





# Toward natural asset management in the **City of New Westminster**

**British Columbia** 

#### Summary of inventory results and recommendations February 2022

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**Municipal Natural Assets Initiative** 





#### **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.

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## 1 Purpose

This document summarizes the results of a project to develop a natural asset inventory for the City of New Westminster 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<sup>1</sup>.

#### 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.

<sup>1</sup> 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<sup>2</sup>, 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**

#### General 3.1.



Figure 2: City of New Westminster<sup>3</sup>

The City of New Westminster (population ~71,000) is in the Lower Mainland region of British Columbia and is a member municipality of the Metro Vancouver Regional District. It is on the banks of the Fraser River on the southwest side of the Burrard Peninsula<sup>4</sup>.

[BYLAW NO. 8151, 2019]

The City of New Westminster's interests in natural asset management relate to identifying the natural areas on which they rely and establishing the value of the services they provide. This, in turn, will better enable the City of New Westminster to protect natural assets by integrating them into policy, plans and management, and municipal decision-making. By assigning a financial value to the services from natural assets, the City of New Westminster will be better able to justify the acquisition of new natural areas and green spaces to provide services. The foregoing aligns with the objectives of the City of New Westminster's Environmental Strategy & Action Plan<sup>5</sup>.

The City of New Westminster aspires to deepen its understanding of the role of natural assets in adapting to climate risks such as flooding, sea level rise and storm surges. Finally, per their Asset Management Strategy, the natural asset inventory will be integrated into the current asset management system and link to their asset management policy and long-term financial plans<sup>6</sup>.

The City of New Westminster has identified its foreshore areas, trees, parks, and pollinator plots as priority natural assets. The highest priority municipal

- Wikipedia. Retrieved August 2021 from en.wikipedia.org/wiki/New\_Westminster 4
- 5 City of New Westminster- Environmental Strategy & Action Plan. (2018, August). Retrieved August 2021 from www.newwestcity.ca/database/files/library/ESAPweb.pdf
- City of New Westminster Asset Management Strategy. (2019). Retrieved August 6 2021 from www.newwestcity.ca/database/files/library/Asset\_Management\_ Strategy(SAMP)\_Final\_Draft\_pdf.pdf



Our City 2041, New Westminster Official Community Plan (2017, October 17) 3 www.newwestcity.ca/ocp#downtown-community-plan

services from the natural assets include climate resiliency, stormwater interception (e.g., capturing surface runoff), flood protection against storm surges and sea level rise, pollution control, and habitat protection.

#### 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<sup>7</sup> 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**

Overall, the City of New Westminster is at an intermediate stage of asset management with respect to policy and governance. It has an asset management policy in place and a road map that will guide its actions over the next 3 to 5 years. The policy refers to natural assets in a general way, and staff have noted opportunities to strengthen the policy objectives around natural assets. Some natural asset management-related work is underway, but the City of New Westminster has not yet integrated it within its asset management strategy. The City of New Westminster's roadmap has not yet defined asset management objectives for natural assets, nor is there a specific management plan for natural assets.

The City of New Westminster is beginning to collect baseline data related to its asset management practices. Its asset management Steering Committee develops an annual work plan and reports on progress, but no formal performance outcomes have been established yet for engineered or natural assets. The City of New Westminster has done some informal monitoring of its tree canopy inventories, mapped stormwater infiltration in recent years, and is tracking progress on climate action through key performance indicators.



<sup>7</sup> See fcm.ca/sites/default/files/documents/resources/tool/asset-managementreadiness-scale-mamp.pdf for details

#### **Competency 2: People & Leadership**

The City of New Westminster has a cross-functional asset management Steering Committee that includes an asset management lead, and the Directors of Parks and Engineering. The Committee has a formal terms of reference. These do not include requirements around natural asset management yet, and the roles and responsibilities of asset managers have not yet been defined clearly.

Council is supportive of asset management and included infrastructure asset management as one of six strategic priorities. It is also supportive of natural asset management generally, but staff needs to provide more information about resourcing requirements to council to build an understanding of the investments required to make progress. Progress has been made related to resourcing the City of New Westminster's urban forest strategy specifically and new staff positions have been approved.

