



AUGUSTANA MIQUELON LAKE RESEARCH STATION
SUSTAINABILITY PLAN
2015 - 2020

August 2015

FORWARD

The Augustana Campus of the University of Alberta is proud to be a leader nationally and provincially in the promotion of sustainability planning, innovation, and education. Our campus is home to the Alberta Centre for Sustainable Rural Communities and the Jeanne and Peter Lougheed Performing Arts Centre, which boasts the largest in-built photovoltaic system in Canada and the most advanced theatrical LED lighting system in the world. In addition, our general education program, which we believe is an essential foundation of an undergraduate liberal arts education, includes an Environmental Sustainability requirement.



We are particularly proud to extend this commitment to sustainability to the new research station at Miquelon Lake Provincial Park. A collaboration between Alberta Parks and the Augustana Campus, with significant support from Camrose County, Beaver County, and generous private donors, the Augustana Miquelon Lake Research Station (AMLRS) will be both a research and a teaching space. It will support multidisciplinary research in the social and natural sciences and, with imagination, might even support classes in environmental literature, landscape painting, etc. In addition, it will be available as programming space to advance an understanding of environmental and sustainability issues among school children and the general public.

I am excited by the Sustainability Plan for the AMLRS. This document ensures not only best practice in all aspects of the Station's operations; it offers an opportunity for the Station itself to become a valuable teaching tool. As thoughtful as the sustainability plan is, we also recognize that it needs to be a living document. We welcome public comment and suggestions for ongoing improvement.

The vision of the University of Alberta is "to inspire the human spirit through outstanding achievements in learning, discovery, and citizenship in a creative community, building one of the world's great universities for the public good." My Augustana colleagues and I aspire for AMLRS to be an important contributor to this vision.

Allen H. Berger
Dean and Executive Officer
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TABLE OF CONTENTS

FORWARD

INTRODUCTION

PART 1: SUSTAINABLE USE - USER PARTICIPATION

- 1) **WASTE AND RECYCLING**
 - a) In Residence
 - b) In the Lab
 - c) In the Field
- 2) **WATER CONSUMPTION AND USE**
 - a) In Residence
 - b) On Site
- 3) **ENERGY USE**
 - a) In Residence
 - b) In the Lab
- 4) **GREEN CLEANING**
- 5) **TRANSPORTATION**

PART 2: SUSTAINABLE OPERATIONS

- 1) **BUILDING EXTERIOR AND HARDSCAPE MANAGEMENT PLAN**
 - a) Cleaning and Maintenance of Exterior Features
 - b) Cleaning and Maintenance of Hardscapes
 - c) Snow and Ice Removal
 - d) Exterior Paints, Stains, and Sealants
 - e) Maintenance Equipment
- 2) **MANAGEMENT OF NATURAL COMPONENTS**
 - a) Integrated Pest Management
 - b) Erosion and Sedimentation Control
 - c) Landscape Waste Diversion
 - d) Vegetation Selection
 - e) Compost and Chemical Fertilizer Use
 - f) Informing Site Users of Pests, Pesticide and Chemical Fertilizer Use
 - g) Stormwater Management
- 3) **SUSTAINABLE PURCHASING**
- 4) **MONITORING**

PART 3: FUTURE SUSTAINABILITY INITIATIVES

APPENDICES

- A) **WASTE MANAGEMENT AND LANDFILL DIVERSION PLAN**
- B) **WATER MANAGEMENT PLAN**
- C) **ENERGY MANAGEMENT PLAN**
- D) **WATER USE MONITORING PROGRAM**
- E) **ENERGY USE MONITORING PROGRAM**

INTRODUCTION

The Augustana Miquelon Lake Research Station (AMLRs) Sustainability Plan is the Station's contribution to the University of Alberta's environmental commitment. Through sustainable use, sustainable operations, and ongoing sustainability initiatives, AMLRS strives to reduce its carbon footprint, lessen its impact on the environment, and contribute to a growing pool of high quality research and knowledge, driving the University into the future on a platform of sustainability.

Sustainability is a core concept in the University of Alberta (U of A) and on the Augustana Campus. When AMLRS was still in its initial concept stages it was designed with sustainability in mind, from building establishment to decommissioning and reclamation at the end of its life. Some of these early design features include building the Station on a previously disturbed site, tying into existing water and sewage lines, and raising the Station off the ground to minimize subterranean disturbance while installing utilities. In addition to a more sustainable building installation, the Station has built-in systems and facility supported strategies to reduce the Station's environmental impact. This Sustainability Plan outlines those additional sustainability features in AMLRS.

Those features also played a key role in achieving recognition through the University of Alberta's [Office of Sustainability](#). We are proud to announce that AMLRS has the highest level of Green Spaces certification, Gold level, in its laboratory, residence, and office spaces! That certification is reflected in this Sustainability Plan. The Sustainable Use section is designed for Station users as a guide on how to contribute to sustainability while living and working at AMLRS. As the Station has no permanent staff on site to manage the items addressed in this Plan, it is up to users to make AMLRS operate as sustainably as possible during their stay. Thank you in advance for your effort and support in upholding our sustainability ethic!

The Sustainable Operations section of this plan is designed to guide Station management in long term sustainability. It includes plans and programs which address topics such as grounds keeping and maintenance, supply purchasing, and Station monitoring. While not essential for Station users, this section provides useful information on how the Station is sustainably run 'behind the scenes.'

The Ongoing Sustainability section of this plan outlines steps that the Station is working towards, but are not in place at present. The action items described in this section are currently not feasible due to financial constraints, legislative requirements, or time restrictions. Some of the issues are currently being worked on, and all of the projects are being considered for future implementation.

We thank you for your support of the policies outlined in this plan, and for helping us toward our goal of becoming a leader in sustainable research and innovation.

