

SUSTAINABLE LAND CARE STANDARD

GUIDE FOR PRACTICAL IMPLEMENTATION

Version 1.0; August 2023

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TERRITORIAL ACKNOWLEDGEMENT

The University of Waterloo acknowledges that much of our work takes place on the traditional territory of the Neutral, Anishinaabeg, and Haudenosaunee peoples. Our main campus is situated on the Haldimand Tract, the land granted to the Six Nations that includes six miles on each side of the Grand River. Our active work toward reconciliation takes place across our campuses through research, learning, teaching, and community building, and is centralized within the Office of Indigenous Relations.

LAND ACKNOWLEDGEMENT

In addition, Waterloo recognizes that the lands on which it operates and the ecosystems across campus are incredibly important parts of both Indigenous spirituality and the broader ecological and social wellbeing of the local community. The University has a responsibility to act as a steward of these lands and the vibrant webs of creatures inhabiting them, and to build a relationship of reciprocity in its ongoing management of natural spaces across campus.

To these ends, implementation of this standard is intended to make significant strides to support thriving local ecosystems. Waterloo has begun to build relationships with local Indigenous communities and to create mechanisms and processes for respectful and appropriate engagement and consultations more broadly. As those relationships develop, it will be important to connect those into the University's approach to land management. This can be in the form of consultations around land use changes, as well as deeper integration of Indigenous traditional knowledge of stewardship and reciprocal care of the natural world.

Time and effort are needed to nurture those relationships, but in review of best practice and external frameworks, there is significant action that can be taken now, as articulated in this standard.

The standard is certainly only a first step. The continuous improvement process in the standard will make it a living document, and that the intent is to build this stronger connection on consultation and traditional knowledge with Indigenous communities over time, as appropriate.

TERMS AND ACRONYMS

AFIWs – Affiliated and Federated Institutions of Waterloo – Conrad Grebel University College, Renison University College, St. Jerome’s University, and United College. These are on University property but are partially separately managed.

Invasive Species – an organism that is introduced to a new environment, can rapidly spread, and outcompete native species

Managed Area – areas that are mowed or require regular maintenance (i.e., lawns, garden beds, etc.)

Natural Area – areas that are vegetated and do not require regular maintenance (i.e., woodlots, streambanks, etc.)

Semi-natural Area – areas that have vegetation, though require some maintenance (i.e., areas with trees but are still mowed, etc.)

SOPs – Standard Operating Procedures, refers to official processes for how work should be completed, and which guide day-to-day and regular actions. These are integrated at the department level and provide the most granular level of detail on work duties and processes.

R&T Park – David Johnston Research and Technology Park, refers to the space north of Columbia Street that is leased to tenant developers and companies and is separately managed.

INTRODUCTION

BACKGROUND

University of Waterloo owns over 1,200 acres of property, with a mix of built, managed, semi-natural, and natural areas. These grounds support the University's core mission, creating spaces for learning and for research, for living and for community gathering, for relaxation and recreation, and for competition and collaboration.

Over time, Waterloo's physical landscape has transformed from that of an open suburban campus surrounded by farm fields, to a much denser urban form. Fields were replaced in many areas with parking lots, green spaces with buildings. Waterloo's 2009 Campus Master Plan recognized this, and featured key principles and directions meant to prioritize green spaces and protect the natural environment. These directions built on a legacy of initiatives such as phasing out chemical pesticides in broad application, creating a native species planting list, and naturalizing the Laurel Creek corridor.

Since the creation of the Campus Master Plan, there has continued to be increasing demand across society for sustainability action, including on campus. Climate change, biodiversity collapse, and pollution are creating escalating crises with both environmental and human impacts. Waterloo's Environmental Sustainability Strategy creates a framework for the campus' response, across many dimensions.

Integrating sustainability requirements into the design and management of outdoor spaces is an important part of this response. Waterloo is a steward of many parts of the local community's ecological heritage, including the 270 acre Environmental Reserve and the Laurel Creek corridor. It hosts a range of terrestrial and aquatic habitats for many species, from pollinators to fish, mammals to migratory birds. Its management practices create impacts beyond the campus borders, including groundwater pollution and air pollution. And Waterloo's students, employees, and community partners have expectations of leadership and responsibility in maintaining high-quality, sustainable spaces.

ABOUT THE STANDARD

The Sustainable Landscaping Standard will provide a guiding framework for how the University of Waterloo's grounds and natural areas are developed and maintained over time.

It adds more detail to the directions articulated in the Campus Master Plan and in the Environmental Sustainability Strategy, with a focus on implementation and continuous improvement. In addition, it standardizes and builds consistency around current ad-hoc or informal efforts, while drawing in best practices from other institutions and third-party standards.

The Standard is meant to be a living document, improving over time as the campus evolves and as sustainability actions mature. It is designed modularly, such that specific elements can be integrated into standard operating procedures, policies, planning processes, or projects as needed, while still providing a coordinated view of the breadth of action and approach.

This document includes seven focus areas, with multiple actions under each area.



1. Soil and vegetation



2. Fertilizers and pesticides



3. Biodiversity



4. Water management



5. Snow and ice management



6. Equipment



7. Stakeholder engagement

Each focus area has a detailed list of actions which contain information to reflect on the action’s purpose, description, criteria, monitoring, and additional resources. A summary of all actions within the Standard can be found in Appendix A.

SCOPE

Unless otherwise indicated, this document should be interpreted as being applicable for all lands directly managed by the University of Waterloo. This includes the South, East, North, Northwest, Kitchener, Cambridge, and Stratford campuses, as well as other satellite facilities.

It excludes some sites that are within the University’s landholdings but have separate management practices, including the AFIWs, R&T Park areas managed by tenants and developers, and private developments on the Northwest Campus.

In this version of the Sustainable Landscaping Standard, the focus is on the outdoor environment and green spaces. It does not include design or management of building-connected natural spaces, such as green roofs and/or rooftop gardens, nor does it include construction requirements (for example on site disturbances and soil remediation/preservation) which are integrated into other sustainable landscaping design frameworks (i.e. The Sustainable SITES Initiative and scoring framework).

Some actions may affect landscape design requirements around new buildings that are planned.

1. SOIL AND VEGETATION

1.A. FOLLOW THE SPECIES PLANTING LIST FOR ALL NEW PLANTINGS

PURPOSE:

Utilizing native species when planting is an important strategy to preserve local ecology, restore ecosystem services, and support biodiversity. Native species can help reduce maintenance needs, as they are typically already suited to local climatic and geographical conditions, they provide appropriate food and habitat for local wildlife, and they minimize the risk of being invasive among other local species. Edible native species can potentially help address food insecurity on campus. However, changes in climatic conditions on campus that have already occurred and are expected to occur in the coming decades, may mean that plant species once well-adapted to the local area have a harder time surviving. Periods of prolonged drought, for example, may be equally challenging for some native species, but drought-tolerant or resistant plants can reduce long-term maintenance and water needs, saving time and money.

Integrating a balanced approach between native and ecologically-appropriate species can ensure that plants on campus are well-suited to the campus environment, while also not disturbing other local ecologies and providing suitable habitats for local wildlife.

