

US EPA ARCHIVE DOCUMENT

INTEGRATING ENVIRONMENTALLY BENEFICIAL LANDSCAPING INTO YOUR ENVIRONMENTAL MANAGEMENT SYSTEM

PURPOSE AND STRUCTURE

The goal of this guidance is to help Federal facilities integrate environmentally beneficial landscaping into their Environmental Management System (EMS). The document provides practical guidance, potential language, and examples of environmentally beneficial landscaping practices for each of the EMS elements, as described in the International Organization for Standardization 14001: 2004 Technical Specification and Guidance for Use (ISO 14001). The intended audience includes Federal facility staff tasked with developing an EMS and reducing the environmental impact of facility landscaping activities. The purpose of this guidance document is to assist with the addition of sustainable landscaping practices to an existing EMS or to the incorporation of sustainable landscaping into the development of an EMS. It does not, however, provide information on how to develop an entire EMS¹.

Section 1 provides an introductory discussion on EMSs and environmentally beneficial landscaping. The table in Section 2 walks through the key elements of an EMS and discusses the incorporation of environmentally beneficial landscaping activities into the system. Section 3 covers specific environmentally beneficial landscaping activities that can be undertaken as a part of a comprehensive EMS.

I. INTRODUCTION

Environmental Management Systems

The Federal government is committed to reducing its environmental footprint, improving the implementation of green purchasing, and pursuing other greening the government initiatives. Federal facilities across the country are pursuing these initiatives in the context of an EMS and in response to Executive Order (EO) 13148: Greening the Government through Leadership in Environmental Management², which mandated that all appropriate Federal facilities implement an EMS by December 2005.

An EMS is a systematic approach to ensuring that environmental activities are well managed in any organization. Because an EMS focuses on management practices, it can operate at facilities of widely varying size, complexity, and missions, whether they are offices, laboratories, ships, facilities, programs, or agencies. An EMS can provide Federal managers with a predictable structure for managing, assessing, and continuously improving the effectiveness and efficiency of the management of their environmental activities. An EMS approach builds in periodic review by top management and emphasizes continuous improvement instead of crisis management. Properly implemented, an EMS can reduce support costs and improve operating efficiency while advancing environmental production and performance.

The most common framework for an EMS is that described in ISO 14001. Though other types of EMSs can be adopted, and EPA does not specifically endorse any individual EMS standard, the ISO 14001 EMS is the most widely recognized. ISO 14001 specifies the actual requirements for an EMS

¹ For more information on the development of an EMS please see (www.epa.gov/epaoswer/ems/ems-101/ems101.htm)

² For the text of Executive Order 13148 see (www.archives.gov/federal-register/executive-orders/2000.html)

including procedures to identify environmental aspects over which the organization has control and can be expected to have an influence, including implementation of landscaping activities.

Environmentally Beneficial Landscaping

For many Federal facilities, grounds maintenance activities such as landscaping, leaf and brush removal, pesticide and fertilizer application, lawn-trimming and lawn mowing maintenance, composting, snow removal, and debris cleanup are daily business activities. These landscaping and grounds-keeping operations can result in millions of tons of waste materials including grass, trees, brush, lumber, asphalt, and concrete being hauled away, buried, or burned each day. Additionally, millions of gallons of water, pesticides, fuels, and oils are used daily in those operations. Environmentally beneficial landscaping refers to sustainable land management techniques that are cost effective, environmentally-sound and reduce adverse impacts to the natural environment. These techniques may be best applied in erosion control, landscaping irrigation, pesticide application, pesticide mixing, storage and disposal, plant waste disposal, storm water control, and wildlife management.

EO 13148 explicitly states that each Federal agency must strive to promote the sustainable management of Federal facility lands through the implementation of cost-effective, environmentally sound landscaping practices and programs to reduce adverse impacts to the natural environment. Part 6 of EO 13148, which addresses landscaping management practices, requires that each agency incorporate the Presidential Memorandum on Environmentally and Economically Beneficial Landscaping Practices on Federal Landscaped Grounds into landscaping programs, policies, and practices. In implementing landscaping policies, each agency is expected to purchase environmentally preferable and recycled products, including EPA-designated items such as compost and mulch that contribute to environmentally and economically beneficial practices.