PART 1: SUSTAINABLE USE - USER PARTICIPATION

This section outlines what Station users can do to contribute to ongoing sustainability while using the Station. It covers sustainable actions related to cooking, living, working at and travelling within and around AMLRS and Miquelon Lake Provincial Park. Please read Part 1 carefully; we strongly encourage user participation to keep the Station running in its most sustainable manner. If you have suggestions on further sustainable actions that could be included in this Plan, please contact the Station Manager.

1) WASTE AND RECYCLING

Waste and recycling at AMLRS are guided by the Waste Management and Landfill Diversion Plan (see Appendix A). Key concepts and policies have been pulled from the managements sections of this Plan and adapted into this user guide on waste reduction and recycling.

Reducing solid waste is a key element of sustainable operation. Less waste means fewer greenhouse gas emissions, less land area required to deal with waste, and a reduction in the amount of raw materials, water, and energy required to produce more goods, contributing to increased sustainability. Station user participation is a critical component in waste reduction and diversion.

To encourage waste reduction at AMLRS, there are waste and recycling bins throughout the Station. Recycling is mixed single-stream recycling, so many recyclable materials can be placed into the same recycling bins. These include:

- paper
- light (not corrugated) cardboard
- some plastics (#1, 2, 3, 5, & 7)
- light metals

Refundable recyclables (drink containers) can be collected in a separate labelled container. Clean unbroken glass, batteries, and ink cartridges can also be recycled in their own labeled containers. Electronics can be tagged with a 'recycle me' tag and stored in the server room to be recycled.

Waste and recycling should be emptied on a regular basis and when leaving the Station at the end of your stay. Solid waste is placed in large black garbage bags and deposited in a wildlife proof garbage bin just outside the Station, while mixed, refundable, and glass recycling are deposited in their respective bins.

a) In Residence

In AMLRS, 'residence' refers to the kitchen/dining room, washrooms, bedrooms, and multi-purpose rooms. There are many ways to reduce solid waste in these areas.

Kitchens typically produce a large amount of waste, and there are multiple ways to reduce waste production here. Food creates a significant portion of kitchen waste. As AMLRS is Green Spaces certified at a Gold level for its residence space, there are several recommendations concerning food that contribute to sustainability and reducing waste: before buying groceries, plan your meals and make grocery lists to reduce the amount of food waste you are likely to produce; keep leftovers in mind and consider how you can turn small amounts of leftovers into complete meals with items already on your shopping list; choose to buy items with less packaging, and fully recyclable packaging; consider planning meals with more local or seasonal foods and reducing meat consumption to further reduce your carbon footprint in the kitchen.

While preparing and eating meals, use the provided reusable cookware, dishes, cutlery, etc. instead of disposable options. Using reusable water bottles, travel mugs, dishware, and cutlery and storage containers will cut down on waste that would have been produced by their disposable counterparts.

In cleaning any part of residence, consider your cleaning equipment. Using cloths instead of paper towel to wipe down or wash surfaces produces less solid waste, but also requires additional laundering. If you are staying at the Station long enough to require a full load of laundry, consider using cloths instead of paper towels. Also be mindful of the amount of cleaning solution used, and use the least amount necessary to complete the task.

Both washrooms are equipped with paper towel dispensers, but also have hand towels available. Using the reusable, washable hand towels over single use paper towels is preferred if your stay is long enough to require a full load of laundry. These simple actions lead to significant reductions in waste.

b) In the Lab

In AMLRS, the 'lab' refers to the wet laboratory, server room, and the multi-purpose rooms. Reducing waste here can also be done in several ways.

In typical lab and teaching spaces, paper products are a large component of waste. To reduce paper use, consider using electronic journal, newspaper, and newsletter subscriptions instead of print subscriptions. Use electronic documents and encourage the use of electronic documents whenever possible. Each lab room is equipped with

multiple outlets to facilitate the use of electronic documentation and digital technology to reduce paper use. If you do have to print documents, print double sided and print on recycled paper. All printed paper provided by AMLRS has a minimum 30% post-consumer recycled content rating. Recycle all paper and paper products in the appropriate bins when they are no longer necessary.

When using chemicals in the wet lab, use them sparingly. By using the least amount necessary, you can reduce the amount of chemical that may be wasted. You can also decrease chemical requirements in some cases by using computer simulations as demonstrations. If you are U of A staff, consider obtaining chemicals through or giving excess chemicals to the University's [chemical exchange program](#) (talk to the Station Manager about having chemicals delivered to/picked up from Augustana campus). If you are not U of A staff and have excess chemicals, consider giving them to other Station users that require them.

Clean, unbroken lab glassware can be recycled with the residence glass recycling.

c) In the Field

Waste reduction in the field requires prior preparation. Bring a reusable water bottle or travel mug, reusable food containers and cutlery, etc. to minimize waste. Bring a garbage bag for other food wrappers, straws, equipment wrappings, etc. and be sure to collect them all; littering in a Provincial Park is not only illegal, but can be extremely harmful to wildlife and the environment. Practice 'leave no trace' field work and ensure that all materials and equipment come back to the Station with you, unless field equipment must remain in the field for an extended period of time. Ensure that waste is put into wildlife-proof garbage bins; do not leave it outside or burn it.

2) WATER CONSUMPTION AND USE

Potable water is an extremely valuable resource. In an effort to conserve water and contribute to long term water sustainability, several systems and strategies are in place at AMLRS. See Appendix B for the AMLRS Water Management Plan.

a) In Residence

As a Station user, there are several ways you can contribute to reducing water consumption at AMLRS. The residence section of AMLRS accounts for almost all Station water use. To reduce this high water usage, low flush toilets and low flow faucet aerators have been installed throughout the building, excluding the showerheads due to system complications. Water efficient appliances including the dishwasher and washing machine assist in conserving water, but these machines should only be run when they are full to further reduce water consumption.