DESCRIPTION OF ACTION:

Waterloo will develop and maintain a Species Planting List that includes grasses, trees, shrubs, wildflowers, and other foliage that are native and/or ecologically appropriate for use on the University campus. All plants and trees introduced to the campus will conform to this list wherever possible. When there are other species introduced which are not on the Species Planting List, these species must be non-invasive, and documentation will be retained as to why the non-native species needed to be introduced, prior to being planted.

The Species Planting List will also indicate which varieties of plants are drought-tolerant, and these species should be used whenever possible. Waterloo already has examples on Environment-3's [Green Roof](#), the [Naturalized Gardens](#) and the [Woodland Fern Garden](#).

CRITERIA:

- The Species Planting List will be publicly available online
- Exceptions are permissible for annual plantings in flowerpots and planters, though preference should still be given to native wildflowers where possible to support native wildlife
- Buying guides, contracts, and other SOPs should reference the Native Species list

MONITORING:

Grounds Services will sign off annually that, for the year prior, introduced species followed the Species Planting List, and provide the documentation for any non-native species introduced.

STUDENT ENGAGEMENT:

This action presents strong opportunity to engage students and faculty in the creation and/or updating of the Species Planting List.

RESOURCES:

- University of Waterloo Species Planting List (TBD)
- [Database of Vascular Plants of Canada](#)
- [Ontario Native Wildflowers](#)
- Native alternatives to [Invasive Plants in Ontario](#)
- Credit Valley Conservation's [Guide to Native Plant Nurseries and Seed Suppliers](#)
- [Ontario Tree Atlas](#) and Evergreen's [CanPlant](#) native tree database
- Southern Ontario [Tree Seed Zone Atlas](#)
- [Where to find native plants in Ontario](#), including plant growers and sellers
- Drought-tolerant native species list by [Guelph Healthy Landscapes](#) and [Canadale Garden Centre](#)
- List of (mainly) [native shade trees](#) in Waterloo and their drought tolerance among other growing factors – introduced species are noted on the guide
- [Climate change projections in Waterloo Region](#) from Waterloo's Interdisciplinary Centre on Climate Change
- [Climate change and the tree canopy of Waterloo Region](#) and associated [list of tree species](#) includes a description of the vulnerability of local trees to projected climate change impacts and tree selection criteria such as native status, drought tolerance, allergen scores, mature size and other factors.

1.B. MEASURE SOIL QUALITY

PURPOSE:

Soil quality is an important indicator of ecological health. It helps measure soil organic matter, compaction, nutrients, and pollutants. Measuring campus soil quality can establish a baseline to monitor change over time. For instance, these measurements help to determine the impacts of construction and/or salt on campus soil, or whether soil restoration and preservation efforts are working.

DESCRIPTION:

The campus resides on the Salina Formation of bedrock, characterized by grey and red shale, grey-brown dolomite, minor limestone, salt, anhydrite and gypsum (Ontario Division of Mines, 1972). The dominant form of soil on campus is Luvisolic which is underlain by loamy tills derived from underlying sedimentary rocks or on clayey lacustrine deposits (OMAFRA, n.d.).

An effective soil monitoring program can establish several monitoring points across the campus, and, in reflection of Gustafson et al.'s (2009) landscaping guidelines, should include five categories to consider when evaluating soil health:

1. Organic matter
2. Compaction
3. Infiltration rates
4. Biologic function
5. Chemical characteristics

In addition, the minimum basic profile to be tested during restoration of soil chemical characteristics for plant growth include:

- pH*
- Soluble salts (electrical conductivity)
- Cation exchange capacity*
- Extractable phosphorus*
- Potassium*
- Calcium*
- Magnesium*

*Should be comparable to the original undisturbed soil or site's reference soil; salinity must be regionally appropriate for plant species.

CRITERIA:

- A program and protocol are established to measure soil quality at designated points across the campus
- Monitored data and observed findings are available to relevant University staff

MONITORING:

The Sustainability Office and Grounds Services will sign off annually to confirm that the monitoring program is in place.

STUDENT ENGAGEMENT:

This project presents many opportunities for integration in teaching and research activities.

RESOURCES:

- Gustafson et al. (2009). [Sustainability How-To Guide: Sustainable Landscaping. International Facility Management Association \(IFMA\)](#)
- Ontario Division of Mines (1972) Ontario Geological Report No.105: [Paleozoic Geology of Southern Ontario](#)
- OMAFRA Soils of Canada [interactive map](#)
- OMAFRA [Soil Management, Fertilizer Use, Crop Nutrition and Cover Crops for Fruit Production](#) guidelines

1.C. RE-USE LEAVES, CLIPPINGS, AND MULCH ON SITE WHEREVER POSSIBLE

PURPOSE:

Reusing pre-existing materials from the campus reduces waste from campus operations, replenishes natural nutrient cycles, and reduces the need of additional synthetic chemicals for fertilization.

DESCRIPTION:

Regular and annual maintenance activities across the grounds of the campus can generate significant amounts of residual organic matter, such as grass clippings, leaves, and brush/twigs/wood etc. Waterloo has a long history of reusing these materials wherever possible.

Going forward, the University will:

- Leave mulched grass and leaves to compost in-situ on all lawns

- Collect leaves from parking lots, walkways, and other areas as required and bring them to the designated compost pile
- Collect woody brush as required and bring it to the North Campus to be turned into wood chips and used on top of gardens or other areas on campus as appropriate
- Ensure invasive and/or noxious plant species are not spread from these activities

If no beneficial use for these materials is possible, then they can be processed through Waterloo’s waste hauler for removal.

CRITERIA:

- SOPs are updated to reflect the practices above, and a tracking process is in place to calculate material which is processed on-site as organic material, or which is taken from a third-party hauler.

MONITORING:

Grounds Services will sign off annually that the SOPs reflect the above standard. In addition, an estimated number of truckloads of processed leaves/clippings/mulch brought to the compost pile shall be provided. The Sustainability Office will collect from the University’s waste hauler additional data on all material taken off-site.

RESOURCES:

- [Top Do’s and Don’ts of Mulching](#)
- [Keep your leaves](#) – tips from the City of Guelph
- Home Depot’s [Guide to Mulching](#)
- Trees Are Good – [Proper Mulching Techniques](#)
- USDA – [Mulching](#)
- USDA NRCS Conversation Practice Standard – [Mulching \(Code 484\)](#)

1.D. SUPPORT STRONG TURF DEVELOPMENT IN LAWN-CARE PRACTICES

PURPOSE:

Ongoing mowing and other management of turf grass is important to maintain healthy and resilient lawns across the University. When done properly, cutting grass can stimulate healthy root growth, seed dispersal, nutrient cycling, water retention, soil quality improvements, and control weeds, all while creating green and inviting spaces for many purposes across campus. Improper mowing, however, can lead to scalping, increased stress on the grass leading to die-off, introduction of weeds, shallower roots with associated susceptibility to drought, and excessive maintenance needs all while diminishing the aesthetic of the University.

DESCRIPTION:

The University will ensure its mowing schedules, equipment, and planning align with best practices, including but not limited to:

1. **Calibrating mowers** – This can vary between different species of grass, but for cold-climate grasses common to Ontario, this is typically 3”+ during spring and summer, and

slightly lower (2.5”) in the fall. Grass heights can be kept longer during periods of drought to keep shade on the soil and retain water. Keeping blades sharp also reduces the stress on the grass.