#### **Competency 3: Data & Information**

The City of New Westminster has basic inventory data for most major engineered assets, including information on general asset properties such as size, material, location and installation date and is moving its asset data to a centralized location for staff to use. Some information is available about the condition of some assets, but the City of New Westminster has not yet defined critical assets. It has capital and operating expenditure data for some engineered assets and has not yet linked asset data with financial data other than for water and transportation assets. Work is underway to start linking this through the development of asset management plans.

The City of New Westminster has a basic inventory of natural assets that the development of this project has strengthened. For urban forests only, the City of New Westminster has captured capital and operating budgets from three years ago. It has developed value-for-ecosystem-services for the urban forest and budgeted for capital and operating costs of planting new trees.

#### **Competency 4: Planning & Decision-making**

The City of New Westminster has a structured asset investment planning approach that sets priorities using similar criteria based on organizational goals and objectives; most departments follow this structured approach.

The City of New Westminster is relatively early in developing asset management plans, which have only been completed for Transportation and Water Services. It is prioritizing the development of asset management plans by asset class, based on staff assessment of risk, beginning with engineered assets. It is currently working on a plan for the drainage and sanitary system.

The City of New Westminster prepares an annual capital and operating budget that is based on an annual reassessment of current needs. It has a five-year capital plan that addresses short-term issues and priorities.



## **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 the City of New Westminster 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

To establish the inventory, MNAI obtained data from the City of New Westminster and the Province of British Columbia (open data). MNAI combined the spatial data layers to establish a comprehensive depiction of natural assets. Table 1 describes the data sources used to develop the inventory and complete the condition assessment.

TABLE 1: SUMMARY OF DATA SOURCES								
DATASET NAME	DESCRIPTIVE NAME	SOURCE	PURPOSE					
CityBoundary	New Westminster City Boundary	New Westminster Data Transfer	Used to delineate study area					
Eco_Inventory	New Westminster Eco Inventory	Diamond Head Consulting	Used as the main landcover source for building a base landcover dataset to describe natural assets in study area					
GreenSpaceInventory	Green Space Land Use	New Westminster Data Transfer	Used to account for built-up pervious assets not represented in the Eco Inventory					
LandUse	Land Use	New Westminster Open Data	Used land use data to create a complete landcover and land use dataset for the study area to perform adjacent land use condition assessment					
Esri2020Landcover	Esri 2020 Global Landcover	Esri	Used this dataset primarily to fill in the gaps for landcover not represented by the Eco Inventory and Green Space dataset to perform adjacent land use condition assessment					
Neighbourhood Boundaries	New Westminster Neighbour- hoods	New Westminster Open Data	Used to split assets up by their relevant neighbourhood and summarize assets by neighbourhood in the dashboard					



TABLE 1: SUMMARY OF DATA SOURCES							
DATASET NAME	DESCRIPTIVE NAME	SOURCE	PURPOSE				
Watersheds	Watersheds	BC Open Data/ New Westminster	Used to assign watershed name and drainage area to natural assets				
SLSN	New Westminster Roads	New Westminster Data Transfer	Used to summarize length of road within 100m buffer of asset and perform road density condition assessment				
CityOwnedPropertyTable	City-Owned Property Details	New Westminster Data Transfer	Joined to property zoning land use dataset to summarize ownership of natural assets				
Property_Zoning_Landuse	Land Use Parcels with Ownership Details	New Westminster Data Transfer	Joined ownership details to property zoning land use dataset to summarize ownership of natural assets				
TrailsAndGreenways	Trails and Greenways	New Westminster Data Transfer	Used to count trails within natural assets, assign trail name(s) to natural assets, and summarize length of trails in km within natural assets				
Trees	New Westminster Trees	New Westminster Data Transfer	Used to determine count of trees within natural assets. Asset type and asset details also joined to trees dataset and separate tree inventory added to dashboard				
Floodplain	Floodplain Extent	New Westminster Data Transfer	Used to summarize natural asset area within floodplain. Can also indicate which natural assets fall within the floodplain				

The inventory project defined a total of 1,635 individual assets, covering 569 hectares (ha), as noted in Table 2. 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. The majority of the asset area in the City of New Westminster was open aquatic, followed by built-up pervious and forest. The asset class types are defined by the landcover datasets employed to create the natural asset inventory. For example, the assets that constitute street trees and park trees were delineated using the Tree dataset obtained from New Westminster. The other asset types were defined as per the eco-inventory dataset also provided by New Westminster. Specifically, the asset types correspond to the land cover designations employed in that dataset.

