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Toward natural asset management in the

City of West Kelowna

British Columbia

Summary of inventory results and implications
April 2021

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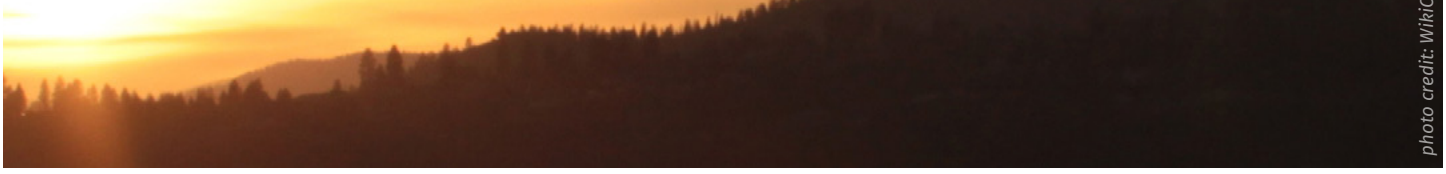
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Municipal Natural Assets Initiative

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.

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Table of Contents

1 Purpose

This document summarizes the results of a project to develop a natural asset inventory in the City of West Kelowna, 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 ones. Doing so can enable local governments to 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

Inventories provide details on the type 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.

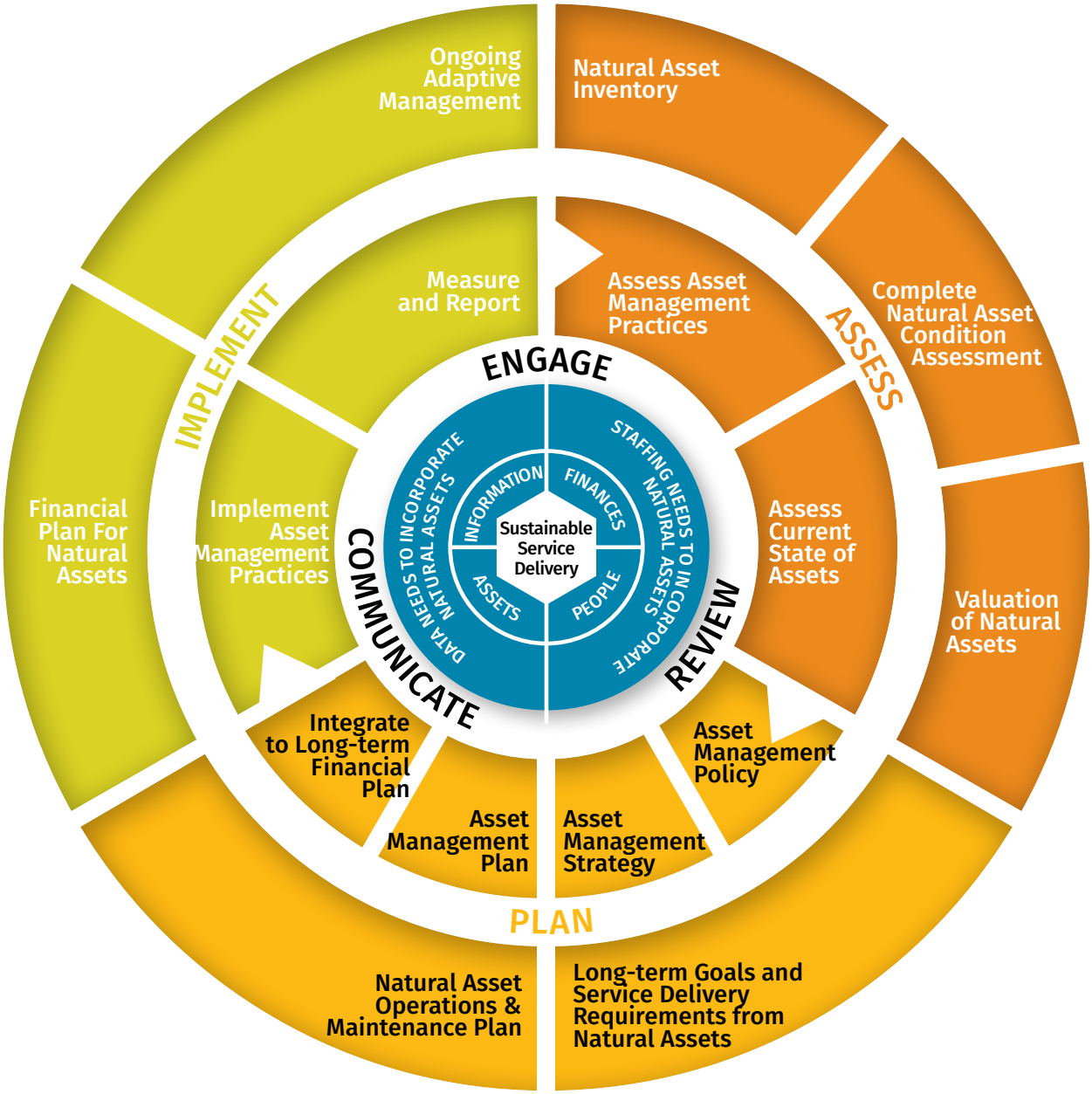

Figure 1: *The Asset Management Process. MNAI has adapted this for use with natural assets.*