One of the most important ways to conserve water is to report leaks, drips, or improperly running water to the Station Manager as soon as you notice them. In addition, ensure that taps are fully closed and sealed when you shut them off. You can also take shorter showers, not use the toilets for tissue disposal, and turn off the taps as you brush your teeth or shave. Wash dishes soon after cooking to reduce water use as cookware and dishware clean more easily when warm.

Filling containers of water and keeping them in the fridge is also a much more water-efficient way of getting cold water than running the tap and waiting for the water to cool. 'Cold' water coming from the indoor cistern will remain at room temperature regardless of how long you run the tap. Cistern water is also much more expensive than the Park water supplied to the washrooms, so please be mindful.

Water use in the wet lab is minimal, but you should still be aware of water consumption and attempt to use the smallest amount of water required for your tasks.

b) On Site

There are also protocols in place to reduce the amount of water used outside of the Station itself. Rainwater collection may be the most significant system in reducing exterior potable water use. Rainwater is collected and can be stored in rain barrels for long periods of time before being used for both indoor and outdoor purposes.

Washing machinery and heavy equipment is prohibited on site in an effort to reduce water consumption and avoid flushing chemicals and toxins into the soil and groundwater. Stairs should be swept, not washed, to further reduce water usage.

3) ENERGY USE

AMLRS runs on two different kinds of energy: electricity and gas. Most of the electricity generated in Alberta comes from coal fired power plants, and natural gas is extracted from the ground through drilling operations. Both of these energy options produce greenhouse gases in obtaining, refining, and delivering their products. By reducing energy use, AMLRS is reducing demand on those forms of energy, contributing to reduced greenhouse gas emissions and increased sustainability.

a) In Residence

There are many easy ways to reduce your energy usage in the Station. One way is to turn off unnecessary lighting. Even though Station lights are fluorescent and use less energy than traditional incandescent bulbs, they still use energy. Open blinds to let in natural light and use task lighting (lamps, headlamps, etc.) instead of turning on lights

for an entire room. Plan meetings and events to be in rooms that will receive more daylight, or during times of day that receive more natural light. AMLRS is also located within Miquelon Lake Provincial Park, which is within a Dark Sky Preserve, so please limit the amount of light escaping the Station between dusk and dawn.

Another way to save electricity is to unplug equipment and appliances that are not in use. Lamps, laptops, cell phone chargers, the microwave, and other appliances use energy when they are plugged in, even if they are not being used. By unplugging these items you reduce the 'phantom energy load'.

Turning the thermostat down a few degrees, wearing warmer clothing and using the wood stove to heat the Station will also reduce energy use. Close doors and heat vents to rooms that you will not be needing, such as a spare bedroom or multi-purpose room, to trap heat in the rooms you will use the most.

b) In the Lab

The AMLRS lab offers unique options for energy conservation. Remember to adjust the refrigerator and freezer to the temperatures required for your work. While -50 Celsius may be needed for killing some bacterial strains, it isn't necessary for freezing water samples. Using the freezer at an excessively low temperature uses more energy and is harder on the equipment. When using the drying oven (and other electrical equipment), remember to a) turn it off, and b) unplug it when you are done using it. If you are using lab equipment that requires batteries to be frequently replaced, consider using rechargeable batteries. Batteries should also be taken out of equipment once you are done using it to preserve battery life.

4) GREEN CLEANING

In accordance with the University of Alberta's *Cleaning for a Healthy U* green cleaning program, AMLRS has adopted a green cleaning policy. This policy aims to reduce harmful chemicals in cleaning supplies used in the Station, to reduce the amount of water required for cleaning, and so provide a safe and healthy living environment. Using green cleaning products also reduces the risk of harmful chemicals getting into the surrounding natural environment and contaminating valuable water resources. Green cleaning products must meet EcoLogo™, Green Seal™ and/or Environmental Choice™ certification, and must meet Greenguard certification to be considered compliant to the AMLRS green cleaning policy. Products are obtained through Augustana Facilities & Operations.

Green cleaning products should be returned to their storage areas after being used. Proper storage of these products will help minimize the risk of spills and will prevent duplicate batches being prepared unnecessarily.

Station users are responsible for cleaning up after themselves and maintaining Station cleanliness. Please read the instructions on each product before using it, only use the minimum amount called for, and use cleaning products responsibly.

It is also the responsibility of Station users to maintain Station accessibility. When removing snow from steps and walkways, mechanical means (shovelling, sweeping, etc.) should be used before chemical-free de-icing agents (sand, green certified products, etc.), and de-icing agents should be used in the least required amounts. Chemical de-icers should be used as a last resort.

5) TRANSPORTATION

There are several transportation options for getting to and around Miquelon Lake Provincial Park. In an attempt to reduce the adverse environmental impacts related to mechanical transportation, consider active transportation - walking, biking, canoeing, etc. - to get around inside the Park. If you are driving a motorized vehicle, carpool if you can.

The Station is a designated 'no idling zone'; if your vehicle is not actively moving, it should be shut off. The exception is for warming a vehicle's engine in the winter, which only requires a few minutes. Keep your vehicle well maintained (proper tire pressure, full fluids, etc.) to ensure it runs in the most fuel efficient way. Remember there is no vehicle washing or maintenance allowed on site (see Part 1, section 2).

PART 2: SUSTAINABLE OPERATIONS

This section of the AMLRS Sustainability Plan contains more detailed information on the operation of the Station. These action items are to be addressed by the Station Manager, Augustana Facilities & Operations, and higher management levels.