2. **Optimizing schedules** – During regular weather, setting a mowing schedule that limits the amount of cut grass to generally around 1/3 of the total grass height. This limits the shock to the plant if the grass is too tall, while stimulating growth and not cutting too frequently.
3. **Avoiding extremes** – To prevent damage to the grass, avoid mowing during periods of extreme heat with low precipitation. If the grass is becoming dormant or not growing, it should not be cut to maximize water retention. Similarly, avoid cutting during frost periods to prevent damage to the cell structure of the grass.
4. **Aerate as appropriate** – Lawns with low foot traffic and limited compaction can be aerated every 2-3 years, while lawns with heavy use can be done yearly or even twice per year. Aeration should be done in spring or fall to avoid root damage during hotter months.
5. **Dethatch as appropriate** – Removing excessive thatch, either by mechanically breaking it up or adding top-dressing of soil to introduce microorganisms, can help ensure water penetration to the soil, as well as healthy root development. Dethatching should be done in spring or fall.

CRITERIA:

- SOPs are adjusted to reflect the above principles and best practices

MONITORING:

- Grounds Services will sign off annually that practices are in effect.

RESOURCES:

- [Lawn Establishment](#), from OMAFRA
- [Turf in Ontario](#), from OMAFRA
- [How to maintain a healthy lawn](#), from Landscape Ontario
- [Healthy Lawns](#), Government of Canada

1.E. IDENTIFY PRIORITY AREAS FOR NATURALIZATION

PURPOSE:

Natural and semi-natural areas are important to build out a range of habitats to increase biodiversity on and around campus, and can improve soil quality and drainage, and limit maintenance needs when compared to the regular cutting and nutrient management of turf grass, in the long run. They are also important spaces for campus aesthetics, for mental health, wellness, and for community activities.

DESCRIPTION:

Waterloo has a mix of managed, semi-natural, and natural areas across the campus, and effort has been made to re-naturalize areas that were historically mostly turf. Examples include Dorney Garden around EV1, the Arts-Environment Gardens, and the land adjacent to Laurel Creek.

Additional opportunities should be integrated within long-term planning, for implementation as opportunities arise. This can include:

- Areas which are rarely used, to reduce maintenance needs
- Sloped areas that can be difficult to maintain
- Border areas or irregularly shaped areas at the edge of frequently used green spaces
- Transitions between different types of areas, for example between aquatic and land areas
- Borders of open green spaces that are frequently used, to improve aesthetics and improve access to nature

Naturalized areas could include woodland and meadows or open areas with wildflowers and prairie grasses, which are reasonably close to ecosystems without human interference. These spaces typically are left to flourish independent of significant maintenance and management, except where necessary. Semi-natural areas may include areas with more diversity of species, such as shrubs, gardens, groundcover, etc., but that have ongoing management, such as for pruning, clipping, weeding, etc.

CRITERIA:

- Opportunity areas for naturalization projects are identified.

MONITORING:

Grounds Services will sign off annually on the priority areas being developed, as well as any naturalization projects which have been undertaken in the past year.

STUDENT ENGAGEMENT:

This action presents an ideal opportunity for students to identify appropriate sites for naturalization, species selection based on site needs, planting/rehabilitation where appropriate, and long-term monitoring.

RESOURCES:

- Evergreen: [Urban Naturalization in Canada: A Policy and Program Guidebook](#)
- City of Calgary [Naturalization Guidelines](#)

1.F. DEVELOP CRITERIA FOR FOOD GARDEN PLOTS

PURPOSE:

Campus food gardens are of increasing interest for many students and employees and can serve multiple benefits. Native and seasonal food crops can aid local biodiversity, and they help members of the community connect to nature in a meaningful way, with physical and mental health benefits. To do so, however, food gardens should also have a flexible framework to ensure they operate properly, that there are sustainable, long-term care and maintenance plans with accountability, they do not cause unintended burden on operational staff, and that they are in appropriate locations.

DESCRIPTION:

Waterloo has several food gardens on its North Campus, next to the Columbia Lake greenhouse. These have been operating for many years, through a number of different student, employee, and community groups. The gardens are distant from the heart of the campus, limiting ease of access. Several student and employee groups have proposed gardens more proximate to the main campus, but in the past, these have been rejected due to a mix of location, accountability, and logistics.

To empower development of plots in the future, a set of approval criteria and an approval process should be developed to enable flexible but consistent decision-making as requests for garden plots are brought forward. This could include the following:

1. **Site Location:** Selection of appropriate sites is important for garden success. Ideally, a few pre-approved locations should be identified. For these locations, and any subsequent areas requested, the following should be considered:
 - a. The area is on mostly flat ground, accessible, well-drained, has full sun exposure, and has space for accessible raised beds;
 - b. The area is not utilized for other purposes, including recreation, academics, events, or other common activities;
 - c. The area does not inhibit access to buildings or other operations (i.e. snow clearing, grounds maintenance);
 - d. If the area is next to a building, the primary space owner (i.e. faculty, ASU, etc.) is consulted and approves the use of space;
 - e. Access to outdoor services such as a water line/hose;
 - f. Ability to store tools nearby.
2. **Accountability:** To ensure that there is accountability, the University should request that:
 - a. Specific plots will be assigned to groups for each growing season; groups will have to register to access;
 - b. Each group has a point of contact with the University, and the contact person should have the information of any volunteers within their plot;
 - c. As part of their logistical plan, each group should have a succession plan and a list of garden rules.
3. **Logistics:** Ensuring that groups have thought through the logistics of managing a garden, from supplies to scheduling to where the produce will go, can prevent additional staff maintenance for unsuccessful gardens. Groups should provide an implementation plan when registering. This could include:
 - a. Details on how they will source and store equipment;
 - b. What they plan to do with the food produced from the garden;
 - c. Who will be managing the gardens, and how they will address academic term transitions for students;
 - d. Funding plan;
 - e. Acknowledgement for any other criteria that the University establishes (i.e. no invasive species, types of soil additives and sprays/treatments, safety and indemnity)

CRITERIA:

- Creation of a checklist of requirements for food gardens, and a process for approvals and monitoring/follow-up.

MONITORING:

Grounds Services and the Sustainability Office will sign off annually on the checklist and requirements, and the Sustainability Office will report on uptake and utilization over time.

RESOURCES:

- University of Calgary – [Edible gardens case study](#)
- University of Windsor – [Campus Community Garden](#)
- Carleton University – [Campus food initiatives study](#)
- Food Secure Canada – [Edible Campuses: Campus gardens opportunities and challenges](#)
- [Waterloo Region Community Garden Network](#)

2. FERTILIZERS AND PESTICIDES

2.A. ELIMINATE SYNTHETIC FERTILIZERS AND PESTICIDES FOR GENERAL APPLICATION

PURPOSE:

Managing the application of fertilizers, pesticides, and other inorganic chemicals on campus grounds is important for long-term ecological health and resilience. Excess use of fertilizers can lead to unbalanced nutrient cycles in soils, runoff of excess nutrients into surface and groundwater bodies, and reduced resilience of plant and animal life, while pesticides introduce toxicity risks. Restricting usage to only specific circumstances can minimize these risks.