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

3 Local government context

3.1. General

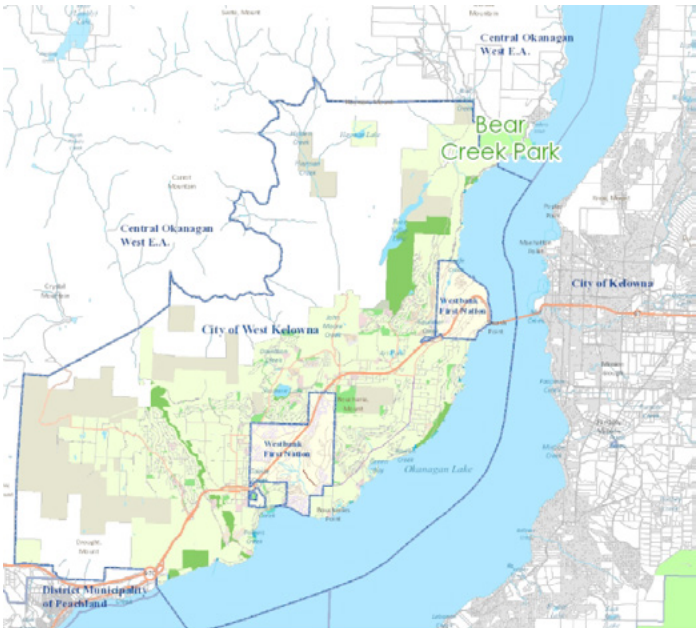

Figure 2: City of West Kelowna.

The City of West Kelowna, formerly Westbank (population ~36,500), is located in British Columbia's Okanagan Valley. West Kelowna's interest in natural asset management is three-fold. First, West Kelowna would like to have a comprehensive understanding of both natural and physical municipal assets to support planning, development and financial decisions, as well as investments in the community.

Second, West Kelowna would like to become more conscious of the local impacts of climate change and build in a correspondingly sustainable and resilient manner. As an example, West Kelowna is currently creating its first Asset Management Plan and is in the second phase of its Official Community Plan (OCP) update and considers this an opportunity to integrate natural assets. West Kelowna also anticipates that such actions may contribute to meeting B.C. Climate Action Charter objectives and Council's Strategic Priorities.

Third, West Kelowna sees the inventory as an opportunity to inform an update of the Parks Master Plan, which plays a crucial role in the acquisition, management and development of parks in the community.

In terms of current activities, West Kelowna focuses on protecting corridors, greenbelts and greenways, waterfront and waterways, stormwater servicing, biodiversity, and environmentally sensitive areas. The OCP contains policies related to the management of natural assets, including discouraging greenfield development and limiting growth to existing developed areas; maintaining existing greenways, greenbelts, green and open spaces; restoring vegetation where possible with native species; retaining land ownership located next to streams, lakes and reservoirs, and other significant waterbodies; protecting ground water, streams, ponds, lakes and other waterbodies; and ensuring that development retains ecosystem features and functions.

West Kelowna identifies stormwater management as its highest priority service. There is risk that the existing stormwater system could become overburdened by the community's rapidly increasing population. Natural assets are under stress due to wildfires, overland and coastal flooding from increased stormwater runoff and rising water levels on Okanagan Lake, and hotter temperatures due to climate change.

3.2. Asset management readiness assessment

As part of the 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[3] 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 natural asset readiness assessment will, in turn, help West Kelowna government increase its effectiveness in managing all assets, including natural ones.

Details of the readiness assessment are available at: *fcm.ca/sites/default/files/documents/resources/tool/asset-management-readiness-scale-mamp.pdf*.

Based on the assessment, West Kelowna is at an early stage of adopting asset management, ranging from working on level 1 (initial investigation) in some competencies and outcome areas, through to having completed level 2 (early adoption) in others. It is currently developing its first Asset Management Plan, scheduled for completion in 2021 or 2022. West Kelowna's asset management project team is in the process of identifying a steering committee member to help guide the project. A full-time engineering technician has been hired and will be responsible for developing the asset management plan. There may be opportunities for this position to provide support to natural asset management work in the future.

West Kelowna has a ledger of all the engineered assets in West Kelowna but still has many large data gaps that need to be addressed to develop a more robust asset registry. There are no lifecycle or replacement costs included in the inventory yet. Work is underway to review the condition of these assets to complete the registry.

Currently, West Kelowna is using Master Plans and a Financial Plan to determine budget priorities, particularly for its infrastructure and utility investments.

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

4 Natural asset inventory

4.1. Inventory overview

MNAI gathered data for an area scoped to the West Kelowna municipal boundary. The inventory has two main components: a tabular asset registry, and an online dashboard. MNAI provided West Kelowna with the registry as Excel data, and the dashboard in a website format. 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

MNAI obtained data from the City of West Kelowna and from GeoBC and combined these spatial data layers to establish a comprehensive depiction of natural assets. Table 1 describes the data sources used to develop the inventory and condition assessment.

TABLE 1: DATA SOURCES SUMMARY

DATA	SOURCE	PURPOSE
VRI - 2020 - Forest Vegetation Composite Polygons	GeoBC	Used to create base natural asset inventory
Annual Crop Inventory 2019	Agriculture and Agri-Food Canada (AAFC)	Used in combination with VRI to create base natural asset inventory
CityBoundary	City of West Kelowna	Study area for the natural asset inventory
TrailsDraft	City of West Kelowna	Summarized length of trails within natural assets
WFN_ CommunityForestArea	City of West Kelowna	Used to indicate assets in WFN Community
WK_Contours_2meter	City of West Kelowna	Interpolated to 2 m DEM and used to assign mean elevation to assets
WK_fire_dp_area	City of West Kelowna	Used to determine which assets are within the wildfire interface/area of assets within wildfire interface
WK_Geo_Roads	City of West Kelowna	Used to estimate road density and perform road density condition assessment
WK_Municipal_Parks	City of West Kelowna	Used to determine area of assets which are considered municipal park
WK_Neighbourhoods	City of West Kelowna	Used to assign assets to applicable neighbourhood
WK_OCP_Landuse_ Bylaw_100	City of West Kelowna	Used to determine the land use designation of assets based on the land use comprising the majority area

