

# Elon University Sustainable Building Operations and Maintenance Guidelines

## Preface

The University has over 600 acres of maintained land with a substantial portion that is undeveloped and maintains over 3,000,000 square feet of building space.

The watchful stewardship of these physical resources is heavily influenced by Elon University's commitment to sustainability. Members of the Physical Plant are attentive to implementing practices in their operations and maintenance activities that support and advance the preservation of the campus grounds and the reduction of greenhouse gases. These measures are undertaken in order to provide attractive, safe and healthy teaching, learning and work environments. The guidelines that follow summarize the practical steps taken by the Elon University Physical Plant, as well as the campus community, to demonstrate and practice our ethos of sustainability in everyday living.

### Sustainable Sites

Elon University is fortunate to have ample land, which has enabled it to minimize its impact on its environs while continuing to grow responsibly. Over the last 17 years, the student population has increased 45 percent. To accommodate this growth, the campus infrastructure and facilities have grown in accordance with the campus master plan. Planners have recognized the importance of open green space and mature trees in their capital planning. They have preserved and incorporated these natural features into the current campus landscape.

Stormwater collection and management is highlighted by the three man-made lakes on campus. In addition to mitigating erosion runoff, these lakes are further utilized as sources of irrigation for our landscaping and grounds activities. They additionally provide a natural gathering point for native wildlife such as Canada geese, ducks, herons, muskrats and turtles. About eighty-five percent of the campus irrigation needs are satisfied through these lakes. Two of the larger lakes are also inter-connected which allows for the transfer of water from one lake source to the other. These lakes are fed primarily by stormwater runoff. The use of synthetic fertilizer is kept to a minimum through the use of frequent soil and tissue tests and custom blended fertilizer to provide only the nutrients found to be deficient. Further, the use of slow release nitrogen components (polymer coated, sulfur coated urea's) are primarily used as they require both moisture and high soil temperatures to become available, virtually eliminating leaching or run-off concerns and provide a slow nutrient release.

Around each campus building, landscaping is provided to enhance and soften the stark features of brick and mortar. Shrubs and flower beds are created to be low in maintenance with a preference for perennials where possible and in accordance with sound horticultural designs. Other landscaping design considerations include the use of drought tolerant species, inclusion of convenient sidewalks to encourage walking, sidewalk recycling containers and wide sidewalks which facilitates physical removal of snow and ice with equipment, thereby minimizing the use of deicing materials.

The landscape is managed with an integrated pest management approach consisting of six principles: 1 - identify the pest to be managed, 2 - define the management area, 3 - establish monitoring techniques, 4 - establish thresholds of tolerance (health, economic, aesthetic), 5 - develop predictive models for each target pest and 6 - develop a management plan and schedule for each target pest. Although specific practices vary widely, there are several guidelines. First, the campus landscape will be maintained to meet established standards of landscape management and appearance. Typically, the thresholds of tolerance will be damage and/or appearance. Secondly, in accordance with IPM principles, the order of control options should be: plant species options; cultural, physical or mechanical; biorational; biological; and lastly synthetic chemical control. Thirdly, we will seek new options or products (especially concerning the difficult pest problem of weed control).

A yard debris composting facility is located at the Loy Farm. This 2 acre facility is designated as a small composting operation and has less than 6000 cubic yards material composting quarterly. All yard waste debris: leaves, grass clippings, branches, etc. from campus are taken to the site to be composted and reused back on-campus for new landscape construction projects and/or for top-dressing over existing turfgrass areas.

## Sustainable Building Operations and Maintenance at Elon University

In 2004, the Elon University campus was designated a botanical garden to serve as a model for stewardship of the environment and conservation of plants. Moreover, the campus landscape has been and continues to be used as an educational resource with an expanded diversity of plants and interactive displays. In 2019, the Elon University Botanical Garden was classified as an accredited ArbNet Level II Arboretum. Elon University is also a member of the American Association of Botanical Gardens and Arboreta (AABGA).

New parking lots are constructed on the campus perimeter and bicycle racks are conveniently provided at most buildings to discourage driving and promote biking and walking as the preferred mode of transportation.

For outdoor pole lights, as electronic ballasts go out and metal-halide lamps burn out, they are replaced with LED lamps. 30-foot parking lot light poles are reducing from 400 watt metal-halide to 94 watt LED lamps. 10-foot sidewalk pole lights are reducing from 175 watt metal-halide to 54 watt LED lamps.

