



DuPage County Government Center Sustainability Best Practices Guide

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Chapter 1 INTRODUCTION



DuPage County has a long history of promoting sustainable practices on its campus at Government Center, a 57-acre area that houses the County's administrative offices, jail, judicial office, health department, Convalescent Center, Division of Transportation, and other departmental facilities. The sustainability activities DuPage County has undertaken at Government Center range from retrofitting energy inefficient lighting fixtures in and around campus facilities to establishing a demonstration native plant garden outside the Administration Building. To advance sustainability on its Government Center campus, the County seeks to learn about new and innovative sustainability strategies. The DuPage County Campus Sustainability Best Practices Guide will help to create an interdepartmental, campus-wide approach to sustainability planning.

What is Sustainability?

Sustainability can mean different things to different people, groups, and organizations. Sustainability is often defined as “meeting the needs of the present without compromising the ability of future generations to meet their needs.”¹ Another common way of understanding sustainability is through the interrelationships among the “3 E’s”: environment, economy, and equity. In this framework, sustainability regards the total wealth of society as natural, human, and man-made capital.² These definitions, which are not mutually exclusive, can shape how different groups approach and inform sustainability solutions.

Putting sustainability into practice can mean a range of actions on the ground. Sustainability actions can vary based on geographic scale, jurisdiction, and organizational mandate. Local governments, including counties, can advance sustainability through a variety of means, including developing policies and regulations, providing financial incentives, and implementing demonstration projects, among other mechanisms. For instance, local governments may require that any public policy or investment meet certain environmental, economic, and social equity goals.

Local governments can also advance sustainability by focusing on best practices relating to public assets. Adopting sustainable practices in campus planning and facilities maintenance not only underscores a community’s commitment to sustainability by “walking the walk,” but also helps to highlight the actions that local residents and businesses can adopt to follow suit.

As DuPage County expands the range of its sustainability initiatives, it can develop an approach to sustainability that is most appropriate to its own local context.

¹ Brundtland Report, Our Common Future, 1987.

² CMAP Sustainability Regional Snapshot, 2007.

Relationship with the GO TO 2040 Comprehensive Regional Plan

The Chicago Metropolitan Agency for Planning (CMAP) is the official regional planning organization for the northeastern Illinois counties of Cook, DuPage, Kane, Kendall, Lake, McHenry, and Will. CMAP developed and now guides the implementation of the GO TO 2040 Comprehensive Regional Plan, metropolitan Chicago's first comprehensive plan in more than 100 years.

To address anticipated population growth of more than two million new residents, GO TO 2040 establishes coordinated strategies that help the region's 284 communities address transportation, housing, economic development, open space, the environment, and other quality-of-life issues. The plan contains four themes and 12 major recommendation areas:

Livable Communities

1. Achieve Greater Livability through Land Use and Housing
2. Manage and Conserve Water and Energy Resources
3. Expand and Improve Parks and Open Space
4. Promote Sustainable Local Food

Human Capital

5. Improve Education and Workforce Development
6. Support Economic Innovation

Efficient Governance

7. Reform State and Local Tax Policy
8. Improve Access to Information
9. Pursue Coordinated Investments

Regional Mobility

10. Invest Strategically in Transportation
11. Increase Commitment to Public Transit
12. Create a More Efficient Freight Network

GO TO 2040's recommendations help to achieve sustainability in several ways:

- Long-term land use and development planning promotes walkable, affordable, and diverse communities.
- Effective natural resource management practices are needed to maintain thriving ecosystems.
- Transportation programs that support low-carbon transportation investments promote healthy and active lifestyles and mitigate greenhouse gas emissions that contribute to climate change.
- Access to resources, such as jobs, education, and natural resources, are a necessary part of building an equitable and sustainable region.

By undertaking a process to develop a Sustainability Best Practices Guide to further its sustainability activities within Government Center, DuPage County is shaping its future and demonstrating its commitment to the long-term sustainability of the County.

How to Use the Sustainability Best Practices Guide

The Sustainability Best Practices Guide highlights strategies the County can take to enhance the sustainability of the Government Center campus. The goal of the guide is to build awareness and offer options that can guide the County's decision-making by providing innovative and effective sustainability best practices tailored to the needs and contexts of the campus. The Guide applies to the facilities and initiatives within Government Center, but does not extend to the municipalities within the County or to other County assets throughout DuPage.

The Best Practices Guide is distinct from a sustainability plan in that it does not prescribe recommendations, goals, or quantitative targets for the County, but rather provides a range of options for further action. This Guide should be seen as a menu of options for the County to consider incorporating into its sustainability and facilities work plan moving forward.

Like a sustainability planning process, the process to develop this Guide included a review of existing sustainability conditions and activities, interviews with staff representing multiple County departments to identify priority issues, and research on best practices to address areas of opportunity for improved sustainability. Unlike a sustainability plan, the development of this Guide did not include public visioning or goal-setting. Since the Guide is meant to directly address buildings, lands, and operations within Government Center, the main stakeholders engaged in this process were County employees. This geographic specificity also means that the Guide provides more site-specific detail about best practices that relate to various campus conditions than are typically included in a sustainability plan, which would generally be more policy-based.

The Guide contains seven chapters divided by topic area: green building, transportation and mobility, waste, open space and ecosystems, water, energy, and education and awareness. Each of the chapters begins with a summary of the County's sustainability achievements in that area, followed by enumerated best practice strategies, including the benefits of the best practice, informational resources, and ideas describing how the County might apply the practice on its campus. The potential applications and documented benefits of each best practice can be referenced when seeking funding sources for planning and implementation.

Process

The process to develop the DuPage County Campus Sustainability Guide included multiple steps lasting approximately a year. The key steps in the planning process are illustrated in Figure 1.

Staff Engagement

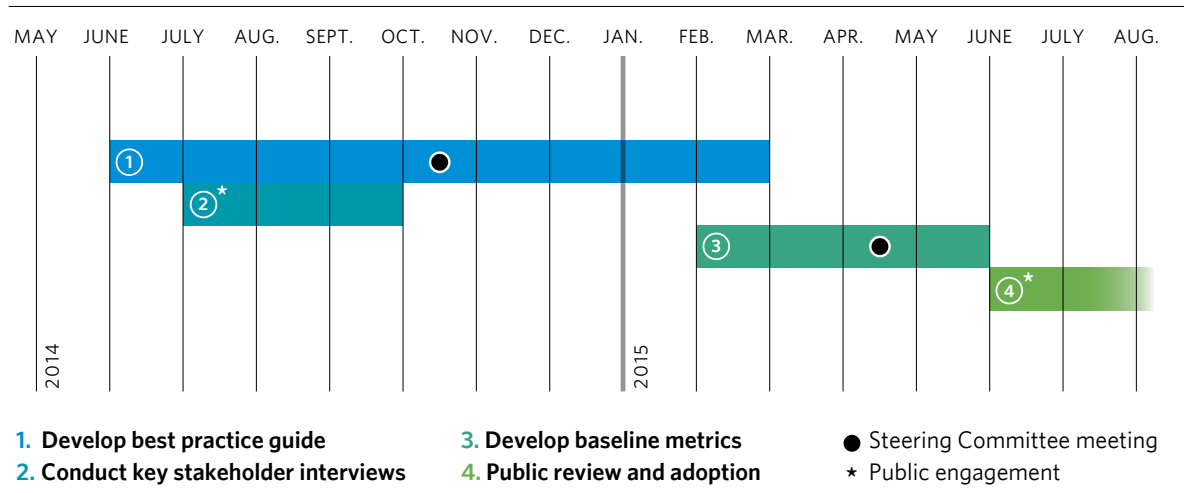
Staff participation was the linchpin of the Sustainability Best Practices Guide development process. The process was crafted with assistance from County staff, and has been designed to include staff input throughout. The development of the Guide was informed by a Steering Committee comprised of representatives across County departments. The Steering Committee’s role includes providing invaluable information on current and past sustainability achievements, input on future directions for sustainability actions, and feedback on the Guide.

The members of the Steering Committee include:

- Chuck Curcio**, *Facilities and Maintenance*
- Mark DeIorio**, *Convalescent Center*
- Keith Fuchs**, *Facilities and Maintenance*
- Tim Harbaugh**, *Facilities and Maintenance*
- Clayton Heffter**, *Stormwater Management*
- Joy Hinz**, *Department of Economic Development and Planning*
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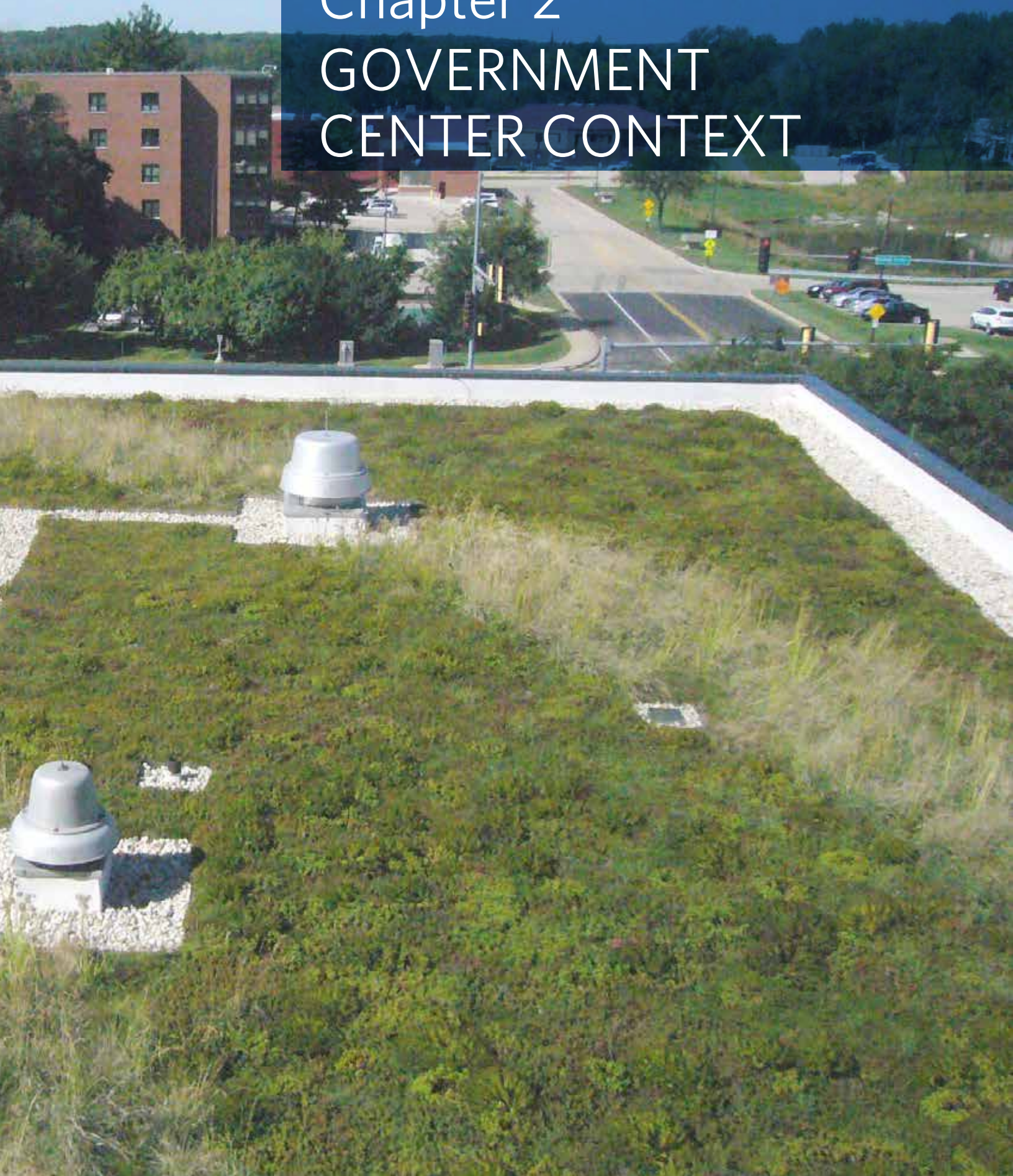
In-depth interviews with County staff, including Steering Committee members and other departmental staff, helped to ensure that the Guide represents the County’s needs in creating a more sustainable future for Government Center. These interviews, which occurred both in person and over the phone, captured ideas and information from the perspectives of building and facilities management, grounds maintenance, stormwater management, IT maintenance, transportation planning, and Convalescent Center operations.

Figure 1. Timeline for DuPage county sustainability best practices guide project



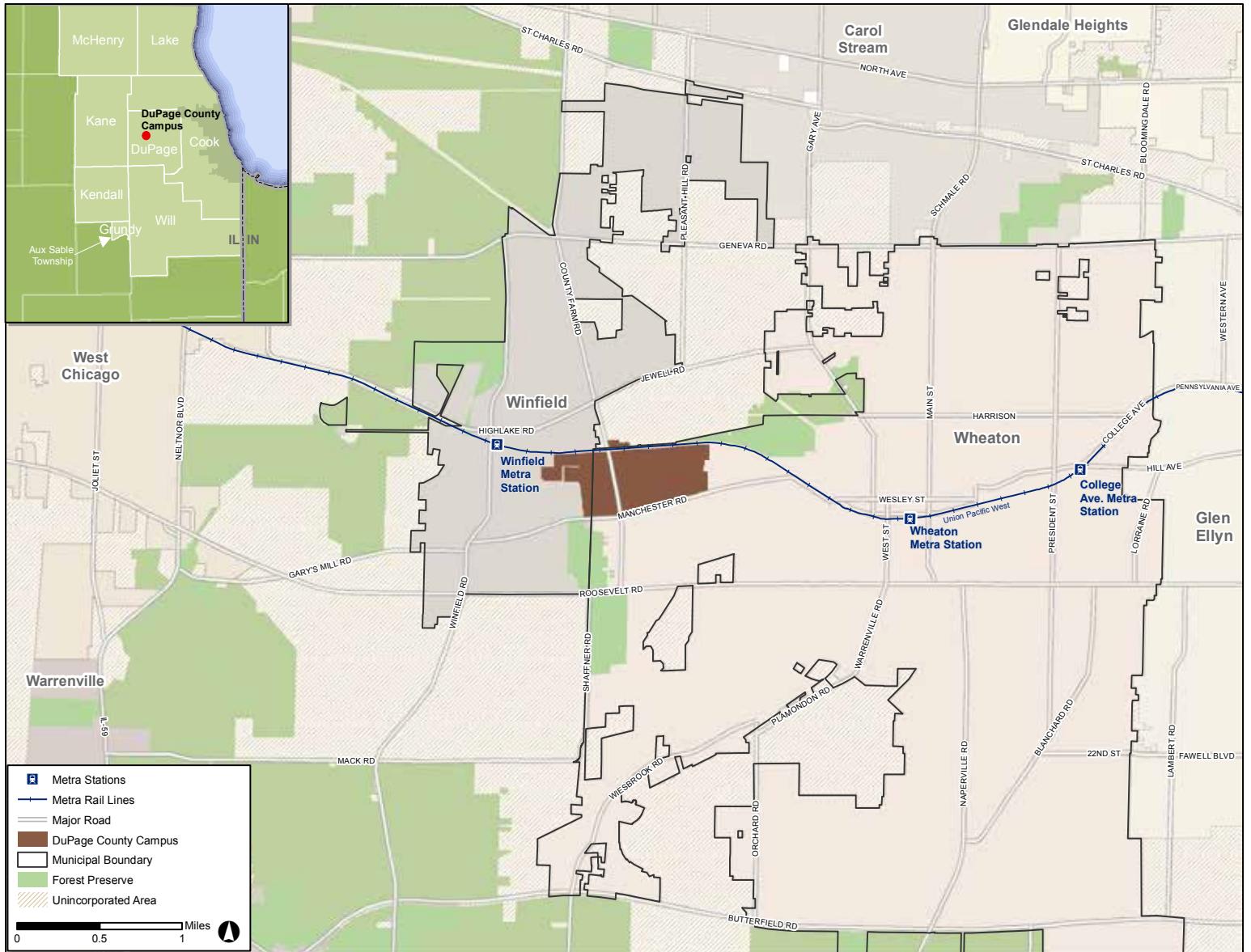
Source: Chicago Metropolitan Agency for Planning, 2015.

Chapter 2 GOVERNMENT CENTER CONTEXT



This section provides an overview of Government Center’s regional context, facilities, and operations. This contextual understanding directly informs the sustainability practices that are feasible for and appropriate to the County campus.

Figure 2. Sub-regional map



Source: Chicago Metropolitan Agency for Planning.

Regional and Sub-Regional Context

Situated at the geographic center of DuPage County, Government Center straddles the City of Wheaton and Village of Winfield (refer to Figure 2).

Approximately 30 miles west of the Chicago Loop, the campus enjoys close proximity to several major transportation networks:

- Wheaton Metra station (1.1 miles east)
- Winfield Metra (1.8 miles west)
- IL-59 (3.5 miles west)
- I-355 Tollway (7 miles east)
- I-88 (6 miles south)
- 301 and 591 Pace Bus routes

DuPage County Government Center Campus

The 57-acre Government Center campus is situated approximately two miles from downtown Wheaton at the intersection of County Farm Road and Manchester Road. The complex was developed in 1990 after rapid population growth caused the County to outgrow its previous location in downtown Wheaton.

County Farm Road serves as the dividing line between the east and west sides of Government Center. The campus is bordered by the Union Pacific West railroad to the north and Winfield Creek to the west. Other neighboring land uses include municipal parks (East Street Park in Winfield and Graf Park and the Lincoln Marsh Natural Area in Wheaton) and residential neighborhoods, including some unincorporated land.

A summary of Government Center facilities and operations is shown in Table 1.

Table 1. Summary of the DuPage county government center size and scope of operations

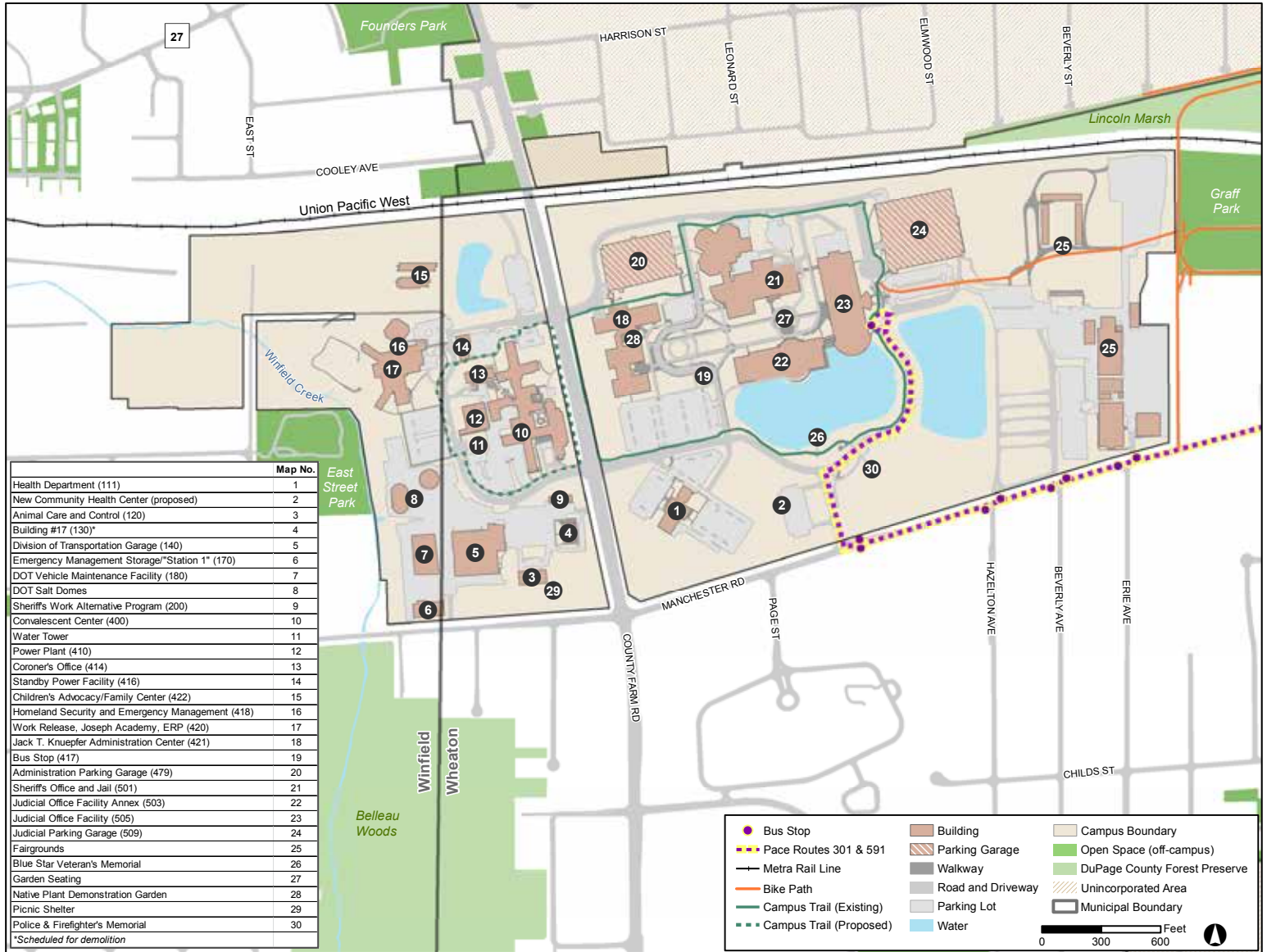
CHARACTERISTIC	COUNT
Total # of Employees	2,225
Total Acres of Government Center Campus	190.0
Total Acres Impervious Land Managed	75.5 (40%)
Total Acres Pervious Land Managed	114.5 (60%)
Total # Buildings and Structures	35
Total # Facilities Owned	19 (on this campus)
Total # Facilities Leased	4*
Total Facility Gross Square Feet (GSF)**	1,881,877
Total # Fleet Vehicles Owned	540
Total Operating Budget Fiscal Year (FY) 2013	\$10,854,760
Total Amount Spent on Energy Consumption FY 2013 (\$ Million)	\$3,068,290
Total Energy Consumed per GSF	1.08 Therms; 21.22 KW-hrs

*Traffic Court (3) and Workforce Development (1).

