MEMORANDUM

TO: **Mayor and City Council**

FROM: **Lee Ledesma, Utilities Finance and Administrative Services Manager**

THRU: **David Hornbacher, Director of Utilities and Environmental Health & Sustainability**
Scott Miller, Public Works Director

DATE OF MEMO: **May 12, 2017**

MEETING DATE: **May 22, 2017**

RE: **Ordinance 16, Series 2017 – Public Hearing – Water Efficient Landscape Ordinance --**

REQUEST OF COUNCIL: Staff requests approval of Ordinance 16 which would adopt the Water Efficient Landscaping Standards and apply to all City of Aspen water customers both within, and outside, city limits. The Water Efficient Landscaping Standards outline landscaping and exterior water use policies for property owners on new construction and significant remodel projects and promote efficiency within the City of Aspen's water service area.

Staff is also requesting approval of a minimum 12-month pilot program outlined within the Water Efficient Landscaping Standards with the intent to check in with Council prior to full implementation of these Standards.

PREVIOUS COUNCIL ACTION: On May 8th, Council approved First Reading of Ordinance 16, Series 2017 to adopt the Water Efficient Landscape Ordinance. Prior to First Reading, a worksession was held on April 18, 2017 wherein the specific aspects of the Water Efficient Landscaping Standards were reviewed and discussed.

Based on feedback obtained after the April 18th worksession presentation, the following modifications to the Standards have been made:

- Appendix B from draft entitled "Recommended Plant List" has been removed and replaced with GreenCo Plant List, which is more extensive and an industry standard.
- Appendix C is now the Colorado State University Extension FireWise Plant List, providing FireWise plants that will be required in moderate and high risk zones with the Aspen Water service area.
- Appendix D is now Wildfire Hazard Zones Maps—previously Appendix C.
- Maximum Applied Water Budget has been set at 7.5 gallons per sq. ft. per season. Note: Compliance with the water budget will not be required during Pilot Phase and may be modified at full implementation based on data gathered during the pilot.

- Added reference to graywater programs being evaluated during the Pilot Phase.
- Clarified city has the right to operate irrigation master shutoff valve when the city has declared a water shortage or when more than 50% of the account usage occurs in water rate tier 4.

On September 28, 2015 City Council adopted the Roaring Fork Watershed Regional Water Efficiency Plan and the City of Aspen Municipal Water Efficiency Plan. In those plans, Aspen identified landscape regulations as an important next step for water efficiency.

The City of Aspen received a grant from the Colorado Water Conservation Board (CWCB) in the amount of $42,515 in the spring of 2016 and Council approved the acceptance of the State grant and the creation of a new capital project for the water efficient landscape regulation project on July 11, 2016.

BACKGROUND: Conservation is an important component of Aspen's Integrated Water Supply System and effective conservation practices enable the City to manage our water supplies more efficiently. The City of Aspen has been promoting water efficiency since the mid-1990s. The City approved its first water conservation plan in 1996. Aspen's water utility currently has limited storage and the water supply is most vulnerable from the late summer into fall when vegetation is thirsty and resulting landscape irrigation demands are still high while stream flow from melted snow pack is diminishing. This water conservation/efficiency program is focused on efficient outside water use, which helps mitigate this vulnerability.

As identified in both the Regional and Municipal Water Efficiency Plans, Aspen is interested in developing water efficient landscaping standards (Landscape Ordinance) that will promote water conservation, prevent water waste, and protect water quality. Managing outdoor landscaping demands through land use regulations for new development is being considered throughout Colorado and would provide the City of Aspen with an opportunity to reduce some of the impact from future demands.