By targeting green landscaping (greenscaping) within the EMS, a facility or installation can achieve both cost savings and environmental objectives while complying with the Presidential Memorandum on Federal Landscaped Grounds. Put into place on April 26, 1994, it is one of the key documents that should be considered when developing greenscaping practices. The EPA has also recently launched a public/private partnership called GreenScapes to encourage greener, more sustainable landscaping methods. This program promotes practices and products that meet the users' needs in landscaping but are more environmentally friendly as they are designed to preserve natural resources and prevent waste and pollution. GreenScapes is a component of EPA's Resource Conservation Challenge (RCC), a major initiative that identifies and uses innovative, flexible, and protective methods to conserve natural resources and energy³.

Waste minimization and environmentally beneficial landscaping practices, often make good economic and business sense. Benefits include:

- Cost savings through more efficient use of materials, equipment and labor
- Improved public perception of organization
- Positive environmental impact
- Waste reduction
- Water conservation
- Energy savings

³ For more information, visit www.epa.gov/greenscapes.

- Reduced exposure to potentially harmful chemicals, solvents, fuels, and pesticides
- Increased beauty: a natural environment is aesthetically pleasing.

II. EMS ELEMENTS AND ACTIVITIES RELEVANT TO ENVIRONMENTALLY BENEFICIAL LANDSCAPING

A well-designed EMS can effectively integrate waste reduction and environmentally beneficial landscaping with other environmental activities. With an EMS, facilities will be able to identify more quickly those approaches that could be adapted to their unique conditions. The potential for incorporating green landscaping strategies into each EMS element is described in more detail in the table below.

EMS Element and Relevance to Environmentally Beneficial Landscaping	Actions and Examples
<p>Environmental Policy A conforming Federal Facility Environmental Policy Statement can include beneficial landscaping practices by reference in the commitments to compliance with legal and other requirements and prevention of pollution. An organization also may include more direct commitments to those practices by identifying specific landscaping commitments in the EMS policy.</p>	<p>Action</p> <ul style="list-style-type: none"> • Develop an environmental policy that emphasizes environmentally beneficial landscaping practices that can reduce waste, conserve water, reduce energy usage, and reduce the use of hazardous substances. <p>Examples</p> <ul style="list-style-type: none"> • An EMS environmental policy can specifically state that environmentally beneficial landscaping activities will be employed including: use of regionally native plants for landscaping; the design, use and promotion of construction practices that minimize adverse effects on natural habitats; prevention of pollution caused by landscaping practices; implementation of water and energy efficient landscaping practices; and creation of outdoor demonstration projects. • The EMS Policy at the DOE Headquarters facilities includes the following general language: “Implementation of sound stewardship practices that are protective of the environment, safety and health of DOE HQ employees, support contractors, and occupants; cost effectively eliminate or reduce the generation and release of pollutants from activities and services and reduce consumption of natural resources through conservation, cost effective reuse/recycling, use of recycled content materials, use of other environmentally preferable products...”

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<p>Environmental Aspects and Impacts Identification of environmental aspects should be applied to all landscaping activities including ongoing planting and landscape maintenance operations, and one-time or proposed actions such as siting of new buildings and “hardscapes” (walkways and parking areas). Recognize that many landscaping activities are outside of the facility’s primary mission and processes, but remain within the scope of the EMS.</p>	<p>Actions</p> <ul style="list-style-type: none"> • Include procurement and contracting personnel, facility/landscaping and equipment management officials, and recycling specialists on the EMS Cross Functional Team identifying and ranking aspects and impacts. Ensure that contracted landscaping activities are addressed in aspect analyses. • When identifying and prioritizing environmental aspects, consider the impacts of the landscaping practices as being prime pollution prevention candidates that trigger a significance determination. <p>Examples</p> <ul style="list-style-type: none"> • The following are examples of aspects and impacts associated with landscaping activities: <ul style="list-style-type: none"> ○ Activity: Irrigation ○ Aspect: Water consumption ○ Impact: Depletion of natural resources ○ Activity: Pesticide application ○ Aspect: Hazardous and non-hazardous waste disposal (from unused or expired chemicals) ○ Impact: Soil and groundwater contamination ○ Activity: Mowing ○ Aspect: Emission of air pollutants - exhaust ○ Impact: degradation of air quality ○ Activity: Construction related grading and soil preparation ○ Aspect: Erosion and silted runoff ○ Impact: Siltation, and contamination of surface water
<p>Legal & Other Environmental Requirements Regulatory implications are generally defined as those mandated by Federal, state, or local government agency statutes, laws, or regulations, Executive Orders, and Directives specific to each Federal Agency. A conforming “legal and other requirements” EMS procedure should identify regulatory implications that apply to all landscaping activities.</p>	<p>Actions</p> <ul style="list-style-type: none"> • Ensure that clearly regulated activities such as the use and disposal of landscaping chemicals are addressed. • Ensure that Executive Order or memorandum requirements that relate to procurement of certain recycled content landscaping items or the use of native plants in landscaping activities are considered and incorporated into the planning of the EMS. <p>Examples</p> <ul style="list-style-type: none"> • Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federal Landscaped Grounds • Other key requirements: <p><u>Landscaping</u></p> <ul style="list-style-type: none"> • Federal requirements: EO 13148 requires the use of environmentally beneficial landscaping. Such landscaping takes native species, water availability, flood impact and other concerns into account. • State requirements: Several states are requiring beneficial landscaping in order to conserve water

