



DEFINING AND SCOPING MUNICIPAL NATURAL ASSETS

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The Municipal Natural Assets Initiative (MNAI) 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	Introduction.....	1
2	Defining municipal natural assets.....	1
2.1	Why do we need a definition for municipal natural assets?	1
2.2	What is a natural asset?	2
2.3	Natural Asset vs. Green Infrastructure:	3
2.4	What are Municipal Natural Assets?.....	5
3	A proposed common scope for Municipal Natural Assets Management.....	6
3.1	How to identify / assess municipal natural assets?.....	6
3.2	Natural assets that cross jurisdictions/authorities?	8
4	Areas for further research/refinement	8
4.1	Feedback Questions	9
4.2	Future Defining / Scoping Research Areas	9
	Appendix A: Municipal Natural Asset Scoping Questions.....	10

1 Introduction

Local governments¹ across Canada are faced with significant asset management challenges. Many of the services they provide - including water and wastewater delivery, waste removal, transportation, and environmental services – depend, in large part, on engineered infrastructure assets that are in need of renewal. Meanwhile, the effects of climate change are expected to put even more strain on these assets and on local government budgets going forward.

In order to provide community services in a cost effective and sustainable manner now and in to the future, local governments are looking for ways to improve management of the critical assets that supply these services. Asset management – the process of inventorying a community’s existing assets, determining the current state of those assets, and preparing and implementing a plan to maintain or replace those assets—allows municipalities to make informed decisions regarding a community’s assets and finances.

Unfortunately, local governments lack policies and methods to measure one class of assets: natural assets. Natural assets are ecosystem features that provide, or could be restored to provide, services just like the other engineered assets, but historically have not been considered on equal footing or included in asset management plans.

As the municipal infrastructure asset management process evolves, it will be critical to ensure that all community assets that may provide municipal services—lakes, wetlands, green spaces and trees as well as roads, bridges, buildings—are appropriately identified and managed.

2 Defining municipal natural assets

2.1 Why do we need a definition for municipal natural assets?

Municipal natural asset management (MNAM) is one of many approaches being developed to advance the recognition of natural assets in municipal decision-making on the management of municipal infrastructure assets. Because this is an emergent approach, a clear definition for “municipal natural assets” is needed to differentiate this approach from other approaches to municipal infrastructure asset management, and to establish a common basis of understanding where the MNAM practice can bring value to decision-making.

¹ Use of the term “local government” or “municipality” throughout this document refers to all authorities that have municipal responsibilities (i.e. local administrations, metropolitan and regional municipalities, and sectoral organizations). Each province uses its own terminology. For more information, see https://www.fcm.ca/Documents/tools/International/Your_Guide_to_Municipal_Institutions_in_Canada_EN.pdf

2.2 What is a natural asset?

Natural assets to date have been more commonly referred to as *natural capital*, though the meaning is the same. The concept of *natural capital* is used as an economic metaphor for the limited stocks of physical and biological resources found on earth. A complex web of biological, chemical, and physical processes produce *ecosystem goods and services* that flow like interest or dividends from those stocks, supporting all life on earth and deeply influencing the quality of human life.

Ecosystem goods are the products from natural capital such as food, fibre, clean air, and water; *ecosystem services* are the less tangible but no less significant benefits from ecosystem processes such as nutrient cycling, water purification and climate regulation, and non-material benefits such as recreation, aesthetic and cultural benefits.

There are many varying definitions of natural capital, but all revolve around the main theme of the stock of renewable and non-renewable natural resources that includes land, water, atmosphere, minerals, plant and animal species, and all living things. For example,

“Natural Capital can be defined as the world’s stocks of natural assets which include geology, soil, air, water and all living things.”
~World Forum on Natural Capital²

Many definitions also include reference to the flow of goods and services that come from natural capital (Figure 1):

“Natural capital is another term for the stock of renewable and non-renewable resources (e.g. plants, animals, air, water, soils, minerals) that combine to yield a flow of benefits to people.”
~ Natural Capital Coalition³

The concept of natural capital intentionally references the familiar economic notion of financial capital:

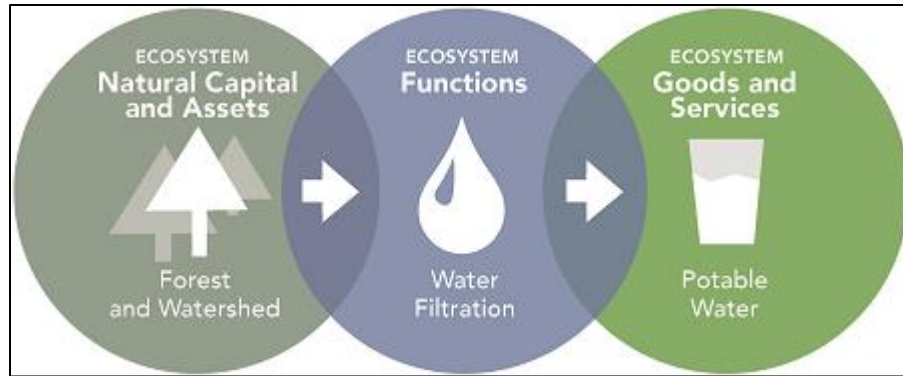
“The term 'capital' has been borrowed from the financial sector to describe the value of the resources and ability of ecosystems to provide flows of goods and services such as water, medicines and food. Flows of goods and services that benefit people are called 'ecosystem services'. Much as an investor will use financial capital to generate profits, a stock of forest or fish will provide a future flow of timber or food, which if used sustainably will provide long-term benefits to people.”
~The Natural Capital Declaration⁴

The images in Figure 1 illustrate the link between the stock (i.e. natural capital) and the service (e.g. potable water).

² World Forum on Natural Capital held in Edinburg in 2015; source: <http://naturalcapitalforum.com/>

³ Natural Capital Coalition definition of natural capital as found at: <http://naturalcapitalcoalition.org/>

⁴ The Natural Capital Declaration document retrieved from: <http://www.naturalcapitaldeclaration.org/wp-content/uploads/2012/04/NaturalCapitalDeclaration.pdf>



(image source: Earth Economics <http://www.earthconomics.org/science-economics/>)

2.3 Natural Asset vs. Green Infrastructure

The terms natural asset and green infrastructure are often used interchangeably, but they have different meanings. Whereas natural assets refers to the stock of natural resources and ecosystems that yield a flow of benefits to people, green infrastructure also includes designed and engineered elements that have been created to mimic natural functions and processes in the service of human interests (see Figure 2).

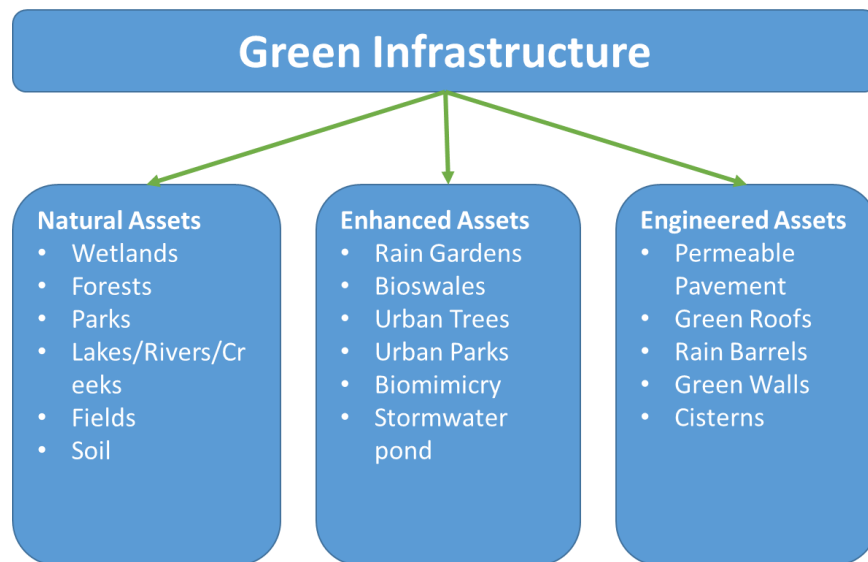


Figure 2: Elements of Green Infrastructure. Enhanced assets are generally those assets which have been designed to act like natural assets, whereas engineered assets are generally those which have been designed to function like natural assets but are new designs not found in nature.