DISCUSSION:

Objectives: The water efficient landscaping standards and ordinance address landscaping material and irrigation design and practices. Specifically: climate appropriate/water-efficient vegetation and, where designated, use of firewise plant material; soil preparation and amendments; water budgets; recirculating water features and efficiency measures; landscape design plans; proper irrigation system design; correct installation of irrigation system and plantings, water efficient irrigation controllers and shut-off devices; water efficient emission technology; backflow prevention; master shut-off valves for irrigation systems; dedicated landscape meters for large systems; hydrozone requirements; stormwater management; landscape irrigation audit and approval letter; irrigation system maintenance schedule; irrigation scheduling; irrigation management; and efficient irrigation practices. Overall, these standards establish a structure for planning, designing, installing, maintaining and managing water efficient landscapes in new construction and renovated/rehabilitated projects within the Aspen water service area.

Goals:

• Promote the values and benefits of healthy landscapes while recognizing the need to invest in efficiency.
• Establish a structure for planning, designing, installing, maintaining and managing water-efficient landscapes in new construction and renovation/rehabilitation projects.
• Require better designed, more efficient, effective irrigation systems, and precise delivery of water to the landscape, reducing water needed to maintain a healthy landscape.
• Use water efficiently without waste by setting an upper limit water budget and a low use goal.

Applicability:
The standards will apply to the following projects that use City of Aspen potable water:

- Landscaping, grading, installing or disturbing hardscapes, or making additions to structures, etc. that have a disturbance area greater than 1,000 square feet and greater than 25% of the entire site.
- All new construction with internal work only that demolishes more than 50% of the existing structure.

Process:
While the Water Efficiency Plan is being managed by the Utilities department, the creation and implementation of a landscaping regulation required coordination and time commitments from Parks, Engineering, Building, Community Development, Attorneys, Council Member Ann Mullins, Pitkin County, and Colorado Parks and Wildlife. The process took more than 10 months with over a dozen stakeholder meetings and significant input from private industry involved in landscape design, landscape installation and landscape maintenance.

Recommended Pilot Phase:
A minimum 12-month pilot phase is recommended. During this pilot phase the standards, including documentation, plan submittals and installation of plantings and irrigation infrastructure are required. A "Maximum Applied Water Budget," as calculated in the Water Efficient Landscape Worksheet (see Appendix A of the Water Efficient Landscaping Standards), as well as issues that may arise during a post-installation site audit, will be part of the review but not part of compliance. Staff is currently recommending a maximum applied water budget of 7.5 gallons per square foot per irrigation season. The pilot phase will assist staff in making a final recommendation to Council at the end of the program on a maximum applied water budget. The pilot program will also advise staff on how processes and standards may need to be adjusted at the end of this phase and prior to full implementation.

Benefits:
If a maximum water budget of 7.5 gallons/sq.ft./season is utilized after the end of the pilot phase, the Landscape Ordinance is estimated to reduce irrigation water demand by 14 % as compared to new plan submittals sampled in the past year. And, when compared to typical existing homes, there is a potential landscape water use savings of up 60% when these properties refresh their landscaping and irrigation systems. Using a water budget of 7.5 gallons/sq. ft./irrigation season (14% savings) would put the City on target to achieve the 2015 Water Efficiency Plan projection of a 50 acre feet per year of water savings by 2035.

FINANCIAL IMPACTS: Based on discussions with Engineering and Parks the Ordinance will trigger compliance of approximately 200 permits, with an estimate review time of 7.5 hours per plan. The cost of the one year pilot program, starting in 2017 and ending in 2018, is $59,870. The funding requested is for the labor costs to review the landscaping and irrigation plans, as well as site visits. During pilot phase, Utilities will use revenue from current Development Review fees to fund this request. If approved, the 2017 prorated cost is $38,205. The remaining balance of the program cost of $21,665 will be include as part of the 2018 budget.

RECOMMENDED ACTION: Staff recommends adoption of Ordinance 16, Series 2017, which adds Section 25.30 to the City of Aspen Municipal Code.

ALTERNATIVES: City Council could choose to not proceed with adoption of Ordinance 16 or request modifications to the Water Efficient Landscaping Standards prior to adoption by ordinance.