### Water Usage

Water utility billings are closely monitored and any anomalies in water consumption are immediately referred to the Plumbing Shop for investigation and or correction.

Throughout the campus, toilet and shower fixtures are fitted with low flow water devices. In newer buildings, water closets are specified with dual flush valves for solid (high flush) or liquid (low flush) wastes. Shower heads are rated at 1.6 gallons per minute (gpm); residential lavatories at 1.5 gpm and lavatories in office/classroom buildings are rated at 0.5 gpm. Commercial or residential kitchen sinks are rated at 2.2 gpm.

In order to minimize the purchase of plastic bottled water, Elon encourages the refilling of reusable water bottles by specifying water coolers with bottle filler features such as the Elkay Model EZSTL8WSLK or “gooseneck” units. These units are installed in high traffic areas for accessibility and as a visual reminder to make sustainable choices in our everyday lives.

### Energy Usage

Since 2003, Elon University has reduced its energy consumption per square foot by 41 percent. This has been accomplished through a variety of strategies as identified in this section.

As newer facilities are constructed and added to the physical plant, their building systems are designed to be more energy efficient. This results in lower consumption of energy per square foot. Per the University’s Green Building Policy, new construction projects and major renovations consisting of 8,000 or more square feet of conditioned, occupied space will achieve LEED certification. LEED Silver certification is the strongly preferred level and in no case will such projects achieve less than LEED Certified certification. When facilities are renovated, energy efficiency is a factor. Major energy usage equipment replacement and renewal follows an Energy Master Plan in guiding type, efficiency and life-cycle energy usage goals.

## Sustainable Building Operations and Maintenance at Elon University

A facility energy conservation policy has been adopted that outlines heating and cooling set point temperatures (69°F winter heating/74°F summer cooling), lighting guidelines, computer power management, fume hoods, office equipment and appliances. The policy specifics may be reviewed at

<https://www.elon.edu/u/bft/sustainability/wpcontent/uploads/sites/783/2019/07/EnergyPolicy-Jan-2019.pdf>

In 2008, Elon University implemented a web-based, visual building dashboard (<https://buildingos.com/s/elon/Campus/>) that affords the campus community and others observation of their energy consumption in real-time. Over time, the web-based control or monitoring of the HVAC systems has expanded to approximately 80% of the campus facilities. The web-based control system enables remote access for HVAC and Control technicians to monitor, manipulate, trouble shoot and correct climate control systems to run more energy efficiently as well as improve the comfort of building occupants. At a minimum, energy consumption is monitored on a monthly basis, compared against the previous years, to monitor conservation goals. Using the web-based monitoring/control system and billing, energy consumption trend data is captured and utilized to investigate high-energy consumption (electric & natural gas – primarily) against an established baseline. This trend data can indicate run times of key systems such as pumps, chillers, boilers and other HVAC systems and when coupled with energy consumption analysis, provides useful intelligence that enables the University to manage energy and systems more efficiently.

The University has initiated building space conditioning setback times (Occupied and Unoccupied) with building automation system (BAS) controls throughout all the university facilities. Where feasible, the BAS controls for space conditioning are integrated with a space scheduling system to allow spaces to be conditioned (heated/cooled) based on usage (reservations) of the space. This system ensures spaces are comfortable when in use and set to conserve energy when not in use.

Antiquated thermostats have been replaced with lockable and programmable models (in apartments and facilities that have such individual controls outside of the web-based control system) to prevent unauthorized access and inappropriate HVAC settings. HVAC systems utilize variable frequency/variable speed drives which allow motors to operate more closely to the actual loads.

The campus is migrating to LED lighting. All new construction or renovations implement LED lighting. As compact fluorescents, T5, and T8 lamps burn out, they are replaced with LED retrofit bulbs. LED bulbs are more energy efficient and do not contain mercury.

Solar thermal hot water systems are installed on five campus buildings: Clohan Hall and the Story, Moffitt, Danieleley I and Danieleley K residence halls. By passively capturing solar heat, water is heated or preheated, thus eliminating, or reducing the consumption of natural gas for domestic hot water production and use. The solar thermal systems are continuously monitored through the BAS to maintain efficient operation. In addition, a geothermal heating and cooling system is utilized in the Colonnades residential neighborhood.