Although green infrastructure can provide many ecosystem services, such as temperature moderation and air filtration, much of the emphasis in current discourse is on those elements that provide ecological and hydrological functions and processes for managing

Defining and Scoping Municipal Natural Assets – Discussion Paper

water.⁵ These green infrastructure elements include natural heritage features and systems, parklands, stormwater management systems, street trees, urban forests, natural channels, permeable surfaces, and green roofs.^{6,7} The US EPA, for example, states that “green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments.”⁸ In the *Ontario Provincial Policy Statement 2014*, green infrastructure is defined as “natural and human-made elements that provide ecological and hydrological functions and processes”.⁹ Other terms related to green infrastructure include low impact development, rainwater management, or natural stormwater management. In Canada, there are additional variations: the Government of Canada, for example, has included clean energy in the definition of green infrastructure,¹⁰ and uses the term “living green infrastructure” for the more common definition of green infrastructure.

The distinction between a natural asset, a municipal natural asset and green infrastructure can be confusing when trying to determine what category a certain asset, for example a wetland, might fall under. Figure 3 attempts to depict where the terms overlap.

⁵ See West Coast Environmental Law, 2007, *The Green Infrastructure Guide* (available at: <http://www.waterbucket.ca/gi/sites/wbcgi/documents/media/336.pdf>) for a slightly different definition that includes “design with nature” principles

⁶ Ontario Provincial Policy Statement 2014; retrieved from: <http://www.mah.gov.on.ca/AssetFactory.aspx?did=10463>

⁷ For additional explanation of green infrastructure elements see US EPA Green Infrastructure website; retrieved from: <http://www2.epa.gov/green-infrastructure/what-green-infrastructure>

⁸ See US EPA website, What is Green Infrastructure?; retrieved from: <https://www.epa.gov/green-infrastructure/what-green-infrastructure>

⁹ Ontario Provincial Policy Statement, 2014; available at www.mah.gov.on.ca/Page10679.aspx

¹⁰ The Government of Canada’s 2016 Budget included a full section on Green Infrastructure that lists a much wider range of infrastructure for clean energy, asset management, and water and wastewater systems. See Government of Canada, *Budget 2016: Growing the Middle Class* (March 2016); retrieved from:

<http://www.budget.gc.ca/2016/docs/plan/budget2016-en.pdf>. Infrastructure Canada also recently issued a statement via social media explaining that green infrastructure includes climate resilient infrastructure, clean energy, cleaning-up contaminated sites, and water/wastewater infrastructure. See Infrastructure Canada, Twitter Feed; retrieved from: https://twitter.com/INFC_eng/status/705121953749864448