**For energy usage purposes.

Source: Data provided by DuPage County.

Figure 3. Government center map



Source: Chicago Metropolitan Agency for Planning.

Previous Plans, Studies, and Reports

While DuPage County has never adopted a sustainability plan, it has developed several policies and progress reports that capture the County's past sustainability accomplishments.

DuPage County Environmental Responsibility and Conservation Policy

In 2008, the DuPage County Board adopted an Environmental Responsibility and Conservation Policy (ERCP) that provided guidance for environmentally responsible practices. This policy builds off of previous environmental policies adopted in 1993 and 2002. The ERCP sets forth procedures for reducing resource consumption, including considerations for environmentally preferred purchasing, product life-cycles, waste disposal, energy efficiency, and landscaping. The policy has provided the foundation for many subsequent sustainability actions across Government Center.

DuPage County Environmental Progress Reports

The County published Environmental Progress Reports in 2006 and 2011 to document the many sustainability efforts it has undertaken. These summary reports highlight the many robust initiatives that DuPage County has embarked upon in the past decade, but do not set goals or targets for future sustainability activities.

DuPage Cool Counties Resolution

In 2012, DuPage County **adopted a resolution** to become an Illinois "Cool County." The Sierra Club program consists of counties across the country that pledge to reduce greenhouse gas emissions levels. DuPage County set a goal of reducing countywide greenhouse gases 10 percent below the 2007 levels by 2020 and to 20 percent below 2007 levels by 2030. As part of the initiative, the County commits to lowering energy consumption on the campus. It is currently developing a County-wide energy reduction policy to achieve that goal. A newly appointed Green Government Council of citizens and energy industry representatives are shepherding the energy plan development process.

This policy provides the foundation for the County's work on reducing greenhouse gas emissions and adapting to future climate impacts through energy, air quality, land use, transportation, water, and solid waste. The Cool County resolution applies to the entire county, not just to the Government Center campus.

Sustainability Best Practices

The following chapters of this document present a range of sustainability best practices for DuPage County to consider adopting in the future. The practices are organized according to seven sustainability topic areas:

- Chapter 3: Green Building
- Chapter 4: Transportation and Mobility
- Chapter 5: Waste
- Chapter 6: Open Space and Ecosystems
- Chapter 7: Water
- Chapter 8: Energy
- Chapter 9: Education and Awareness

Because of the interrelationships of many sustainability topics, many practices addressed in this Best Practices Guide do not fall neatly into one chapter topic. In several places, references are made to other chapters where a strategy is discussed at greater length. The co-benefits of each sustainability action are summarized in the strategy tables included at the start of each best practices section.

Chapter 10 discusses next steps that the County can take to prioritize and implement the practices included in this Guide. Appendix A includes several resources and case studies that the County can use to learn more about specific practices described in the Guide.

Chapter 3

GREEN BUILDING



Green building is a holistic approach that considers the positive and negative impacts that the built environment can have on the natural environment and the people who inhabit it³. Green building best practices address the environmental impact caused by the design, construction, operation, and maintenance of built structures. Green building relies on an integrated design approach that holistically considers building components such as site selection, energy systems, water related systems, indoor environmental quality, and human health and wellbeing.

³ U.S. Green Building Council. Accessed December 19, 2014. See <http://www.usgbc.org/articles/what-green-building>.

Choosing green building design over conventional practices can generate a variety of benefits, such as reducing energy and water consumption, improving the health and wellbeing of building occupants, reducing greenhouse gas emissions and other pollutants, and providing the opportunity to showcase best practices in sustainability. Integrating green building strategies into the design and construction can also reduce project costs and save taxpayers money.

Since green building principles touch on many sustainability topic areas, strategies that are specifically targeted toward energy and water use, indoor environmental quality, material selection, and waste generation are covered in the other chapters. This chapter specifically touches on campus-wide green building and climate resiliency strategies.

Key Green Building Achievements

- The County has incorporated green building practices into the campus through new construction, renovations, and pilot projects.
- The County has received several grants for green building improvements.
- The County’s resolution to become a member of the Cool Counties initiative commits the County to reducing greenhouse gas emissions and preparing for the impacts of climate change.

Certification

Among other sustainability considerations outlined in the Environmental Responsibility and Conservation Policy (ERCP), the County requires that sustainable design and construction practices be employed when practicable, such as utilizing building materials that have longer documented life spans or that are made with renewable materials. The ERCP has provided the impetus for several green building activities.

Several projects have been completed in compliance with the County’s ERCP. Of these projects, two have followed Leadership in Energy & Environmental Design (LEED) guidelines. The Office of Homeland Security and Emergency Management was renovated in 2012 with a \$1.4 million grant from the Federal Emergency Management Agency (FEMA). The renovation meets LEED criteria and embraces sustainable elements including water saving fixtures, energy efficient lighting, low-emitting volatile organic compound (VOC) paints, flooring, and furniture, and reuse and recycling of materials.

Completed in 2013, the Jeanine Nicarico Child Advocacy Center is the County’s second LEED project on campus. The Center meets LEED Gold standards and features green practices such as a solar roof, permeable pavement parking lot, and bioswales to absorb roof runoff.

Green Building Best Practices

The County’s LEED certifications have included several green building measures, but are contained within only two buildings in the Government Center. The practices in this section provide options for the County to apply green building practices across all campus facilities and make its building design standards more robust. The following best practices center around three themes:

- **Standardize the design guidelines across the campus.** The County could use a system for integrating a set of minimum design criteria across all campus buildings.
- **Increase the resilience of the campus’ built environment to climate change.** In accounting for future precipitation and temperature projections, the County can help increase the campus’ resilience to climate change.
- **Adopt tools to measure building performance.** The County could benefit from a centralized system that tracks the effectiveness of specific green building improvements.

Table 2. Summary of benefits for green building best practice strategies

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Campus-Wide Green Building Design Standards	Secondary	Secondary	Primary	Secondary	Secondary	Secondary	Secondary
Resilient Design Standards	Secondary	Secondary	Primary	Secondary	Secondary	Secondary	Secondary
Climate Vulnerability Assessment	Secondary	Secondary	Primary	Secondary	Secondary	Secondary	Secondary
Green Building Evaluation Tools	Secondary	Secondary	Primary	Secondary	Secondary	Secondary	Secondary
Green Building Certification Alternative	Secondary	Secondary	Primary	Secondary	Secondary	Secondary	Secondary

Source: Chicago Metropolitan Agency for Planning.

Standardized Green Building Design Guidelines

Campus-Wide Green Building Design Standards

While goals outlined in the ERCP have been a primary driver of green building improvements, it lacks specificity for operationalizing the policy. Establishing green building standards that can be applied throughout Government Center can be an effective way to ensure that each new construction or renovation project adheres to consistent criteria. The standard should provide more concrete details for:

- Energy and water conservation standards
- Stormwater runoff capture requirements
- Environmentally preferable building materials
- Construction and demolition standards for reduction, recycling, and composting
- Indoor air quality standards during building construction and long-term operation

Guidelines can vary based on project size or type, such as major renovation or system upgrades, to identify a minimum level of design and process requirements accordingly. Because green technology, innovations, and methodology are constantly evolving, goals and standards should be periodically updated. The standards can be packaged into a simple checklist to assess future projects. Elements of the checklist could include LEED certification, opportunities for on-site renewable energy generation, and implementation of water management strategies such as water-efficient fixtures. The County can look toward many existing standards to determine the guidelines that are most appropriate for Government Center. Options for green building standards are included in the Additional Resources section.



Resilient Design

The County may choose to expand existing green building practices to encompass resilient design. The Resilient Design Institute defines resilience as the capacity to adapt to changing conditions and to maintain or improve functionality in the face of stress or hazard⁴. For the Government Center and DuPage County as a whole, a changing climate will primarily exacerbate problems of flooding and heat waves.

⁴ Resilient Design Institute. Accessed February, 11, 2015. See <http://www.resilientdesign.org/>.

Resilient design seeks to improve resilience to future weather impacts through the intentional design of buildings, landscapes, communities, and regions. Increasing the resiliency of Government Center increases the County's preparedness for extreme weather events and natural disaster, minimizes and avoids costs of disaster recovery, and increases the longevity of building lifespans. Resilient design can be implemented at Government Center through two related practices that assess facility vulnerabilities to climate change and establish standards that can improve resilience to climate change.

Resilient Design Standards

The findings of a vulnerability assessment can inform a set of resilient design standards. These resiliency considerations can be included as a sub-set of standards in a potential unified building design standard (see Strategy 3.1). Some strategies to achieve resilience at the building or campus scale include:

- Designing and constructing buildings to withstand severe storms and flooding.
- Locating critical facilities (such as the Office of Homeland Security) to endure flooding and extreme weather events.
- Increasing vegetation near buildings to reduce water flows and pollution leaching.
- Increasing the use of on-site renewable energy.
- Specifying products and materials that will not release gases or leach hazardous substances in the event of flooding.
- Maintaining a non-perishable food supply on-premises.

Integrating a resilient design approach that focuses on preparing for, coping with, and managing vulnerability and risk into the County's campus planning and investment strategy can mitigate the impacts of intense storms, warmer temperatures, and power outages. Adapting to a changing climate in the present will be cheaper and less disruptive than retrofitting or rebuilding later. Even taking modest, inexpensive steps now can help ensure resilience over the long term.

Climate Vulnerability Assessment

Conducting an assessment of existing vulnerabilities to climate change is the first step of a resilient design process. Many resources, including the *Self-Assessment to Address Climate Change Readiness* and the CMAP *Climate Adaptation Guidebook for Municipalities in the Chicago Region*, outline the process to conduct a climate vulnerability assessment. Generally speaking, this process entails (1) identifying the historic and projected trends relating to temperature, precipitation, and ecological change to understand the area's overall climate risks, and (2) evaluating the vulnerabilities of campus facilities to the identified risks.

Underlying climate data for the Chicago region can be compiled from many existing resources, including the Illinois State Climatologist's summary of *Primary Impacts of Climate Change in the Chicago Region*.

A comprehensive assessment should include a facility-by-facility breakdown of current vulnerabilities to impacts, such as extreme flooding, extreme heat, and changing plant hardiness zones. The facilities covered in the assessment can include all buildings within Government Center, as well as the landscape grounds and the County Fair Grounds. The vulnerability assessment conducted as part of Boston's Climate Ready Plan provides a good example of an in-depth and comprehensive examination of government facilities.

Performance Measurement

The County may be interested in measuring building performance to assess the effectiveness of its green building practices. Tracking tools and certification programs can help the County document and evaluate green building efforts.

Green Building Evaluation Tools

Several free tools exist to evaluate the performance of construction and retrofitting projects. These tools can help the County evaluate the effectiveness and performance of green building strategies and can also be used to track indicators in the long-run. Adopting an effective green building tool also promotes strategic investment decisions based on performance metrics. Evaluation tools can also foster coordination of green building activities across County departments as new construction projects arise and new facilities maintenance strategies are employed. Examples of several green building tools described below vary in scope and function. The County should define its needs and goals for green building performance measurement before selecting potential tools.

GreenCheck

Developed and used by the U.S. Environmental Protection Agency (U.S. EPA), GreenCheck provides the U.S. EPA with a consolidated checklist to evaluate and track the sustainability requirements of a project. The GreenCheck program incorporates sustainability areas, such as energy and water consumption, stormwater management, waste management, and indoor environmental quality.

GreenCheck was developed to streamline federal regulation compliance for U.S. EPA projects. Completion of the form is required for projects undertaken by U.S. EPA that exceed one or more thresholds based on project area (in square feet), cost, and increase in impervious surface. The form is completed by EPA architects, engineers, and other experts, and used by the project lead throughout the process to track compliance, from its inception to construction and occupancy phases. The form is provided as a Microsoft Word document that can be easily downloaded from U.S. EPA's website.

In addition to ensuring regulatory compliance, the tool is particularly effective in fostering collaboration among project team members and stakeholders to help identify sustainability best practices, resolve issues, and offer technical expertise.

Sustainable Facilities Tool

The Sustainable Facilities Tool (SFTool) is an interactive website developed by the U.S. General Services Administration to provide sustainability guidance for facility managers, procurement professionals, project managers, and leasing specialists. The tool provides concepts for sustainable workspaces, ideas for integrating sustainability into projects, types of sustainable building initiatives, green procurement guidance, and successful case studies.

This tool is best used for small projects that are less than 10,000 square feet, including: materials, furniture and furnishings replacement, renovation of interior office spaces, small gut rehab projects, building system upgrades, or building operations and maintenance services. For projects larger than 10,000 square feet, SFTool recommends using the LEED rating system. One highlight of the tool is the Explore component, which allows users to compare sustainability benefits and considerations of various materials and building systems.

Building Life Cycle Cost Program

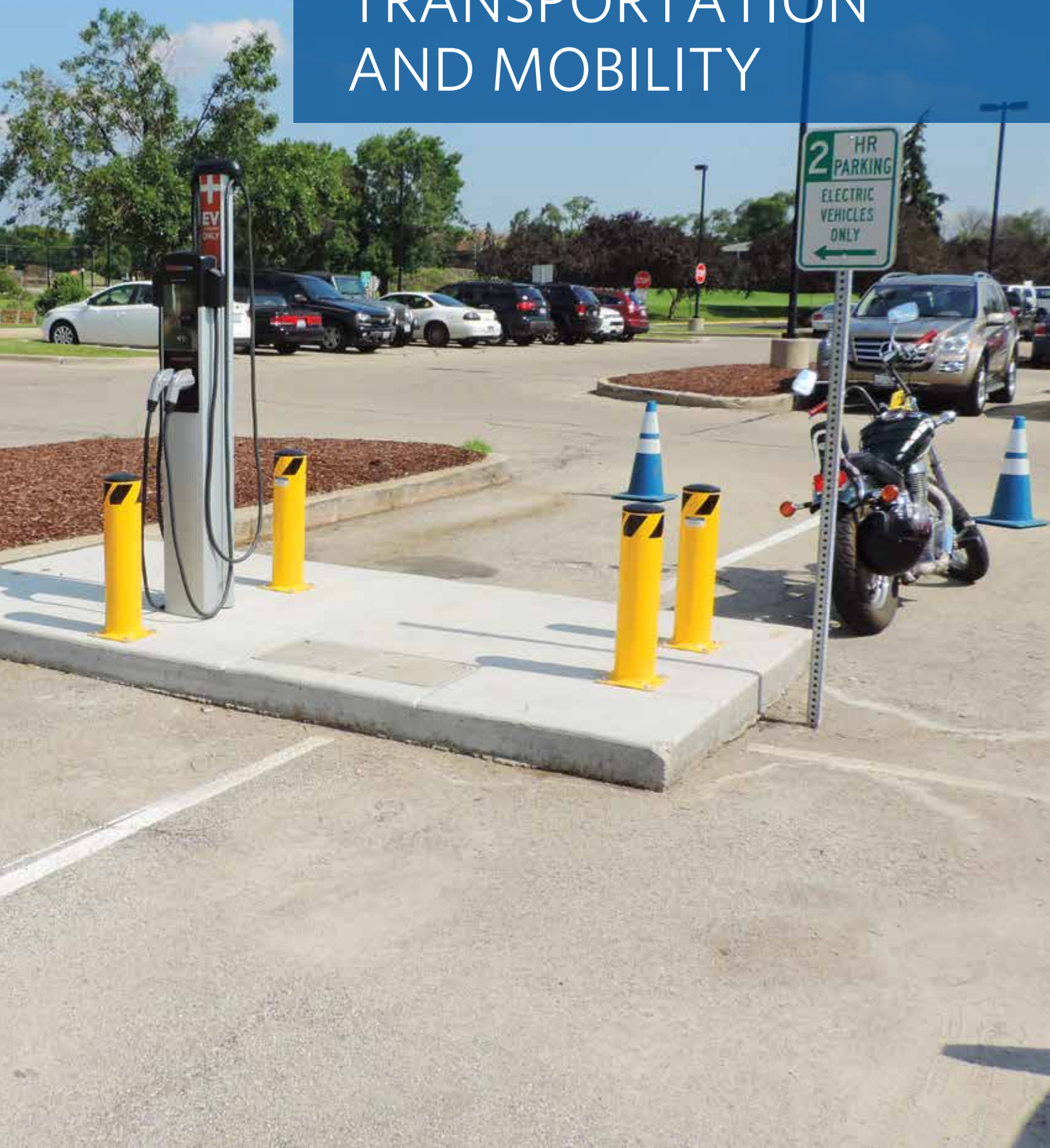
Life cycle cost analysis helps facility managers and other decision makers to consider all present and future costs associated with projects involving upfront and ongoing expenses, such as new construction, major renovation, and equipment replacement.

The Building Life Cycle Cost Program was established by the National Institute of Standards and Technology to provide tools for assessing capital investment in buildings. Building Life Cycle Cost is a computer program that evaluates the cost-effectiveness of sustainability best practices such as water conservation and renewable energy projects that may have a higher upfront cost but a lower operating cost over the system's lifespan. The program allows users to compare two or more alternative designs to determine the most economical option.

Green Building Certification Alternatives

The County has previously pursued green building certification through the LEED rating system for specific projects on campus and may wish to do so again in the future. Certification can lead to increased public recognition and support for the County's commitment to sustainability. There are a variety of certification programs to choose from, all of which incorporate most of the preceding green building standards. Alternative certification options are listed in the Additional Resources section.

Chapter 4 TRANSPORTATION AND MOBILITY



Transportation is inextricably linked to water quality, air quality, and human health. Private automobile trips, often measured in vehicle miles traveled (VMT), directly contribute to the carbon footprint of the campus. Expanding transportation alternatives through pedestrian, bicycle, and transit improvements will not only help to reduce greenhouse gas emissions, but also encourage more active lifestyles that improve health and wellbeing. Such alternatives can be encouraged through service and infrastructure improvements, such as constructing new bicycling and walking trails; establishing bicycle parking, changing rooms, and shower facilities to support bicycle commuters; and expanding electric charging stations or alternative fueling stations.

Sustainable transportation planning must also consider the impact of transportation infrastructure on stormwater management. Roads, parking lots, and sidewalks comprise large areas of impervious surfaces, collect debris and pollution from many diffuse sources, and carry them with stormwater runoff into local waterways during rainstorms. Effective stormwater management not only reduces the volume of runoff to nearby waterbodies, but also mitigates non-point source pollution that impairs water quality. From limiting the chemicals used for ice and snow removal to increasing the permeability of paved surfaces, many sustainable practices can lead to more sustainable infrastructure design and maintenance. Greening transportation infrastructure can also play a significant role in reducing the urban heat island effect that results from overheating of paved surfaces, buildings, and vehicles.

