Research on Funding, Financing Models, and Strategies to Support Ecosystem Services on Agricultural Lands

CONSOLIDATED REPORT

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SUBMITTED BY

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Introduction

ALUS employs an incentive based approach to use marginal farmland for the production of ecosystem services, including flood and drought management and water quality improvement.

The purpose of this research is to create a path forward to fund specific ALUS projects and more broadly other types of green infrastructure, and to provide policy solutions that are practical and immediately actionable by decision makers, as well as being financially sustainable over the long term.

The research and analysis is divided into **three parts:**

PART I "Funding" provides:

- a summary of federal infrastructure funding, identifying criteria that could be barriers for green infrastructure funding and ways to address these barriers;
- a description of the broader policy context in Canada and how green infrastructure projects fit into government policy priorities;

    a. current government funding sources and limitations on eligibility;
    b. government funding programs in the United States that fund ALUS style projects;
    c. opportunities to influence access to funding;
    d. policy context in federal and select provincial governments and influencing opportunities that they present;
    e. overview of alternative financing models that could provide sustainable funding over the long term; and
    f. recommended approach to creating funding pathways for ALUS projects.

PART II "Accounting" provides:

- an update on federal infrastructure funding eligibility and accounting rules, based on the Federal Budget 2017 and discussions with Infrastructure Canada
- an analysis of accounting rules that apply to 'assets'
- an assessment of the implications of accounting rules for green infrastructure and identification of key issues.
- recommendations for enabling not-for-profit organization eligibility for bilateral Infrastructure funding programs.

PART III "Financing Models - Case Studies" provides:

- consideration of four alternative financing models for green infrastructure and ecosystem services in different jurisdictions:
    - Ontario - South Nation River Watershed (phosphorus offsets)
    - Great Lakes - Sustain our Great Lakes (habitat restoration)
    - Florida - Everglades and Lake Okeechobee (dispersed water management, retention)
    - Australia - Rivers of Carbon (carbon sequestration, biodiversity, habitat)
- recommendation for funding program design for green infrastructure projects in a rural/agricultural context
- within appendices:
    - observations and lessons learned from alternative financing models
    - shorter versions of two case studies - Rivers of Carbon and Sustain Our Great Lakes
    - notes on early research into financing models in other jurisdictions.

PART I - FUNDING

1. Statement of Problem

ALUS Canada operates in six provinces on a variety of projects that provide ecosystem services on agricultural land.

It is currently embarking on four projects that would benefit from government funding. The four proposed projects are in different regions of the country and each addresses a combination of impacts, from flood control to water quality to habitat protection. Together, these projects will serve to communicate the public benefit of green infrastructure investment to governments at different levels and the public at large.

In seeking financing to support these projects, ALUS Canada has discovered eligibility requirements with certain government funding programs that pose a challenge to access these funds. This research will assist in finding a path forward to fund these important projects.

The four projects include:

i) The City of Edmonton and the Modesté Subwatershed Riparian Project in Alberta

The Modesté is a subwatershed encompassing 482,000 hectares that form part of the North Saskatchewan River Basin in Alberta. The subwatershed is upstream from a major urban centre, the City of Edmonton. The Province of Alberta has identified the Modesté subwatershed as being of priority for flood mitigation, drought, and water quality protection. The project will involve collecting data and identifying priority riparian areas for restoration and conservation efforts in the Modesté subwatershed, development of a collaborative action plan with municipal partners including setting goals and targets on high priority riparian areas, and aligning municipal by-laws that pertain to riparian protection. Finally, a cost-benefit analysis of the recommended restoration activities will be conducted, quantifying the downstream water quality improvement and flood mitigation benefits in relation to the costs associated with water treatment, water security and flooding.

ii) Agricultural Green Infrastructure in Norfolk County's Lynn River Watershed in Ontario

This project will evaluate the costs and benefits of restoring green infrastructure on agricultural lands in the Lynn River Watershed, located in Norfolk County in southwestern Ontario. The Lynn River empties into Lake Erie. The Lynn River is the receiving stream for the Simcoe Wastewater Treatment Facility. Investments in water treatment infrastructure are expected in the next two decades. This research project will investigate how upstream protection and restoration on agricultural lands may directly and indirectly reduce the cost of built infrastructure. Reducing nutrient load throughout the watershed will directly affect the assimilative capacity of the Lynn

River thereby impacting the future effluent limits of the wastewater facility. Flood and drought mitigation offered through wetlands, riparian buffers, tree planting and modified agriculture will indirectly affect the cost for water treatment (and other built infrastructure) by reducing the need for treated water and the wear and tear on water, wastewater and stormwater structures.

iii) The Economics of Alternative Land Use Services and Climate Change in Manitoba

In cooperation with the International Institute for Sustainable Development, this project will examine the economic benefits of two types of ALUS projects (water retention via engineered storage and wetland restoration, and riparian buffers) and prepare a geographically specific case study of the potential impact of a green infrastructure plan for the Town of Virden, located in the Scallion watershed in southwest Manitoba, which faces increasing flood risk. A large culvert planned to mitigate flood risk for the Trans-Canada Highway near the town would increase flood risk to the town. The case study will examine whether green infrastructure in the upper reaches of the Scallion watershed is a cost-effective solution to mitigate flood risk to the highway and the town.

iv) Alternative Land Use Services (ALUS) in Trout River and Mill River (Carruthers Brook) Watersheds in Prince Edward Island

Located in Western PEI, the Trout River and Carruthers Brook Watersheds together encompass just over 16,100 hectares. Land-use-related environmental impacts include elevated nitrate levels in drinking and surface waters, anoxic events in the estuaries, fish kills, sedimentation, and flooding. The Community of O'Leary proposes to pilot new and expanded ALUS incentives to effect changes in how land is managed in these watersheds. This will include expanded riparian buffer zones along watercourses, cover cropping, increased area of forest cover and taking high-risk agricultural lands out of production.

Each of these four projects addresses a combination of impacts, from climate impacts such as flood control or drought, to habitat restoration, to water quality. Each seeks to demonstrate how mitigation of these impacts through the use of lower cost green infrastructure can accomplish what has traditionally been addressed through high cost grey infrastructure.

2. Opportunities and Challenges Facing Green Infrastructure Funding

2.1 Current Eligibility of Green Infrastructure for Funding

Under the 2016 Canada-Ontario Infrastructure Funding Agreement, there were several clauses that, together, made some green infrastructure (GI) eligible for funding.

2.1.1 The Definition of an Asset

There is no specific prohibition of GI assets that may be included in funding applications. The definition of an asset is permissive with regard to tangible assets associated with GI. Under Section 1.1, an 'asset' is defined as:

> *'any real or personal property or immovable or movable asset, acquired, constructed, rehabilitated or improved…'*

Furthermore, in schedule A, eligible projects include stormwater and wastewater projects,

> *'including the construction of naturalized systems for management and treatment of wastewater and stormwater.'*

However, operating and maintenance costs, which form a high proportion of GI costs, are explicitly prohibited. Under Schedule A, subsection h) Ineligible Costs:

> *vii. Costs associated with operating expenses and regularly scheduled maintenance work.*

Under the Clean Water and Wastewater Fund (CWWF), there is an added provincial requirement, which is not a federal requirement, that municipalities must confirm that the proposed projects align with their asset management plans. That would mean that any GI project for which funding was sought would have to be in a municipality's asset management plan.

2.1.2 Ultimate Recipient of Funding

The agreement is also permissive with respect to who the recipient of funding could be. According to Schedule A, an 'Ultimate Recipient' could include not only municipal governments, but also:

> *'organizations designated by a province or territory and agreed to by Canada, such as Indian Act Band Councils' and 'Other entities providing water or wastewater services to communities as designated by Ontario.'*

The Ontario Ministry of Infrastructure confirmed that the bilateral agreement identifies eligible

Ultimate Recipients as the Province and municipalities, as well as organizations that the Province designates as additional Ultimate Recipients conditional on receiving federal government agreement on the designation. Ontario has designated federally-recognized First Nations as an additional eligible recipient.

Provided an application is submitted by one of the above Ultimate Recipients, under CWWF there is no condition to limit the involvement or sub-contracting of a nonprofit by an ultimate recipient. The usual procurement requirements would equally apply to profit and nonprofit contractors alike, that is that the proponent demonstrate value-for-money in the procurement process (Hillen 2017).

Federal Budget 2017 confirmed that this arrangement will be maintained for Phase 2 infrastructure funding, albeit at a lower threshold of 40%. Chapter 2 of the federal budget reads,

> *'The bilateral agreements will involve cost-sharing for agreed-to projects, with the proportions determined based on the recipient of the funds. The Government will provide funding for projects on the following basis: up to 40 percent federal funding for projects undertaken with municipal and not-for-profit partners;'*

This reaffirms ALUS' current approach of partnering with municipalities to apply for bilateral infrastructure dollars.

2.1.3 Measurable Outcomes

In the evaluation of applications, the CWWF puts a strong emphasis on measurable outcomes, through performance indicators. Two indicators in the agreement could be used in support of GI, at least as these projects relate to safe drinking water and improved wastewater effluent and stormwater quality, including:

i) *Safer drinking water: Number of water treatment facilities that have improved water quality as a result of funded investments;*
ii) *Cleaner wastewater and stormwater: Number of systems that have improved the quality of wastewater effluent or storm water discharge as a result of funded investments.*

2.1.4 Allocation Versus Application-based Funding Distribution

The Ontario Government favours a combination of allocation versus application-based funding distribution. This allows the province to choose specific big ticket projects to fund, such as regionally-significant public transit projects, while allocating the rest of the funding on a per-capita basis to municipalities. This eliminates the competitive nature of project-specific applications and provides the recipient greater discretion to determine the appropriate priority projects. As long as a municipality considers GI as a priority, this does not pose a barrier to their eligibility. However, it would require strong advocacy on the part of GI advocates to ensure that these projects are included in the list of priority projects to be funded by a municipality's

allocated amount.

2.1.5 Incrementality

Unfortunately, as a result of some limitations in the agreement, in practical terms, green infrastructure projects were not evaluated in a favourable light. Primary among these is the requirement to demonstrate measurable 'incrementality." This means that federal funding under the Agreement is over and above the funding already planned by the Government of Ontario through its 2016 Budget or municipalities as part of provincial and municipal infrastructure plans, to allow Ontario and municipalities to carry out more infrastructure projects or to accelerate those that they had already planned. This requirement is designed to inject a short-term stimulus to the economy. This requirement had the effect of attracting non-essential but costly infrastructure rehabilitation projects like road pavings and pipe replacements.

2.1.6 Projects on Private Land

According to the Ontario Ministry of Infrastructure, under the Clean Water and Wastewater Fund:

> *'a project may take place on private land provided there is public benefit and the project meets the eligibility criteria. Final evaluation on eligibility would require assessment of project specific details. However, the proponent would have to be an eligible Ultimate Recipient as defined by the bilateral agreement. As explained above, so far the only ultimate recipients agreed to by the federal and Ontario governments are Municipalities, First Nations and Local Services Boards' (Hillan 2017).*

For Phase 1 infrastructure funding, this was not the position supported at the Federal level, where the Department of Infrastructure and Communities had been clear that projects on private land would not qualify for CWWF funding.

However, this difference in the way the Federal and Ontario Governments view funding of projects on private land seems to have been resolved. As noted above, in Federal Budget 2017, infrastructure funding rules have been altered to allow funding for projects with nonprofit partners. Minister's staff in the Federal Department of Infrastructure has confirmed that this rule change would apply to projects on private land as well (Freeman 2017). How this rule will be applied in practice will become more clear as project proposals are submitted.

Another area that has the potential to limit the types of GI that can be funded through federal-provincial infrastructure funding is the requirement that funding requests only include assets that conform to Public Sector Accounting Standards set by the Public Sector Accounting Board (PSAB).

Under Section 18.1 Accounting Principles, the Agreement stipulates that:

'All accounting terms will have the meanings assigned to them, all calculations will be made and all financial data to be submitted will be prepared, in accordance with the Public Sector Accounting Standards in effect in Canada'.

By definition, these PSAB standards only apply to public sector assets on public land. PSAB officials admit that PSAB rules have not 'caught up' with public infrastructure like green infrastructure that provides a public benefit but is located on private land. This will be explored further in the Accounting section below.

In summary, the current federal-provincial infrastructure funding agreement is permissive on the definition of assets, is holding the line on 'recipients,' has an outright prohibition on the eligibility of operating and maintenance costs, and is not aligned on the question of projects on private land for public benefit.

2.2 Phase 2 Federal Provincial Infrastructure Funding

The recently released Federal Budget 2017 articulated federal priorities for Phase Two of federal-provincial infrastructure funding, including climate change adaptation, which could support ALUS projects.

The more detailed negotiations around the eligibility criteria and definition of 'recipients' will be negotiated between each province and the Federal Government over the next year. This provides an opportunity for GI advocates to encourage governments to support more GI-friendly criteria, as discussed further below.

2.3 Other Federal Sources of Funding

Federal budget 2017 includes a number of funding commitments that could benefit green infrastructure.

- $2 billion is committed to a Disaster Mitigation and Adaptation Fund to "support national, provincial and municipal infrastructure required to deal with the effects of a changing climate." According to the budget, the cost-shared fund will focus on "built and natural, large-scale infrastructure projects supporting mitigation of natural disasters and extreme weather events and climate resilience" (emphasis added). The fund will be administered by Infrastructure Canada.

- $9.2 billion over 11 years for 'green infrastructure', which is defined much more broadly than what is usually considered GI, including projects that "reduce greenhouse gas emissions, deliver clean air and safe water systems, and promote renewable power."

- A Canada Infrastructure Bank will invest $5 billion over 11 years to 'green infrastructure,' again defining the term broadly.

Other funds that may be relevant include:

- Federal-provincial agricultural funds under the third round of Growing Forward (GF3), expected to be negotiated in the summer of 2017. Typically, GF funds have been a flow through to provincial agricultural departments. Funding priorities and eligibility criteria are largely left up to the provinces and partner organizations administering the programs. For example, the Ontario administrative partners are the Ontario Soil and Crop Improvement Association (OSCIA) for producers and the Agricultural Adaptation Council for organizations and collaborations. Although GF funds have been difficult to access to date, there may be a role for ALUS and other GI advocates to influence the Ontario Ministry of Agriculture, Food and Rural Affairs early in the process for the next round of funding.

- Transport Canada will invest $16.4 million over five years to undertake risk assessments on federal transportation infrastructure assets, including roads, bridges, rail systems and ports, "to ensure that Canada's transportation infrastructure is able to withstand the effects of natural disasters." To the extent that federally managed highways need to be made more resilient, there may be a role for GI advocates to push for the use of more green infrastructure in this area.

- In February 2017, FCM and the Government of Canada announced a five-year, $75 million federally funded 'Municipalities for Climate Innovation Program' to provide municipalities with funding, training and resources to help them adapt to the impacts of climate change and reduce greenhouse gas (GHG) emissions. This program is meant to complement federal funding for municipal infrastructure by building their adaptation and mitigation capacity. There may be a role for GI advocates to offer technical assistance and education with respect to GI through this program.

Overall, federal government funding priorities are placing a strong emphasis on climate adaptation and mitigation at the local level as well as support for innovation. Together these commitments have been called a "game changer" for municipalities by the Federation of Canadian Municipalities. However, much of the funding appears to be geared towards the urban centres and the built environment. An additional possible source of funding is through newly established Cap and Trade regimes in Alberta and Ontario. These hold the potential for monetizing conservation and agricultural practices through carbon offset credits, as discussed under 'Alternative Financial Models' below.

3. United States Funding Program Models to Address Barriers

3.1 United States Funding Programs

The review of government funding programs in section 3, above, identifies several specific barriers or challenges to GI eligibility, including:

a) funding projects on private land
b) funding for operations and maintenance expenses
c) ultimate recipient, and
d) allocation based funding.

In considering funding eligibility rules that would further support GI, it is helpful to learn from the United States, where there has been more robust support for GI both through programs dedicated to addressing nonpoint sources of pollution as well as combined point and nonpoint infrastructure funding programs. Aspects of these programs could be adopted in Canada to improve support for GI.

3.1.1 Clean Water Act and Section 319 Grants

The *US Clean Water Act* establishes a funding program dedicated to addressing nonpoint sources of pollution in impaired waterways. In recent years, funding was also made available for flood control in recognition of its impact on water quality. Section 319 of the CWA establishes a grant program with federal funding flowing through to states. Each state is given broad discretion to set its nonpoint source funding priorities. However, these priorities must be substantiated by a comprehensive watershed plan. The grants may address both urban and rural NPS, although the majority of the funding is directed towards urban NPS projects.

Recipients of Sec. 319 grants can be tribes, municipalities or nonprofit organizations. Sec 319 grants can fund projects on private land. These are considered a 'subsidy' to the landowner, and the subsidy is a benefit to the public.

Section 319 grants are meant to protect or improve impaired waterways, including conventional GI projects, septic tank replacement or land acquisition. This recognizes that nonpoint sources of water pollution are land-driven, the majority of which is privately-owned. In the words of one US EPA official, "You can't address nonpoint sources without including private land." Consequently, Section 319 grants may fund projects on private land as a subsidy for 'private' benefit. However, EPA's position is clear that *"funds provided under a 319 grant must be used primarily for the benefit of the public by addressing a public water quality concern. Section 319 grant funds are not provided primarily for the benefit of an individual*."

Section 319 grants can pay for materials, but cannot purchase equipment to install materials, because the benefit of the equipment outlasts the grant period. However, rather than have grant recipients return money for equipment, some states have allowed grant recipients to lease

equipment for the period of the grant, and then offer the grant recipient the option to complete the purchase under the lease.

While Section 319 grants have been a mainstay for states to tackle their NPS priorities, these projects face challenges familiar to other GI projects. For instance, projects are hampered by the lag in seeing benefit, and the difficulty in measuring the improvement in water quality. Multi-year monitoring is essential. With projects on agricultural land, there have been issues with grantees breaking contracts when commodity prices rise.

Total federal Sec. 319 grants reached a high of $239 million in the early 2000s, but had declined to $163 million by 2016.

3.1.2 Clean Water State Revolving Funds

Unlike Canada, the US does not have an infrastructure grant program, but instead has a low/no interest loan program. For wastewater and stormwater infrastructure, it provides loans to states through the Clean Water State Revolving Fund.

State revolving funds used to be focused exclusively on point sources. In 2009, eligibility was expanded to include greater emphasis on stormwater management. Despite the expanded scope, there was relatively low uptake from municipalities to apply for GI. There are a number of theories as to why this is the case, including:

- high demand for grey infrastructure repair.
- high transaction costs for administering the loan had to be justified by the amount of funding being applied for, and GI projects are lower cost items relative to grey infrastructure
- lack of internal capacity and knowledge of GI projects in smaller cities, and limited experience or familiarity of local engineering consultants who are subcontracted by these communities to prepare CWSRF proposals.
- lack of familiarity with GI amongst staff in departments tasked with reviewing and approving applications.

In order to more directly incentivize applicants to adopt GI and other more sustainable approaches to infrastructure, under the American Recovery Act of 2009 the federal government required that at last 10 percent of CWSRF funding be dedicated to 'green project reserves' (GPR), which included green infrastructure, water and energy efficiency, and other innovative water quality projects. This GPR program was maintained for two successive budget years.

EPA guidance explained that, the goals of the green project reserves were to:

> *'direct state investment practices in the water sector to guide funding towards projects that utilize green or soft path practices to complement and augment hard or grey infrastructure, adopt practices that reduce the environmental footprint of*

water and wastewater treatment, collection and distribution, help utilities adapt to climate change, enhance energy and water conservation, adopt more sustainable solutions to wet weather flows and promote innovative approaches to water management problems… EPA expects that green projects will help the water sector improve the quality of water services without putting additional strain on the energy grid, and by reducing the volume of water lost every year.'

Eligible costs for GPR included planning, design, and building of capital water quality projects. Planting trees and shrubs, purchasing equipment, environmental cleanups, and development and initial delivery of educational programs as capital water quality projects. Daily maintenance and operations such as expenses and salaries are not considered capital costs.

The guidance included a detailed list of eligible projects under GPR (see GPR in References below).

Anecdotally, many municipalities opted for energy efficiency, as this could pay for high cost capital items such as new energy efficient pumps.

The State of Illinois introduced a three-year Green Infrastructure grant program under this new revolving fund program, which allowed grantees to expand their use of GI.

3.1.3 NRCS Farm Bill Grants

The US Department of Agriculture's Natural Resources Conservation Service (NRCS) offers a range of nation-wide and geographically specific funding programs to farmers to support conservation practices, through its 2014 Farm Bill.