CITY MANAGER COMMENTS:

ATTACHMENTS:
Exhibit A – Ordinance #16, Series 2017
Exhibit B – Water Efficient Landscaping Standards
Exhibit C – March 1, 2017 Letter of Support from Colorado Water Conservation Board

ORDINANCE NO. 16

Series 2017

AN ORDINANCE OF THE CITY COUNCIL OF THE CITY OF ASPEN, COLORADO, AMENDING TITLE 25 OF THE MUNICIPAL CODE OF THE CITY OF ASPEN--UTILITIES[1,2,3]— TO ADD A NEW CHAPTER 25.30 ENTITLED: WATER EFFICIENT LANDSCAPING STANDARDS.

WHEREAS, the City owns and operates a public water system; and

WHEREAS, implementation of water efficient landscaping standards will fulfill certain recommendations identified in the City of Aspen's Municipal Water Efficiency Plan, the Roaring Fork Regional Efficiency Plan, and the Roaring Fork Watershed Plan; and

WHEREAS, water conservation and efficiency has been identified as an important component of Aspen's Integrated Water Supply System; and

WHEREAS, the Water Efficient Landscaping Standards provide policies, guidelines, and minimum landscaping design, installation, maintenance, and management criteria to governmental agencies, design professionals, private developers, community groups, and homeowners for new development and significant remodels; and

WHEREAS, these standards promote efficient development and use of water within the City of Aspen's water service area; and,

WHEREAS, the City Council finds that this ordinance furthers and is necessary for the promotion of the public health, safety, and welfare.

NOW THEREFORE, BE IT ORDAINED BY THE COUNCIL OF THE CITY OF ASPEN, COLORADO:

Section 1.

That Title 25 of the Municipal Code of the City of Aspen, Colorado, is hereby amended by the addition of a new chapter 25.30, which chapter shall read as follows:

CHAPTER 25.30

WATER EFFICIENT LANDSCAPING STANDARDS

Sec. 25.30.010. Purpose.

(a) Promote the values and benefits of healthy landscapes while recognizing the need to invest water and other resources as efficiently as possible.

(b) Establish a structure for planning, designing, installing, maintaining and managing water-efficient landscapes in new construction and renovated/rehabilitated projects.

(c) Use water efficiently without waste by setting a Maximum Applied Water Budget as an upper limit for water use and reduce water use to the lowest practical amount.

Sec. 25.30.020. Adoption of City of City of Aspen Water Efficient Landscaping Standards

Pursuant to the powers and authority conferred by the laws of the State of Colorado and the Charter of the City of Aspen, there is hereby adopted and incorporated herein by reference as if fully set forth the City of Aspen Water Efficient Landscaping Standards as may be amended from time to time by City Council Resolution. At least one (1) copy of the City of Aspen Water Efficient Landscaping Standards shall be available for inspection at the City of Aspen Utilities Department, the City of Aspen Parks department, and City of Aspen Community Development Department.

Sec. 25.30.0030. Applicability.

(a) After June 22, 2017, the City of Aspen Water Efficient Landscaping standards shall apply to the following projects that use City of Aspen potable water:

(i) Landscaping, grading, installing or disturbing hardscapes, additions to structures, etc. that has a disturbance area greater than 1,000 square feet and greater than 25% of the entire site.

(ii) All new construction with internal work only that demolishes greater than 50% of the existing structure.

Sec. 25.30.040. Review Authority.

Utilities Director, or designee, is authorized to make and enforce the rules and regulations contained in the Water Efficient Landscaping Standards in order to carry out the intent of the standards and this Chapter.

Where no specific or applicable rules, regulations, or standards appear to be set forth in the Water Efficient Landscaping Standards, other rules, regulations, or standards, and recommended practices, as published by professional associations, technical organizations, model code groups, and similar entities, may be used by the City for guidance.

Sec. 25.30.050. Review Procedure.

A. Review Process. The Utilities Director shall have the authority on behalf of the City of Aspen to determine that all design and construction is completed to a level that is equal to or exceeds the requirements set forth in this Chapter and the Water Efficient Landscaping Standards.