TABLE 2: SUMMARY OF NATURAL ASSETS BY TYPE					
NATURAL ASSET TYPE	NUMBER OF ASSETS	TOTAL AREA (HA)			
Built-up Pervious*	756	92			
Canal	4	0.7			
Forest	186	49			
Grassland	15	3			
Open Aquatic	126	343			
Park Trees	205	43			
Pollinator Plot	17	1			
Shrubland	197	27			
Street Trees	71	3			
Wetland	58	7			
Total	1,635	569			

\* Built-up pervious includes manicured lawns and greenspaces (e.g., sports fields)



Figure 3 shows the spatial distribution of the natural assets.

Figure 3: Spatial distribution of natural assets.



#### 4.3. Asset registry

Each asset within the inventory has a unique identification number that allows users to select and analyze individual assets and manipulate the corresponding data as required. For example, changes in condition can be noted for individual assets. Information on each asset is housed in an asset registry. Table 3 is an excerpt from the City of New Westminster's online registry showing natural asset characteristics and details. Additional detail is provided in the online dashboard.

#### **TABLE 3: EXCERPT FROM THE REGISTRY**

vatura	il Asset Regi	stry																	¥.,
Asset ID	Asset Type	Sub- Asset ID	Asset Area (ha)	Asset Area in Neighbourhood (ha)	Neighbourhood	Watershed	Subclass	Ownership	Land Use	Floodplain Area (ha)	Trails and Greenways Length (km)	Trails and Greenways Name(s)	Park Area (ha)	Park Name	Adjacent Land Use Score	Permeability Score	Relative Size Score	Road Density Score	Total Score
FOR103	Forest	FOR103-1	0.11	0.11	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		4	10	1	1	16
FOR110	Forest	FOR110-1	0.09	0.09	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		5	10	1	1	17
FOR130	Forest	FOR130-1	10.91	10.91	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		10.59	Poplar Island	10	10	10	10	40
FOR16	Forest	FOR16-1	0.10	0.10	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		-4	10	1	1	16
FOR5	Forest	FOR5-1	0.90	0.90	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		4	10	1	1	16
FOR55	Forest	FOR55-1	0.00	0.00	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		7	10	1	10	28
FOR58	Forest	FOR58-1	0.21	0.21	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		5	10	1	1	17
FOR59	Forest	FOR59-1	0.19	0.19	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.00	0.00		0.00		4	10	1	1	16
FOR72	Forest	FOR72-1	0.50	0.04	Brow of the Hill	Fraser River	Deciduous	Other	Natural	0.04	0.00		0.00		7	10	1	1	19
FOR72	Forest	FOR72-5	0.50	0.00	Brow of the Hill	Fraser River	Deciduous	New Westminster	Natural	0.00	0.00		0.00	Muni Evers Park (future site)	7	10	1	1	19
PER10	Built-up Pervious	PER10-1	0.37	0.34	Brow of the Hill	Fraser River	Managed Grass	Other	Built-up Pervious	0.00	C.00		0.00		5	1	5	1	12
PER10	Built-up Pervious	PER10-2	0.37	0.03	Brow of the Hill	Fraser River	Managed Grass	New Westminster	Built-up Pervious	0.00	C.00		0.00		5	1	5	1	1
PER11	Built-up Pervious	PER11-1	0.23	0.23	Brow of the Hill	Fraser River	Managed Grass	Other	Built-up Pervious	0.00	0.00		0.00		5	1	1	1	8
PER120	Built-up Pervious	PER120-1	0.04	0.04	Brow of the Hill	Fraser River	Managed Grass	School District	Built-up Pervious	0.00	0.00		0.00		6	1	1	1	5
PER192	Built-up Pervious	PER192-1	0.00	0.00	Brow of the Hill	Fraser River	Managed Grass	New Westminster	Built-up Pervious	0.00	0.00		C.00	Toronto Place Park	5	1	1	1	8
PER193	Built-up Pervious	PER193-1	0.00	0.00	Brow of the Hill	Fraser River	Managed Grass	New Westminster	Built-up Pervious	0.00	0.00		6.00	Toronto Place Park	5	1	1	1	1
PER195	Built-up Pervious	PER195-1	0.05	0.05	Brow of the Hill	Fraser River	Managed Grass	New Westminster	Built-up Pervious	0.00	0.00		0.05	Lookout Park	4	1	1	1	7
PER196	Built-up Pervious	PER196-1	0.01	0.01	Brow of the Hill	Fraser River	Managed	New	Built-up	0.00	0.00		0.01	Lookout	4	1	1	1	7