DESCRIPTION:

In general, the use of inorganic chemicals on campus should be eliminated as much as possible. Significant external restrictions have already been implemented across Ontario, limiting the types of materials available for application. And Waterloo has historically been forward-looking in the phase out of chemicals in broad application.

In practice, this means Waterloo will update its SOPs to adopt natural nutrient management and Integrated Pest Management (IPM) principles, which include the following:

1. Eliminating chemical fertilizers and pesticides for broad application – for example as the default form of nutrient cycling and pest management.
2. Prioritizing natural nutrient cycling, such as in-situ mulching or top-dressing of soil from composted and/or mulched materials.
3. Employing, wherever possible, natural, non-chemical practices for pest management. This could include, for example, hand-weeding and/or hot water application.
4. Limiting application of chemical pesticides/fungicides, when they are necessary, to specific areas, for designated amounts of time, and in the appropriate quantities. “Necessary” should be defined as to include:
 - a. Certain types of invasive and noxious species which can only safely or effectively be eliminated with pesticides
 - b. Areas with specialized quality control needs, such as sports fields, if no other alternatives exist
 - c. An escalation pathway if other natural or non-chemical solutions are not possible to use or have been tried and are ineffective
5. A record of application and usage of chemical fertilizers and pesticides is maintained.

CRITERIA:

- SOPs are updated to include the above requirements, and additional planning documents are created as necessary (for example an IPM plan)

MONITORING

Grounds Services will sign off annually on the continued conformance with the above and will provide a record of all applications of fertilizers and pesticides.

RESOURCES:

- OMAFRA Integrated Pest Management [resources webpage](#)
- University of California Agriculture and Natural Resources [Statewide IPM program](#)
- OMAFRA [Sprayer Calibration Calculator](#) for fertilizers
- Ontario [classification of pesticides](#)
- Ontario [pesticide use restrictions and Allowable Pesticide List](#)
- Ontario Pesticide Education Program [videos](#)

2.B. USE ECOLOGICALLY PREFERABLE MATERIALS FOR FERTILIZERS AND PESTICIDES

PURPOSE:

When deemed necessary, opting for fertilizers and pesticides that use ecologically preferable materials (EPM) can reduce negative disturbance to the soil profile of the surrounding environment and watershed and minimize impact on wildlife, while improving plant health or addressing the problem.

DESCRIPTION:

EPMs include those with organic and naturally-occurring materials. In fertilizers, they can help reduce many of the challenges associated with inorganic/manufactured fertilizers, including over-application/burning, leaching, and fast release of nutrients that can build soil and plant dependencies on further nutrient application. EPMs for fertilizers could include items such as:

- Topsoil, alfalfa meal/pellets, or composted yard waste, biochar, or other composts applied as top-dressings or in targeted applications where appropriate
- Manure, bonemeal, blood-meal, and other organic fertilizers where appropriate

EPMs for pesticide and herbicide use can include, but are not limited to:

- Vinegar/acetic acid
- Diatomaceous earth
- Pesticides or herbicides with active ingredients listed within the Allowable Pesticides list from the Province of Ontario

Supplementary development of a dedicated list of all fertilizers and pesticides will be integrated within the documentation of the IPM, or within SOPs. Grounds should document fertilizer and chemical pesticide use that goes beyond the EPMs identified in these documents.

CRITERIA:

- SOPs are updated to include the above requirements, and additional planning documents are created as necessary (for example an IPM plan)

MONITORING:

Grounds Services will sign off annually that the SOPs and/or supplementary documents reference these criteria. Grounds Services will also provide records for use of fertilizers and/or pesticides used outside the EPM list.

RESOURCES:

- NC State University article: [Students study compost as alternate fertilizer for campus recreation fields](#)
- Hazra (2016): “[Different types of eco-friendly fertilizers: an overview](#)”
- Chen et al. (2018). [Environmentally friendly fertilizers: A review of materials used and their effects on the environment](#)

3. BIODIVERSITY

3.A. IDENTIFY AND MONITOR POPULATIONS OF MAJOR PLANT SPECIES

PURPOSE:

Plants are the foundation of almost all ecosystems across the University. From grasses to wildflowers, and from shrubs to trees, they are the sources of nearly all biological energy, they cycle nutrients, and they provide food and habitats for birds, mammals, insects and pollinators, amphibians, and fish. Understanding the changing composition and diversity of plant species across University grounds is important for learning how to grow and protect that biodiversity while building its resilience toward invasive species, a changing climate, and other environmental stresses.

DESCRIPTION:

While the intent is not to provide environmental assessment-grade data through this process, it can be useful as a dynamic monitoring tool for the general wellbeing of natural areas on the campus. The monitoring process can be structured to align with appropriate protocols where appropriate, and could include expanding categories of the following:

- Indication of types of areas across the campus, including built, managed (i.e., turf), semi-natural, and fully natural spaces
- Identification in databases of major plant species, including but not limited to (in approximate ordering of sizes):
 - Dominant varieties of grasses across turf areas
 - Major areas of invasive species
 - Annuals and other planted gardens
 - Ground covers and aquatic plants
 - Wildflowers
 - Shrubs and bushes
 - Trees
- General indications of the health and condition of both zonal areas and specific plants.

Much of this work is already underway through the [Campus EcoMap project](#), and can be expanded over time to add more granular details. It has also been developed through coursework and community science initiatives, for example finding over 260 species of plants and fungi in the Environmental Reserve alone through iNaturalist, and ongoing work through the Ecology Lab.

A list of major plant species can be created and updated with numbers and locations to monitor change over time. These changes should be communicated to Grounds personnel for ongoing management and intervention as necessary.

CRITERIA:

- Coordinated maintenance of an ongoing inventory, and protocols and/or promotion for usage and updating over time
- Monitored data and observed findings are available to relevant University staff

MONITORING:

Most of the monitoring will be done through courses and student projects. The Sustainability Office will annually sign off on the inventory's status and will provide Grounds Services with any potential findings or feedback from the identification and inventory process.

STUDENT ENGAGEMENT

This is an ideal project for student engagement, as many activities for species identification are already part of existing courses and programs of study. It can also be an ideal engagement opportunity for all community members, through tools such as iNaturalist to generate crowdsourced and/or community science data.

RESOURCES:

- [Campus EcoMap project](#) has a current database of zone areas and species lists
- [EDD MapS](#) Ontario
- [iNaturalist](#)

3.B. IDENTIFY POPULATIONS OF MAJOR LAND AND AQUATIC ANIMAL SPECIES

PURPOSE:

Similar to tracking plant species, monitoring major animal species is important for understanding campus biodiversity and serving as a foundation for management of endangered species, invasive species, or nuisance animals that can cause future challenges.

DESCRIPTION:

Animals are clearly more transitory than plants, and species populations will shift over time and through seasons. This can make tracking and collection of data far more difficult, especially when analysis and collection of data may be limited to certain times of the year (for example, relevant courses being offered only in certain terms). Creation of inventories for animals will therefore need to be more dynamic, and likely rely on a mix of data-collection methods.