Key Transportation Achievements

The County's efforts to address surface parking maintenance and fleet management have driven environmentally conscious purchasing decisions, mitigated polluted runoff, reduced operating costs, and garnered recognition as an industry best practice.

Parking

The majority of County employees and Government Center visitors drive to the campus, which creates high demand for parking accommodations. The campus contains 14 main surface parking lots and two parking garages. The surface facilities, especially those servicing the Administration Building and Courthouse, tend to quickly reach capacity; however, the parking garages are often left underutilized. One designated parking space in the Administration Building parking lot is available for employees who carpool. Providing convenient parking for carpool vehicles can encourage more employees to reduce their carbon footprint by driving to work together.

Surface Treatment

Given the substantial amount of surface parking surrounding campus facilities, extending the lifespan of paved surfaces through proper long-term maintenance is important to the County. According to a 2012 report from the Illinois State Water Survey, chloride concentrations in Illinois waterways have risen since the 1960s and are largely attributed to the application of road salts. To minimize the negative impact caused by road salt on waterbodies, the County has experimented with alternative methods to treat County roadways, campus roads, and parking lots during snowfall. The County uses alternatives such as Eco-salt mixes on sidewalks and Geomelt, a sugar beet-based organic accelerator, on the parking garages. Such products are beneficial for infrastructure longevity because they are less corrosive on surfaces, melt snow and ice more quickly, and require less salt than traditional rock salt. Using low-chloride deicers such as liquids and treated salt also improves water quality of local waterways, for which further details are provided in the Water chapter of this guide.

The County has also improved salt application methods across DuPage County by using power brooms on roadways and treating the salt stock with Geomelt, which has helped the County to more efficiently respond to snow and ice events. As a result of these efforts, the DuPage County Division of Transportation (DuDOT) was awarded the 2013 Green Industry Achievement Award by the Illinois Road and Transportation Builders Association's Green Council, as well as the 2011 and 2014 Conservation Foundation's Low Salt Community Award.

The County also conducts environmentally friendly snow and ice operations to all paved surfaces on campus by conserving salt and reducing contaminated snowmelt runoff through some simple actions:

- Maintaining gutters and catch basins to keep them open and clear of leaves, snow, and ice which will prevent ice and thereby avoid runoff from pooling.
- Removing snow prior to applying salt to avoid salting snow, and only salt when there is certainty that ice is about to form.
- Placing snow piles on pervious, upland areas, where sand and other debris will remain after snowmelt instead of being swept into a storm sewer. Not piling snow on top of catch basins or in drainage swales.
- Sweeping up salt after snow melts.
- Storing salt uphill of snow piles to avoid water flowing through.

In addition to pursuing alternative snow treatment options, the County has also taken measures to manage snow and rain through permeable pavement installations. The campus boasts three permeable paver parking lots at the Children's Advocacy Center, Power Plant, and one of the DuDOT garages. While the permeable paving systems produce environmental benefits for the campus, maintenance and snow removal has been challenging. More information on the environmental benefits of these systems is included in the Water section.

Transit

Government Center lies between the Wheaton and Winfield Metra stations. Both stations are on the Union Pacific West line connecting Elburn to downtown Chicago. While the campus is directly adjacent to the train line, there is not a separate stop at Government Center.

⁵ RTAMS. Accessed February 23, 2015. See <http://www.rtams.org/rtams/ridershipTables.jsp?dataset=paceBus&ridershipID=591>.

The campus is also served by two Pace routes: Routes 301 and 591. The primary bus stop at Government Center is located outside of the Judicial Office Facility (Building 505). Route 301 is a fixed route which provides weekday rush hour service along Roosevelt Road between the Government Center, Wheaton, and Forest Park CTA Station. Ridership between the Government Center and Wheaton is low, with average weekday campus boardings and alightings at 9 and 20 respectively. Route 591, also known as the Wheaton-Winfield Call-n-Ride Shuttle, provides hourly weekday service between the Wheaton Metra Station and the Government Center from 6:30 a.m. to 6:45 p.m. The route was established in 2012 and now carries an average weekday ridership of 65 people⁵. According to Pace, most of these passengers travel between the train station and Government Center. While these bus services are provided, they are not widely advertised and are underutilized by County employees and visitors.

Pedestrian Facilities

County facilities have a number of walkways and sidewalks connecting campus buildings and parking areas. Sidewalks are also found along both sides of County Farm Road and on the south side of Manchester Road. Generally, the east side of campus is better served by sidewalks than the west side.

The East Campus Trail provides a one-mile loop around the eastern portion of the Government Center. The trail offers efficient pedestrian circulation between facilities on East Campus, while also providing opportunities for recreation. A similar half-mile trail is proposed to be built near facilities management in West Campus.

Bicycle Facilities

Some of the sidewalks and trails on campus also serve bicyclists. A bike path cuts across the fairgrounds to connect the East Campus Trail to an off-road bike path located on the eastern edge of the campus. This off-road path leads to the Lincoln Marsh Forest Preserve and eventually the Illinois Prairie Path-Elgin Branch. Planned bikeways in the vicinity provide opportunities for improved bike connections to the Government Center from the Winfield Metra Station.

Bike racks are provided at several locations throughout campus, including the Administration Building, Judicial Office, Office of Homeland Security and Emergency Management, Sheriff's Office and Jail, and parking garages. Bikes are permitted on Pace Route 301 buses and on Metra trains during off-peak hours; however, they are not permitted on Pace Route 591.

Vehicle Fleet Efficiency

The County's vehicle fleet upgrades focus on fuel efficiency and reduce emissions. One of the DuDOT's accomplishments includes the development of a vehicle performance and fuel efficiency policy that improved vehicle maintenance and operation, encouraged exploration of alternative fuel vehicles, and advocated the use of advanced fleet technologies.

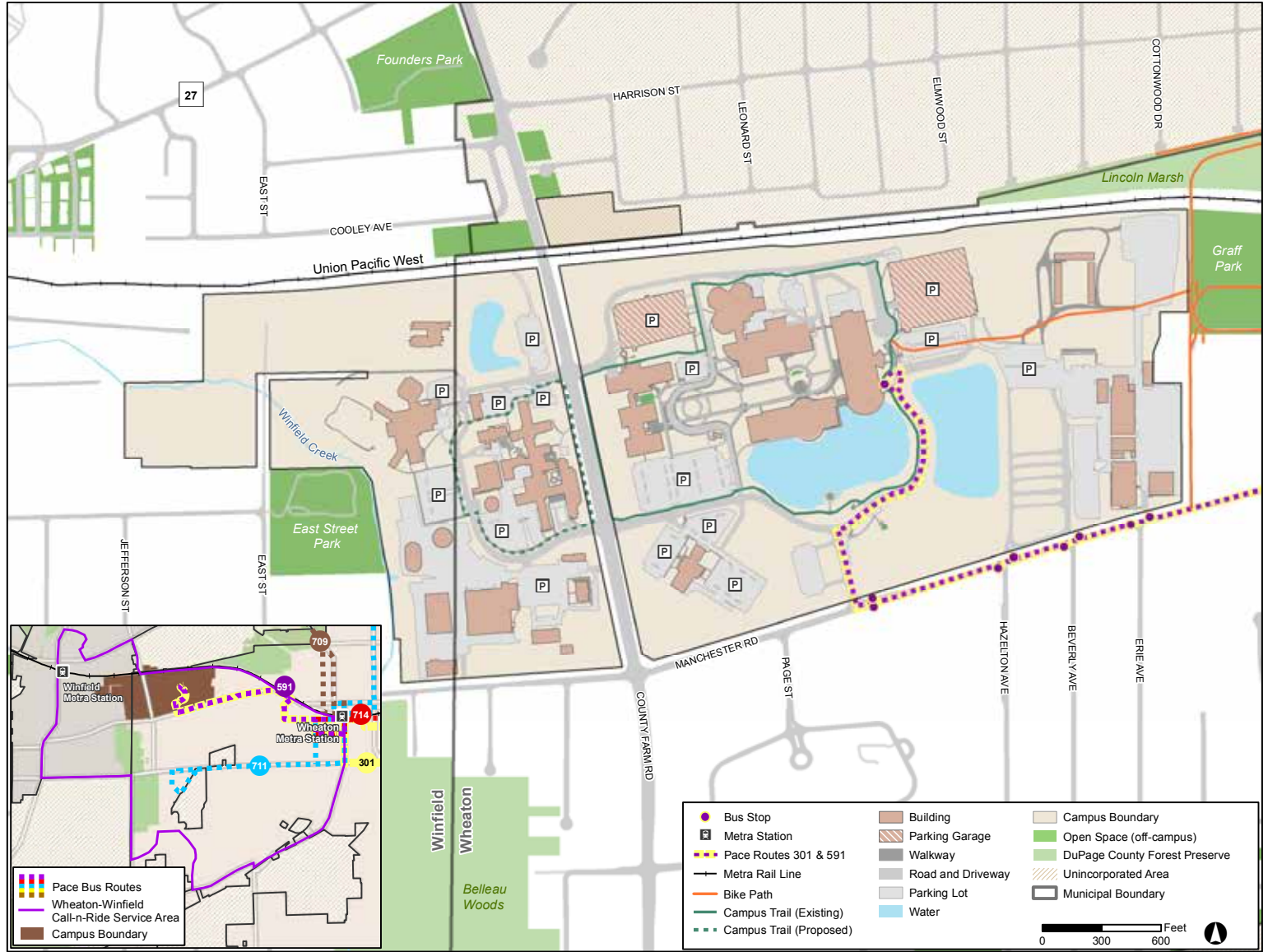
According to the Governors Sustainability Award, 46 percent of the County's fleet (228 out of 500 vehicles) runs on alternative fuel. The current fleet includes a mix of electric and hybrid vehicles, as well as vehicles that run on compressed natural gas (CNG), ethanol, and biodiesel. With funding from a Chicago Area Clean Cities federal grant, the County converted several County-owned vehicles to operate on CNG and installed a CNG fuel station on campus. The County also installed an electric vehicle charging station in the Administration Center parking lot that is available for public use and is used to charge its electric grounds maintenance cart.

All of the County's off-road diesel equipment has been converted to run on B20 biodiesel which is comprised of 20 percent volume biodiesel and 80 percent volume petroleum. Another 96 are E-85 equipped vehicles, also known as FFVs, which can run on a gasoline-ethanol blend of up to 85 percent. Through purchasing and vehicle conversions, the County owns 100 biodiesel trucks, 96 E-85 flex fuel vehicles, 8 bi-fuel vehicles, 11 CNG fuel vehicles, 12 hybrid vehicles, and one electric grounds maintenance cart⁶.

The County has also taken measures to reduce fuel consumption and emissions, such as instituting policies for slow acceleration and reduced idling. In terms of fleet maintenance, the County recycles coolant, hydraulic oil, engine oil, and other fluids for re-refinement and reuse.

Demonstrating the success of the Division of Transportation's efforts, the County has received designation as an Illinois Green Fleet by the Illinois EPA and Chicago Area Clean Cities.

Figure 4. Transportation map



Source: Chicago Metropolitan Agency for Planning.

Transportation Best Practices

In 2012, the transportation sector made up 27 percent of County-wide total greenhouse gas emissions, representing a one percent increase from 2007.

Building off of the County's extensive transportation achievements, the Guide presents several physical, policy, and maintenance improvements to mitigate air, water, and chemical pollution associated with Government Center's transportation network. These opportunities for improving sustainability informed a variety of strategies, classified into four categories:

- **Reduce stormwater runoff.** Practices in this section mitigate water pollution from runoff through improvements to transportation infrastructure design and maintenance.
- **Reduce the urban heat island effect.** Transportation infrastructure should also be designed to reduce heat island effect and improve microclimates.
- **Influence commuter behavior through County programs.** These practices highlight ways that the County can take better advantage of nearby transit systems.
- **Reduce fleet-related emissions through purchasing, operations, and maintenance.** While the County has shifted to CNG fuel for its fleet, many additional changes to fleet maintenance and purchasing can further improve the longevity, efficiency, and emissions of fleet vehicles.

Transportation-Related Stormwater Management

The following tactics offer additional methods to design, construct, and maintain paved surfaces that address water quality and stormwater management. The benefits of these practices extend beyond improvements in the pollution, rate, and volume of stormwater runoff. They also reduce stress on the sewer and stormwater system, contribute to cost-savings by avoiding over-application of deicers, reduce potential space and money required for larger-scale stormwater detention and treatment, and educate the public on best stormwater practices through visible demonstration.

Permeable Pavements

The County has already tested permeable pavers in three parking lots, but report some challenges in snow removal and longer term maintenance of those lots. Given this feedback, the County may explore alternative permeable pavement products such as porous asphalt (which is more commonly used in colder climates) and vegetated permeable pavements in lower traffic areas including trails, sidewalks, overflow parking areas, and service access roads.

Vegetated permeable pavements are made of paving materials and grass systems to allow for water to percolate into the ground. Some vegetated pavements involve a concrete grid and grass paver use lattices for support and allow grass to grow between the gaps while others use plastic interlocking cells to provide structural support. Both types are underlain by a stone bed that filters and collects stormwater. A grass paver pilot project could also be completed at the fairgrounds.

Since proper maintenance of the permeable pavement surface is vital to the system's function, the County may wish to develop a maintenance plan and training program to educate staff on proper upkeep.

Table 3. Summary of benefits for transportation and mobility best practice strategies

■ Primary benefit of this strategy
 ■ Secondary benefit of this strategy

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Permeable Pavements							
Cool Pavements							
Parking Lot Landscaping							
Commuter Study							
Carpooling							
Motor Pool							
Transit Benefit Fare Program							
Bicycle Infrastructure							
Fleet and Trip Reduction							
Purchasing Standards							
Operations and Maintenance							
Bicycle Fleet							

Source: Chicago Metropolitan Agency for Planning.

Heat Island Reduction

Extreme heat is expected to increase with climate change. The large surface areas of parking lots, roadway pavements, and other impervious surfaces on Government Center contribute to the urban heat island effect. This makes it not only uncomfortable for pedestrians to travel from parking lots to County buildings, but also exacerbates ozone pollution. The County can explore changes to paving materials and surface parking design that not only reduce the heat island effect and improve air quality, but also provide many co-benefits for water quality and place making. For instance, shade and cooler pavement temperatures reduce thermal water pollution by reducing the temperature of runoff that enters the waterway. Many fish, aquatic plants, and other riverine species can only thrive in waters within a certain temperature range. When water returns to Winfield Creek at a higher temperature than the water supply, it reduces dissolved oxygen levels and can have drastic effects on aquatic ecosystem health. Shade trees are not only effective at reducing thermal water pollution, but can also improve the pedestrian environment of surface parking lots.

Cool Pavements

The lighter color of high albedo or “cool” pavements reflects more sunlight which in return reduces surface temperatures. Given its color, conventional concrete is a naturally cooler pavement, although its ability to reflect sunlight diminishes over time. Other cool pavement examples include conventional asphalt that has been modified with high albedo materials or treated with a thin sealing layer to increase reflectance, resin-based pavements, and colored asphalt and concrete, among others.

Developed by U.S. EPA, the Cool Pavement chapter of Reducing Urban Heat Islands: A Compendium of Strategies provides additional details on high albedo pavement types and application considerations.

Parking Lot Landscaping

Landscaping design within parking lots can play a significant role in reducing the urban heat island effect and creating more comfortable microclimates for pedestrians. Incorporating shade trees into parking lots also reduces surface temperatures through shading and evaporation. Employing landscaping to mitigate the heat island effect also provides benefits for stormwater capture and placemaking.

Planted landscape islands and medians provide a way to beautify parking lots, provide shade, and capture and filter stormwater runoff. Despite the challenges they pose in snow removal, the County should continue to consider the incorporation of landscape islands and medians in upcoming parking lot reconstruction projects, exploring alternative designs or materials to mitigate the challenges that have been faced. In addition, the County can also consider perimeter landscaping around the edges of parking lots to minimize potential barriers with snow plows. The County can also consider vines, tall grasses, and other low-maintenance or space efficient-plantings as alternatives to traditional tree and shrub plantings. The County should also consider long-term maintenance of landscaping, including the use of non-compactable landscaping materials and selection of plants for shade or drought- and water-tolerance.

Commuter Mode Share

Commuters who leave their car at home just two days a week can cut their annual greenhouse gas emissions by more than 3,000 pounds⁷ or nearly 18 percent of household emissions generated from fuel oil consumption.⁸ Active transportation modes, which include biking, walking, and taking public transit, can reduce reliance on vehicle travel. Increasing the convenience, safety, and enjoyment of active transportation can benefit commuter health, increase transportation equity, reduce greenhouse gas emissions, and reduce costs of commuting for County staff. The following strategies to improve active transportation options through programs that encourage County employees to green their commute, as well as transit service enhancements that strengthen multimodal linkages between Government Center and the Metra stations.

Commuter Study

The County's recent addition of a designated commuter parking spot is one step toward building a full-fledged commuting program. Conducting a commuter survey would serve as a next step in the process. Commuter surveys not only identify how employees travel to work and where they are coming from, but also reveal barriers to taking public transit, walk, or bike to work. Performing a survey prior to initiating a green commuting program is an important step to gather baseline data that can later be used to track program success. Even if the County expects to find that most people drive, the survey can help the County target strategies that encourage alternative commuting modes.

The results of such a survey can inform priorities for the County to increase alternative transportation to campus. Common commuting challenges range from inadequate transit routes, limited transit service schedules, lack of showers or bicycle storage facilities, lack of continuous sidewalks, or poor last-mile connections from Metra or Pace stops to Government Center.

The Guide to Employer Commuter Surveying, provided by the Best Workplaces for Commuters program, provides detailed information on developing and conducting a survey.

⁷ U.S. EPA. Accessed December 19, 2014. See <http://www.epa.gov/otaq/greenvehicles/you/saving.htm>.

⁸ Percentage based on typical annual CO₂ emissions of 16,779 pounds per household based on national average monthly consumption of 62 gallons of oil. U.S. Environmental Protection Agency. Household Emissions Calculator Assumptions and References. Accessed February 23, 2015. See <http://www.epa.gov/climatechange/ghgemissions/ind-assumptions.html>.

Carpooling

Carpooling can be a very effective way for employees to green their commute. Interviews with stakeholders indicate that public transportation services to and from the Government Center are little known and possibly underutilized. Pace provides valuable resources to make carpooling easier for employers and employees. The Commuter Toolkit was developed for employers to help introduce alternative commute options with employees, initiate or enhance a commuter program, and provide readymade materials for education and outreach.

Employees can also use Pace RideShare, a free matching service that allows them to find potential carpools and/or vanpools or start their own. Anyone can start or join a RideShare group using tips from the Commuter Toolkit. Depending on interest, the County may wish to establish its own carpooling program by posting sign-up sheets in the cafeteria or creating a message board on the County's intranet site.

Motor Pool

Programs to share a common motor vehicle pool are meant for short trips and one-way trips and can assist with last-mile connections for commuters and employees. A potential motor vehicle pool could serve commuters traveling between the Metra stations and Government Center, as well as employees traveling within the DuPage County for County-related work. The County may opt to use its own fleet for the vehicle pool or partner with a car sharing service. The Chicago region hosts different car sharing options, such as Enterprise CarShare (formerly I-Go) and Zipcar. Both services have a history of helping government agencies and organizations meet sustainability goals while reducing fleet costs (see 4.10 Fleet and Trip Reduction).

Transit Benefit Fare Program

Pre-tax transit benefit programs, such as through the RTA, can help make commuting by public transit more cost-effective. The program allows employees to reduce their commuting costs by using pre-tax deductions from their paycheck to pay for the purchase of transit fares. Once enrolled, employees can set aside up to \$130 per month for their Metra, bus, vanpool, or other public transit costs.

Bicycle Infrastructure

Providing adequate bicycle facilities supports current bicycle commuters and encourages other employees to adopt alternative commuting modes. A few ways that employers can improve facilities include providing a dry and secure place for bicycle storage, such as covered bike racks or lockers, access to showers and changing rooms, and shared tools such as tire pumps or patch kits.

Beyond physical improvements, establishing programs and hosting events can encourage employees to green their commutes by bicycle. The Active Transportation Alliance provides a wealth of bicycle resources on its website, including tips on biking to work, how to bring bikes on transit, and other information on safety, route planning, and choosing a bike. Active Transportation Alliance also hosts the annual Bike Commuter Challenge which encourages companies and organizations across the Chicago region to commute by bike over a week-long period in June. While individual employees may have participated, DuPage County was not an organizational participant in 2014. The County can look into creating an official team as a chance to boost ridership and provide bike commuting awareness and tips. The County can also identify experienced cyclists to lead commuting rides for less experienced ones along common commuting routes.