#### 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 New Westminster. The full version can be accessed at *go.greenanalytics.ca/NewWestminster*.



Figure 4: Screenshot of main inventory summary.

### 4.5. Condition of natural assets environmental condition

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 built it into the inventory to provide an initial understanding of the status of the natural assets for the City of New Westminster. As part of a full natural asset management project, MNAI would expand this assessment to include additional metrics related to condition (e.g., relative biodiversity, riparian and wetland health, soil condition, connectivity, and others) and possibly employ site visits to confirm and verify the condition ratings. The desktop exercise completed as part of this inventory is a reasonable first step in assessing condition and can be used as a foundation for future work in this area.

Table 5 summarizes the condition assessment steps and indicators. MNAI chose these indicators for their relative ease of measurement (given time and budget constraints) and for their relevance to measuring the ecological health and service delivery capabilities of natural assets. They are proxy metrics for these broader condition considerations. For example, larger asset size implies more



connectivity of natural areas, higher road density implies more fragmentation and higher hydrologic impairment of water flows, and more permeability implies greater ability to store water which means more effective stormwater management. The adjacent land use metric measures and distinguishes natural assets that are next to other natural assets from natural assets that are next to built infrastructure. How and the extent to which a given natural asset is influenced by the drainage in the adjacent landscape varies depending on factors such as the local topography and soils, orientation (e.g., upland versus lowland, position in the watershed) and the size and nature of the feature itself. However, it is well-established that the condition of a natural asset in an urban context tends to be negatively impacted when more of the surrounding land uses are impervious (i.e., paved, concrete or buildings) because this tends to alter pre-existing drainage and infiltration pathways, which can cause a natural area to receive much more or much less drainage than prior to being in an urban context. Urban runoff also typically carries a host of sediments and contaminants, and when such runoff is directed to natural areas and not properly treated, it can negatively impact the feature and its functions for plants and wildlife.

TABLE 4. CONDITION ASSESSMENT APPROACH AND INDICATORS							
Indicator	Description & Methods for Quantification	Data used to Quantify Indicator*					
Relative asset size	For each natural and semi-natural asset type, total area is calculated, and a rank is assigned to the assets within each class based on its percentile score. Natural assets within the top third of the ranking (e.g., the largest assets within a class) received a 3, those within the middle third of the ranking received a 2, and those within the bottom third of the ranking received a 1.	Natural asset inventory					
Road density	Measures the density of the roads in and around the assets according to high density (assets with more than 2km of roads per km squared), medium density (assets with between 1km and 2km of roads per km squared) and low density (assets with less than 1km of road per km squared).	Natural asset inventory plus spatial representations of roads					

TABLE 4: CONDITION ASSESSMENT APPROACH AND INDICATORS							
Indicator	Description & Methods for Quantification	Data used to Quantify Indicator*					
Surface permeability	The permeability of surfaces is ranked on a scale of nil to high depending on the type of landcover present. Urban areas, roads and industrial areas are ranked as nil. Assets within impervious surfaces are assigned as low permeability. Agriculture and shrublands are ranked as medium. Wetlands, waterbodies and forests are ranked as high.	Natural asset inventory, spatial representations of land uses and roads, as well as the Global Man-made Impervious Surfaces Dataset from NASA data.nasa.gov/dataset/ Global-Man-made- Impervious-Surface- GMIS-Dataset-Fr/dkf4- 4bi3					
Adjacent land use	Considers the distance to, and the nature of, the area surrounding natural assets. Intense land uses (e.g., airports) in close proximity to natural assets result in a poor rating, while distant land uses that are less intense (e.g., agriculture) result in a good rating. If there are no human land uses within 100 m of the assets, the assets are scored 10. If there are intensive land uses within 100 m of the assets, the score is 0.	Natural asset inventory plus spatial representation of land use as well as intensity rankings of land uses					

\* Data sources provided in Table 1 unless noted here.