TABLE 1: DATA SOURCES SUMMARY		
DATA	**SOURCE**	**PURPOSE**
WK_Regional_Parks	City of West Kelowna	Used to determine area of assets which are considered regional park
ParcelMap BC Parcel Fabric	GeoBC	Used to assign ownership properties to natural assets (for example, private versus federally owned land)
ws_lakes	City of West Kelowna	Used to add wetlands and lakes not represented by base landcover
stream_line	City of West Kelowna	Used to calculate length of streams within assets. The name of the stream running through the asset was also added
waterbody	City of West Kelowna	Used to determine count of waterbodies in asset and added waterbody type, bank, and depth

The inventory project defined a total of 3,921 individual assets covering 9,434 hectares (ha) of the municipal area, as noted in Table 2. The majority of this area was forest cover, followed by agriculture.

TABLE 2: SUMMARY OF NATURAL ASSETS BY TYPE		
NATURAL ASSET TYPE	**NUMBER OF ASSETS**	**TOTAL AREA (HA)**
Forest	2,111	8,462
Grassland	586	268
Shrubland	814	256
Water	92	101
Agriculture	200	330
Wetland	118	17
Total	**3,921**	**9,434**

4.3. Asset registry

MNAI gathered the data, then sorted and analyzed it for relevance, and then delineated the type, location and extent of natural assets within the project area. Each asset 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. The information pertaining to each asset was then placed into an asset registry. An excerpt from West Kelowna's registry showing natural asset characteristics and details is in Table 3.

TABLE 3: EXCERPT FROM THE REGISTRY

West Kelowna Natural Asset Inventory | Summary | Asset Registry | Condition | Decomposition

Natural Asset Registry

Asset ID	Asset Type	Asset Area (ha)	Sub Asset Area (ha)	Neighbourhood	ACI Definition	Majority VRI Definition	Private (ha)	Mean Elevation (m)	Length of Streams (km)	Stream Name	Interior Forest %	Length of Trails (km)	Permeability Score	Adjacent Land Use Score	Relative Size Score	Total Score
WET99	Wetland	0.63	0.63	Glenrosa		Herb	0.63	775.03	0.00		0	0.00	10	6	5	26
WET98	Wetland	0.39	0.39	Glenrosa		Herb	0.39	773.44	0.00		0	0.00	10	5	5	25
WET97	Wetland	0.07	0.07	Glenrosa		Treed Mixed	0.07	778.61	0.06	Law Creek Tributary 4	0	0.00	10	6	1	18
WET96	Wetland	0.04	0.04	Glenrosa		Urban	0.04	778.09	0.05	Law Creek Tributary 4	0	0.00	10	5	1	17
WET95	Wetland	0.00	0.00	Glenrosa		Urban	0.00	775.99	0.01	Law Creek Tributary 4	0	0.00	10	3	1	15
WET94	Wetland	0.02	0.02	Glenrosa		Treed Coniferous		805.61	0.02	Law Creek Tributary 2	0	0.00	10	10	1	31
WET93	Wetland	0.07	0.07	Glenrosa		Treed Mixed		870.65	0.02	Law Creek Tributary 2-2-1	0	0.00	10	10	1	31
WET92	Wetland	0.03	0.03	Glenrosa		Treed Mixed		868.19	0.03	Law Creek Tributary 2-2-1	0	0.00	10	10	1	31
WET91	Wetland	0.35	0.09	Bartley North		Urban	0.35	551.04	0.00		0	0.06	10	7	5	27
WET91	Wetland	0.35	0.26	West Kelowna Business Park		Urban	0.35	551.04	0.00		0	0.06	10	7	5	27
WET90	Wetland	0.13	0.13	Bartley North		Urban	0.13	551.78	0.00		0	0.00	10	7	1	23
WET9	Wetland	0.04	0.01	West Kelowna Business Park	Wetland	Urban	0.03	445.47	0.00		0	0.00	10	6	1	18
WET9	Wetland	0.04	0.03	West Kelowna Estates / Rose Valley	Wetland	Urban	0.03	445.47	0.00		0	0.00	10	6	1	18
WET89	Wetland	0.03	0.03	Glenrosa		Urban		497.31	0.04	Powers Creek Tributary3-2	0	0.00	10	3	1	15
WET88	Wetland	0.07	0.07	Glenrosa		Urban		471.46	0.07	Powers Creek Tributary 3-2	0	0.00	10	3	1	15
WET87	Wetland	0.02	0.02	Tsinstikeptum 9		Urban		434.41	0.02	Smith Creek Tributary 2	0	0.00	10	3	1	15
WET86	Wetland	0.00	0.00	Tsinstikeptum 9		Urban		433.97	0.01	Smith	0	0.00	10	3	1	15

4.4. Online dashboard

Inventories may provide more insights when characterised 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 3 and Figure 4 are screen shots from the dashboard that MNAI provided to West Kelowna. The full version can be accessed at *go.greenanalytics.ca/WestKelowna*.

