



Edmonton Valley Zoo Sustainability Plan

Scott B. | Sustainability Scholar | August 2016

Jasmine S. | Mentor | Edmonton Valley Zoo



Table of Contents

| | |
|--|----|
| Executive Summary and Key Recommendations..... | 2 |
| Introduction | 4 |
| Green Team Sustainability Mission | 6 |
| Sustainability Vision | 7 |
| Baselines and Benchmarks..... | 8 |
| Awareness | 9 |
| Innovation | 12 |
| Ecological Conservation..... | 15 |
| Purchasing..... | 21 |
| Construction..... | 24 |
| Chemical Management | 27 |
| Energy Management..... | 28 |
| Waste Management..... | 31 |
| Water Management | 35 |
| Fuel Management | 38 |
| Appendices | 41 |

Executive Summary and Key Recommendations

Executive Summary

This plan represents the Edmonton Valley Zoo's (EVZ) next step towards leading green and sustainable practices within the Greater Edmonton area. To do this, the EVZ has put together the Green Team whose mandate is to significantly lower the Zoo's overall ecological footprint while developing impactful, fun, and informative messaging that the public can adapt in their lives. This plan was written with the help and insights of numerous EVZ staff, a number of zoos and aquariums from across North America and the globe, the City of Edmonton (CoE), and sustainable guidelines provided by the Association of Zoos & Aquariums (AZA).

In light of global climate change, habitat loss and mass species extinctions, pollution, unethical production of goods and services, and other world issues, the EVZ and the CoE are committed to reducing their ecological footprint and procuring ethically sourced goods and services, all while providing a happy and healthy community-focused environment for Edmonton's citizens and guests alike. Practices and procedures that were once deemed socially acceptable, like pouring chemical waste directly into our waterways, are now discouraged if not outright illegal. This is a result of people growing as a global community, and a deeper understanding of our connections to and interactions with local and global systems. This is a process of learning.

There are many professional and personal practices which are considered common ground, "normal", and sustainable by today's standards but will be taboo in the near future. As we learn and grow, opportunities to make positive impacts on the world will become more apparent and easier to adapt. This is also really exciting. There is ample opportunity for organizations the world over to not only integrate established sustainable practices into their operations but to also discover and develop practices that are completely unprecedented anywhere. A chance "to boldly go where no one has gone before". This is what is meant by being a sustainability leader.

The EVZ and the CoE have already taken numerous steps to be recognized as sustainability leaders. The CoE is committed to its ISO 14001 environmental management certification, sometimes referred to as Envisio within the city, and is outlined in the city's environmental strategy plan "The Way We Green". An example of this commitment by the CoE is Edmonton's world class waste management system, with a citywide goal of attaining a zero waste footprint. Being a city facility, the EVZ is also committed to the Envisio certification while simultaneously being committed to zoo specific sustainable practices. As such, this sustainability plan encompasses aspects of Envisio, AZA's Green Guides, and valuable sustainability lessons learned from other zoo and aquarium organizations. The EVZ has made some amazing steps towards a sustainable tomorrow including rain/run-off water capture systems, the use of onsite solar panels at multiple locations across the site, the Conservation Station, the LEED Silver certified EdVenture Lodge and plaza, amongst many others. This momentum should continue as the Zoo further distinguishes itself as a true sustainable leader.

Key Recommendations

This plan focuses on 10 categories of sustainability and how they relate to the EVZ: awareness, innovation, chemical management, purchasing, construction, waste management, energy management, ecological conservation, water management, and fuel management. All recommendations in this report fall under one or more of these pillars. Below are a number of key recommendations consisting of short term, mid term, and long term goals that primacy should be given to. They are not comprehensive of all recommendations outlined in this report and greater details on what these recommendations entail can be found in the body of the report.

Short term

- 1) Develop detailed annual inventories for resource management (e.g. electricity, water, etc.)
- 2) Work with the CoE to use smart/sub-metering technology across the EVZ
- 3) Appropriately monitor and manage onsite waste including the compost pile
- 4) Identify distinct and measurable sustainability goals (e.g. carbon neutral by 2050)
- 5) Continue to develop educational programs that include messages about sustainability
- 6) Write Annual Sustainability Reports (this being the first)

Mid term

- 7) Create a Sustainability/Green Plan Coordinator position
- 8) Adaptation of environmentally friendly building/landscaping retrofits as technology increases
- 9) Increase standards of new onsite construction (e.g. LEED Silver to LEED Gold cert.)
- 10) Integration of renewable energy sources across the site
- 11) Progress reports on reaching sustainability goals included in Annual Sustainability Reports
- 12) Become a petroleum-based plastic free facility
- 13) Be a leader in organizing local ecological restoration projects
- 14) Provide greater support to conservation initiatives through education and direct involvement

Long term

- 15) Attain long-term sustainability goals that were identified in the short-term recommendations
- 16) Grow into an ecologically and socially neutral facility (e.g. carbon, water, purchasing, etc.)
- 17) Be viewed as a world leader in sustainability for similarly sized zoos and aquariums
- 18) Fully harmonize with the CoE as smart city designs become the norm

Introduction

How does an organization go about writing a sustainability plan and then integrating this plan into their day-to-day operations when the idea of being sustainable is such a vague concept? The first step is for the organization to remove the vagueness from the term “sustainable” until this societal concept is formed into a tangible, practical, realistic, and working understanding of sustainability that can be implemented by that organization as it grows. This includes specifically identifying the goals that the organization wishes to accomplish and recognizes how the strengths and weaknesses of the organization relate to attaining these goals. Since an IT company functions differently than a landscaping company that functions differently than a public zoo, a sustainability plan for each will have many differences but a common theme between all will be to bring long-term stability to the organization in question. This vision of long-term stability may include a diverse number of goals ranging from maintaining positive clientele relationships, having a happy and healthy work environment for employees, working towards and gaining mutual respect with the local and global communities, respecting and promoting thriving ecosystems that provide for the people of today and future generations, and so on. It is the responsibility of any organization looking to develop a sustainability plan to define what is sustainable according to their own needs and goals as there is no single working definition of what sustainable is or should be.

Luckily there are more and more resources on how to develop a practical definition of sustainability. This report, written as the first complete Edmonton Valley Zoo Sustainability Plan, uses the AZA Green Guide Volumes 1 and 2 - 2013 (<https://www.aza.org/green-practices/>) as the main resources for developing a practical definition of sustainability and then applying this definition to the entirety of this report. This plan is written using a concept of sustainability defined by the “triple bottom line” where a practice, product, service, etc. is measured on a scale of less to more sustainable depending on how it positively addresses three key categories: environmental, social, and economic (see the image below). For example, a practice is considered unsustainable if it ignores all three categories during its implementation and highly sustainable if it addresses all three categories simultaneously.

Being a CoE facility, the EVZ follows the ISO 14001 environmental standard certification, called Enviso by the city. This certification has been integrated into the CoE’s vision and strategic plans, referred to as “The Ways” (for more information about “The Ways” please visit http://www.edmonton.ca/city_government/city-vision-and-strategic-plan.aspx). This report was written with this in mind, with a focus on goals and strategies outlined in “The Way We Green” Environmental Strategic Plan. In particular, goal 11 - “The City of Edmonton strives for sustainability and resilience in all it does” and goal 12 - “Lifestyles of Edmontonians contribute significantly to the city’s sustainability and resilience.” The EVZ attempts to address specific sustainability concerns while following Enviso protocols and practices. However, some sustainable recommendations in this report deviate from current CoE protocols and practices. Where these recommendations deviate from current CoE protocols and practices, such as the installation of sub/smart-metering across the EVZ facility, communication between the EVZ and a CoE Enviso representative(s) will be required to make sure that the ISO 14001 certification is being followed while also addressing the sustainability concerns at the Zoo.

The Three Spheres of Sustainability



Image borrowed from AZA Green Guide Volume 1 (2013).

Green Team Sustainability Mission

The Green Team is dedicated to improving the environmental impact of onsite practices and encouraging sustainability in the lives of employees at work and at home.

The EVZ Green Team is responsible for reviewing the zoo's practices and procedures.

This includes:

- Awareness
- Innovation
- Ecological conservation
- Purchasing
- Construction
- Chemical management
- Energy management
- Waste management
- Water management
- Fuel management

Sustainability Vision

Green Team Vision

The EVZ is a model leader in sustainable education and practices for the citizens of Edmonton. This includes embracing the concept of the triple bottom line: environmental stewardship, societal responsibility, and economic stability. The EVZ is committed to limiting its ecological footprint through green initiatives, technical innovation, community support, conserving wildlife and wild areas, promoting positive perceptual and behavioural changes in the public, and a true drive to live up to the responsibilities associated with being a sustainability leader.

The Way We Green Vision: 2040

As a CoE facility, the EVZ not only has its own Sustainability Vision but also that of the CoE. Below is the CoE “The Way We Green” vision, a vision of how the CoE sees itself in 2040:

Edmonton is a sustainable and resilient city. Living within the limits of nature, we have become a leader in energy efficiency and energy conservation. A carbon-neutral city, Edmonton is prepared for disturbances that could result from climate change and peak oil. In the course of everyday life, Edmontonians experience a strong connection with nature and rich biodiversity. Even though our population has increased significantly, our air and water are cleaner and the amount of waste we generate has decreased. Edmontonians have learned to live locally and our food supply is secure. As reflected by our ever-shrinking ecological footprint, Edmontonians live in ways that are equitable to other people and life on the planet. Our journey has transformed us physically, environmentally, socially, and economically. Throughout the journey we have collaborated with other communities and orders of government, helping to create sustainability and resilience in our region and beyond. We have lived our lives sustainably, in ways that have protected the environment for future Edmontonians. Our legacy is a sustainable, resilient city that will support and enrich the lives of future Edmontonians.

Baselines and Benchmarks

Progress to Date Table

| Project | 2009 | 2010 | 2011 | 2012 | 2013 | 2014 | 2015 |
|---|----------|-----------|-----------|---------|---------|---------|---------|
| Electricity ¹ (kWh) | 1,061,31 | 1,091,819 | 1,352,864 | - | - | - | - |
| Natural Gas ¹ (GJ) | 17,279 | 18,683 | 22,580 | - | - | - | - |
| Water ¹ (m ³) | 140,469 | 56,505 | 100,810 | - | - | - | - |
| Waste to Landfill ² (t) | - | - | - | - | - | - | 47.97 |
| Recyclables to Landfill ² (t) | - | - | - | - | - | - | 39.27 |
| Organics to Landfill ^{2,3} (t) | - | - | - | - | - | - | 30.81 |
| Zoo Attendance Records | - | - | 177,750 | 224,536 | 229,143 | 261,595 | 377,281 |

¹ These values were measured before Arctic Shores and the Plaza/EdVenture Lodge were constructed and functional. As such, care must be taken when comparing these values to post-construction values. Values are from Stantec Detailed Energy and Water Assessment (October 20, 2012).

² Waste separation and diversion has only begun to be measured in detail for EVZ since August 2015. 2015 values were calculated by multiplying the sum of total monthly values from August to November by a factor of 3. These values should be seen as a rough estimate only. Values are from the CoE.

³ Organics sent to the onsite compost pile are not included in these values.

Why Measure Baselines and Benchmarks?

This table is by no means complete and is a generalization of Zoo operations at the time of writing. As the EVZ integrates better measurement and monitoring practices into its operations, this table is expected to grow and include more measured variables and more detail within variables. Additional variables to add to the table may include greenhouse gas emissions, office paper consumption, etc. The more detailed the better as these values will be referenced in the future. Remember two mantras... **“if it can’t be measured, it can’t be managed”** and **“what gets measured gets done”**. These may be clichés but there is truth behind them when identifying which sustainable actions are worthwhile exploring and which actions should not be undertaken, either now or ever. It also allows the Zoo to accurately track its progress over the years.

One of the most important steps the EVZ will take towards becoming more sustainable is to put together the detailed inventories that are described throughout this report. Where inventories cannot currently be compiled for any reason (e.g. lack of information), the Zoo must address this issue sooner than later as mid to long term sustainable planning requires these inventories to be successful. Measuring baselines and identifying benchmarks will be instrumental in guiding the Zoo’s sustainable practices into the future.

Awareness

Sustainability Goals

The Green Team's goals are to reduce the Zoo's impact on the environment and provide a good example to guests of the facility. The Green Team hopes to encourage individuals to make changes in their own lives, by modelling environmental responsibility, and engaging and educating visitors.

Meetings

Green Team meetings occur quarterly throughout the year. The minutes to these meetings are saved on the CoE's internal G: drive. For more information please contact Jasmine Spraakman (jasmine.spraakman@edmonton.ca).