Western Lake Erie Basin Initiative

In 2016, NRCS announced a $41 million, 3-year program to improve water quality in the Western Lake Erie Basin. The program helps farmers in Ohio, Michigan, and Indiana implement conservation measures specifically designed to reduce runoff entering waterways from farms in an 870,000 acre area in the Basin. This is in addition to $36 million made available through the 2014 Farm Bill. Prior to the Farm Bill, between 2009-2014, financial and technical assistance supported 2,000 conservation contracts that have reduced annual nutrient and sediment losses by an estimated 7 million pounds of nitrogen, 1.2 million pounds of phosphorus, and 488,000 tons of sediment (NRCS 2016).

Environmental Quality Incentives Program

The *Environmental Quality Incentives Program* (EQIP) provides technical and financial assistance to farmers to deliver environmental benefits including improved water and air quality conserved ground and surface water, reduced soil erosion and sedimentation or improved or created wildlife habitat. Payments are made on completed practices or activities identified in an EQIP

contract that meet NRCS standards. Funds can support development of a Conservation Activity Plan (CAP) to address a specific natural resource concern in an agricultural operation.

EQIP's checklist provides a rich resource of best practices (see 'EQIP" in References section below).

Other financial assistance offered through NRCS includes (see USDA References section):

- The *Agricultural Management Assistance Program*, which supports natural resource conservation on farms.
- The *Conservation Stewardship Program*, which is based on a compensation payment for conservation activities undertaken. Participants earn CSP payments for conservation performance - the higher the performance, the higher the payment.
- *Rural Development Water and Environmental Program* (WEP) is the only federal program exclusively focused on the water and waste infrastructure needs of rural communities with populations of 10,000 or less. The programs provide technical assistance and financing for development of drinking water, waste disposal, and stormwater systems in rural areas.

3.1.4 California Legal Recognition of Streams

While not a funding program, the following example could fundamentally change the way green infrastructure is perceived under infrastructure funding programs.

In September 2016, the State of California signed a new law (Assembly Bill 2480) that states,

> *"source watersheds are recognized and defined as integral components of California's water infrastructure."*

Expanding the definition of water investments in this way is rather unique. It allows state infrastructure funds to be used for the restoration and maintenance of meadows, streams, rivers, and forests to support their role in water resources management. Nature infrastructure is therefore eligible for funds previously targeted at 'hard' infrastructure. The law is directed towards five watersheds in California. The bill is brief and lacks details on specific restoration activities. The state still needs to determine the funding amount, and a watershed investment plan is expected to guide projects.

3.2 Lessons Learned from US Funding Programs

3.2.1 Dedicated Funding to Address Nonpoint Sources of Water Pollution

The US funding programs described above provide good examples of government-sponsored programs aimed at addressing water quality impairments by specifically supporting projects that address nonpoint sources of pollution.

3.2.2 Private Land

The programs have the added advantage that the funds may be spent on projects on private land. There is no impediment to providing funding for projects on private land through federal grant or loan programs because legislation and regulations governing all federal grant or loan making do not impose any prohibitions or limits. Most limitations are imposed at the state and local level, due to concerns over legal implications and the added negotiations involved.

As a result, some states limit grant recipients to public entities operating on public land only. This was in part to avoid private land projects involving land acquisition, which introduced legal issues related to land title that added a level of legal complexity, risk and delay for programs with short turnaround times.

For instance, the State of Illinois introduced limitation on funding projects on private land primarily due to two perceived risks:

1. Liability, if something goes wrong, municipalities or state will be liable; or
2. Corruption, or the risk that the money will not be spent on what it is meant to be spent on.

Federal EPA did not share these concerns. Officials felt that these risks could be mitigated through requirements to have contractors bonded and insured.

3.2.3 Recipient

US Federal rules are permissive with respect to funding non-government entities so long as they are not-for-profit. It is at the state and municipal levels that some restrictions apply.

4. Policy Context and Influencing Opportunities

4.1 How do ALUS-style Projects Contribute to Government Priorities?

In order to position itself favourably vis-a-vis government funding programs, it is important for ALUS to align its projects with stated government policy priorities and funding. ALUS needs to frame its pitch in government terms - in what way do ALUS-style green infrastructure projects contribute to government's desired outcomes?

Green infrastructure addresses a range of issues that are of varying importance to different levels of government.

1. Nonpoint sources and water quality issues, like phosphorus in Lake Erie (Canada-Ontario) and Lake Winnipeg (Canada-Manitoba)
2. Lot-level stormwater management (MOECC, municipalities, conservation authorities)
3. Flood risk management (municipalities, roads authorities – federal, provincial, municipal, conservation authorities)
4. Climate adaptation, resiliency (Canada, provinces to the extent they have to work towards federally-mandated desired outcomes from federal-provincial infrastructure funding, municipalities, conservation authorities)
5. Conservation, habitat protection, biodiversity (Ontario Ministry of Natural Resources, conservation authorities, Alberta, Manitoba)

4.1.1 Nonpoint Sources and Water Quality

In general, water quality and nonpoint sources have not been high on any government's radar for some time. However, there are some important geographically specific exceptions, including Lake Winnipeg, Lake Simcoe, and Lake Erie. These seriously impaired waterways have received significant attention from all levels of government due to the impact of nonpoint sources of pollution. GI is well positioned to help address nonpoint source pollution in the land base surrounding these impaired waterways.

In the case of Lake Erie, the Canadian and Ontario Governments recently released their joint draft Domestic Action Plan, as required under the Great Lakes Water Quality Agreement. While the draft plan is short on details regarding funding to achieve the 40% phosphorus reduction target, it does set the stage for activity in the region. Ontario is under greater pressure to reach 40% reduction given its commitment to a hard deadline to do so, 20% by 2020 and 40% by 2025. Sources of funding such as the Canada-Ontario Agreement funds, Growing Forward 3 (GF3), and possible funding from Environment Canada, MOECC and OMAFRA could be made available for projects aimed at contributing to the achievement of the 40% target. The Federal Budget announced $70 million to address freshwater quality problems, including in Lake Winnipeg and the Great Lakes, but was short on details about how that money will be spent. It is likely committed to staffing and science and monitoring activities at the federal level.

4.1.2 Lot-level Stormwater Management

Stormwater management is not a federal preoccupation, unless it is associated with climate resiliency and adaptation and flooding (see below). At the provincial level interest in stormwater management is related to its permitting and standard-setting role.

In Ontario, stormwater infrastructure for new developments or expanded capacity for existing stormwater infrastructure requires a permit from the Ontario Ministry of Environment and Climate Change under the *Ontario Water Resources Act*. However, the OWRA provides an exemption for permitting of stormwater infrastructure in an agricultural context, as it is covered under separate legislation, the *Drainage Act*.

Provincial guidelines for lot level stormwater management are currently under review by MOECC. A revised stormwater management guidance document, with more stringent design specifications for lot-level stormwater retention, is expected to be released by MOECC for public comment in the summer of 2017. The new specifications are based on retaining the 90th percentile of rainfall in a geographically relevant rain event. While it will vary depending on the geographic location, this translates into about 27 milliliters of rainwater retention per rain event. This guideline is geared towards an urban environment. Retention on pervious agricultural land likely meets this guideline, unless the agricultural operations are occurring on impervious surfaces, such as greenhouses or feedlots. Again, on agricultural land that has drainage infrastructure governed by the *Drainage Act*, no permitting is required and therefore the new guidelines will not apply.

Nevertheless, where the new guideline will apply, the hard standard of 90th percentile retention will drive considerably more activity on lot level stormwater retention and the widespread adoption of green infrastructure to meet this standard. This in turn will likely compel more municipalities to introduce stormwater fees to create a revenue stream to pay for this higher retention standard. Further down the road, it may also open the door to stormwater trading schemes like those found in Washington DC (see financing models, below) and Philadelphia. In municipalities with both rural and urban environments, this may provide more opportunities for ALUS-style GI projects.

While higher municipal costs to meet the new provincial stormwater management guidance are anticipated, there has been no corresponding indication from Ontario that funding will be made available to support these increased investments. That leaves the financing of lot-level GI to developers for new developments, and where these investments are not covered through development charges, it will be municipalities that bear the cost.

In most municipalities, there is no dedicated revenue stream for stormwater management. However, there are some exceptions, where municipalities have introduced a stormwater fee based on a property's percentage of impervious surface. The cities of Mississauga, Waterloo and Kitchener have stormwater fees. The cities of Toronto, Guelph, and Brampton have also spent time investigating the feasibility of introducing such fees. In response to the new MOECC

stormwater guidance, it is likely that more municipalities will introduce stormwater fees, creating a revenue stream that can pay for more GI throughout Ontario.

4.1.3 Flood Risk Management

Flood management is gaining more attention given extensive flooding in a number of regions in Canada, most notably in Calgary and the GTA area in 2013. At the federal and provincial level, and correspondingly at the conservation authority and municipal level, more resources are being devoted to flood preparedness.

This policy priority has been matched with funding, at least at the federal level. As noted above, the federal government has committed $2 billion towards a Disaster Mitigation and Adaptation Fund to support national, provincial and municipal infrastructure required to deal with the effects of a changing climate, including natural, large-scale infrastructure projects.

Particular attention is being given to riverine flooding. The federal government has invested in Floodnet, a flood management research network based out of McMaster University, which, among other objectives, will prepare guidelines for flood management infrastructure design.

At the provincial level, the Ontario Ministry of Natural Resources and Forestry is reviewing and revising its Riverine Flood Management guidance manual to integrate consideration of climate change. Depending on the extent of revisions to this provincial guidance, it may drive changes in flood management by conservation authorities and municipalities in designated floodplains of rivers and streams.

Road authorities are also having to consider flood management in relation to road maintenance. The Ontario Ministry of Transportation's (MTO) 2007 Directive on Drainage Management Policy and Practice provides guidance on MTO's responsibilities with respect to drainage.

MTO's responsibilities are limited to drainage directly related to its road assets, and not beyond. The directive explicitly states that:

> *"It is not the fundamental purpose of a highway drainage system to convey collected stormwater from external development areas in excess of water that would naturally flow, in the undeveloped state, from these areas to the highway right of way."*

However, MTO may embed its highway drainage plans within a broader watershed plan maintained by the Conservation Authority. Where MTO has signed off on a watershed plan, it must conform with it. This more integrated approach to highway drainage may lend itself to opportunities similar to the ALUS project in Manitoba that seeks to mitigate highway drainage impacts on the Town of Virden (above).

4.1.4 Climate Adaptation and Mitigation

As noted above, the federal government is devoting a great deal of political attention and resources to climate change adaptation and mitigation. Framing ALUS-style GI as an important aspect of this nation-wide effort may be received well in federal departments with shared responsibility for this priority area. Funding will be made available through a variety of federally-sponsored mechanisms, including FCM's 'Municipalities for Climate Innovation Program,' federal-provincial bilateral infrastructure funding programs, and the soon to be established Canada Infrastructure Bank (see above). Much of this funding will flow through municipalities, suggesting that ALUS should continue its practice of partnering with municipalities. Conservation Authorities in Ontario may also prove to be willing partners to access some of this federal funding, although some conservation authorities may see ALUS as competing for the available funding.

To the extent that provinces must work towards federally mandated desired outcomes enshrined in federal-provincial infrastructure funding agreements, they too will have an interest in climate adaptation projects. However, more provincial attention is being devoted to climate change mitigation. Both Ontario and Alberta have established cap and trade carbon markets that allow for carbon credits to be bundled and sold in the marketplace, create a potential revenue stream for projects.

4.1.5 Conservation, Habitat Protection, Biodiversity

Support for conservation, habitat protection and biodiversity was given a boost in Ontario with the adoption of the *Endangered Species Act* and the subsequent designation of specific species under the legislation. ALUS benefited from this policy initiative in Norfolk County. However, other than limited funding from MNRF, there is no dedicated government revenue stream to support conservation and habitat protection.

4.2 Matching ALUS projects, Government policy priorities and accessible funding

Table 1 below summarizes government priorities and funding sources that lend themselves to GI. This helps to identify opportunities for funding for GI.

Table 1: Government Priority Areas and Funding Sources				
POLICY PRIORITY AREAS				
Nonpoint Sources and Water Quality (Geographically Specific)	**Climate Mitigation and Adaptation**	**Lot-Level Stormwater Management**	**Flood Management**	**Habitat Protection/ Conservation Practices/ Biodiversity**
GOVERNMENTS WHO HAVE ADOPTED THESE POLICY PRIORITIES				
Federal - ECCC, Agriculture and Agri-food Canada - Lake Erie Domestic Action Plan, Lake Winnipeg	Federal – National Climate Change Framework	Ontario - MOECC permitting, guidance specifications (guide)	Federal - Public Safety Canada	Ontario - MNRF
Ontario-MOECC, OMAFRA - Lake Erie Domestic Action Plan, Lake Simcoe Action Plan		Municipalities - building permits	Ontario - MNRF, Conservation Authorities	Alberta Land Use Framework; Alberta Land Stewardship Act; Alberta Wetlands Policy
Manitoba - Lake Winnipeg				
FUNDING IN SUPPORT OF POLICY PRIORITY				
$70M for Lake Erie, Lake Winnipeg, Canada-Ontario Agreement (COA) funding, Growing Forward 3	Bilateral federal-prov infrastructure funding; Canada Infrastructure Bank; FCM Municipalities for Climate Innovation Program; Alberta Watershed Resiliency and Restoration Program	Bilateral federal-provincial infrastructure funding	Federal - Disaster Mitigation and Adaptation Fund	Alberta Watershed Resiliency and Restoration Program
Canada-Ontario Agreement (COA) Great Lakes funding; Growing Forward 3		Municipal stormwater fees, wastewater/ stormwater capital plans		

Based on this summary table, it appears that i) climate adaptation, ii) geographically specific nonpoint source water quality, and iii) flood mitigation are the top three policy areas with funding attached that could provide support towards GI.

Where there is a lack of funding to support priority policy areas, there may be alternative financing mechanisms that could be explored. For instance, stormwater management at the local government level will become an even higher priority as big storms result in property and infrastructure damage and threaten public safety. The lack of an external funding source for municipalities to draw on may slow progress on adopting green infrastructure. However, as the examples below demonstrate, a range of market-based mechanisms have been successfully implemented in other jurisdictions.

5. Alternative Financing Models

5.1 Range of Watershed Investment Instruments

The scan of financing models as cases studies within this report provides a sampling of different approaches to financing ALUS-type projects using watershed investment instruments. Some of these align well with policy priorities outlined in Section 4 above.

The major advantage to these alternative financing approaches is that, when delivered effectively, they are a more predictable and sustainable source of financing, unlike government funding which is available sporadically and is vulnerable to budget cuts. They can also achieve better results at a reduced cost.

However, alternative financing models, including market-based instruments, come with their own challenges. Some trading schemes are administratively burdensome, with high transaction costs. Others have not found effective ways to measure and communicate their impact. Still others have not convinced participants to engage, offset or trade at a volume that justifies establishing the program. This may be a result of dubious benefits of participating, or sensitivity amongst farmers over privacy and sharing data. Environmental advocates are also skeptical of trading arrangements that do not demonstrate in a transparent way that greater impacts are being achieved than could be achieved through a more direct regulatory route. These challenges would need to be addressed in any model proposed.

To attract participants to trading/offset programs, for example, there must be a strong driver (e.g. cost savings) and low administrative and financial costs to ensure continued participation. A smaller geography (e.g. South Nation River Watershed in Ontario) also seems to help generate more interest and activity, and ensure offsets can be realized in the same geographic area. Protection of privacy will also be a significant issue for farmers.

To be accepted by the public and environmental advocates, the financing model must be fully transparent, and result in measurable public benefits and outcomes.

At the heart of these issues is the question of credibility and trust. Involving participants and observers alike early in the program design process will go a long way in building the necessary trust to secure their collaboration and buy-in. A trusted organization that can serve as an honest broker in this process is also essential.

Another key ingredient is a clear vision of what the program is meant to achieve. Under Section 319 grants, states have to develop a watershed plan and identify priority actions for Section 319 grant funding. Similarly, a clear sense of the broader desired outcomes and how specific types of projects could contribute effectively to these desired outcomes is essential. A scatter-gun approach to trading will likely not reap definitive enough results to sustain the program.

An increasing number of jurisdictions are creating the legislative and regulatory framework to allow for market-based mechanisms to be added to the basket of instruments at government's disposal to achieve its objectives. Canada and the provinces can benefit from lessons learned from this considerable experience in the US and elsewhere.

Models that align well with Canadian or provincial policy priorities and could fit into existing legislative or permitting regimes are outlined below. These include programs to address:

1. Geographically specific nonpoint source water quality impairment (phosphorus trading/offset programs)
2. Climate change mitigation
3. Water quantity management

5.1.1 Phosphorus Offsetting and Trading Programs

Addressing geographically-specific nonpoint source water quality problems in Lake Erie and Lake Winnipeg is a policy priority area that does not currently have a sufficient source of funding to attract ALUS projects, other than those that are negotiated on a farmer by farmer basis.

The financing models outlined in Part III and the Appendices illustrate a range of experiences with phosphorus offset and trading programs in Ontario (South Nation), Chesapeake Bay, and Ohio River Basin in the US.

The South Nation River Watershed Total Phosphorus Management Program provides a localized approach to phosphorus offsetting, associated with impaired water quality and the need to limit new phosphorus while allowing new development. Its track record provides solid evidence of how such a mechanism has be successfully negotiated in Ontario amongst MOECC, the municipality, the conservation authority, and farmers and landowners.

A standardized approach with more administrative oversight and more sophisticated monitoring and measurement of progress would have to be negotiated for a larger geography like the Lake Winnipeg watershed.

Nutrient trading programs in the Chesapeake Bay region may be able to provide experience with a larger, more sophisticated approach. It has thirty years of experience in monitoring and reporting on nonpoint sources of nutrients entering Chesapeake Bay. In both Virginia and Pennsylvania there are legislated and regulatory trading rules.

However, trading programs have suffered from the common problems of high transaction costs and difficulty in measuring actual versus modelled nutrient reductions. The Chesapeake example is also not directly analogous to the Canadian context as it is based on total maximum daily loads (TMDLs) that are established by US Environmental Protection Agency.

In the absence of a subwatershed or maximum daily load-limit, a trading program could be traded against a municipality's permitted discharge level from its sewage treatment plant. For example, a new phosphorus standard of 0.5 milligrams per litre for large sewage treatment plants in the Thames River Watershed to be established under the Lake Erie Phosphorus Reduction Domestic Action Plan could serve as the limit against which trades are made.

Another vital ingredient to a successful trading program involving farmers is the involvement of a credible farming organization in the program. For example, under the Ohio River Basin Trading Project, the American Farmland Trust assists with farmer engagement. Involvement of respected agricultural organizations would be essential to the success of such a program in Manitoba or Ontario. The Ohio River Basin Trading Project was piloted in 2013 to 2015, and is now establishing itself as the largest interstate trading regime in the United States.

In 2016, the Great Lakes Commission launched "Erie P Market" as a phosphorus trading pilot for Lake Erie. While new, it will be important to keep an eye on how this program unfolds.

Some work has already been undertaken to develop a phosphorus trading concept for Lake Winnipeg, including a report by the International Institute for Sustainable Development (IISD 2009).

5.1.2 Contributing to Climate Change Mitigation and Biodiversity

The federal government has made climate change mitigation a signature national policy in its first mandate. At the subnational level, a number of provinces have already proceeded with their own cap and trade programs. In Ontario, cap and trade legislation allows for agricultural offset credits, but these have yet to be defined in regulation. Alberta already recognizes a wide range of agricultural practices that can be monetized into carbon credits. However, most of these practices are based on capturing the energy potential of biomass or maximizing the carbon sequestration potential of soil through no till and soil health measures. While important, these activities do not necessarily lend themselves to more conservation-oriented ALUS projects.

If conservation practices could be identified as having carbon trapping potential, there may be opportunities to monetize them into carbon credits.

While not a carbon offset-based program, Australia's Rivers of Carbon Project is an example of a program that compensates landowners for conservation activities that result in carbon sequestration, with an emphasis on restoring and revegetating riparian corridors. ALUS outcomes related to carbon sequestration could be communicated to provinces with carbon-trading frameworks who could then be encouraged to adopt practices as recognized agricultural protocols for which farmers could earn carbon credits.

The US Sustain Our Great Lakes Program serves as another model combining private sector and public sector funding to support restoration and conservation around the Great Lakes basin.

In Alberta, a Watershed and Resiliency Restoration Program (WRRP) was created in response to the extreme flooding in July 2013. WRRP supports partners working with landowners on restoration activities specific to watershed needs.

5.1.3 Water Quantity Management

Water on farmland can also be monetized as part of a water quantity management system. Programs to address water quantity management, in both flood and drought conditions offer examples of the type of program that could be established in Canada. Drought prone areas in Alberta could benefit from such programs, as could flood prone areas in southwest Ontario. While strict water rights trading programs may not have any obvious benefit for ALUS projects, some of the projects identified in the jurisdictional scan in Part III and the Appendices of this report combine water quantity trading with other conservation and habitat co-benefits.