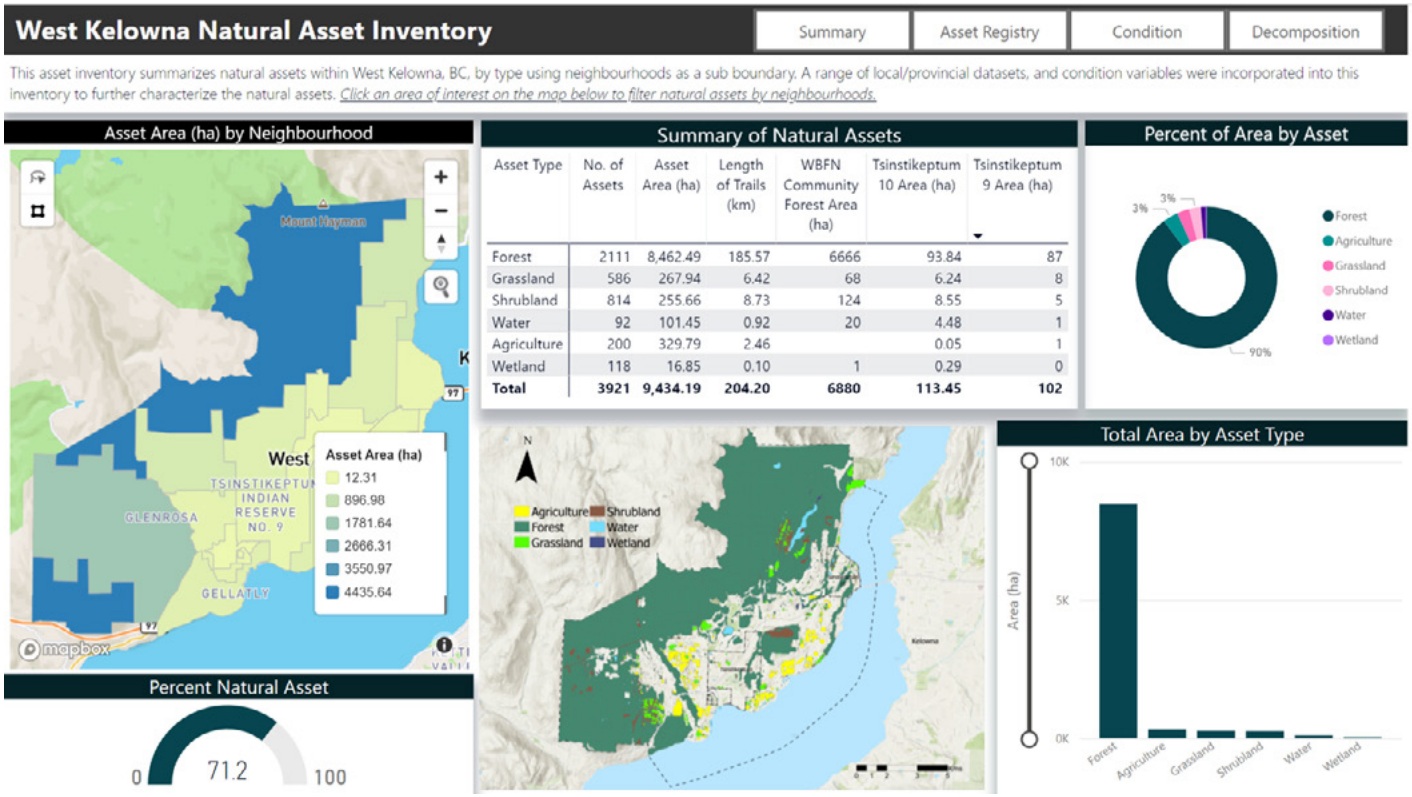

Figure 3: Screenshot of main inventory summary

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.

For West Kelowna, MNAI completed a desktop condition assessment and built it into the inventory to provide an initial understanding of the status of the natural assets. Table 4 summarizes the condition assessment steps and indicators.

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 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.
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 ('nearest neighbours')	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.	Natural asset inventory plus spatial representation of land use as well as intensity rankings of land uses.

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 rated 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:

- **Good -** assets with a score of 30 or higher
- **Fair -** assets with a score between 20 to 29
- **Poor -** assets with a score between 10 to 19
- **Very Poor -** assets with a score lower than 10

Figure 4 illustrates the results of the condition assessment for West Kelowna as they are presented in the online dashboard.