Green Team Members (as of June 2016)

Jasmine - jasmine.spraakman@edmonton.ca Edmonton Valley Zoo Program Manager

Karyn - karyn.macdonald@edmonton.ca Zoo Attendant

Derrick - derrick.matheson@edmonton.ca Zoo Attendant

Dean - dean.treichel@edmonton.ca Operations Supervisor

Beckie - rebekah.boutilier@edmonton.ca Program Coordinator (JJNC)

Isabelle - isabelle.frederick@edmonton.ca Interpretation Program Coordinator (Zoo)

Wade - wade.krasnow@edmonton.ca Zookeeper Team Lead

Yvonne - yvonne.johnston@edmonton.ca Site Keeper

Jen - jennifer.camphuis@edmonton.ca Site Keeper

Annual Reports

This document is the first of what should become a series of transparent **Annual Sustainability Reports (ASRs)** produced by the EVZ's Green Team. As the Zoo evolves and Zoo management practices change, so should the sustainability goals of the Zoo. As such, this document is to be viewed as a "living document" - never set in stone and changing as the Zoo changes. With that said, this document can be referred to when necessary to help map the Zoo's progress towards becoming more and more sustainable. It will recognize Zoo sustainable successes over the year, areas that the Zoo requires improvements, and modifies previous years' goals as the Zoo becomes more capable.

*It should be noted that by 'modifying goals' this does not mean consistently pushing back sustainable targets and deadlines (e.g. water neutrality by 2050... 2060... 2070). Instead, one should realize that the EVZ of 2025 will not be the same EVZ of 2016. The ASRs should reflect the EVZ as it is at the time of writing, not what it used to be.

Employees and Sustainability

The findings, achievements, and areas of improvement of the ASRs should be regularly communicated internally to staff and volunteers to promote the Zoo's sustainable practice efforts. Recognition of sustainable efforts and progress should be included in staff performance evaluations when appropriate. In coordination with these efforts, future interviews for new staff and volunteers should screen for "demonstrated environmental responsibilities" as being valuable characteristics and life experiences that will add to the entirety of the Zoo team as a whole.

One of the roles of the Green Team is to actively engage employees and volunteers about the importance of sustainability at the Zoo and at home. In conjunction with having a green gift exchange during the holiday season, the Green Team can hand out “Green Holiday Gift Guides” to promote conscious consumerism. “Lunch and Learn” educational programs hosted by the Green Team are another means to teach sustainability practices to employees and volunteers in a fun and engaging manner.

As sustainability initiatives get integrated into the operations of the Zoo, defining who is accountable for which aspects of the sustainability plan will be key to make sure that the initiatives are a success. This will help alleviate issues associated with lack of leadership and confusion around who should be doing what initiative. Many EVZ employees already have full workloads so it is strongly recommended that a permanent sustainability/green plan coordinator position be created to guide and implement sustainable research and practices across the Zoo (see “Sustainability/Green Plan Coordinator” in the Innovation section for further details).

Public Engagement and Awareness

As the Zoo takes steps to become ever more sustainable, engaging and educating the public about sustainable practices at the Zoo and at home could be shared by interpreters at the Conservation Station. Having a regular roving interpreter dedicated to sharing sustainability info with the public would go a long way in this area. Signage on sustainability can be placed in areas related to the message being conveyed (e.g. water conservation in washrooms, why recycling is important on recycling bins, cool composting facts by the compost pile). To further instill the idea of the “reduce, reuse, recycle” mantra on the public, the interpreter could demonstrate art, crafts, and alternative uses for commonly recycled items in one’s home. The Zoo should encourage the public to get creative with their recycling. The zoo could even contract a professional artist to design and make a sculpture made out of recycled materials and have the sculpture highly visible for the public to enjoy.

Avoiding Greenwashing

As the EVZ moves towards and publicly promotes sustainable practices, it must be careful in avoiding “greenwashing” any sustainable initiatives that it is promoting. According to The Sins of Greenwashing (www.sinsofgreenwashing.com), greenwashing is defined as “the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service.” Ethically speaking, the Zoo should avoid knowingly greenwashing any Zoo activity, program, initiative, etc. at all costs. It is better to be truthful about a practice that the Zoo may not be proud of and take steps to rectifying this practice than to lie or hide this practice from public scrutiny. Being factually accused of greenwashing by an environmental organization or the public can seriously tarnish the EVZ’s sustainable image and its credibility as a respectable public facility. It is much easier for an organization to lose a positive public image than it is to gain a positive public image.

The Sins of Greenwashing recognizes “seven sins” of greenwashing which the EVZ should be aware of as it moves into and promotes a more sustainable future:

- Sin of the Hidden Trade-off: Claiming that something is “green” based on a narrow or highly specific set of attributes. For example, saying that an office paper brand is green because it came from a FSC certified forest but ignoring all the toxic chemicals used during the paper production process or the greenhouse gas emissions associated with the production and transportation of the paper.

- Sin of No Proof: Making an environmental claim about a product or service that cannot be proven with easily accessible information or through a reliable third-party source. An example of this is toilet paper and facial tissues that claim a given percentage of recycled paper in the product but provide no clear evidence to substantiate this claim.
- Sin of Vagueness: Claiming a product is “green” through broad or poorly defined labelling that is easily misunderstood or misinterpreted by the consumer. This is exemplified through labelling a product as “All Natural”. There are many “All Natural” substances (e.g. uranium, arsenic, mercury, etc.) that are truly naturally occurring but are also poisonous. Having these “All Natural” substances in your shampoo or morning cereal is probably not a good idea.
- Sin of Worshipping False Labels: Giving the impression that a product or service is endorsed by a reliable third-party in which there is no such endorsement. In short, fake labeling. Examples of this are common for seafood claiming to be sustainably harvested or food products claiming to be organically produced.
- Sin of Irrelevance: A truthful environmental claim that is not important or does not help the consumer make an informed decision on the product/service they are purchasing. Household laundry detergents that claim they are “phosphorus free” or hairspray products that claim they are “CFC free” are examples of this sin. By law in Canada, no household laundry detergents can have phosphorus and no hairspray products can have CFCs so these claims do not help the consumer make an informed decision.
- Sin of Lesser of Two Evils: A claim that is true within the service/product category but hides the wider ranging negative environmental impacts of the whole category. Examples potentially include fuel efficient SUVs or organic cigarettes.
- Sin of Fibbing: This is straight up lying to the consumer. A common example of this sin is lying about being Energy Star registered or certified.

Innovation

Innovation Inventory

An **Innovation Inventory** is a means by which the Green Team can measure and compare different innovative ideas around the Zoo. It consists of compiling innovative ideas on a consistent basis (e.g. annually), monitoring the implementation of these ideas into completed projects, and then using what is learned to develop further innovation. If possible, each of these innovations should be quantified according to money saved in relation to the time/effort it took to implement the innovations, or a similar metric. This will allow for better judgment in the future when determining which innovative ideas are worth pursuing and which may require further development before implementation. It should also specifically identify innovative sustainable strategies which are currently, or will be, underway in the current year of the inventory.

Sustainability/Green Plan Coordinator

This sustainability plan is only a guide and a first step for future sustainable actions at the EVZ. The actual implementation of what this plan has outlined will be a lot of work and to try and divvy up this work amongst current employees that already have full workloads may not be an efficient or effective way of making the EVZ a sustainability leader. Someone will have to create and maintain inventories, conduct site audits, do comparison calculations, research into new sustainable practices, make sure ideas become implemented in a timely fashion, bridge communication across the Zoo, etc. As such, it is highly recommended that the Zoo create a permanent position for a Sustainability/Green Plan Coordinator sometime in the mid future to spearhead projects and make sure the EVZ stays ahead of the sustainability curve. This position could be part-time at first to get an idea of workload balance and then be developed into a full-time position if required. The wage for this position would be made up through the amount of efficiency savings that the right person for the position could save the Zoo and the limiting of negative ecological externalities associated with Zoo operations. In addition, the CoE has made a commitment to Envisio through "The Ways", and hiring a permanent Sustainability/Green Plan Coordinator would definitely be a statement about the EVZ's commitment to fulfilling the vision outlined by the CoE in "The Ways".

Zoo Food

The EVZ currently has a privately operated Wild Earth Cafe and a number of concessions on site which provide food to patrons. Traditionally, these stands have sold soda, chips, hot dogs, cotton candy, or similar foods. If the Zoo looks to be a model of sustainability then it should also be supporting sustainable food practices, both in terms of ethically produced food and in educating people about healthy eating habits. Obesity amongst children and adults alike is becoming an epidemic in our modern society. Changes can include options as simple as the Zoo no longer selling soda but selling juice with no sugar added or replacing popcorn with apple chips.

In addition, the concession stands have a lot of potential to become public education centers in and of themselves, and can promote limited plastic or plasticless lifestyles. Our society is used to receiving a plastic lid and straw when we order a fountain drink or plastic fork and knife with an order of fries and gravy. These could be replaced by biodegradable plant-based plastics or similar alternatives, or, in the case of the lid and straw for the fountain drinks, not be given out at all. Similarly, there are compostable saran wrap alternatives that can be used in place of traditional saran wrap. Concession stand attendants could be trained in public education

techniques in terms of explaining to customers as to why their fountain drink does not have a lid or why they do not serve hot dogs anymore.

Locally Produced

Recognition that a change in how we distribute goods and services throughout our society is another area of sustainability which the EVZ can have influence on the citizens of Edmonton. The Zoo has already demonstrated that it is committed to locally produced goods through its use of the plaza for a Tuesday farmer's market during the summer season and through the Zoo's volunteer led enrichment gardens found throughout the site. It is recommended that the EVZ continues these practices while seeking local good and service alternatives to traditional sources when these alternatives become available and economically viable. If the area and volunteers are available, the enrichment gardens could even be expanded or made into exhibits themselves (see "Future Growth" in the section on Construction). Furthermore, interpretive signage could be used in areas where the enrichment gardens are visible to the public to promote locally grown produce and locally made products. Many people just simply have not been exposed to the fact that there are often local alternatives to the goods and services which they use every day.

Green Team External Advisory Team

As the sustainability program at the EVZ continues to grow, a **Green Team External Advisory Team (GTEAT)** should be developed to be constructively critical of initiatives developed by the Green Team. This is to ensure that future sustainability practices are adapted as efficiently and effectively as possible. The GTEAT is not a large team, 2 to 3 members, and can have either an annual or semiannual meeting to discuss the achievements of the Green Team. Membership to the GTEAT should consist of interested employees who have demonstrated an ongoing vested interest in EVZ sustainable practices and are not already members of the Green Team. Having a third party voice to discuss Green Team initiatives with the Green Team will help spark future innovation and keep Green Team initiatives on track in a responsible manner.

Conservation Action Month

Conservation Action Month is an interesting initiative originally developed by Chicago's Shedd Aquarium. During Conservation Action Month, which can be decided upon by the Green Team, Zoo employees are encouraged to participate in a paid 'community day of action' where they spend either a half day or full day of work doing community building activities away from and outside of the Zoo's own mandate. Each employee gets to choose her/his own community activity to participate in and the day this activity would be conducted, with approval from the Green Team and the appropriate supervisor(s). The beauty of Conservation Action Month is that, although the word "conservation" is in the title of the month, the actions chosen by employees do not necessarily have to be conservation related as long as the activities further to build Edmonton as an engaged and caring community. For example, an employee may want to help Edmonton's homeless population through the Hope Mission. This not only gives the employee a chance to actively participate in a community building program that they may not have been exposed to otherwise but also allows the Zoo to share what they are doing to strengthen Edmonton, and the globe, with members of the community that may not have known about the Zoo's many ongoing initiatives otherwise.

Smart Storage

As the Zoo grows, thinking strategically about operational storage will be a must for efficient use of time finding items and the proper maintenance of those items. Some items (e.g. lawnmowers, equipment attachments, etc.) are currently stored wherever there is room at the time of storage

instead of having an allocated storage area. Spatial storage designation and following this designation will make the Zoo site a safer and more efficient place to work. This also includes the storage of recyclables like certain woods and metals until it makes sense economically and/or operationally for these items to be removed from site. In conjunction with storage, regularly scheduled site clean-ups are necessary to do accurate equipment/item inventories, remove any potential hazards to people and animals, and to re-evaluate storage capacity as new construction projects are initiated and completed across the Zoo. An active and easily accessible construction laydown area(s) will be especially important during times of future high construction activity.