In Florida, to improve water retention around Lake Okeechobee, farmers are paid to store water on their land to reduce the amount of runoff entering waterways impacting water quality in the Everglades. Temporary reservoirs are created through the implementation of 'dispersed water management' strategies or 'water farms.' While this program is financed through state funding, similar principles could be applied, possibly in combination with a phosphorus reduction program.

In Australia, water sharing investment partnerships (WSIPs) have been established by The Nature Conservancy. WSIPs serve "to ease water scarcity in stressed regions while also conserving and restoring water ecosystems." The Murray-Darling Basin Balanced Water Fund is an example of such a WSIP. "Water entitlements" can be bought, sold, or leased to offer access to a share of water. Financial returns are provided via annual leasing of water entitlements, trading of water allocations or the Fund's overall asset portfolio. The Fund has facilitated the return of water to wetlands in drought prone areas.

Each of these examples offers a new innovative way of monetizing the value of agricultural land or the soil and water on the land, to support positive environmental outcomes and address issues of interest to governments in Canada.

6. Recommended Approach to Creating Funding Pathways for ALUS Projects

6.1 Summary

This research and analysis has explored different avenues to create a pathway to fund specific ALUS projects and green infrastructure projects more generally. So far this section has explored:

- current government funding sources and limitations on eligibility;
- government funding programs in the US that fund ALUS-style projects;
- opportunities to influence access to funding;
- policy context in federal and select provincial governments and influencing opportunities that they present; and
- alternative financing models that could provide sustainable funding over the long term.

In Section 2, with respect to current bilateral infrastructure funding (Phase 1), while there is no outright prohibition on the eligibility of green infrastructure projects, limitations on what entity can be an 'ultimate recipient' of funding, the federal condition for recipients to demonstrate 'incrementality,' and federal restrictions on funding projects on private land in Phase 1 of the Bilateral Infrastructure Funding program, have served as formidable barriers to the eligibility of ALUS projects on agricultural land. Rule changes that appeared in Budget 2017 have relaxed limitations on projects on private land and have clarified that recipients may partner with nonprofit organizations for these types of projects.

Apart from infrastructure funding, there are other sources of funding announced in the 2016 and 2017 federal budgets that show promise, including the Disaster Mitigation and Adaptation Fund, the Canada Infrastructure Bank, Growing Forward 3, and various climate change mitigation funding sources, including carbon offset credits.

In Section 3, a number of US government funding programs are identified that could point the way in overcoming remaining barriers to ALUS project eligibility in Canadian funding programs particularly related to eligible recipients, and projects on private land. In particular, Clean Water Act Section 319 grants offer funding exclusively to address nonpoint source water impairments, funding projects on both public and private land, to both public and nonprofit recipients. This is in recognition that nonpoint sources of pollution simply cannot be addressed on public land alone. Following suit, eligibility for Clean Water State Revolving Fund (CWSRF) loans was expanded to include nonpoint sources, and briefly provided dedicated resources to green infrastructure solutions. Farm Bill grants under various programs provide dedicated funding to conservation practices on agricultural land.

Section 4 examines how ALUS projects can be framed to address government policy priorities

including geographically specific water quality issues, stormwater management and flood risk management, climate change mitigation and adaptation, and conservation, habitat and biodiversity protection. It then identifies funding sources and funding gaps for each priority policy area.

Section 5 explores alternative sources of financing for projects where government funding is lacking. Examples from different jurisdictions are identified that align with specific policy priorities including phosphorus reduction, climate change mitigation and biodiversity, and water quantity management.

6.2 Four-Tier Recommended Approach

The main pathways to fund specific ALUS projects, and green infrastructure projects more generally, that have emerged from this research and analysis can be organized into the following four-tiered strategy:

I. The most **immediate pathway** is in identifying where there is a government policy priority that matches ALUS projects, supporting funding and funding criteria that make ALUS projects eligible.

   a) Geographically specific nonpoint source water quality, funding through GF3, climate mitigation/adaptation, funding from GF3, COA funding
   b) Climate change mitigation: FCM's Municipalities for Climate Innovation Program
   c) Lot-level or agricultural stormwater management: municipal stormwater fees, Ontario Drainage Act fees paid for drainage alterations in Engineer's report
   d) Flooding: portion of Federal Disaster Adaptation and Mitigation Fund dedicated to rural agricultural adaptation.
   e) Habitat protection/conservation/biodiversity: private sources

II. A **short-medium-term pathway** is to identify existing barriers to access funding and build the case for removing these barriers, including: i) funding projects with public benefit on private land; and ii) working with municipalities to familiarize them with GI, encourage them to include green infrastructure projects in their asset management plans

   a) Clarify if/where PSAB accounting standards still pose a barrier to the eligibility of projects on private land for federal-provincial infrastructure funding;
   b) If this is an issue, work with GI allies (IISD, Ontario conservation authorities, DU, GIO, Greenbelt Foundation, Freshwater Alliance, etc.) to prepare a study on how accounting standards must be updated to reflect current stormwater and GI practices.
   c) Working with GI allies, offer information sessions on GI projects on private land to municipal staff responsible for submitting infrastructure funding proposals, and to provincial and federal staff responsible for reviewing infrastructure funding proposals.

As asset management plans will likely become even more important reference documents for funders, ALUS should work with other GI allies to offer training to municipalities on the value of and practical application of GI to achieve different operational infrastructure objectives and how to integrate GI into asset management plans.

III. A **medium-term pathway** is to identify where there is a government policy priority that matches ALUS projects, but where funding is lacking. ALUS could support the creation of alternative financing models that would provide sustainable revenue stream for ALUS-type projects.

a) Drawing on experience from South Nation/Chesapeake Bay/Ohio River Basin, ALUS and allies could advocate for a phosphorus offsetting or trading program.
b) Australia's Rivers of Carbon Program is focused on conservation projects along riparian corridors that serve to both sequester carbon and support habitat and biodiversity. Carbon credit trading could provide a funding source for a program built on the same principles as the Rivers of Carbon Program.
c) Water Retention to mitigate the impact of flooding in the Everglades and investment funds for rights over scarce water in drought prone areas in Australia offer models for water quantity management financing programs.

IV. A final, **longer-term pathway** is to advocate for dedicated funding for policy priorities that may be addressed by ALUS-type projects, including:

a) A federal-provincial government funding program for dedicated nonpoint source impacts on water quality.
b) A public-private partnership to support conservation practices, similar to Sustain Our Great Lakes Program as a model.

Join with GI allies, NGOs, to push federal/provincial governments to adopt a freshwater protection strategy that includes dedicated resources to address nonpoint sources, modelled on the USEPA Section 319 grant program, and/or advocate for rural community stormwater assistance (see WEP, in Section 3.1.3).

6.3 Next Steps

It is proposed that ALUS host a workshop with GI allies, conservation organizations, and select municipalities to discuss the above 4-tiered strategy and seek their input and buy-in.

PART II – ACCOUNTING PRINCIPLES AND APPLICABILITY TO FUNDING PROGRAMS

1. Update on Federal Infrastructure Funding Programs, Eligibility and Accounting Rules

In the first installment of this research, a number of federal infrastructure funding programs and several criteria that were barriers to green infrastructure funding were identified. In this section, federal infrastructure programs are revisited, with updated information on how these criteria have been modified in a way that address some of the barriers identified in the first installment research. These include:

1. Federal-Provincial Infrastructure Funding Program
2. Gas Tax Fund
3. FCM's Green Municipal Fund
4. FCM's Municipalities for Climate Innovation Program

This section also identifies the accounting rules that apply to each of these funding programs. All funding programs include a statement on the accounting rules that must be followed that clarifies which costs are eligible for funding. Eligible costs vary from funding program to funding program, but under infrastructure funding programs, eligible costs are primarily associated with tangible capital assets, including direct purchase of assets and expenses that directly support the assets.

Adherence to standardized accounting rules also facilitates auditing of the funding program's financial statements. For example, Infrastructure Canada holds signatories to account for the use of its funds through audited annual expenditure reports. In doing so, the funding program is made publicly accountable for the way it disburses public funds (Commissioner of Environment and Sustainable Development 2016). Further discussion of the relevance of these accounting rules follows below.

1.1 Federal-Provincial Infrastructure Funding Program

Update

In the first installment of research provided in Part I, several barriers to federal-provincial infrastructure funding were identified, including:

i) Ultimate recipient limited to provinces, territories and municipalities only
ii) An (apparent) prohibition on funding for projects on private land

Since that research was completed, these two barriers have been removed. It has been

confirmed with Infrastructure Canada and the Ontario Ministry of Infrastructure that:

- Not-for-profits may apply as an ultimate recipient for funding under Phase II of the Federal-Provincial Infrastructure Funding program; and
- Projects on private land with public benefit will be eligible under Phase II of the Federal-Provincial Infrastructure Funding program.

This is a significant step forward in making funding for green infrastructure accessible through Canada's primary infrastructure funding program. Nevertheless, some challenges may persist.

In conversation with staff from Infrastructure Canada, there were still questions related to the value of green infrastructure projects on private land. There was also a suggestion that while they may be eligible, green infrastructure projects may be too small to warrant federal–provincial infrastructure funding, given that the program favours larger projects (INFC 2017).

An additional consideration is the requirement to demonstrate incrementality under Phase I of the program. While it is anticipated that the incrementality requirement will be defined differently in Phase II, this could still pose a significant barrier to green infrastructure projects, given their smaller scale that have limited impact in terms of additional capital investments to stimulate the economy.

Accounting Rules

Round I of the current Federal-Provincial Infrastructure Funding Program requires that applicants follow Public Sector Accounting Board (PSAB) rules.

Under Section 18 of the federal-provincial agreement creating the current (Phase 1) infrastructure funding program, it explicitly states,

> *All accounting terms will have the meanings assigned to them, all calculations will be made and all financial data to be submitted will be prepared, in accordance with the Public Sector Accounting Standards in effect in Canada.*

As described below, infrastructure programs like the federal-provincial program relies on the PSAB definition of Tangible Capital Assets. Notwithstanding some interpretations of what can be included as a tangible capital asset (TCA) (see below), federal and provincial review of applications will generally accept the municipal applicant's interpretation of TCAs as eligible for infrastructure funding (MOI 2017).

Infrastructure Canada staff have made clear that eligible costs include TCAs and direct costs that support TCAs, but do not include operating costs (INFC 2017).

Eligibility

Under Phase 1 of federal-provincial funding for water and wastewater, contracts between federal/provincial governments (funders) and municipalities (recipients) stipulate that eligible costs include:

E.2.2 Eligible Investments:

i. Capital projects for the rehabilitation of water treatment and distribution systems, and wastewater and stormwater collection, conveyance and treatment systems;
ii. Separation of existing combined sewers and/or combined sewer overflow control;
iii. Initiatives that support system optimization and improved asset management including studies and pilot projects related to innovative and transformative technologies;
iv. Design and planning for upgrades to wastewater treatment infrastructure to meet federal regulatory requirements; and
v. New construction projects, including the construction of naturalized systems for management and treatment of wastewater and stormwater, if the projects will be completed within the program timeframe.

E.2.3 Scope of Eligible Expenditures:

Eligible Expenditures include only the following:

i. All costs considered by Province to be direct and necessary for the successful implementation of an eligible project, including:
    a. Environmental assessment costs
    b. Engineering costs, including tendering and contract administration
        i. Feasibility studies, detailed design or pilot projects that support system optimization and/or asset management.
        ii. Design and planning for upgrades to wastewater treatment infrastructure to meet federal regulatory requirements.
    c. Project management costs
    d. Material costs
    e. Construction costs
    f. Contingency costs (maximum 15% - calculation excludes professional fees)

Summary

Of the four programs reviewed in this section, the Federal-Provincial Infrastructure Funding Program has the strictest approach to interpreting capital assets and eligible costs, following the PSAB definition of TCAs and direct costs in support of TCAs (see discussion of TCA definition, below). As yet, it is not known how Federal-Provincial infrastructure funding accounting rules and eligibility will change under Phase II now that not-for-profits qualify as ultimate recipients. It could mean that accounting rules might be broadened to include CICA not-for-profit standards that are more permissive on the accounting of natural resources (see discussion below).

1.2 Gas Tax Program

Update

The federal Gas Tax Fund is a permanent source of funding for municipal infrastructure. In Ontario, the Association of Municipalities of Ontario (AMO) delivers gas tax funds to all Ontario municipalities, except Toronto, twice a year, based on a per capita allocation. Funds can be invested into infrastructure or can be used for capacity building projects that contribute to strategic asset management and long-term planning.

In 2016, Ontario municipal governments will receive $600 million from the Gas Tax Fund, a 5% increase from last year due to indexation.

All municipal recipients must develop and implement an asset management plan.

The incrementality principle also applies to the Gas Tax Fund, although it is calculated in a somewhat different manner to the Federal-Provincial infrastructure program. Any GTF funding cannot replace or displace existing sources of funding for a Municipality's tangible capital expenditures. The municipality must demonstrate that its total annual expenditures on tangible capital assets, on average, will not be less than the Base Amount, which is calculated based on average capital expenditures in years previous to the GTF program.

Accounting Rules

Under the Gas Tax program, recipients must adhere to GAAP rules. Eligibility rules stipulate that:

> *The expenditures associated with acquiring, planning, designing, constructing or renovating a tangible capital asset, as defined by Generally Accepted Accounting Principles (GAAP), and any related debt financing charges specifically identified with that asset (AMO).*

Given that the recipients are municipalities, the requirement to follow GAAP rules is interpreted as meaning public sector accounting rules. According to AMO, sector specific definitions under each of the project categories interpret the definition of capital assets somewhat differently, and may not strictly adhere to what an accountant may interpret as capital assets under public sector accounting rules. Some 'grey areas' in interpretation are permitted. For example, changing street lighting to make it more energy efficient is not strictly speaking a capital expenditure, but this type of project is permitted. Likewise, community energy projects that create energy efficiency also do not qualify as tangible capital assets under a strict interpretation of the term, but are also permitted. AMO largely relies on 'case law,' that is, it interprets what is fundable based on precedent.

Eligibility

Under the Gas Tax, eligible recipients (Ultimate Recipient) includes a municipality or a non-municipal entity, including for profit, non-governmental and not-for-profit organizations.

According to the Gas Tax agreement, if a municipality is transferring funds to a non-municipal entity, such as a not-for-profit, council has to endorse the project via by-law. Under this situation, municipalities are still responsible for meeting all the requirements of the Agreement related to the use of the transferred Gas Tax Funds, including all reporting.

While such arrangements with a third-party delivery agent are permitted under the GTF, AMO was unaware of any record of such an arrangement in the Ontario program since its inception. Therefore, there is no track record of third party delivery of GTF funded projects. However, this provision has been used in other provinces.

Under the Gas Tax, there are sixteen eligible project categories. The most relevant to ALUS are:

i) Wastewater: infrastructure that supports wastewater and stormwater collection, treatment and management systems.
ii) Disaster Mitigation: infrastructure that reduces or eliminates long-term impacts and risks associated with natural disasters. Focus under this category is on disaster prevention (i.e. protecting against a flood through the construction of a dike, berm, foreshore, etc.) not on disaster response (i.e. fire halls, fire trucks, ambulance stations. GAAP considerations – auditing is done by the provinces/territories – *must be considered capital* (emphasis added).
iii) Drinking Water: infrastructure that supports drinking water conservation, collection, treatment and distribution systems.
iv) Local Roads and Bridges: roads, bridges, tunnels and active transportation infrastructure (active transportation refers to investments that support active methods of travel.

Eligible expenditures include:

a) The expenditures associated with acquiring, planning, designing, constructing or renovating a tangible capital asset, as defined by Generally Accepted Accounting Principles (GAAP), and any related debt financing charges specifically identified with that asset;
b) For the capacity building category only, the expenditures related to strengthening the ability of Municipalities to improve local and regional planning including capital investment plans, integrated community sustainability plans, life-cycle cost assessments, and Asset Management Plans. The expenditures could include developing and implementing: i. studies, strategies, or systems related to asset management, which may include software acquisition and implementation; ii. training directly related to asset management planning; and, iii. long-term infrastructure plans.
c) Employee and Equipment Costs: The incremental costs of the Ultimate Recipient's

employees or leasing of equipment may be included as Eligible Expenditures under the following conditions: a) the Ultimate Recipient is able to demonstrate that it is not economically feasible to tender a contract; b) the employee or equipment is engaged directly in respect of the work that would have been the subject of the contract; and c) the arrangement is approved in advance and in writing by Canada and AMO's Executive Leads or Canada and Toronto's Executive Leads, as appropriate.

Ineligible costs include:

a) The cost of leasing of equipment by the Ultimate Recipient, any overhead costs, including salaries and other employment benefits of any employees of the Ultimate Recipient, its direct or indirect operating or administrative costs of Ultimate Recipients, and more specifically its costs related to planning, engineering, architecture, supervision, management and other activities normally carried out by its staff, except in accordance with Eligible Expenditures above;
b) Taxes for which the Ultimate Recipient is eligible for a tax rebate and all other costs eligible for rebates;
c) Purchase of land or any interest therein, and related costs;
d) Municipal administration costs;
e) Legal fees; and
f) Routine repair and maintenance costs.

Funding projects with public benefit on private land are not explicitly ineligible under GTF, but they are uncommon. Generally speaking, AMO would apply a test to determine if it was appropriate to fund such a project using gas tax funds, which would include:

i) Does the municipality own/control the asset on private land?
ii) Is there a clear public benefit?

Unless these two tests are fairly clear, AMO would likely encourage the municipality to find another source of funding for projects on private land.

Summary

Gas Tax funding provides greater flexibility than do periodic, application–based funding programs, given that its annual allocation model does not involve a strict pre-approval process. Not-for-profits are eligible with a municipal partner, but this option has not been exercised by Ontario municipalities to date. Funding public projects on private land are not encouraged.

1.3 Green Municipal Fund

Update

The FCM's Green Municipal Fund (GMF) differs from traditional infrastructure funding programs in that it puts an emphasis on innovative projects and ones that deliver environmental goals, including water quality. In recent years, it has relaxed its rules that were solely focused on infrastructure, and now accept applications for a range of projects.

Accounting Rules

Eligible Capital costs are defined in accordance with generally accepted accounting principles (GAAP), including: costs for acquiring, developing, constructing, modernizing or leasing systems (equipment, hardware, software, etc.) (FCM 2017).

Eligibility

Applicants for GMF must be municipalities, but they may have not-for-profit partners. Previous rounds of GMF required a direct financial contribution of 10% of the project value by the municipality, but this requirement no longer applies.

In past years, funding had a strong emphasis on built infrastructure, providing funding for plans, feasibility studies, pilot projects and capital projects. More recently, FCM has relaxed its emphasis on built infrastructure, and will now accept applications for project ranging from education projects or even apps, so long as they demonstrate an innovative way to achieve an environmental goal. Eligibility criteria are flexible so applicants can determine the best ways to achieve their environmental goals.

General operating expenses are not eligible, but depending on the type of cost associated with maintaining green infrastructure, some expenses in the first year may be permitted and would be considered on a case-by-case basis.

Summary

With the more flexible approach to eligible costs, GMF may offer more opportunity for ALUS-type projects than in the past.

1.4 FCM's Municipalities for Climate Innovation Program

Update

FCM's new MCIP is designed to mitigate and build resiliency to climate change, including managing water quantity. Either a municipality or a not-for-profit can be the main applicant, but a municipality must be a partner and must demonstrate its commitment through some kind of contribution. There is no specific minimum contribution stipulated. Funding is available for a range of expenses, including capital costs, and staff costs.

Accounting Rules

FCM is looking into which accounting rules must be followed if a not-for-profit is a partner but it is likely the decision of the municipal partner.

Eligibility

While only municipalities are eligible for MCIP, a not-for-profit could be a subcontractor.

MCIP provides funding to municipalities for plans, studies, demonstration projects and support for staff salaries to plan and implement climate change adaptation projects. Focus areas include energy, water, waste, transportation, asset management, GHG reductions and reducing vulnerability to climate change impacts. MCIP also offers funding for operational studies which explore how to improve municipal policies towards climate change mitigation or adaptation, for example in the realm of land use planning.

Projects on public and private land may be funded.

Under MCIP capital projects, existing natural assets for adaptation projects are recognized as fundable expenses.

ALUS may be interested in regional scale climate initiatives. Under this funding category, funding is provided for groups of municipalities to develop plans, studies or other strategies to reduce GHG emissions or adapt to climate change impacts.

Demonstration project grants are also available for municipalities to implement climate change initiatives on a small scale. Funding will be available for up to 80% of costs to a maximum of $1 million.

Summary

There are a number of aspects to MCIP that are particularly well suited to ALUS-type projects. Firstly, not-for-profits may be a partner. Secondly, the program does not distinguish between projects on public or private land, both are eligible. And finally, under MCIP capital projects,

existing natural assets for adaptation projects are recognized as fundable expenses.