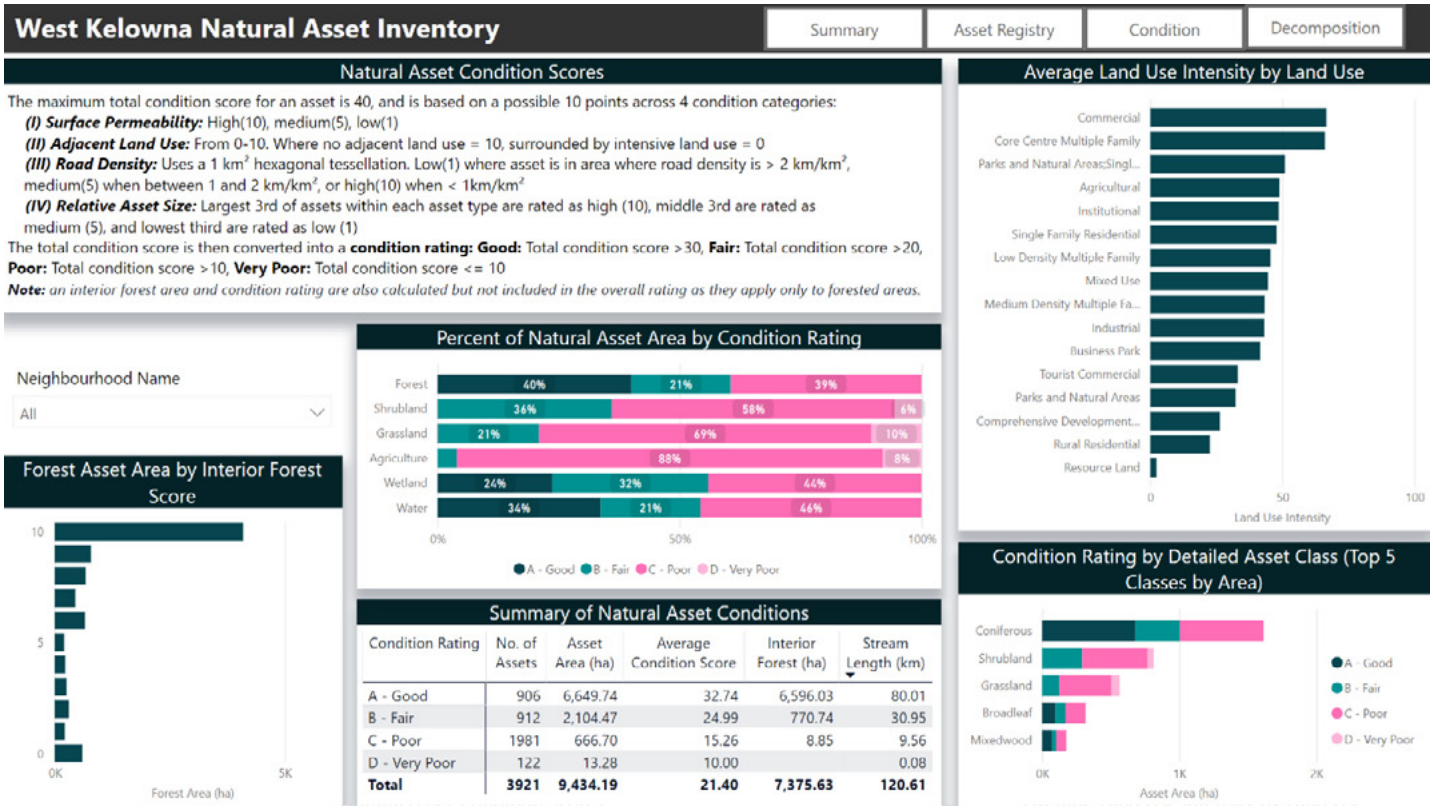

Figure 4: Screenshot of condition assessment details

Overall, about 6,650 ha (or 70 per cent) of natural assets were assessed in good condition and 2,104 ha (or 22 per cent) were assessed in fair condition.

Shrubland, grasslands and agriculture assets were largely rated poor. This is due to a combination of these assets being relatively small and in close proximity to roads and intense land uses. Note, however, that these assets only account for a small portion of the overall natural asset area.

The forest assets are generally in good or fair condition. Forest assets in poor condition are rated as such due to being smaller assets in close proximity to intense land uses.

Within the project area, wetlands rated good, fair and poor. Those that rated poor were relatively smaller and in close proximity to roads and intense land uses.

Table 5 summarizes condition ratings and Figure 5 summarizes condition by natural asset type.

TABLE 5: SUMMARY OF NATURAL ASSET CONDITION RATINGS

Condition Rating	Number of Assets	Total Area (ha)	Average Total Score
Good	906	6,650	32.74
Fair	912	2,104	24.99
Poor	1,981	667	15.26
Very Poor	122	13.28	10.00
Total	**3,921**	**9,434**	**21.40**

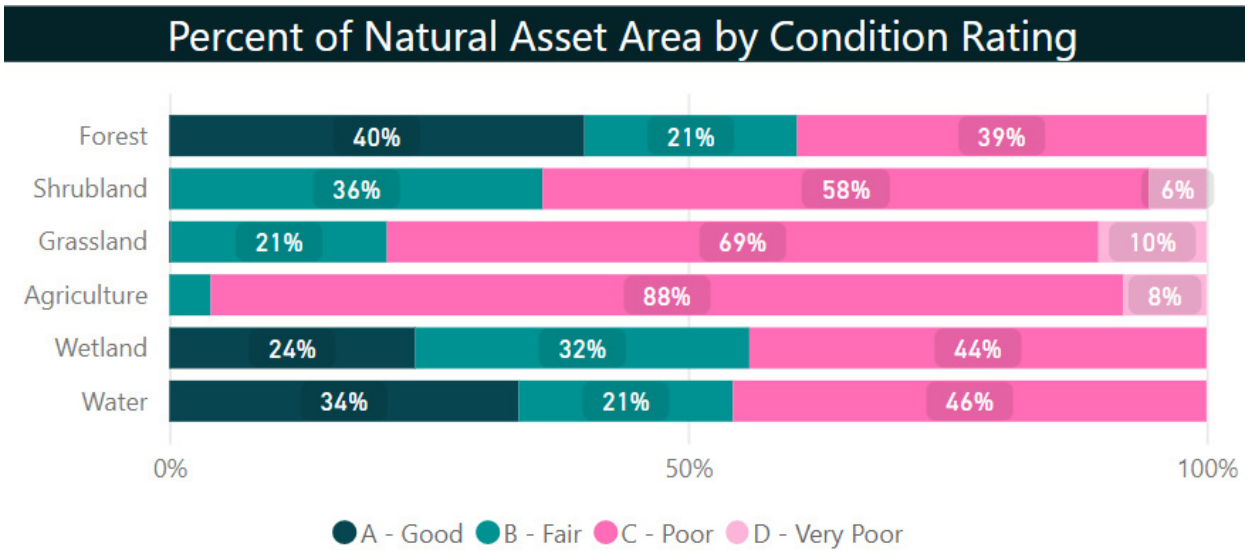

Figure 5: Summary of condition rating by natural asset type

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 management focus emerge. However, 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 at 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 risk identification tool informs the first and second stages of risk management by identifying the top risks to natural assets and their associated services, and providing 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 West Kelowna 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, West Kelowna 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/dumping
- Flooding (current and future)
- Forest fire
- Development pressure
- Pollutant loading from urban, agricultural, or industrial sources (e.g., overuse of salt on roads)
- Drought (current and future)
- Storm surge
- Construction activity
- Political policy change

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, West Kelowna considered four questions:

1/ what impact is likely to happen?