Further Innovation Actions

There are a countless number of other innovation actions that the EVZ is and could potentially be pursuing. The Zoo has the ongoing “Eliminate the Trash” challenge which has employees logging any garbage they pick up and recognizes those who have made outstanding efforts. There is also the Innovation Station, a CoE ran website which encourages employees to share their innovative ideas. Other actions the Zoo is or could be pursuing includes having the “Green Practices Pocket Guides”, located on the AZA website here (<https://www.aza.org/green-practices-pocket-guides>), available for patrons at customer services and strategic locations around the zoo, and online on the EVZ website; recognizing outstanding employees and volunteers that have helped implement innovative ideas; hosting renewable energy, gardening, composting, etc. workshops at the Zoo; giving the public a forum to share their sustainability ideas for the Zoo, perhaps in the Conservation Station (not the same as comment cards at customer services); formal repurposing of items with the help of volunteers (this is already done for many animal enrichments); and “work smarter, not harder” - identifying ways to do jobs more efficiently in a publicly engaging manner (e.g. using goats on a tether and stake in the ground instead of a lawnmower to maintain the lawn in some publicly accessible grassed areas around the site).

Cities across the globe, including Edmonton, are moving towards “smart city” designs which integrate technology, social awareness, efficient transport, urban ecology, etc. into a full city management system. As the CoE moves evermore towards a fully integrated smart city design, the EVZ will be expected to be part of this design. This will lead to zoo-based innovations that are not even conceivable yet. This is an exciting time for sustainable urban innovations as smart city designs are in their infancy and integrating the Zoo into these designs has huge potential for creative and impactful sustainable initiatives.

Ecological Conservation

Conservation Initiatives Inventory

The **Conservation Initiatives Inventory** is to be a comprehensive inventory of all the different biological conservation practices, programs, protocols, etc. that the EVZ currently participates in. This includes the Species Survival Plan (SSP), partnerships with conservation organizations, participation in community events like the shoreline clean-up, creation of native plant gardens, etc. The role of this inventory is to compile a central document that can be referred to about any biological conservation initiatives that are ongoing or pending at the Zoo. The document should also contain info on each of the initiatives, when the initiatives were first adopted and when did they end (if applicable), specific costs associated with the initiatives, where to find further information, etc. This inventory is to be reviewed annually with new initiatives and information being added as they become available. As future conservation initiatives are identified by the Zoo, this inventory will become a useful resource in determining which initiatives work well with the Zoo's mandate and resources, and which initiatives it may be wise to pass on given the EVZ's own strengths and limitations.

Species Survival Plan

Being a member of Canada's Accredited Zoos and Aquariums (CAZA), the EVZ takes pride in being a facility engaged in biological conservation practices both on and off site. The EVZ is a recognized facility for a number of SSP programs including those developed for the red panda, Amur tiger, Canadian lynx, kea, and number of other species. The SSP was developed by an international coalition of zoos in 1981 to help prevent species at risk from going extinct and the EVZ joined this coalition in 1992. As the capacity and ability of the Zoo to be a humane agency of positive conservation action grows, new possible SSP candidates should continue to be researched and steps to aid in the recovery of the viable candidates are to be taken sooner than later.

Ecological Restoration Projects

There are a number of ongoing local ecological restoration projects which the Zoo could be participating in at varying degrees. The EVZ already participates in events like the Great Canadian Shoreline Cleanup, an initiative started by the Vancouver Aquarium and the World Wildlife Fund, which inspires local communities to come together and cleanup waterways in their region. The Zoo has also set up a number of solitary bee hotels across the site to promote the conservation of these important pollinators. There are a number of other local initiatives which the Zoo can look into getting involved with. Organizations like Ducks Unlimited Canada and the Alberta Conservation Association are regularly looking to build partnerships with groups that are interested in wetland and forest restoration projects. Some of these projects could even potentially happen on Zoo property as the Zoo should not only be viewed as a conservation site for exotic animal species but also a managed site for people and local species alike. The Toronto Zoo has taken some interesting initiatives along these lines and could be used as a potential model for what the EVZ could strive for in the future.

Grassed areas that do not get used by the public regularly should be converted to native plant gardens or replanted with native grasses to promote the protection of local ecosystems. Historically, grassed areas have been planted with introduced grasses, such as Kentucky bluegrass, and these areas have been planted as grass monocultures. Areas that are to become grass for public use should be planted with a native grass seed mix. Native grasses do not establish themselves as quickly as the more commercialized varieties and take more care to

become established but are more beneficial to local ecosystems including the maintenance of healthy soil biota, something that is often over-looked in contemporary horticultural practices.

Weed management at the Zoo also presents its own difficulties. Difficulties include the large area of the Zoo, limited number of staff, ongoing construction across the site spreading weeds, and a restricted use of chemicals (ie. only spraying noxious weeds in the fall as the EVZ follows the same regulatory guidelines as Edmonton schools when using herbicides). As such, the Zoo should develop an onsite **Weed Management Protocol** which outlines how to ID weeds, onsite weed monitoring and mapping initiatives, what controls/strategies have been identified, etc. There are a number of strategies for weed control such as early detection (this requires a staff member or volunteer to be devoted to this in spring and early summer), proactively monitoring weed distribution across the CoE so that plans are in place if a new weed species arrives at the EVZ, knowing the biology/ecology of the weed species of interest, removing the flowering heads from weeds before they seed, organizing volunteer weed pulls within the Zoo site, and the use of biocontrols although care must be taken as biocontrol species have become invasives in the past. It can be hard to justify the costs associated with proactive weed management as the weed issue has yet to manifest itself into something tangible (e.g. a landscaped bed that has weeds and gets weeded appears to be a more productive use of time than a bed that never gets weeds because of proactive management). However, proactive weed management is a much more cost effective and labour saving strategy than retroactive weed management.

Public Involvement

The Zoo has a number of ways in which it engages the public to get involved in biological conservation. This includes the “Quarters for Conservation” program and information shared with the public through the Conservation Station. Surveys could be handed out to Zoo patrons explaining in more detail about what the “Quarters for Conservation” program is, would they be willing to pay even a bit more for admission knowing that that additional cost was going directly to a conservation initiative (e.g. an additional quarter for an adult admission), and whether choosing which initiatives get funding affects the amount patrons are willing to pay on top of the regular admission fee (e.g. conservation funding for Dromedary jumping-slugs vs. African elephants). There are a number of citizen monitoring programs which the Zoo could share information about and challenge the public to get involved in. A great example of this is Journey North (<https://www.learner.org/jnorth/>) which has a number of fun ways citizens can get involved. A fantastic passive interpretive opportunity for engaging the public about conservation would be to have a large, easy-to-read world map at the entrance/exit to the Zoo so patrons would see it when they entered and would see it again when they left. This map would show where Edmonton is located on the globe, all the areas around the world in which the EVZ is in some way involved in conservation initiatives, and would be updated regularly as Zoo conservation practices change. This will give patrons a world perspective about how wide ranging and diverse the efforts of the EVZ reach across the planet. In supporting the EVZ and its many initiatives, patrons are making positive global change simply by visiting and supporting the Zoo. Many members of the public do not have the background to grasp what is meant by conservation biology or realize how much effort zoos put in behind the scenes to help preserve the Earth’s biological integrity. Having this map highly visible when patrons both enter and leave will give these patrons a moment of reflection about how we are all connected across the planet. Although zoos are more formally about educating the public about fauna over flora, certain interpretive programs could engage the public about the importance of using native plants in home gardens or how fruit and vegetables are produced. The trick here will be to not think of

what a modern zoo is but what a future zoo could be in terms of public education. There is ample opportunity for the EVZ to become a leader in diversifying how it educates the public.

Conservation Station

This hub of public awareness is being developed to engage visitors to become active participants in local and global conservation initiatives, and will provide resources for these visitors to become sustainability leaders in their own lives. Allowing the public to measure and compare their own ecological footprint and sustainable behaviours with those of others has the potential to promote positive lifestyle choices while bringing attention to negative lifestyle choices which the public may not even be aware that they are doing. This can be accomplished by allowing the public to use an “ecologically footprint calculator” and through a guestbook in which guests write one sustainable practice they already do and one sustainable practice they plan to begin doing. This guest book could be digital or paper. If paper is chosen, elephant poo paper could be used in the guest book. Giving the public access to the sustainable ideas of their neighbours will hopefully challenge them to adopt these or similar practices. The Conservation Station will also be responsible for educating the public about how the zoo is involved in sustainable and conservation practices around the globe. Below is some information on the current initiatives and public awareness programs which the Zoo actively engages in. Further initiatives and programs should be identified by the Green Team as the concept of Conservation Station continues to grow.

- 96 Elephants: Through the 1980s, the illegal trade of ivory was devastating to elephant populations. The world took action against this crisis in 1989 by banning the global commercial ivory trade. By 1989, the world recognized the crisis and banned the commercial trade of ivory. This slowed elephant poaching, but not for long. Since the ban, political motivations have tried to undermine the ban, wars in Central Africa have raged in critical elephant habitat, and an increase in the illegal ivory markets due to an emerging East Asian middle class has put additional stresses on the elephants. About 35,000 African elephants were poached and their tusks were put on the black market in 2012. The majority of elephant poachers are not hunting the elephants for food. They are after the ivory tusks, which are referred to at times as “the white gold of jihad” and are used to fund a number of terrorist groups around the globe. Wildlife trafficking and poaching is a major transnational crime. It the fourth largest international crime.

The Wildlife Conservation Society (WCS) has long been protecting elephants in eight of the most important conservation landscapes in Africa. They have launched elephant protection programs including the 96 Elephants initiative, named after the average number of African elephants which are poached every day. This global initiative is petitioning governments around the world and is actively working across Africa to stop elephant poaching. This includes adding 5 new ecologically significant sites to its anti-poaching campaigns: Okapi Faunal Reserve in the Democratic Republic of Congo, Ivindo National Park in Gabon, Niassa National Reserve in Mozambique, and Katavi and Ruaha National Parks in Tanzania.

Visit <http://www.96elephants.org/> or <http://www.wcs.org/> for more information.

- Polar Bears International: Polar Bears International (PBI) is the world's leading polar bear conservation group and are dedicated to saving polar bears by saving their sea ice habitat. The EVZ takes part in PBI by being an Arctic Ambassador Centre, which means

the Zoo educates the public about climate change, carbon emission reduction initiatives in Edmonton, and how each of us can help by making small changes in our own lifestyles. The dangers of a warming Earth are not limited to animals like polar bears. However, polar bears are a well-recognized, iconic spokesperson for climate change.

Today, the primary conservation concerns for polar bears are habitat loss and reduced access to their primary prey due to receding Arctic ice. Other threats include increased commercial activities, pollution, disease, inadequate habitat protection (of denning and seasonal resting areas), and the potential for overharvest in smaller or declining sub-populations.

It is not too late to save polar bears! We have the power to stop human-caused climate change and save the arctic ecosystem by greatly reducing greenhouse gas emissions. You can do this by taking the Thermostat Challenge, Transportation Challenge, Phantom Power Challenge, or the No Idling Challenge! Although the EVZ does not have polar bears on site, there are many Arctic animal ambassadors here at the Zoo - like Shilah and Tundra, the Arctic Wolves; and Sofia, Mischa, Isadora, and Mika, the Northern Fur Seals.

Visit www.polarbearsinternational.org for more information on PBI and the personal challenges mentioned above.

- **Red Panda Network:** The Red Panda Network (RPN) is global initiative to protect red pandas in the wild by preserving their habitat by empowering local communities through education, engaging in community-based research, and carbon reduction strategies. Project Punde Kundo, the first community based red panda monitoring program in the world, was created by the RPN in eastern Nepal by consulting with local villagers. This program hired 42 villagers, known as Forest Guardians, whose roles include educating “community forest” user groups (CFUGs) about the importance of red pandas, monitoring community forests, and working with these user groups to preserve local forest ecosystems.

The term “community forest” describes a forest management strategy where forest users play a major role in managing the forest that they use to make a living, and the RPN has given support to CFUGs to create methods for growing sustainable medicinal plants, managing livestock, and strategies for reforestation. The long-term goal of the RPN is to help groups develop forest management strategies that are ecologically and economically sustainable. Using a holistic approach to manage local forests is the most successful way to realize this goal.

The EVZ has three red pandas in the red panda SSP program - Kalden, who was born in the Northeastern Wisconsin Zoo; Pip, who was born here at the EVZ; and Rina, from the Shizuoka Municipal Nihondaira Zoo in Japan. Only about 2,500 adults remain in the wild. Over the past decade, the EVZ has successfully bred seven red panda cubs.

Visit <http://redpandanetwork.org/> for more info on the RPN.