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	<p>resources. These are primarily western states and often the state, county or municipality will limit the water that can be used for landscape irrigation and thereby encourage the use of xeriscaping.</p> <p><u>Erosion Control</u></p> <ul style="list-style-type: none"> • Federal requirements: Under the Clean Water Act, erosion control is often regulated during construction activities through the National Pollutant Discharge Elimination System (NPDES) stormwater permit (40 CFR 122). • State requirements: States may regulate erosion control through the NPDES stormwater permitting system or they may have separate ordinances addressing the issue. <p><u>Pesticide Application, Mixing and Storage and Disposal</u></p> <ul style="list-style-type: none"> • Federal Requirements: Under the Federal Insecticide, Fungicide and Rodenticide Act, personnel applying restricted-use pesticides must be certified and must keep application records of the following information: (7 CFR 110.3) <ul style="list-style-type: none"> ○ the brand or product name, and the EPA registration number of the restricted-use pesticide that was applied ○ the total amount of the pesticide applied ○ the location of the application ○ the month, day and year of the application ○ the name and certification number of the certified applicator • State Requirements: States may have additional pesticides as restricted-use, may have categories for applicators that are in addition to those identified federally, and often regulate operational practices for selected application methods. <p><u>Plant Waste</u></p> <ul style="list-style-type: none"> • Federal Requirements: Under the Resource Conservation and Recovery Act, "Federal Procurement," requires Federal agencies to procure designated guideline items composed of the highest percentage of recovered materials practicable. Executive Order (EO) 12873, "Federal Acquisition, Recycling, and Waste Prevention" sets forth procedures and guidelines to implement RCRA Section 6002. With regard to the purchase of landscaping products, the guidelines include: hydraulic mulch, yard trimmings compost, garden and soaker hoses, and lawn and garden edging. • State Requirements: States may limit open burning of plant waste or ban disposal in landfills. They may also regulate how compost piles are managed (i.e. runoff).

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	<p><u>Wildlife management</u></p> <ul style="list-style-type: none"> • Federal Requirements: Federally designated endangered or threatened species (floral or fauna) must be protected under the Endangered Species Act, the grounds must be managed so as not to damage habitat and proposed actions or activities must be reviewed as to their impact on threatened or endangered species (50 CFR 402). Further, personnel may not transport noxious weeds (i.e. non-native) without a permit and migratory birds, their eggs and nests must be protected, and they cannot be taken, sold or acquired without a permit. • State Requirements: States have their own lists of threatened or endangered species in addition to the Federal list. States also often regulate hunting and fishing and may regulate erosion control through the NPDES stormwater permitting system or they may have separate ordinances addressing the issue. <p><u>Stormwater</u></p> <ul style="list-style-type: none"> • Federal Requirements: Under the Clean Water Act, all storm water discharges associated with industrial and construction activities that discharge to Municipal Separate Storm Sewer Systems (MS4s), or directly into waters of the United States are required to obtain either individual NPDES storm water permit coverage, or coverage under the state or EPA's general permit. Federal facilities that often require storm water permit coverage are those that perform industrial activities, have vehicle fleets, and frequently undergo building construction. • State Requirements: Most states are authorized to implement the NPDES Storm Water permit program, however, some states may have requirements that are more stringent than the federal requirements.
<p>Objectives, Targets, and Programs Setting objectives and targets for the identified significant environmental aspects is a key facet in the development of an EMS. Through the achievement of these objectives and targets an organization addresses its significant aspects, including compliance, mission, and environmental risks. Separate programs may be appropriate in the EMS for addressing green landscaping or they may be a part of more comprehensive programs designed to address aspects and impacts whose scope is wider e.g. water and energy use.</p>	<p>Examples Examples of Objectives and Targets</p> <p><i>Water and Energy Use</i> <u>Objective:</u> Reduce fuel use and emissions from facility operations. <u>Target:</u> Reduce fuel use by 50% from 2004 baseline by 2010. <u>Objective:</u> Reduce water use <u>Target:</u> Reduce water use by 20% on 1992 baseline.</p> <p><i>Point Source and Fugitive Air Emissions</i> <u>Objective:</u> Reduce emissions from gasoline and diesel equipment</p>