2/ what is the consequence of that impact happening?

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

4/ what cues will signal the need for mitigation?

5.3. Results of the risk identification process

The risk identification process revealed:

- 3 high-level risks (development pressure, forest fire, and flooding)
- 4 medium-level risks (pollutant loading, drought, construction activity, and overuse of trails)
- 1 low-medium level risk (storm surge)

The identified risks affect natural assets across the entire area within West Kelowna's boundaries. Green-field sites, lands abutting and downstream of agricultural properties, watercourses, and waterfront properties have been identified as areas of heightened risk.

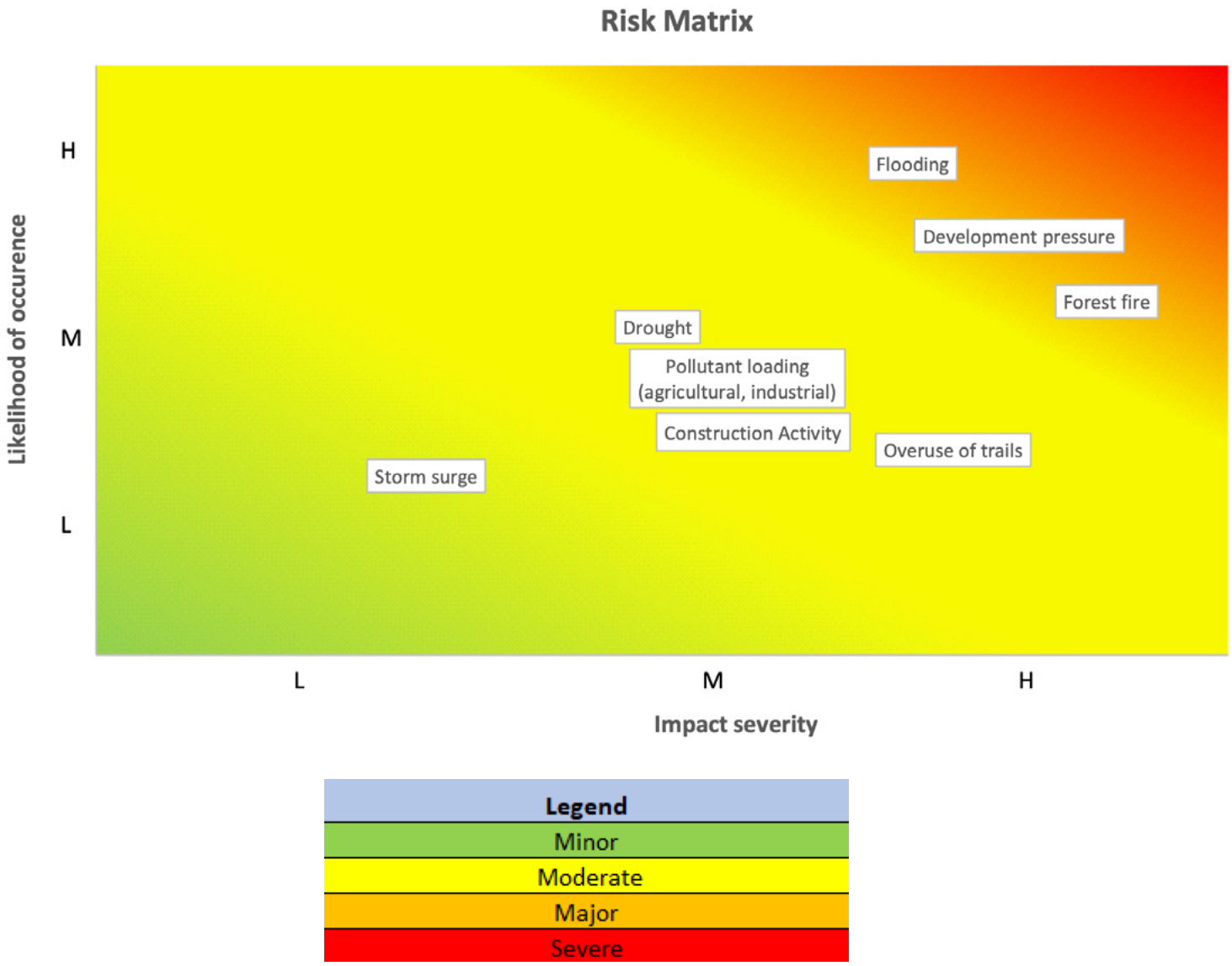

Figure 6: Results of risk management process

6 Implications

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 (a) potential priorities for the local government (b) possible actions for the further development of the inventory, and (c) issues the community can consider to advance to a full natural asset management initiative.