Once again, the intent here is not for environmental-assessment grade data collection, but for ways of collecting data that can help drive decisions or inform other elements of the Standard. Monitoring could include identification on gradually increasing categories of species, including:

- Mammal species
- Bird species
- Terrestrial and aquatic insects
- Fish
- Molluscs
- Reptiles and amphibians
- Fungi

Existing data collection through programs such as iNaturalist, for example, have identified over 430 species among these categories at the University.

CRITERIA:

- Coordinated maintenance of an ongoing inventory, and protocols and/or promotion for usage and updating over time
- Monitored data and observed findings are available to relevant University staff

MONITORING:

The Sustainability Office will annually sign off on the inventory's status and will provide Grounds Services with any potential findings or feedback from the identification and inventory process.

STUDENT ENGAGEMENT:

This is an ideal project for student engagement, as many activities for species identification are already part of existing courses and programs of study. It can also be an ideal engagement opportunity for all community members, through tools such as iNaturalist to generate crowdsourced and/or community science data.

RESOURCES:

- [Campus EcoMap](#)
- [Ontario Mammals](#) – iNaturalist
- [Ontario Reptiles](#) – Ontario Nature
- [Ontario Amphibians](#) – Ontario Nature
- [Ontario Fish Identification](#) – MNRF
- [Ontario Benthos database](#) – Ontario Benthos Biomonitoring Network

3.C. IDENTIFY AND DEVELOP MANAGEMENT PLANS FOR INVASIVE SPECIES

PURPOSE:

Understanding and tracking the spread and/or aggressiveness of invasive species on campus can help manage the threat, increase efficiency of remedial action to avoid pesticide applications, and preserve native biodiversity. Having clear processes for addressing them increases efficiency of management efforts and helps the ecosystem recover from damage.

DESCRIPTION:

Through the identification processes listed in 3A and 3B, as well as through other means of monitoring, existence of invasive species will be made known to the University. Waterloo will document the existence of invasive species that are being identified and will develop management plans to manage the spread or eliminate the species, as necessary. These will be developed on a case-by-case basis.

In some cases, there are regulatory requirements for management/removal of invasive species.

CRITERIA:

- A protocol for escalation and management of invasive species has been developed and is integrated into SOPs.
- Remediation plans or actions are documented.

MONITORING:

Grounds Services will annually sign off that the protocol for management of invasive species is in place and will maintain documentation of remediation plans.

STUDENT ENGAGEMENT:

This action has potential for student engagement, including for identification of invasive species and strategies for managing species.

RESOURCES:

- [Aquatic invasive species](#) – Ontario Streams
- [Invasive species in Ontario](#) – MECP
- [Invasive species gallery](#) – NCC
- Mosher (2012) “[An Inventory and Recommendations for the Management of High Priority Invasive Alien Plants in Point Pelee National Park](#)”
- University of Victoria [Invasive Species Management Strategy](#)
- US Department of Agriculture “[Field Guide: Invasive Plant Inventory, Monitoring and Mapping Protocol](#)”
- Ontario Invasive Plant Council: [Creating an Invasive Plant Management Strategy: A Framework for Ontario Municipalities](#)
- [Best Management Practices](#) for different invasive species in Ontario
- Stanley Park Ecological Society [Invasive Plant Management Plan](#)
- University of Victoria [Invasive Species Management Strategy](#)
- Research Institute for Nature and Forest “[Guidance for drafting best management practices for alien invasive species](#)”

3.D. DESIGNATE KEY HABITATS, NATURALIZED, AND/OR PROTECTED AREAS

PURPOSE:

Identifying and designating key habitats, naturalized and protected areas promotes biodiversity efforts. Such areas are critical to the health of the campus environment, providing refuge for pollinators, native species, and more. It also aids monitoring biodiversity within these areas over time.

DESCRIPTION:

Identifying these areas can be integrated into actions 3A and 3B and will form a natural part of the species inventory on campus. Where possible, these can also be integrated into planning documents, campus maps and/or wayfinding, and other communication strategies.

The current Campus EcoMap, for example, already has identified key zones of the campus that can be framed as managed, semi-natural, and naturalized areas. Further detail on important habitats can be added with further analysis. Management plans can be developed over time as needed, for example by identifying areas where no building will occur, or where there may be need for additional buffer space between natural and managed spaces.

CRITERIA:

- Integration of these habitats, zones, and protected areas within an ongoing inventory.

MONITORING:

The Sustainability Office and Grounds Services will sign off annually that major zones and usage types have been identified, and that ongoing monitoring is part of the inventory.

RESOURCES:

- University of Exeter biodiversity [brochure](#) and [map](#)
- University of Victoria [Sensitive Ecosystem Inventory](#)
- Schoolyard biodiversity investigation [educator guide](#)

3.E. DEVELOP PROTOCOLS FOR MANAGING SPECIES AT RISK

PURPOSE:

From time to time, the University of Waterloo has found species at risk on campus. These not only present an opportunity to help conserve and protect these species, but also can create regulatory obligations for the protection of those habitats and/or restrictions on other University activities that can impact the well-being of the species. Having an escalation protocol for these scenarios is important.

DESCRIPTION:

Guidelines are provided through the Ministry of the Environment, Conservation and Parks. There are also funding opportunities to protect these species through federal and provincial grants.

CRITERIA:

- A protocol for managing endangered species is integrated within SOPs and implemented as needed.

MONITORING:

The Sustainability Office will maintain annually a record of all species at risk identified through the species inventory process, and Grounds Services will sign off annually on the existence of a management protocol and any necessary actions.

STUDENT ENGAGEMENT:

Research on management protocols, as well as potential assistance in habitat protection or remediation for endangered species, are ideal projects that can be integrated into student learning opportunities for selected classes.

RESOURCES:

- Species at Risk in Ontario [database](#)
- [Management plans](#) for specific Species at Risk
- Other [guides and best practices](#) documents for specific at-risk species
- Ontario Species at Risk [Stewardship Program](#)
- Government of Canada – [Community-nominated priority places for species at risk: proposal guide](#) (includes guidance for determining how to select priority areas)

3.F. TREAT NUISANCE ANIMALS HUMANELY

PURPOSE:

Wildlife can cause conflicts or problems that impact humans on and around campus. These nuisances can include health and safety risks, such as from aggressive animals or animals that can carry disease, as well as risk of damage to property, such as through burrowing, dams, nesting, or getting into food and waste. While it is important to deal with these issues, they can often be approached in humane ways that minimize the harm to wildlife and reduce risk to the University's reputation.