Similarly for commuters who carpool, the Pace RideShare service matches potential bicycle commuters with others who make a similar commute by bike. Depending on the level of interest among employees, the County may wish to establish its own bike commuter program or bike club that could coordinate bicycle related activities such as “lunch and learns.”

Case Study on Commuter Mode Share: Central Indiana Commuter Services, Indianapolis, IN

Similar to the commuting resources provided by Pace, the State of Indiana manages a comprehensive green commuting program to assist employees at the Indiana Government Center and at other state facilities in the Indianapolis area. The focus of the Central Indiana Commuter Services program is to encourage commuters to take alternative transportation methods to work, such as biking, walking, carpooling, and using transit. The program covers several commuting areas, including:

- Carpool or vanpool and “bicycling buddy” matching services
- Emergency rides (up to five per year)
- Carpooling Preferred Parking Spaces
- Links to commuting resources including locker/shower facility locations, bus timetables, and regional commuting programs provided by the Central Indiana Regional Transportation Authority.

Vehicle Fleet

Aside from providing more transportation alternatives for commuters, the County can also employ practices that make its own vehicle fleet more sustainable. Over the years, DuPage County has revamped its fleet by converting standard vehicles to operate on alternative fuels and by making environmentally driven purchasing decisions. Several opportunities exist to further reduce the environmental impact of the County's vehicle fleet through improved purchasing, operation, and maintenance practices. The following outlined practices minimize fuel consumption, mitigate climate change, reduce costs associated with fuel and vehicle maintenance, increase the efficiency and reliability of the County's fleet, limit human exposure to harmful chemicals, and avoid dispensing those chemicals into waste and water streams.

Fleet and Trip Reduction

The first step in reducing the County's vehicle fleet is to take stock of its inventory and use. Performing a fleet management assessment allows fleet managers to take a comprehensive look at their current vehicle supply and compare it with individual department needs. By identifying inefficiencies, managers can find ways to reduce total mileage and fuel consumption.

A fleet management assessment should determine the minimum number of vehicles required to meet the needs of County operations and provide a plan for reducing fleet accordingly. Fleet pool sharing can further reduce fleet size by offering vehicles to be shared among departments with less frequent needs. Encouraging smart driver habits can also have a positive effect on the sustainability of the County's fleet. Vehicle-miles traveled (VMT) can be reduced by encouraging employees to plan driving trips that serve multiple purposes.

Case Study on Fleet Reduction: Cook County Shared Fleet, Cook County, IL

In order to reduce maintenance, costs, and environmental impacts of its fleet, Cook County initiated a car sharing program that combines Zipcar access with county-owned Shared Fleet vehicles. Depending on the length of the trip, employees make online reservations for a Shared Fleet vehicle (for longer trips) or Zipcar (for shorter trips) and access the vehicle with a swipe card. By supporting car sharing, the County was able to reduce its fleet by ten vehicles and saved approximately \$250,000 during its first year.

Purchasing Standards

The County has made several clean vehicle purchases in recent years, but could benefit from instituting vehicle standards that can be used for all new purchases. Such a standard can include requirements for vehicle size, fuel efficiency, or emissions. A purchasing standard can also require staff to apply for exemptions to purchase high-emissions vehicles, such as trucks and SUVs, to incentivize fuel-efficient purchases.

Several resources exist that can guide the County in developing purchasing standards. The U.S. EPA's Green Vehicle Guide is a user-friendly tool to assess the environmental impact of new vehicle purchases based on vehicle fuel economy, greenhouse gas emissions, and smog rating. The website also allows users to quickly calculate estimated savings associated with vehicle fuel efficiency. SmartWay certification, designated by the U.S. EPA and the U.S. Department of Energy, is given to vehicles that receive high ratings for greenhouse gas and smog emissions.

Operations and Maintenance

The Environmental Responsibility and Conservation Policy includes a general statement about fleet maintenance as a resource conservation strategy. Several opportunities exist to further improve the maintenance and repair of conventional vehicles in the County's fleet. The Sustainable Cities Institute provides environmentally preferable fleet vehicle maintenance and repair strategies, such as routine maintenance, purchase of recycled-content products, and shop improvements to avoid contamination by waste pollutants.

Currently, the County performs safety and maintenance checks for all vehicles at 3,000 miles. In addition to the environmentally friendly fleet maintenance measures described above, the County can also pursue additional practices to improve the maintenance and repair of the County's conventional vehicles in its fleet. Recommended environmentally preferable vehicle practices include:

- Purchase products that are made with recycled content and are recyclable.
- Environmentally preferred products for fleet maintenance such as vehicle oils and care products are provided on the U.S. Department of Agriculture BioPreferred website.
- Depending on the type of vehicle washing facility, upgrades could be made to reduce water use and disposed wastewater.

Bicycle Fleet

Bicycle fleets support vehicle fleets by providing employees with a healthy, efficient, and environmentally sensitive way to make short trips, even within the County campus. In addition to providing bicycles for employee use, a bicycle fleet program should also include bicycle repair equipment and training for vehicle maintenance staff. Depending on interest, a bicycle fleet could be expanded to provide non-fleet employees with access to campus bicycles for local trips. The County could also work with Metra to explore the possibility of locating fleet bicycles at the Wheaton and Winfield Metra Stations for employee use.

Chapter 5 WASTE



The reduction of waste is an integral aspect of sustainability planning in terms of land use, resource consumption, and greenhouse gas emissions. Landfills require significant energy and space to operate. Leakage from landfills and increased emissions from waste hauling traffic pose human health and environmental risks to nearby neighborhoods, waterways, and ecosystems. Landfills are also large contributors to climate change. The decomposition and treatment of waste in landfills make up the third-largest source of methane emissions in the United States⁹. Reducing landfill-bound waste can be accomplished by preventing and diverting materials from the waste stream. These practices not only reduce resource use and mitigate climate change, but also diminish costs of purchasing and waste hauling.

⁹ U.S. EPA Overview of Greenhouse Gases, <http://epa.gov/climatechange/ghgemissions/gases/ch4.html>.

Key Waste Achievements

While there are no active landfills near Government Center, waste disposal has become an exporting industry and should be viewed as a regional issue that reduces overall quality of life for other communities. Reducing and diverting waste from landfills also leads to direct consumer benefits by decreasing costs of hauling and collecting waste.

A comprehensive waste management strategy has three main components: reduction, diversion, and precautionary purchasing. Together, these three strategies consider the productive use and re-use of resources across a product's entire life cycle, from extraction to disposal, to minimize the amount of materials involved and their associated environmental impacts. Waste reduction involves the design, purchase, manufacture, or use of products and materials to prevent the amount or toxicity of solid waste that enters a landfill. By minimizing the amount of materials consumed, waste reduction strategies result in less material discarded. In addition to the environmental benefits of reducing waste, such strategies often generate cost savings by reducing the quantity of material that is purchased and disposed. Waste diversion is a practice of redirecting materials once they have been produced to prevent the disposal of waste to a landfill, and includes both recycling and composting. Diversion practices not only reduce reliance on landfill disposal, but also contribute to economic sectors. A recent waste management report by the Delta Institute outlines the potential economic and workforce benefits of expanding the recycling and composting sectors in Illinois.

The purchase of environmentally preferable products is an upstream method to reduce waste by managing resource consumption at the procurement stage. Environmentally preferable purchasing guidelines encourage purchasing products that are compostable or made with recycled-content materials. Purchasing recycled-content products not only conserves resources up the waste stream, but it also supports the market for recyclables.

The Environmental Responsibility and Conservation Policy (ERCP) puts forth several waste-related policies for the County, including the consideration of end of product life disposal practices, environmentally preferred purchasing, paper sourcing and printing, and recycling.

- The Convalescent Center recently began using a trash compactor, somat waste pulping system under the dish table, and a remote extractor. Together, this equipment has reduced the volume of trash generated by kitchen operations by 80 percent, using recirculated water.
- The Convalescent Center also provides reusable dishes and stainless steel flatware to reduce the waste generated from food service.
- The County has expanded opportunities for recycling across campus.

Environmental Responsibility and Conservation Policy

The ERCP includes many direct waste reduction and recycling goals. It specifies that reuse and recycling activities should be employed when possible, including providing mixed paper recycling in all County offices and glass, steel, aluminum, and plastic recycling in County cafeterias; printing double sided and conserving paper; pursuing waste reduction strategies in the cafeterias; and recycling construction or demolition debris. The ERCP also covers environmentally preferred purchasing guidelines and considers end of product disposal practices. This policy facilitated many of the activities outlined above and provides the basis for future sustainable waste initiatives.

Recycling

The Government Center offers a single stream recycling service for employees, visitors, and Convalescent Center residents. With 2009 funding from Illinois' Department of Commerce and Economic Opportunity, the County purchased additional recycling bins, which have increased recycling by 59.5 tons per year. Recycling receptacles are located throughout County offices, cafeterias, and in the dining hall and resident rooms of the Convalescent Center. The Division of Transportation also routinely recycles vehicle waste such as steel scrap, oil, oil filters, and coolant.

State Electronic Challenge

When purchasing technology equipment for the campus, the County makes sustainably driven decisions to reduce waste. Between 2011 and 2015, the County received certification from the State Electronic Challenge for sustainable electronics purchasing, usage, and recycling. Over the three-year time period, the County recycled 58,136 pounds of electronics and purchased 381 desktop processors, 108 notebook computers, and 200 copiers that meet the Electronic Product Environmental Assessment Tool (EPEAT) Gold level standards for reducing the use of primary and toxic materials.

Waste Reduction and Materials Conservation

County-led initiatives have reduced paper consumption and waste generation. In 2010, the County switched from printed to electronic agendas, which reduces annual paper consumption by 660,000 sheets or 31 trees, and generates yearly savings of \$3,400. Another conservation practice was instituted in 2011 when reimbursement and flex spending checks were consolidated with payroll checks which saves paper and generates annual savings of \$3,000.

The County's IT Department also manages default settings for double sided printing for 80 percent of copiers and 75 percent of printers.

With 2010 Federal Energy Efficiency and Conservation Block Grant funding, the County purchased reusable dishware for use in the Convalescent Center. The project avoids the annual purchase and disposal of 299,300 foam plates, bowls, and cups and 109,500 plastic utensils. In addition to providing reusable dishware for residents, the County gave employees refillable mugs to use for beverage purchases in the cafeteria. The reusable dishware saves energy used to manufacture disposable products and reduces the demand on landfill space. A modest return on investment was attained within the project's first year.

Other waste reduction strategies have been pursued at the Convalescent Center. In 2014, the County installed a waste compactor in the dining hall kitchen, somat waste pulping system under the dish table, and a remote extractor, which together reduces waste volume by 80 percent and has eliminated one trash haul per week. In addition reducing the volume of waste, the Convalescent Center also implements environmentally friendly food recycling practices. Fats, oil, and grease are converted into biodiesel or recycled at several locations in DuPage County through receptacles provided by the Mahoney Corporation. The Convalescent Center, which also manages campus cafeterias in the Administration Building and Courthouse, purchases recycled paper napkins for dining and offers green catering upon request, although patrons tend to be unfamiliar with this service. The County also produces many menu items on a short order basis, in order to reduce overproduction of food products that would go to waste.

Waste Best Practices

Following a comprehensive waste management approach, the following ideas outline practices for waste reduction, recycling, and environmentally preferable purchasing organized according to waste stream type (office supply waste, food waste, and construction and demolition debris).

By making smart choices about how materials are purchased, used, and disposed of, DuPage County can reduce landfill waste on campus and decrease greenhouse gas emissions associated with the consumption required to do business. The main opportunity areas for improving the County’s waste practices include the following types of actions within each type of waste:

- **Change employee behavior.** Green purchasing alone will not achieve significant waste reduction. Practices in this section suggest changes to daily office activities and practices that can reuse products and reduce waste and costs of office resources.
- **Purchase greener products.** Future procurement practices can consider up- and downstream product uses to minimize packaging and favor products that contain recycled or biodegradable content.
- **Increase opportunities for waste diversion.** Recycling, composting, and donating items can reduce the waste generated at Government Center.
- **Adopt waste management tools.** Many tools and processes can help the County efficiently track waste management efforts across facilities over time.

Table 4. Summary of benefits for waste best practice strategies

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Office Supply Recycling	Primary					Primary	
Office Supply Purchasing	Primary					Primary	
Food Scrap Composting	Primary	Secondary		Secondary		Primary	
Food Packaging Reduction	Primary					Primary	Secondary
Construction Waste Management Plan			Secondary			Primary	
Deconstruction			Secondary			Primary	
Recycled Pavement		Secondary	Secondary			Primary	
Waste Stream Assessment	Primary					Primary	
Hauler Resource Management Contracts						Primary	

Source: Chicago Metropolitan Agency for Planning.

Office Supply Waste

Office supplies, including paper and other equipment, are a large and continuous part of the County's procurement and waste stream. Paper is an especially large contributor to waste in office settings. In fact, nearly 350 pounds of wastepaper per employee is discarded by a typical office every year.¹⁰ Establishing a smart paper program that combines waste prevention, recycling, and environmentally preferable purchasing can continue to reduce the Government Center's carbon footprint and save the County money.

¹⁰ NRDC. Green Living: Green Guides. Accessed January 14, 2015. See <http://www.nrdc.org/cities/living/paper/why.asp>.

The Natural Resources Defense Council's Smart Paper Plan toolkit can help offices make environmentally driven decisions regarding paper use, recycling, and purchasing. The toolkit provides resources to develop a program, including how to establish a "Smart Paper Team" for encouragement and plan development, as well as templates and samples memos, signs, and procurement policies. The County may want to use the toolkit to integrate its current practices and new policies into a cohesive program. Possible strategies to include in a smart paper plan are highlighted below.

Managing waste from paper, supplies, and equipment can reduce greenhouse gas emissions, deforestation, and energy and water use associated with material production. It can also divert the harmful chemicals and metals that are often found in paper and equipment products from the County's own waste stream.

Office Supply Recycling

Many office supplies can be reused and repurposed within Government Center or at external organizations. One-sided printed pages can be used for faxes or scratch paper. File folders, boxes, and paper clips can also be reused many times before disposal. The County can also encourage better recycling rates by providing paper recycling bins to every work station and communicate recycling practices to the staff and cleaning crew through recycling campaigns and prominent signage.

The County currently holds organized recycling drives for staff and visitors for special waste items, including electronics, paint, and clothing. The County can look into expanding the types of waste accepted in the recycling drives or offering more drop-off times for waste collection.

Furniture and other large supplies that are unwanted but functional can be donated to charities, nonprofit organizations, or schools.

Office Supply Purchasing

Many products have green alternatives that include higher recycled content or sustainably sourced materials. Some common elements that the County can build into its purchasing policy include the following considerations:

- Buy paper that contains at least 30 percent of postconsumer recycled content and that is “processed chlorine free” (PCF). PCF products avoid harmful chemicals associated with chlorine bleach from entering the waste stream.
- Avoid paper made from 100 percent virgin pulp or at a minimum ensure the virgin fiber comes from sustainably managed forests, such as products certified by the Forest Stewardship Council (FSC).
- On printed materials, such as reports, include a line indicating the environmental features of the paper used.
- Encourage suppliers to use minimal or reusable packaging and return shipping materials such as crates, cartons, and pallets for reuse.
- Purchase and maintain high quality, long-lasting supplies and equipment, or consider renting equipment that is infrequently needed.
- Maintain office supplies in a central location to avoid over-purchasing.
- Create or amend a purchasing policy to clearly define goals and preferences for procurement of paper, supplies, and equipment.

The County may wish to amend its purchasing policy to include additional considerations for paper, supplies, and equipment purchases. This could be done in conjunction with developing an environmentally preferable purchasing policy.

Food Waste

Forty-five percent of landfill waste in the United States is comprised of food and packaging waste.¹¹ Food service establishments, including workplace cafeterias, generate a steady supply of waste that is routinely hauled to landfills. DuPage County can institute several practices that divert food and food packaging from the waste stream. The following strategies focus waste practices in the Convalescent Center and Administration Building cafeterias and lunch rooms in other campus facilities.

¹¹ U.S. EPA. Reducing Wasted Food and Packaging: A Guide for Food Services and Restaurants. See http://www.epa.gov/waste/consERVE/foodwaste/docs/reducing_wasted_food_pkg_tool.pdf.

Food Scrap Composting

Composting is the process of converting organic waste, such as food scraps and yard trimmings, into a soil amendment that can be used in landscaping and gardening. Unlike food waste donation, composting is best suited for low-quality food surplus, such as food scraps, as well as paper and compostable or biodegradable plastic packaging.

A composting program can be developed on-site or compostable materials may be hauled off-site to a processing facility. For on-site composting, adequate space and dedicated staffing is required to minimize nuisances and ensure a high quality product. Off-site composting is often preferred for large-scale facilities, such as Government Center.

Because the effectiveness of a composting program relies upon individual behavioral change to food disposal habits, it is important to train and educate about composting. Prominent signage paired with educational resources about what can and cannot be composted can help ensure waste is properly sorted. The City of San Francisco provides a free tool that allows users to customize compost, recycle, and landfill signs.

A demonstration compost system could be established on the County campus to educate staff and visitors on the process and benefits of composting. The system could be located near the tree nursery on west campus and the compost could be used as a soil amendment for landscaping. To begin this project, the County could collect food waste at the Administration Building cafeteria by providing clearly marked composting waste containers and educating staff and janitorial crew on the new program. If successful, the program could be expanded to collect paper towel waste from restrooms as well.

Case Study on Food Scrap Composting: University of Massachusetts at Amherst, Amherst, MA

In 2012, the University of Massachusetts-Amherst established composting bins at a campus eatery, which served approximately 7,000 individual meals daily. In order to ensure that food waste was being properly disposed, the University launched an education and outreach program. Because the University had already switched to compostable to-go food containers, they had a starting point to educate patrons about proper disposal. Eatery staff were trained to assist and educate consumers on proper waste sorting at the register and waste bins, especially during peak meal hours. Thanks to these efforts, the program now diverts approximately 1,200 pounds of food and container waste per day and serves as a highly visible demonstration of the University's commitment to sustainability.

Food Packaging Reduction

Implementing strategies to reduce the amount of wasted food packaging can significantly lower a cafeteria's contribution to the waste stream. The most effective methods to reduce food packaging target buying in bulk, utilizing reusable products and environmentally friendly packaging, and implementing recycling or composting programs. Specific strategies include:

- Buying food, such as condiments, sugar, and spices, in bulk instead of individual serving containers.
- Offering cafeteria discounts to employees who bring their own reusable coffee mugs or other containers.
- Encouraging consumption of tap water over bottled water at meetings and events.
- Utilizing biodegradable, or starch-based, food containers and 100 percent recycled unbleached napkins.

The County has drastically reduced the amount of wasted packaging generated by the Convalescent Center dining services program through the purchase of reusable dishware. While purchasing reusable products may be infeasible for other campus cafeterias, the County could explore the benefits and considerations of using biodegradable silverware and containers in the Administrative Building and for campus meetings and events.

To assist with environmentally preferable purchasing, the U.S. Department of Agriculture BioPreferred program provides a database of bio-based products that are developed from plants and other renewable materials as opposed to conventional petroleum derived products. Common bio-based products for cafeterias include starch-based serving ware that is compostable, biodegradable, and requires less energy for production than paper or polystyrene products. The Reducing Wasted Food & Packaging guide provides a checklist to identify common strategies to prevent and reduce waste.

Additionally, the U.S. Environmental Protection Agency (EPA) provides sample contract language based on their environmentally friendly procurement standards for a U.S. EPA facility in North Carolina. Incorporating guidelines to reduce packaging into a procurement policy is an important step in reaching reduction goals.

Construction and Demolition Debris

Construction and demolition (C&D) debris consists of the materials generated during construction, renovation, and demolition. Construction and demolition waste management techniques divert materials from the waste stream by reducing, reusing, and recycling, which in return preserves resources and landfill capacity.

Recycling of C&D debris is incorporated in the ERCP and has been required in past construction bids. The highlighted strategies in this section build off the County's achievements to provide actions that will improve the management of construction and demolition waste on campus.

Construction Waste Management Plan

Requiring that contractors create a waste management plan ensures that proper waste management techniques are considered by contractors during construction. A waste management plan typically includes measures such as deconstructed or salvaged materials, recycling, packaging reuse and recycling, disposal of hazardous materials, and other measures such as educating construction workers on the project's waste prevention goals, as well as proper materials handling and storage. For example, in the deconstructed materials section, the contractor will list the materials that will be reused in the project and identify haulers for those salvaged materials that will not be used.