Sec. 25.30.060. Variances.

(a) The City may grant variances to the Water Efficient Landscaping Standards when practical difficulties or unnecessary hardships exist that cause inconsistencies with the purpose and intent of the standards.

(b) Requests for variances from the standards, policies, or submittal requirements of this document shall be submitted in writing with appropriate documentation and justification to the City Utilities Director. Variance requests must, at a minimum, contain the following:

(i) Criteria under which the applicant seeks a variance;

(ii) Justification for not complying with the standards;

(iii) Proposed alternate criteria or standards to comply with the intent of the criteria;

(iv) Supporting documentation, including necessary calculations;

(v) The proposed variance's potential adverse impacts for adjacent landowners; and,

(vi) An analysis of the variance request, signed by a qualified landscape professional or qualified irrigation design professional, depending on the topic of the request.

(c) Upon receipt of a complete application for a variance, the City Utilities Director shall prepare a statement to recommend that the variance be approved or denied or to request a modification of the proposed variance.

Sec. 25.30.070. Existing Compliance.

(a) The City may grant a determination of compliance for existing projects meeting the minimum standards.

(b) Requests for determination of compliance shall be submitted in writing with appropriate documentation and justification to the City Utilities Director. Requests for determination of existing compliance must, at a minimum, contain the following:

(i) Landscape and Irrigation Documentation Package; and

(ii) Irrigation audit report performed by a third party certified landscape irrigation auditor.

(c) Upon receipt of a complete application for a determination of existing compliance, the City Utilities Director shall prepare a statement to recommend that the determination be approved or denied or to request a modification of the proposed determination.

Sec. 25.30.080. Appeals.

(a) Initiation. An applicant aggrieved by an order, requirement, decision, or determination of the City Utilities Director may be appealed to the Administrative Hearing Officer, pursuant to the procedures set out in Chapter 26.108 of this Code except to the extent set forth herein . The notice of appeal shall be filed with the City Utilities Director within fifteen (15) days following the date of such order, requirement, decision, or determination. The notice of appeal shall state in detail the action appealed, the grounds for the appeal, and the relief sought. Failure to file such a notice of appeal within the prescribed time shall constitute a waiver of any rights under this section to appeal any order, requirement, decision, or determination.

(b) Effect of Filing an Appeal. The filing of a notice of appeal shall stay any proceedings in furtherance of the action appealed from unless the City Utilities Director certifies in writing to the Administrative Hearing Officer that a stay poses an imminent peril to life or property, in which case the appeal shall not stay further proceedings. The Administrative Hearing Officer may review such certification and grant or deny a stay of proceedings.

(c) Timing of Appeal. The Administrative Hearing Officer shall consider the appeal within thirty (30) days following the date of filing the notice of appeal, or as soon thereafter as is practical under the circumstances.

(d) Action by Administrative Hearing Officer. The Administrative Hearing Officer shall review the record of the action taken by the City Utilities Director, and provide a decision to the Applicant in writing. The Administrative Hearing Officer may reverse or affirm wholly or partly the order, requirement, decision or determination appealed from and shall enter such order, as they deem appropriate under the circumstance.

Section 2.

Any and all existing ordinances or parts of ordinances of the City of Aspen covering the same matters as embraced in this Ordinance are hereby repealed and all ordinances or parts of ordinances inconsistent with the provisions of this ordinance are hereby repealed; provided, however, that such repeal shall not affect or prevent the prosecution or punishment of any person for any act done or committed in violation of any ordinance hereby repealed prior to the taking effect of this Ordinance.

Section 3.

If any section, subsection, sentence, clause or phrase of this Ordinance is, for any reason, held to be invalid or unconstitutional, such decision shall not affect the validity or constitutionality of the remaining portions of this Ordinance. The City of Aspen hereby declares that it would have adopted this Ordinance, and each section, subsection, clause or phrase thereof, irrespective of the fact that any one or more sections, subsections, sentences, clauses and phrases thereof be declared invalid or unconstitutional.

