls and oversight, which can lead to poor record-keeping and poor monitoring of asset.
- **Financial risk:** risks related to the financial capacity of the City of Colwood to maintain municipal services.
- **Political risk:** risks related to the nature of municipal politics.

5.2. Using the risk identification tool

Using the risk tool, the City of Colwood considered possible risks that the loss of natural asset functions could pose to built infrastructure, personal health and safety, and private property, including:

- Overuse of trails and illegal dumping
- Flooding
- Forest-urban interface fire
- Invasive species and pests
- Development pressure
- Increase in extreme weather events
- Drought
- Coastal erosion
- Sea level rise
- Pollutant loading
- Loss of trees

Each risk was then ranked low, medium or high according to the probability of an impact occurring, and the relative magnitude of its negative consequences. To assess impact and consequence, the City of Colwood considered four questions:

i/ what impact is likely to happen?

ii/ what is the consequence of that impact happening?

iii/ what can be done to mitigate the probability of impact and/or consequence?

**iv/** what cues will signal the need for mitigation?

5.3. Results of the risk identification process

The risk identification process revealed:

- 2 high-level risks (drought and forest-urban interface fire)

- 8 medium-level risks (overuse of trails and illegal dumping, flooding, development pressure, loss of trees, invasive species and pests, extreme weather events, coastal erosion, and sea level rise)

- 1 low-level risk (pollutant loading)

In terms of scope, the identified risks affect natural assets across the City of Colwood, particularly forests, shrublands, grasslands, and street trees. The neighbourhoods of Royal Roads, Latoria, Triangle Mountain, and CFB Esquimalt face several risks and could experience compounding impacts. The identified risks also have the potential to negatively impact engineered assets (both city-owned and non-city-owned), property, and personal health and safety.

Risk Matrix
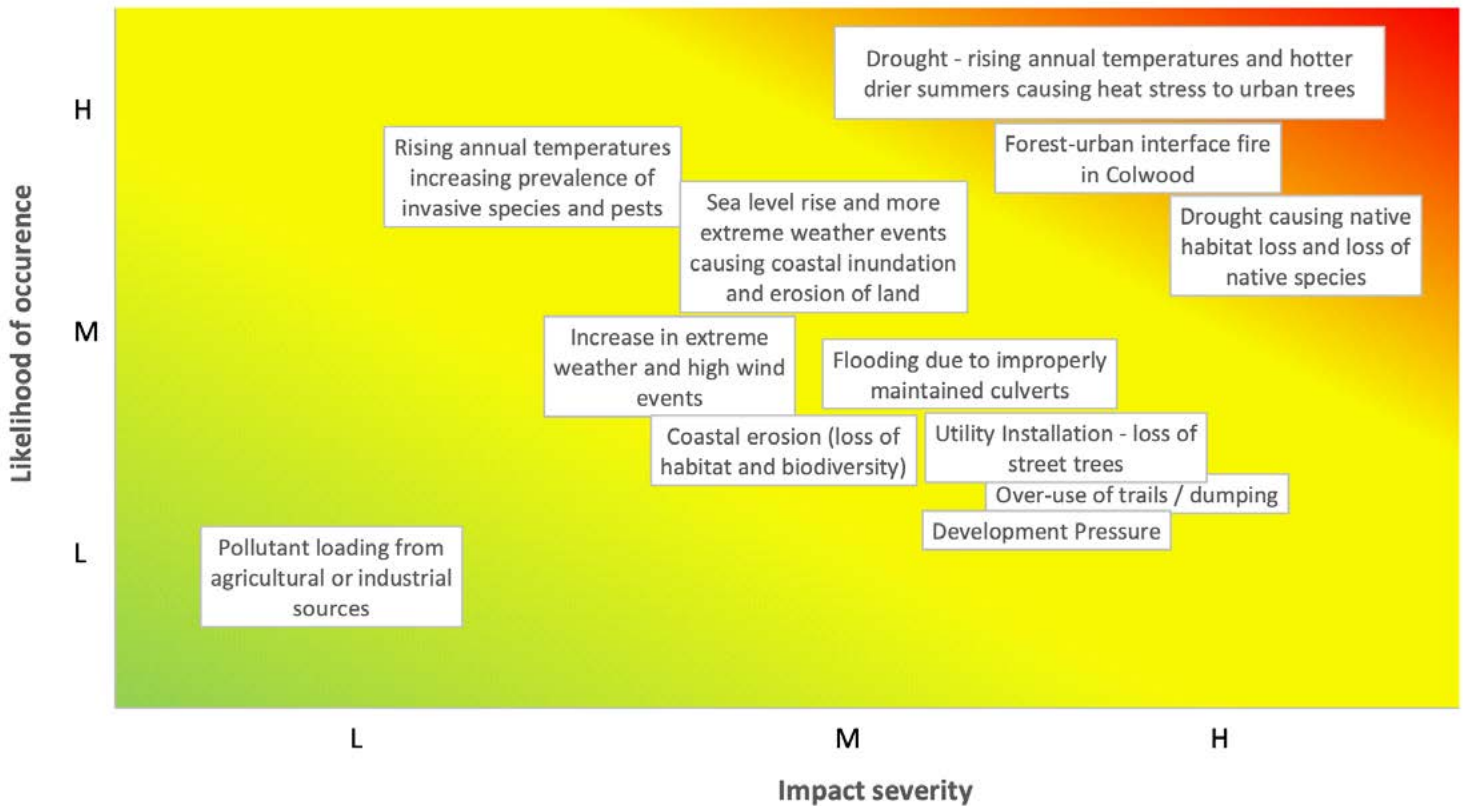
Figure 4: Results of risk identification process.