- **WCS Bats:** A deadly bat disease caused by an introduced parasitic fungus (*Geomyces destructans*) was discovered in 2006 on bats living in a cave in New York State. This disease is known as White Nose Syndrome (WNS). Since 2006, WNS has been found in

five provinces and more than 20 states. This disease prefers humid, cool conditions to propagate, like those conditions found in caves, and grows on the bat's wings and body as the bat hibernates. The fungus causes the infected bat to emerge prematurely from hibernation, spend energy grooming itself, and then expending even more energy to survive, flying around more than they would without being affected by the fungus. Due to the higher resource needs of the bat to maintain its metabolism, the fungal infection is often fatal to the bat. WNS has drastically affected bat populations by causing massive die-offs, having a negative cascading effect on the ecosystems which the bats inhabit. This is devastating to bat populations infected by WNS as bats have relatively low reproductive rates in relation to their size. This leaves bat populations highly vulnerable to infection and collapse.

The WCS is urgently researching bat populations in western Canada to gain a deeper understanding of the wintering ecology of bats to develop strategies to slow or prevent the spread of WNS into western Canada. We know little about bat behavioural ecology in winter and how this ecology relates to the spread of WNS. Bat diversity in western Canada is surprisingly high. BC alone contains 16 out of 18 Canadian bat species. Understanding bat ecology in western Canada will be instrumental in the protection of these animals from WNS and future conservation initiatives. The EVZ is actively involved in promoting bat conservation and currently has Jamaican Fruit Bats on display in the nocturnal wing of the Saito Centre.

For more information about bat conservation in Canada visit <http://canada.wcs.org/wildlife/bats.aspx>.

- **Snow Leopard Trust:** The Snow Leopard Trust (SLT) uses sound science to prioritize snow leopard conservation initiatives in three key areas: long-term conservation programs and identifying resources to support these programs, researching critical habitat and the behavioural ecology of snow leopards, and building positive communication and community partnerships with local communities to help identify the needs of these communities. The IUCN estimates that these endangered cats have a population of somewhere around 4,000 to 6,500 individuals left in the wild. Of the twelve mountainous central Asian countries where wild snow leopards are found, the SLT currently has conservation programs in 5 of these countries: Pakistan, the Kyrgyz Republic, India, China, and Mongolia.

The SLT has staff in these 5 countries and maintains communication with conservation organizations and researchers across the globe. This has led the SLT to become the world's leader in preserving snow leopards and their habitat into perpetuity. Snow leopards may be the top carnivores in their native mountainous range but human encroachment is seriously threatening these majestic predators and the habitats they require for survival. Retribution killings, poaching, habitat loss, lack of prey species, mining, and lack of resources are all threatening the long-term survival of snow leopards. It is for this reason that conservation solutions which must also engage and include local people which share the same habitat as the snow leopards. The EVZ is a member of the snow leopard SSP program and currently has three snow leopards: Sherri, Kazi, and Indira.

Visit <http://www.snowleopard.org/> for more info.

- Seafood Watch: Seafood Watch is a program developed by the Monterey Bay Aquarium to inform the public about seafood choices which are sourced in an ecologically and ethically sound manner, and which seafood choices one should avoid. This is done to protect sea life and their habitats into perpetuity through informed consumer choices. Seafood Watch recommendations let the consumer know which seafood choices are considered "Best Choices", "Good Alternatives," and which seafood to "Avoid." "Best Choices" are the seafood items that you should buy first. These choices are caught or farmed in a manner which is well managed, and causes little harm to other ocean life and important marine habitats. Some "Best Choices" examples are farmed Arctic char, mussels or farmed rainbow trout. "Good Alternatives" are the next best choice, however, some issues exist concerning how these choices are either farmed or caught. "Good Alternatives" include wild scallops, yellow fin tuna or snapper. Seafood choices listed as "Avoid" are animals that are poorly managed or unethically caught and includes overfishing of stocks and farming practices which are detrimental to the marine environment. "Avoid" Atlantic farmed salmon, bluefin tuna and imported canned crab.

Seafood Watch engages the public by spreading awareness about issues related to the management and harvesting of sustainable seafood. This is done through the Seafood Watch website, mobile apps, consumer guides, and public outreach. More than 56 million consumer guides have been distributed since 1999 and there has been more than 1.5 million downloads of the free Seafood Watch smartphone app. At the EVZ, many of our mammals' diets enjoy the nutritional benefits of seafood. The North American river otters, harbour seals, and northern fur seals are all seafood lovers! The seals love to eat capelin and herring, while the otters consider mussels a tasty delicacy. The Zoo is currently working with on-site and off-site vendors to ensure all the seafood used at the Zoo is sustainable. The EVZ also has rainbow trout on display up in The Wander. Furthermore, the EVZ is proud to be a Conservation Partner (CP) with Seafood Watch since 2015. CPs includes aquariums, zoos, science museums, and other organizations that promote Seafood Watch in their communities and engage the public about becoming educated seafood consumers.

Visit <http://www.seafoodwatch.org/> for more info.

- Palm Oil Campaign: Palm oil is a kind of vegetable oil that is found in many products including commonly consumed foods and soaps. Native to West Africa, the oil palm tree, the plant that produces the fruit that palm oil comes from, grows easily in many tropical climates across the world. Most of the world's production of palm oil comes from the islands of Sumatra and Borneo, which also happen to be the only place in the world where orangutans live. To make room for palm oil plantations, large sections of the rainforest, critical habitat for the orangutans, are being cut down. The Roundtable on Sustainable Palm Oil (RSPO) was formed to address this and many other ecological and social issues centred on palm oil production. The EVZ is also committed to sustainable palm oil production by educating the public about palm oil production and how consumers can make a difference by being aware of products that contain unsustainable palm oil and the alternatives to these products that are available for purchasing. The EVZ also practices what it preaches by committing to buy products for events that contain sustainably harvested palm oil, such as purchasing certain brands of candy over other brands. The EVZ advocates for transparent labeling of products that maintain strict standards to protect biodiversity, rainforests, peatlands, human rights, and the climate.

Visit <http://www.rspo.org/> for more info.

Purchasing

Purchasing Inventory

Putting together a comprehensive **Purchasing Inventory** will allow the Green Team to better assess collective bulk purchasing of products/services for the EVZ and the purchasing strategies used to obtain these products/services. Since the EVZ is a CoE ran facility, purchasing strategies may be a bit different than experienced by a private zoo facility. With that said, putting together a Purchasing Inventory for the Zoo has great potential for saving money on buying bulk items, identifying more sustainable alternatives to products currently being purchased, and streamlining the purchasing process in general. This inventory should consist of identifying all bulk and specialty items the Zoo purchases, as well as services rendered, on an annual basis. As this inventory is updated, more efficient purchasing strategies can be developed to streamline the purchasing of goods and services. The inventory will also allow for a centralized document which all hubs across the Zoo can refer to for their purchasing requirements, helping to promote communication across hubs.

Green Procurement Plan

Being ISO 14001 certified the CoE has committed to the purchasing of sustainable products following a combination of three criteria: environmental responsibility, ethically sourced, and locally made. Included in this procurement plan are typical office supplies like stationery items, toiletries, and catering services. Since the operations of the Zoo require goods and services that are not typical of the office environment (e.g. canned monkey food), purchasing can be a bit more difficult for the Zoo than other CoE facilities. However, the EVZ can continue to follow the three criteria out lined above while simultaneously providing for all the animals being cared for at the Zoo. Where the CoE is not able to provide sustainable purchasing info on items particular to the Zoo, the AZA offers information, a streamlined process for purchasing bulk and specialty items, and sourcing support for these items.

Visit http://onecity.edmonton.ca/ordering_contracting/sustainable-purchasing.aspx for more info on CoE sustainable purchasing practices.

Visit <http://www.azasmartsource.org/> for more info on AZA Smart Source Cooperative Purchasing Programs.

Site “Do Not Purchase” List

As the Zoo develops its “Do Not Purchase” policy, a **Master Site “Do Not Purchase” List** can be compiled from the smaller “Do Not Purchase” lists discussed in other sections throughout this plan (e.g. chemicals, construction materials, etc.). This, done in conjunction with the Purchasing Inventory above, will help identify alternatives to purchasing items which may be a risk to people or animal health, environmentally damaging, or unethically sourced. The Master Site “Do Not Purchase” List will also be a centralized reference for anyone around the Zoo wondering if an item they would like to purchase is sustainable or not. Employees should be encouraged to add to this list as alternatives become available or economically viable. When this list becomes highly developed, it will become possible for the Zoo to quantify the premium it is paying to purchase Earth friendly products over their more detrimental counterparts. This master list should be included in the Contractor’s Environmental Responsibilities Package (see “New Construction Projects” in the Construction section) and contractors are to be encouraged to add to the list.

Is it Sustainable?

Sustainable purchasing can be difficult and confusing when one considers all of the factors that go into the harvesting/mining of materials, production, distribution, and disposal of any given product. For example, look at all of the ingredients in a bottle of shampoo, even an ethically sourced bottle, and try to imagine where all the ingredients come from, how were they harvested, what are the chemical processes to bring those ingredients together, where were they brought together, how were they shipped, where did they ship from, did the employees get treated ethically, and the list goes on. If these are just some of the considerations in making a sustainable consumer decision about a bottle of shampoo, imagine making sustainable purchases for an organization the size of the EVZ!

Here are a few questions one can ask when choosing which product to purchase when options are available:

What information is available about the product?

A little bit of time researching a given bulk item or large product can go a long way. However, a balance between time spent researching an item and making a decision must be made. There is a huge difference between researching a \$3 bag of balloons and sourcing \$500,000 of construction materials for an upcoming construction product.

Has the product been certified from a reputable source?

There are organizations that help the consumer in deciding on which products they conclude are sustainable or not (e.g. Ocean Wise for seafood or The Rainforest Alliance for goods harvested from rainforests). The EVZ not only promotes many reputable certifying sources but also practices what it promotes. For example, the capelin that the Zoo uses as feeder fish for its animal residents is Ocean Wise certified and follows strict Hazard Analysis Critical Control Point food safety guidelines (feeder fish are fit for human consumption). If you are unsure what a particular certification label stands for, you can visit <http://www.ecolabelindex.com/ecolabels/> to hopefully find information on the label in question.

Where does the product come from?

In some circumstances, product alternatives may be ethically sourced but shipped from the other side of the globe (e.g. a given item made of bamboo). In these cases where transportation is considered, it may actually be more sustainable to purchase the local product that is not certified over the global product that is.

Can it be produced onsite?

It may make sense, now or sometime in the future, to produce particular goods onsite. The Zoo already has several enrichment gardens. These gardens provide food and entertainment grown onsite for a number of the animals at the Zoo. Currently, feeder crickets, mealworms, etc. are sourced outside of the Zoo. Food items like these could be produced onsite, saving the Zoo money and eliminating transportation emissions. The tradeoff being that a zookeeper(s) or similar will have to be trained in the rearing of feeder insects. Another good already being produced onsite to some degree is renewable energy, through multiple solar panels across the site. As the Zoo continues to develop and grow, it should strive to produce as much energy as possible onsite. There is a lot of potential for the Zoo to accomplish this goal.

Plasticless Zoo

A challenging yet impactful statement that the Zoo can make to the public about its commitment to sustainability is to set a goal towards using 0% petroleum based plastics onsite. This includes

everything from packaging to the products themselves. Letting vendors know that the Zoo will seriously reconsider where it sources goods based on plastic usage will have the vendors questioning their own sustainable practices to maintain positive customer relationships. This statement shows the public that if an organization the size of the EVZ is able to make a commitment to reducing its use of plastics, individuals can do it in their own homes as well. Steps towards this goal include only selling goods that are made of plant-based plastics, installing more water fountains around site and selling only EVZ branded reusable water bottles instead of disposable water bottles, purchasing uniforms and similar from sustainable and ethical sources (e.g. shirts made from 100% rayon bamboo), using only biodegradable products (e.g. plant based utensils, saran wraps, etc.) from the concession which can then be composted, reduce the purchasing of office supply plastics (e.g. buying less higher quality pens over more lower quality pens), etc.

Communication with Vendors

Customer loyalty is an important part of doing business and vendors are willing to make changes to maintain that loyalty. The Zoo can ask for a green product discount in exchange for loyalty. Aim to have goods from a given vendor arrive on a pre-scheduled basis to gain the greatest bulk discount possible from this vendor while simultaneously reducing emissions associated with the transportation of these goods. The Zoo can request that vendors use as minimal packaging as possible and, when necessary, packaging be re-usable and/or recyclable.