2. Explaining General Accounting Principles

2.1 What are General Accounting Principles and Why Are They Important?

At its core, accounting is about drawing boundaries around entities, whether they be public, private or non-profit, and reflecting the value of the entity through a financial balance sheet that documents assets and liabilities.

In order to be able to compare apples to apples, standard accounting rules are used to capture this financial snapshot, through an entity's balance sheet, which details in standardized categories its assets and liabilities, valued in money (capitalized), applying accepted accounting principles.

The common set of accounting principles are known as Generally Accepted Accounting Principles (GAAP). Canadian GAAP are set out in the Canadian Institute of Chartered Accountants (CICA) handbook. The handbook is updated by the Accounting Standards Board (AcSB) for profit and not- for-profit organizations, and the Public Sector Accounting Board (PSAB) for the public sector.

PSAB establishes accounting rules for the public sector in Canada, including local government. PSAB rules apply to the economic entity, the government or crown corporation and all its assets. The Canadian Public Sector Accounting Handbook contains accounting standards that apply to all public sector entities.

For the purposes of funding applications that are submitted by a not-for-profit organization (NFPO) in partnership with a municipality, where the municipality maintains the control of the project, it is assumed that the NFPO must apply PSAB rules given the public nature of the project. However, depending on the nature of the partnership, and shared control model, there may be circumstances where not-for-profit accounting rules may be followed. The issue of which accounting rules apply in projects with shared control was discussed by the Public Sector Accounting Discussion Group in late 2016. It concluded that the Public Sector Accounting Handbook (Section PS 3060 – Shared Control) does not provide sufficient guidance and further clarification is required (Public Sector Accounting Discussion Group 2016).

2.2 What are Assets?

The main principle for accounting is that if something is purchased, it has a capital value that is recognized and recorded in financial statements. This is a pragmatic rule that allows for objective measurement of capitalized value. There are a number of different categories to evaluate the worth of assets.

The Public Sector Accounting Board outlines the principles on which the definition of assets are based in its handbook under Section PS 1000. Under this section, public assets are defined as:

> *Economic resources controlled by a government as a result of past transactions or events and from which future economic benefits are expected to be obtained.*

Assets are further defined as having the following three characteristics:

a) they embody a future benefit that involves a capacity, singly or in combination with other assets, to provide future net cash flows, *or to provide goods and services;* (emphasis added)
b) the government can control access to the benefit; and
c) the transaction or event giving rise to the government's control of the benefit has already occurred.

The concept of 'future economic benefit' figures prominently in PSAB's definition of assets. Section PS 1000 further explains,

> *For an asset to be a government's asset, that government must control the future economic benefit associated with the asset to the extent that it can benefit directly from the asset and generally can deny or regulate access to that benefit by others.*

For instance, an item does not qualify as a public asset if there is:

a) no future economic benefit;
b) a future economic benefit, but the government cannot obtain it; or
c) a future economic benefit that the government may obtain, but the events or circumstances that give the government control of the benefit have not yet occurred.

This concept of demonstrating future economic benefit may be important when considering public benefit from projects on private land. This is discussed in greater detail below.

Once established as assets, items are further separated into tangible and intangible assets:

- Tangible assets include cash equipment, machinery, plant, property and anything that has long-term physical existence or is acquired for use in the operations of the business

and not for sale to customers.

- Intangible assets include things without physical substance but that have significant value, such as brand, copyright, trademarks, or patents.
- Tangible assets are further categorized to distinguish between tangible capital assets and other types of tangible assets.
    - Tangible capital assets are non-financial assets having physical substance that are expected to last beyond the accounting reporting period.
    - Tangible assets that are not tangible capital assets include works of art and most importantly, natural resources. This will be explained below in further detail.

Definitions of terms and accounts that dictate what can and cannot be included in these categories are outlined in the AcSB and PSAB accounting handbooks. As these accounting terms are typically used in the eligibility criteria of infrastructure funding programs, it is important to understand the definitions themselves and how they are interpreted. However, it must also be acknowledged that AcSB and PSAB rules do not go into great detail about what counts as a tangible capital asset. There is some grey area in interpreting these accounting rules.

2.3 Recent Evolution in Public Sector Accounting with Respect to Assets

Standardized private sector accounting allows shareholders to assess the efficiency of a firm's operations and the firm's profitability.

The valuation and accounting of assets in the private sector is important for a number of reasons. For example, from the point of view of mergers and acquisitions, it is the accounting of assets that contributes to the determination of a company's worth. Accounting of assets is also essential for insurance policies to determine the value of things that can be damaged or destroyed by fire, hurricane, or other disasters or accidents. Accounting of assets is also the basis for evaluating how they may be used as collateral to raise loans, or sold to raise cash in emergencies. Decisions by management, shareholders, and tax collectors are all predicated on the valuation of assets.

Unlike private sector accounting, which is focused on the bottom line, public sector accounting evolved around government transparency, that is, to demonstrate to the public that civil servants and elected officials were keeping to the budget assigned to them. In the public sector, what is accounted for in terms of assets and liabilities, is what the public sector entity controls on behalf of the public.

Until recently, this public sector accounting was done on a cash accounting basis. That is, things were valued based on their price at the time of purchase. This cash accounting approach had a number of disadvantages. Most significantly, assets stayed at the same value (the value at time of purchase), offering no information on the nature and age of the asset, regardless of the fact that their value was depreciating over time as they neared the end of their lifecycle. Cash accounting did not give decision makers the necessary information to properly plan financially

to maintain service levels and replace infrastructure at the end of its lifecycle.

For this reason, among others, there was an international movement in accounting to apply aspects of Private Business Standards to Public Sector Accounting. This brought about a change from cash accounting to accrual accounting. This involved capitalising tangible capital assets and allocating their costs to future accounting periods through an annual amortization expense. Moving to full accrual accounting gave decision makers a more accurate financial picture of the state of capital assets over their lifecycle, and important information about appropriate resource allocation.

In Canada, PSAB instituted this change to accrual accounting in 2009. As of January 2009, PSAB requires that governments present information about the complete stock of tangible capital assets, and their amortization, in their summary financial statements. The transition to accrual accounting for tangible capital assets has been a significant undertaking for municipalities. It involves changes to municipal processes for reporting, budgeting, and day-to-day accounting for tangible capital assets.

2.4 Tangible Capital Assets (TCAs)

Public infrastructure is accounted for largely in the category of TCAs in financial statements. Understanding tangible capital assets, how the category is defined by the Public Sector Accounting Board and how it is interpreted under different funding programs is key to understanding how to represent green infrastructure in infrastructure funding applications.

How TCAs are accounted for under PSAB rules

Section PS 3150 of the Public Sector Accounting handbook outlines how PSAB rules apply to TCAs. This includes how to reflect the value of capital assets and amortization, 'to demonstrate stewardship and the cost of using those assets to deliver programs and provide services.'

PSAB definition of TCAs

According to the PSAB handbook, TCAs are non-financial assets having physical substance that:

(i) are held for use in the production or supply of goods and services, for rental to others, for administrative purposes or for the development, construction, maintenance or repair of other TCAs;
(ii) have useful economic lives extending beyond an accounting period;
(iii) are to be used on a continuing basis; and
(iv) are not for sale in the ordinary course of operations.

Before an item is recognized as a TCA for financial reporting purposes, it needs to meet two criteria:

a) it satisfies the above definition of a TCA

b) it has a cost or other value that can be reliably measured.

What can and cannot be included as a TCA?

PS3150 does not prescribe specific asset categories. There are too many variations to standardize definitions of capital asset categories. Instead, the selection of asset categories is left to government to define, based on the specific nature and objective of their capital assets.

Nevertheless, there are broad categories that are common to most local governments, including:

- Land
- Buildings
- Equipment
- Roads
- Water, sewer and other utility systems
- Bridges
- Electricity transmission
- Communications networks
- Motor vehicles
- Furniture and fixtures.

There are also explicit prohibitions in the accounting of TCAs.

Under PSAB standards, Natural Resources do not qualify as TCAs. This includes flora and fauna occurring naturally (Section PS3150.03). This has implications for certain types of green infrastructure, as described below.

Crown lands that have not been purchased by the municipality or land held for resale are also excluded from the TCA category.

It should be noted that under CICA not-for-profit accounting standards, **there are no such explicit prohibitions** on accounting for natural resources as tangible capital assets.

Directly attributable costs

In addition to the things themselves, TCAs can include capitalized costs that are directly attributable to the acquisition, construction, and development of the asset. These do not include general administrative costs, but can include construction, architectural or other professional fees, and carrying costs like internal design, inspection, and other directly attributable administrative costs. Where EAs and feasibility studies are undertaken, these can also be capitalized if the capital asset is ultimately constructed and becomes operational.

Discretionary aspects of TCA accounting

In addition to the categories of assets, there are additional aspects of TCA accounting that are left to the discretion of the public entity. These are:

i) Reporting TCAs as complete systems (component approach) or separate assets
ii) Capitalization thresholds
iii) Method for accounting for value
iv) Establishing useful life

i) Section 3150.12 outlines how a tangible capital asset can include complex networks systems like water and sewage treatment, which can consist of a number of components. Whether these assets are reported as one complete system or separate assets is left to the discretion of the public entity. PSAB prefers the component approach.

ii) The public entity establishes its own capitalization threshold. Strictly speaking, anything that meets the definition of a TCA and can be measured qualifies as a TCA. In practice, most public sector entities will establish a capitalization threshold. This is a minimum amount that expenditures must exceed before they are 'capitalized.' Items below the threshold are recorded as expenses in the financial reporting year that they are purchased rather than as TCAs. The larger the municipality, the higher the threshold.

iii) A public entity must establish the 'useful life' of each of its TCAs, to provide some consistency to the valuation of the asset over time.

iv) A public entity may decide how to assign an initial value to an asset. There are three methods for assigning value to an asset:

a) Historical: the value of the asset when it was acquired or constructed;
b) Replacement cost: for long life capital assets;
c) Market value (or appraised value): the sale price of the asset in an unrestricted market.

The appropriate method of assigning value depends on the transaction anticipated for the asset. For that reason, replacement cost is often used for long life assets like grey infrastructure. However, for green infrastructure, historical value may be more appropriate. For accounting purposes, historical value is preferred.

If ALUS is partnering with a municipality on a project, it would be important to understand the municipality's approach to the above discretionary aspects of its accounting practices, as noted below.

3. Implications for Green Infrastructure

There is no explicit direction in the PSAB handbook on how to account for green infrastructure. Nor is there much guidance developed on how to apply PSAB rules to green infrastructure. Green Infrastructure Ontario has started some of this work, but in the absence of guidance material, the accounting profession, funding program administrator, and municipal staff do not know how to account for green infrastructure and may be applying PSAB rules to green infrastructure in an inconsistent manner.

This section discusses how accounting rules may be applied to green infrastructure, and points to some areas that may benefit from further definition and research to improve general understanding of green infrastructure projects and why they should be considered capital assets.

3.1 Accounting for Green Infrastructure as a TCA

There are some types of green infrastructure that can be accounted for as TCA in a consistent and straightforward manner.

For instance, if green infrastructure is part of another tangible capital asset (e.g. grey infrastructure), it can be accounted for under PSAB rules in the same manner as any other tangible capital asset. For example, if a road is installed, with natural drainage, then the natural drainage can be capitalized as part of the road. The primary asset is the road, but the natural drainage directly supports the road, so can be included in the capitalization.

Where there is freestanding green infrastructure, unassociated with grey infrastructure, but it is tangible, that is, it is purchased and constructed, but uses different materials than grey infrastructure, in theory it meets the definition of a tangible capital asset according to the PSAB handbook. It is the primary asset, and it is performing a service.

3.2 Is Green Infrastructure a Natural Resource?

From a public sector accounting perspective, whether green infrastructure is considered a tangible capital asset hinges on whether it is considered a natural resource, e.g. flora and fauna, in which case it is explicitly exempted, and become an expense rather than an asset.

In instances where green infrastructure is not purchased and constructed, that is, it is already there and is being preserved, like a lot of trees, these are explicitly excluded from tangible assets, as they are accounted for as ‘inherited natural assets.’

In an interpretation of PSAB rules on this subject, published by AMCTO and MFOA, the following explanation of the debate is offered:

> *Are Trees a Tangible Capital Asset? There are two schools of thought on this. One is that they are a biological resource, and not TCAs by definition, since it is hard to quantify any benefits that may directly accrue from planting a tree, and landscaping provides only an intangible aesthetic benefit. The other school is that planting trees improves the health of the community. They do not differ from other assets whose primary purpose is beautification or the promotion of environmental sustainability. They have a cost, a life expectancy and may even be the focus of an entire group of municipal workers in cases where a municipality has an urban forestry department. (MFOA-AMCTO)*

The specific exception of trees as an inherited natural asset was discussed by the PSAB public forum in the Fall of 2016 as a result of interactions between PSAB and Green Infrastructure Ontario (Public Sector Accounting Discussion Group 2016). PSAB's public forum discusses emerging issues in accounting. The public forum discussed rules that prevent natural resources 'inherited in right of the Crown' to be included as a tangible capital asset in municipal financial accounting.

There may be two ways around the exemption of trees as an inherited natural asset.

First, rather than account for the trees, the municipality could account for the land on which they are located. Land is considered a tangible capital asset, unless it is Crown land or land for resale, as outlined above.

Second, if the trees are purchased, they could be accounted for as a purchased natural resource. As such, a cost could be attributed to the natural resource. It would be down to the interpretation of the accountant as to whether the cost was legitimate. There is no guidance in the PSAB guidebook on this.

As noted above, this exemption of inherited natural resources does not apply to not-for-profit accounting standards. Therefore, establishing that not-for-profit partners that are administering projects on behalf of a municipality may apply not-for-profit accounting rules rather than PSAB rules would provide greater flexibility in terms of accounting for natural resources as capital assets.

3.3 Does the Green Infrastructure Have Service Potential?

Another way of evaluating whether green infrastructure qualifies as a TCA is to determine if it has a service potential as defined under PSAB tangible capital asset rule PS3150.05(f):

"the output or service capacity of a tangible capital asset, is normally determined by reference to attributes such as physical output capacity, quality of output, associated operating costs, and useful life."

If it is determined that the green infrastructure in question has aesthetic value, but no service potential, then it is not a TCA. Further work on defining the service potential of green infrastructure may be beneficial.

3.4 Capitalization Threshold and Systems Approach to Asset Accounting

As explained above, a municipality has discretion over how it accounts for TCAs. A municipality's approach to two of these discretionary decisions, its capitalization threshold and its approach to accounting for assets on a component by component basis or a system-wide basis, should be considered when negotiating a project partnership.

The combined decisions on a municipality's capitalization threshold and its approach to accounting for its assets (component by component or on a system-wide basis) could affect whether green infrastructure is accounted for as a TCA and ultimately is included in infrastructure funding applications.

For instance, if a municipality opts for reporting on a component basis, and has a threshold of $20,000 for assets that must be capitalized, and a green infrastructure project falls under that threshold, it will be accounted for as an expense rather than a TCA. However, if a municipality reports on a systems basis, and green infrastructure forms part of a stormwater system for example, it would then be capitalized along with the whole system, would exceed the threshold and would qualify as a TCA.

3.5 Public Benefit on Private Land

The accounting of green infrastructure is further complicated when considering public benefit of assets on private land.

The definition of a public tangible asset in the PSAB handbook requires that the entity that is reporting controls the economic benefits of the asset. However, if the public asset is on private land, this economic benefit may be shared. For accounting purposes, the public benefit and the private benefit must be separated out and the private benefit must be subtracted from the public benefit for the public entity reporting. Determining the private benefit is fairly straightforward: it could include increased value of land as a result of the investment.

Unfortunately, there is no hard and fast accounting definition for public benefit. There are a number of ways that public benefit may be accounted for.

Firstly, an accountant or funding program administrator may look at the objectives of the funding program, and evaluate whether the funded investment meets the objectives.

Secondly, an accountant or funding program administrator may look for an established definition of 'public benefit' in another sphere. For example, the Canada Revenue Agency has a public benefit test when considering the registration of charities that may be applicable (CRA). The two-part test:

- requires that a tangible benefit be conferred, directly or indirectly. (More recently, and in the Canadian context, this requirement has also been described as an "objectively measurable and socially useful benefit").
- requires that the benefit have a public character, that is, be directed to the public or a sufficient section of the public

Demonstrating a tangible benefit means a benefit that is recognizable, capable of being proved. Intangible benefits are acceptable as well, but only in cases where there is a clear general consensus that the benefit exists.

A third approach would be to equate 'public benefit' to 'future economic benefit', which, as discussed above, is an established public sector accounting principle in evaluating what constitutes an asset. Defining the future economic benefit of green infrastructure in a way that allows a public entity to provide goods and services could serve to explain its 'public benefit.'

The lack of a definition of public benefit, and the unfamiliarity of accountants or funding program administrators with the concept of public benefit on private land could pose a considerable obstacle to ALUS in its pursuit of funding for projects on agricultural land. This is an area in need of further investigation. An effort to define 'public benefit' in terms that accountants and funding program administrators understand and accept, and possibly developing case studies to illustrate the concept, could serve to facilitate funding applications that involve green infrastructure on private land.

3.6 Accounting Standards and Projects with Shared Control

As noted above, guidance on which accounting rules apply for projects with shared control between a municipality and a not-for-profit organization (PSAB or not-for-profit accounting standards) remains a grey area. While the two sets of accounting rules are quite similar, they differ in one important respect that is relevant to green infrastructure. While public sector rules explicitly exclude natural resources from the definition of a tangible capital asset, not-for-profit rules do not. Further clarification is needed from PSAB and funding program administrators on the applicability of these two sets of accounting rules in projects with shared control.

3.7 Incrementality

Both the Federal-Provincial infrastructure program and the Gas Tax Fund have a requirement to demonstrate incrementality. This means that the capital projects that are funded must be in addition to the amount that a municipality would have otherwise invested in its capital projects, so that this funding provides an added stimulus to the economy. Depending on how a municipality needs to measure incrementality in its funding applications, green infrastructure projects may not be considered as contributing much of a stimulus. This could count against green infrastructure projects. The definition of incrementality for Phase II of Federal-Provincial infrastructure funding program in particular will therefore be critical.

3.8 Cost

Ironically, one of the selling points of green infrastructure, its lower cost compared to grey infrastructure, may count against it in large infrastructure funding programs. As alluded to by Infrastructure Canada, smaller projects may not be evaluated favourably when the Federal-Provincial infrastructure funding program is geared towards funding larger projects that are otherwise hard to fund. Lower cost projects, unless bundled with higher cost system-wide projects, may not reach the unspoken scale or cost threshold that some funding program administrators are looking for. These may be considered fundable by other means. Further discussions with funding program administrators on this point would be worthwhile.

3.9 Conclusions

There has been considerable progress on overcoming two critical barriers to the eligibility of ALUS-type green infrastructure projects for public infrastructure funding. Firstly, several funding programs have now removed the prohibition on the eligibility of projects on private land, and secondly, these same programs are now accepting funding applications from not-for-profits, either with municipal partners or in their own right.

While this progress is welcomed, the practical implementation of these two important policy changes may be challenging for funding program administrators, and municipal staff given their inexperience in dealing with such projects.

Similarly, while PSAB rules are in principle permissive with respect to accounting for green infrastructure as a tangible capital asset (where the green infrastructure meets the definition of a TCA), there remain important considerations that require greater scrutiny and/or clarification. These include:

i) questioning the explicit exclusion of natural assets or natural resources remain from the public sector definition of tangible capital assets;
ii) defining the service potential of green infrastructure;
iii) determining a 'green infrastructure-friendly' capitalization threshold and systems approach to asset accounting with a municipal partner;
iv) defining public benefit in the cases of green infrastructure projects on private land;
v) clarifying which set of accounting standards apply to projects with shared control;
vi) understanding the definition of incrementality and how it may affect green infrastructure project eligibility for public infrastructure funding; and
vii) determining if there is an implicit bias against lower cost projects under existing infrastructure funding programs.

These seven areas may serve as a good starting point in discussions with green infrastructure advocates and allies, as well as in discussions with funding program administrators and potential municipal partners.

4. Recommendations to Enable NFPO Participation in Bilateral Infrastructure Funding

Given the above analysis on funding program eligibility criteria and accounting standards, the following recommendations are focused on specific policy guidance needed to enable participation of not-for-profit organizations (NFPO) in future rounds of bilateral infrastructure funding programs.

In Federal Budget 2017, it was announced that NFPOs may apply for bilateral infrastructure funding (BIF). The Government committed to providing up to 40% federal funding for projects undertaken with municipal and not for-profit partners. (See Federal Budget 2017, Chapter 2: Communities Built for Change, 'Infrastructure Partnerships Through Bilateral Agreements'). It has also been confirmed that projects on private land will be eligible for funding under BIF.