Once conditions were allocated to each asset, an overall score was derived for the project area. The maximum possible score for an asset was 40, based on a possible 10 points for each of 4 categories:

- Road density as low (10), medium (5) or high (1).
- Surface permeability rated as high (10), medium (5), low (1), or nil (0).
- Adjacent intensive land use (0 for intense land uses, otherwise 10).
- Relative asset size where the largest 3rd areas receive 10, 5 for middle 3rd, and 1 point for the lowest 3rd.

The total condition score was then converted into a rating scale:

- Very good assets with a score of 32 or higher
- **Good -** assets with a score between 24 and 32
- **Fair -** assets with a score between 16 and 24
- **Poor -** assets with a score between 8 and 16
- **Very Poor -** assets with a score lower than 8

Figure 5 summarizes the natural asset condition assessment results as per the online dashboard.





Figure 5: Screenshot of condition assessment details.

Overall, about 352 ha (or 62 per cent) of natural assets were assessed in very good condition and 14 ha (or 2 per cent) were assessed in good condition. Water and wetland assets largely ranked very good, while built-up pervious and street trees poor and very poor. Note that this score is to be expected for these assets given that they are largely found in areas with more intense surrounding land uses and denser roads. The percentages provided include natural assets not owed by the City of New Westminster, such as the Fraser River, Brunette River, and Poplar Landing.

Table 5 summarizes condition ratings and Figure 6 summarizes condition by natural asset type. Additional insights on the condition results can be obtained through the "Decomposition" tab of the online dashboard.

#### **TABLE 5: SUMMARY OF NATURAL ASSET CONDITION RATINGS**

Condition Rating	Number of Assets	Total Area (ha)	Average Condition Score
Very Good	109	352	33
Good	66	14	28
Fair	304	107	20
Poor	896	85	12
Very Poor	260	12	7
Total	1,635	569	14



●A - Very Good ●B - Good ●C - Fair ●D - Poor ●E - Very Poor



Figure 6: Summary of condition rating by natural asset type.

#### 4.6. Maintaining the inventory

Inventories are not static. Both the registry and the dashboard can be expanded as new information becomes available. For example, asset condition might improve as a result of restoration efforts, or new studies may add insights on the condition of the assets. 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. City risk workshop

The City of New Westminster assembled a working group composed of staff from Engineering and Parks & Recreation to identify risks to natural assets. The working group held one workshop and the risks identified in this report should be considered preliminary. Additional discussion is required to identify the services provided by the natural assets and review the risk rankings and impacts to the City.

### 5.2. 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 by identifying the top risks to natural assets and their associated services, plus 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 New Westminster to maintain municipal services.
- **Political risk:** risks related to the nature of municipal politics.

#### 5.3. Using the risk identification tool

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

- Construction activity
- Development pressure
- Urban flooding
- Invasive species

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- Overuse of unsanctioned trails
- Encroachments
- Illegal dumping
- Drought
- Forest fire
- Brush fire
- Storm surge
- Freshet flooding (annual and 1-in-50-year event)
- Pollutant loading/contamination
- Erosion
- Insect outbreak/tree disease
- Beavers

Staff then ranked each risk according to the probability of an impact occurring and the relative magnitude of its negative consequences. The estimation of likelihood and consequence was determined through a risk scoring process where each individual risk was assigned a score based on pre-defined criteria. This ensured a consistent approach was maintained for engineered and natural infrastructure. To assess impact and consequence, the City of New Westminster 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?

#### 5.4. Results of the risk identification process

The risk identification process revealed:

- 6 high-level risks (construction activity, development pressure, urban flooding, invasive species, overuse of unsanctioned trails, and encroachments )
- 4 medium-high level risk (illegal dumping, drought, forest fire, and storm surge) and annual freshet flooding)
- 6 medium-level risks (brush fire, pollutant loading/contamination, erosion, insect break-out/tree disease, beavers, and freshet flooding)



In terms of scope, the identified risks affect natural assets across the City of New Westminster, with numerous risks potentially affecting trees, trails, ditches and canals, and rivers. The identified risks have potential to negatively impact engineered assets (both city-owned and non-city-owned), property, and personal health and safety.