The assessment of existing facilities for renewable energy opportunities is an on-going, collaborative effort between the Physical Plant staff and the Director of Sustainability. Leaders

## Sustainable Building Operations and Maintenance at Elon University

within the Physical Plant, hold bi-weekly energy conservation meetings where energy conservation goals are developed, reviewed and input sought from maintenance personnel. These collaborative meetings also identify potential energy conservation projects.

### Material and Resource Usage

The Physical Plant utilizes the University's Sustainable Purchasing Guidelines in its purchasing decisions as feasible.

Elon has a green cleaning program that covers all normal cleaning activities undertaken in the course of managing University facilities and addresses the following: Cleaning Chemicals, Janitorial Products and Equipment, Entryway Systems Maintenance, Waste and Education. Non-toxic and bio-based cleaning products have been tested and initiated in our efforts to develop our green cleaning protocols throughout campus. The initiative for green cleaning provides considerable benefits to the health of building occupants as well as custodial staff. In our testing, product effectiveness is the primary criterion.

Carpet cleaning agents are effective when mixed with cold water, eliminating the need to waste energy and water heating either the water or machine.

Carpeting that is removed is recycled and new carpeting is required to have a minimum of 10 percent recycled content.

Residence hall mattresses are sanitized, cleaned, and re-conditioned in order to extend their service life and reduce the amount of new mattresses that are purchased annually. Mattresses that have reached the end of their usual life span and can no longer be re-conditioned are donated to local charitable organization for further reuse. The goal of the mattress re-use program is to reduce the number of mattress purchased annually and to avoid sending any mattresses to the landfill.

Campus recycling is an on-going activity and is introduced to all students during New Student Orientation. Recycling stations are conveniently located throughout all residence halls, classrooms, offices and around the campus grounds. Waste reduction and recycling is further promoted as convenient with the single-stream recycling concept, thereby eliminating the need for sorting glass, metal, plastic and paper products.

Composting organic waste products also serves to maximize our operational sustainability. Through partnership with our food service provider (Aramark), waste food is collected and composted through a third party. In this process, pre and post-consumer food waste is collected. Retail or "front of the house" composting bins are placed in locations that encourage the student, or other patrons, to sort their waste into the proper receptacles. Composting bins are also located throughout campus and in many residential areas. Additionally, Landscaping and Grounds collects and composts yard waste from campus, which is used in flower and shrub beds throughout campus.

### Indoor Environmental Quality

As an institution of higher education, it is critical that the classrooms, labs and offices

## Sustainable Building Operations and Maintenance at Elon University

facilitate and enhance the processes of teaching and learning. Additionally, daily operations and maintenance activities are evaluated to ensure that the buildings, building occupants and the environment are safeguarded. The University is a smoke free campus with respect to all facilities, except outdoor facilities. Smoking is not permitted within 30 feet of University Buildings or in Rhodes Stadium.

All heating, ventilation and air conditioning systems are routinely maintained to provide environmentally controlled conditions for occupant comfort and health. Monitoring of CO2 levels is standard in all new building construction or renovations. Outside air intakes provide fresh air and are located away from harmful emission sources including building exhausts. Temperature and relative humidity levels are monitored and with set-points designed to inhibit the formation mold. Alarms are delivered via text message or email whenever building conditions fall outside of established parameters, facilitating rapid maintenance response to HVAC issues.

Occupants of many LEED certified buildings are given a survey to assess their thermal comfort satisfaction. The results are reviewed by Physical Plant to determine what, if any, adjustments might be needed.

The University utilizes a pest management firm that provides an integrated pest management program for the prevention and treatment of common pests.

New vacuums procured must meet the CRI's Green Label vacuum certification program for cleaning effectiveness and indoor air quality.

To the maximum extent possible, natural day-lighting is used before artificial lighting is turned on. Window treatments are also utilized to minimize glare as well as heat gain.

Noise levels inside classrooms and offices can be adversely affected by outdoor ground maintenance equipment. In order to minimize this impact, leaf blowers, lawn edgers, mowers, chain saws, etc. are operated with class schedules and normal business hours in mind.

Paint and adhesive products are selected based on their VOC levels. The goal is to select products with the lowest VOC possible, preferably a zero VOC product if available.

Environmental Services utilizes a green cleaning program. Food wastes and other odor producing wastes are to be removed daily. Soap is a type of foam that supports using less water and less waste. In addition, the paper towels used on campus are made from recycled paper.

The Physical Plant has a No-idling and Proper Fueling policy to ensure vehicles are not idling for extended period of times and vehicles are not topped off during fueling.