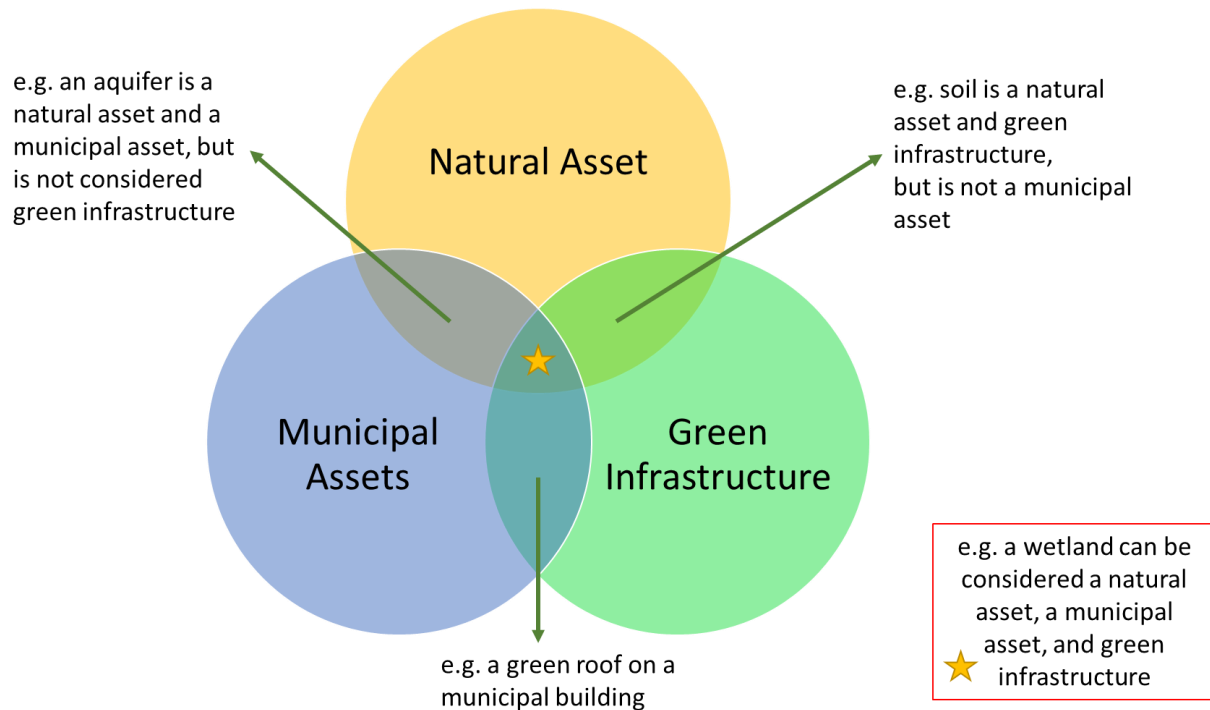


Figure 3: Overlapping terms related to natural assets and green infrastructure

2.4 What are Municipal Natural Assets?

Although the term natural capital or natural asset is relatively well known in environmental research and policy, applying it in a municipal context is a new and emergent concept.

In a municipal context, the term asset typically refers to engineered infrastructure such as roads, bridges, water treatment plants and drainage pipes. Yet nature also provides many services that fall within the realm of municipal services, such as water storage and filtration or rainwater management. In this capacity, from a service perspective, nature, or natural capital, is a municipal asset no different from other forms of infrastructure. A natural wetland, for example, performs the same function (i.e. water treatment and storage) as a reservoir.

Many municipalities are developing asset management strategies to more systematically manage their infrastructure assets. The impetus towards developing asset management strategies is being driven by changes to public sector accounting guidelines, eligibility criteria for federal Gas Tax grants, certain provincial legislative requirements, as well as program support and funding.

The Government of Ontario's Guide for Municipal Asset management explains it as the "process of making the best possible decisions regarding the building, operating, maintaining, renewing, replacing and disposing of infrastructure assets. The objective is to maximize benefits, manage risk, and provide satisfactory levels of service to the public in a

Defining and Scoping Municipal Natural Assets – Discussion Paper

sustainable manner”.¹¹ The focus on service, rather than engineered assets, is highlighted by the Canadian Network of Asset Managers’ description of asset management as “the coordinated activities of an organization to realize value from its assets in the achievement of its organizational objectives”.¹² Asset management strategies embrace a lifecycle approach and strive for continuous improvement in asset management practices.

Municipal asset management is therefore focused on the “infrastructure assets” that are managed by a municipality for the provision of a sustainable municipal service. Natural assets that are municipally managed and that provide a municipal service would consequently meet this definition.

Suggested definition for municipal natural assets:

Municipal natural assets refers to the stock of natural resources or ecosystems that is relied upon, managed, or could be managed by a municipality, regional district, or other form of local government for the sustainable provision of one or more municipal services.

3 A proposed common scope for Municipal Natural Assets Management

Now that we have a working definition of municipal natural assets, we need to further refine this definition for practical application. Each municipality will have a different set of natural assets within their purview and so the goal of this section is not to provide a prescriptive list of what to include in each municipal asset management plan. Instead, the goal of this section is to provide guidance in the decision making process.

3.1 How to identify / assess municipal natural assets?

As identified in the previous section, not all natural capital would be considered municipal natural capital or assets. For example, through pollination, bees are natural capital that provide critical ecosystems services that benefit humans. However, municipalities are not responsible for providing pollination services and so bees would not be considered a municipal natural asset. Figure 4 provides a simplified visual demonstrating that only a portion of all natural assets would be included as municipal natural assets.

Once you have identified the ecosystem services that match municipal services, the natural assets that provide those services can be identified, as shown in Table 1.