DESCRIPTION:

Many species have adapted to live in urban and suburban environments, bringing them into close contact with humans, buildings, and infrastructure. While most of these interactions are benign, they can sometimes cause problems. Known historical examples of this have included:

- Beaver dams in the Laurel Creek
- Groundhogs tunnelling near utility services or in gardens
- Canada Geese leaving droppings across walkways and becoming aggressive, especially during nesting season
- Bats, birds, rodents, and other wildlife getting inside buildings
- Wasp and hornet nests on and around buildings that can give life-threatening stings
- Negative interactions between humans and coyotes, foxes, and other small predators
- Racoons, skunks, and squirrels and other animals getting into garbage and/or food

These will often require remedial actions, which can take many forms on a case-by-case basis, and some of which have provincial or federal restrictions. These actions are sometimes undertaken by University staff, but may also be outsourced to third parties. In all cases, however, the University will prioritize escalation of the management process as follows:

1. **Monitoring:** Connected to 3A and 3B, understanding the presence of animals which pose a potential nuisance risk can help pre-empt problems, allowing earlier interventions and more humane approaches. Many animals that are nuisances in certain situations are important parts of nearby ecosystems, add value when not in contact with humans, and can be simply monitored over time without further action needed.
2. **Prevention:** This focuses on efforts to remove the causes of attraction for nuisance animals, including:
 - a. Alterations to habitat – for example by adding natural barriers to water or open spaces that Canada Geese enjoy.
 - b. Removal of food sources – for example by ensuring lids are closed on outdoor organics bins.
 - c. Blocking access – for example through fencing outdoor areas where appropriate, or sealing building envelopes.
 - d. Introduction of deterrents – for example types of plants, terrain features, scarecrows, natural sprays/solutions, or other objects that nuisance animals try to avoid.
3. **Humane Removal:** When prevention is not possible, it may be necessary to remove an animal that has become a risk for people or the built environment. Humane treatment should be prioritized for this, including but not limited to:

- a. Capture and release – for example of bats and birds that have made their way inside buildings, this can simply involve using a net to catch the animal and bring it back outside (in the case of bats, monitor potential nest sites).
 - b. Capture and relocation – For wildlife such as groundhogs, skunks, or racoons which have become a problem, this could include non-lethal capture of the animals and transportation to a location away from the area on which the animal was causing harm. Note that there are important restrictions from the Province of Ontario on when this is allowed, and who is authorized to conduct this work. For example:
 - i. Trapped wildlife must be treated humanely (i.e., no-harm traps, not subject to extreme heat or cold) and must be released within 24 hours of capture
 - ii. Trapped wildlife cannot be relocated more than 1km from the space in which they were originally captured
 - iii. The dens of mammals, except foxes or skunks, cannot be destroyed
 - iv. If employing a third party, the third party must meet certain criteria to be considered a “wildlife agent”
 - v. Additional requirements apply to Species at Risk
 - c. Removal – For some wildlife, such as bees, there are services that can rescue wildlife and take them to a proper area where they can be appropriately managed.
4. **Extermination:** For some wildlife, extermination may be necessary. This can be when there is an immediate danger to people or property, when all other means of control have failed or are not possible, or when the animal has been severely injured and cannot be rehabilitated. When required to use lethal action, the following should be prioritized:
- a. Ensure compliance with all regulations and requirements. For example, it is not legal to paint eggs of migratory birds under the Migratory Birds Convention Act without a permit, and certain killings require a permit.
 - b. Use quick-kill methods whenever possible, for example avoiding of sticky-strips that cause long periods of distress.
 - c. Use targeted methods, for example avoidance of broad poisons that could impact other wildlife or could pose a danger to human health without further protective measures.
5. **Education:** While many of the above fall under the responsibility of University staff, educating users on prevention strategies in particular can be important to preventing wildlife nuisances from occurring. This could include efforts from the broader community to not feed wildlife, to eliminate food sources, to avoid potential conflict areas (such as geese nests), and to monitor for early intervention of nuisance animals.

CRITERIA:

- SOPs integrate the escalation pathways listed above.

MONITORING:

Grounds Services and/or Building Services will sign off annually that SOPs align with the above escalation approaches and will provide comment on areas of concern.

RESOURCES:

- [Bats in Buildings: A guide to safe and human exclusions](#) by Bat Conservation International (2011)
- [Provincial list](#) of wildlife rehabilitators

- [Requirements for capturing or killing of wild animals](#), by the Province of Ontario
- [Preventing conflicts with wildlife](#), by the Province of Ontario
- [Handbook for managing Canada Geese](#), by the Government of Canada
- [Wildlife fact sheets and tips for dealing with Wildlife](#), Ontario SPCA and Humane Society
- [Options for removing honeybees](#), from the Ontario Beekeeper's Association

4. WATER MANAGEMENT

4.A. MEASURE NUTRIENT LEVELS AND CONTAMINANTS IN WATERSHED

PURPOSE:

Runoff from the campus and from nearby areas can make its way to local streams and groundwater. This runoff can contain excess nutrients, chemicals, sediment, salt, and litter or other contaminants. These can pose risks to both the environment and human health and can also signal other management issues.

DESCRIPTION:

A process will be created to measure and monitor over time a range of possible contaminants in nearby surface water bodies, for example in the Laurel Creek, in Columbia Lake, and in stormwater runoff. Sampling already takes place regularly in several different academic courses, from within the Faculty of Environment, Faculty of Engineering, and Faculty of Science.

A mechanism to aggregate these sources of information, and to monitor over time and communicate back to campus operators can be established to support this effort.

This process can be supported by the Ecology Lab, who already run such tests as part of their undergraduate classes. Other labs on campus and student/staff researchers may also have data to contribute to this process.

CRITERIA:

- Coordinated maintenance of an ongoing sampling system, and protocols and/or promotion for usage and updating over time

MONITORING:

The Sustainability Office will sign off annually on whether the sampling and measurement system is in place and communicate any findings.

RESOURCES:

- Water Institute – Water Quality Management [contacts](#)
- Water Institute – Watershed Management [research](#)
- Credit Valley Conservation – [Water Quality Parameters](#)

4.B. CREATE A DESIGN STANDARD FOR PATHWAYS

PURPOSE:

Pathway design through the campus has important impacts on water buildup and runoff, ice management, and transportation of contaminants. There must be a balance between various requirements for permeability and drainage, ease of maintenance, accessibility, and required minimization of surface contaminants such as salt and particulates.

DESCRIPTION:

Waterloo has a mix of walkway types across campus, from interlocking brick to asphalt to three permeable pavement sites. Impermeable surfaces can cause problems during rainfall events as they direct water runoff into concentrated areas and can lead to flooding or pose a burden on stormwater systems, while also transporting surface contaminants such as salt and suspended solids. In addition, these surfaces can pool water during winter seasons thereby requiring more salt application to de-ice.

Permeable pavements can reduce some of these risks by allowing water to infiltrate more slowly, limiting excess runoff, and creating more dispersion of contaminants. On walkways, where there is typically limited drainage into the stormwater system, most salt and other contaminants are transported to the surrounding localized areas but may be more concentrated due to surface flows. There are areas subject to the Source Water Protection Plan that are recommended to remain impermeable, particularly on South Campus near University Avenue. Permeable pavement sites can, however, have increased maintenance requirements.

Reflecting this, a design guideline should be developed to help guide installation of new and/or replaced walkways and pathways throughout the campus, balancing the above criteria as appropriate for various contexts.

CRITERIA:

- Creation of a supplementary guideline for pathway design and installation.

MONITORING:

Grounds Services will sign off annually on the presence of a supplementary guideline.