Section 4.

This Ordinance shall take effect thirty (30) days after passage, adoption and publication thereof as provided by law.

Section 5.

This ordinance shall not affect any existing litigation and shall not operate as an abatement of any action or proceeding now pending under or by virtue of the ordinance repealed or amended as herein provided, and the same shall be conducted and concluded under such prior ordinances.

FIRST READING OF THIS ORDINANCE WAS INTRODUCED, READ, ORDERED AND PUBLISHED as provided by law, by the City Council of the City of Aspen on the 8th day of May 2017.

Attest:

Linda Manning, City Clerk

Steven Skadron, Mayor

FINALLY, adopted, passed and approved this 22nd day of May, 2017.

Attest:

Linda Manning, City Clerk	Steven Skadron, Mayor

Approved as to form:

James R. True, City Attorney

WATER EFFICIENT LANDSCAPING STANDARDS

The Water Efficient Landscaping Standards provide policies, guidelines, and minimum criteria to governmental agencies, design professionals, private developers, community groups, and homeowners for all new development. These standards promote efficient development and use of water within the City of Aspen's water service area.

CITY OF ASPEN
WATER

FOR DISCUSSION PURPOSES ONLY

April 28, 2017

Contents

1. OBJECTIVE AND PURPOSE

1.1 Objective

The *Water Efficient Landscaping Standards* provide policies, guidelines, and minimum landscaping design, installation, maintenance, and management criteria to governmental agencies, design professionals, private developers, community groups, and homeowners for new development and significant remodels. These standards promote efficient development and use of water within the City of Aspen's water service area. Implementation of these standards fulfills certain recommendations identified in the City of Aspen's Municipal Water Efficiency Plan (updated in 2015), the Roaring Fork Regional Water Efficiency Plan (2015), and the Roaring Fork Watershed Plan (2012).

1.2 Purpose

1.2.1 Promote the values and benefits of healthy landscapes while recognizing the need to invest water and other resources as efficiently as possible.

1.2.2 Establish a structure for planning, designing, installing, maintaining and managing water-efficient landscapes in new construction and renovated/rehabilitated projects.

1.2.3 Use water efficiently without waste by setting a Maximum Applied Water Budget as an upper limit for water use and reduce water use to the lowest practical amount.

2. APPLICABILITY AND GENERAL PROVISIONS

2.1 Applicability

30 days after adoption of Ordinance 16, Series 2017, these standards shall apply to the following projects that use City of Aspen potable water:

2.1.1 Landscaping, grading, installing or disturbing hardscapes, additions to structures, etc. that has a disturbance area greater than 1,000 square feet and greater than 25% of the entire site.

2.1.2 All new construction with internal work only that demolishes greater than 50% of the existing structure.

2.2 Exceptions

The standards do not apply to:

2.2.1 Projects that do not have water supplied or conveyed by the City of Aspen.

2.2.2 There may be special circumstances, including but not limited to the following, in which portions of the standards shall not apply. In these circumstances, applicants shall follow the variance process described in Section 2.4 below.

a. Irrigation of public parks, sports fields, golf courses, and schools.

b. Landscapes where tree preservation is required under the local tree ordinance.

c. Landscapes including public right-of-way.

d. Registered local, state or federal historical sites.

e. Ecological restoration projects that do not require a permanent irrigation system.

f. Mined-land reclamation projects that do not require a permanent irrigation system.

g. Stormwater treatment facilities that require irrigation.

h. Wildfire mitigation areas planned to establish defensible space.

2.3 Pilot Phase

A 12-month pilot phase will begin 30 days after adoption of Ordinance 16, Series 2017, During the pilot phase, all of the standards and documentation described in this document will be required but the City will not deny a project a Certificate of Occupancy for failure to meet the Maximum Applied Water Budget standard or based on results of the post-installation site audit report. The City encourages efforts be made, to the extent possible, to meet the Maximum Applied Water Budget standard during the pilot phase. Enforcement of these standards will begin a minimum of one year after adoption of Ordinance 16, Series 2017, including inspections, audits, and certifications. During the pilot phase, the City is also considering programs associated with utilizing graywater as it relates to the standards.