5.4. Potential priorities for the local government

The risk identification process highlighted potential priorities on which the City of Colwood could focus their natural asset management efforts. These are:

- **Drought:** The City of Colwood identified drought as an imminent, unmanageable, and intolerable high-level risk to natural assets, habitats, and species. Specifically, urban trees (including street trees and forest areas), grasslands, shrublands, waterways, and vegetation are susceptible to drought throughout, which will have cascading impacts on native habitats (both terrestrial and marine) and native species. Climate change projections include rising annual temperatures and hotter, drier summers, which can exacerbate drought and impact ecological systems. This can bring about reduced plant growth, species reduction or extinction, reduced water retention of soils, declining water quality, and reduced opportunities for recreation. Maintaining and where necessary, restoring, wetlands and forests to maximize water storage capacity and thus slowing the release of water can be a highly effective strategy.

- **Forest-urban interface fire:** The City of Colwood identified fires at the interface of urban and forested areas as an imminent, manageable, and tolerable high-level risk to forests, grasslands, and shrublands, particularly in the neighbourhoods of Royal Roads, Latoria, Triangle Mountain, and CFB Esquimalt, where significant populations and/or infrastructure are in close proximity to forests. To limit risk, the City of Colwood could consider developing a Community Wildfire Protection Plan to minimize ecological and community impacts.

- **Disaster risk reduction:** The City of Colwood identified the increase of extreme weather events such as high winds, sea level rise, storm surges, and extreme rainfall, as a medium-level risk in several risk categories. These risks will increase over time, prompting the need for disaster risk reduction. The City of Colwood is undertaking coastal flood inundation mapping to address sea level rise and tsunami risk. These efforts should consider the role of coastal natural assets in building resilience.

6 Recommendations

This section provides insights that can be gained from considering both the inventory - including the condition and risk assessments - and the asset management readiness assessment. It is divided into (6.1) opportunities to strengthen natural asset management at an organization-wide level, (6.2) possible actions for the further development of the inventory, and (6.3) steps the City of Colwood can consider to advance to a full natural asset management initiative.

6.1. Opportunities to strengthen natural asset management at an organization-wide level

As the City of Colwood formalizes its asset management program, they have an opportunity to recognize the role of natural assets in service delivery. For example, a future asset management policy and/or strategy could include objectives related to strengthening natural asset management. For example, the City of Colwood has expressed interest in building on the natural asset inventory project to ensure that restoration and protection of coastal natural assets are included in the development of a coastal adaptation plan; objectives related to this could be included in an asset management strategy.

The City of Colwood identified an opportunity to formalize a cross-functional asset management team. MNAI recommends that, should this occur, the team includes staff with responsibilities for incorporating natural asset management considerations into asset management. The City of Colwood also expressed the need for additional resources for asset management because currently there is only one 0.25 FTE dedicated to asset management.