RESOURCES:

- Credit Valley Conservation [Section 4.7: Permeable Pavement](#) of the LID SWM Planning and Design Guide
 - See also: [CVC Permeable Pavement Fact Sheet](#)
- Landscape Ontario “[Paving the Future](#)”
- Smith (2020) [Permeable Pavement Standards](#)
- [5-Year Performance of Permeable Pavements](#), Sustainable Technologies and University of Toronto
- US EPA [Permeable Pavement Resources](#)

4.C. UTILIZE GREEN INFRASTRUCTURE IN FLOOD-PRONE AREAS

PURPOSE:

Green infrastructure includes a wide range of tools that provide important community services. Of particular relevance for Waterloo, it can help to capture, retain, or slow down water during rainfall or thawing events. Green infrastructure can include bioswales, rain gardens, and other natural features, as well as more engineered solutions such as soakways or cisterns. By slowing down the movement of water during rainfall events and/or increasing the absorptive capacity of areas that currently have turf, green infrastructure can help reduce flood risk, reduce runoff of nutrients, and can improve the aesthetics of outdoor spaces.

DESCRIPTION:

The University will identify areas that may be prone to flooding, runoff during rain events, or experience poor conditions such as excess muddiness, that can be prioritized for installation of green infrastructure features as funding or redevelopment opportunities become available.

Specific implementation of improvements, such as bioswales and rain gardens, can be prioritized as opportunities arise within each of these identified areas over time.

CRITERIA:

- A list of flood-prone areas is developed, and a long-term plan for implementation of green infrastructure is implemented.

MONITORING:

Grounds Services and the Sustainability Office will sign off annually on the identification of flood-prone areas, and any new infrastructure features added to mitigate and manage these.

RESOURCES:

- University of British Columbia: [University Boulevard makeover to improve biodiversity](#)
- Credit Valley Conservation: [Ecological Buffer Guideline Review](#)
- Credit Valley Conservation: [Rain Gardens Guidelines](#)
- [Designing a Rain Garden on Campus at the University of Illinois](#) (including costs, site planning, etc.)

5. SNOW AND ICE MANAGEMENT

The actions in this section are designed to be aligned with and a summary of the existing Salt Use Reduction Plan mutually agreed between the University of Waterloo and Region of Waterloo under the latter's Source Water Protection Plan requirements.

5.A. MEASURE SALT APPLIED TO CAMPUS GROUNDS AND PARKING LOTS

PURPOSE:

Waterloo has obligations within the Regional Source Water Protection Plan to make efforts to minimize salt runoff within the local watershed. Measuring how much salt is applied across the campus is an important input indicator as to the success of its salt management initiatives over time.

DESCRIPTION:

Waterloo will maintain records and develop an annual total of the amount of salt, which is applied to University properties, and will request the same from any third-party contractors who apply salt to the campus grounds.

CRITERIA:

- Creation of a tracking process and inventory for salt applied to campus.

MONITORING:

Grounds Services will report on the amount of salt, in tonnes, applied to each campus.

RESOURCES:

- Conservation Ontario – [Good Practices for Winter Maintenance in Salt Vulnerable Areas](#)
- Canada Water Quality Guidelines for the Protection of Aquatic Life: [Chloride](#)
- Government of Canada Code of Practice: [road salts environmental management](#)

5.B. IMPLEMENT TRAINING ON SALT REDUCTION

PURPOSE:

Training of Grounds Services staff is important to ensure University employees are aware of salt reduction obligations, best practices, and opportunities. It also ensures that credible, informed decisions can be made, and internal expertise is developed.

DESCRIPTION:

To support this, a training presentation will be developed for Grounds Services employees, clarifying standard operating practices and their requirements and responsibilities. This will be reviewed annually with all staff members responsible for salting the campus. From time to time, additional learning opportunities such as webinars, lunch-and-learns, or guest speakers may be explored.

Additionally, at least one Grounds Services supervisor will complete the Smart About Salt certification program through Landscape Ontario.

CRITERIA:

- At least one full-time staff member in Grounds Services is Smart About Salt certified
- A training program exists for all Grounds Services staff

MONITORING:

Grounds Services will sign off annually on the certification and existence of the training program.

RESOURCES:

- Smart About Salt [Training web page](#)

5.C. IMPLEMENT A SALT USE REDUCTION WORKPLAN

PURPOSE:

A Salt Use Reduction Workplan is required through the Regional Source Water Protection Plan, and has already been negotiated with the Region of Waterloo. The plan is meant to reduce salt use and application over time.

DESCRIPTION:

For the purposes of this Standard, the existing Salt Use Reduction Plan will be the basis of action. Core elements of the Salt Use Reduction Workplan include:

- Ensuring salt concentration is calibrated on spreaders and communicated for hand-spreading
- Avoiding salting during cold temperatures where salt is ineffective
- Exploring salt alternatives where appropriate and feasible
- Ensuring safe storage of salt

CRITERIA:

- Adherence to Salt Use Reduction Workplan

MONITORING:

Grounds Services will sign off annually that practices align with the Salt Use Reduction Workplan.

RESOURCES:

- Conservation Ontario – [Good Practices for Winter Maintenance in Salt Vulnerable Areas](#)
- Government of Canada [road salt FAQ](#)
- Environmental Defence – [“Salt-ernatives”](#):

6. EQUIPMENT

6.A. PRIORITIZE ELECTRIC EQUIPMENT

PURPOSE:

Electric landscaping equipment has numerous benefits. Compared to gasoline equipment, it significantly reduces greenhouse gas emissions, eliminates particulate emissions that are harmful to both operators and the community, reduces noise disturbances for both people and wildlife, eliminates fuel spills, and can reduce fuel costs.

DESCRIPTION:

Over the past several years, many manufacturers of grounds maintenance devices such as trimmers, chainsaws, hedge clippers, leaf blowers, and push and riding lawn mowers have expanded and improved their battery-electric offerings. Since most of these devices are utilized during the daytime, there can be ample time for overnight charging, and many manufacturers have high-speed charging replacements for swappable battery packs.

It is recognized that battery-electric options may not be available and/or suitable for all applications. However, Waterloo will make a stated preference for sourcing battery-electric equipment whenever feasible as part of regular equipment lifecycle management.

CRITERIA:

- Grounds Services will update purchasing documentation and other SOPs to reflect a stated preference for battery-electric equipment where possible.

MONITORING:

Grounds Services will sign off annually on the stated preference and will provide a copy of the year-end equipment inventory.

RESOURCES:

- New York Department of Environmental Conservation: [Reducing Air Pollution from Lawn and Garden Equipment](#)
- [Future of Electric Future of Landscape Maintenance](#), Interview via CleanTechnica
- [Lawn Care is Going Electric](#), via Washington Post
- [Zero-Emission Landscaping Equipment](#), California Air Resources Board

7. COMMUNICATION AND ENGAGEMENT

7.A. COMMUNICATE ACTIONS FROM THE LAND CARE STANDARD

PURPOSE:

While many actions within the Land Care Standard will be highly visible, it is important to ensure stakeholders are informed about the efforts that the University of Waterloo is taking. This can build accountability to the Standard, raise awareness of best practices, and build community support for actions, as well as provide an important educational and engagement opportunity about Waterloo's natural heritage and ecological features.