This is a significant step forward to enable NFPOs like ALUS Canada to access BIF to support green infrastructure on public and private land.

It is anticipated that the operationalization of these new policies may initially cause some confusion amongst municipal and NFPO applicants, funding program administrators and application reviewers, auditors and accountants. Unfamiliarity with NFPO funding applications, particularly for projects on private land, could create a major barrier to the success of these applications. This could be managed with timely guidance material explaining how NFPO applications should be treated.

Prior to developing such guidance material, several issues related to program criteria, the application of accounting standards, and other review considerations require clarification.

There are at least four areas related to program criteria, accounting standards and review considerations that require clarification in operational guidance to enable successful implementation of NFPO eligibility for bilateral infrastructure funding.

1. The application of the incrementality principle
2. The application of NFPO accounting standards versus public sector accounting rules
3. Projects on private land
4. Funding threshold and full system funding versus component funding

4.1 Incrementality

Phase I of the BIF program required that infrastructure investments made possible through BIF were in addition to a municipality's planned infrastructure investments in their capital plan, thus providing an economic stimulus.

The incrementality requirement does not fit well with NFPO projects for two reasons. Firstly, projects proposed by NFPOs are not 'in addition to' existing capital plans that are funded through public tax revenue. All investments in NFPO projects are additional given that they are funded through private and public grants. If these grants are not available, no projects move forward. Secondly, if projects are chosen for their overall stimulating impact to the economy, lower cost green infrastructure investments will have relatively to lower impact than higher cost grey infrastructure.

For these reasons, it is recommended that NFPO projects be recognized by default as meeting the incrementality criterion, or set a threshold under which NFPOs under a certain value are exempt from meeting the criterion.

4.2 Application of NFPO Accounting Standards versus PSAB standards

In funding applications where an NFPO is the lead applicant with a municipal partner, or the NFPO is the sole applicant, clarity is needed with respect to the set of accounting standards that should be applied.

Currently, under Phase I, there is a requirement that applicants apply PSAB rules. However, in their own financial operations, NFPOs apply the Canadian Institute of Chartered Accountants' (CICA) NFPO accounting standards. While the two sets of accounting standards are substantially the same, they differ in one crucial aspect which is particularly important to green infrastructure projects. PSAB standards do not recognize natural resources (flora and fauna) unless purchased, nor do they include inherited natural assets (e.g. existing tree lots or wetlands) as tangible capital assets. This means that municipalities are barred from including these natural assets in

their infrastructure funding applications.

Given the importance of natural resources in NFPO green infrastructure projects, and the fact that PSAB standards do not apply to NFPOs, it is recommended that the BIF agreements allow either PSAB or CICA NFPO accounting standards to apply, depending on the applicant. This could be accommodated by a simple word change, requiring that Generally Accepted Accounting Principles (GAAP) be followed, rather than the more specific requirement of PSAB standards. Both the Gas Tax agreement and the FCM Green Municipal Funds refer to GAAP rules rather than PSAB standards.

For projects with shared control between municipalities and NFPOs, an agreement should be reached between the partners regarding which accounting standards should be applicable. This could be determined based on the nature of the participating organizations and the applicability of the standards as set out by the relevant Canadian accounting standard setting bodies. For instance, a private NFPO may follow NFPO standards whereas a government NFPO may follow PSAB standards. The party that maintains control of the assets once constructed may also be a factor in determining which standards to follow.

4.3 Projects on Private Land

There has been some debate as to whether BIF should be used to support projects on private land. In the case of climate adaptation and stormwater management, the overwhelming majority of land over which snowmelt and heavy rains travel is private. Recognizing this, local authorities in urban areas are increasingly offering incentives or are charging fees related to the management of stormwater on private land. The Government of Ontario is currently revising its urban stormwater management guidance manual to put an emphasis on stormwater site controls on private land. The need to manage stormwater through distributed stormwater management systems applies equally to private rural and agricultural land.

A decision on whether or not to invest in projects on private land could be assessed in a number of ways. From an outcome point of view, it could be based on an assessment of the 'public benefit' derived from the project. From an accounting point of view, it could be assessed based on 'future economic benefit' of the asset.

There is no working definition of public benefit under the BIF, nor is there one under accounting rules to serve as a guide. A new definition would be required. The definition of public benefit could be addressed in the following ways:

i) High level principles underpinning public benefit that could apply to any kind of project. These could be based on objectives or desired outcomes of the funding program (e.g. climate mitigation and adaptation);
ii) It could be assumed that NFPOs with charitable status meet the 'public benefit' test given that their objects or bylaws have already been reviewed and met the test of 'public

benefit' as defined by the Canadian Revenue Agency;

ii) The measurement of public benefit specific to the proposed project. The applicant could be required to put forward performance metrics for measuring public benefit, for example, a flood mitigation project could include metrics for the retention of water or the conveyance of floodwaters away from built communities.

'Future economic benefit' is an established accounting principle in evaluating what constitutes an asset. Defining the future economic benefit of green infrastructure on private land could serve to explain its public benefit in terms recognized by accountants and auditors.

It is recommended that guidance be provided to funding program administrators, municipal and NFPO applicants, auditors and accountants to clarify how public benefit or future economic benefit is to be assessed and measured for projects on private land funded under BIF.

4.4 Funding Threshold and Full System vs Component Accounting

The only formal funding threshold currently under BIF is determined by the municipality itself through its capitalization threshold. As noted earlier, NFPO green infrastructure projects are relatively low cost (in the tens to hundreds of thousands of dollars) compared to grey infrastructure (in the tens to hundreds of millions of dollars).

Where municipalities and NFPOs are partnering on a project, there is a risk that green infrastructure projects may fall under the municipal capitalization threshold and, as a result, off the funding application prioritization list. This may be avoided by encouraging municipalities to adopt a systems-based approach rather than a component-based approach to accounting for its assets when applying for funding. For example, a municipality may apply for funding for individual components of a stormwater system, such as stormceptors, pumps, ponds, pipes, and green infrastructure such as vegetated beds or buffer strips. If each component is valued as a separate project, some of the low cost components may fall under the capitalization threshold. However, if a municipality applies for funding for the complete stormwater system, encompassing all the components together, the value of the project will be well over the capitalization threshold. Guidance is needed to assist municipalities with integrating green infrastructure into a systems-based approach in funding applications.

For NFPO projects with no municipal partner, project costs will be low. Some guidance is needed for BIF funding application reviewers to consider the public benefit or future economic benefit (see above) rather than just the overall cost as a measure of the impact of the project.

4.5 Conclusion

It is very encouraging that the BIF program will be accepting project applications from NFPOs, including projects on private land. This change in policy raises some issues with current BIF eligibility criteria and municipal and NFPO accounting practices. To operationalize this policy-level eligibility, ALUS Canada offers recommendations and advice on clarification and guidance in four areas that can assist applicants, funding program administrators and application reviewers, accountants and auditors.

1. NFPO projects should be made exempt from any future 'incrementality' requirement under BIF.

2. a) BIF agreements should be changed to require Generally Accepted Accounting Principles (GAAP), rather than the more specific requirement of Public Sector Accounting standards, to allow for the application of CICA's NFPO accounting standards.

b) For projects with shared control between municipalities and NFPOs, an agreement should be reached between the partners regarding which accounting standards are applicable.

c) Guidance should be provided to funding program administrators, municipal and NFPO applicants, auditors and accountants to clarify how public benefit or future economic benefit is to be assessed and measured for projects on private land in applications submitted for funding under BIF.

4. To address the issue of small scale NFPO projects competing with large scale grey infrastructure projects, guidance is needed to assist municipalities with integrating NFPO green infrastructure projects into their broader infrastructure systems, by adopting a systems-based approach to asset accounting rather than a component-based approach. For low-cost NFPO projects, guidance is needed for BIF funding application reviewers to consider the public benefit rather than just the overall cost as a measure of the impact of the project.

ALUS Canada would be pleased to assist in providing further advice on development of this guidance material to facilitate the operationalization of NFPO eligibility.

PART III - FINANCING MODELS - CASE STUDIES

A preliminary scan of financing models was conducted, and four models were selected to explore further as case studies. Sources for each case study are noted at the back this report. Overarching observations with respect to opportunities, challenges, and lessons learned from the financing models reviewed are noted in Appendix A. Appendix B includes shorter versions of two select cases, and Appendix C contains notes on other alternative models reviewed during the scan.

The following four case studies are provided below:

1. Ontario - South Nation River Watershed (phosphorus offsets)
2. Great Lakes - Sustain our Great Lakes (habitat restoration)
3. Florida - Everglades and Lake Okeechobee (dispersed water management, water retention)
4. Australia - Rivers of Carbon (carbon sequestration, biodiversity, habitat)

This section concludes with recommendations on a modified program design for the Federal Disaster Mitigation and Adaptation Fund to promote green infrastructure projects in a rural agricultural context.

1. Ontario South Nation River Watershed Total Phosphorus Management Program

The South Nation River Watershed is located southeast of Ottawa, Ontario, between the Ottawa and St. Lawrence rivers. The watershed is home to many rural communities that have historically engaged in mixed farming focused on dairy, corn, and soybeans.

In the 1990s, water quality within the watershed became highly degraded, with further development expected to contribute additional degradation. At times, phosphorus concentrations had been found to be up to five times greater than Ontario Provincial Water Quality Objectives, with 90% estimated to come from nonpoint sources (Gore and Storrie 1993). Sources of nutrients included agricultural and urban runoff, sedimentation, flooding and erosion, poor natural drainage, and, to a lesser extent, municipal wastewater discharges.

Given the level of degradation, the South Nation River Watershed was identified as an area of concern by the Ontario Government, who in 1998 stipulated that water quality in the region not meeting standards "shall not be degraded further." As such, provincial approvals for any new or expanded wastewater discharged to the watershed would require plans for either: 1) zero increase in phosphorus loading, i.e. treatment at the source; or 2) offsetting increased phosphorus at a location other than the source, i.e. funding of agricultural beneficial management practices (BMPs).

Program Description

In response to this requirement, South Nation Conservation took the lead in developing the first phosphorus point source - nonpoint source offset program in Ontario. A South Nation River Watershed Management Strategy was created with a Total Phosphorus Management (TPM) program component.

The TPM views the watershed as a unit. While phosphorus is contributed via different sources throughout the watershed, the TPM component gives dischargers the choice to remove phosphorus anywhere within the watershed through offsets.

Those discharging point sources of phosphorus (municipal wastewater treatment plants, industrial companies, and/or institutions with separate wastewater systems) can offset their discharge by purchasing credits from landowners implementing BMPs. Credits are assigned to different BMP projects depending on the local context of the land and relevance of agricultural practices, and the degree to which practices are expected to achieve phosphorus reductions.

Purpose and Desired Outcomes

The overall purpose of the TPM is to reduce total phosphorus in the South Nation River Watershed. The program provides financial incentives to landowners to implement practices that reduce phosphorus from nonpoint sources, regardless of the location of the source. Offsetting is designed to help meet regulatory requirements and, where relevant, avoid costly treatment of point sources resulting in cost-effective water quality improvements. Over the course of the program, offsetting became the preferred method of regulatory compliance, as exercised by a municipality's decision to either treat or offset its wastewater discharge.

In terms of desired outcomes, the TPM program states "there must be a net environmental benefit to South Nation River" which is promoted by a total phosphorus loading offset ratio of 4:1 (Kassirer 2005). This offset ratio involves reducing four kilograms of nonpoint source total phosphorus annually for every kilogram from point sources. In dollars, this equates to the discharger paying $400 for every $100/kg of phosphorus. Considering uncertainties around achieving desired outcomes, and to ensure a higher degree of confidence, the relatively high ratio provides a buffer to account for variable results when and where BMPs may not produce the desired reduction.

Note that an agreement signed in 1997 between farmers and regulators clarified concerns from the agricultural community that they would be blamed if desired outcomes were not achieved. The agreement notes that landowners are not legally bound to attain phosphorus reductions. This responsibility rests with municipalities, industries and/or institutions as dischargers (O'Grady 2011).

Organizations Involved

One of the key aspects of South Nation's TPM program is the nature of its organizational structure and delivery agent. South Nation Conservation acts as a broker, coordinating the bulk of program implementation, monitoring and reporting, and other administrative matters.

As a long serving conservation authority, celebrating its 70th anniversary in 2017, South Nation Conservation (SNC) holds regulatory power to prevent "alteration of waterways, construction in floodplains, and destruction of wetlands." However, it does not have control over managing water quality, which lies with the provincial government. The Ontario Ministry of Environment and Climate Change (MOECC) is responsible for wastewater works complying with regulatory requirements, as well as monitoring and implementation of provincial water quality objectives.

In a collaborative partnership, a Clean Water Committee was established to bring watershed entities, provincial government agencies, municipalities and industries, farm industry organizations, and landowners together to manage water quality as a multi-stakeholder group. The Committee is administered by South Nation Conservation board members, in partnership with Ontario MOECC and OMAFRA, municipal staff, Ontario Soil and Crop Improvement Association, and community members. A TPM Working Group was also created to help address issues that arose during program development and implementation.

Farmers play a particularly important role in conducting field visits and providing recommendations directly to the Clean Water Committee on which agricultural BMP projects to support. They also engaged in developing the TPM program, a considerable strength in building trust among partners, ensuring participation, and addressing program concerns.

Funding Process

The Clean Water Committee administers the flow of TPM funds through the Clean Water Program. The process involves negotiating a TPM agreement with the discharger (e.g. municipal wastewater treatment plant operator) to confirm the phosphorus cap required and agree on the amount of the offset/credit. The discharger then pays into the Clean Water Program. BMP projects are identified by the Clean Water Committee, and funds are allocated to eligible projects within the watershed. Farmer representatives conduct inspections to ensure project completion, and report back to the Clean Water Committee. The amount of reduced total phosphorus is calculated and credits are allocated to the discharger.

South Nation Conservation is the lead responsible for the Clean Water Program, including the signing of TPM letters of understanding with partner municipalities, as well as collecting funds and distributing grants that support BMP projects. Examples of eligible TPM-related BMP projects include: manure storage, wastewater treatment, runoff controls, livestock restrictions (fencing), and septic systems (O'Grady 2011; Boutz 2017). Under the broader Clean Water Program, support is provided for other practices such as buffers, cover crops, streambank

erosion control, well decommissioning, and conservation tillage (South Nation Conservation 2017).

The broader Clean Water Program offers cost-share grants from $1,000 to $8,000 depending on the BMP project (South Nation Conservation 2017), and has funded more than $2.3 million to over 742 projects. Of this, $732,000 in TPM cost-share grants have been provided to landholders between 2000 and 2016, with $179,000 of additional funds covering program delivery costs.

Note that the Clean Water Program was established in 1993 (prior to TPM being developed) and was known for managing successful water quality improvement projects in the region. This is one of the reasons why South Nation Conservation became a trusted broker for the TPM program, given its early track record of managing projects under the broader program.

Note as well that the citizens of Ottawa have their own funding opportunity via the Ottawa Rural Clean Water Program which engages 'rural' residents within the City of Ottawa but outside the downtown core. While this program name is similar to the Clean Water Program, and is also coordinated by South Nation Conservation, it is not part of the TPM offsetting option.

Progress and Evaluation of Outcomes

Specific to the TPM program, the bulk of offsetting activity took place from 2000 to 2010. During this time, 287 offset projects generated 12,144 kilograms/year of reduced phosphorus. There were no projects from 2011 to 2014. In 2015, while modest, an additional six projects generated 60 kilograms/year, bringing the total to 293 projects and 12,204 kilograms/year of reductions to date (Boutz 2017).

TPM program activity was at its peak in the early to mid-2000s as municipalities were looking to expand their wastewater discharges at that time. However, TPM offsets and grants through the Clean Water Program are still available. South Nation Conservation staff mentioned a couple of TPM plans may still be implemented.

As part of the grant agreements, and supported by the cost-share nature of the grants, landowners agree to maintain completed projects in working order for at least five years. Due to associated lag times of BMPs, this may result in water quality improvements well into the future.

The program outcomes are based on algorithms, not actual water quality monitoring. Mathematical formulas are used to estimate the amount of phosphorus kept out of a water by different BMPs. Draper and Weatherbe (1995) provided calculations for loading of one kilogram phosphorus per hectare per year. While approved by the regulator and accepted by the community early in the program, these calculations are not updated regularly. As such, the formulas have been consistently applied; however, the program risks not relying on more up-to-date science (O'Grady 2011).

In a survey of landowners, 80% of respondents said the program increased the value of their

land, another intriguing outcome (O'Grady 2011).

Challenges and Lessons Learned

Early in the development of the TPM program, offset projects were postponed to address a number of concerns identified by participants. As mentioned earlier, farmers had early reservations around being blamed if BMPs did not meet expectations, and having to cover all the costs. They were also concerned that the program would lead to regulatory restrictions controlling agricultural practices in the future, and become too costly. Confidentiality of farmer data was another major concern raised, as well as overall lack of engagement, and trust issues in general.

In response, the program purposefully remained voluntary for landowners, with responsibility for phosphorus reductions placed on point source dischargers. Landowners were not legally bound to the results of BMPs. While this brings its own challenges in terms of meeting desired outcomes, it was key to overcoming reservations expressed by local communities, and allowed for the necessary buy-in and participation needed from farmers (O'Grady 2011). To address privacy concerns, the program was coordinated using ID numbers rather than specific farm details. In an effort to enhance consultation and improve relationships, farmers were more fully engaged in the process of developing and implementing the program. South Nation Conservation worked to build trust among participants and partner organizations.

Highlights: What Worked

Overall success of the South Nation Watershed TPM Program can be attributed to several elements outlined by Dennis O'Grady (2011), former South Nation Conservation General Manager:

- Enhanced farmer and community engagement, involving early agreement and uptake;
- Strong regulatory support, including cap on point sources and ability to offset;
- Credible offset calculations based on science;
- Certainty around costs to dischargers and funding available for farmers;
- Farmer-led program delivery and project verification, focused on adoption of BMPs;
- A reliable broker to reduce administrative burden and provide support over long-term;
- Clear instructions to guide the offsetting process; and
- Legal liability protection to cover risks associated with the obligation to deliver credits.

Other contributing conditions of success include the presence of an established granting mechanism, in this case the Clean Water Program, prior to the start of offsetting. This led to the conservation authority serving as a natural coordinating body, taking care of the behind-the-scenes work. This closed system of program delivery (as opposed to an open 'clearinghouse' used in alternative trading programs) was valuable in keeping the administrative burden to a minimum.

While South Nation Conservation uses terms like water quality 'trading', 'credits' and 'offsets' interchangeably (see O'Grady 2011 referring to TPM as a water quality trading program), a helpful distinction can be made with respect to its implementation as an 'offset' program. This is not only differentiated in the 'offset' language issued by MOECC, but also the nature of program itself. Localized in its design and implementation, South Nation's TPM program was created specifically to serve the needs of a relatively small geographic area, compared to other trading programs that attempt to administer trades within a larger basin. As well, TPM is administered by one central broker, which not only reduces the burden on participants, but allows for enhanced negotiation and accommodation of community needs, as well as more detailed verification and attention paid to projects.

Through local offsetting, activities can also be tailored to specific watershed plans and objectives, strategically targeting areas that will result in the greatest gains, rather than relying on unrelated activities achieved by less coordinated trades. In addition to clear instructions for the offsetting process, it was also noted that a set of clearly defined and agreed upon roles and responsibilities helped guide partners and participants through the process, and likely reduced potential conflicts.

The South Nation River Watershed TPM program has set an important precedent in Ontario, achieving multiple objectives including improved water quality, reduced municipal infrastructure costs, and financial support for agricultural stewardship. While participation is voluntary, there is a clear driver. Otherwise, more costly treatment would be needed to comply with requirements. Acceptance of a relatively high 4:1 offset ratio helped address uncertainties. According to a survey conducted by South Nation Conservation staff, 86% of farmers recommended the program, which speaks to its success as a model.

2. Sustain Our Great Lakes Program

Sustain Our Great Lakes (SOGL) is a binational public–private partnership working to improve the ecological health of the Great Lakes basin by providing support for habitat restoration activities.

Purpose and Desired Outcomes

The mission of SOGL is to "sustain, restore, and protect fish, wildlife, and habitat in the basin" by "leveraging funding, building conservation capacity, and focusing partners and resources toward key ecological issues."

Program priorities shift year to year; however, there are several key funding categories. Projects announced in 2016 totaling $5.18 million focused on outcomes related to improving fish passage, controlling invasive species, protecting important habitat, restoring wetlands, and improving the structure of stream habitat.

New grant funds up to $7.8 million will be announced in the summer of 2017, with a focus on stream and riparian habitat, coastal wetlands habitat, and a new category dedicated to green infrastructure in cities along the Great Lakes shoreline. Restoration strategies include removing dams, replacing culverts, naturalizing stream channels, installing instream structures, managing sediment, stabilizing banks, and restoring native plants.