6.1. Potential priorities for the City of West Kelowna

Combining results of the condition assessment with outcomes of the risk identification highlights potential priorities on which West Kelowna could focus natural asset management efforts. These are:

- **Development pressure:** Development pressure in West Kelowna can lead to the degradation or loss of green-field lands, forested areas, and lands adjacent to agricultural lands. While the majority of natural assets, by area, are in good or fair condition, increasing proximity to intensive land use can contribute to declining health. As a newly incorporated municipality, West Kelowna has not yet established an urban growth boundary. 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 pressure on existing infrastructure, and preserve natural areas.
- **Forest fire:** Wildfires are more likely to occur as a result of global warming, which brings risk to undeveloped, inaccessible areas, including large forests surrounding residential areas such as Glen Rosa, Smith Creek, Goats Peak and Rose Valley. The relatively large size of forests as well as their distance from roads and intensive land use means that about 60 per cent of them were rated as being in good or fair condition; however, these are the very factors that also bring challenges for managing wildfire. West Kelowna has adopted a Community Wildfire Protection Plan to reduce risk and has recently hired additional fire fighters to fill staff shortages[4]. The engagement of the Government of British Columbia in fire management on Crown land could potentially be augmented through completion of the Community Wildfire Resiliency Planning process.
- **Flooding:** Increased flooding associated with climate change has the potential to affect all natural assets, particularly those in close proximity to watercourses, sloped areas, and low-lying areas. Coastal flooding resulting from sea level rise and storm surge can also impact shorelines and coastal natural assets. Flooding can bring economic impacts, stress infrastructure, damage private property, and risk human health and safety. In response, West Kelowna has implemented land use restrictions in riparian, aquatic and terrestrial areas to protect natural areas, mitigate erosion due to flooding, and safeguard infrastructure. For instance, in 2020 the Gellatly Road bridge was replaced and the height adjusted to accommodate higher water levels.

4 *City of West Kelowna Climate Action Update. 2019.*

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.

Table 6 lists and provides brief descriptions of risk mitigation strategies.

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

Important next steps for West Kelowna will include: deepening the understanding of natural asset condition and services to better incorporate details into asset management planning; and, for both engineered and natural assets, filling gaps in asset and performance data, notably for streams and retention ponds.

West Kelowna has developed a basic understanding of its infrastructure management needs and responds to some known problems through financial planning and budgeting. It recognizes it must continue to evaluate and assess these needs moving forward. This could include building an understanding of the condition of both engineered and natural assets, and the risks to critical assets.

West Kelowna will be able to make progress more quickly if its asset management work is supported with additional, dedicated capacity, as there is currently no individual focal point or champion for the organization. Related next steps could be for West Kelowna to establish a cross-functional asset management team (or senior management team) to guide asset management planning and support prioritization of efforts, and develop an asset management policy that defines principles and accountabilities for asset management that aligns with organizational objectives.

6.2. Possible actions for the further development of the inventory

Based on the inventory, West Kelowna 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.
- Determine acceptable levels of risk to inform West Kelowna's risk mitigation strategies (see Table 6).

- Further develop the condition assessment and risk assessment using West Kelowna's 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 flooding and stormwater management perspective, the coastal areas, wetlands and forested areas in the watersheds will be key.
- Share the inventory with adjacent local governments to stimulate collaboration.
- Add more condition ratings - for example, canopy cover, which also links to stormwater management services.
- 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.
- 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 West Kelowna wishes to proceed with a full natural asset management project, including implementation, they would need to consider the following steps:

1/ **Confirm scope, roles and responsibilities**. Undertake a meeting or workshop to confirm (a) assumptions [for example, that stormwater management and development pressure are, indeed, 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 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 this, 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**. The natural asset implementation phase is part of an adaptive management cycle, not a finite journey. It is during this time that actions identified based on the previous steps can begin to be implemented. MNAI can provide ongoing advice / guidance on policy pieces and integration of the above information for 12-18 months. After this point, the local government, together with local partners and service providers, would ideally have the capacity to continue these efforts on their own.

7/ **Ongoing monitoring**. Project monitoring is essential 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-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 West Kelowna's risk identification

This Annex contains the results of West Kelowna's use of MNAI's risk identification tool, which they self-administered with guidance from MNAI. Table 1 was the main product, developed by West Kelowna personnel, that resulted from the exercise.

Step 1: Identification of risks

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 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
1/ Development pressure	H	All natural assets City (infrastructure)	Community-wide, with specific areas of increased pressures being those on green-field sites, and areas of potential infill or density increases (low density residential to medium or high density residential/ commercial) Lands abutting agricultural land creates potential for perceived loss of community character, and growing tension between the rural (agricultural) and urban land uses – further tension with diversity of land use intensities, sounds and smells Green-field sites, potentially those that include natural assets or are in close proximity to natural assets, including forest areas.	Increasing development pressures have caused stress on existing neighbourhoods and on the existing infrastructure. Further development in the future will require that some infrastructure be replaced/upgraded, including water, sewer, roads Neighbourhoods (& persons) may need to adapt to an increase in land use intensity/density and change in use. This may cause further strain on the dynamic of West Kelowna's traditional built form (rural, agricultural, suburb community vs growing city) Growing development pressures puts a strain on the natural environment, resulting in a net loss of green field land West Kelowna has not yet established an urban growth boundary, which would limit the area of development in the community. Until that time, development may continue to sprawl. Proactive policy and land use planning can ensure appropriate measures are taken to retain higher densities in existing growth areas of the City and limit sprawl In the future, West Kelowna may adopt additional policies and land use regulations to reduce land use conflicts (rural vs urban). West Kelowna may consider further siting regulations for those lands that abut agricultural uses. Further policies/land use regulations may be permitted in the future to preserve natural areas and reduce the impact of development

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
2/ Forest fire	H	Forests Grassland Shrubland Agriculture Private (homes) City (infrastructure)	Undeveloped areas (forest/ grassland natural assets) Glenrosa neighbourhood Goats Peak/ Gellatly neighbourhood Shannon Lake neighbourhood Bartley North neighbourhood (Area) Rose Valley Regional Park neighbourhood Westside Road/ Bear Creek Road neighbourhood	Wildfires are more likely to occur as a result of global warming which causes instability in normal climate conditions and can lead to increased severity of storms (lightning strikes) and drought. Some undeveloped, inaccessible areas are more prone to risk, including large forest areas such as those surrounding Glenrosa, Smith Creek, Goats Peak and Rose Valley Consequences for the City: increased cost of servicing wildfire risk areas; greater services required to bring on more staff and resources to protect, inform and educate public Increased responsibility of home owner to protect their property through regular clean up, maintenance of property (removal of undergrowth, brush, and low branches) Further work can be done to reduce risk of wildfire with proactive wildfire management (ie.g., underbrush clearing, trimming trees, maintaining slopes), and the application of policy, land use regulations, and West Kelowna's Terms of Reference West Kelowna Fire Rescue can provide indicators on the current situation of risk and areas of hazard