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	<p><u>Target:</u> Reduce equipment emissions by 15% by May 2008.</p> <p><i>Storm Water Discharge</i> <u>Objective:</u> Improve storm water discharge quality <u>Target:</u> Investigate application of natural landscaping for facility grounds by January 2008. <u>Target:</u> Investigate effectiveness of additional best management practices by January 2007.</p> <p><i>Hazardous and Non-hazardous Wastes</i> <u>Objective:</u> Reduce waste and material use and increase recycling. <u>Target:</u> Investigate use of take-back tonnage and reduction of packaging waste from green landscaping practices. <u>Objective:</u> Use environmentally friendly products and practices in cleaning and maintenance operations. <u>Target:</u> Use 100% green products by 2010. <u>Objective:</u> Reduce hazardous waste generation. <u>Target:</u> Reduce hazardous waste by eliminating landscaping chemicals and drums.</p> <p><i>Other</i> <u>Objective:</u> Protect biota. <u>Target:</u> Continue to use an integrated pest management program to protect biota.</p> <p>Section III of this document provides detailed information on specific environmentally beneficial landscaping activities that can be used to develop related programs as a part of your EMS. These activities include:</p> <ul style="list-style-type: none"> ○ the use of native plants ○ construction practices that minimize the impact on natural habitats ○ chemical use reduction ○ waste reduction ○ water and energy efficient landscape practices ○ environmentally beneficial purchasing ○ outdoor demonstration projects.
<p>Resources, Roles, Responsibility and Authority Identify the key roles and responsibilities for the green landscaping component of your EMS. Specify resources available for meeting program objectives, targets, and programs. Ensure high level staff support for the greenscaping initiative and designate clear lines of authority.</p>	<p>Actions</p> <ul style="list-style-type: none"> • Include landscaping, procurement, contracting and environmental specialist personnel on the EMS Implementation Team. • Assign specific responsibility and resources to achieve each environmentally beneficial landscaping objective and target.
<p>Competence, Training and Awareness Identify green landscaping training needs based on significant aspects and legal and other requirements identified for green landscaping programs. Training at the</p>	<p>Action</p> <ul style="list-style-type: none"> • Train and encourage procurement and contracting staff and product users to request landscaping goods and services that reduce environmental impacts and meet performance standards.

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<p>operational control level will also be necessary for properly handling toxic materials, operating equipment, responding to accidents, spills and other emergencies.</p>	<p>Examples</p> <ul style="list-style-type: none"> • Identify training needs for staff that do landscaping activities, including: <ul style="list-style-type: none"> ○ Optimal equipment efficiency maintenance; ○ On-site waste reduction and recycling activities; ○ Integrated pest management ○ Green landscaping techniques (see Section III)
<p>Communication The Communication Procedure should include guidance on who is responsible for internal communication on legal and other requirements, and significant aspects including those related to green landscaping. Procedure should include guidance on how, how often and to whom information will be disseminated.</p>	<p>Action</p> <ul style="list-style-type: none"> • Consider including green landscaping results and benefits in external communications. <p>Example</p> <ul style="list-style-type: none"> • The Greenscapes Alliance provides outreach materials on the benefits of greenscaping that can be used to communicate the importance of greenscaping both internally and externally. This information can be found at: www.epa.gov/greescapes.
<p>Control of Documents Document control procedures must apply to all sustainable landscaping documentation, including Affirmative Procurement and EPP plans, specifications, purchase orders and contracts and lists of green products approved for purchase.</p>	<p>Actions</p> <ul style="list-style-type: none"> • Ensure effective management of procedures and other system documents. • Procedures and responsibilities for creation and modification of purchasing and equipment management documents related to landscaping may be applicable.
<p>Operational Control Operational control refers to procedures that help an organization implements its environmental policy, objectives, and targets. All significant aspects related to landscaping should be addressed by operational controls. Operational control procedures should ensure that the management and purchase of products and services support the environmental policy, legal and other requirements and green purchasing and equipment management objectives and targets.</p>	<p>Actions</p> <ul style="list-style-type: none"> • Identify, plan and manage operations and activities in line with policy, objectives and targets. • Develop and implement control procedures to ensure that product users, maintenance workers, and the procurement and contracting personnel include an evaluation of environmental considerations, along with price, performance and availability, in the criteria for purchasing decisions and the selection of services with regard to environmentally beneficial landscaping efforts. • Green contract language for more than 600 products and services is available at http://www.epa.gov/epp/database.htm <p>Examples</p> <ul style="list-style-type: none"> • Written procedures should be developed that guide on-site project managers and contractors to ensure that practices which minimize impacts to the natural habitat are followed across landscaping and construction activities. For example: <ul style="list-style-type: none"> ○ Mitigation of soil erosion ○ Proper disposal of construction debris ○ Creating a integrated pest management plan ○ Using regionally native plants for landscaping ○ Reduce waste through the composing of