#### **Risk Matrix**

Figure 7: Results of risk identification process.

### 5.5. Potential priorities for the local government

The outcomes of the risk identification process highlight potential priorities on which the City of New Westminster could focus their natural asset management efforts. Where possible, these are also informed by the condition assessment. These are:

Construction activity: Construction was identified as a high-level risk to natural assets across the City of New Westminster. Private and public construction has resulted in damage to private and boulevard trees and plant material and contributed to the loss of soil and surface vegetation. An increase in impermeable surfaces and degradation of natural assets can exacerbate existing risks such as urban flooding, pollutant loading, and invasive species. Mitigation actions include implementing increased encroachment and tree protection zones.

- Managing development pressure: Development is taking place across the City of New Westminster often resulting in the loss of trees, hedges, and surface vegetation. While most natural assets were identified as being in very good or good condition by area, it must be noted that this outcome is augmented by open aquatic assets, and that many landbased natural assets were not identified as being in good condition. Intensive land use can contribute to the declining health of land-based natural assets. Proactive land use planning and policies that include identifying and managing natural assets and their associated services can limit urban sprawl and direct development to growth areas, reduce land use conflicts and pressures on existing infrastructure, and preserve natural areas. Better information on natural assets, including on the full range of services that they provide, and the value of those services, can ensure that development decisions are evidence-based.
- Urban flooding: Flooding can negatively impact infrastructure, public safety, property, the local economy, and the environment. Urban flooding both from high levels of precipitation and the freshet was identified as a high-level risk to natural assets, particularly ditches, canals, rivers, and natural assets within river floodplains (e.g., trees, soils, vegetation). The neighbourhoods of Brow on the Hill and Glenbrooke North have a significant percentage of street trees and built-up pervious areas with very poor rankings. These areas warrant further investigation and, if necessary, flood mitigation planning.
- Invasive species: Invasive species reduce the resiliency and biodiversity of ecosystems. This could reduce ecosystem services such as aesthetic values, quality of life, and physical and mental health benefits associated with time in nature. Invasive species are a high-level threat to natural assets across the City of New Westminster. Their presence is driven by increased recreation use and warmer weather associated with climate change. Noxious weeds (e.g., knotweed and hogweed) are monitored and managed with chemicals and the assistance of professionals; however, knotweed along the Brunette River has been difficult to manage. Some cities (e.g., City of Mississauga) have developed an Invasive Species Management Plan that includes goals, targets, and timelines, methods for prioritization of resources, engagement opportunities, management actions, costing and staffing requirements, and funding opportunities.
- Overuse of unsanctioned trails: Excessive use of unsanctioned trails in Hume Park and Glenbrook Ravine have been identified as a high-level risk to natural assets in these areas. Increased use due to COVID-19 has compacted soil and destroyed plants and tree roots. Erosion has been documented in the Glenbrook Ravine. To address these issues, the City of New Westminster could increase public education, emphasize the maintenance and rehabilitation of degraded trails, and evaluate alternative trail locations against user experience, ecological, and financial considerations.



**Encroachment:** Urban encroachment is a high-level risk experienced across the City of New Westminster, particularly in areas adjacent to parks and natural areas. Encroachment can fragment habitat and cause a decline in services provided by natural assets. Prioritizing compact, low impact development, creating multifunctional landscapes, and protecting sensitive areas should guide development and help to limit fragmentation.

Table 6 lists and provides brief descriptions of risk mitigation strategies. Future stages of the MNAI process can address these.

TABLE 6: RISK MITIGATION STRATEGIES						
Accept	Risk may be acceptable if probability and consequences are small					
Minimize	Risk under local government's control that warrants exposure reduction					
Share	Partners in a project permit the sharing of larger risks to reduce it for each					
Transfer	Insurance, fixed price contracts, and other risk transfer tools					

### **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 New Westminster can consider to advance to a full natural asset management initiative.