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
3/ Flooding	H	Potential to affect all natural assets, but those most at risk are those in proximity to watercourses, or are in sloped or low lying areas Private lands (homeowners) City (infrastructure)	Watercourses, sloped and low-lying areas, properties adjacent to watercourses as a result of overland flooding Waterfront properties	A changing climate is likely to cause an increase in the amount of precipitation and as a result increase the risk of storm water runoff and snow accumulation, both of which can cause localized overland flooding Coastal flooding is also more probable as a result of increased severity of storm events and rising lake (Okanagan Lake) levels and wave surges The impact of overland flooding is mostly likely to damage city infrastructure and private property. In addition, flooding may damage or alter the function of natural assets (e.g., streams) West Kelowna continues to implement land uses in aquatic/riparian areas and terrestrial areas to avoid damaging existing natural areas and increasing the risk of flooding and erosion. Furthermore, West Kelowna has been proactive in its efforts to protect infrastructure; a recent project (2020) saw the replacement and height adjustment of the Gellatly Road bridge

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
4/ Pollutant loading (Agricultural/ Industry)	M	Agricultural Wetlands Waterbodies (Okanagan Lake)	Lands abutting Agricultural Land Lands downstream of Agricultural Lands Watercourses and Waterbodies (including Okanagan Lake)	There is risk of contaminating soils, water sources (watercourses and waterbodies) The contamination of these areas could result in the loss of sensitive terrestrial and aquatic habitat. Human health could also be affected from contamination of the ground and the release of particulates. Noise pollution and visual impact also play a factor in people's happiness and health Continued planning and land use regulations to regulate agricultural and industrial uses will ensure these uses are located in areas that will have minimal impact on surrounding land uses, sensitive natural areas, and people A sign of change may come where there are visual changes to surrounding land uses, e.g., heavy pollutants are affecting usability of land

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
5/ Drought	M	All natural assets City infrastructure (operations) Private (households/water use)	There is potential for drought to affect all of West Kelowna, though some areas will be more affected than others e.g., forests, agriculture, wetlands	Droughts are a pre-existing event that may become increasingly prevalent as a result of changing climactic conditions Droughts can have a direct impact on the function of natural assets (like wetlands and agriculture) and have an indirect impact on natural assets as it increases the inherent risk of wildfire (grassland and forests) and potential loss of wildlife Drought also has an impact on the function and operation of city infrastructure, like the water treatment plants. Extended dry periods put increased strain between urban and agricultural uses and the demand for this resource Drought mitigation is difficult to manage at a community level as it is partially a by-product of climate change; however, West Kelowna may continue to employ its Water Conversation Plan and support the planting of local plants/trees that are more resilient to the Okanagan climate

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
6/ Construction activity	M	All natural assets	Greenfield development has the greatest degree of disruption to existing natural assets; areas of future development include further development around Mt. Boucherie, and new development at Smith Creek and Goats Peak	New construction can disrupt, damage, and alter the function of natural assets, particularly water assets (wetlands/stream) that are not able to be moved and must be managed throughout the development process New construction can disrupt existing communities/neighbourhoods and have a negative impact on people's health and happiness Where development alters or changes the land, there are strict application requirements and ongoing inspections to ensure the development does not negatively impact the principle and surrounding land uses. Through this process, staff administer planning regulations that protect natural areas and sensitive habitats that would be affected Further mitigation efforts may be triggered whereby unknown site conditions/species/hazards are observed, in which case additional development regulations and standards would be applied

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
7/ Overuse of trails/parks	M	Urban greenspaces Forest areas Grasslands Wetlands	Existing public trail network Future trail network (expansion) Forest areas/ grasslands (unmarked trails)	West Kelowna is well known for its exceptional parks, green spaces, and natural areas. As the community continues to grow, so too will the need for these amenities and the use of these services. With a growing population and popularity as a tourist destination, it may be anticipated that the trails require greater level of service and protection in the future The increased use of trails could lead to deterioration of quality and could result in greater time/money in maintaining these features in the future. Greater use may also see an overall increase in the dumping of garbage/garbage cleanup required to maintain park appearances Increased use of trails may have negative impact on users and require adding park/green space/trails to offset the increase in users Parks may continue to operate with regular park maintenance and monitoring. Self-monitoring (public) is a reliable method of protecting from dumping/litter An evaluation of the Parks Master Plan can be useful in indicating the level of service and amount of green space/trails required to service the community. This may be actively monitored through the development process and master planning process

TABLE 1: SIMPLIFIED RISK IDENTIFICATION SURVEY

Risk	Ranking (L/M/H)	Assets Affected	Location	Notes
8/ Storm surge	L / M	Greenspaces Private properties	West Kelowna's waterfront (Okanagan Lake)	Increasing storm severity can cause storm surges, damaging public and private properties. Damage can include erosion, and loss of infrastructure and structures (private property) Storm surges are largely uncontrolled as they are, in part, due to climate change, but the impact may be mitigated with proper infrastructure and regulations to limit the opportunity for damage to take place Development on Okanagan Lake is regulated by Aquatic Development Permit regulations, which limit the opportunity for structures to be placed in these areas. These regulations also seek to preserve these areas

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