To strengthen data and information about assets, the City of Colwood identified an opportunity to build ArcGIS and Access attribute tables for each asset class.

This would supplement locational information contained in ArcGIS. It also sees the need to identify critical assets, conduct a risk assessment on each one, identify life-cycle investment requirements, and define levels of service in all areas. With respect to strengthening information about natural assets, the City of Colwood expressed interest in expanding this inventory to undertake a full condition assessment of natural assets.

The City of Colwood recognizes the need to develop a formal, structured approach to asset investment planning using common criteria. MNAI recommends that when this occurs, the approach includes goals and objectives around the role and health of natural assets.

The City of Colwood also identified the need to develop asset management plans that are consistent with an asset management strategy. If it does so, MNAI recommends that natural asset management considerations are incorporated either through the development of a specific natural asset management plan or by incorporating natural asset management into the asset management plans of specific service areas.

6.2. Possible actions for the further development of the inventory

Based on the inventory, the City of Colwood could consider the following, regardless of whether or not it pursues a full natural asset management process. These are mostly incremental measures.

- Expand the risk identification to include field verification of results, beginning with priority natural assets (i.e., trees and forests, riparian areas, and waterfront areas).

- Determine acceptable levels of risk associated with each identified risk.

- Further develop the risk assessment for natural assets using local climate projections, land use modelling, and other data already at their disposal.

- Complete a condition assessment using data that MNAI provided as a basis.

- Identify linkages between services and assets and assess the condition of, and risks to, natural assets from the perspective of disaster risk reduction.

- Share the inventory with adjacent local governments to stimulate collaboration within the watershed.

- Initiate or enhance monitoring - for example, using gauges, water level sensors, and loggers - to improve understanding of trends and improve data for condition ratings of assets, and gather information for modelling.

- Schedule regular updates (e.g., every 3-5 years) of the inventory, condition assessment and risk identification to understand trends.

- Maintain interest and momentum in natural asset management to move towards a full natural asset management project.

6.3. Steps to a full natural asset management project

If the City of Colwood wishes to proceed with a full natural asset management project, including implementation, it will need to consider the following steps:

1/ **Confirm scope, roles and responsibilities**. Undertake a meeting or workshop to confirm (a) assumptions [for example, that water management and development pressure are the primary services of concern] (b) roles, responsibilities, and capacities (c) community capacity to undertake a larger project.

2/ **Fill essential knowledge gaps**. If discussions on scope and certainty and related data needs for modelling indicate the need for additional data, these could be filled.

3/ **Modelling**. Modelling the levels of service that natural assets currently provide and the levels of service under different potential management, local climate change projections, and rehabilitation or restoration scenarios, is central to natural asset management as it gives communities the ability to explore how different actions will affect the health and corresponding performance of natural assets.

4/ **Economic assessment**. The economic assessment component provides a market-based indication of (a) the current value of the services from natural assets if they had to be provided by an engineered means, and (b) the costs and values of different interventions in terms of service delivery.

5/ **Planning**. This step allows local governments to explore different scenarios such as "what happens to the services provided by the wetland if there is significant building upstream?" or "what happens to the services if the forest is restored?" Using modelling, changes in service levels can be understood and quantified. Corresponding values can also be determined through continued economic assessment. Based on the foregoing, local governments can begin to consider and prioritize actions ranging from status quo to planning, regulatory, financial operations, maintenance, acquisition, and monitoring interventions.

6/ **Implementation**. MNAI can provide ongoing advice / guidance on policy pieces and integration of the above information for 12-18 months. After that, the local government, together with local partners and service providers, would ideally have the capacity to continue efforts on their own.

7/ **Ongoing monitoring**. It is essential to continue monitoring the project to learn whether interventions are working and to share lessons and learnings from other communities undertaking natural asset management. MNAI would typically stay involved with the community for three years through a monitoring arrangement to be established with the communities.