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

Staff identified opportunities to strengthen the City of New Westminster's asset management policy to better integrate natural asset management into decision-making; for example, wording could be added to make the connection between natural assets and objectives such as carbon resilience. The City of New Westminster could also ensure that staff managing tangible capital assets and natural assets not only apply the policy, but also expand its application to services from natural assets that exist outside its jurisdiction. For example, the City of New Westminster is contributing to the management of the Brunette River natural asset. The policy could also articulate that it applies to all green infrastructure, including enhanced natural assets and (e.g., bioswales, raingardens) and engineered green infrastructure (e.g., green roofs, walls, permeable pavement).

Staff suggested that natural asset management needs be embedded across all service areas. A next step for the City of New Westminster would be to develop objectives for natural assets, and an asset management plan for natural assets. To facilitate this, staff recommended that natural asset management should be added to the Asset Management Steering Committee's terms of reference. Furthermore, the composition of the Asset Management Steering Committee could be strengthened to include Parks staff who are more directly responsible for managing natural assets. Staff also noted the importance of defining the roles and responsibilities of asset managers and ensuring they are communicated across the organization.

Another opportunity for improvement noted by staff is to value the carbon storage and sequestration services associated with the forest and soils. The current valuation of ecosystem services for the City of New Westminster's urban forest does not include this service, which can contribute to climate-action goals.

With respect to planning and decision-making, staff noted that while Engineering manages planning and policy work, most of that work happens through collaboration between Engineering Operations and Parks. They also noted it could be done more strategically by following the structured asset investment planning approach used for engineered assets. Staff has recommended an inter-departmental discussion to determine how best to integrate natural asset management across service areas, noting, for example, opportunities to better incorporate natural asset management considerations into transportation planning (e.g., street trees) using strategy and design guidelines. Developing a specific management plan for all natural assets is one way to support integration. An MNAI guidebook published in 2022 on developing levels of service for natural assets provides information that could be helpful in this context<sup>8</sup>.

The City of New Westminster has not yet identified critical assets. As it improves data and information about asset condition, performance and risk, it will be in a better position to budget and inform long-term financial planning.

## 6.2. Possible actions for the further development of the inventory

- Based on the inventory, the City of New Westminster 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 process to include field verification of results.
- Identify the services provided by the natural assets. Review the identified risk to confirm the consequence of the risks on the service of the asset.

8 mnai.ca/developing-levels-of-service-for-natural-assets



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- Determine acceptable levels of risk to its risk mitigation strategies (see Table 6).
- Further develop the condition assessment and risk assessment for trees, parks and pollinator plot (the identified priority assets) using local climate projections, land use modelling, and other data already at their disposal.
- Identify linkages between services and assets and assess the condition of, and risks to, the assets from the perspective of their ability to deliver services. From a flood and stormwater management perspective, watercourses, wetlands and forested areas in the watersheds will be key.
- 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, feed into 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

A full natural assessment management project allows local governments to move through all phases of the cycle depicted in Figure 1. This, in turn, helps them understand the capacity of the natural assets they own and/or the ones they rely upon for services, understand changes in services as a result of different interventions (e.g., restoration, acquisition), determine the current services from natural assets, their value, and how these services and values may change with interventions, and develop strategies and actions to protect and manage natural assets for the long-term.

Following is an illustrative list of steps that the City of New Westminster could undertake with MNAI, should it wish to proceed with a full natural asset management project. These steps can be phased, and/or adapted to local context. MNAI is available to discuss specifics in detail.

- 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

Federation of Canadian Municipalities. October 2018. Asset Management Readiness Scale: Municipal Asset Management Program. *fcm.ca/sites/default/files/documents/resources/tool/asset-managementreadiness-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 New Westminster's risk identification process

This Annex contains the results of the City of New Westminster's use of MNAI's risk identification tool, which they self-administered with guidance from MNAI. Table 7 was the main product that personnel developed from the exercise.