¹¹ Government of Ontario, Building Together – Guide for municipal asset management plans (<https://www.ontario.ca/page/building-together-guide-municipal-asset-management-plans#section-1>)

¹² The Canadian Infrastructure Report Card: Asset Management Primer (2014); retrieved from http://cnam.ca/wordpress/wp-content/uploads/2015/05/CIRC-Asset-Management_EN_LR.pdf

Defining and Scoping Municipal Natural Assets – Discussion Paper

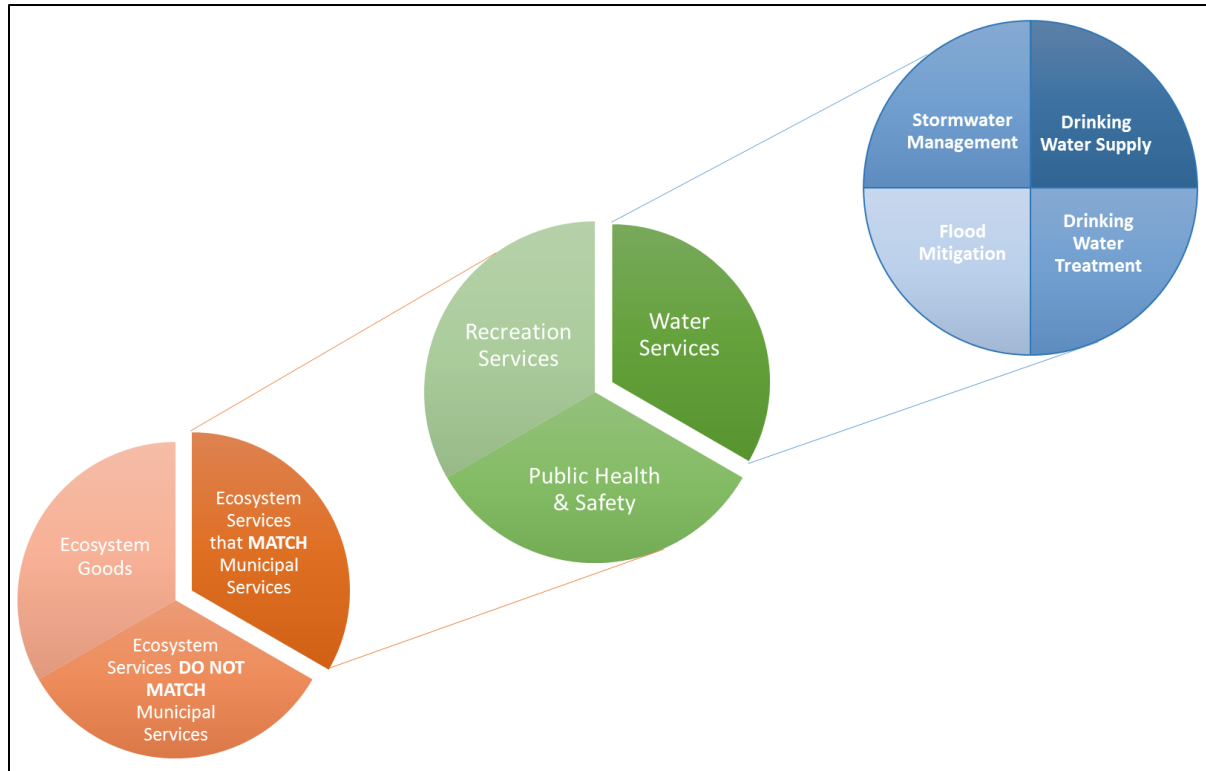


Figure 4: Illustration of the portion of ecosystem services provided by natural assets that match municipal services and the portion of those municipal services that are specific to water.

Table 1: Example water specific Municipal Services that can be provided by natural assets and ecosystem services

Municipal Water Services	Equivalent Ecosystem Service	Natural Capital Component
Drinking Water Supply	Aquifer Recharge	Aquifer & Source Water Area
	Lake Recharge	Lake Watershed
	River Headwaters	Headwater lands
Drinking Water Treatment	Water purification	Wetlands, forests, vegetation
	Water Filtration	Wetlands, forests, vegetation
Stormwater Management	Rainwater Absorption	Wetlands, forests, vegetation
	Rainwater Filtration	Wetlands, forests, vegetation
Flood Mitigation	Rainwater Absorption	Wetlands, forests, vegetation

3.2 Natural assets that cross jurisdictions/authorities?

Unlike traditional infrastructure, such as roads, sewers, etc., natural assets can extend beyond the boundaries of municipal jurisdiction and can also be owned or “managed” by multiple entities (public and private). A creek, for example, can flow through many municipalities, providing each with stormwater management services. Which municipality is responsible for its management if its headwaters are in one jurisdiction but it flows through another? What about the sections of the creek that run through private property? The image in Figure 5 illustrates many of the issues associated with multiple authorities over a single resource.