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	<ul style="list-style-type: none"> ○ biodegradable materials ○ Purchase of durable products over those that require frequent replacement (i.e. the purchase of perennials instead of annuals) ○ Focus on water and energy efficient practices such as drip irrigation and xeriscaping ○ Purchase of environmentally beneficial products such as those with recycled content and bio-based cleaning products.
<p>Monitoring and Measurement An organization should measure and monitor its environmental performance against its objectives and targets. A conforming procedure will document the landscaping related data to collect and how to manage the data related to significant environmental aspects and environmentally beneficial landscaping activities. The development of baseline data and goals can serve as records for a facilities EMS. Monitoring can help staff with responsibility for landscaping activities identify and evaluate the root causes of problems and implement appropriate corrective actions.</p>	<p>Action</p> <ul style="list-style-type: none"> • Monitor key activities and track performance. Meaningful performance indicators should be developed. Refer to RCRA Section 6002 and EO 13102 on progress in solid waste prevention, composting and recycling for performance indicators. <p>Example</p> <ul style="list-style-type: none"> • When possible, measurements should quantify positive environmental impacts as well as progress toward meeting established environmentally beneficial landscaping objectives and targets. For example, measure reductions in waste materials sent to the landfill as a result of composting organic waste.
<p>Evaluation of Compliance Establish and maintain procedures for periodically evaluating compliance with applicable landscaping requirements and other environmental requirements to which the organization subscribes.</p>	<p>Action</p> <ul style="list-style-type: none"> • Conduct periodic assessments of compliance with legal requirements.
<p>Nonconformity, Corrective and Preventive Actions Designate responsibility for investigating and correcting findings of nonconformance with the EMS requirements, in accordance with facility corrective action procedures.</p>	<p>Action</p> <ul style="list-style-type: none"> • Identify and correct problems and prevent their recurrence. <p>Example</p> <ul style="list-style-type: none"> • EMS procedures should include the designation of responsibility for investigating and correcting non-conformance with established environmentally beneficial landscaping practices.
<p>Records Identify relevant records, such as training, purchases of specific products, amount of toxic chemicals removed from waste stream, donation or disposal, reports to management and government agencies and audits. Maintain these environmental records in accordance with facility EMS procedures.</p>	<p>Action</p> <ul style="list-style-type: none"> • Maintain and manage records of EMS performance. <p>Example</p> <ul style="list-style-type: none"> • EMS records should capture environmentally beneficial landscaping activities.
<p>Management Review Periodically review your EMS with an eye to continual improvement. Ensure that the management review considers</p>	<p>Action</p> <ul style="list-style-type: none"> • Ensure that progress toward achieving environmentally beneficial landscaping objectives and targets and any related operational controls are discussed as part of the

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recommendations to improve environmentally beneficial landscaping efforts.	<p>EMS Management Review.</p> <p>Example</p> <ul style="list-style-type: none"> The EMS Management Review can be used to highlight environmentally beneficial landscaping achievements and show progress toward commitments.