1) BUILDING EXTERIOR & HARDSCAPE MANAGEMENT PLAN

This Plan operationalizes best practices in environmentally sustainable building exterior and hardscape management at AMLRS. It will significantly reduce the use of harmful chemicals, energy use, water consumption, air pollution, solid waste and chemical runoff as compared to traditional practices. Best practices apply to the Station itself as well as hardscape, collectively the 'site', and will apply to buildings or hardscape extensions that may be added to the site in the future.

The application of this plan contributes to:

- a safer, cleaner, and more environmentally friendly exterior environment for those using or in close proximity to the site;
- energy efficiency, water conservation, and improved exterior air quality, while simultaneously reducing operational costs;
- preventative maintenance, extending the life of the buildings and hardscape.

This plan includes management procedures for:

- cleaning and maintenance of the Station's exterior features
- cleaning and maintenance of hardscapes
- snow and ice removal
- exterior paints, stains, and sealants
- maintenance equipment

a) Cleaning & Maintenance of Exterior Features

The building exterior consists of steel wall and roof finish, glass windows, and treated lumber accesses.

The steel finish and treated lumber do not require routine cleaning, and are only cleaned when necessary. In such cases, the steel finish will be rinsed with a pressure washer. The treated lumber will be manually swept and only washed if needed.

Exterior windows are cleaned using green cleaning products and rainwater collected on site. This minimizes the use of chemicals and potable water while maximizing natural light in the Station.

If the building exterior requires maintenance, best practices in building repair and maintenance will be used by Augustana Facilities & Operations to assess and remedy the situation.

b) Cleaning and Maintenance of Hardscapes

The gravelled parking area is inspected regularly but will not be re-gravelled unless necessary, reducing maintenance requirements.

c) Snow and Ice Removal

If de-icing agents are required, they will not contain salts, chlorides, or dyes, and must be safe for accidental human and wildlife ingestion. Sand and Ecotraction™ are highly recommended as a primary de-icer options. De-icing agents are stored in the mechanical room to reduce the hazard of potential spills.

d) Exterior Paints, Stains, and Sealants

Exterior paints, stains, and sealants will only be used when necessary for maintenance or significant aesthetic improvements, as deemed necessary by the AMLRS Oversight Committee and/or Augustana Facilities & Operations. Paints, stains, and sealants will meet green product standards and be environmentally preferred products with low volatile organic compound levels whenever possible.

e) Maintenance Equipment

Because AMLRS is in a more secluded area of the Park and is not an openly public space, the lawn will be mowed less frequently, reducing the amount of fuel required to maintain it. This service is provided by Miquelon Lake Provincial Park.

2) MANAGEMENT OF NATURAL COMPONENTS

Managing natural components in AMLRS is being done through a series of plans and protocols using best practices in environmentally sustainable natural component management. This preserves ecological integrity, enhances natural diversity and protects wildlife while supporting sustainable building operations and the integration of AMLRS into the surrounding Provincial Park landscape.

The application of these management practices will contribute to:

- safer, locally adapted and naturalized landscaping to minimize potential adverse impacts on the surrounding environment and wildlife;
- reduced long term maintenance, water conservation, and reduced fertilizer requirements while simultaneously reducing operational costs.

This section includes management procedures for:

- integrated pest management
- erosion and sedimentation control
- landscape waste diversion
- plant selection
- compost and chemical fertilizer use
- informing site users of potential pests, pesticide use, and chemical fertilizer use
- stormwater management

a) Integrated Pest Management

This protocol is designed to manage indoor and outdoor pests - including plants, fungi, insects, and animals - in a way that makes AMLRS safe for human use and viable for sensitive research projects while maintaining a near-natural state of the surrounding environment. In an effort to make AMLRS as sustainable as possible, pest management avoids the use of chemical pesticides as much as possible. Pest management will instead proactively reduce pests by providing proper housekeeping and regular maintenance before the use of pesticides.

Initial measures consist of non-invasive manual means, including:

- using wildlife-proof garbage bins
- skirting AMLRS so wildlife cannot reside beneath it
- installing nearby bat-boxes and birdhouses so bats and birds do not reside in AMLRS buildings themselves
- hanging fake wasp nests to deter nest building on site
- manually removing wasp/hornet nests on or near AMLRS buildings
- manually removing invasive plant species, if possible
- replanting bare outdoor areas with non-invasive grass approved by Park officials
- keeping the Station interior, exterior and grounds regularly maintained so as not to provide pest habitat
- ensuring Station doors are not propped open for long periods of time and are fully closed when shut
- providing flyswatters

When manual methods are ineffective, non-chemical pest management will be considered for use before other pesticides. These include, but are not limited to:

- using home remedies to deter insects, cure fungal diseases, deter ungulate browsing on specific plants, deter rodents and rabbits (search online)
- installing mouse traps
- installing wasp/hornet traps
- installing ant repellents

If non-chemical pesticides are ineffective, least-toxic green certified chemical pesticides may be used in their smallest effective quantities and in specifically targeted locations to manage specifically targeted pest species.

Chemical pesticides may be applied as a last resort or in an emergency situation, as decided by Augustana Facilities & Operations. Chemical pesticides should be applied in the smallest effective amounts and restricted to areas of known pest activity.

b) Erosion and Sedimentation Control

Erosion and sedimentation control measures are not heavily required as the majority of the AMLRS site is already covered in well-established grasses and other vegetation. However, in the event of grass and root removal, as in the case of new construction or vegetation removal/planting, a Parks approved grass seed mixture will be applied to the disturbed area as soon as effectively possible after the disturbance to reduce the possibility of wind and water erosion.

Rain gutters on roofs will also prevent water runoff from causing erosion beneath roof edges. Collected rainwater may also be used to spray the gravelled area during dry and windy periods to reduce wind erosion and provide dust control.