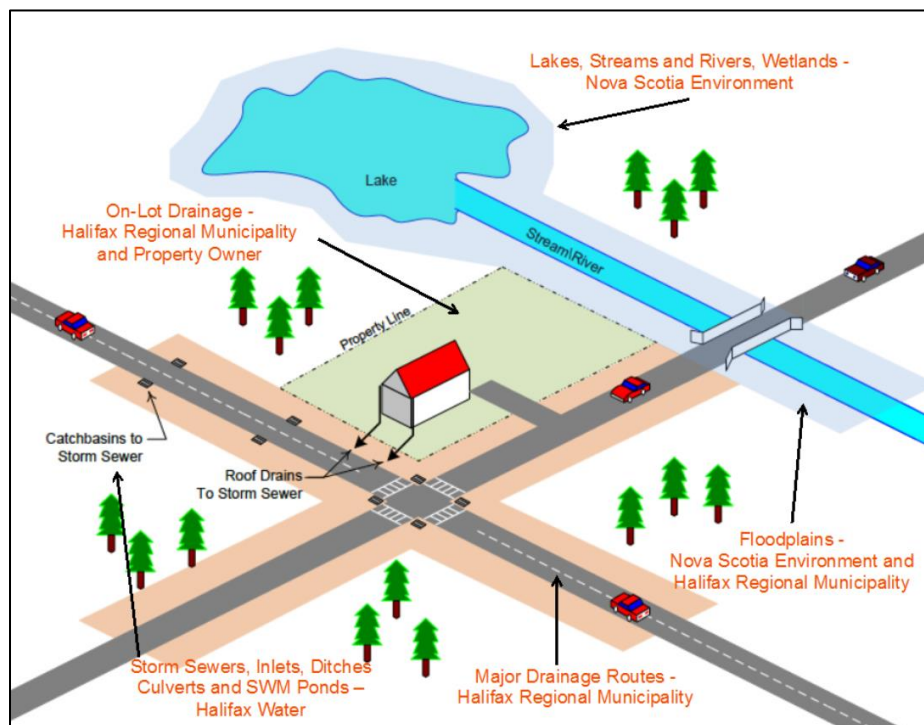


Figure 5: Example depiction of the multiple stakeholders and authorities involved in the management of a single natural resource - water (Source: Halifax Integrated Resource Plan <http://www.halifax.ca/hrwc/documents/Vol1.pdf>)

4 Areas for further research/refinement

Given the innovative nature of the MNAM approach, many items will be refined through trial and error during implementation. The central goal of the Municipal Natural Asset Initiative is to provide scientific, economic and municipal policy 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.

Defining and Scoping Municipal Natural Assets – Discussion Paper

4.1 Feedback Questions

To begin to refine a common definition and scope for municipal natural assets, feedback on the following questions is invited:

1. Does the proposed working definition of Municipal Natural Assets make sense?
2. Does Figure 2 represent the different elements of Green Infrastructure as it is understood within your municipality? If not, what is different?
3. What ecosystem services, in addition to the water specific services outlined in Figure 4 and Table 1, are providing municipal services in your municipality? (e.g. are vegetated shorelines providing erosion protection?)
4. How are these municipal natural assets currently being managed? And for what services? (e.g. if a green space is being managed, is it being managed for recreational services, stormwater management services, both, neither, or something else?)
5. In reference to Section 3.2, if there is shared management of a natural asset:
 - a. How is that asset managed?
 - b. How are natural assets that pass through/overlap private property managed?
 - c. What aspects of that process can be adapted to managing municipal natural assets for municipal services?

4.2 Future Defining / Scoping Research Areas

As part of the ongoing process, additional questions related to defining and scoping municipal natural assets will inevitably arise. The identified next research phase of the project is to address the role of private landowners in the management of municipal natural capital. Questions related to policy barriers at the national and provincial levels and how natural capital fits in with existing professional standards and norms have also been identified for future research.

Is there an immediate research topic we are missing? Let us know!

Appendix A: Municipal Natural Asset Scoping Flowchart