Organizations Involved

SOGL is administered by the United States' National Fish and Wildlife Foundation (NFWF). Its corporate partner is ArcelorMittal, a steel and mining company with operations throughout the basin. SOGL also works in partnership with a number of federal government agencies including the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, National Oceanic and Atmospheric Administration, and U.S. Department of Agriculture Natural Resources Conservation Service.

Eligible grantees include non-profit organizations, state government agencies, municipal and local governments, tribal governments, as well as educational institutions. Most of the grants have been awarded to organizations in the United States. However, there is a current opportunity for $200-400K to be directed to projects around western Lake Ontario near Hamilton and Toronto.

Funding Process

At the start of the program in 2006, SOGL was supported by a relatively small cooperative agreement with the U.S. Environmental Protection Agency. In 2007, it approached ArcelorMittal, who had recently merged into a new company and was keen to support conservation efforts in the basin, with an interest in the restoration of specific geographic areas. Shortly thereafter,

President Obama announced the Great Lakes Restoration Initiative (GLRI) in 2009. Seeing an opportunity to leverage existing public and private funding, the GLRI began contributing funds to SOGL in 2010/2011.

GLRI funds flow from the EPA to the Fish and Wildlife Service, and then on to the NFWF on an annual basis as needed for distribution to grantees. While a significant portion of SOGL funds continue to be provided by the GLRI, confirmed to the end of fiscal 2017, the program also relies on support from its private and public sources, together with matching funds from grantees.

Grant amounts currently range from $50,000 to $1.5 million, with grantee cost-share contributions added to this. According to SOGL guidance for potential grantees, projects with a 1:1 match ratio (50% grantee matching) are more likely to be selected. Matching support can include cash, donated materials/services, in-kind staff contributions, and cost of land acquisition.

There is a requirement that up to 70% of a grant must support on-the-ground habitat restoration work, including land protection. The remaining 30% can be spent on planning, design, engineering, monitoring and outreach (SOGL 2017). Activities related to advocacy, fundraising, and research are ineligible, as are costs associated with implementing legally mandated projects.

Grantees submit a budget within their proposal outlining projected costs. They are paid for actual costs after submitting disbursement requests for reimbursement to NFWF administering the funds. Timing of payments is flexible, depending on when costs are incurred as well as the frequency in which grantees chose to submit their requests for reimbursement. Grantees can also receive an advance to cover costs.

Over 264 grants worth $60 million have been awarded since 2006. Grantees have contributed an additional $65 million, bringing the total investment to more than $125 million (SOGL 2017).

Progress and Evaluation of Outcomes

From 2006-2016, the SOGL program has restored 30,573 acres of wetland and associated habitat, 1763 miles of fish passage and aquatic connectivity, 201 miles of stream and riparian habitat, and 4,477 acres of shoreline habitat (SOGL 2017). While SOGL supports a range of wetland and riparian restoration efforts, projects dedicated to restoring hydrology and other physical processes have had the greatest outcomes.

One critique with SOGL using acres and miles to measure progress, is that it does not speak to biological outcomes, often monitored using indicator species (Headwaters Group et al 2013). SOGL funds can be used within projects to support the development of monitoring plans, progress metrics, and monitoring of biological outcomes related to fish and bird populations. However, overall SOGL program outcomes are measured and reported through acres and miles at this time.

From a socio-economic perspective, in the first five years of the program (2006 to 2011), an estimated 270–600 jobs were created through SOGL activities, generating $45 million in economic activity (Headwaters Group et al 2013).

Highlights, Challenges and Lessons Learned

The number of partner organizations involved in the SOGL program has been its strength, but at times a challenge, too. Negotiating initial partnership agreements required finding common ground and terminology, agreeing on a set of priorities and criteria, and, perhaps most importantly, building trust among partners.

SOGL priorities have needed to evolve over time in response to funder conditions and constraints. For example, federal requirements shifted from areas of concern to coastal wetlands. SOGL funding categories have reflected this and other changes in direction.

While there are benefits to clustering related grants, concerns were raised about targeting funds to specific geographic areas. Some partners preferred to concentrate investments in areas most likely to have cumulative impacts, while others felt a more distributed approach was needed to reduce the perception of political motivations and regional inequalities.

To the program's benefit, diversity of partners provided a range of perspectives, expertise and skills, such as scientific knowledge, grant administration, and outreach, which made for better decision making, implementation, and communications.

The presence of multiple funding sources also offered opportunities to leverage funds and achieve higher returns on investment. The notable challenge related to ensuring the timeline of grant payments matched that of partnership agreements and renewals.

SOGL does not distribute based on funding sources. Projects are leveraged at a programmatic level (issue-based) across a range of projects over time and geography, as opposed to the project level (site specific).

The standard two-year grant period made it difficult for some grantees to plan and implement restoration projects, particularly those designed to generate greater impacts over a longer period. A formal evaluation of the program recommended a longer project cycle (Headwaters Group et al 2013). SOGL now offers the flexibility of three-year projects, and allows for modifications and extensions. Note that the percentage of funds directed to on-the-ground habitat improvement was initially 90%, but was relaxed to the 70% requirement noted earlier to encourage better planning and more attention to monitoring.

As a binational public-private partnership providing grants across a large geographic area for over 10 years, the SOGL program has served as an effective model for financing habitat restoration.

3. Florida Everglades/Lake Okeechobee Dispersed Water Management Program

Over the past 100 years, the Florida Everglades and Lake Okeechobee watershed have been dramatically altered to support urban and agricultural growth. Extensive drainage has altered the hydrology of the area resulting in degraded water quality, reduced flow, and loss of wildlife habitat.

Significant weather events contribute to flooding and pollution. After major storms, when Lake Okeechobee water levels are high, the United States' Army Corps of Engineers is forced to release polluted water into nearby rivers to prevent flooding. In 2016, a state of emergency was declared after resulting harmful algal blooms putting human health, property values, and economic livelihoods at risk.

Florida has long grappled with these issues, but during the last 20 years has tried to coordinate solutions. In 2000, Florida's Comprehensive Everglades Restoration Plan (CERP) was approved by Congress, consisting of more than 60 federal-state supporting projects designed to address water quantity, quality, timing and distribution challenges over a 35-year period. Many of the projects involved large scale government initiatives designed to restore water flow and water quality in the watershed.

However, private landowners own much of the land in Florida. As such, a role was identified for smaller scale projects that directly engage ranchers and farmers in dispersed water management.

Program Description

The dispersed water management (DWM) program was designed to engage private and public landholders in central and southern Florida in implementing practices that retain water on the land and improve the quality of water flowing into and out of Lake Okeechobee and to the Everglades downstream.

The Florida Ranchlands Environmental Services Project (FRESP) was a pilot implemented from 2005 to 2011 on eight properties in central Florida. FRESP focused on highly-drained or nutrient-enriched wetlands with the untapped capacity to store water. Strategies included plugging ditches, creating shallow reservoirs, rehydrating previously drained wetlands, and building impoundments. In many cases, structures like culverts and riser boards already exist. Note that the program was based on 'additionality' in that ranchers would only receive payment for environmental services that went beyond what was provided by existing BMPs (Bohlen 2009).

In 2014, the pilot evolved into the "Northern Everglades Payment for Environmental Services" program specific to cattle ranchers.

A related 'water farming" pilot program was developed to provide incentives to select farmers with fallow citrus lands. Farmers are also paid to hold water on their property, "treating it as if it were a crop."

Purpose and Desired Outcomes

Water retention (also known as dispersed storage) is critical to the success of Florida Everglades cleanup and restoration efforts. The specific goal of dispersed water management programming is to engage and compensate farmers in water retention goals, with the added potential of achieving co-benefits such as reduced nutrient loadings, improved groundwater recharge, and creation of wildlife habitat, not to mention flooding control and delayed construction of deeper storage options (Gray and Lee, 2015).

While separate from CERP, the DWM program seeks to contribute to the overall goals of the larger plan to ease the release of polluted water downstream, replenish water supplies, and increase water flow to the basin.

Organizations Involved

DWM programming was developed by a coalition of environmental groups (World Wildlife Fund, Resources for the Future), academic institutions (University of Florida, MacArthur Agro-Ecology Research Centre), federal and state government agencies, as well as ranchers, and implemented by the South Florida Water Management District. The W. K. Kellogg Foundation has also supported this work, and the Everglades Foundation has been involved in applying and evaluating DWM methodologies.

Funding Process

Major sources of funding for the FRESP pilot were provided by Florida Department of Agriculture and Consumer Services, and Conservation Innovation Grants from the U.S. Department of Agriculture Natural Resources Conservation Service. Other support came from the U.S. Environmental Protection Agency, South Florida Water Management District, and the W. K Kellogg Foundation. The State of Florida committed over $3 million, and an additional $3 million was provided from federal and private sources (Bohlen 2009).

Building on the pilot, in January 2011, the South Florida Water Management District issued a request for proposals under the Northern Everglades Payment for Environmental Services Program, which resulted in eight 10-year contracts with ranchers. The fixed-term contracts provided further opportunities for the buyer and sellers to measure the value of environmental services, and decide whether to extend or return land back to its original condition (Bohlen et al 2009). The contracts also offered assurance to landowners of regular payments during the contract. Dedicated funding streams were therefore critical. In 2014, the State of Florida earmarked funds from its 'environmental land initiative' to support dispersed water management programming.

Flat rate payments are based on a set of models and calculations that estimate how much water in theory can be stored, considering the context. Modelling also helped determine priority areas on which to focus.

The intention was for small farms and ranches to submit proposals, compete for contracts, and benefit from an additional source of revenue, while provided public benefit and delaying the cost of building permanent storage structures. One major landowner (Alico) benefited from the program, impacting the intended wider reach of funding support. This was also controversial given the company was criticized for lobbying the government.

Progress and Evaluation of Outcomes

The FRESP pilot resulted in 20% less water flowing from properties (Shukla via Gray and Lee 2015). It also engaged partners in developing techniques to estimate costs and benefits of DWM to address data gaps, and provide assurance to buyers and sellers of the value of environmental services.

According to the South Florida Water Management District, approximately 89,200 acre-feet of water storage was achieved in the greater Everglades as of 2014 (SFWMD 2015). Unfortunately, the requirements for retention in the watershed far exceed DWM contributions. A University of Florida Institute report estimated the need for up to 1.6 million acre-feet of additional storage around Lake Okeechobee. DWM fits within the broader plan, but must be considered one of many tools.

The pilot illustrated how a coalition of public, private and nonprofit organizations could work cooperatively toward water retentions goals, and conduct cost-benefit analyses, while supporting ranchers and farmers with an additional revenue stream (Gray and Lee 2015; Bohlen et al 2009).

Challenges and Lessons Learned

Agri-environmental programs are often provided through cost-share programming or subsidies. Lessons from examples like this one that pay landowners directly for the provision of environmental services are worthy of attention, despite modest gains in achieving desired goals for retention. These types of programs come with inherent challenges in agreeing on a process for valuing environmental services, and providing consistent payments (Bohlen et al 2009).

DWM is not without its own challenges. Studies have shown DWM to be successful under dry to average conditions. However, during very wet conditions, the ground is already saturated, and the approach has not resulted in significant decreases in flow. Furthermore, under drought conditions, DWM may contribute to reduced inflows to Lake Okeechobee (Everglades Foundation, Naja 2017).

The program stores a fraction of the water needed to be effective. The largest contract to Alico ($120 million over 11 years) was projected to make a difference of about one inch in the depth of Lake Okeechobee. With respect to this contract, DWM programming has been criticized for failing to benefit a wider range of small farms and ranches.

In terms of intended water quality improvements, results are context-specific and often inconclusive. According to the National Academies of Science, Engineering and Medicine, the program has achieved limited reductions in phosphorus loading to Lake Okeechobee. A study by Goswami et al. (2014) suggested that in some cases there is the potential for increased phosphorus loads from water retention practices.

As for the big picture, ecological indicators for Everglades restoration monitor aquatic vegetation, invasive species, and native aquatic species such as crocodiles, fish, macroinvertebrates, and wading birds, among others. The latest system-wide ecological indicators report for the Everglades shows restoration targets for many indicators have not been met, and in some cases have deviated significantly from the targets (South Florida Ecosystem Restoration Task Force 2014). There is much work to be done, and additional restoration activities have been recommended for the larger region.

Highlights: What Worked

While dispersed water management has so far played a limited role in the big picture restoration needs of the Everglades, it is important to keep in mind the intention and broader goals of engaging ranchers and farmers in restoration, providing compensation, and the nature of co-benefits. Smaller initiatives like the pilot and recent state funded programming have led to valuable data on what works, and what can be improved upon.

One of the conditions for qualifying for the DWM program required farmers to adopt BMPs, which contribute multiple benefits beyond efforts directed at retention alone. The program has also provided an incentive for landowners not to develop their land, thereby avoiding further drainage issues.

There has been considerable debate over the years on whether to build a permanent reservoir to ease flooding and pollution concerns. Opponents, including vocal farmers, have suggested it would destroy agricultural productivity of valuable land. Proponents, including support from some environmental groups, welcomed the solution, but differed on the implementation details to ensure water storage and quality improvements were achieved. In May 2017, a reservoir law was signed by the Governor of Florida, which, if it proceeds, will likely have implications on the need for the DWM program in the future.

While dispersed water management has not matched the scale of required water storage in the Everglades example, payment for ecosystem services programming is relatively new, context-specific, and lacking in data. Despite the challenges, it should be considered one of many tools in a suite of options to finance retention on private land, with an eye toward co-benefits.

4. Australia Rivers of Carbon Program

The Rivers of Carbon (RoC) program was inspired by the farming community of Breadalbane in New South Wales, Australia. Breadalbane farmers expressed keen interest in implementing restoration projects - including fencing, revegetation of riparian areas, and erosion control - to address biodiversity loss and water quality issues. In addition, several significant wetlands in the area were identified in need of riparian restoration.

Program Description and Desired Outcomes

The RoC program financially compensates landholders for carrying out restoration activities that provide multiple benefits including habitat for endangered species, carbon sequestration, instream productivity, and water quality improvements, among other "win-win" outcomes.

RoC invests in revegetating and rehabilitating sites with native species to create a "biodiverse carbon" sink with multiple benefits. "Biodiverse carbon" provides an "array of ecosystem services such as wildlife habitat, a mix of native vegetation species, a supply of food, leaves, litter and shade for aquatic animals and a reduction in soil erosion and improved aesthetic, social and cultural values." (RoC 2017). As an example, RoC's Breadalbane project focuses on connecting areas of native vegetation to form riparian corridors, i.e. rivers of carbon.

The concept of 'rivers of carbon' is rather intriguing, as explained by the program founders:

> *A 'river of carbon' describes the total of carbon that is found and can be captured in rivers, riparian habitats and the terrestrial systems. The phrase encompasses the carbon in the plants, animals and soils that are found in-stream and on the land connected to river systems. As with the carbon cycle, rivers of carbon is a dynamic concept that that is influenced by the cycle of the river itself, the prevailing climate and the management practices in place (SOGL).*

The tagline is "mess it up and slow it down" referring to the intention of natural green infrastructure to be diverse and 'messy' to help retain water and store carbon. This is in contrast to traditional built infrastructure that is often created to control water and keep it moving.

The program is guided by a "five P management framework" acknowledging the importance of environmental, economic and social factors in natural resources management. The five Ps are: profit, proof, people, place, and promise.

RoC defines 'profit' in terms of the economic and social benefits achieved through restoration such as improved water quality, carbon sequestration, wildlife habitat, and recreational opportunities. 'Proof' ensures scientific evidence informs the program's goals and activities. RoC aims to communicate science in a way that people can relate and understand. 'People' are in turn valued for their knowledge and experience. Recognition of 'place' aims to strengthen

connections to the land through stewardship. Finally, 'promise' speaks to the program's commitment to setting meaningful expectations and building relationships based on trust.

Organizations Involved

RoC is a collaborative effort led by the Australian River Restoration Centre and Greening Australia. They have several projects running in the Southern Tablelands of the State of New South Wales, including Breadalbane and Goulburn, with others recently completed along the Yass River and Upper Bidgee River, and another called the Southern Linkages project near completion.

Funding flows to the Australian River Restoration Centre, who immediately transfers 80% to Greening Australia who is subcontracted to take care of on-the-ground project delivery.

Each project also engages a unique group of partner organizations. For example, continuation of the Breadalbane project from June 2017 to 2019 will be implemented in partnership with Upper Lachlan Landcare, landholders, Local Land Services, and the community at large. A more substantial project has just begun in the district of Goulburn, and will run from 2016-2025.

Funding Process

RoC Breadalbane pilot was originally funded by the Australian Government's Clean Energy Future Biodiversity Fund created "to maintain ecosystem functions, increase resilience to climate change, and improve carbon storage." This allowed the program to establish strong communications and management systems over its first six years of operation, and also leverage funds for additional projects. The Breadalbane pilot project is now supported by the New South Wales Environmental Trust.

While the new Goulburn Linkages project is just beginning, regional grants will be provided through to 2025, and assessed over the ten-year period to ensure desired outcomes are achieved.

In terms of how funds flow, Greening Australia develops ten-year management agreements with each landholder. Payments are made to landholders for fencing, planting riparian vegetation, livestock watering improvements, etc. A farmer may be paid according to the number of kilometers that are fenced, per the area that is seeded, or for specific practices. Most grants are under $10,000, with landholders expected to share in the cost. Each site and resulting payment is assessed on a case-by-case basis taking into account an initial appraisal, overall conservation goals, and landholder interests. Funds are generally paid up-front to allow landholders to hire contractors as needed. When and where larger amounts are involved, Greening Australia will manage the contracts.

The Australian Minister of Agriculture and Water Resources confirmed in mid-May 2017 that the National Landcare Program of $1 billion remains 'secure.' It is not clear if this is a recycled

announcement, or the fund was in jeopardy. However, given the program focuses on "practical, on-the-ground ways to improve issues like soil health, erosion management and water quality," it is of relevance to landowners (Government of Australia 2017). While RoC is not currently funded by National Landcare, it does partner with Landcare groups and is in a position to explore opportunities to apply for joint funding.

Progress and Evaluation of Outcomes

Before restoration activities begin, site conditions are assessed to determine a baseline. This includes an appraisal of the 'recovery potential' of a site, its existing habitat, wildlife and riparian linkages, and opportunities for carbon sequestration. Cost-benefit analysis (i.e. return on investment) is conducted, and sites with 'high recovery potential' are selected to direct activities to areas that are cost-effective and will benefit most from restoration work.

RoC is just wrapping up their Southern Linkages Project carried out from June 2011 to June 2017. According to their site, they have achieved stated objectives and targets. At project end, there are 72 sites spanning over 887.6 hectares, with 123.3 kilometers of stream fencing installed. Sites focused on biodiverse plantings, regeneration of native species, and control of invasive species.

In terms of aggregated achievements, as of March 2017, RoC's five main projects have engaged 16 partners in the restoration of 103 sites. This includes 995 hectares of revegetated land, the addition of 126,000 plants, 37 kilograms of direct seeding, 145 kilometers of fencing, and 478 hectares of weed control.

Opportunities have been assessed for landholders to claim carbon credits in the future through the Australian Emissions Reduction Fund (ERF). ERF seeks to meet Australia's target to reduce emissions through projects such as regenerating native vegetation. Research incorporated into RoC's model shows biodiverse vegetation has greater potential to sequester carbon. RoC is working on more detailed assessments of carbon storage from its projects. While newly planted vegetation takes time to grow, carbon trading is a future economic benefit for which farmers can receive additional payments, building off the initial RoC investment.

Highlights, Challenges and Lessons Learned

RoC has a solid scientific foundation. The program's ability to build a strong business case was noted as key to getting buy-in from partners and participants. It has further gathered strength from its 5 P framework, together with a three-pronged approach focused on "managing rivers, valuing people, and sharing knowledge."

RoC has engaged more than 500 farmers in the New South Wales' Southern Tablelands. The program notes that 'they do not go into regions unless invited,' directing support to communities that explicitly express interest in the opportunity to strengthen biodiversity and store carbon. Enthusiasm from farmers has encouraged others to follow, with the program now

expanding into more regions.

More research is expected to help RoC better understand how restored area and distances noted above translate into measurable carbon sequestration outcomes.

RoC serves as a model for agri-environmental partnerships prioritizing climate change mitigation, habitat and biodiversity, along with a broader approach that encompasses other environmental, economic and social co-benefits. While the farthest in geography, it is closest in form to ALUS-type projects.

5. Recommendations for DMAF Funding for Green Infrastructure in Rural Context

In Budget 2017, the Federal Government announced a significant and welcomed commitment to climate adaptation with the creation of the $2 billion Disaster Mitigation and Adaptation Fund (DMAF) to invest in built and natural infrastructure needed to deal with climate change. Administered by Infrastructure Canada, DMAF is expected to support communities in improving resilience to extreme weather events. Creating resilient infrastructure requires investment in urban and rural communities, with both public and private landowners engaged and supported.