The County may wish to require waste management plans as part of future construction contracts on campus. More information on requiring waste management plans can be found in the Construction and Demolition Waste Management section of the City of New York High Performance Building Guidelines.

Deconstruction

Deconstruction is a form of diversion that makes C&D debris available for direct reuse by carefully disassembling buildings during demolition, which makes it possible to recover building components and materials. Using deconstructed materials requires less energy and fewer raw materials than new material production or recycling and saves money in purchase and disposal costs. Deconstructed components can also be sold for profit.

The feasibility of deconstruction depends on the building materials and the way it was constructed. Characteristics of suitable buildings include those that are structurally sound or with heavy timbers and beams, specialty materials, and/or high-quality brick. Partial deconstruction may be possible for buildings made of concrete or steel.

For buildings where full or partial deconstruction is infeasible, recycling C&D debris is the next best option for waste management. Commonly recycled C&D materials include asphalt, concrete, rubble, wood, and metals. More recycling resources can be found on the U.S. EPA's website.

In place of demolition, the County may wish to use deconstruction and reuse techniques for future construction projects. While full deconstruction may not be practical, the County could require deconstruction and salvage of valuable building components, such as windows, doors, and facades. Implementing this strategy on campus would allow the County to serve as an example for property owners in DuPage County.

Recycled Pavement

The County has already experimented with pavement mixed with recycled rubber tires on its roadways. In addition to ground tire rubber, there are a variety of ways to incorporate recycled industrial materials into the pavement surface, sub-base, and subgrade soil. Fly ash, steel slag, reclaimed concrete, and roofing shingles represent a few of the materials suitable for pavement mixes. The U.S. EPA provides a fact sheet which contains further information on industrial material types and applications, as well as additional resources.

For campus projects that include standard asphalt resurfacing, the County may wish to review its options for including industrial materials in the pavement specification. Educational signage should accompany an otherwise invisible project to communicate the County's use of recycled materials.

Waste Management

Making improvements to waste management offers additional ways to reduce waste generated on campus. The following outlined strategies target waste hauler services and provide available resources to assess, track, and measure waste streams.

Waste Stream Assessments and Tracking

A waste assessment measures and tracks the amount and type of waste. They can provide information on waste disposal trends for each building, as well as the breakdown of items that make up the campus' waste stream. By understanding the largest contributors to campus, the County can tailor its waste plan accordingly to focus on food, paper, equipment, or other specific items. Often, waste assessments can be incorporated into hauler contracts and completed by the vendor.

The County can also use other programs for facility-by-facility breakdowns of generated waste. WasteWise is a free-of-charge system that allows organizations to collect, organize, analyze, and report their solid waste and recycling information by department or building. Instituting a process for waste tracking can allow the County to set targets for waste reduction in the future.

Hauler Resource Management Contracts

Resource management (RM) is a strategy that compensates haulers based on their ability to achieve waste reduction goals set by the client or waste generator. Unlike conventional waste hauler contracts, RM is a performance-based contract strategy that provides haulers with monetary incentives and offers waste generators the ability to implement reduction strategies that target waste prevention, recycling, and reclamation.

Developed by the U.S. EPA, the WasteWise Resource Management manual provides step-by-step guidance to evaluate, plan, and implement an RM program, including how to hire an RM contractor. Depending on the County's current contract, adopting a resource management program may be an effective solution to help achieve campus waste reduction goals.



Chapter 6

OPEN SPACE AND ECOSYSTEMS



A community's open spaces and ecosystems can improve quality of life by providing space for recreation, habitats for native flora and fauna, stormwater capture and filtration, carbon sequestration, air quality purification, and host of other ecosystem services. Maximizing the ecological functions of the campus' natural areas through restoration and conservation activities has benefits for capturing stormwater, mitigating climate change by sequestering carbon, providing healthy ecosystems for native plants and wildlife, and providing recreational opportunities for people on the campus.

It is also important to consider the sustainability of open space maintenance practices alongside conservation and restoration activities. Lawn care can entail many polluting chemicals and use large volumes of water for irrigation. Reducing the pollutants and water used in landscape maintenance on a daily basis can improve the quality of natural areas surrounding built environments.

Key Open Space and Ecosystem Achievements

- The County has implemented several native landscaping demonstration projects that lessen the hardscape of campus facilities, increase outdoor air quality, and beautify the campus.
- The Facilities and Maintenance Department has initiated a nursery of trees that are resilient to the invasive emerald ash borer.
- Government Center offers one main pedestrian trail and a few benches and tables for outdoor recreation.

Native Plants

Growing pest-resistant plants is a priority for the campus's landscape. The County has planted around 65 new trees including a newly established campus nursery to repopulate trees lost to invasive emerald ash borers. In addition, the County has recognized the value of utilizing native plantings for landscaping that only require irrigation during the establishment period. The County is also committed to using natural fertilizers and non-petroleum based pesticides for the non-native plantings. Increasing native plantings not only reduces water consumption, but it also absorbs stormwater runoff, improves air quality, reduces dependence on fertilizers and pesticides, provides habitat to native species, and offers opportunities to interact with nature in otherwise built environments.

Native prairie plantings have been incorporated in the design of new buildings, such as the Jeanine Nicarico Child Advocacy Center, as well as existing facilities including the Office of Homeland Security and Emergency Management. Several of the campus's stormwater basins have been planted with native wetland vegetation. Muddy turf at the east entrance of the Administration Building was also replaced with an extensive Native Demonstration Garden planted with 3,000 plugs that adapt naturally to the area and require little additional irrigation. Educational signage in the garden, provided by the Division of Transportation Sign Shop, helps visitors to identify each plant species.

Green Infrastructure

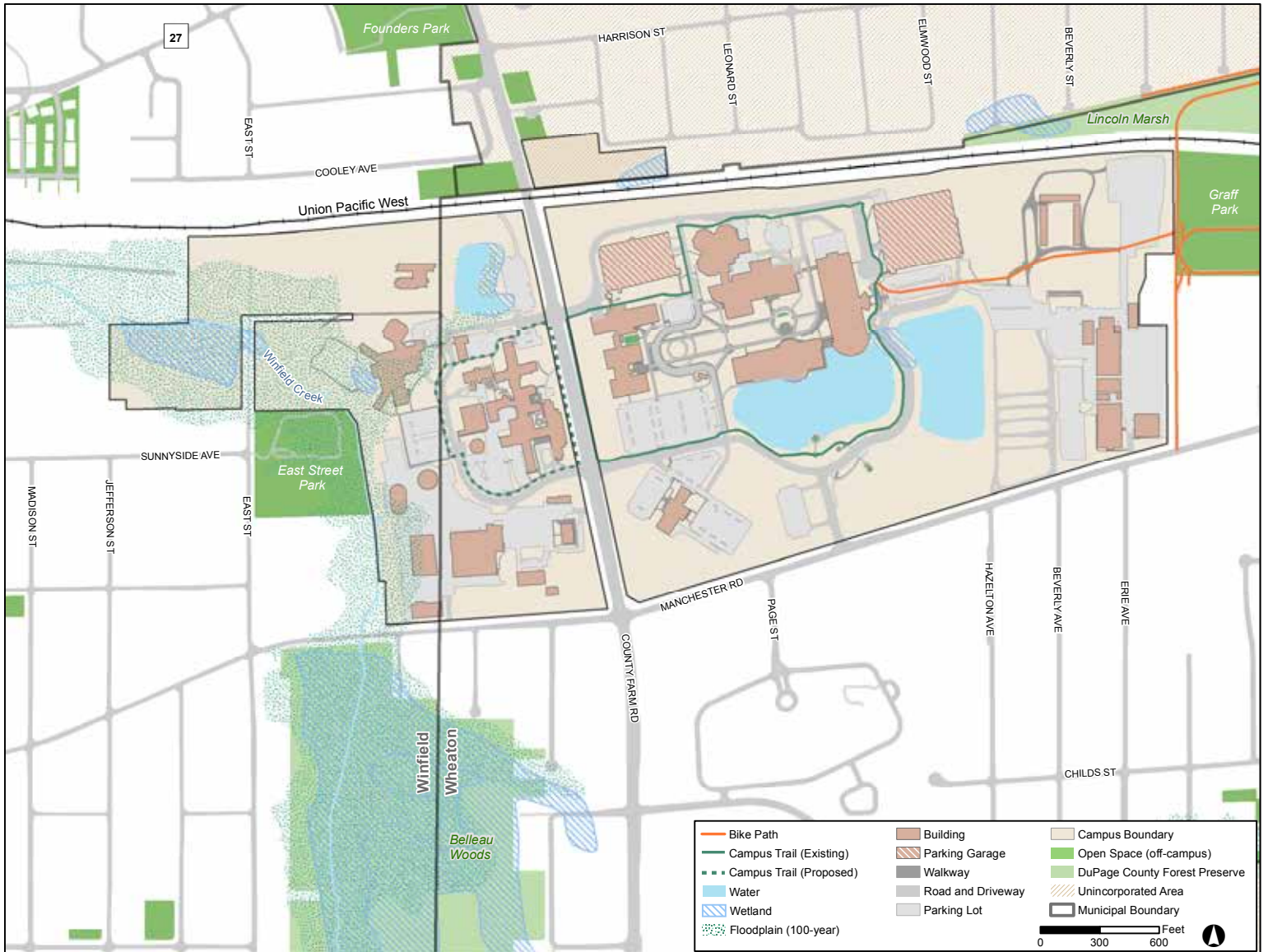
The Government Center campus is located in an environmentally sensitive area within the Chicago region. The campus is situated along Winfield Creek and encompasses regionally significant conservation areas identified in the Green Infrastructure Vision (GIV). The GIV is a large-scale, multi-state vision of important and interconnected land and water resources that provide environmental and economic benefits to human and wildlife populations.

The GIV area on campus includes a riparian buffer along Winfield Creek. This area comprises 41 percent of west campus and measures approximately 350 feet from the streambed. Off-campus GIV areas containing DuPage County Forest Preserve property exist in the immediate vicinity, including Belleau Woods to the southwest of campus and Lincoln Marsh Natural Area to the northeast.

Health and Wellbeing

The campus offers some outdoor locations for walking and social interaction. Amenities, such as benches and tables, are provided outside of the Administration Building and Judicial Office and Jail, as well as in locations along the campus loop trail.

Figure 5. Natural resources map



Source: Chicago Metropolitan Agency for Planning.

Open Space and Ecosystem Best Practices

The County's ongoing native planting initiatives provide a strong foundation to establish a more coordinated land management strategy. Such an approach moves beyond establishing site-scale demonstration projects in convenient or standalone locations toward creating a thriving environment for recreation, biodiversity, and ecological health. Best practices that the County could pursue to increase the sustainability of campus open spaces and ecosystems are classified into three categories:

- **Conserve and restore landscapes.** The coordinated design, expansion, and maintenance of campus open spaces can allow the County to strategically connect smaller areas of native plantings and green infrastructure to make up a larger cohesive ecological network. Establishing ecological corridors can preserve or reestablish habitats for native flora and fauna.
- **Improve landscape maintenance practices.** Many landscaping operations can be altered to reduce pollutants from fertilizers, herbicides, and pesticides. Sustainable landscaping can also reduce the use of water and time required for day-to-day care of landscaped areas within Government Center.
- **Improve health and wellbeing.** The County can create more opportunities for employees and visitors to enjoy the outdoors on campus through open space programming.

Conservation and Restoration

The practices in this section emphasize how specific native landscaping projects can be implemented and considered as an interconnected system. These practices provide a multitude of environmental benefits including improved air quality, stormwater management, and increased biodiversity.

Habitat Corridors

Connecting restored or protected areas can create corridors used by wildlife to travel and migrate. By prioritizing conservation, restoration, or management of clusters of habitats over disjointed sites, new planting projects better serve as a native habitat network that supports biodiversity for plants and wildlife. Because each plant and wildlife species has different requirements for habitat connectivity, DuPage County may want to consider particular species of interest when designing habitat corridors.

A potential application of this practice could involve creating a landscape buffer along the north side of campus, adjacent to the Union Pacific-West railroad tracks. Focusing on this area would create a habitat corridor which connects Winfield Creek and the wooded area that comprises the northwest corner of campus to the Lincoln Marsh Natural Area located northeast of the Government Center. This approach can also be integrated with stormwater management practices: designing a series of bioswales to intercept runoff leading toward Winfield Creek is an effective way to maximize the effectiveness of small-scale interventions while also providing connective habitat areas for native species.

Table 5. Summary of benefits for open space and ecosystems best practice strategies

■ Primary benefit of this strategy
 ■ Secondary benefit of this strategy

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Habitat Corridors							
Riparian Buffers							
Turf Grass Reduction							
Invasive Species Management							
Integrated Pest Management							
Sustainable Materials Management for Landscaping							
Sustainable Lawn Maintenance							
Pocket Parks							
Community Gardening							
Farmers Market							

Source: Chicago Metropolitan Agency for Planning.

Riparian Buffers

When it rains, stormwater flows across impervious surfaces and carries many pollutants with it. When placed adjacent to roadways and parking lots, landscaping creates buffers to filter polluted stormwater runoff.

Landscaping with native plantings, such as big bluestem, switchgrass, coneflower, and blazing star that can thrive in times of heavy rain and drought alike, is one of the most effective ways to capture runoff. Buffers can also be established to absorb rainwater that falls on smaller impervious surfaces such as walkways. Additional benefits, such as habitat diversity, air quality, and shade, can be generated by incorporating native trees into the native plant buffer.

Riparian buffers, or vegetated areas along streams, lakes, and ponds, can be especially effective in enhancing stream health and water quality. Similar to native plant buffers adjacent to impervious surfaces, vegetated riparian buffers provide natural filtration of pollutants from stormwater runoff and increase habitat corridors. Riparian buffers also prevent stream bank erosion and help to absorb and slow flood waters.

While recommended riparian buffer widths vary from 75 to 100 feet, the buffer should at least include the 100-year floodplain, steep slopes, and adjacent wetlands.¹² The west campus partially includes the following facilities: Emergency Management Storage (“Station 1”), Office of Emergency Management, Dupage Division of Transportation (DuDOT) Salt Domes and Vehicle Maintenance Facility, and associated parking areas. Depending on the new floodplain delineation, the presence of these facilities may or may not preclude a complete restoration of the floodplain on campus. Either way, the County could enhance the riparian buffer of Winfield Creek by replacing the existing lawn between the stream bed and the DuDOT parking areas with native vegetation. This area measures approximately 1,000 feet along Winfield Creek and varies between 65 and 150 feet in width.

¹² The Federal Emergency Management Association (FEMA) is currently revising the 100-year floodplain for Winfield Creek which will likely reduce its current area on campus (see Figure 5).

Turf Grass Reduction

Lawns are a common feature of most campus landscapes. As the County continues its native habitat restoration activities on campus, it should look at potential areas of existing turf grass for conversion to prairie and native landscaping. Sensitive land that contains steep slopes or saturated soils should be prioritized; however, any underutilized turf area would be an ideal location to re-vegetate with prairie grasses or other native groundcover plants.

Other than the stormwater benefits of reducing turf grass, this practice also mitigates greenhouse gas emissions and reduces time, chemicals, and resources devoted to mowing and lawn care. Alternatives to turf grass can also prevent soil erosion and increase plant species biodiversity on campus. Because maintaining turf grass can make up a significant portion of a campus landscape budget, turf grass reduction can also significantly reduce costs of landscape maintenance.

This practice is recommended in any location where turf grass has been difficult to establish. One specific application could include converting turf grass to prairie in the area between the DuDOT Garage, Animal Care and Control, and Manchester Road on west campus. Enhancing the landscape in this location would also provide stormwater management of the campus and public roadway. Further information on stormwater best management practices can be found in the Water section.

Invasive Species Management

The County's restoration and conservation efforts must also consider the management of invasive species. Invasive species are plants, animals, or other organisms that are non-native to an ecosystem and whose introduction causes or is likely to cause harm to ecological health.¹³ The aggressive growth of invasive species is a continuous threat to species that are native to DuPage County. The loss of the County's ash trees to the invasive emerald ash borer is a prime example of the damage that can be caused by invasive species.

Strategies for eradicating invasive species include developing a strategy to identify transportation vectors of invasive species, minimize the use of exotic plants, preserve campus natural areas, and conduct assessments on a scheduled basis.

The County may want to assess its need for invasive species management on campus, especially within the natural areas in the northwest corner of campus and along Winfield Creek. The Illinois Department of Agriculture provides a list of common invasive species in Illinois. Additional resources provide photos for identification of those species. Likewise, the County can develop a native plant palette based on particular site conditions found across campus to facilitate future native plantings. The County could host volunteer events to engage staff, students, and other interested residents to help eliminate invasive plant species on campus.

¹³ National Invasive Species Information Center. Accessed January, 14, 2015. See <http://www.invasivespeciesinfo.gov/index.shtml>.

Landscape Maintenance

A number of best practices can reduce pollutants and resources needed to care for Government Center grounds. These land management practices provide options for the County to control pesticide and herbicide usage, adjust management techniques for different types of landscapes, and reduce water needed for irrigation.

Integrated Pest Management

Integrated pest management (IPM) is an environmentally sensitive approach to control pests by using information on pest life cycles and their interaction with the environment. IPM programs take advantage of all suitable pest management options including the sensible use of pesticides for which organic pesticides should be substituted. Implementing an IPM program reduces the risk of chemical harm to people, property, and ecosystems, and can also result in cost-savings from over-application of pesticides, herbicides and fertilizers. Any IPM program should be implemented in line with the County’s activities on invasive species management.

Table 6. IPM program steps

Step 1: Set Action Thresholds	Determines the point at which action needs to be taken.
Step 2: Monitor and Identify Pests	Avoids the use of pesticides on harmless or beneficial organisms and ensures the appropriate type of pesticide is used.
Step 3: Prevention	Includes activities such as selecting pest-resistant plant varieties.
Step 4: Control	Once Steps 1 and 2 indicate that further action is required, pest control methods are evaluated for effectiveness and applied.

Source: U.S. EPA.

Sustainable Landscaping Materials

The County can adopt procurement guidance to favor landscaping products made from recycled materials, as well as include a list of vendors that promote resource consumption and waste reduction. The U.S. EPA’s Buy-Recycled Series on Landscaping Products provides recommendations for recycled landscaping materials.

Priority should also be given to materials that contain recycled content or are regionally sourced. The U.S. Environmental Protection Policy (EPA) provides guidance for purchasing recycled landscaping products. Federal guidelines recommend the following maximum distances for regionally sourced materials: 50 miles for soil and aggregate, 250 miles for plants, and 500 miles for all other materials.

Sustainable Lawn Maintenance

The County may wish to preserve existing turf grass for programming flexibility or aesthetic reasons. Traditional maintenance of turf grass causes significant impacts to the environment. Nitrogen, phosphorus, and potassium are plant nutrients commonly found in traditional fertilizers. When overused, these fertilizers can lead to the contamination of surface water and groundwater.

There are several ways to improve lawn maintenance practices through changes to fertilizing, mowing, and waste management practices. Developing a fertilizing plan that outlines best practices can help limit the use of excess nutrients, such as phosphorus. For lawns that are recently established or nutrient deficient, use of low phosphorus fertilizer is recommended. Mature lawns should typically use a phosphorus-free fertilizer. When fertilizing, avoid over-applying and use the proper equipment to distribute it efficiently. After applying, sweep up excess fertilizer or grass clippings from impervious surfaces to prevent contamination of local waterways.

The County can also help its turf grass become more drought resistant by maintaining grass at a taller height. This helps to establish a strong root system that can better withstand drought. Waste accumulated during mowing such as excessive grass clippings, leaves, and branches should be collected and recycled as mulch.

Health and Wellbeing

Improving open space management is not only good for natural resources and ecosystems, but also for the wellbeing of the people served by the County's facilities. Recent research has shown that contact with nature positively affects employee health, job performance and concentration, and reduces stress and anxiety.¹⁴ Government Center has 2,225 employees and hundreds of daily visitors that walk through the grounds. The following practices describe opportunities for designs and programming to activate the campus and to encourage physical and mental health for DuPage County employees. All of these strategies help to activate underutilized spaces on campus and provide more activities in which County staff and visitors can participate.

¹⁴ Human Spaces Report: Biophilic Design in the Workplace. See <https://greenplantsforgreenbuildings.org/wp-content/uploads/2014/09/Human-Spaces-Report-Biophilic-Design-in-the-Workplace-web-res.pdf>.