Most erosion and sedimentation will occur in the gravelled driveway area as it is a loose substrate. Erosion and sedimentation will be controlled in the gravelled area to the best of AMLRS ability by maintaining grass coverage to the edges of the area.

Stormwater runoff will naturally run away from AMLRS buildings due to ground slope, but the site will be inspected regularly for signs of poor drainage. Additional trees and shrubs may be planted along site edges to reduce erosion and sedimentation from stormwater.

c) Landscape Waste Diversion

Landscape waste will be minimal as all AMLRS vegetation is to be native or adapted, requiring less maintenance than other species. Grass clippings will not be collected, retaining organic material on the lawn. Removed organic materials will be taken to an off-site composting facility or used as firewood for the AMLRS wood stove or fire pit.

d) Vegetation Selection

All newly planted vegetation will be Park approved and native or adapted to increase vegetation survival and reduce watering, fertilizing, and general maintenance needs. Newly planted vegetation will be watered with collected rainwater when possible to reduce the use of potable water.

Seeds and plants will be applied by hand to minimize over-seeding. Non-native and non-adapted species will be removed from the site and replaced with native or adapted species.

e) Compost and Chemical Fertilizer Use

Since the vegetation on site will be native and adapted plants, fertilizer should not be required. If it becomes necessary, compost will be used before any chemical fertilizer. If no compost or not enough compost is readily available, minimal amounts of chemical fertilizers may be applied by hand to reduce over-fertilizing.

f) Informing Site Users of Pests, Pesticide and Chemical Fertilizer Use

AMLRS users will be informed of any problem pests, chemical pesticide use, and chemical fertilizer use as they are discovered and at least 48 hours before the chemicals are applied. AMLRS users will be contacted via phone or email. Manual and non-chemical pest control methods will not necessarily require AMLRS user notification. In the event of chemical pesticide or fertilizer use, affected areas will also be marked with clear signage and MSDS sheets will be available for any pesticides or fertilizers used.

g) Stormwater Management

As AMLRS is located within a Provincial Park, no underground cisterns or holding tanks were installed to collect stormwater, as they would have increased site disturbance. AMLRS has instead installed rain gutters on building roofs to collect rainwater in rain barrels. This collection will not affect stormwater runoff quantity, maintaining regular groundwater recharge rates in the local area.

The AMLRS landscape naturally directs water away from the site, as it sits on a local high point. Regardless, the site will be inspected regularly for pooling water and poor drainage. If monitoring reveals these issues, they will be addressed by Augustana Facilities & Operations to facilitate improved stormwater drainage. Maintaining on-site vegetation will reduce the potential for erosion and sedimentation caused by stormwater runoff.

With respect to maintaining stormwater runoff quality, only minimal amounts of chemicals will be used on site. In addition, no chemical insecticides, herbicides, fertilizers, de-icing agents, or other chemical applications may be stored outside of an AMLRS building or on the floor of the garage. Chemicals will not be applied within 48 hours of an expected storm, if possible.

3) SUSTAINABLE PURCHASING

Green purchasing principles were developed at the University of Alberta in 2011 to inform the campus community about sustainable and ethical purchasing options that would reduce environmental impacts and promote sustainability.

The Office of Sustainability, in conjunction with University of Alberta Supply Management Services, maintains a list of preferred suppliers from which the majority of the U of A's administrative and operational goods and services are purchased. These suppliers are used to meet criteria outlined in the U of A Environmentally Preferable Purchasing policy. As a research station owned by the U of A and operated through the U of A's Augustana Campus, AMLRS has adopted and applied these green purchasing principles in its own operation.

a) The AMLRS Green Purchasing Plan

One of the first steps in Green Purchasing is not purchasing at all. AMLRS was largely outfitted and furnished with donated items, and will continue to source gently used furniture and other items in the future. Items may be sourced for free from donations, the Augustana surplus system, and the U of A surplus system.

Items and appliances that cannot be obtained at no cost can be purchased or traded from local consignment stores. Some recommended stores include socially conscious stores such as the Camrose ReStore, which supports Habitat for Humanity. The ReStore is also a local organization. Buying local requires less transportation involved in obtaining items, which is a component of the 'supplier' principle, and is also economically sustainable for the local community.

Items that cannot be found in good condition from surplus or consignment stores can be purchased from the U of A's preferred suppliers, when possible. Other items can be purchased from suppliers that are third party certified as being environmentally responsible, from suppliers that support sustainability initiatives and/or environmentally friendly business operations. When purchasing new items, cost, product quality, and duration of expected use should be taken into consideration to find the best item options.

Ongoing purchases of consumables made by AMLRS will continue to follow the U of A's Green Purchasing principles and the AMLRS Green Purchasing Plan whenever possible and appropriate. Ongoing purchases include, but are not limited to, items such as:

- cleaning products and maintenance supplies
- toilet paper and paper towel
- laboratory chemicals, supplies, and equipment
- computer and IT equipment, including ink and toner cartridges
- paper and paper products
- batteries

Many of these items will also be purchased in bulk with Augustana Campus and Augustana Facilities & Operations supplies to reduce additional transportation and packaging requirements.

In addition to the previous Green Purchasing principles, AMLRS follows guidelines on purchasing, maintaining, and replacing equipment. These include:

- CFC restrictions. No CFC-based refrigerants may be used in the Station.
- Mercury restrictions. No lighting, including lamps, containing high levels of mercury may be used in the Station.
- Fire suppression restrictions. No fire suppression systems (fire extinguishers) containing ozone-depleting substances (CFCs, HCFCs, or Halons) may be used in the Station.