Sources

City of Colwood - Official Community Plan. (2020).
colwood.civicweb.net/document/131567

City of Colwood - Sustainable Infrastructure Replacement Plan. (2019).
colwood.civicweb.net/document/136144

Federation of Canadian Municipalities. October 2018. Asset Management
Readiness Scale: Municipal Asset Management Program.
fcm.ca/sites/default/files/documents/resources/tool/asset-management-readiness-scale-mamp.pdf

MNAI. Defining and Scoping Municipal Natural Assets. June 2017.
mnai.ca/media/2019/07/SP_MNAI_Report-1-_June2019-2.pdf

MNAI. Results from the First National Cohort. Decision-maker summary. 2018.
mnai.ca/media/2019/08/spmnaijuly31-summaryweb.pdf

MNAI. Cohort 2 National Project Overview. February 2020.
mnai.ca/media/2020/02/MNAI-CohortSummary.pdf

Annex: Results of the City of Colwood's risk identification process

This Annex contains the results of the City of Colwood's use of MNAI's risk identification tool, which they self-administered with guidance from MNAI. Table 3 was the main product that personnel developed from the exercise.

Step 1: Identification of risks

Common Risks to Natural Assets:

- Overuse of trails/dumping
- Flooding due to improperly maintained culverts
- Development pressure
- Utility installation – loss of street trees
- Rising annual temperatures increasing prevalence of invasive species and pests
- Drought – rising annual temperatures and hotter drier summers causing heat stress to urban trees
- Drought causing native habitat loss and loss of native species (e.g., nesting bird habitat, salmonids, vegetation loss)
- Forest-urban interface fire in Colwood
- Increase in extreme weather and high wind events
- Coastal erosion – more extreme weather events causing loss of habitat and biodiversity
- Sea level rise and more extreme weather events (storm surges, extreme rainfall, and wind events) causing coastal inundation and erosion of land
- Pollutant loading from agricultural or industrial sources

Step 2: Complete survey

TABLE 3: SIMPLIFIED RISK IDENTIFICATION SURVEY				
Risk	**Ranking (L/M/H)**	**Assets Affected**	**Location**	**Notes**
1. Overuse of trails/ dumping	M	Forest, Shrubland, Grassland	Trail Network and roads adjacent to grassland and shrubland areas	Imminent / Manageable / Tolerable Risk
2. Flooding due to improperly maintained culverts	M	Culverts, road infrastructure, buildings	Throughout Colwood	Imminent / Manageable / Tolerable Risk
3. Development Pressure	M	Street Trees, Forest, Grassland, Shrubland, Waterway and Marine Habitats	Throughout Colwood	Imminent / Manageable / Tolerable Risk
4. Utility Installation - loss of street trees	M	Street trees	Throughout Colwood	Imminent / Manageable / Intolerable Risk
5. Rising annual temperatures increasing prevalence of invasive species and pests	M	Forest, Grassland, Shrubland, Waterway and Marine Habitats	Throughout Colwood	Imminent / Unmanageable / Tolerable Risk
6. Drought - rising annual temperatures and hotter, drier summers causing heat stress to urban trees	H	Street Trees, Forest areas	Throughout Colwood	Imminent / Unmanageable / Intolerable Risk
7. Drought causing native habitat loss and loss of native species (e.g., nesting bird habitat, salmonids, vegetation loss)	H	Street Trees, Forest, Grassland, Shrubland, Waterway and Marine Habitats	Throughout Colwood	Imminent / Unmanageable / Intolerable Risk
8. Forest-urban interface fire in Colwood	H	Forest, Grassland, Shrubland	Royal Roads, Latoria, Triangle Mountain, CFB Esquimalt	Imminent / Manageable / Tolerable Risk

TABLE 3: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
9. Increase in extreme weather and high wind events	M	Street Trees, Forest areas	Street Trees Throughout Colwood; & Forested areas at Royal Roads, Latoria, Triangle Mountain, CFB Esquimalt	Imminent / Unmanagable / Tolerable Risk
10. Coastal erosion - more extreme weather events causing loss of habitat and biodiversity	M	Esquimalt Lagoon and bird sanctuary	Waterfront & Foreshore area	Imminent / Unmanagable / Intolerable Risk
11. Sea level rise and more extreme weather events (storm surges, extreme rainfall, and wind events) causing coastal inundation and erosion of land	M	Waterfront and foreshore area	Royal Roads, Coburg Peninsula	Future / Unmanagable / Intolerable Risk
12. Pollutant loading from agricultural or industrial sources	L	Waterways & Marine Environment	Across Colwood	Imminent / Manageable / Tolerable Risk