Pocket Parks

Stakeholder interviews with County staff indicate a desire for more comfortable outdoor amenities. Pocket parks are small-scale parks that provide outdoor spaces for stress-relief and relaxation, socializing, and other events. They transform otherwise underutilized space into destinations for people to walk and gather around. The flexible design of pocket parks, which can be constructed within building setback spaces, at bus stops, or along trails, make them appealing for many types of campus layouts.

The existing walking path, pond, landscaping, and outdoor benches on the County's west campus make it an appropriate location for exploring potential new pocket park locations to serve employees during lunch and other breaks throughout the workday. The current picnic table area may be a good candidate for placemaking improvements.

Community Gardening

Community gardens are common fixtures across DuPage County that provide fresh produce and educate residents on sustainable food production. Community gardening on the Government Center campus can enhance human health and wellness by providing stress relief, as well as opportunities for bringing together DuPage County staff and residents.

Community gardens can also be beneficial additions to workplaces and public lands. In fact, a number of companies across the Chicago region have added community gardens to office properties. Initiating fruit and vegetable gardens at places of work can promote healthy lifestyles by providing nutritious, fresh produce and by allowing employees the opportunity to exercise during breaks. At a Des Plaines logistics company, employees help tend to six large raised beds that grow fruits and vegetables for the office kitchen. Different departments oversee each raised bed, which has sparked competition among employees. Another garden at Kraft Food Group Inc., created with assistance from the Chicago Botanic Garden, is tended to by employee volunteers and the harvested produce is donated to food pantries and local shelters.

The lawn near the Administration Building is a highly visible and sunny area that can be used for community gardening.

Farmers Market

Farmers markets are increasingly common for high-density employment centers. Farmers markets near places of employment are most commonly held around lunch hours or after-work hours to maximize opportunities for employee attendance. While the markets may cater to employees, they are usually open to the general public and attract other residents and passers-by. Farmers markets are not only community-building activities, they also promote healthy and local food consumption. The County can explore options for featuring DuPage or other regional area farmers, which would also help to build the sustainable food economy in the metropolitan area.

The County can explore using the County Fairgrounds as a potential location for a farmers market. The Fairgrounds are currently on lease to DuPage County, and the County would need to explore the potential for this type of programming on a seasonal or year-round basis. If that is not an option, there are large areas of turf grass and surface parking that may be suitable for holding a farmers market. If the County is interested in utilizing surface parking lots for a farmers market, it may need to analyze parking demand to ensure that this recurring activity does not interfere with parking availability during peak hours.

**PRAIRIE
DROPSEED**

*sporobolous
heterolepis*

Chapter 7

WATER



Water is a vital resource for human and ecological health. Our survival depends on the protection of water resources; yet insufficient management threatens water quantity and quality and exacerbates the risk of flooding. The built environment disrupts the hydrologic cycle which naturally manages rainwater. In this cycle, water is consumed by plants, returned to the atmosphere, and absorbed into the soil to replenish groundwater and maintain stream baseflow. Impervious surfaces impede this process, and instead, cause water to runoff which impairs water quality. While the County relies on abundant clean water for its consumption on campus, sustainable water management is necessary to protect its streams, ponds, and wildlife habitat.

Smart water management is also important to increasing resiliency to severe weather and drought predicted in this region due to climate change. Campuses such as Government Center use a significant volume of water for plumbing, food preparation, and irrigation. Taking steps to reduce indoor and outdoor water use can reduce water utility costs and better prepare the campus for a range of climatic changes.

Key Water Achievements

- The County has implemented water efficiency measures in new and existing buildings that have already demonstrated savings in cost and water consumption.
- Bioswales, permeable pavers, and naturalized stormwater retention ponds have helped to alleviate campus flooding.
- The campus' chloride reduction program has improved the quality of water entering Winfield Creek.

¹⁵ FEMA is currently revising the 100-year floodplain delineation.

Water Efficiency

The County installed water-saving faucet fixtures in newly constructed, renovated, and existing facilities, including the Child Advocacy Center, Office of Emergency Management, and Administration Building. A recently installed water efficient kitchen dishwasher in the Convalescent Center uses steam provided by the Power Plant for its final rinse stage. The installation of solar operating, automatic turn off fixtures in the Administration Building in 2010 reduced annual water consumption by over 2.1 million gallons in 2011, generating \$10,500 in savings.

Stormwater and Water Quality

A substantial area of impervious surface combined with a naturally high water table causes localized flooding on campus. The Government Center has several surface water features including Winfield Creek, wetlands, and stormwater ponds. When it rains, runoff from the campus' impervious surfaces flows into the stormwater ponds and is eventually discharged into Winfield Creek¹⁵. Some facilities on the west side such as the Office of Emergency Management are critical facilities and are situated adjacent to the 100-year floodplain of Winfield Creek.¹⁵ Critical facilities that could be susceptible to inundation in storms that exceed the 100-year event need to operate during these large flood events and could benefit from smart water management.

Given the prevalence of water on the campus, the County has implemented several stormwater best management practices (BMPs) to intercept runoff and improve water quality. The County installed permeable paver systems in three locations on campus: the Jeanine Nicarico Child Advocacy Center, the Standby Power Facility, and one of the DuPage Division of Transportation (DuDOT) garages. Replacing traditional surface parking with permeable pavement reduces the amount of runoff that enters the storm sewer system, increases groundwater infiltration, improves water quality, and enhances the health of adjacent wetlands. While permeable paving produces more environmental benefits than standard asphalt, maintenance and snow removal on permeable surfaces has been a challenge.

In conjunction with the campus native landscaping program on campus, the County constructed vegetated BMPs to mitigate stormwater and improve water quality. Bioswales were constructed at the Child Advocacy Center to absorb runoff from the roof of the building. The County has also retrofitted campus stormwater basins to include wetland vegetation that helps remove pollutants from the water before it enters Winfield Creek.

Using federal funding from the U.S. Department of Energy in 2011, the County installed its first campus vegetated roof which replaced 6,400 square feet of standard blacktop roof over the cafeteria of the Administration Building. The roof allows the County to capture and store up to 40 percent of the precipitation that falls on it during the winter and up to 90 percent of rain in the summer. The roof also alleviates heating and cooling costs and enhances wildlife habitat. A model and poster explaining the vegetated roof system provides an educational opportunity for County employees and campus visitors. In addition to the green roof pilot project, a rain barrel installation is located inside the Administration Building to raise awareness of best management practices for homeowners and illustrate the benefits of capturing and reusing roof runoff. (The installation is for demonstration purposes only and is not functional.)

The DuDOT's chloride reduction program, discussed in the Transportation chapter, has also led to water quality benefits.

Water Best Practices

County staff expressed significant interest in expanding sustainable water initiatives on campus. From identifying areas in need of relief to creating more absorbent landscapes, there are many sustainable strategies at the County’s disposal. As the County explores the types of best practices to adopt for reducing water consumption and increasing water quality, it should consider a “one water” approach¹⁶ to water management, which accounts for the relationship between potable water consumption and wastewater production. This approach can encourage the County to consider its indoor and outdoor water usage through a common framework. These practices can lead to savings in water bills and wastewater treatment alike.

¹⁶ This approach is detailed in the Center for Neighborhood Technology’s *One Water* report on integrating water services for sustainability.

The water best practices, which follow a one water approach, are organized around the following categories of action:

- **Expand indoor water efficiency retrofits.** The County can institute water efficiency practices for a wider range of fixtures and appliances that reduce water consumption. Efficiency measures reduce water consumption and decrease the amount of energy expended in the transport, treatment, and redistribution of that water.
- **Manage and capture stormwater.** The campus’s stormwater system is inadequate to deal with heavy rainfalls, causing flooding at County facilities such as the Judicial Building and Office of Emergency Management. Constructing stormwater capture practices throughout campus can capture runoff before it reaches Winfield Creek and improve the overall water quality of non-point source pollution from Government Center.

Table 7. Summary of benefits for water best practice strategies

■ Primary benefit of this strategy
 ■ Secondary benefit of this strategy

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Toilets and Urinals							
Faucets and Showerheads							
Laundry Equipment							
Food Service Equipment							
Mechanical Systems							
Stormwater Management Plan							
Stormwater BMPs							

Source: Chicago Metropolitan Agency for Planning.

Indoor Water Efficiency

Water efficiency within Government Center buildings can be improved through equipment upgrades, changes in operation and maintenance, and user education programs. While a few of the County's facilities have been upgraded with water-efficient fixtures and equipment, several opportunities still exist to decrease indoor and outdoor water use. Nearly 50 percent of a facility's total water consumption is due to sanitary fixtures and equipment in restrooms and laundries.¹⁷ The best practices for reducing water use outlined below are classified into five appliances types: toilets and urinals, faucets and showerheads, laundry equipment, food service equipment, and mechanical systems.

¹⁷ U.S. EPA. WaterSense at Work. See http://www.epa.gov/watersense/commercial/docs/watersense_at_work/#/58/zoomed.

Toilets and Urinals

Replacing older, inefficient toilets is the most effective way to increase water efficiency while also reducing the wastewater generated from flushing. Such retrofits not only reduce water used in bathrooms, but also decrease the infrastructure and chemicals needed for water treatment. Many options exist for purchasing new toilet and urinals. Tank toilets with a WaterSense label are certified with a flush volume of 1.28 gallons per flush (gpf) or less and pass the performance test for waste removal. For flushometer-valve or tankless toilets, a flush volume of 1.6 gpf or less is preferred. When new flushing urinals are needed, consider WaterSense labeled products or low flushing and waterless urinals.

Retrofits to existing toilets and urinals are not generally recommended as they may reduce performance or void manufacturer warranties. If the County has flushometer-valve toilets, however, those may be retrofitted with dual-flush conversion devices that replace the existing flush valve handle.

A possible application of this practice could include a phased project to upgrade sanitary fixtures in the Administration Building as a pilot facility, with the ultimate goal of expanding upgrades to all County buildings. With all of these options, the County should test products before embarking on a large-scale retrofit project.

Case Study on Indoor Water Efficiency: University of Illinois Low-Flow Toilet Feasibility Study, Urbana/Champaign, IL

¹⁸ Alliance for Water Efficiency. Accessed February 25, 2015. See <http://www.home-water-works.org/indoor-use/showers>.

In 2014, the University of Illinois at Urbana-Champaign conducted a study on the feasibility of using low-flow toilets in university facilities. The team quantified the environmental and economic benefits of two types of toilets, high-efficiency toilets and ultra-low-flow toilets. The results of the study indicate that replacing traditional toilets with a daily flush frequency of 12 or higher with high-efficiency toilets would generate significant water and cost savings for the university. Specifically, the study estimates a 10-year payback period for the high-efficiency replacements and minimum savings of 6,000 gallons per toilet per year — equivalent to about \$45 per toilet.

Faucets and Showerheads

The average American shower uses roughly 17 gallons and lasts for around 8 minutes.¹⁹ Like toilet and urinal retrofits, faucets and showerhead retrofits not only reduce potable water and energy consumption, but also decrease the costs of future wastewater treatment. Certified water-efficient, high-performing showerheads are labeled by the U.S. Environmental Protection Agency (EPA) WaterSense program and should be considered whenever replacing older, inefficient showerheads or installing new ones.

Low-flow, self-closing, and metered faucets can reduce water consumption in restrooms, kitchens, and other areas. Water faucets equipped with aerators or other low-flow accessories reduce the flow of water that leaves the faucet by combining air into the water stream. Flow rates for high efficiency aerators range from 0.5 to 1.5 gallons per minute (gpm), which is significantly less than the standard faucet flow rate of 2.2 gpm. In fact, the U.S. model plumbing code and the U.S. standard flow rate for non-residential faucets is 0.5 gpm. Aerators can be incorporated into new faucet designs or added as accessories onto existing faucets.

Self-closing and metered faucets reduce the amount of water used by dispensing a preset amount of water prior to shutting off (metered) or utilizing a spring-loaded knob that automatically shuts the water off when the knob is released. Facilities with medical concerns, such as the Convalescent Center or Health Department, should consider specific health and safety needs before installing low-flow faucets or faucets with automatic sensors.

Laundry Equipment

Installing new laundry equipment or retrofitting existing washers can result in significant water and energy savings. Depending on the type of laundry equipment recently replaced at the Convalescent Center, retrofitting may be an option. When replacing older, inefficient equipment, consideration should be given to models that use less water per cycle. The County might opt for multi-load washers that include 8.0 gallons per cycle per cubic feet of capacity and washer extractors with a water recycling system that allow it to use less than 2.5 gallons of water per one pound of wash. Tunnel washers, the most efficient type of laundry equipment, are a good potential replacement option for processing large volumes of laundry. An upgrade or retrofit may be appropriate at the Convalescent Center or Jail, depending on the type and age of existing laundry equipment.

Food Service Equipment

Kitchens with large, water-intensive equipment can benefit from water and energy savings through upgrades and retrofits. Commercial dishwashers alone are estimated to consume more than two-thirds of a commercial kitchen's overall water consumption.¹⁹ Another method for reducing water consumption is to upgrade a kitchen's pre-rinse spray valve (PRSV), which is used to remove food from dishes prior to washing. A standard PRSV can use between 2 to 5 gpm, while a high-efficiency PRSV uses up to 1.3 gpm. The U.S. EPA's WaterSense program provides labels for high-efficiency PRSVs.

Upgrading the PRSV at the Convalescent Center kitchen would be a possible application of this practice.

Mechanical Systems

Mechanical equipment for heating and cooling makes up about 30 percent of water use for office buildings.²⁰ Upgrading the mechanical systems that use the most water should be prioritized. While complete system upgrades may be costly, there are several steps in operations and maintenance that can be taken to improve water efficiency.

Single-pass cooling equipment, which uses water to cool mechanical equipment, is often the largest consumer of water in large facilities. These appliances should be prioritized for system upgrades or replaced altogether. Single-pass cooling equipment can be retrofitted to reuse the water consumed for cooling instead of disposing it after a single use. Other mechanical systems that can be improved for efficiency include boiler and steam systems, cooling towers (condensate recovery systems), and chilled water systems.

¹⁹ Alliance for Water Efficiency. Accessed December 31, 2014. See http://www.allianceforwaterefficiency.org/commercial_dishwash_intro.aspx.

²⁰ U.S. EPA. WaterSense at Work. See http://www.epa.gov/watersense/commercial/docs/watersense_at_work/#/188/zoomed.

Stormwater Management

The water management ideas included in this section highlight ways to improve water quality that may be impacted by outdoor uses. Practices relating to outdoor water management can be found elsewhere in this Guide; for example, water-efficient irrigation practices are discussed in the Open Space and Ecosystems chapter, while vehicle washing best practices are included in the Transportation & Mobility chapter.

The high visibility of the Government Center campus and its location within the Winfield Creek floodplain make it an ideal location to showcase best stormwater management and water quality practices. The campus green roof and naturalized detention basins illustrate the County's commitment to sustainable stormwater management. By continuing to treat rainwater as a resource, the Government Center can meet irrigation demands, reduce the flow to the campus stormwater system and mitigate flooding, and improve the quality of water that enters Winfield Creek.

Stormwater Management Plan

Beyond simply implementing individual projects, developing a stormwater management plan would solidify a campus strategy for flood mitigation and future improvements by identifying those areas in need of relief. A potential stormwater management plan can provide a roadmap for constructing and maintaining stormwater best management practices (BMPs) so that the installations are strategically implemented and work together as a system.

Stormwater BMPs

A stormwater management strategy is composed of many individual types of stormwater BMPs that are designed to fit a range of soil, topographic, and site conditions. These techniques range from shallow depressions planted with water-tolerant plants to filter, retain, and absorb stormwater to larger-volume storage and infiltration structures. They can take on a number of shapes and be positioned adjacent to buildings to capture roof runoff, such as the rain gardens at the Jeanine Nicarico Child Advocacy Center, as well as within parking lots, plazas, or lawn areas.

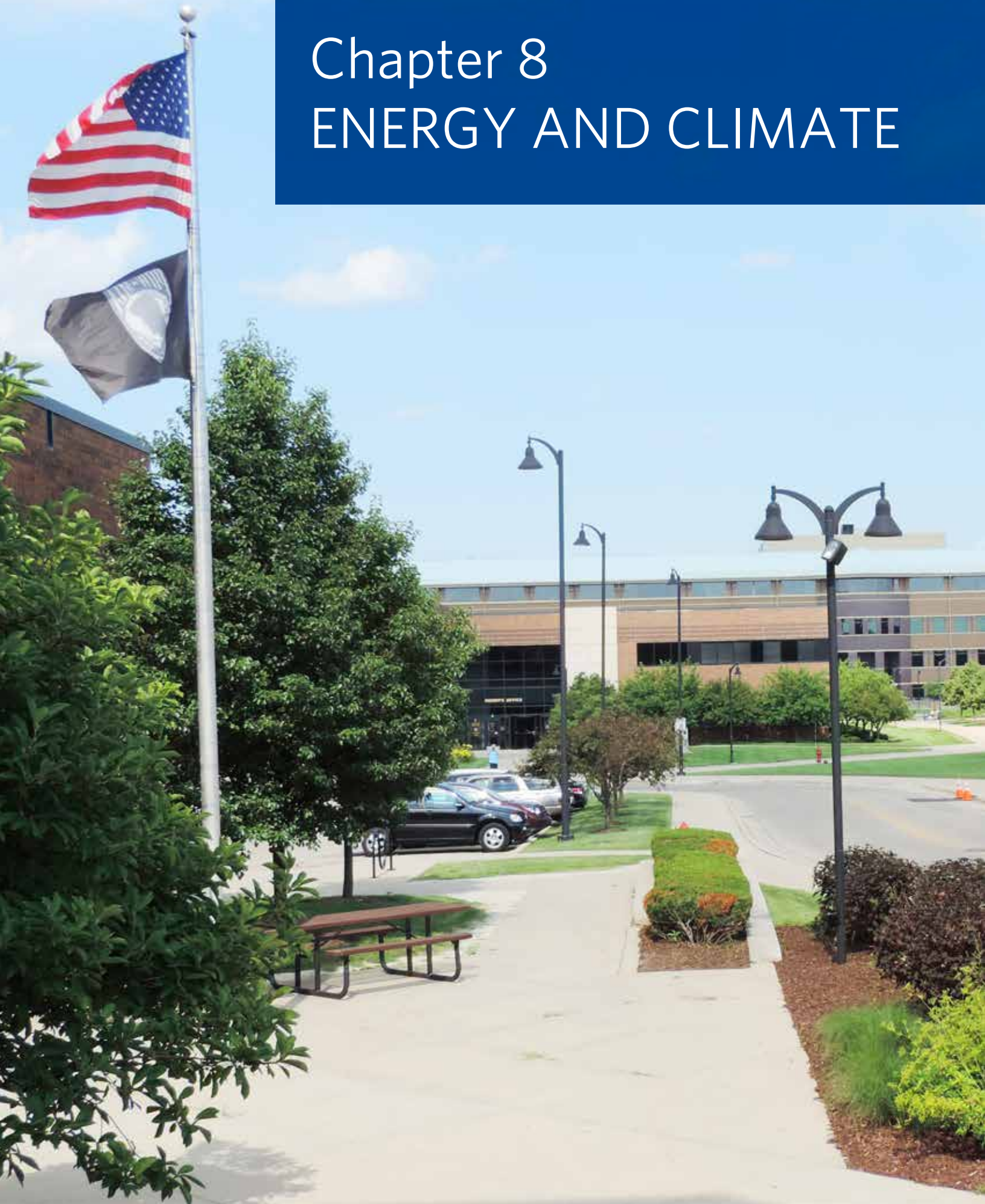
The range of BMPs can be adapted to many diverse contexts. Rain barrels, for example, harvest rainwater for reuse and are meant to be placed near downspouts of smaller buildings. Although many of campus facilities have internal downspouts that would be difficult to retrofit, the County could adopt this practice for buildings with external roof leaders that could be easily disconnected. The water captured for reuse can be stored and used for irrigation.

Stormwater beds provide larger storage volume and are often placed beneath other uses such as fields and parking lots. Because of the large area of fields and parking at Government Center, stormwater beds may be of particular utility to the County; however, the high water table presence on campus may limit its feasibility in certain areas.

Bioswales, flow-through planters, and filter strips are designed to intercept runoff to capture and purify stormwater before it enters local waterways. These practices are particularly relevant for the areas of campus near Winfield Creek and can serve as the last defense of stormwater capture before runoff reaches the stream.