Construction

Construction Efficiency Inventory

An annual **Construction Efficiency Inventory** of existing buildings onsite should be developed. This is to be done to help address energy efficiencies in buildings as they are discovered. One of the main roles of this inventory is to quantify energy efficiencies/inefficiencies in the buildings so that changes in energy use can be tracked more effectively. As it stands at the moment, the EVZ is metered as an entire site instead of metering each building individually. Not being able to monitor each building separately means that the efficiencies of buildings that are more energy efficient (e.g. EdVenture Lodge) are being masked by less efficient buildings (e.g. Saito). Construction inventories cannot be conducted in a complete manner until the CoE establishes a new means of measuring energy to its facilities, such as smart meters on individual buildings. With that said, there is still huge value in starting an annual Construction Inventory sooner than later as areas requiring new windows, light fixtures, light sensors, etc. can be identified and addressed, which will save money and lower the operational footprint of the Zoo in the long run.

New Construction Projects

The CoE, as part of its ISO 14001 certification, has committed to having ALL newly constructed buildings meet the minimum specifications required to obtain a Leadership in Energy and Environmental Design (LEED) silver certification. As such, any new construction projects at the EVZ must also meet the specifications for this certification. The EVZ has some major construction phases projects planned in the near future. If possible, the building of carbon neutral exhibits would allow for huge potential in sharing information about carbon neutrality to the public in a fun and engaging manner. The fact that the exhibits are carbon neutral could be subtly added into interpretive talks about the animals in their enclosures. Pre-planning will be instrumental in making sure that the construction process moves ahead efficiently and effectively, and that the entirety of the construction process (start to end) is completed as environmentally and socially responsible as possible.

A “**Do Not Purchase**” **List of Construction Materials** (e.g. risk to the health of people or animals, unethically sourced, etc.) should be identified, developed, and shared with contractors before materials arrive onsite. This “Do Not Purchase” list is expected to change and grow as more ethical building materials become readily available on the market. In conjunction with this, a “**Preferable Purchase**” **List of Construction Materials** of wildlife friendly, ethically sourced, and sustainable alternatives would provide guidance on the purchasing of the best environmentally friendly materials when these materials are available on the market.

A **Construction Waste Diversion Plan** can be created that sets EVZ goals on limiting the amount of construction waste being hauled off-site. Some materials may be used in other areas of the Zoo, such as animal enclosure given that the materials are appropriate. For example, repurposing of construction waste can be a fun, creative, and rewarding process for Zoo staff and volunteers alike. This plan aims is to challenge the EVZ to consistently get better at waste diversion where the long term waste diversion goal should be that all construction “waste” would be diverted from being hauled off-site and used in another area of the Zoo.

New onsite construction projects will see many 3rd party contractors coming and going from the EVZ on a daily basis. To make sure that these contractors are aligned with the Zoo’s sustainable vision and goals, a **Contractor’s Environmental Responsibilities Package** should be put together and given to new contractors as part of their site orientation. To ensure compliance, it should be made clear to new contractors that this package is mandatory, not a

suggestion, and that there may be unannounced check-ups to make sure that best environmental practices are being followed. This may sound a bit draconian but a positive swing can be applied to the environmental responsibilities of contractors. These responsibilities can range from not having vehicles idling to the proper disposal of waste/unused chemicals. The contractors can be challenged to “think outside the box” to go above and beyond what is outlined in the Contractor’s Environmental Responsibilities Package, encouraged to utilize what is learned at the EVZ in terms of best environmental practices to promote their businesses to potential future clients, to add to the Responsibilities Package in their own dynamic way, and the Zoo could even offer awards and public recognition to those companies that have put in outstanding efforts to make their own company ethically sound and sustainable.

Future Growth

In conjunction with future construction plans, several innovative construction ideas that have already been done at other zoo facilities across North America could also be adapted by the EVZ according to its own unique requirements and situation. Any new eatery should be designed for the needs of the future, not the needs of today. This includes seriously considering that reusable dishes be available at new eateries and that dealing with dirty dishes would be part of the design of building. This is a different way of thinking about serving concessionary fast foods but if the EVZ wants to be a leader in sustainable practices little steps like these are the ones that will put the EVZ ahead of the game and will have visitors talking.

The parking lot upgrades could convert the parking lot into a “green lot”. Some ideas for this include having the parking lot set-up simultaneously as a solar farm. The solar panels can be shaped like leaves and used to provide shade for the vehicles in the parking lot. This will collect green electricity onsite for the Zoo while reducing GHG emissions from vehicles by lowering the use of A/C in vehicles shaded by the panels. Having electric vehicle chargers, a few to start, would promote the use of electric vehicles to and from the Zoo. An urban wetland constructed at the low end of the parking lot could collect runoff containing hydrocarbons and other chemicals which would otherwise run directly into the river. Interpretive signage explaining the importance of the wetlands in relation to the Zoo would be of value to Zoo patrons and those using Sir Wilfrid Laurier Park alike. It may even draw in new patrons from Sir Wilfrid Laurier Park that would not visit the EVZ otherwise.

The EVZ has already taken steps to produce some foods and entertainment for the resident animals in the Zoo’s enrichment gardens. This could be expanded on by building a low cost greenhouse (e.g. hoop house), even if only temporary until permanent exhibits are built in the area where the greenhouse stands. For example, a greenhouse could be constructed towards the back of the Zoo between where the camels are currently kept and the compost pile is located. This greenhouse can also function as an education centre about the diets of a number of animals across the site and the hard work that goes into their care. People see the animals in the exhibits but may not realize how much care goes into the animals behind the scenes. Having a greenhouse growing animal foods onsite, such as some of the total bamboo requirements for the Zoo, can reduce GHG emissions by lowering transportation need, promote buying local produce, or inspire the public to start their own gardens.

Conservation and Construction

The pre-planning phase of any new construction or renovation project should also include an assessment of the needs of migratory and local wildlife so that negative impacts on local wildlife by construction and renovation activities are minimized. Considerations for new buildings will

require more than just what is best for the people using the buildings and their surroundings. New landscaping projects can aim to be recognized for their contribution to the re-establishment and protection of local habitats. Certifications like the Wildlife Friendly Habitat certificate obtained from the Canadian Wildlife Federation could be the goal for all new landscaping projects, maintaining a combination of ecological functionality and design. Please visit here for more information: (<http://cwf-fcf.org/en/do-something/challenges-projects/get-certified/>). The EdVenture Lodge and Plaza integrated living roofs and rain gardens into its design. All future construction and landscaping projects should seriously consider similar integrations as well.

Education

The potential for the EVZ to expand its reputation as a leader in conservation and environmental education both locally and globally is phenomenal. Every visitor, from the newly born to long-term retiree, has their own unique history and will take home their own unique experiences from their visit. This means that there are potentially a number of Zoo visitors that would find the construction of environmentally friendly buildings and the LEED certification process to be really interesting. Developing interpretation signage and programs focused on sustainable construction and practices could be a great “value added” project that may also count towards obtaining a higher LEED certification score. The buildings themselves should be viewed as educational tools. These sustainability focused education programs also have the potential to share small sustainable changes that the public can do in their own homes. For example, imagine the water conservation difference that could be made by teaching 50,000 Edmonton households how to do a simple fix on a single leaky tap in their own homes.

Chemical Management

Chemical Inventory

The Green Team should maintain a **Chemical Inventory** of onsite unit usage of chemicals that is reviewed annually. The reasoning behind doing this is to track changes in chemical usage and identify why these changes have occurred with the goal of lowering chemical usage over time. When possible, chemicals that are produced through “green chemistry” - chemicals produced in a way that are deliberate in reducing or eliminating hazardous substances used or produced during production of the chemicals - should be used over alternatives on the market. This could be created alongside a **“Do Not Purchase” List of Chemicals** compiled specifically for the EVZ.

Onsite Chemical Control

Onsite chemical storage follows CoE Enviso standards and is audited regularly by the city. Unusable chemicals are sent to either CoE waste management facility or Nor-Alta for disposal. Chemicals sometimes get donated/left behind by contractors, etc. The EVZ currently does not have a protocol for what can and cannot be donated to the Zoo. Such a protocol should be created to make sure that any chemicals on the “Do Not Purchase” list do not get left at or used on Zoo property. This can also save the zoo on disposal costs as chemicals that would have become the zoo’s responsibility to dispose of remain the responsibility of the contractor, etc.

As the EVZ grows and changes, new chemicals may be required to maintain zoo functionality. When there is a choice between competing chemicals, each chemical should be thoroughly ranked and evaluated before a choice of purchase is made. There are many methods to do such a ranking and evaluation including a system developed by a group of students for their final capstone report titled “Reducing the Environmental Footprint of the Edmonton Valley Zoo”. See Dean Treichel, Operations Supervisor, for access to this report. Furthermore, intimate knowledge of the storm drain system across the site is required to help prevent chemicals entering the North Saskatchewan River. This knowledge is to be used when identifying areas for the parking and storing of vehicles and work equipment. This will help prevent unattended chemical leaks (e.g. oil, gas, etc.) from flowing directly into the North Saskatchewan River during rain events.

Energy Management

Energy Inventory

The implementation of an on-going **Energy Inventory** would allow the EVZ to better track energy use patterns and identify areas across the Zoo where effective energy reduction strategies should be implemented. This inventory would be conducted by the Green Team annually and should include the amount of energy being consumed from particular energy sources (e.g. natural gas, coal, solar, etc.). This inventory is similar to the Construction Efficiency Inventory (see “Construction Efficiency Inventory” in the Construction section) with the main difference being that this inventory monitors changes in energy usage while the Construction Efficiency Inventory tracks onsite construction and renovations that make the Zoo more efficient. Once the Energy Inventory is established, it would be easy for the EVZ to set realistic energy reduction goals for the site and/or individual buildings/exhibits (e.g. 15% reduction in energy usage for Saito). Over time, the EVZ would be expected to increase the energy reduction goals as more energy efficient technologies and practices become accessible. The EVZ should adopt more sustainable sources of energy as these sources become readily available and affordable. Energy reduction savings should be re-invested into the Zoo to provide further energy reduction strategies.

Smart/Sub-Metering

Currently the EVZ does not use smart/sub-metering on its buildings. To properly measure and manage building energy usage, smart/sub-meters should be installed on all buildings across the site to better manage onsite energy usage. It is highly recommended that the Zoo petition the CoE to have smart/sub-metering installed across the facility. If sub/smart metering was incorporated across the site, a metric to measure energy efficiency over time and across buildings could be easily developed and included as part of the annual Energy Inventory discussed above. For example, one could compare changes in energy usage by calculating BTUs (British Thermal Units) per square foot for buildings and exhibits across the site and this could become part of the Energy Inventory as a form of energy performance monitoring. The EVZ has some major construction projects in the near future. The Zoo could use this time of construction as an opportunity to petition the CoE to allow for the installation of sub/smart meters on buildings and exhibits across the site. This would not only benefit the Zoo through reduced operation costs, but could potentially be seen as a model pilot project by the CoE in which other facilities would want to emulate the EVZ to also reduce their own operation costs and ecological footprint. Could this be the initiative that the Zoo would be recognized for as an environmental champion and be rewarded with the CoE’s Charles Labatiuk Award for Environmental Excellence?

Alternative Energy Sources

The EVZ has already taken steps in developing alternative energy sources. The EdVenture Lodge and Plaza utilizes solar panels as an inherent part of its design. The Fascination Station is an excellent example of an innovative way to promote alternative energy sources to the public. Several animal enclosures have electrified fences which are powered by solar panels. This is further exemplified in the Conservation Station where there is a solar powered electronic device charger for public use. These are all excellent steps and the EVZ should continue this trend. As mentioned in the Construction section, the parking lot has huge potential to become an area simultaneously used for people to park vehicles and a solar farm. There may be wind turbine potential in multiple onsite areas off-limit to the public across the site. Bio-generators are becoming popular at other Zoo facilities across the globe as a means to simultaneously deal with waste while producing electricity onsite. This option may not be viable at the moment due

to the size of the EVZ but as bio-generator technology becomes more efficient, this alternative energy source is one that the Zoo should seriously consider down the road. Research into the potential for geothermal heating/energy at the EVZ may also be more fruitful than one would have initially anticipated. There are other buildings located in Edmonton which utilize a mix of alternative energy sources, including geothermal heating/energy, that could be a model for the EVZ to follow. For example, visit <http://themosaiccentre.ca/> for info on The Mosaic Centre for Conscious Community and Commerce; a privately funded LEED Platinum certified building located in southern Edmonton that uses onsite geothermal energy in conjunction with other onsite renewable energy sources to operate the building.