4) MONITORING

There are several monitoring programs in place at AMLRS to track utility usage and waste diversion. Augustana Facilities & Operations will make regular visits to look for building damage and carry out regular maintenance. On these trips, F&O will also record meter readings for monthly water use, electricity use, and natural gas use, and collect and record the volumes of recyclables being diverted from the waste stream. Monitoring will still occur when the Station is unoccupied to maintain consistency and troubleshoot the Station. These records will be kept for the life of the Station to maintain a history of Station-wide utility usage and waste diversion.

These records will contribute significantly to the sustainable operation of AMLRS. Maintaining an accurate history of resource use and waste diversion will allow the AMLRS Oversight Committee and Station Manager to develop or adjust Station protocols and/or infrastructure to reduce utility use, improve recycling rates, and lower the overall environmental impact of the Station.

See appendices D and E for Water and Energy Use Monitoring Programs, respectively.

PART 3: FUTURE SUSTAINABILITY INITIATIVES

Our Common Future: Report of the World Commission on Environment and Development (1987), more commonly known as the Brundtland Commission or Brundtland Report, defines sustainable development as “development that meets the needs of the present without compromising the ability of future generations to meet their own needs.” AMLRS has integrated this concept into its own idea of sustainability so planning is not done for just the present - there are also plans for long-term future sustainability developments at AMLRS. These plans will increase the quality and quantity of research, undergraduate coursework, and programming offered, and will do so in an ever more sustainable way throughout the life of the Station.

Sustainability will be regularly reviewed through annual AMLRS meetings. These meetings will identify areas of sustainability weakness. In doing so, updated or altered best management practices can be implemented into their respective sections in order to maintain a high level of sustainability features in the Station.

In addition to these meetings, AMLRS maintains a list of future sustainability initiatives that are currently not in place at the Station. These initiatives are a priority of the Station, and will have actions taken to make them a reality.

Compost

Composting plays a significant role reducing waste by removing organic material from the landfill. The compost bin will be wildlife-proof and low maintenance, requiring little time and effort by Station users. Finished compost will be used as fertilizer for AMLRS grounds, MLPP grounds, and Augustana campus grounds, as needed.

Station users will be encouraged to use the compost for food scraps and organic material that cannot be otherwise recycled, such as food-contaminated paper products.

Expanded Monitoring Program

As it becomes feasible, the monitoring program will be extended to include several categories besides the existing utility use and recyclables monitoring. This may include solid waste (by weight), compost (by weight), fuel consumption on site (for equipment use; by volume), and fertilizer use (by weight). Being able to expand the monitoring program to include these items would give AMLRS a better idea of the resources and facilities being used, and where to focus on developing additional or altered programs for further sustainability efforts.

Wildflower Garden for Pollinators

Planting a simple garden of native wildflowers with overlapping flowering seasons can attract pollinators. As global bee populations are declining, a pollinator garden would provide an area to sustain local bee populations, as well as other pollinators, in a natively vegetated and pesticide-free area. A wildflower garden for pollinators would also provide unique research opportunities into pollinator behaviour and ecology, contributing to long-term pollinator knowledge and environmental sustainability.

100% Green Energy

There are several companies in Alberta that offer the option for facilities to purchase 100% of their energy from green sources. Green energy sources include solar, wind, hydro, biomass, and biogas capture.

Though currently not feasible in the AMLRS budget, 100% green energy is a very real possibility for the future. Eliminating the emissions produced in powering the Station would be a huge step toward improving long-term sustainable Station operation.

On-Site Solar Energy

Another alternative energy option is to generate energy directly on site through solar panels on AMLRS buildings. Solar technology is becoming cheaper, more efficient, and easier to maintain. By installing solar panels and an attached battery system, solar energy can be gathered during peak daylight hours, stored, and released on command for Station use. With this initiative energy use could be significantly reduced, if not eliminated for parts of the year, increasing the Station's long-term sustainability.

Water Recycling Systems

The AMLRS water infrastructure system can be altered to direct the flow of the Station's greywater through the system to be used in the toilets, eliminating potable water consumption in the toilets.

LEED Certification

Leadership in Energy and Environmental Design (LEED) certification provides recognition to buildings that display excellence in sustainable design and operation. This level of certification is also promoted through the wider University of Alberta Sustainability Plan. Having AMLRS certified as meeting the extensive LEED criteria would cement and promote the idea of the Station as a research station operating at an exceptional level of sustainability.

APPENDICES

APPENDIX A WASTE MANAGEMENT AND LANDFILL DIVERSION PLAN

1) INTRODUCTION

The AMLRS Waste Management and Landfill Diversion Plan is designed to reduce the amount of waste that ends up in landfills. Having this plan in place can help to reduce the amount of material that ends up in landfills and incinerators, reducing greenhouse gas emissions and reducing the area needed to dispose of waste. Proper waste management includes a large recycling component, reducing the amount of raw materials, water, and energy required to produce goods from new materials.

Waste reduction in the Station is achieved through diversion strategies grouped into:

- A. Solid Waste
- B. Recycling
- C. Laboratory Waste
- D. Green Purchasing

The success of the first three strategies rely on AMLRS users for direct participation. All Station users will be made aware of the waste diversion options available in the Station and will be encouraged to use them.

The Waste Management and Landfill Diversion Plan will be regularly reviewed to determine areas of weakness in waste diversion. These areas will be addressed and corrected for with updated best management practices and innovations specific to the unique needs of AMLRS.

2) IMPLEMENTATION

a) Solid Waste

Solid waste (garbage) bins accompanied by recycling bins are found throughout AMLRS. Through consistent, understandable, and clearly visible labelling on recycling bins, the Station will reduce the amount of waste incorrectly ending up in the garbage.