Much attention has been focused on the need for climate adaptation efforts in urban centres, such as Calgary and Toronto, given the risk to public safety and extensive property damage (and related costs and liability of local government and insurers).

Adaptation is equally critical for rural agricultural communities. From eroded roadways to crop damage, due to drought or flooding, to water quality impairments, due to phosphorus loss from more frequent and intense storm events and snow melts, the impact and cost of climate change to rural communities and agricultural lands is significant. The capacity of agriculture to withstand natural disasters - oscillating from extreme floods to extreme drought - depends on the implementation of water management and retention practices on fields, as well as the strength and connectivity of the natural capital surrounding them.

In order to effectively address both urban and rural/agricultural adaptation, it is recommended that DMAF create separate funding streams to customize criteria and eligibility to circumstances specific to the two environments.

Under the rural/agricultural stream, DMAF could incent rural landowners in improving the resiliency of their land through natural infrastructure, on a cost sharing basis.

Over a large geography, it is important to base investments on an understanding of the watershed and subwatersheds, and to prioritize interventions based on sound science.

Alberta's Watershed and Resiliency Restoration Program (WRRP) serves as an excellent example of this type of approach. Created in response to the extreme flooding that occurred most notably in Calgary, but also across Alberta in July of 2013. WRRP supports NFPOs, stewardship groups, municipalities, and First Nations working on watershed restoration activities together with private landowners. Natural infrastructure projects supported by the program include riparian plantings, wetland creation, river naturalization, water retention improvements, and other conservation-oriented undertakings tailored to specific watershed needs.

As knowledge of watersheds and strong relationships with landowners are essential to understanding the adaptation needs of an area, the rural/agricultural component of DMAF could be administered by NFPOs and/or conservation agencies already working in the area.

Investing in adaptation by watersheds will provide a range of high value ecosystem services with public benefits. While the focus of DMAF is on climate adaptation, co-benefits will include improved water retention, carbon mitigation, water filtration, wildlife habitat, biodiversity, and water security.

NFPOs like ALUS Canada are working with private landowners - including farmers and ranchers - to promote nature-based infrastructure solutions that deliver multiple ecosystem services. Infrastructure funding dedicated to rural adaptation would enable NFPOs to work in partnership with rural communities to achieve disaster mitigation goals alongside other beneficial outcomes.

Infrastructure Canada should dedicate a portion of its Disaster Mitigation and Adaptation Fund to support rural adaptation, with emphasis on agricultural communities implementing green infrastructure, watershed restoration, and beneficial management practices. The funding could be further divided into regional programs in line with current national priority areas such as the Great Lakes and St. Lawrence basin, Lake Winnipeg basin, and Western Watersheds. This funding should support NFPOs, rural municipalities, and partners working with landowners to provide ecosystem services on private land. There should be no prohibition against combining DMAF funding with other matched funds.

Other programs like Rivers of Carbon implemented in New South Wales, Australia, and 'Sustain Our Great Lakes' administered in the United States, are also worth exploring as models dedicated to carbon mitigation and habitat restoration, with the broader co-benefits of adaptation and resilience.

Conclusion

Infrastructure Canada should dedicate a portion of its green infrastructure funds toward NFPOs working in partnership to support rural/agricultural adaptation and watershed restoration on private land.

Funding could be geographically-focused and tailored to specific performance outcomes relevant to priority watersheds across Canada. For example, water retention and carbon sequestration may be of critical interest in Manitoba, while the Great Lakes region could target improvements to water quality, all the while building resilience.

Borrowing from Alberta's WRRP, the overall objective of a dedicated rural/agricultural green infrastructure funding stream could be "to increase the natural ability (of agricultural land) to reduce the intensity, magnitude, duration and effects of flooding and drought through mitigation (and adaptation) measures." Informed by science, and implemented through a participatory approach, the dedicated funding program could further assess climate risks, identify specific areas likely to benefit most, and support natural infrastructure projects that restore connectivity and improve resiliency in rural agricultural communities.

APPENDICES

Appendix A: Observations from Scan of Financing Models

Opportunities

Alternative financing models, including market-based instruments, offer opportunities to:

- **Provide incentives.** Watershed investments, including markets and other conservation incentives, aim to promote agricultural innovation by compensating producers for protecting, conserving and restoring water.

- **Understand value and invest in co-benefits.** Create systems to improve understanding of the value of ecosystem goods and services, and invest in a range of public benefits provided by nature including improved water security, climate adaptation, carbon sequestration, water retention, water filtration, habitat and biodiversity.

- **Manage risk.** Better manage environmental, social and economic risks, as well as cumulative effects, within a watershed. Improve social license to operate.

- **Improve transparency and accountability.** Enable decision makers to identify, prioritize, monitor, and report on environmental outcomes critical to the health of their watershed.

- **Meet regulatory requirements.** Increase options for municipalities and industry to comply with regulations, obtain permit approvals, and seek alternatives for compliance.

- **Achieve cost-effective gains.** Direct limited funds to priority areas where the greatest projected outcomes/improvements can be achieved through agricultural conservation and restoration. Reduce cost of regulatory compliance and built infrastructure.

Issues and Challenges

Financing models also come a number of challenges and concerns:

Scale, Scope, and Administration

- **Geographic boundaries.** Benefits and costs of ecosystem goods and services are highly localized. There is no globally or nationally established platform to finance green infrastructure and agricultural BMPs. Financing models are most often designed to address local (and sometimes basin-wide) water issues. Offsets exchanged within a particular region aim to ensure local benefits. Often programs spread across large geographic areas have higher associated transaction costs and lower participation.

Smaller geographies have proven to be more successful.

- **Delivery units.** In implementing BMPs, the unit of measurement or delivery unit differs across financing models (e.g. by hectare, pounds of pollution). There is no universally accepted unit like in carbon trading (i.e. one tonne CO2 equivalent). This contributes to the challenge of identifying and verifying agricultural conservation efforts.

- **Supply and demand.** Volume of activity varies across models and geographies. Challenges include finding suitable land, addressing accessibility issues on private property, and small number of buyers or sellers. Difficulty translating small scale pilot projects to other areas.

- **Administrative burden and transaction costs.** Administrative costs associated with negotiating and completing new contracts between buyers and sellers (monitoring, enforcement, insurance). High transaction costs negatively impact the volume of trades. Standardization can bring costs down, as can a closed system where a broker manages administrative matters.

Regulatory, Legal and Administrative

- **Policy driving action.** Lack of a strong driver can impede uptake of BMPs and limit the effectiveness of market-based instruments. Enabling policies serve to facilitate incentives and drive voluntary action. Compliance (point source) achieved through voluntary practices (nonpoint source) has shown to achieve cost-effective gains.

- **Continuity.** Many examples speak to the challenge of ensuring long-term sustainability of financing under political change and/or financial instability without enforceable regulatory requirements, strong buy-in from partners, and measurable results.

Performance

- **Uncertainties.** Understanding the benefits of BMPs under different conditions, as well as how they interact in combination, continues to be a challenge. Difficult to determine market price for watershed services. Extended lag times exist where 'legacy phosphorus' lingers in soil, sometimes for long periods of time between implementation and the time when improvements are realized. Requires long-term thinking and adaptive management. Address unknowns through modelling and feasibility studies.

- **Demonstration of co-benefits.** Difficulties experienced in valuing, integrating and articulating multiple environmental, social and economic outcomes for public and specific users (health, adaptation, risk mitigation, biodiversity, water quality, jobs and training). Mix of scientific/technical, social and communication challenges.

- **Verification process.** Challenges encountered in standardizing credit verification and

evaluation processes as outcomes vary according to watershed and community needs. Accounting techniques must evolve to monitor, report on and communicate results, including the range of co-benefits.

Collaboration

- **Trust and participation.** Skepticism within the farming community concerned about future regulatory requirements, data privacy and confidentiality, and lack of early and ongoing consultation. Environmental advocates are concerned that real outcomes may not be realized. Requires engaging community in the development of financing models, creating meaningful partnerships, and highlighting cost-effective gains and outcomes.

Lessons Learned

Elements for success in developing financing models include:

- **Mix of policy drivers and voluntary actions.** Support voluntary approach facilitated by clear regulatory and financial drivers.

- **Participatory approach.** Engage communities in program design, implementation, and evaluation early and during the process.

- **Context-specific.** Tailor financing to local watershed needs. Customizing a program based on a specific watershed plan generates more cost-effective gains.

- **Performance-based.** Prioritize outcomes and co-benefits, and establish concrete targets and monitoring.

- **Risk-informed, evidence-based.** Understand risks and tradeoffs when developing watershed plans. Prioritize focus areas, and select projects designed to meet specific outcomes. Conduct assessment and evaluation based on best available science.

- **Low administrative burden.** Keep programs as simple as possible. Programs implemented by one credible administrator help reduce the burden on participants.

- **Transparent process.** Establish transparency in funding distribution, verification, and communication of results. Aim to adopt a standardized approach.

- **Adaptive management.** Evolve to improve performance over time under changing conditions. Adapt model to reflect lessons learned.

See References section "Sources for Financing Models in General" including Willamette 2015 and 2012; O'Grady 2011; Ecosystem Services & Biodiversity Network 2016; World Resources Institute 2009 and 2017; Chesapeake Bay Commission 2012; Forest Trends 2015/2016; USEPA 2017; McNeil 2013; Smart Prosperity.

Appendix B: Short Versions of Two Select Case Studies

Short Case Study 1: Rivers of Carbon Program in Australia

Description An initiative compensating landholders for carrying out habitat restoration and carbon sequestration activities in New South Wales, Australia.

Purpose To achieve agricultural productivity and biodiversity goals, while providing an opportunity to store carbon, and enabling farmers to claim future carbon credits.

Priority Issue A 'river of carbon' describes the total carbon that can be captured in rivers, riparian habitats and terrestrial systems through plants and soil. The priority is to connect areas of native vegetation to form 'corridors' that store carbon and provide a range of public benefits through ecosystem goods and services.

Desired Outcomes Tag line is "mess it up and slow it down." Built infrastructure is traditionally created to control water and keep it moving, whereas natural green infrastructure is intentionally designed to be diverse and messy to help retain water and carbon. The RoC program invests in revegetating and rehabilitating sites with native species to create a "biodiverse carbon" sink resulting in multiple co-benefits including: climate mitigation and adaptation; enhanced agricultural productivity; habitat for endangered species; and water quality improvements, among other outcomes.

Strategies Restoration strategies include: planting native vegetation, installing fencing, implementing erosion control, and making improvements to livestock watering.

Partners RoC is a collaboration between two non-profit organizations, the Australian River Restoration Centre and Greening Australia. Regional projects also engage a unique group of conservation-focused organizations and the community at large. Funding flows to the Australian River Restoration Centre, who immediately transfers 80% to Greening Australia as a subcontractor responsible for on-the-ground delivery.

Funders The program received an initial six years of funding from the Australian Government's Clean Energy Future Biodiversity Fund created "to maintain ecosystem functions, increase resilience to climate change, and improve carbon storage." This early investment was used to leverage other grants within a year of the program getting underway, and led to five other projects. Funders have since expanded to include New South Wales Environmental Trust, Upper Lachlan Landcare, and State of New South Wales' Local Land Services.

Geography RoC currently has two projects in the Southern Tablelands of New South Wales focused on the communities of Breadalbane and Goulburn. Two others were recently completed along the Yass and Upper Bidgee Rivers. Another called the Southern Linkages project is near completion.

Grant Funding The program began as a pilot initiative in Breadalbane to support farmers that expressed a keen interest in implementing restoration work. The Breadalbane project has been extended to 2019 with support from New South Wales Environmental Trust. While the Goulburn Linkages project just began in 2015, grants

will be provided to landholders through to 2025.

Funding Process Greening Australia develops ten-year management agreements with each landholder. Payments are made according to the number of kilometers fenced or area planted, and/or based on specific restoration strategies. Most grants are under $10,000, with landholders expected to share in the cost. Each site and payment is assessed on a case-by-case basis, considering an initial appraisal as well as overall conservation goals and landholder interests. Funds are generally paid up-front to allow landowners to hire contractors as needed. When larger amounts are involved, the contracts are managed by Greening Australia.

Selection Criteria Before restoration activities get underway, site conditions are assessed to establish a baseline. This includes an appraisal of the 'recovery potential' of a site, its existing habitat, wildlife and riparian linkages, and opportunities for carbon sequestration. Cost-benefit analysis is conducted, and sites with 'high recovery potential' are selected to direct activities to areas that are cost-effective and likely to benefit most from restoration work and carbon storage.

Program Structure The program is guided by a "five P framework" focused on environmental, social and economic factors including: profit, proof, people, place, and promise. 'Profit' is defined by the public economic and social benefits of natural infrastructure such as improved water quality, carbon storage, and recreational opportunities. 'Proof' ensures scientific evidence informs program goals and activities. 'People' are valued for their local knowledge and experience. Recognition of 'place' aims to strengthen connections to the land through stewardship. 'Promise' speaks to a commitment to build relationships based on trust.

Achieved Outcomes RoC has engaged more than 500 farmers. As of March 2017, five RoC projects have involved 16 partners in the restoration of 103 sites. Achievements include 995 hectares of revegetated land, the addition of 126,000 plants, 37 kilograms of direct seeding, 145 kilometers of fencing, and 478 hectares of weed control.

Opportunities have been assessed for landholders to claim carbon credits in the future through the Australian Emissions Reduction Fund (ERF). ERF seeks to meet Australia's target to reduce emissions through projects such as regenerating native vegetation. Research incorporated into RoC's model shows biodiverse vegetation has greater potential to sequester carbon. RoC is working on more detailed assessments of carbon storage from its projects. While newly planted vegetation takes time to grow, carbon trading is a future economic benefit for which farmers can receive additional payments, building off the initial RoC investment.

Lessons Learned RoC serves as a model prioritizing biodiversity and climate change mitigation. The program has a solid scientific foundation, but has also gathered strength in a three-pronged participatory approach of "managing rivers, valuing people, and sharing knowledge." It is structured to encourage on-the-ground action by landholders through investment in green infrastructure that contributes to carbon storage.

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Short Case Study 2: Sustain Our Great Lakes Program

Description A binational public–private partnership supporting habitat restoration within the Great Lakes basin.

Purpose "To sustain, restore, and protect fish, wildlife, and habitat in the basin by leveraging funding, building conservation capacity, and focusing partners and resources on key ecological issues."

Priority Issues From 2006 to 2016, funding priorities were aquatic connectivity, stream/riparian habitat, wetlands, and shoreline habitat. In 2017, green infrastructure was added.

Desired Outcomes Individual projects contribute to habitat improvements as measured in acres or stream feet, and/or hundreds of thousands of gallons of stormwater storage. Co-benefits include ecological services such as water quality improvements, water retention, flood control, nutrient cycling, and carbon sequestration.

Strategies Examples of restoration strategies: naturalizing stream channels, installing instream structures, managing sediment, stabilizing banks, and restoring native plants.

Partners SOGL is administered by U.S. National Fish and Wildlife Foundation (NFWF), in partnership with ArcelorMittal, a steel and mining company, and five U.S. federal government agencies: Environmental Protection Agency (EPA), Fish and Wildlife Service, Forest Service, National Oceanic and Atmospheric Administration, and the Department of Agriculture's Natural Resources Conservation Service.

Funders In 2006, initially supported by a cooperative agreement with the EPA. In 2007, ArcelorMittal, a steel and mining company, joined as a private funding partner with an interest in specific geographic areas. Since 2010-2011, a significant portion of SOGL funds have been provided by the Great Lakes Restoration Initiative (GLRI), confirmed through to the end of fiscal 2017. GLRI funds flow from the EPA to the Fish and Wildlife Service, and then on to the National Fish and Wildlife Foundation on an annual basis as needed for distribution to grantees. Overall, funding is leveraged at a programmatic level (issue-based) across a range of projects over time and geography, as opposed to a project level (site specific). SOGL also relies on matching funds from grantees.

Grant Funding Grants currently range from $50,000 to $1.5 million. In 2016, $5.18 million was granted, with up to $7.8 million expected to be announced in summer 2017. Since program inception in 2006, over 264 grants worth $60 million have been awarded. Grantees have contributed an additional $65 million, bringing the total investment to $125 million.

Funding Process Grantees submit a budget within their proposal outlining projected costs. They are paid for actual costs after submitting disbursement requests for reimbursement

to NFWF administering the funds. Timing of payments is flexible, depending on when costs are incurred as well as the frequency in which grantees chose to submit their requests for reimbursement. Grantees can also receive an advance to cover costs.

Cost Share

Projects with 1:1 match ratio (50% grantee matching) are more likely to be selected. Matching support can be provided in the form of cash, donated materials and services, in-kind staff contributions, and the cost of land acquisition.

Grant Recipients

Eligible recipients include non-profit organizations, state government agencies, tribal governments, municipal/local governments, and educational institutions. SOGL invests in both public and private lands. Where land is acquired, landowners commit to protect/manage the property for conservation purposes in perpetuity.

Geography

All projects are completed within the Great Lakes basin, with the majority awarded in the U.S. In 2017, between $200,000 to $400,000 may be directed to Canadian projects, particularly in western Lake Ontario and along the St. Lawrence River.

Selection Criteria

Project selection is based on merit, focusing on: alignment with program goals and federal/state priorities; ability to build on existing conservation plan; specific performance metrics and monitoring; increased resilience to climate change; benefit to species at risk/of concern; demonstration of long-term sustainability.

Eligible Expenses

Up to 70% of grant must support on-the-ground habitat restoration work, including land protection. Remaining 30% can be spent on planning, design, engineering, monitoring, and outreach. Activities related to advocacy, fundraising, and research are ineligible, as are costs associated with legally mandated projects.

Achieved Outcomes

From 2006-2016, the SOGL program restored 30,573 acres of wetland and associated habitat, 1763 miles of fish passage and aquatic connectivity, 201 miles of stream and riparian habitat, and 4,477 acres of shoreline habitat. From a socio-economic perspective, in the first five years of the program (2006 to 2011), an estimated 270–600 jobs were created, generating $45 million in economic activity.

Lessons Learned

Negotiating initial partnership agreements necessitated finding common ground and building trust among partners. Multiple funding sources offered opportunities to leverage funds and achieve higher return on investment. A notable challenge related to ensuring the timing of grant payments matched that of partnership agreements. Diversity within the partnership provided a range of perspectives and expertise, including scientific knowledge, grant administration, and outreach, which allowed for better decision making, implementation, and communications.

Early in the program, a standard two-year grant period made it difficult for some grantees to plan and implement habitat restoration projects, particularly those designed to generate greater impacts over a longer period. An evaluation of the program recommended a longer project cycle. SOGL now offers the flexibility of three-year projects, and allows for modifications and extensions.

The percentage of funds directed to on-the-ground habitat improvement was initially 90%, but relaxed to 70% to support increased planning/monitoring efforts.

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Appendix C: Other Financing Models Explored During Preliminary Scan

The following are other models explored during initial scan.

Chesapeake Bay Nutrient Trading Program

Chesapeake Bay is the largest estuary in the United States. Excess nutrients from both point and nonpoint sources have caused water quality degradation in the Bay, and the region's population is expected to grow.

Description: The Chesapeake Bay Program is an intergovernmental partnership that has been working to reduce nutrients for over three decades. Directing the program since 1982, the Chesapeake Executive Council is comprised of the governors from each state, the mayor of Washington D.C., United States EPA Administrator, and chairperson of the Chesapeake Bay Commission. The Chesapeake Bay Foundation is an active partner, together with municipalities, agricultural producers, farm and community organizations, and industry players, among others.

In 2001, nutrient trading principles and guidelines were released, and, in 2002, the Chesapeake Bay Water Quality Initiative (WQI) was signed. States within the Chesapeake Bay watershed include: Virginia, Pennsylvania, Maryland, and West Virginia, along with Washington D.C. (five signatories to the original WQI), as well as Delaware and New York. Watershed jurisdictions were encouraged to develop their own voluntary watershed implementation plans (WIPs) to reduce nutrient and sediment loads within the watershed.

As of 2010, the Bay has operated under a TMDL (Total Maximum Daily Load) limit per the *Clean Water Act* that sets the amount of pollutants that can enter a water body, while still meeting water quality standards. National Pollutant Discharge Elimination System (NPDES) permits are issued based on the regulatory TMDL, and help drive the demand for nutrient credits.

Purpose and Desired Outcomes: The overarching goal is to improve water quality through nutrient load reductions. In 2010, the TMDL equated to a 25% reduction in nitrogen, 24% reduction in phosphorus, and 20% reduction of sediment per year. According to the TMDL, all

new or increased growth is to be offset. Farmers are compensated for investing in agricultural BMPs that reduce nutrient loadings. This results in costs savings when compared to the higher unit costs incurred by the wastewater and stormwater sectors to reduce similar loads (World Resources Institute 2017).