### Step 1: Identification of risks (draft)

Common Risks to Natural Assets:

- Overuse of trails/dumping
- Flooding (current and future)
- Forest fire
- Invasive species
- Development pressure
- Pollutant loading from urban, agricultural, or industrial sources (e.g., overuse of salt on roads)
- Drought (current and future)
- Erosion
- Ice jams
- Storm surge
- Lack of flood hazard mapping
- Lack of land management plans
- Lack of monitoring reports
- Construction activity
- Political policy change



### Step 2: Complete survey

TABLE 7: SIMPLIFIED RISK IDENTIFICATION SURVEY (DRAFT)								
Risks	Ranking	Assets Affected and location	Notes					
1. Construction activity	Η	Everywhere in the City, mostly impacting private and boulevard trees. reservoir, City parks, forest	More encroachment/tree protection zones, damage to tree and plant material and the loss of soil and surface vegetation as well. Risk is from private (i.e., by developers) and public (i.e., internal City projects) construction projects.					
2. Development pressure	Н	Everywhere in the City	Loss of trees, hedges, and surface vegetation due to development.					
3. Urban flooding	Η	Ditches/Canals Rivers (e.g., Brunette R) floodplains – trees, soils, vegetation (can be affected by urban and freshet)						
4. Invasive species	Η	All natural assets (e.g., Brunette River, Glenbrook Ravine)	Increase of presence/expansion of invasive species associated with increase in recreation use (shoes, bikes, dumping etc.) and warmer weather that comes with climate change Current noxious weeds: knotweed and hogweed are being monitored and managed with chemicals and with professionals; knotweed along the Brunette River difficult to manage.					
5. Encroachments	Η	Across the City; unopen laneway, utility corridors in QB, and adjacent to City parks and natural areas						
6. Illegal dumping	М-Н	Dumping in QB ditches, Queens Park, Hume Park, Pier Park, Moody Park	Incudes illegal dumping due to encampments.					
7. Drought (current and future)	M-H	All natural areas, park trees, street trees	Probability of occurring may increase if heat dome episodes becoming more of a regular occurrence. May cause plant mortality and increases vulnerability to pest and plant disease.					



TABLE 7: SIMPLIFIED RISK IDENTIFICATION SURVEY (DRAFT)								
Risks	Ranking	Assets Affected and location	Notes					
8. Forest fire	M-H	All forested areas, such as in City Parks, coniferous forests. • Lower hume/Hume • Queens Park	Could be higher probability in the future with hotter dry conditions due climate change.					
9. Brush fire	М-Н	Brush/grasslands and pollinator pastures. Particularly those close to major roads (i.e., cigarettes thrown out of windows)						
10. Storm surge	M-H	Queensborough	Impact of a storm surge breaching the dyke.					
11. Freshet flooding (annual)	Μ	Ditches/Canals Rivers (e.g., Brunette R) floodplains – trees, soils, vegetation (can be affected by urban and freshet) Fraser River Shorelines (e.g., South Dyke Rd forested area) Cascading impacts: Municipal infrastructure (roads, bridges, culverts), potentially affect buildings	Freshet flooding is a regular occurrence and anticipated and ecosystem adapted (moderate).					
12. Pollutant/ contamination loading from urban, industrial sources	Μ	All natural areas, but mostly ditches on Queensborough and waterways	Industrial run-off.					
<b>13.</b> <b>Erosion</b> (can be a consequence of flooding)	Μ	Natural Area Parks (e.g., Glenbrook Ravine and Hume Park), Shorelines						
14. Insect outbreak/tree disease	Μ	Trees all over New West	Risk of Japanese Beetle coming to New West.					
15. Beavers	Μ	Queensborough	Beavers have been known to take trees down along canals.					



TABLE 7: SIA	<b>APLIFIED RISK</b>	( IDENTIFICATIC	ON SURVEY (	DRAFT)

Risks	Ranking	Assets Affected and location	Notes
16. Freshet flooding (1-in-50 years)	Μ	Ditches/Canals Rivers (e.g., Brunette R) floodplains – trees, soils, vegetation (can be affected by urban and freshet) Fraser River Shorelines (e.g., South Dyke Rd forested area) Cascading impacts: Municipal infrastructure (roads, bridges, culverts), potentially affect buildings	Extreme events might be catastrophic if banks are toppled (1-in-50 yrs).
17. Overuse of unsanctioned trails	Н	Trails in Hume Park	Because of COVID-19, there is an increased use of unsanctioned trails, compacted soil destruction of plant material and tree roots. Some erosion has a notable impact, noted in the Ravine.



### **Municipal Natural Assets Initiative**