Providing Station users with reusable dishes, cups, cutlery, food storage containers, and cooking utensils will further reduce solid waste. Promoting the use of reusable hand towels over paper towel in the kitchen and washrooms will also reduce waste.

b) Recycling

Recycling is a major component in reducing AMLRS waste. In addition to beverage container recycling, single-stream mixed recycling is in place at the Station, allowing mixed paper, light cardboard, plastics (#1, 2, 3, 5, & 7), and light metals to be recycled together. By making the recycling process easier and more convenient for Station users in that they do not have to sort recycling, usage will be higher.

There are also options for recycling other items in the Station. Glass, batteries, and ink cartridges can be recycled in appropriately labelled bins. Electronics can be labelled as recycling and placed in the server room for collection. Arrangements can be made through the Station Manager to recycle furniture, equipment, and other durable goods. Items that need to be replaced will be acquired following the AMLRS Green Purchasing Plan, reducing the purchasing of brand new items.

c) Laboratory Waste

In addition to the presence of recycling bins, each room is equipped with several electrical outlets to encourage the use of digital technology to reduce paper use.

Waste management protocols specifically for the wet laboratory are somewhat unique to the rest of the Station. These protocols require minimum chemical and material use as a matter of safety, as well as waste reduction. It is encouraged that any excess chemicals be shared with other researchers to reduce the total amount of chemicals purchased. Clean, unbroken laboratory glassware can be recycled through the residential recycling. Broken glass and sharps are collected in the appropriately labelled wet lab bin and are disposed of through the U of A Hazard Waste Management System. Hazardous waste is collected in the appropriately labelled container and is also disposed of by the U of A Hazard Waste Management System.

d) Green Purchasing

The AMLRS Green Purchasing Plan outlines choosing products and services that reduce environmental impact. It includes principles such as reducing purchases by purchasing out of necessity, purchasing products made of recycled content, purchasing durable quality products over disposable products, and considering water and energy efficiency. The guidelines also refer to preferred U of A suppliers that share environmentally sustainable views in business dealings.

In addition to purchasing items, the AMLRS Green Purchasing Plan outlines steps for reducing purchases through accessing surplus services, where previously used items including furnishings, lab equipment, and other durable goods, can be obtained by U of A departments for U of A use.

APPENDIX B

WATER MANAGEMENT PLAN: SYSTEMS AND STRATEGIES TO REDUCE WATER USE

1) INTRODUCTION

AMLRS is dedicated to sustainability, and reducing water usage is a significant part of sustainable operations. As such, there are various strategies and systems in place at AMLRS to reduce water use and improve the long term sustainability of the Station.

Broken into general categories, these implementations include:

- A. Systems
- B. Strategies
- C. Encouraging Water-Efficient User Behavior
- D. Water Use Monitoring Program

While water use should be reduced throughout the Station, minimizing cistern water use is especially important. As the cistern needs to be filled by truck and cannot be fed by the Park system, this water is more expensive and requires additional fossil fuel burning to be transported to AMLRS.

The Water Management Plan and the Water Use Monitoring Program will be examined regularly to determine areas of weakness in reducing water usage. These areas will be addressed and corrected for with updated best management practices and innovations specific to the unique needs of AMLRS.

2) IMPLEMENTATION

a) Reducing Water Use - Systems

There are multiple mechanical systems integrated into AMLRS to reduce potable water usage without Station user effort. These water saving systems are key in reducing baseline water use.

The first system includes low flush toilets and low flow faucet aerators installed throughout the Station, with the exception of the showers due to system complications. These reduce the amount of water used when flushing and running water, as compared to conventional flow fixtures. Another system includes water efficient appliances, including a dishwasher and clothes washing machine.

Rainwater capture is another system used in AMLRS. By designing rain gutters to collect water from building roofs and channel that water into rainwater collection barrels, a store of water becomes available for exterior use without using potable water.

Water metering is the final water-related system in place at AMLRS. The ability to meter water usage provides the opportunity to monitor and measure water usage. The Water Use Monitoring Program explains in more detail how this ability to measure water usage contributes to reduced total water usage.

b) Reducing Water Use - Strategies

In addition to the systems reducing water usage at AMLRS, there are also several strategies to further reduce water usage. These strategies provide opportunities for conserving potable water and promote the sustainable operation of AMLRS.

First, the buildings themselves are designed to not require regular external washing. Their steel finish does not have to be annually washed, unlike plastic composite siding, reducing the amount of water and chemicals required for maintenance and cleanliness.

Monthly visits by Augustana Facilities & Operations will help catch leaks early on. On-call maintenance is available for contact when water issues such as leaks or drips are discovered by Station users, reducing the time between finding and fixing water issues.

Exterior hardscape and landscape management also have strategies for reducing water use. Building accesses are swept instead of washed. All plants, including grasses, shrubs, and trees planted on the site must be native or adapted; these plants require less water to survive, and typically also require less fertilizer. Mowing the lawn at a higher level reduces evaporation, and leaving the grass clippings on the lawn allows for water retention and nutrient cycling in situ.

Designated cleaning supplies and regular maintenance schedules minimize the use of water and potential chemical pollutants within the Station.

c) Reducing Water Use - Encouraging Water-Efficient User Behavior

There are additional practices in place to encourage AMLRS users to be aware of and alter their water-use habits, reducing the amount of potable water used.

Advertising the Station as a research facility designed around sustainable operations is the first step in encouraging sustainable use. By initially presenting the Station as a sustainable facility, users are primed for sustainability features and practices, including reduced water use, before ever reaching AMLRS.

Education is also an important part of encouraging water-efficient user behavior. AMLRS users are made aware of the sustainability elements in place at the Station as well as why those elements are so important on both a local and larger sustainability

scale. Signage around AMLRS also reminds users of practices that reduce their personal water use.

d) Water Use Monitoring Program

The AMLRS Water Use Monitoring Program is used to measure and record water usage at AMLRS through water metering. Water from the Provincial Park is metered by an external water meter. Water from the cistern is monitored through purchasing receipts. Metering data can be used to monitor trends in water usage and identify ways to alter and further reduce potable water usage. Any altered practices will be added to or updated within the Water Management Plan or Water Use Monitoring Program as they are implemented.