III. SPECIFIC ENVIRONMENTALLY BENEFICIAL LANDSCAPING INITIATIVES

A variety of specific greenscaping initiatives can be undertaken with an EMS. Both Greenscapes, which promotes the four basic principles of Reduce, Reuse, Recycle, and Rebuy and the guidelines laid out by the 1994 Presidential Executive Memorandum on Landscaping Practices promote the same fundamental environmentally beneficial landscaping practices. These two resources offer a wide range of examples of potential objectives, targets and programs for a greenscaping component of a Federal EMS, the highlights of which are identified below.

Use of Regionally Native Plants for Landscaping

The 1994 Memorandum requires that Federal agencies incorporate regionally native plants in site design and implementation where cost-effective and to the maximum extent practicable. With regard to the use of regionally native plants, Federal agencies are expected to strive to avoid or minimize adverse impacts of proposed actions or projects on existing communities of native plants and ensure that the appropriate site and soil analyses are performed during pre-design stages of the project to aid in the proper plant selection and to ensure success of the plantings. The 1994 Memorandum also requires that site design and implementation as well as plant selection incorporate such considerations as their biological needs, minimal plant care, low water use, and minimal need for fertilizers and pesticides. By incorporating native plants into the landscape a wider variety of birds, insects, and mammals are attracted.

Design, Use, or Promote Construction Practices That Minimize Adverse Impacts on the Natural Habitat

The 1994 Memorandum requires that Federal agencies avoid or minimize adverse impacts to natural habitat. This requirement includes the avoidance of sites which are relatively undisturbed during preliminary site selection and when such areas cannot be avoided employing construction practices and procedures that minimize adverse impacts to natural habitat and incorporate existing vegetation and associated natural habitat into the project.

It is further required that project plans and specifications include explicit direction regarding construction practices to meet the goals of this guidance. On-site project managers and contractors are expected to ensure that practices which minimize impacts to natural habitat are followed during project construction. Such practices may include site management to control soil erosion and non-point source run-off and proper disposal of construction material and debris. Where practicable, personnel responsible for on-site construction practices, including contractors and construction inspectors, should be knowledgeable about natural habitat resources.

Chemical Use Reduction

The 1994 Memorandum requires that Federal agencies use chemical management practices that reduce or eliminate pollution associated with the use of chemical fertilizers and pesticides. Wherever practicable, Federal agencies are to employ practices which avoid or minimize the need for using fertilizers and pesticides. These practices include, but are not limited to, selection of plant materials that limit growth of "weed" species, use of integrated pest management (IPM) techniques and practices, use of chemical pesticides which biodegrade, and use of slow release fertilizers.

IPM reduces the environmental and health risks from pesticides and, in some cases, the amount of pesticides needed. IPM is based on a combination of techniques, such as biological control, habitat manipulation, and modification of cultural practices. It often includes steps that can be taken before a pest problem is encountered. For example, the use of native plants, which are more resistant to pests and disease, leads to a diminished need for fertilizers and pesticides. Long-lived, hardy vegetation can lower labor costs and reduce spending on maintenance supplies as well.

Waste Reduction

Under the 1994 Memorandum, Federal agencies are required to recycle and/or compost leaves, grass clippings, and landscape trimmings for further use as both soil amendments and mulches. Woody debris such as tree trunks, stumps, limbs, etc., should also be recycled as appropriate. On-site composting of green wastes is an activity highly recommended by Greenscapes. Compost contributes vital organic matter, nutrients, and disease-suppressing properties to the soil, reducing the need for chemical fertilizers or pesticides. Compost can be used to improve or reclaim damaged or nutrient-poor soil and prevent erosion. Plus, adding compost to planting beds helps improve water absorption and retention and further reduces watering requirements.

Greenscapes recommends that when planning a new landscape design or updating a current one, products that require frequent replacement (such as annual plants) or regular maintenance to reduce future waste should be avoided. Durable products will long outlast those of lesser quality, reducing future waste generation and the need to purchase new or replacement products. It is recommended that the use of annuals be avoided and that regionally native perennial plants be used in their stead. The use of annuals creates a great deal of waste during every re-planting cycle. Additionally, they require additional use of fertilizers and water, and the constant delivery of new plants leads to unnecessary emissions and fuel use associated with their transport. If annuals must be planted, compost them once they are no longer being used. Native plants are also more pest resistant and healthier, thus requiring less fertilizers and pesticides. Long-lived, hardier vegetation can save money by lowering labor costs and money spent on maintenance supplies.