DESCRIPTION:

A communications plan should be established and implemented to communicate Waterloo's efforts and its progress implementing this standard, as well as to showcase the natural features across the campus that students and employees can access and use for recreation, leisure, and to unwind. These could include, but are not limited to:

- Public posting of this Standard within the Sustainability and Plant Operations websites;
- Integration of progress measurements from ongoing monitoring within the annual Environmental Sustainability Report;
- Integration of key ecological features within the Campus Map;
- Expanded physical signage across campus, highlighting ecological features, assets, and projects;
- Walking or virtual tours of the campus from an ecological perspective;
- Blog posts, infographics, podcasts, and/or social media posts highlighting actions within the Plan, and the overall plan's implementation;
- Photo contests, scavenger hunts, bio-blitzes, tree-planting/fundraisers and other time-focused opportunities for members of the campus to engage with and support the Standard;
- Integration with university courses through the Sustainability Living Labs;

CRITERIA:

- Creation and implementation of a communication plan for the Land Care Standard.

MONITORING:

The Sustainability Office will update annually on the implementation of a communication plan.

7.B. DEVELOP A TRAINING PROGRAM AND FEEDBACK PROCESS

PURPOSE:

Ensuring consistent application of all elements within the Land Care Standard will be important, and this will require both acceptance and passion for implementation from key operational staff. A training program and ongoing professional development can help to ensure efficient action, provide an opportunity for feedback and continuous improvement as various actions within the Standard are implemented, and identify new opportunities. Students will

have the opportunity to participate in events and provide feedback on future iterations of the Standard.

DESCRIPTION:

A training program and annual update for the Standard will be developed, as well as a mechanism to integrate feedback and input from staff and students over time. This can include presentations, reference materials, copies of this plan, and updates to SOPs, as well as less formal opportunities such as lunch-and-learns, webinars, and open-houses.

CRITERIA:

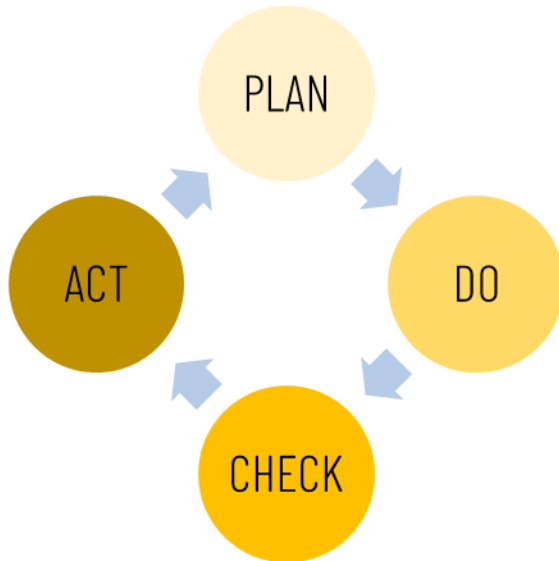
- A training program is created for the Land Care Standard.

MONITORING:

Grounds Services and the Sustainability Office will update annually on training activities.

8. CONTINUOUS IMPROVEMENT

Following a Plan-Do-Check-Act process is the foundation of continuous improvement. As this document both standardizes many longstanding de-facto practices and introduces new actions or requirements, it is important that this cyclical process is followed.



This Land Care Standard establishes the Planning phase, which both Grounds Services and the Sustainability Office will support implementation of during the “Do” phase.

An annual “Check” will be established between Grounds Services and the Sustainability Office, as well as other stakeholders as relevant, to reflect on the year’s practices and accomplishments within the Standard, and understand where there are barriers, challenges, and opportunities. The “monitoring” elements highlighted throughout the Standard will be the basis for this check-in, as well as feedback received from the campus community and from operations staff. More frequent check-ins can be implemented for specific action items as required.

With these check-ins, any recalibrating of the initial proposed Standard and/or new ways to approach implementation can be proposed and integrated during the “Act” phase.

APPENDIX A – STANDARD SUMMARY

AREA	ACTION	TYPE	TIMING*			OWNERSHIP			RESOURCES
			23	24	25	GS	SO	SLL	
1. Soil and Vegetation	1.A. Follow the Species Planting List for all new plantings	SOP, Spec.	x			√		√	Low
	1.B. Measure soil quality	Data		x			√	√	Medium
	1.C. Re-use leaves, clippings, and mulch on site wherever possible	SOP		x		√			Medium
	1.D. Support strong turf development in lawn-care practices	SOP	x			√			TBC
	1.E. Identify priority areas for naturalization	Imprv.	x			√		√	High initial
	1.F. Develop criteria for food garden plots	Process	x			√	√		Low
2. Fertilizers and Pesticides	2.A. Eliminate synthetic fertilizers and pesticides for general application	SOP		x		√			TBC
	2.B. Use ecologically preferable materials for fertilizers and pesticides	SOP; Spec.		x		√		√	TBC
3. Biodiversity	3.A. Identify and monitor populations of major plant species	Data			x		√	√	Low
	3.B. Identify and monitor populations of major land and aquatic animal species	Data			x		√	√	Low
	3.C. Identify and develop remediation plans for invasive species	Data; Imprv.			x	√	√	√	TBC
	3.D. Designate key habitats, naturalized, and/or protected areas	Process		x		√	√	√	Low
	3.E. Develop protocols for managing endangered species	SOP		x		√		√	Low
	3.F. Treat nuisance animals humanely	SOP	x			√			Low
4. Water Management	4.A. Measure nutrient levels and contaminants in watershed	Data		x			√	√	Medium
	4.B. Create a design standard for pathways	Spec.			x	√			TBC
	4.C. Utilize green infrastructure in flood-prone areas	Imprv.			x	√		√	High initial
5. Snow and Ice Management	5.A. Measure salt applied to campus grounds and parking lots	Data	x			√			Low
	5.B. Implement training on salt reduction	Other	x			√			Low
	5.C. Implement Salt Use Reduction Workplan	SOP, data, Spec., Imprv.	x			√	√		High
6. Equipment	6.A. Prioritize Electric Equipment	SOP, Spec.		x		√	√		Low
7. Communication & Engagement	7.A. Communicate actions from the Land Care Standard	Other		x			√		Medium
	7.B. Develop a training program and feedback process	Other		x		√	√		Medium

*Timelines are tentative

Definitions

SOP = standard operating procedure integration;

Data = measurement/inventory;

Process = process change or improvement;

Spec. = Supplementary specifications, lists, etc.

Imprv. = capital improvement or major change to physical space

Other = training, communications, etc.

GS = Grounds Services

SO = Sustainability Office

SLL = Sustainability Living Lab project opportunities

APPENDIX B – FUNDING SOURCES

(for internal info only)

Operating Funds – For items which can reasonably be transitioned but are not necessarily net additional

Sustainability Action Fund – For projects between \$2,000 – \$30,000

Region of Waterloo Community Environment Fund – For projects between \$5,000 - \$20,000 focus on naturalization and ecosystem management and improvements

WWF Canada Go Wild Grants – For small projects between \$500-\$1,000 with a focus on naturalization and re-wilding

University Fund – For time-bound (non-operating) projects that align with institutional commitments and objectives

Student Endowments – \$ varies, but must be student-led projects for students within the respective faculty or grad/undergrad levels

Faculties - \$ varies, but could be drawn on by students for site-specific projects (i.e., naturalization, gardens) close to major faculty spaces; some areas of existing support (i.e., Arts-ENV gardens)

Research funds – if connected to research grants for activity on-campus

Capital planning – Within site improvement aspects for new construction, infrastructure renewal (pathways/parking lots, vehicles, etc.)