Lighting

There are a number of renovations, both large and small, that the Zoo has already started adopting and should continue to adopt into the future. Some lights have had motion sensors put on them. This move towards motion sensor activated lights should continue across the site, except in areas where light switches are required for animal upkeep or staff safety like in exhibits and workshops. The EVZ has been transitioning over to the use of LEDs where possible, including buying LED bulbs that work in the T5 fixtures found in Saito. These bulbs use 28w vs. 56w that the T5 bulbs use, last for approximately 60,000 hours instead of 8,000 hours of the T5s, and cost roughly twice that of the T5 bulbs. The LED bulbs being a much wiser choice than the T5 bulbs in the long run. This transition should continue to include areas of Saito not yet converted, the elephant building, the old winter quarters, and any other buildings around the site which have older light fixtures. Light intensity levels in areas used by staff/public can be measured and, in some situations, dimming and/or less energy intensive lighting may be recommended. For more info on light intensity levels at the EVZ see the Stantec Edmonton Valley Zoo Detailed Energy and Water Assessment (ask Dean Treichel, Operations Supervisor, for access to this report).

Heating

Zoo heating uses up to 75% of the Zoo's total energy consumption, a combination of natural gas and electricity, and 80% of total natural gas consumption on site. There is huge potential for the Zoo to make major energy reduction improvements by producing heat through alternative energy sources, addressing heat loss in existing buildings, and not heating buildings when not required (e.g. after hours). Solar water heaters have proven to be effective in other areas of Canada and may be highly valuable at the EVZ in reducing energy costs. For example, the water in Arctic Shores, millions of gallons annually, could be heated by solar water heaters placed on the hills behind the exhibit or buildings currently be warmed by propane could be warmed from solar water heaters instead. Hot water tanks across the site can be turned down 2 – 3°C with minimal impact on water utility for staff and patrons alike. The insulation on these tanks should be checked annually for defects as new water heater blankets are cheap in terms of replacement when compared to loss of heat from tanks not properly insulated. Older water heaters should be replaced once their recommended lifetime is over to maintain and increase energy efficiency. The same goes for older A/C units. Air intake areas and outflow vents should be routinely checked to make sure they are not blocked in any way or form.

Where possible, individual rooms should have their own thermostat so that heating throughout the building can be micromanaged as need be. These thermostats should allow for a temperature range, have timers, and be set 2c above and below the desired temperature. When rooms are not in use (e.g. night) the thermostats can have their timers set to off for this time and be programmed to come back on 15min before the arrival of staff. Staff should also be aware that heat producing devices (e.g. computers) should not be placed near thermostats as these

can affect the functionality of these thermostats. As long as animal biology allows, some exhibits can also be cooler at night. Room temperature should also fluctuate with the season, being a bit warmer in summer and a bit cooler in winter. To help maintain desired indoor temperatures, windows on older buildings that have not been recently replaced should be replaced with high efficiency windows sooner than later. Roofs on older buildings can be upgraded with materials that help reflect heat in summer and absorb heat in winter. Or, if costs allow, older roof areas could be converted over to solar panel roofs.

Another area of heating where the Zoo could potentially save on energy is by providing heat in certain enclosures by means other than heat lamps (ceramic or otherwise). These lamps use lots of wattage relative to the heat they produce, the heat dissipates quickly, and there are a lot of heat lamps located across the Zoo. Some potential alternatives include using heating cable controlled by rheostats, flexwatt heat tape (maybe some safety concerns so further research is required for this alternative), or radiant heat pads. Each of these alternatives have pros and cons which should be weighed but the long term energy savings may be well worth the time researching and implementing these alternatives.

Behavioural Changes

Staff and volunteers have the potential to make contributions to lowering energy use on site simply by making some behavioural changes. Phantom energy, energy used to maintain idle electronic devices, is a huge waste of electricity in Canada. According to Hydro-Québec, up to 40% of electronic device power use occurs when they are “off” and any given household is potentially paying 5% to 10% of their total electricity bill towards phantom energy alone. Imagine the electricity savings that the Zoo could potentially have by being aware of phantom energy. Although buildings at the Zoo have different electricity use demand patterns than a household, if we take the average of 1,243,856 kWh/year from 2009 to 2012 as determined by Stantec and multiply this by 5% we get an energy savings of over 62,000 kWh/year, or approximately \$5,000 a year, simply by turning off or unplugging devices not being used. Staff and volunteers should get in the habit of unplugging devices not in use (e.g. phone chargers, coffee makers, etc.), turning off computers and lights when not required (surge protecting power bars are a great and easy way to turn off multiple devices simultaneously), and being more conscious of their everyday ecological footprint. The Green Team could even organize a rotating daily or weekly individual in each of the main office/work spaces across the Zoo whose role it is to properly power down and/or unplug all unnecessary devices at the end of the each work day. Staff would require specific training in certain areas of the Zoo so that animal care and human safety are not compromised by devices being powered down. The ecological footprint calculator being installed in the Conservation Station is a fun way to see how one’s own footprint compares to others across Canada. New staff/volunteers should be encouraged to use this calculator to gain a perspective on their own energy use and how they compare to other Canadians. Any new appliances purchased for staff should be Energy Star® certified products. These behavioural changes are something that the Green Team can promote to the EVZ’s employees and volunteers without making any infrastructural changes to the Zoo whatsoever.

Waste Management

Waste Inventory

The EVZ, being a CoE ran facility, has already started an ongoing waste audit which can become a detailed and helpful **Waste Inventory** (see Appendix B). The one downfall to inventorying waste at the Zoo is that only waste that makes it to a regional waste management facility currently gets inventoried. A large portion of Zoo waste is organic and gets taken to the onsite compost site. This waste is not yet considered in the inventory so the inventory is misleading about waste generation and disposal at the EVZ. To include this compostable waste into the inventory would not be too difficult. A simple way of inventorying compostable waste is to collect the waste over a number of days and measure the amount of waste per day. The more days you measure the waste, the more accurate your estimates will be. After you have a baseline estimate of daily compostable waste, similar measurements can be taken every 3-4 months to track any changes in daily compostable waste. Estimates per day can then be calculated. Daily measurements will still be required from time to time to maintain the accuracy of the daily estimates. Also, the CoE has recently begun the “Follow Your Print” initiative to better manage and reduce waste associated with office printing. A section of the Waste Inventory could be devoted to this initiative once the CoE has some findings to release.

Waste in the inventory will be separated into three categories: waste, recyclables, and compostables. Sources of waste across the Zoo (e.g. landscaping, food service, office supplies, etc.) should be identified to get numbers on the three categories of waste per source. If necessary, the three categories can be split even further into sub-categories. The inventory should also state proper management/disposal of waste from each source including spill/clean-up protocols, how this waste is transported off site, and any environmental hazards associated with the waste/waste source. Once quantities of waste from each source have been measured, financial analyses can be calculated to better understand the Zoo’s waste management structure and how waste reduction initiatives could save the Zoo money while simultaneously being better for the environment.

This inventory, once fully functional, can be used to develop a **Waste Reduction Policy** for the EVZ. This policy will outline specific waste reduction goals set by the Zoo (e.g. 10% waste reduction by 2020, 50% reduction by 2030, etc.) and the strategies the Zoo will take to meet these goals. As the Zoo becomes more experienced with onsite waste management, waste reductions goals should be increased to continue to challenge the Zoo to develop new and more efficient means of dealing with waste, leading to a smaller overall ecological footprint left by the day-to-day operations of the Zoo. It has been recommended to the Zoo by the CoE’s ongoing waste audit that the Zoo can simultaneously save money and be more environmentally friendly through two actions: increase onsite recycling areas and further promote these areas, and to actively monitor how full waste bins are for service days (Mon/Wed/Fri) and call for pick-up only when bins are full instead of having a scheduled pick-up (see Appendix B). The CoE’s recycling service is cheaper than the waste service so any onsite diversion of recyclables into the proper bin is saving the Zoo money. Of the three waste bins that were picked-up during the August 2015 waste audit, only one was full. The other two were only half full. Calling for pick-up only when the bins are full would also save money.

Onsite Composting

Onsite composting at the Zoo has gone through some major changes over the last 20 years or so. At one point the Zoo was even selling compost to the public years ahead of other similar initiatives at other zoo organizations. Regulations around selling compost have become stricter

since that time and the Zoo no longer sells compost as it is not a recognized commercial composting facility. This is not a problem as there should be plenty of landscaped areas across the Zoo which could easily be amended with the compost being produced. In line with the Waste Inventory above, the EVZ should develop a better means of accurately tracking compostable waste into the compost site, compost out of the site, and what the compost was used for. For example, the North Carolina Zoo began diligently tracking their compost in the mid 1990's. What they found is that, simply by composting onsite, tracking this compost, and using this compost for landscaping around their zoo, they saved an estimated \$1,079,318US between the years of 1996 - 2007! That is roughly \$100,000US per year that is now freed up for use in other projects.

The Zoo's compost pile used to have a clay pad underneath it that would collect runoff from the composting process and stop this runoff from entering the local river system. This pad has fallen into disrepair over the years and requires proper attention if the Zoo is going to continue composting onsite. Since Zoo composting waste is often in contact with animals, there is the potential that composting runoff not being properly managed could contain zoonotic diseases, vectors capable of carrying zoonotic diseases, or other public health issues related to untreated runoff entering the river system.

The EVZ will require more diligence by employees to identify items that can and cannot enter the compost pile. Certain kinds of animal/bio waste, for example, may require disposal methods other than being sent for composting. A quick walk around the composting area reveals many non-compostable waste items (e.g. rubber/vinyl gloves, food wrappers, pieces of plastic, etc.) amongst the compostable waste. Separating these items from the compost is really time consuming but will be required to use the compost. It is more efficient to make sure these items do not end up in the compost pile in the first place. As the Zoo commits to strategies to reduce onsite plastic use, items that are currently unfit for the pile could be replaced by compostable alternatives. The Zoo has looked into compostable gloves to replace the current rubber/vinyl gloves used extensively across the site. At the time these compostable gloves were not economically feasible. However, if the EVZ discovers that it is obtaining reasonably high savings from composting, like the savings estimated at the North Carolina Zoo, these saving could be reinvested in purchasing items such as compostable gloves or alternatives to conventional plastics.

It has also been noted that the EVZ could also make some small changes that would help divert more compostable waste to the compost pile. In high use picnic areas, compost bins alongside recycling and waste bins should be the norm across the Zoo, and these bins, including waste bins, should be highly visible and increase in frequency. It can be difficult to find an appropriate waste bin and, instead of holding onto the waste, patrons just discard their waste on the ground. These bins provide excellent opportunities for interpretive signs about the importance of composting and recycling. This signage can be as simple as showing proper waste sorting strategies which patrons can use in their own homes. It is recognized that such public bins will have the wrong kind of waste items inadvertently entering the composting site, but, as noted above, inappropriate waste can already be found in the composting piles without these public composting bins in effect. The change in public opinion about recycling and composting that interpretively signed bins would help facilitate outweighs the issue that bins will sometimes get misused. Another area of waste diversion that the Zoo can begin doing that has been done at other public organizations is set aside a bin in each bathroom strictly for paper towel and have these bins labelled as such. This paper towel can be diverted directly to the composting pile instead of leaving the site. It may also be worthwhile for the Zoo to purchase or occasionally

borrow a wood chipper to process tree limbs in the compost pile instead of shipping these waste items to the local waste management facility.

Recycling

The EVZ not only participates in in-house recycling and the recycling of items from patrons, but is also a drop-off site for several innovative recycling organizations. Two examples of these programs are TerraCycle and ECO-CELL. TerraCycle “is eliminating the idea of waste by recycling non-recyclables”. Essentially TerraCycle is looking to provide a recycling service for items which have previously been considered un-recyclable and would have ended up in the landfill or incinerated. They collect a number of items from pens to plastic gloves to coffee capsules. ECO-CELL is a recycling organization which focuses specifically on the recycling of handheld electronic devices and similar. These devices each contain small amounts of precious materials, such as coltan and gold, which are extremely damaging to the environment to mine and process. Coltan, for example, is found naturally in large quantities in the Congo. The areas where this mineral is found in large quantities is in the middle of critical habitat for gorillas, elephants, and a number of other endangered and endemic species. Waste electronics leak toxic chemicals when sitting unattended in a landfill, which has the potential of entering the groundwater. ECO-CELL recycles the precious materials found in each handheld device and eliminates the leaking of toxic chemicals into local ecosystems. The recycling of handheld electronics reduces greenhouse gas emissions so much so that one million devices recycled is equivalent to removing approximately 33 cars from the streets for one year. The Zoo should continue to seek out partnership opportunities with organizations like TerraCycle and ECO-CELL.