2.4 Variances and Existing Compliance

2.4.1 Variances

The City may grant variances to the Water Efficient Landscaping Standards when practical difficulties or unnecessary hardships exist that cause inconsistencies with the purpose and intent of the standards.

Requests for variances from the standards, policies, or submittal requirements of this document shall be submitted in writing with appropriate documentation and justification to the City Utilities Director. Variance requests must, at a minimum, contain the following:

- Criteria under which the applicant seeks a variance;
- Justification for not complying with the standards;
- Proposed alternate criteria or standards to comply with the intent of the criteria;
- Supporting documentation, including necessary calculations;
- The proposed variance's potential adverse impacts for adjacent landowners; and
- An analysis of the variance request, signed by a qualified landscape professional or qualified irrigation design professional, depending on the topic of the request.

Upon receipt of a complete application for a variance, the City Utilities Director shall prepare a statement to recommend that the variance be approved or denied or to request a modification of the proposed variance.

2.4.2 Existing Compliance

The City may grant a determination of compliance for existing projects meeting the minimum standards.

Requests for determination of compliance shall be submitted in writing with appropriate documentation and justification to the City Utilities Director. Requests for determination of existing compliance must, at a minimum, contain the following:

- Landscape and Irrigation Documentation Package; and
- Irrigation audit report performed by a third party certified landscape irrigation auditor.

Upon receipt of a complete application for a determination of existing compliance, the City Utilities Director shall prepare a statement to recommend that the determination be approved or denied or to request a modification of the proposed determination.

2.5 Appeals

2.5.1 Initiation

An applicant aggrieved by an order, requirement, decision, or determination of the City Utilities Director may be appealed to the Administrative Hearing Officer. The notice of appeal shall be filed with the City Utilities Director within fifteen (15) days following the date of such order, requirement, decision, or determination. The notice of appeal shall state in detail the action appealed, the grounds for the appeal, and the relief sought. Failure to file such a notice of appeal within the prescribed time shall constitute a waiver of any rights under this section to appeal any order, requirement, decision, or determination.

2.5.2 Effect of Filing an Appeal

The filing of a notice of appeal shall stay any proceedings in furtherance of the action appealed from unless the City Utilities Director certifies in writing to the Administrative Hearing Officer that a stay poses an imminent peril to life or property, in which case the appeal shall not stay further proceedings. The Administrative Hearing Officer may review such certification and grant or deny a stay of proceedings.

2.5.3 Timing of Appeal

The Administrative Hearing Officer shall consider the appeal within thirty (30) days following the date of filing the notice of appeal, or as soon thereafter as is practical under the circumstances.

2.5.4 Action by Administrative Hearing Officer

The Administrative Hearing Officer shall review the record of the action taken by the City Utilities Director, and provide a decision to the Applicant in writing. The Administrative Hearing Officer may reverse or affirm wholly or partly the order, requirement, decision or determination appealed from and shall enter such order, as they deem appropriate under the circumstance.

3. DEFINITIONS

Application rate: the depth of water applied to a given area, usually expressed in inches per hour.

Applied water: the portion of water supplied by the irrigation system to the landscape (supplemental to precipitation).

Approval Letter: the document showing the project has been installed and inspected per the approved irrigation design plan.

Automatic controller: a mechanical or solid state timer, capable of operating landscape irrigation stations and setting the schedule (days and length of time) for water application.

Backflow prevention device: a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water from the irrigation system.

Check valve or anti-drain valve: a valve located under, or incorporated within, a sprinkler head or other location within the irrigation system, to hold water in the system so it minimizes drainage from the lower elevation sprinkler heads when the system is off.