Chapter 8

ENERGY AND CLIMATE



In 2012, 32 percent of total U.S. greenhouse gas emissions came from the generation, transmission, and distribution of electricity.²¹ Reducing electricity and natural gas consumption and relying more heavily on renewable sources are important components of mitigating climate change. A more sustainable approach to energy and climate issues on a campus scale can include practices that affect infrastructure and appliances, behavioral changes that reduce energy consumption, and infrastructure changes that generate or rely upon renewable resources.

²¹ U.S. EPA. Accessed February 25, 2015.
See <http://www.epa.gov/climatechange/ghgemissions/sources/electricity.html>.

Energy efficiency is often viewed as the low-hanging fruit of reducing energy consumption. For a major energy consumer such as the County, retrofits to lighting fixtures, appliances, or equipment can add up to significant energy- and cost-savings.

Expanding the energy mix to include renewable resources also reduces the climate footprint of the campus. While there are many potential renewable energy measures to draw from, cost and viability of the resource in northeastern Illinois are two of the common limiting factors for renewable energy decisions.

Key Energy and Climate Achievements

- DuPage's participation in the Cool Counties initiative and adoption of the Environmental Responsibility and Conservation Policy (ERCP) have been drivers of many further County actions on energy, from efficiency improvements to the development of a new County energy plan.
- The County has enhanced the energy efficiency of campus buildings through numerous upgrades of inefficient appliances and equipment to retrofits to standard asphalt roofs.

Policies

The ERCP recommends that equipment purchases consider energy efficiency during the procurement process, when cost effective. As a result, the County's Data Center in the Administration Building has also received energy efficient upgrades. The Center's cooling system was made more efficient by utilizing overhead cabling, which requires less electricity and installing energy efficient air conditioning units. Switching to virtual servers has also resulted in energy savings as the IT Department now manages only four physical servers.

The IT Department also oversees campus-wide practices, such as default settings for double sided printing and monitor display power options. The use of PaperCut print management software will reduce the cost and electricity consumed by printing by directing employees to print from more energy efficient copiers. As part of the County's new employee training, participants are educated on the benefits of shutting down computers on a daily basis; however, an official policy is not enforced.

In addition to pilot projects and retrofits, the County has led and participated in efforts to reduce energy consumption. In 2012, DuPage County passed a resolution to become a Cool County in Illinois. The Cool County initiative commits members to reducing greenhouse gas emissions 20 percent below 2007 levels by 2030. The County is in the process of developing an energy plan to meet the goals of the resolution.

Energy Efficiency and Conservation Block Grant

In 2009, the County received \$4.6 million in federal funding as part of an Energy Efficiency and Conservation Block Grant. The grant funded 17 energy efficiency and conservation projects that were completed between 2010 and 2013. Retrofits at the Jail and Public Works facilities were accomplished with incentives from the Illinois Department of Commerce and Economic Opportunity.

The majority of the County's energy efficiency projects consist of lighting retrofits to replace high consumption fixtures with high output Light Emitting Diode (LED) or fluorescent lighting in buildings and garages and along roads and entryways. Several of the projects, such as the Administration Building and Judicial Office Facility Annex Building, incorporated occupancy sensor controls to reduce energy demand in the evenings when the facilities are in use by cleaning crews. LED exit signs were also installed at the Convalescent Center, which has led to annual savings of nearly \$4,000. While much of the lighting retrofits have been implemented on the east campus, the County is currently installing motion sensors and low-wattage bulbs in facilities on the west side of Government Center.

Lighting retrofits not only generate energy savings, they also decrease the demand for maintenance as high output fixtures have a longer lifespan. Retrofits in campus parking areas and garages also increase light diffusion and security. As of November 2014, the locations of completed lighting retrofit projects include: Highway Maintenance Garage, Fleet Garage, Administration Building, Administration and Judicial Parking Garages, Convalescent Center, Judicial Office Facility Annex Building, and Public Works Underground Maintenance Garage, as well as the Entryway Bollard Light Retrofit and Ring Road Streetlight Replacement projects.

Roof retrofits were also made possible through the County's 2009 Energy Efficiency and Conservation Block Grant. In 2010, the County installed ENERGY STAR-rated white roofs in four locations at the Administration Building: above two stairwells, a pedestrian bridge, and the auditorium. By lowering the temperature of the roof and, therefore, decreasing the energy demand needed to cool the building, the white roofs save 1,598 kWh per year and generate \$3,100 in annual cost savings. Additional benefits of the project include extended roof life expectancy and reduced demand on the building's heating, ventilating, and air conditioning (HVAC) system.

²² This figure was calculated from GSA Metrics and excludes CNG stations and conversions, and solar water faucets, which are not covered in this section.

Additional energy efficiency projects have focused on equipment replacement and HVAC systems. In 2010, the County installed six energy-efficient escalators and in 2011, the County replaced 81 appliances in the kitchen, laundry, and physical therapy areas of the Convalescent Center with updated ENERGY STAR equipment that reduce electricity and natural gas use. In 2012, the Center's building operation system was automated and variable frequency drives on the air handlers were installed, which allow the building to operate at a lower temperature. Annually, these improvements reduce natural gas consumption by 54,000 therms and \$18,000. Overall, the County's sustainable energy initiatives, outlined above, have led to annual cost savings of \$91,000 for the campus.²²

In addition to the physical improvements made around campus, in January 2014, the County held a DuPage County Energy Summit that engaged a multidisciplinary group of stakeholders in discussions on the importance of energy efficiency.

Renewable Energy Generation

With partial funding from the Illinois Clean Energy Community Foundation, the Child Advocacy Center was designed and constructed to feature a 15 kW solar roof. The roof is ENERGY STAR-certified and achieves a Solar Reflectance index of 100 — the highest percentage of solar energy reflected by a surface. The 1,389 square foot solar roof generates cost savings of \$1,066 annually; however, the system's 38-year payback period poses an investment challenge for the County.

Energy Best Practices

Because the County’s only on-campus power plant is reserved for emergency back-up generation and is subject to strict regulatory requirements, this section focuses on a suite of demand-side management strategies that reduce energy use and diversify the energy mix to include more renewable sources. The best practices highlighted in this section expand on the County’s accomplishments:

- **Implement more robust energy efficiency and conservation measures.** The availability of grant funding for energy efficiency and the immediacy of returns on investment in the energy bill has made energy efficiency an appealing strategy, and the County’s energy efficiency achievements are a testament to its continued commitment to sustainability. Many opportunities remain for the County to explore further efficiency measures for specialized and large-scale equipment.
- **Increase renewable energy options.** Purchasing energy from solar, wind, and geothermal resources can green the supply of energy consumed on campus and reduce emissions of greenhouse gases.

Energy Efficiency and Conservation

With lighting retrofits soon to be complete, the County will devote more focus on strategies for other appliances and equipment. Some conservation practices highlighted in the Water section, such as equipment upgrades, also generate significant energy savings when hot water use is reduced.

Computer Power Management

In addition to recent data center upgrades and equipment purchases, stakeholder interviews revealed an opportunity to conserve energy through computer power management, which includes the configuration of computers to power down into “sleep mode” after a period of inactivity. Establishing a computer power management campaign is an easy way to conserve energy and save up to \$50 per computer each year. The U.S. Environmental Protection Agency provides power management resources on its ENERGY STAR website, which includes outreach materials, a savings calculator, and free technical assistance.

Powering down computers at the end of the day is also a best practice that conserves considerable energy. Policies can either be implemented voluntarily through campaigns or via power management software. The County may want to formalize its computer power management strategy into a campus-wide standard.

Table 8. Summary of benefits for energy and climate best practice strategies

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Computer Power Management							
Reduce Building Leakage							
LED Traffic Lighting							
Passive Solar							
Energy Tools							
Solar Collectors and Solar Panels							
Wind							
Geothermal							
Renewable Energy Certificates and Carbon Offsets							

Source: Chicago Metropolitan Agency for Planning.

Case Study on Computer Power Management: University of Wisconsin-Oshkosh, Oshkosh, WI

Since 2005, the University of Wisconsin-Oshkosh's computer management program has generated significant energy savings for the campus. Since upgrading its lab computers with Windows Vista and Windows 7, the University has taken full advantage of the built-in client management features offered through Windows Server 2008. The University estimates that its power management program will generate energy savings of more than \$76,500 each year. Over a three-year typical computer lifespan, these energy savings amount to \$200,000 and prevent the release of more than 3,520 tons of carbon emissions into the atmosphere.

Reduce Building Leakage

Energy is wasted when heated or cooled air leaks through the building envelope. In fact, up to 40 percent of the energy consumed to heat or cool a building can be attributed to air leaks. Since air leakage often represents a substantial portion of energy use, identifying and sealing leaks in the building envelope could significantly reduce energy consumption and cost.

Signs of air leakage include excessive energy use, inefficient or costly mechanical systems operation, temperature fluctuations, and condensation, moisture, mildew, and mold. To diagnose the air leakage pathways, standard practice recommends a visual assessment of the building envelope, depressurization testing, air leakage path location, and the use of infrared thermography.

Strategies to reduce building leakage will depend on the diagnosis and can range from weather stripping and caulking to installing roof insulation. While specific methods of sealing will vary depending on the area made airtight, it is recommended that air sealing occur in the following order:

1. Top: roof
2. Bottom: ground floor and basement
3. Vertical Shafts: stairwells and plumbing
4. Outside Walls: windows and doors

Depending on the level of effort already carried out by the County, an initial air leakage assessment could be conducted to determine those facilities with the greatest need for air sealing. After the initial assessment and identification of air leakage pathways in the building envelope, improvements should be made beginning with the top of the building, following the order described above. This presentation on "Air Sealing Existing Buildings for Energy Savings" provides additional information on air leakage diagnosis and sealing strategies.

LED Traffic Lighting

The 2009 Energy Efficiency & Conservation Block Grant allowed the County to increase the efficiency of lighting across the Government Center, including retrofitting the parking garage and entryway bollard lighting with Light Emitting Diode (LED) fixtures. More recently, the County has been in the process of upgrading inefficient lighting along interior roadways and within campus parking lots as well. LED traffic signals are very energy efficient, which results in extended bulb lifespan and reduced maintenance costs. LED traffic signals are also considered safer because they offer brighter illumination and contrast and provide greater visibility. LED signals have a tendency to experience snow and ice buildup during certain storm conditions which can affect visibility; however, the industry has been researching the issue to develop solutions.

As a next step, the County can retrofit traffic and pedestrian signals on campus and prioritize LED technology in future traffic lighting installations. Although County Farm Road is technically outside of the campus boundary, the County may wish to upgrade incandescent traffic lights at signalized intersections on campus using energy efficient LED technology, including the Main and North Entrances along County Farm Road. In addition to traffic signals, upgrading roadway lighting along this stretch would further demonstrate the County's commitment to sustainability. The County should consider the use of LED technology in future campus signal installations, including the addition of pedestrian signals at major crosswalks.

Passive Solar

A building's orientation can directly affect the amount of energy required for cooling. Aligning a building along an east-west axis allows the longer end of the structure to face the sunny south. This alignment also minimizes sun exposure to the building's east and west sides which are the most difficult sides to shade. A building that uses passive solar design relies on fewer technologies to meet its lighting and heating needs. Early in the design stage, the County may wish to consider the orientation of future campus buildings and windows to maximize southern sun exposure.

Energy Tools

Stakeholder interviews with County staff indicate a desire to continue to utilize the energy assessment program provided by ComEd to guide future improvements to campus facilities. ComEd provides customers with free online tools to analyze energy usage. The Business Energy Analyzer is used to assess energy use of single-tenant buildings and to identify recommended efficiency improvements. The tool allows building managers to compare energy use from year to year and weigh usage against comparable customers.

Renewable Energy Generation

As exhibited by the Child Advocacy Center solar roof, the campus provides an excellent place for the County to continue to lead by example and demonstrate the viability of renewable energy technologies. While the renewable energy generated by demonstration projects may make up a small portion of the campus energy demand, such projects help the campus become more energy-independent and illustrate the County's commitment to sustainability.

Solar Collectors and Solar Panels

Solar energy systems comprised of solar collectors and solar panels can be installed to provide energy and/or heat production for a facility. There are two types of solar heating systems used for individual buildings: active solar heating and photovoltaic systems. Active solar heating systems generate heat from sunlight which is used to heat building interiors and hot water. These systems use solar collectors mounted on a south-facing roof. Photovoltaic (PV) systems use solar cells to generate electricity. Depending on the building or site, solar panels can be mounted to a roof, pole, wall, or the ground. The solar roof at the Child Advocacy Center is an example of a PV system.

Not every building is suitable for solar energy. The On-Site Commercial Solar PV Decision Guide, developed through the U.S. Department of Energy's Better Buildings Alliance program, provides information for anyone interested in pursuing a PV system, including steps to evaluate the feasibility and benefits of PV, financing and procurement, installation, and operation. While the guide can serve as a tool for future solar projects, guidance provided on inspection, annual maintenance, and staffing may prove useful for the County's current operation and maintenance of the PV system at the Child Advocacy Center.

Wind

Wind energy technologies use the wind to generate electricity. Most technologies can be used as a stand-alone system, connected to the power grid, or combined with a photovoltaic system. Small wind electric systems can provide cost-effective renewable energy generation in areas where there is enough wind on a consistent basis. Due to low wind speeds in the Chicago region, however, the feasibility of wind energy systems is fairly limited.

Geothermal

Geothermal systems use heat derived below the earth's surface to generate energy. Unlike solar or wind systems, geothermal systems provide a continuous source of energy and use between 25 to 50 percent less electricity than conventional heating and cooling systems. A geothermal heat pump can either be a closed- or open-loop system. A closed-loop system circulates a heat transfer fluid through pipes or coils buried beneath the land surface. Open-loop systems, on the other hand, extract groundwater and discharge it to a waterbody or injection well after use. A closed-loop system is generally preferred to minimize consumption of groundwater.

While geothermal systems are very efficient and emit little or no greenhouse gases, their relatively high cost and land demands can impact project feasibility. Such systems are best suited for new construction rather than retrofitting existing buildings on campus.

Renewable Energy Certificates and Carbon Offsets

Renewable energy certificates (RECs) represent the environmental and other non-power attributes and benefits of renewable electricity generation. RECs can be bought based on the renewable resource, such as solar, wind, and geothermal, its location, and when generation occurred. Purchasing RECs gives buyers the right to claim the environmental attributes and benefits of the renewable energy source, which can provide them with a way to meet sustainability goals for renewable energy generation.

Offsetting is typically recommended as the last resort to reduce carbon emitting activities. Carbon offsets represent reductions in greenhouse gases that compensate emissions from somewhere else. They can be bought voluntarily to allow businesses or organizations to offset unavoidable carbon emissions, such as those generated by a large event, by paying for greenhouse gas reductions achieved through other projects elsewhere. Before buying carbon offsets, it is recommended to ensure the carbon offset project and reductions meets high environmental standards. The County can use certification programs, such as Green-e Climate, to evaluate all offsets.

Chapter 9 EDUCATION AND AWARENESS



CONSERVATION@WORK

This property is recognized for its environmentally friendly and sustainable landscape.

Native plants, combined with other water conservation practices, reduce stormwater runoff and low maintenance costs, as well as improve habitat for wildlife.



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Achieving sustainability goals is not a one-time undertaking, but an ongoing pursuit. Education and awareness are critical to the long-term success of any sustainability program. Practices that build awareness about the sustainability activities are important for a number of practical reasons. Documenting sustainability endeavors, as well as the associated financial, environmental, and social effects that they have had, demonstrate positive returns on investment. Moreover, education and awareness efforts can show the public that their taxes are being used responsibly and effectively.

Education and awareness can also be used to influence public behavior. For instance, seeing demonstration practices or reading information about sustainability activities on public facilities may spark ideas for residents and businesses to adopt similar practices in their own properties.

Education and awareness initiatives should not only be geared toward the general public, but also toward staff, the primary beneficiaries of sustainability programs in a workplace. Engaging staff on sustainability activities can encourage community building and provide a better quality work environment for employees.

Key Education and Awareness Achievements

- Demonstration projects on native plantings, the green roof, and rain gardens are located across the Government Center campus. These projects include signage with information about initiatives and demonstration projects inform employees and visitors about environmental practices.
- All new employee training sessions include discussions on sustainability initiatives on campus.
- The County used to have an active Green Team made up of departmental representatives, but this team has been intermittently active.

Public Education

The County uses its sustainability projects as a model to guide other municipalities, community partners, and residents to adopt their own sustainable practices in areas such as landscaping and water conservation. The County has incorporated educational signage into some of its on-campus sustainability projects. Signs are located within the Native Plant Demonstration Garden, on recycling receptacles, and on the vegetated roof. The County also promotes its sustainability efforts through the DuPage Campus Sustainability website and other media outlets such as newsletters and press releases.

In addition, employees collaborate with the Morton Arboretum to celebrate Arbor Day by tagging campus trees with signs highlighting the benefits of trees, including reducing energy bills, increasing home values, promoting economic development, reducing stormwater impacts, and improving the overall health of the community.

Employee Services

County employees have various opportunities to learn about on- and off-campus sustainability initiatives. The County's new employee training program educates all new staff on green services and sustainability improvements on campus. Other employee programming, such as sustainability "lunch and learns" held by the County on the Energy Impact Illinois program, have been initiated on occasion.

County Leadership and Coordination

Throughout the years, the County's leadership in sustainability has shifted from organized groups to individual actions of dedicated staff members. In the past, the County had a more active Green Team made up of representatives across County departments, but this group is only intermittently active. It is primarily the responsibility of the Environmental Coordinator to lead the County's campus sustainability program and liaise with County Department directors to coordinate existing activities and upcoming grant applications and projects. Members from the previous Green Team and Green Government Council have been integral to the County's successes in sustainability.

Education and Awareness Best Practices

As the County initiates new sustainability projects or strengthens existing programs, all efforts should include strategies for education and awareness. The highlighted strategies in this section provide ways to promote campus sustainability education and awareness that inform County staff, campus visitors, and other stakeholders about sustainability practices. These practices include:

- **Establishing signage.** Informational signs can be located alongside more sustainability practices, such as water efficient faucets, energy efficient light switches, revolving doors, or stormwater BMPs.
- **Expand demonstration projects.** Demonstration projects for particularly innovative or interesting practices on campus can provide tangible examples of sustainability in action. These projects should be paired with visible explanatory signage.
- **Institute staff sustainability training.** Trainings can educate those who plan, design, build, operate, and use campus facilities about how they can contribute campus sustainability.
- **Engage the public.** The County can institute more programs and activities that provide a more interactive and informative environment for County visitors.

Table 9. Summary of benefits for education and awareness best practice strategies

BEST PRACTICE STRATEGY	SUSTAINABILITY BENEFITS						
	Education and Awareness	Energy and Climate	Green Building	Open Space and Ecosystems	Transportation and Mobility	Waste	Water
Signage	Secondary benefit of this strategy	Primary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy
Demonstration Projects	Secondary benefit of this strategy	Primary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy
Staff Training	Secondary benefit of this strategy	Primary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy
Public Engagement	Secondary benefit of this strategy	Primary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy	Secondary benefit of this strategy

Source: Chicago Metropolitan Agency for Planning.

Signage

Sustainability practices can be largely invisible to the public eye. The County's sustainability efforts in reducing resource consumption or improving water quality, for example, are not necessarily apparent. Many staff, not to mention the public, may not realize the extent to which the County has benefited from sustainability initiatives.

One simple way to increase awareness is by putting up signage to explain various sustainability efforts. A consistent design or logo for the signs can be used as a way to brand the County's many sustainability activities so that people expect to learn more when they spot the familiar sign around campus.

As a matter of practice, signage should be simple to read and eye-catching. As described in the possible application section below, some signage may have room for more description, but most signage should be short and to-the-point. The County may consider using a QR code so that staff and visitors can visit a specific County website for a longer description of details for each practice.

Signage is particularly effective to highlight for sustainability activities that are less visible, but that affect the general public. For example, the County can use signage for building-wide water efficiency retrofits by placing simple signs that say "low-flow faucet" in bathrooms. The County may want to consider longer explanatory signs to describe more innovative large-scale efforts. For instance, outdoor signage can help to explain the variety of landscaping and stormwater BMPs that it is employing to improve the quality and reduce the volume of runoff.



Signage posted on every revolving door on the Massachusetts Institute of Technology campus reminds students, faculty, and visitors of how they can contribute to energy efficiency. The sign also provides a link for more information.

Source: <http://climatechange.mit.edu/enhance-revolving-door-sticker-empower-learning>.