State Programs: Several states including **Virginia, Pennsylvania**, **and Maryland** have developed their own voluntary nutrient trading programs. Nutrient credit trading may take place within each major tributary of the basin. Feasibility assessments, progress goals, administration, baseline calculations, participant eligibility, verification, and outcome measurements differ across state programs (Willamette Partnership 2012). Virginia and Pennsylvania have completed nutrient credit transactions. See below for more on state programs.

Ratio: To account for uncertainties, a minimum 2:1 ratio is recommended by the Chesapeake Bay Foundation (i.e. two pounds of nonpoint reductions for every pound of point source pollution), although states determine their own ratios and reserve/retirement percentages to achieve net water quality benefits.

Highlights and Challenges: Chesapeake Bay represents the longest standing nutrient trading initiative in the United States. Overall amount of trading has been low. High transaction costs create significant barriers. There have been calls to harmonize trading program rules and infrastructure across the watershed to facilitate trading. There are certain limitations around monitoring BMP efficiencies given they are based on modelling (i.e. Chesapeake Bay Watershed Model) and not actual outcomes (Willamette Partnership 2012). Greater awareness and engagement in understanding the benefits and design of trading programs is needed to build trust, enhance farmer buy in, and ensure buyers are aware of what credits offer (Willamette Partnership 2012).

Individual States within the Chesapeake Bay Watershed

Virginia Nutrient Credit Exchange Program

- Virginia nutrient credit exchange program based on clear legislative rules. In 2005, program established to manage point sources of nitrogen and phosphorus. In 2012, new legislation enhanced trading rules.
- Permits are issued with load allocations for individual point sources. Municipal utilities either reduce their own loads, engage in credit trading, or pay into Virginia Water Quality Improvement Fund.
- Nonpoint source trading is limited to new or expanding point source facilities looking to offset loads over a "tributary strategy load allocation."
- Practice-based standard requires adoption of specific BMPs (in contrast to performance-based standard in Maryland).
- Only nonpoint source credits available for trading are BMPs that would result in "reductions beyond those already required under tributaries strategies plans."

- 2:1 trading ratio required for nonpoint source credits purchased by point sources. Utilities must meet nutrient removal technology requirements based on location and size of new facility.
- Lack of demand for trades (Stephenson and Shabman 2017).

Pennsylvania Nutrient Credit Trading Program

- Pennsylvania Nutrient Credit Trading (NCT) Program (also known as PENNVEST) allows for market-based incentives to meet water quality goals within the Pennsylvania Chesapeake Bay Tributary Strategy.
- In 2006, NCT program initially based on guidelines. Regulations followed in 2010.
- Program open to those within Susquehanna and Potomac sub-basins seeking new or expanding nutrient loads from wastewater treatment plants. Allows point sources to engage in trading with point sources, nonpoint sources, or third parties.
- Farmers must meet baseline regulatory compliance requirements.
- Trading threshold requires set of BMPs before trading can occur.

Maryland Nutrient Trading Program

Description: Maryland has developed a voluntary nutrient trading program together with online tools to assess baseline compliance and test scenarios. Their system uses a performance-based standard focused on compliance with regulatory requirements. Nonpoint sources of pollution are assessed, and compared to baseline calculations. Data on current year crops, as well as agricultural BMPs adopted, are added to the calculation. A landowner chooses new conservation practices to reduce the nutrient load below the baseline level. The implementation of BMPs is measured as the equivalent to TMDL-based loading rates based on the trading calculator. After credits are approved, a farmer can sell directly to a buyer, or through a third-party broker.

Purpose, desired outcomes: The nutrient trading program is designed to provide an alternative to complying with regulations, and serve as an additional source of revenue. Trading offers the potential to sell at a price that covers implementation costs and, where transaction costs are low, also possibly result in a profit.

Organizations involved: Maryland's Department of Agriculture oversees the program. Implementation of green infrastructure may be carried out by landowners, private developers, neighborhood associations, or government agencies.

Funding, how funds flow: Tradable credits are generated and certified by the Maryland Department of Agriculture, and in theory sold to other parties to pay farmers for implementing conservation practices. Trades can occur between point sources (wastewater treatment plants), point and nonpoint sources (agricultural producers), or nonpoint sources (e.g. agricultural and urban stormwater sites). However, no transactions have occurred.

Progress: Maryland continues to explore nutrient trading options, as the process of moving

forward to trading stalled in March 2017. Maryland wishes to better understand the value of pollution reductions before moving forward (Wood 2017). Under review, 'green infrastructure' projects would be selected by the state based on cost-effectiveness, but not necessarily include agricultural BMPs. In 2015, Maryland began developing a stormwater trading policy, but remains under development (WRI 2017).

Washington D.C. Stormwater Retention Credit Trading Program

Washington D.C. does not have a nutrient credit trading program for agricultural nonpoint sources. However**,** as with many other large urban centers, urban stormwater runoff contributes to erosion and transfers pollutants from impervious surfaces into local water bodies.

Description: In 2013, Washington D.C.'s Department of the Environment and Energy (DOEE) adopted local stormwater regulations and an urban stormwater retention credit (SRC) trading program. DOEE regulations required that major "land-disturbing projects" and "substantial improvement projects" retain the volume of water from 0.8- or 1.2-inch storms (respectively greater than 80 and 90% of all 24-hour storms annually).

Purpose, desired outcomes: The SRC trading program was designed to catalyze urban green infrastructure retrofits, reduce runoff, and improve water quality. Together with an in-lieu fee, the trading program allows for private trading to meet ongoing annual water retention requirements, and collects revenue to fund additional green infrastructure. The program aims to provide flexibility to regulated sites while saving overall costs. It also targets implementation of green infrastructure in areas outside downtown Washington D.C. (not including agricultural BMPs).

Organizations involved: DOEE certifies the credits, and collects in-lieu fees.

Funding, how funds flow: Only properties in Washington D.C. can generate SRCs and use them to meet water retention requirements. After 50% of a property's 'stormwater retention volume' is retained onsite, SRCs can be purchased from another site, or an in-lieu fee is paid. Credits are generated by exceeding the requirement, or voluntarily implementing green infrastructure.

Evaluation of outcomes: While an SRC is valid for one year, projects are certified for up to three years to encourage ongoing maintenance. Eligible projects are inspected, and must show they can be maintained over the certification period. One SRC equals one gallon of runoff retention per year. The in-lieu fee follows the same ratio.

Other programs: SRC trading program complements DOEE's other financial incentive programs offering incentives to install green infrastructure on a voluntary basis, including RiverSmart Rewards Programs and in-lieu fees.

- **RiverSmart Rewards Programs** help property owners install rain barrels, green roofs, rain gardens, permeable pavers, shade trees, etc. A site evaluation and up-front funding

is provided in some programs, while others offer a rebate or discount.

- **In-lieu fees:** Instead of buying and using SRCs, sites can pay an in-lieu fee at a rate of $3.57 per gallon per year of required off-site retention. These are paid into DOEE's special purpose revenue fund to fund other green infrastructure.

Progress: In April 2014, the first SRCs were certified by DOEE, and in September 2014 the first trade was made. In May 2016, Washington DOEE announced $12.75 million to incentivize cost-effective green infrastructure, of which $11.5 million is for SRC purchases, and $500,000 to identify cost-effective green infrastructure sites. This model is relevant to areas that adopt a stormwater charge, and decide to allow for credit trading as a compliance cost saving measure. It does not involve agricultural nonpoint source exchange.

Ohio River Basin Water Quality Trading Project (Interstate)

The Ohio River Basin stretches across 14 states representing over 5 percent of the United States, eventually flowing into the Mississippi River.

Description: The Ohio River Basin Water Quality Trading Project is a voluntary program designed to achieve water quality improvements by enabling the trade of nutrient pollution credits. Point sources of nitrogen and phosphorus looking to meet regulatory requirements can buy credits either from nonpoint or point sources.

The project area covers eight of the Basin's states: Illinois, Indiana, Kentucky, Virginia, Ohio, Pennsylvania, Tennessee, and West Virginia. In 2012, Ohio, Indiana and Kentucky signed an interstate pilot trading plan to initiate trading. During the pilot project conducted from 2012 to 2015, the project focused on nonpoint source credits.

Purpose, desired outcomes: Credit holders generate revenue from selling credits. Permitted dischargers have greater flexibility in meeting permit requirements, at an overall lower cost. The business case includes advancing corporate or municipal sustainability goals, addressing water quality risks, and gaining experience with the pilot ahead of compliance requirements.

Credits can "bundle" outcomes including nitrogen and phosphorus reductions, as well as other ecosystem benefits such as improved soil health, habitat restoration, greenhouse gas emission reductions, and economic support for farmers.

Organizations involved: Electric Power Research Institute (EPRI) administers the program and transfer of credits. Industry and municipal utilities, state governments (Ohio, Indiana, Kentucky), and United States Department of Agriculture and Environmental Protection Agency are key players. American Farmland Trust seeks to ensure the project engages with farmers.

Funding, flow of funds: In March 2014 the first voluntary, verified stewardship credits for water

nutrients were transferred. American Electric Power, Duke Energy and Hoosier Energy were the first to buy credits. A "stewardship credit" represents a verified amount of reduced pollution. Prices include the cost of BMPs, project management and other administrative costs, as well as project risk in the form of credits set aside to account for non-performing BMPs and modelling uncertainties.

Progress, evaluation of measured outcomes: A science-based equation is used to determine location-specific nutrient reductions, as opposed to an overarching trading ratio across the Basin. One credit is generated for every pound of total nitrogen or total phosphorus prevented from discharging in a year. Stackable credits have been explored, where more than one credit is provided for a practice (phosphorus credit, carbon credit, etc.).

Verification involves modelling to determine credits associated with specific farm and watershed conditions on a transaction-by-transaction basis, rather than the implementation of BMPs (EPRI 2014). During the pilot period, trades were expected to result in nutrient reductions of 150,000 pounds of total nitrogen and total phosphorus reductions (Fox 2015).

Highlights and challenges: The Ohio River Basin trading project is relatively new. However, according to EPRI, there is potential to scale up the project to cover eight states, thousands of municipal wastewater utilities, and engage a greater number of the 230,000 farmers in the region (EPRI 2012). While extensive water quality monitoring is cost prohibitive in a large watershed, the pilot based nutrient reductions calculations on modelling, which comes with some uncertainty in actual outcomes achieved.

Australia Water Markets and Investment Funds

Murray-Darling Basin Water Markets

Approximately one-third of Australia's food production occurs in the Murray-Darling Basin, generating nearly half of the country's agricultural revenue (TNC 2016). Within the Basin, farmers have relied heavily on irrigation. Australia experienced a major drought from 1997 to 2009, and land use practices were putting increasing demands on a limited, highly variable supply of water. Water market reforms were developed to optimize use and productivity. As a result, several water trading markets were established in the southern and northern parts of the Basin.

Background on system of rights and markets: Within the system of water rights management in Australia, the amount of water allocated to a right is determined by the availability of water over a given year. When it is a wet year, the holder of a water right receives a greater percentage of their total right, and less in a dry year. This is slightly different from western Canada (Alberta, British Columbia, Manitoba) and western United States where water rights are based on prior allocation, i.e. first-in-time-first-in-use. The riparian rights system in Ontario is markedly different.

Description: Water markets within the Murray-Darling Basin use a 'cap and trade' system, where the cap is the "total pool of water available for consumptive use". Australia's available water is distributed to users via an extensive distribution system including channels, pipes, weirs, and storage options responsible for transporting or storing water as needed.

Purpose, desired outcomes: The purpose of Murray-Darling Basin's water markets is to allow water to flow where it can be used efficiently and productively. Trading of water rights allows "irrigators to source water from a broad range of users, and develop different water management options."

Funding, flow of funds, and flow of water: Water users decide whether to keep, buy or sell water rights. The price differs depending on the region, type of right, and timing (season/water security conditions) of the trade. Administered by Basin states, the system involves trading two types of rights: permanent rights called entitlements (i.e. rights to ongoing share of total water available); and temporary rights called seasonal allocations (i.e. rights based on actual amount of water available in a season). Throughout the seasons, water is allocated against entitlements, with available water distributed to water users as right holders. Governments or nonprofit organizations may also act in the public interest to "buyback" water rights to ensure environmental flow.

Organizations involved: The Murray–Darling Basin Authority (MDBA) oversees water resource planning across the Basin, and enforces the Basin Plan's water trading rules. Basin states are responsible for "determining water allocations, developing policies and procedures for trade, monitoring water use, (setting) rules for sharing water between users and the environment, and trade applications and approvals" (MDBA 2017). States also have their own rules regulating trades. Additional rules around pricing practices are monitored and enforced by the Australian Competition and Consumer Commission. The water rights market system also involves over 1000 stakeholders, including: conservation, recreation and community groups; advisory committees; local governments; Aboriginal peoples; industry and academia, among others.

Progress, evaluation of measured outcomes: Since the early 2000s, Basin states have been able to trade water "across boundaries and between valleys." Prior to 2006, few large trades were made, but by 2008-2009 trading in the Murray-Darling Basin had increased significantly (TNC 2016), with more than 95% of all trades in Australia occurring in the Basin (MDBA May 2016).

A Basin Plan for the Murray-Darling region was released in 2012, and, in 2014, water trading rules within the Plan provided a framework to trade surface and groundwater rights. This included approvals, trading restrictions, as well as improved measurement and reporting of outcomes. According to MDBA's 2015-2016 Annual Report, over 2,250 gigalitres (GL) of environmental water was delivered to annual priorities, providing opportunities for water reuse, relief from drought, and other multiple benefits (MDBA 2016).

Highlights and challenges: The Murray-Darling was one of the more advanced water rights (quantity) trading programs. Unfortunately, the program has been rolled back in recent years under a new government, in part due to real and perceived social and economic impacts (particularly in the northern region) around holding water back for the environment. In 2012, a decision was made to prioritize direct infrastructure investments over the instream buyback strategy to revive rivers. In March 2017, an agreement between Basin state ministers ruled out further direct water buybacks under the Plan. The debate continues given buybacks strive to serve the public interest, and have largely proven to be effective. A full socio-economic review expected by the end of 2017.

Challenges speak to the critical role of political leadership, local engagement, and attention paid to economic and social impacts and equity issues when designing and implementing programs. Further lessons point to the need for effective tracking and control of water use, timely information about pricing that incorporates water security risks, as well as integration of groundwater and surface water management (Pacific Institute 2015; Young 2010; Grafton and Horne 2014).

Other Australian Examples

Murray-Darling Balanced Water Fund

The **Murray-Darling Basin Balanced Water Fund** (the fund) was established by The Nature Conservancy in 2015 as the first water investment fund seeking to balance environmental, agricultural, social, and financial outcomes in Australia (Impact Investing Australia 2015). The purpose is to allow investors "to secure water for agriculture, realize a financial return, and restore threatened wetlands through a single investment." Administered by water fund manager Kilter Rural, the fund invests in "water entitlements" that can be bought, sold, or leased to offer access to a share of water. Financial returns are provided via annual leasing of water entitlements, trading of water allocations (volume allocated to a water entitlement), or the fund's overall asset portfolio. Most of the temporary allocations are sold or leased back to the agricultural community by the fund annually, ensuring the environment uses the remainder, such as water returned to wetlands.

Water Sharing Investment Partnerships in General

The Nature Conservancy developed a new investment tool called 'Water Sharing Investment Partnerships' (WSIPs) "to ease water scarcity in stressed regions while also conserving and restoring water ecosystems." WSIPs seek investor capital to acquire water rights that are leased or sold via a water rights market, providing financial returns and addressing water security risks. Rather than an outright purchase of a water right, WSIPs can involve collaborative efforts with landowners to encourage water conservation measures. Australia's Balanced Water Fund above is an example of a WSIP (Ecosystem Marketplace 2016, The Nature Conservancy 2016).

Appendix D: Organizations

National

- ALUS Canada
- Ducks Unlimited Canada (DUC)
- The Nature Conservancy of Canada (NCC)
- Natural Capital Lab, The Natural Step
- Delta Waterfowl
- National Farmers Union
- Christian Farmers
- George Morris Centre
- Smart Prosperity Institute (formerly Sustainable Prosperity)
- Federation of Canadian Municipalities (FCM)
- Government of Canada: Infrastructure Canada, Agriculture and Agri-Food Canada, Environment and Climate Change Canada

Alberta

- Ecosystem Services and Biodiversity Network https://ecoservicesnetwork.ca/about/ Multidisciplinary group working to build knowledge and capacity required to implement ecosystem services and biodiversity markets in Alberta. Focused on market-based conservation finance approaches. Members include:
    - Alberta Innovates (Bio Solutions/Technology Futures)
    - Alberta Biodiversity Monitoring Institute (ecosystem service assessment)
    - Silvacom
    - Land Stewardship Centre
    - Government of Alberta: Alberta Environment and Parks, Alberta Agriculture and Forestry
- Alberta Association for Conservation Offsets: www.aaco.ca (supports design, development and implementation of credible, transparent, and outcome-based system of conservation offsets that considers the needs of environment and people, while allowing for flexible business solutions)
- MULTISAR (Multiple Species at Risk) partners with landowners to conserve grasslands species at risk. http://multisar.ca/ Article: link
- North Saskatchewan Watershed Alliance (NSWA), Mary-Ellen Shain / Headwaters Alliance
- Alberta Conservation Association
- Alberta Wilderness Association
- Cows and Fish
- Alberta Data Partnership
- Legacy Land Trust, Western Sky Land Trust, Legacy Land Trust
- Miistakis Institute
- Alberta Environmental Law Centre (ELC)

Manitoba

- International Institute for Sustainable Development – Hank Venema and Jane McDonald

- Manitoba Habitat Heritage Corporation - Tim Sopuck
- Lake Winnipeg Foundation
- Manitoba Conservation District Association http://www.mcda.ca/

Ontario

- Ducks Unlimited Ontario
- Conservation Ontario, individual Conservation Authorities
- Ontario Federation of Anglers and Hunters
- Ontario Network on Ecosystem Services (Eric Miller) http://www.onecosystemservices.ca/
- Environmental Defence
- Green Infrastructure Ontario
- Ontario Government Ministries: Agriculture, Food and Rural Affairs; Environment and Climate Change; Municipal Affairs; Transportation
- Ontario Crop and Soil Improvement Association (GF2 applications from producers)
    - Administers Great Lakes Agricultural Stewardship Initiative (GLASI)
- Agricultural Adaptation Council (GF2 applications from organizations and producers)

United States

- Conservation Finance Network: www.conservationfinancenetwork.org
- Willamette Partnership: http://willamettepartnership.org/
    - Toolkit on water quality credits, nutrient tracking tool link
    - Bobby Cochran, Executive Director
- National Network on Water Quality Trading: http://nnwqt.org/ (project of Willamette Partnership involved in developing programs that aim to restore waters).
- Environmental Trading Network: http://www.envtn.org/ (clearinghouse for water quality trading and environmental markets. Shares technical info, key policy and regulatory issues, design elements).
- Environmental Finance Centre: green infrastructure programming link
- Environmental Defense Fund
- SNAPP Compensatory Conservation Working Group http://snappartnership.net/groups/compensatory-conservation/ influencing development of compensation policy and guidance, e.g. biodiversity offsets and no net loss policies.
- United States Department of Agriculture (USDA)
    - Natural Resources Conservation Service programs via Farm Services Agency link
    - Environmental Quality Incentives Program link
    - Agricultural Management Assistance Program link
    - Conservation Stewardship Program link
    - Conservation Reserves Program link
    - Farmable Wetlands Program link
    - CLEAR (Clean Lakes, Estuaries and Rivers) Tool assists landowners in creating buffers
- United States Environmental Protection Agency
    - Green Infrastructure Collaborative link

    - Greenstream webinar "Innovative Financing for Green Infrastructure" 2014 link
    - Nutrient Scientific Technical Exchange Partnership and Support Program (N-STEPS)
- The Freshwater Trust
- American Farmland Trust (AMF)
- National Association of Conservation Districts
- Chesapeake Bay Foundation http://www.cbf.org Also Chesapeake Bay Commission
- Electric Power Research Institute (Ohio River Basin Trading Project)

International

- Ecosystem Marketplace, Forest Trends, Alliance for Green Infrastructure
    - Watershed Connect: map of water trading programs www.watershedconnect.org/programs2016/
    - Business and Biodiversity Offset Programme http://bbop.forest-trends.org/
- The Nature Conservancy
- World Resources Institute (WRI)
    - Todd Gartner, Senior Associate Manager, Natural Infrastructure for Water
- Nature Serve http://www.natureserve.org/ (conservation/stewardship network)
- IUCN
- Wildlife Conservation Society
- The Biodiversity Consultancy

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