Certified irrigation designer: a person certified to design irrigation systems by an accredited academic institution, Irrigation Association's Certified Irrigation Designer program, American Society of Irrigation Consultant's Professional Irrigation Consultant designation or other irrigation designer program labeled by U.S. Environmental Protection Agency's WaterSense program.

Certified landscape irrigation auditor: a person certified to perform landscape irrigation audits by an accredited academic institution, a professional trade organization or other program labeled by U.S. Environmental Protection Agency's WaterSense program.

Distribution uniformity: the measure of the uniformity of irrigation water over a defined area.

Disturbance area: disturbance is defined by the external area of the building where the ground is disturbed which includes but is not limited to soil grading, landscaping, removing impervious area, adding impervious area, replacing impervious area, layback areas, and stock pile areas.

Ecological restoration project: a project where the site is intentionally altered to establish a defined, indigenous, historic ecosystem.

Emission device: a component of the system that disperses water to the landscape and includes sprinklers, bubblers, emitters, microsprays, etc.

Established landscape: the point at which plants in the landscape have developed roots into the soil adjacent to the root ball. Typically, most plants are established after one or two years of growth.

Establishment period: the first year after installing the plant in the landscape or the first two years if irrigation will be terminated after establishment. Typically, most plants are established after one or two years of growth. Native habitat mitigation areas and trees may need three to five years for establishment.

Evapotranspiration: the quantity of water evaporated from adjacent soil and other surfaces and transpired by plants during a specified time. See below for “reference ET”.

Flow meter or sensor: an inline device installed at or near the supply point of the irrigation system that produces a repeatable signal proportional to flow rate. Flow meters must be connected to an irrigation controller, or monitor capable of receiving flow signals and operating master valves. This combination flow meter/controller may also function as a landscape water meter or sub meter.

Flow rate: the rate at which water flows through pipes and valves (gallons per minute or cubic feet per second).

Graywater: untreated wastewater that has not been contaminated by any toilet/urinal discharge, has not been affected by infectious, contaminated, or unhealthy bodily wastes, and does not present a threat from contamination by unhealthful processing, manufacturing, or operating wastes. "Graywater" includes, but is not limited to, wastewater from bathtubs, showers, bathroom washbasins, clothes washing machines, and laundry tubs, but does not include wastewater from kitchen sinks or dishwashers.

Hardscapes: a landscape feature that is made of any durable material (pervious and non-pervious).

Hydrozone: a portion of the landscaped area having plants with similar water needs that are served by a valve or set of valves with the same schedule. A hydrozone may be irrigated or non-irrigated. For example, a naturalized area planted with native vegetation that will not need supplemental irrigation once established is a non-irrigated hydrozone.

Infiltration rate: the rate of water entry into the soil expressed as a depth of water per unit of time (inches per hour).

Irrigation audit: an in-depth evaluation of the performance of an irrigation system conducted by a Certified Landscape Irrigation Auditor. An irrigation audit includes, but is not limited to: inspection, system tune-up, system test with distribution uniformity or emission uniformity, reporting overspray or runoff that causes overland flow, and preparation of an irrigation schedule. The audit shall be conducted in a manner consistent with the Irrigation Association’s Landscape Irrigation Auditor Certification program or other U.S. Environmental Protection Agency “WaterSense” labeled auditing program.

Irrigation efficiency: the measurement of the amount of water beneficially used divided by the amount of water applied. Irrigation efficiency is derived from measurements and estimates of irrigation system characteristics and management practices. Greater irrigation efficiency can be expected from well designed and maintained systems.

Irrigation Design Plan: the documents including the scaled drawing plan and any required forms showing calculations that are reviewed, approved and for which a permit could be issued.

Irrigation survey: an evaluation of an irrigation system that is less detailed than an irrigation audit. An irrigation survey includes, but is not limited to: inspection, system test, and written recommendations to improve performance of the irrigation system.

Irrigation water use analysis: a review of water use data based on meter readings and billing data.