Although on-site composting of organic materials is a waste reduction activity, offsite composting is considered recycling by the EPA. If there is not adequate space for on-site composting, then GreenScapes encourages sending compostable wastes to a municipal or private composting site. To further reduce disposal costs, it is important to collect and recycle materials from operations and equipment (e.g., wood waste, yard trimmings, plastics, glass, metals, used oil, and used tires). To encourage recycling, recycling receptacles should be placed next to trash receptacles.

Implement Water and Energy Efficient Landscape Practices

Under the 1994 Memorandum, Federal agencies are required to use landscape management practices, including plant selection and placement, which control and minimize soil erosion, runoff of chemicals, and pollution of groundwater. Federal agencies are also expected to consider energy and

water conservation benefits in the siting and selection of plants - for example, the use of water-efficient landscape design and management practices. These practices (such as Xeriscape) include planning and designing landscaping projects with consideration to: watering requirements, existing vegetation, topography, climate, intended use of the property and water-use zones. Plants that are drought-resistant and indigenous to a region's soil and climate conditions can survive and thrive, generally with less care or water. WaterSense, a voluntary public-private partnership program sponsored by the EPA, can help facilities identify water-efficient products that perform well, save money, and encourage innovation in manufacturing (see www.epa.gov/watersense).

In addition, facility managers should conduct soil analyses and, as appropriate, amend the soil at the project site to improve its ability to support plants and retain water. Initial site design as well as the addition of plants in established areas should seek to establish water-use zones and promote efficient irrigation practices. Where irrigation systems have been installed, irrigation scheduling should be adjusted seasonally to the evapotranspiration rate (ET) for the plants in that particular climate and irrigation systems may be shut down during months with more rainfall. Irrigation with recycled or reclaimed water, where practicable, serves as a preferred alternative to the use of potable water. Drip irrigation and pressure reducers can also be used on irrigation systems to lower water volume, and adding composted materials to soil helps to retain moisture. Managers should also monitor water leaving the grounds since runoff can cause problems downstream, such as chemical pollution, and negatively impact the surrounding community.

When dealing with erosion control and reduction of nonpoint source pollution at new construction or redevelopment projects (e.g., storm water runoff), the use of plastic silt fencing should be reduced or eliminated and substituted with blankets, berms, and filter socks made of compost. Compost provides superior filtration and erosion prevention/control, is more easily installed and maintained, and does not require energy-intensive removal or disposal from the site after the job is completed.

Environmentally Beneficial Purchasing

EPA uses the term "rebuying" to refer to rethinking current purchasing habits by looking for products made with recycled content, biobased content, or other environmentally preferable attributes. Purchasing products made of recycled content helps "close the recycling loop" by reintroducing materials collected through recycling programs back into productive use. One such example is compost. GreenScapes strongly encourages the use of compost for erosion control, site remediation, soil and plant health, on roadsides, brownfields, and golf courses, etc. The program also encourages the use of other products made from recovered resources such as plastic lumber. Another option is rubberized asphalt (made from scrap tires) for parking lots and walking, running, bike, or cart paths. Rubberized asphalt surfaces last longer than traditional asphalt and require less maintenance. Other green purchasing opportunities include using biobased products, such as organic or biobased fertilizers and pesticides, biobased cleaners or solvents, and biobased fuels and lubricants for equipment operations and maintenance instead of petroleum products.

Reevaluating purchases associated with landscaping activities can be financially beneficial. Switching from disposable products to long-lasting or reusable ones enables organizations to purchase fewer items. Buying durable goods might be more expensive at the time of purchase, but during the landscape's lifetime, maintenance and purchasing costs will decrease.

Create Outdoor Demonstration Projects

Under the 1994 Memorandum, Federal agencies are expected to create and maintain outdoor demonstration projects exhibiting and promoting the benefits of economically and environmentally sound landscaping practices. Exhibits can include small scale projects, such as interpretive or wildlife gardens, that focus on environmentally sound landscape management practices, site design, and development appropriate for residential, commercial, and institutional application. Additionally, demonstration projects can highlight larger projects, such as wetland or grassland restoration or woodland rehabilitation, that are more likely implemented by groups or state and local governments. There is a strong relationship between landscaping, wildlife and biodiversity. A demonstration project is an excellent opportunity to provide information on and illustrate this relationship through the selection of plants that support birds, beneficial insects and other wildlife. To best support a healthy ecosystem, Federal agencies should select a wide range of plant types and species to support diversity.