These waste disposal signs from the San Francisco Department of the Environment are simple and easy to understand regardless of English language proficiency.

Source: <http://www.sfexaminer.com/wp-content/uploads/TrashFuture-05.jpg>.

Demonstration Projects

Many sustainability practices have been, and should continue to be, implemented at a demonstration scale at Government Center. Like signage, demonstration projects provide high visibility to various sustainability activities and can illustrate how sustainability practices work on the ground. Seeing functional operations in practice is a more tangible way of engaging staff and the public with the County's sustainability objectives. Demonstration practices help to highlight the County's accomplishments in the sustainability sector and can strengthen the public image of the County government for "walking the walk."

Staff Training

New appliances, practices, and procedures require sufficient staff training to be effective. Proper operation and routine maintenance of equipment can reduce water use and lengthen equipment lifespans. Staff in charge of facilities maintenance or equipment operation must not only know the details of new building or landscaping standards, but should also be kept up-to-date on new practices. As new technologies are constantly evolving, ongoing training may be helpful for appropriate staff. Compared to replacement or retrofit options, which can be costly, initiatives to educate users on simple ways of reducing water consumption can be low-hanging fruit for improving water conservation. Operation and maintenance trainings should emphasize periodic performance assessments and replacement of worn parts, and users should be trained to report faulty fixtures such as leaking toilets or faucets. Posting signage in restrooms, laundry rooms, and kitchens can increase employee and visitor awareness of the County's water efficiency goals. The County should institute internal training for appropriate staff when new practices are adopted.

Maintenance staff is just one group that needs to be trained on sustainability best practices. Training on best behavior practices is needed so that general staff understand their roles and responsibilities in greening Government Center. While some sustainability training has occurred during new staff orientation, staff training should be an ongoing event for new and long-time staff alike. Tools such as an intranet site, newsletter, or brownbag lunch talks can help communicate new campus practices or recommendations for staff to reduce their environmental footprints at work.

Broader trainings can also help staff understand how individual behavior fits into a larger campus-wide strategy, as well as illuminate the many benefits from each action across sustainability topics.

Public Engagement

While County staff comprise the primary stakeholders for the practices listed in this Guide, the general public is also a critical audience to engage. The County should explore volunteer opportunities or other events for both staff and the public to participate in. Activities around campus clean-ups, recycling drives, tree-tagging, and gardening provide just some examples of how to engage the public. The County can also consider guided or self-guided walking tours of the sustainability initiatives and projects on campus.

The County can consider Government Center a centralized clearinghouse for sustainability resources and activities. Whether through printed resource materials or educational exhibits, videos, and demonstration projects in public campus spaces, the County's high-trafficked campus can serve as a learning ground for innovative sustainability practices.

Chapter 10

NEXT STEPS



After the DuPage County Government Center Sustainability Best Practices Guide is presented to the County staff and Steering Committee for review, the next step will be to develop baseline indicators that allow the County to begin tracking progress on sustainability.

Develop a Government Center Campus Sustainability Plan or Planning Priorities Report

In order to implement the strategies outlined in this guide, the County should develop a roadmap in the form of a campus sustainability plan or a sustainability planning priorities report. Both processes allow the County to develop overarching sustainability goals, prioritize the best practices that would help to achieve those goals, set specific and measurable targets, and consistently track indicators to measure progress in the long-run. Both options ensure that individual practices are implemented strategically and meet broader County objectives. Formalizing sustainability commitments in a planning document also helps to continue sustainability efforts through turnovers of staff or elected officials, as well as support the County's application to potential grant programs to fund sustainability activities.

The Steering Committee members of this project, as well as other interested staff, would be a natural group to shepherd the prioritization process. A campus sustainability plan would be most appropriate for a public-facing document, while a planning priorities report is most commonly used as an internal document.

Track Sustainability Indicators

Regardless of the County's decision to develop a full campus sustainability plan, the County should begin tracking indicators to better understand the impact of its sustainability investments. The County's existing Progress Reports are helpful for capturing past sustainability activities, but do not track progress across a consistent set of indicators. Setting sustainability targets and developing indicators to measure those targets will help the County determine the financial, environmental, and other outcomes resulting from its efforts. This Best Practices Guide is also paired with an Indicator Tracking Guide that establishes baselines for key sustainability indicators and provides the foundation for continued indicator tracking and target-setting.

Build Staff Capacity

Progress on sustainability cannot be met without building the internal capacity of staff and building long-lasting relationships among County departments. At the Steering Committee kick-off meeting, many staff commented that they were unaware of sustainability activities being undertaken by other departments or on other corners of campus. Staff capacity can be strengthened by maintaining a core group that meets regularly to share sustainability practices. Regularly convening breaks down departmental silos, builds better cross-departmental relationships, and allows staff to think about sustainability more comprehensively rather than from one specific angle.

As this guide illustrates, one intervention can address several sustainability goals. For instance, permeable pavement installation can be coupled with new parking lot landscaping design to reduce urban heat island effects and capture stormwater through vegetated planters. Undertaking these types of activities in concert requires significant coordination across multiple departments. Bringing multiple perspectives to the table will help the County maximize the potential benefits from one solution.

Any potential green team group should be broad enough to cover all County departments — even those who are not typically involved in sustainability conversations, such as the IT department.

In addition to making sure that County staff are plugged into the many sustainability activities happening in Government Center, the County should also participate in regional groups to learn from best practices in other counties and local governments. The Illinois Environmental Protection Agency provides a list of resources, campaigns, and coalitions for local governments in the state. The County may also want to seek out specific groups for topics for which the County has less experience, but is interested in pursuing. For example, participating in the Illinois Food Scrap Coalition may build connections with others exploring food scrap composting and provide ideas for how the County can implement composting on campus.

APPENDIX



Appendix A: Resources

While the Best Practices Guide provides summaries and potential applications of many sustainability practices, the County may require follow-up information in order to further develop and implement the practices in Government Center. The following section provides case studies and resources that can provide more detail about the strategies for each chapter of the Best Practices Guide. The case studies, which are drawn from across the country, highlight innovative applications of sustainability best practices. Case studies from large campuses are prioritized when appropriate to illustrate examples that are most analogous to Government Center. This section also includes links to resources that provide further guidance or standards on implementing particular strategies. The case studies and resources are organized according to the seven sustainability topic areas covered in the Best Practices Guide.

Green Building Resources

Resilient Design

- CMAP [Climate Adaptation Guidebook for Municipalities in the Chicago Region](#)
- [Resilient Design Institute](#)
- [Climate Ready Boston](#) and [vulnerability assessment](#) of municipal departments, facilities, and operations in Boston
- Resources on climate projections
 - [Midwest Regional Climate Center](#)
 - [Illinois State Climatologist](#)
 - [National Climate Assessment for the Midwest Region](#)
 - [National Climate Resilience Toolkit](#)

Case Study on Resilient Design: [Spaulding Rehab](#), Charlestown, MA

Spaulding Rehab is a leading rehabilitation hospital for survivors of strokes and spinal cord injuries in Charlestown, MA. To accommodate its aquatic rehabilitation program, Spaulding decided to build its new facility on the water at the old Boston Navy Yard. Due to the site's flooding vulnerability, the hospital incorporated resilient design standards in the building and site design of the new facility.

Key improvements increase the building's resilience to flooding, better prepare Spaulding Rehab to cope with other impacts of climate change, and make the facility one of the most resilient hospitals in the country. These updates include:

- Raising the structure above the 500-year flood elevation to accommodate sea level rise.
- Installing a berm at the parking garage entrance keeps floodwater from entering.
- Locating mechanical systems and equipment on the roof or upper level floors, out of harm's way in advance of a large storm.
- Designing manually operable windows to provide for "sheltering in place" when power outages result in the loss of air conditioning.

- Installing high-performance glass to reduce the need for daytime electric lighting in the event of an extended power outage.

Green Building

- U.S. Green Building Council [Roadmap to a Green Campus](#)
- College of Lake County [Sustainability Master Plan](#)
- Design Standards
 - Harvard University [Green Building Standards](#) and [Green Building Resources](#)
 - ASHRAE [Standard 189.1 Standard for the Design of High Performance Green Buildings](#)
 - City of New York Department of Design and Construction [High Performance Building Guidelines](#)

Performance Measurement

- [Institute for Sustainable Infrastructure Envision Rating System](#)
- U.S. Environmental Protection Agency (EPA) [GreenCheck website](#)
- U.S. General Services Administration [Sustainable Facilities Tool](#)
- U.S. Department of Energy (DOE) [Building Life Cycle Cost Programs](#)
- Green building certification alternatives
 - [Green Globes](#)
 - [Sustainable Sites Initiative](#)
 - Living Building Challenge [Net Zero Energy Building Certification](#)

Transportation Resources

Transportation-Related Stormwater Improvements

- DuPage River Salt Creek Workgroup [Chlorides and Winter Management](#)
- [McHenry County Winter Snow and Ice Operations guide](#)
- City of Chicago [Green Alley Handbook](#)
- SEMCOG [Structural Management Best Practices, Cold Climate Considerations](#) (p.125)
- University of Wisconsin-Madison [Outdoor Salt Use Policy](#)
- City of Chattanooga Rainwater Management Guide on [Pervious Pavement](#)
- Southeast Michigan Council of Governments [Structural Management Best Practices, Pervious Pavement Maintenance](#) (p.253)

Heat Island Reduction

- U.S. EPA [Reducing Urban Heat Islands: Compendium of Strategies, Cool Pavements](#)
- U.S. EPA [Green Parking](#)

Commuter Mode Share

- Best Workplaces for Commuters [Guide to Employer Commuting Surveying](#)
- Pace [Commuter Toolkit](#)
- Pace [RideShare Program](#) and [Tips on Forming a RideShare Group](#)
- [RTA Transit Benefit Program](#)

- Active Transportation Alliance [Bike To Work](#)
- Bike to Work Metro DC [Become a Bicycle Friendly Workplace](#)

Vehicle Fleet

- U.S DOE [Comprehensive Federal Fleet Management Handbook](#)
- US EPA [Green Vehicle Guide](#)
- U.S. EPA [SmartWay Certified Vehicles](#)
- Illinois EPA [Prevention Tips for Automotive Repair and Autobody Shops](#)
- U.S. Department of Agriculture [BioPreferred Program](#)
- U.S. DOE [Comprehensive Federal Fleet Management Handbook](#)
- U.S. DOE www.fueleconomy.gov
- U.S. EPA [WaterSense at Work, Vehicle Washing](#)
- International Bicycle Fund guide to [Starting a Corporate or Government Bike Fleet or Pool](#)

Case Study on Bicycle Fleet: [Village of Oak Park Bicycle Fleet](#), Oak Park, IL

In 2008, the Village of Oak Park established a bicycle fleet to encourage Village staff to use bicycles for work-related travel. The fleet consists of six bicycles, four available at the public works center and two available at the village hall. Employees fill out a log each time they take out a bicycle which allows the Village to track fleet use. In addition to logging miles, employees are required to wear helmets and obey traffic laws. Although modest, the program generates myriad benefits for Oak Park by reducing fuel consumption, contributing to employee health and fitness, and allowing staff to see the Village differently by travelling by bike.

Waste Resources

Office Supply Waste

- Illinois Department of Commerce and Economic Opportunity [Recycling Works: A Tool Kit for Reducing Waste in the Workplace](#) (p.3-17)
- Natural Resources Defense Council toolkit on [How to Create a Smart Paper Plan for Your Business](#) and strategies for [Simple Ways to Reduce Office Paper Waste and Make Better Use of the Paper You Need](#)
- SF Environment [Make Your Own Compost, Recycling, and Landfill Signs](#)
- U.S. EPA [WasteWise Program](#)
- Green Meeting Industry Council [Chicago Chapter](#)
- Illinois Department of Commerce and Economic Opportunity, [Recycling Works: A Tool Kit for Reducing Waste in the Workplace](#) (p.3-17)

Food Waste

- Food disposal
 - U.S. EPA [Food Waste Reduction and Prevention](#)
 - U.S. EPA [Food Recovery Challenge](#)

- [Sustainable Food Management Webinar Series](#)
- U.S. EPA [Green Cafeterias](#)
- Food packaging
 - U.S. Department of Agriculture, Biopreferred Program: [Disposable Food Containers](#), [Serving Ware](#), and [Kitchen Cleaning Products](#)
 - U.S. EPA [Reducing Wasted Food & Packaging](#)
- Food donation
 - DuPage County, DuPage Food Pantry [map](#)
 - People's Resource Center [website](#)
 - U.S. EPA [Feed Families, Not Landfills](#)
 - U.S. EPA [Putting Surplus Food to Good Use](#)
 - DuPage County, [Recycling Guide](#) for FOG recycling locations
- Tracking tools
 - [Food and Packaging Waste Prevention Tool](#)
 - [Food Waste Management Calculator](#)
 - [Paper Tracking Waste Logs](#)
 - U.S. EPA [Food Waste Assessment Tools](#)

Construction and Demolition Debris

- National Home Builders Research Center, [Deconstruction: Building Disassembly and Material Salvage](#)
- U.S. EPA [Deconstruction and Reuse](#)
- U.S. EPA [Using Recycled Industrial Materials in Roadways](#)
- U.S. Department of Transportation, [Asphalt Pavement Recycling with Reclaimed Asphalt Pavement \(RAP\)](#)

Waste Management

- U.S. EPA [Calculating Effectiveness: The Waste Management Plan](#)
- U.S. EPA [Resource Management](#)
- Illinois Counties Solid Waste Management Association, [Sample contracts and RFP documents](#)
- SF Environment [Commercial Office Building Guidelines](#)
- U.S. EPA [How to Start or Expand a Recycling Collection Program](#)
- U.S. EPA [Wastes – What You Can Do at Work](#)

Case Study on Waste Management: [The Lemuel Shattuck Hospital](#), Jamaica Plain, MA

In 2003, the Lemuel Shattuck Hospital initiated a resource management plan to reduce waste in an economically and environmentally responsible way. Over a ten year period, resource management contracting between the hospital and hauler has reduced trash by approximately 200 tons per year, nearly tripled the recycling rate, and generated mutual savings of \$32,000.

Key components attributed to program success include:

- Controlling costs through improved management of recycling and trash systems.

- Providing transparent billing that monitors monthly recycling and trash by waste stream and reports quarterly progress in waste reduction and recycling, performance, and program costs savings.
- Initiating a “Green Team” that provides an opportunity for dialogue between hauler and staff.
- Managing one contractor for both recycling and trash which saves the hospital time and resources.

Open Space Resources

Restoration and Conservation

- City of New York Parks & Recreation [High Performance Landscape Guidelines](#) (p. 200)
- Indiana Wildlife Federation [Landscaping the Sustainable Campus](#)
- Riparian buffers
 - River Network [Ribbons of Green: Ideas & Resources for Riparian Buffer Projects](#)
 - Environmental Law Institute [Planner’s Guide to Wetland Buffers for Local Governments](#)
 - U.S. EPA [Riparian/Forested Buffer](#)
- Native and invasive plants
 - Forest Preserve District of DuPage County, [Common Prairie Plants](#)
 - Morton Arboretum, [Trees & Plants Website](#)
 - Center for Invasive Species and Ecosystem Health, [Invasive Species of Concern](#)

Case Study on Restoration: [Oakton Community College Campus Restoration, Des Plaines, IL](#)
 Oakton Community College in the City of Des Plaines provides an excellent local example of how native landscaping efforts can restore habitat corridors, increase biodiversity, and create educational and engagement opportunities for students and staff. Comprising 174 acres along the Des Plaines River, the campus boasts preserved woodlands and wetlands, and reconstructed prairie. Oakton students and staff routinely participate in restoration and management activities, including the [reestablishment of native prairie habitat](#) which spans approximately 55 acres and includes the site of a former landfill. The reestablished prairie has become home to bird such as sora and killdeer, snakes, frogs, toads, and other fauna. In addition to enhancing the campus ecosystem, the project expands the habitat created by the Kloempken Prairie, located on adjacent Cook County Forest Preserve property.

Landscape Maintenance

- Guidance for Federal Agencies on Sustainable Practices for Design Landscapes [Guidebook](#) (p.15)
- U.S. EPA [Buy-Recycled Series: Landscaping Products](#)
- U.S. EPA, Landscaping and Lawn Care [Website](#)
- U.S. EPA, [WaterSense at Work](#), Outdoor Water Use
- U.S. Office of Energy Efficiency & Renewable Energy, [Water-Efficient Irrigation](#)

- U.S. DOE [Advanced Energy Retrofit Guide for Office Buildings](#) and for [Healthcare Facilities](#)
- FacilitiesNet, [Building Envelopes: Putting Up Barriers to Air Leaks](#)
- U.S. DOE [Advanced Energy Retrofit Guide for Office Buildings](#)
- Lighting
 - Institute of Transportation Engineers, [LED Traffic Signals](#)
 - U.S. EPA, [ENERGY STAR Traffic Signals](#)
 - U.S. Green Building Council Solar Orientation [guidelines](#)
- Energy performance tools
 - ComEd, [Tools to Analyze Your Energy Use](#)
 - ComEd, Business Energy Analyzer [Flyer](#)

Renewable Energy Generation

- U.S. EPA [ENERGY STAR Procurement](#)
- U.S. EPA [Clean Energy Collaborative Procurement Initiative](#)
- U.S. EPA [Green Power Partnership](#)
- U.S. EPA [On-Site Renewables Challenge](#)
- Solar
 - National Renewable Energy Laboratory, [PVWatts® Calculator](#)
 - U.S. DOE, [On-Site Commercial Solar PV Decision Guide](#)
- Wind
 - National Renewable Energy Laboratory Illinois Wind Resource [Map](#)
 - U.S. DOE, [Planning a Small Wind Electric System](#)
 - U.S. DOE, [Small Wind Guidebook](#)
- Geothermal
 - U.S. DOE, [Geothermal Heat Pumps](#)
- RECs and carbon offsets
 - U.S. DOE [Renewable Energy Certificates \(RECs\)](#)
 - U.S. EPA Green Power Partnership, [Renewable Energy Certificates](#)
 - Natural Resources Defense Council [Buying Carbon Offsets: What You Need to Know](#)
 - Responsible Purchasing Network [Responsible Purchasing Guide for Carbon Offsets](#)

Education and Awareness Resources

- Signage
 - SF Environment [Make Your Own Compost, Recycling, and Landfill Signs](#)
 - MIT [Revolving Door Energy Efficiency Signage](#)
- Staff Engagement
 - U.S. EPA ENERGY STAR [Engage Occupants](#)

- A Better City [Engaging Employees Around Waste Reduction; Engaging Employees Around Water](#)
- Harvard University [Create a Water Awareness Day](#)
- Minnesota Chamber of Commerce [5 Ways to Engage Employees in Energy Savings](#)
- SHRM Foundation [Promoting Employee Well-Being](#)

Acronym List

BMP	Best Management Practice	IEPA	Illinois Environmental Protection Agency
C&D	Construction and Demolition	IPM	Integrated Peer Management
CMAP	Chicago Metropolitan Agency for Planning	LED	Lighting Emitting Diode
CMAQ	Congestion Mitigation and Air Quality Improvement Program	LEED	Leadership in Energy and Environmental Design
CNG	Compressed Natural Gas	LTA	Local Technical Assistance
DOE	Department of Energy	MMC	Metropolitan Mayors Caucus
DuDOT	DuPage Department of Transportation	PCF	Processed Chlorine Free
EPEAT	Electronic Product Environmental Assessment Tool	PRSV	Pre-Rinse Spray Valve
ERCP	Environmental Responsibility and Conservation Policy	PV	Photovoltaic
FEMA	Federal Emergency Management Agency	RAP	Reclaimed Asphalt Pavement
FHWA	Federal Highway Administration	REC	Renewable Energy Certificate
FPCC	Forest Preserves of Cook County	RFP	Request for Proposal
FSC	Forest Stewardship Council	RTA	Regional Transit Authority
FTA	Federal Transit Administration	SFTOOL	Sustainable Facilities Tool
GIV	Green Infrastructure Vision	U.S. EPA	United States Environmental Protection Agency
GPF	Gallons Per Flush	VMT	Vehicle Miles Traveled
HUD	U.S. Department of Housing and Urban Development	VOC	Volatile Organic Compound

CMAP is the region's official comprehensive planning organization. Its GO TO 2040 planning campaign is helping the region's seven counties and 284 communities to implement strategies that address transportation, housing, economic development, open space, the environment, and other quality of life issues. See www.cmap.illinois.gov for more information.



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