In an August 2015 waste audit, it was recommended that the Zoo could save on operational costs by better separating recycling from waste. The CoE charges less for picking up recycling bins than waste bins so the more items that are recycled the more the Zoo saves. Some of the recycling/waste bins onsite can be difficult to see or find. Making these bins more visible and strategically changing their placement and/or frequency should help curb this issue. There should be the capacity for the public to recycle at all major rest/eating sites around the Zoo. This will help with sorting recycling from waste while limiting litter across the site. Up until spring 2016, the EVZ used to regularly recycle old uniforms. Due to unknown issues at the site of the recycling facility, this service is no longer offered and old uniforms currently go into the waste bin. Researching local recycling facilities should be conducted to see if there are any other places in Edmonton to send used uniforms for repurposing/recycling.

Surplus Item Share

The CoE has a surplus item share program which some city departments are well aware of and others not so much. A “surplus want/have” list is maintained by the Asset Controller in Citizen Services (currently Delores Gertz). Functional surplus city items will be put on this list and will go to storage until a use is found for the items or they go to public auction. Nonfunctional items are appropriately disposed of as recycling or waste. The Zoo should be aware of this program both to find a home for items no longer being used and to find new items that may be of use in some form to the Zoo. This could be a potential treasure trove of animal enrichments for someone looking to do a bit of warehouse exploring. It should be noted that this program has been growing over the years, a good sign that the CoE is making progress on the purchasing and waste management sides of its operations.

Biohazardous/Medical Waste

Being a facility that has onsite veterinarian services and numerous animals with their own unique, medicinal requirements, the EVZ occasionally deals with biohazardous and medical waste. Currently, sharps are collected in the appropriate medical waste containment receptacles and sent for safe disposal. Tissues and deceased animals are frozen and then sent for cremation.

Other Waste Diversion Changes

There are other changes around the site that the EVZ can do to help with onsite waste diversion and positively changing public awareness. Having the concept of “pack in, pack out” for the Arctic Shores exhibit is an excellent idea. However, many urban people have never spent time hiking/camping in wilderness areas and this concept, which seems like common sense to the more experienced backpacker, may be entirely new to a number of patrons visiting the Zoo. If the Zoo wants to continue promoting this concept, which it should, overt signage when entering and leaving Arctic Shores should be in place to explain what is meant by “pack in, pack out”, why this is important when hiking/camping, and that Arctic Shores is a place on site to practice this concept before making a trek into wilder areas. Since the Zoo actively participates with organizations like ECO-CELL, a commitment to having all onsite batteries as rechargeable should be made. There are many items running off of batteries across the Zoo (e.g. soap dispensers). Batteries in these items/devices should be rechargeable and small battery recharge stations could be set-up in the EdVenture Lodge, Saito, Guest Services, and anywhere else where battery use frequency is potentially high. The Zoo can also have an annual **Waste Awareness Day**, the focus being on our relationship with the waste we produce. Reusable bags with the EVZ brand could be given to interested patrons to promote these bags and sustainable practices at the Zoo.

Water Management

Water Inventory

The development of a **Water Inventory** will be required if the EVZ is looking to make major leaps in its water conservation strategies. This inventory is to be updated annually and should include water that enters the Zoo via the CoE water system and water collected onsite in storm water collection ponds/wetlands located across the site. This inventory will look in detail at any sources using water (e.g. exhibits, food services, buildings, landscaping, etc.) and the quantities they are using, how discharged and greywater is managed, and what happens to this water when it is disposed of (e.g. onsite irrigation, storm water drains into the river, sent to the CoE for treatment, etc.). A more complete understanding of the Zoo's water cycle is required to identify future water reduction strategies that cost the least/save the most money while also lowering the Zoo's water use footprint. There were water usage baselines calculated for the years 2009 - 2012 by Stantec (see section on Baselines) but these numbers are aggregated for the entire Zoo site and were calculated before Arctic Shores was functional, which cycles millions of litres of water annually, are not accounted for in the baselines.

Once a Water Inventory is established, the Green Team can work towards creating a **Water Efficiency Plan**. This plan will highlight specific water management goals (e.g. 25% water reduction by 2025) and the strategies that will push the Zoo to reach these goals (e.g. re-circulation of water in exhibit water features instead of this water enter drains and leaving the site). The overarching goal of this plan is to strategize and attain water neutrality for the entire Zoo site. Water neutrality can be defined as a combination of reducing one's water footprint as much as possible while offsetting the negative externalities of the remainder of the footprint. Offsets can be accomplished in a number of ways (e.g. restoring lost wetlands) and the Zoo will have to research offsets that are realistic for its own operations. This may seem like an impossible feat at the moment but as the Zoo integrates new water management technologies and strategies into its day-to-day operations this goal will become more and more attainable.

Smart/Sub-Metering

As with the section on Energy Management, it is highly recommended that the EVZ adapts smart/sub-metering for its water usage across the facility. Water usage, just like energy usage, goes through a single meter for the entire Zoo. This is standard for CoE facilities but is a huge barrier to within facility water and energy use reduction strategies. It is next to impossible to measure water efficiency across the site if the Zoo does not even know where this water is going and when. The Zoo has the potential to become a model leader of sustainable practices across CoE facilities if it is the first to successfully petition the CoE for comprehensive water (and energy) metering across the site, let alone demonstrating to the citizens of Edmonton that the EVZ and the CoE are committed to reducing their energy and water use footprints. Not only is this a step towards having a healthier environment, there is money to be saved in onsite water reduction initiatives.

Landscaping and Exhibits

Although the amount of water usage is not known, landscaping and exhibits account for a huge portion of onsite water use, especially when considering Arctic Shores. Portions of this water are collected through rain and melt waters but potable water is also still a major contributor to the onsite water cycle. There are several storm management ponds/wetlands located across the site which collect runoff from many areas across the Zoo and cycle this water back into the Zoo water cycle, such as that used in Arctic Shores or for irrigation of landscaped areas. Closer monitoring of the amount of water entering back into the Zoo system would allow the Zoo to

accurately calculate their water savings and help strategize future water saving initiatives, such as where to construct new water catchment areas. Many of the exhibit water features empty into the CoE water treatment system. This water would be excellent for watering plants within the exhibits. This could potentially be done via a small portable water pump as zookeepers work, and ways of better recycling water feature water into the system should be considered in exhibit renovations and the construction of new exhibits, such as these features draining into wetland catchment areas. Untreated wells could be built in key areas and be used for landscaping and exhibit cleaning purposes instead of the use of potable water.

The Zoo should be more aware of smart watering practices for grass/landscaped areas. For the amount of irrigation required at the EVZ, rain sensors across the site would be a good investment to better manage the watering of plants and the onsite water cycle. Onsite watering during the heat of the day appears to be a regular practice onsite and watering during a significant rain event at a time that would have been during the heat of the day has been witnessed. Better attention to onsite watering schedules is required for the EVZ site. If CoE facilities like the EVZ do not follow basic water conservation practices for lawn and garden maintenance, why would the citizens who witness the lack of these practices at a CoE facility feel morally obligated to use these same practices at their own homes? The EVZ has the potential to not only be a sustainable model for CoE facilities but also any and every patron that is interested in lowering their own ecological footprint. As new areas become landscaped, a move away from labour and resource intensive exotic plants to local and/or xeric species should become the norm not the exception.

Renovations and Construction

The Zoo has taken a number of steps to reduce its water use. This includes installing automatic taps and low flow toilets in some of the washrooms. This trend should continue until all washrooms are retrofitted with water saving fixtures and inefficient/old plumbing is replaced. The Cincinnati Zoo found that they reduced their building water consumption rates by up to 50% when compared to conventional buildings simply by replacing old urinals with waterless urinals. The EVZ should perform an **Effective Impervious Areas Audit** to better understand and manage onsite storm water flow and make a commitment to having all future hardscapes being pervious to run-off. New buildings, such as what has already been done with buildings in the plaza, should utilize a combination of living roofs and rain gardens to better manage and remove pollutants from building runoff. The EVZ potentially has a number of leaky pipes. A **Leaky Pipe Audit** would help identify the most cost effective water pipe repair/replacement areas. This is a costly and time consuming project to begin and follow through with, but the long term savings/environmental benefits associated with addressing leaky pipe issues will be worth the time and money invested.

Challenging the Public

Water conservation initiatives are an excellent way to challenge the public's personal perceptions on how they interact with the ecosystems around them and their own ecological footprint. Everyone is intimately tied to the water system in their own way. This gives the EVZ the potential to positively impact people's personal behaviours with relatively minimal effort. The Zoo has begun installing water bottle fill stations across site that also let patrons know the number of disposable water bottles that have not gone into the waste stream because of refilling water bottles. More of these stations should be constructed across the site including outside where possible. There are many health misconceptions about the consumption of public tap water, and the processes behind bottling and transporting bottled water. Each water bottle fill stations to could have a common myth and fact about water consumption. Kids looking for ECO-

League badges could get a badge for locating a given number of water bottle refill stations and writing down the water myth/fact or something similar. Water conserving washrooms have lots of wall/floor space not currently being utilized that could easily be used for promoting both water and waste conservation at home through interpretive signage. In conjunction with having water bottle refill stations across the site, the Zoo should move from selling disposable water bottles at all kiosks to selling reusable water bottles with the Zoo's brand. This promotes better personal water consumption practices and gives patrons a souvenir to take home with them. Although above ground rainwater barrels may not contribute a relatively high volume of water to the overall operations of the EVZ, having several placed across the site beside buildings in hi-vis areas would promote water conservation strategies that the public could use in their own yards. The barrels themselves would provide yet another opportunity for sustainable education (e.g. signage) about the importance of water conservation and management.

Fuel Management

Fuel Inventory

Current fuel management practices across the Zoo follow the guidelines set out by the CoE's Envisio and Operational Health and Safety (OH & S protocols). With this said, the Green Team should establish an annual **Fuel Inventory** that looks at the usage of all fuel types throughout a given year at the EVZ to micromanage fuel use across the facility. All fuel types being used on site should be identified (e.g. propane, gasoline, oil, diesel, etc.) and quantities of each fuel type be calculated so that changes in usage can be easily monitored from year to year. This inventory will also include all vehicles and equipment on site which use fuel, when these vehicle and equipment get used seasonally (e.g. snow blowers only used in winter, backpack blowers used year round), how often they are used, and a regular maintenance schedule for each vehicle/piece of equipment. Replacing a piece of equipment that only gets ran twice a year may not have as much of an impact on fuel reduction as replacing a piece of equipment that runs several times a week throughout the year. Once a Fuel Inventory is established, the EVZ can begin setting fuel reduction goals for itself (e.g. 15% reduction in propane use) and these reduction goals should increase as the Zoo looks to challenge its sustainable efforts further. Determining reduction in fuel usage can also be used to calculate GHG emission reductions from the Zoo, which the Zoo can proudly display to the public to inspire reductions in fuel usage by the citizens of Edmonton. Fuel reduction is not only good for the environment but will also save the Zoo operational costs associated with running fuel powered vehicles and equipment.

Fuel Safety

Most onsite fuel is kept at a designated fuel safety site north of Saito and gets audited by CoE's OH & S to ensure it complies with city standards. Almost all of this fuel, with the exception of propane, is kept in jerry cans or similar. Using jerry cans instead of slip tanks works well with the quantity of fuel currently used at the Zoo as it minimizes the risk of serious damage caused by a leak (e.g. 20L instead of 200L) and allows the fuel to be moved and transported easily. The downside to this is that regular trips to get fuel must be made. In essence, the EVZ is burning fuel to get fuel. However, if getting fuel can be timed with other errands then the use of fuel to get more fuel can be minimized.

Move from Fossils Fuels to Renewables

The EVZ has already started to transition from running equipment/vehicles that require fossil fuels to those that run off of electricity, which can be derived from renewable sources. The Zoo runs multiple electric powered golf carts for animal care, site maintenance, and many other reasons. Site keeping is moving from using gas powered landscaping equipment to battery powered equipment (e.g. weed-whackers). With more electric powered vehicles/equipment comes the need for more outlets to charge these vehicles/equipment. This may bottleneck the Zoo's move to electric motors unless more outlets are made available as charging stations. The Zoo also has two solar power augmented vehicles which are great for transporting people around. However, it has been noted that these two vehicles are not being used to their fullest potential and are sitting in the grass towards the back of site keeping. Even having one on display in an area available to the public when not in use would show that the EVZ is committed to sustainable practices and would invite the public to get creative with their own light transport vehicles. This move to electric vehicles and equipment by the Zoo should continue as vehicles/equipment requires replacement. Electric powered vehicles and equipment are not only better for the environment and could save the Zoo money, they also run quieter than their fossil fuel equivalents, thus, effectively reducing onsite noise pollution across the Zoo. The Zoo's animals and patrons alike can be happy about that! A solar powered charge station for

equipment batteries could be set-up by the carousel with interpretive signage to showcase the sustainable equipment used by the Zoo's site keepers and inspire others to follow in the Zoo's footsteps towards sustainability.