APPENDIX C

ENERGY MANAGEMENT PLAN

1) INTRODUCTION

AMLRS runs on two different kinds of energy: electricity and natural gas. Most of the electricity generated in Alberta comes from coal fired power plants, and natural gas is extracted from the ground through drilling operations. Both of these energy options produce greenhouse gases in obtaining, refining, and delivering their products. By reducing energy use, the AMLRS Energy management Plan is reducing demand on those forms of energy, contributing to reduced greenhouse gas emissions and an increase in sustainability. A reduction in energy use also reduces the energy bill of the Station, saving money and making AMLRS more financially sustainable. As such, there are various actions being taken to reduce energy use in AMLRS, including:

- A. Energy Efficient Systems and Appliances
- B. Encouraging Energy-Efficient User Behavior
- C. Energy Use Monitoring Program

The Energy Management Plan and the Energy Use Monitoring Program will be examined regularly to determine areas of weakness in reducing energy usage. These areas will be addressed and corrected for with updated best management practices and innovations specific to the unique needs of AMLRS.

2) IMPLEMENTATION

a) Energy Efficient Systems and Appliances

AMLRS was designed with sustainability in mind. As energy conservation is a significant part of sustainability, energy efficiency was worked into the building design.

AMLRS has windows in the majority of its rooms to provide natural daylight and reduce the need for interior lighting. The interior walls, ceiling, and flooring Station are light in colour to maximize light reflection, further reducing the need for interior lighting. All interior lighting is fluorescent, reducing electricity consumption compared to traditional incandescent light bulbs. Exterior lights are also fluorescent, contributing to reduced electricity consumption, and are to be used minimally as Miquelon Lake Provincial Park is a designated Dark Sky Preserve.

AMLRS is equipped with a high efficiency natural gas furnace. There is also a wood stove that can be used to offset furnace requirements when the Station is cool, reducing natural gas use. A high efficiency natural gas hot water tank supplies heated water through the building, and a high efficiency refrigerator/freezer uses comparatively low amounts of electricity. The dishwasher, electric range, microwave, washing machine

and clothes dryer are also high efficiency, reducing the amount of electricity used in comparison to standard operating machines.

b) Encouraging Energy-Efficient User Behavior

There are additional practices in place to encourage AMLRS users to be aware of and alter their energy-use habits to reduce energy consumption.

Advertising the Station as a research facility designed around sustainable operations is the first step in encouraging sustainable use. By initially presenting the Station as a sustainable facility, users are primed for sustainability features and practices, including reduced energy use, before ever reaching AMLRS.

Education is also an important part of encouraging energy-efficient user behavior. AMLRS users are made aware of the sustainability elements in place at the Station as well as why those elements are so important on both a local and larger sustainability scale. Signage around AMLRS reminds users of practices that reduce their personal energy use.

c) Energy Use Monitoring Program

A key component in measuring the success of energy reduction lies in monitoring. Augustana Facilities & Operations reads the Station electricity and gas meters and records energy use on a monthly basis. Consistent monitoring and recording of energy usage allows for comparisons, analysis, and development of reduction strategies. Energy records can be used as benchmarks to improve management in reducing energy use. Alterations in management or monitoring practices will be added to the Energy Management Plan or Energy Use Monitoring Plan as they are implemented.

APPENDIX D

WATER USE MONITORING PROGRAM

1) INTRODUCTION

The AMLRS Water Use Monitoring Program is used to measure and record water usage at AMLRS through water metering. This part of the AMLRS Sustainability Plan incorporates an opportunity for long term quantitative monitoring of water use. Water conservation and reduced usage is becoming a more important aspect of sustainability as potable water supplies become harder to find and access around the world.

Results obtained from this Program will be used to manage future water usage, including developing water use reduction targets for AMLRS and measuring progress toward those targets, as well as providing data by which water reduction practices can be designed.

2) MONITORING PROCESS

Monitoring must be consistent for usable data to be collected. Consistent monitoring and data collection will lead to more accurate measurements and contribute to effective methods of achieving reductions in water use.

Water sourced from Miquelon Lake Provincial Park water lines is metered by an external water meter. Water from the internal cistern is metered by examining purchasing receipts and schedules.

Meter readings are regularly recorded by Augustana Facilities & Operations. Meter readings will still occur when the Station is unoccupied to maintain consistency and maintenance; no water should be used if there are no Station users present, so water usage during those times may indicate a leak.

APPENDIX E

ENERGY USE MONITORING PROGRAM

1) INTRODUCTION

The AMLRS Energy Use Monitoring Program is used to measure and record energy usage at AMLRS through energy metering. This part of the Sustainability Plan incorporates an opportunity for long term quantitative monitoring of energy use. AMLRS runs on two different kinds of energy: electricity and gas.

Results obtained from this Monitoring Program will be used to further manage energy usage, including developing energy use reduction targets for AMLRS and measuring progress toward those targets, as well as providing data by which energy reduction practices can be designed.

2) MONITORING PROCESS

For usable data to be collected, monitoring must be fairly consistent. Consistent monitoring and data collection will lead to more accurate measurements and contribute to more effective methods of achieving reductions in energy use.

Meter readings are regularly recorded by Augustana Facilities & Operations. Meter readings will still occur when the Station is unoccupied to maintain consistency and maintenance; consistently low energy should be used if there are no Station users present, so anomalies during those times may indicate unnecessarily running equipment, plugged in appliances, lights or appliances left on, the thermostat set incorrectly, etc.