Getting to and from the Zoo

Edmonton Transit System (ETS) public bus route #594 from West Edmonton Mall to EVZ is available to Zoo patrons. However, this service only runs from May 21 to September 3 and everyday service does not start until July 4. The Zoo can take steps to promote the use of public transit and, if enough interest is created, petition the CoE for year-round service. The Zoo could set-up a **Transit Benefit Program** where showing your old bus fare stub or something similar that is uniquely given away by the #594, like a sticker on your stub, where you show this at the entrance and receive a reduced entrance fee for taking transit. This could even be equivalent to the bus fare itself (ie. \$3.25 at the time of writing). Similarly, the Zoo could offer a "free admission if you take the bus" day. These suggestions would simultaneously promote the EVZ, ETS, and public commuting in general to Edmonton citizens.

To limit the use of personal vehicles, the Zoo could offer preferred parking to those that carpool and cyclists could be given a reduced entrance fee. A fee to use the parking lot could be set-up and labelled as a "conservation greenhouse gas offset" fee where 100% of this fee will go towards funding a number of the conservation programs the EVZ is involved in. Interpretive signage in the parking lot would educate the public as to why they are being charged the fee (ie. the emissions from their vehicles are adding to global climate change), reinforce CoE's no idling policy (great way to promote Polar Bears International), and where this fee is going (e.g. Snow Leopard Trust, Red Panda Network, etc.). If charging a parking fee is not an attractive option for Zoo management, similar interpretive signs to those mentioned above could be put up to educate the public about vehicle emissions but instead of mandatory parking fees, secure donation boxes could be set up around the parking lot where patrons could give according to what they felt was fair as a voluntary carbon offset, with 100% of the proceeds going towards conservation programs.

Carbon Neutrality

One of the main long term sustainable goals of the EVZ should be to become carbon neutral. Being carbon neutral means that the Zoo has in place mitigation methods that reduce the level of atmospheric CO₂ at the same or greater level as it is being emitted through the day-to-day operations of the Zoo. The Zoo will have to set a series of attainable carbon reduction goals with the overall long term goal of carbon neutrality, for example, a 10% reduction in emissions by 2025 and a 60% reduction by 2050. The Zoo will have to look into this in more detail once it has a better understanding of its Energy Inventory to determine what goals are realistic for current and future operations. There are many ways to reach carbon neutral goals including constructing more energy efficient buildings, purchasing energy efficient vehicles and motorized equipment, using renewable energy in place of fossil fuels, planting and re-establishing forests and other green areas, and purchasing carbon offsets and/or Renewable Energy Certificates (REC). The CoE used to purchase RECs to help mitigate the effects of carbon emissions but has since stopped to instead focus those resources on building renewable energy infrastructure. The EVZ can also join a consortium of other zoos and aquariums across the globe that is committed to carbon reduction initiatives. One example of this is the Zoos and Aquariums for 350 initiative.

Visit <http://www.cbsq.org/zoos-aquariums-350> for more information about how zoos and aquariums can reduce their carbon footprint and how to join the 350 initiative.

Behavioural Changes

The CoE offers Fuel Sense driver's training to its employees in which employees are taught how to reduce their fuel consumption by simply changing their driving behaviour. Other behavioural changes can help lower fuel consumption at the EVZ. The CoE has a no idling policy but employees should be reminded of this if vehicles are left idling, even for "a minute or two" while picking up garbage or dumping compost. "A minute or two" every time a vehicle stops for garbage or drops off compost adds up really quickly. Employees (not necessarily Zoo employees but CoE employees working at the Zoo) have also been witnessed sitting in their idling van in the Saito parking lot, early summer, with their windows down and the A/C blasting while they do paperwork for about 30 minutes. There is ample room in Saito to do paperwork in a cooled environment and this should be promoted to site visitors. This policy should also be highlighted in the Contractor's Environmental Responsibilities Packages discussed in the Construction section above. If a contractor is seen idling they should be politely reminded of the CoE's no idling policy. Some items and goods are stored where they are regularly used (e.g. hay close to pens). Where possible, attempts to find new areas of storage close to usage should continue. This will save time and resources that would have otherwise been used to collect those items and goods then transport them to where they would be used. In today's age of telecommunication technologies, some office employees could potentially **telecommute** to work a day or two a month. Telecommuting is where you work from a home office instead of physically travelling to your work office. This will lower the number of regular vehicle commutes to the Zoo, lowering vehicle emissions, and can also save office employees some personal time as they will not have to spend time physically commuting to and from the Zoo.

Appendices

Appendix A: Useful Resources

Conservation Biology

96 Elephants Campaign: <http://www.96elephants.org/>
Canadian Wildlife Federation: <http://www.cwf-fcf.org/en/>
Conservation Breeding Specialist Group: <http://www.cbsg.org>
Journey North: <https://www.learner.org/jnorth/>
Polar Bears International: www.polarbearsinternational.org
Red Panda Network: <http://redpandanetwork.org/>
Snow Leopard Trust: <http://www.snowleopard.org/>
Wildlife Conservation Society Canada: <http://canada.wcs.org/>

Government Organizations

City of Edmonton ISO 14001 Certification (Enviso):
<https://sites.google.com/a/edmonton.ca/crfenvisobulletinboard/>
City of Edmonton Vision and Strategic Plans: http://www.edmonton.ca/city_government/city-vision-and-strategic-plan.aspx
Oregon Metro Sustainability Plan:
http://www.oregonmetro.gov/sites/default/files/08012010_sustainability_plan.pdf

Public Education

Alberta Council for Environmental Education: <http://www.abcee.org/>
Canadian Green Building Council: <https://www.cagbc.org/>
Ecolabel Index: <http://www.ecolabelindex.com/ecolabels/>
National Association of Interpretation: <https://www.interpnet.com/>
The Mosaic Centre for Conscious Community and Commerce: <http://themosaiccentre.ca/>
The Sins of Greenwashing: www.sinsofgreenwashing.com

Energy, Recycling and Waste Management

City of Edmonton Waste Management Centre:
http://www.edmonton.ca/programs_services/garbage_waste/edmonton-waste-management-centre.aspx
ECO-CELL: <http://www.eco-cell.com/>
ENERGY STAR: <https://www.energystar.gov/>
Hydro-Québec: <http://www.hydroquebec.com/residential/>
Nor-Alta: <http://www.nor-alta.com/>
TerraCycle: <https://www.terracycle.ca/en-CA/>

Sustainable Purchasing

Association of Zoos & Aquariums Smart Source Cooperative Purchasing Programs:
<http://www.azasmartsource.org/>
City of Edmonton Sustainable Purchasing Guide:
http://onecity.edmonton.ca/ordering_contracting/sustainable-purchasing.aspx
Mazuri Exotic Animal Food: <http://www.mazuri.com/>
Ocean Wise: <http://www.oceanwise.ca/>
Roundtable on Sustainable Purchasing: <http://www.rspo.org>
Seafood Watch: <http://www.seafoodwatch.org>
The Rainforest Alliance: <http://www.rainforest-alliance.org/>

Zoos, Aquariums, Associations, and Societies

Association of Zoos & Aquariums: <https://www.aza.org/>

(*The Green Guides located on this website also contain many useful resources)

British & Irish Association of Zoos and Aquariums: <http://www.biaza.org.uk/>

Buffalo Zoo: <http://www.buffalozoo.org/>

Canada's Accredited Zoos and Aquariums: <http://caza.ca/>

Cincinnati Zoo: <http://cincinnati.zoo.org/>

Denver Zoo: <http://www.denverzoo.org/>

Edmonton Valley Zoo: http://www.edmonton.ca/attractions_events/edmonton-valley-zoo.aspx

European Association of Zoos and Aquaria: <http://www.eaza.net/>

Lincoln Park Zoo: <http://www.lpzoo.org/>

North Carolina Zoo: <http://www.nczoo.org/>

Omaha's Henry Doorly Zoo: <http://www.omahazoo.com/>

Point Defiance Zoo & Aquarium: <http://www.pdza.org/>

Shedd Aquarium: <http://www.sheddaquarium.org/>

Toronto Zoo: <http://www.torontozoo.com/>

Valley Zoo Development Society: <http://www.buildingourzoo.com>

Vancouver Aquarium: <http://www.vanaqua.org/>

Woodland Park Zoo: <http://www.zoo.org/>

World Association of Zoos and Aquariums: <http://www.waza.org/en/site/home>

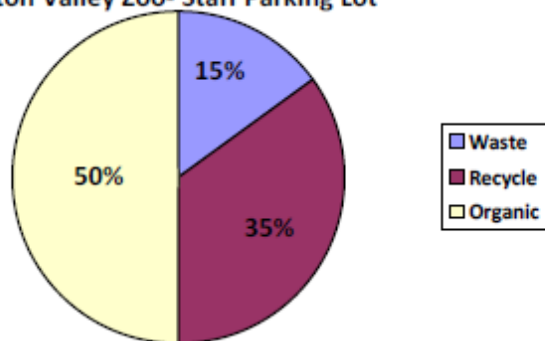
Zoos Victoria: <http://www.zoo.org.au/>

Appendix B: August 2015 Waste Audit

Waste Audit- August 2015

This document summarizes the results of a waste audit conducted in August 2015 of the waste bins only. Any materials listed as recyclable indicates the opportunity to be recycled if separated into a recycle bin. The recycling is NOT sorted for recycle from the waste bins. The recycling put in the waste bins are generally landfilled. The City of Edmonton automatically sorts organic materials for compost from the waste only.

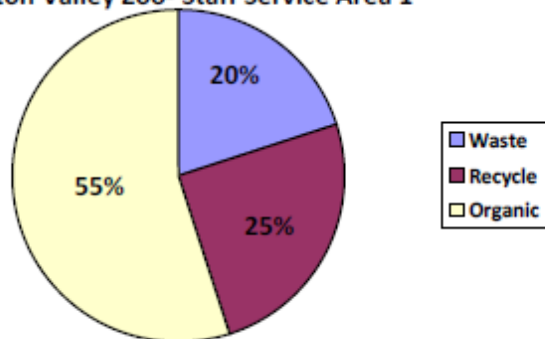
Edmonton Valley Zoo- Staff Parking Lot



50% organic
20% cardboard/paper
15% plastic
0% metal
15% landfill waste

This bin was less than half full on pick up day. Half of the bin was organic material that can be composted- primarily bags of soiled paper towel. Recycle items in the waste bin consisted of empty boxes of cleaning products and paper. Some of the plastics could also be added to the recycle bin instead of waste. Plastics consisted of serving trays, food wrap and food containers.

Edmonton Valley Zoo- Staff Service Area 1



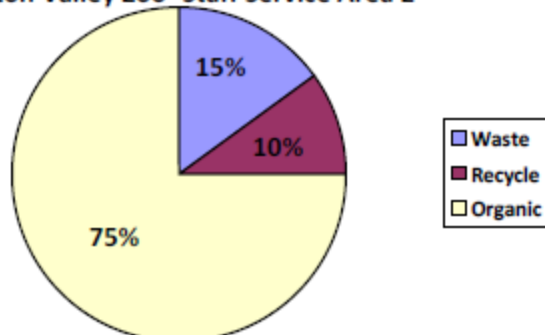
55% organic
20% cardboard/paper
5% plastic
0% metal

Waste Audit- August 2015

20% landfill waste

This bin was about half full before pick up day. Most of the material was organic waste that is composted and consisted of primarily green plant material, food waste and soiled paper towel. Most of the landfill waste was food containers.

Edmonton Valley Zoo- Staff Service Area 2



75% organic
0% cardboard/paper
10% plastic
0% metal
15% landfill waste

This bin was full on pick up day and is the second bin located in the service area with access restricted to Zoo staff. There was primarily expired food in the bin, hay, food waste and paper towel which could all be composted when sorted from the waste at City of Edmonton sorting facilities. The plastic material, 10%, could be added to a recycle bin instead of waste to avoid going to landfill. 15% of the material is true landfill waste.

Recommendations:

There are opportunities to increase the diversion rate. The zoo could explore the option of increasing recycling locations and signage available within the building to help get the recycling into the correct bin. Remind cleaning staff in particular that paper and cardboard should go in the recycle containers.

Monitor waste bins for fullness on service days (Mon/Wed/Fri) to be sure you are only paying for service you need. Also, recycle service is cheaper than waste service so the more recycling you put in the correct bin, the less waste service you will need and the cheaper your total monthly waste bill.