Landscaped area: the entire parcel less the building footprint, driveways, non-irrigated portions of parking lots, hardscapes- such as decks and patios, and other non-porous areas. Water features are included in the calculation of the landscaped area. Areas dedicated to edible plants, such as orchards or vegetable gardens are not included.

Landscaping and/or landscape improvements: plantings of grass, shrubs, trees or similar living plants, with minimal use of other ground surface treatment such as decorative rock, bark, or stone. These inert materials are allowed to be used in conjunction with live material in planting beds, but do not count toward the calculations of required landscaping and/or landscaping improvements.

Landscape water meter: an inline device installed at the irrigation supply point that measures the volume of water into the irrigation system by using a flow totalizing device to record water use.

Lateral line: the water delivery pipeline that supplies water to the emitters or sprinklers from the valve.

Low flow irrigation or drip irrigation: the application of irrigation water at low pressure through a system of tubing or lateral lines and emitters such as point source emitters, dripper lines, microsprays and bubblers. Low flow irrigation systems apply small volumes of water slowly at or near the root zone of plants.

Main line: the pressurized pipeline that delivers water from the water source to the valve or outlet.

Master shut-off valve: a lockable automatic valve installed at the irrigation supply point which controls water flow into the irrigation system. When this valve is closed, water will not be supplied to the irrigation system.

Maximum Applied Water Budget: the upper limit of annual applied water (supplemental irrigation water) for the established landscaped area as specified in Appendix A. It is based upon the area's reference evapotranspiration and is adjusted for plant factors and irrigation efficiency, two major influences upon the amount of water that needs to be applied to the landscape.

Microclimate: the climate of a small, specific area that may contrast with the climate of the overall landscape area due to factors such as wind, sun exposure, plant density, or proximity to reflective surfaces.

Mulch: any organic material such as leaves, bark, straw, compost or inorganic mineral materials such as rocks, gravel, pebbles, or decomposed granite left loose and applied to the soil surface for the beneficial

purposes of reducing evaporation, suppressing weeds, moderating soil temperature, and preventing soil erosion.

New construction: for the purposes of these standards, a new building with a landscape or other new landscape, such as a park, playground, or greenbelt.

Non-residential landscape: landscapes in commercial, institutional, industrial and public settings that may have areas designated for recreation or public assembly. It also includes portions of common areas of common interest developments with designated recreational areas.

Operating pressure: the pressure at which the parts of an irrigation system are designed by the manufacturer to operate.

Overhead sprinkler irrigation systems: systems that deliver water through the air (pop-ups, rotors, etc.)

Overspray: the water that is delivered beyond the target area.

Permeable: any surface or material that allows the passage of water through the material and into the underlying soil.

Project applicant: the individual or entity submitting a plan to request a permit, plan check, or design review from the City. A project applicant may be the property owner or designee including the contractor.

Rain sensor or rain sensing shut-off device: a component which automatically suspends an irrigation event when it rains.

Reclaimed water, recycled water, or treated sewage effluent water: treated or recycled waste water of a quality suitable for non-potable uses such as landscape irrigation and water features. This water is not intended for human consumption.

Record drawing: a set of reproducible drawings which show changes in the work made during construction and which are usually based on drawings marked up in the field and other data furnished by the contractor.

Recreational area: areas of active play or recreation such as sports fields, school yards, picnic grounds, or other areas with intense foot traffic.

Reference evapotranspiration or ET: a standard measurement of environmental parameters which affect the water use of plants. ET is typically expressed as the depth of water in inches or the volume of water in gallons used by an irrigated landscape area over a period of time, as represented in Appendix A, and is based on an estimate of the evapotranspiration of a large field of four- to seven-inch tall, cool-season grass that is well watered. Reference evapotranspiration (ET_o) is used as the basis of determining the Maximum Applied Water Budget. One inch is approximately 0.623 gallons per square foot.

Remote control valve: a device used to control the flow of water in the irrigation system.

Residential landscape: landscapes surrounding single or multifamily homes such as duplexes.

Runoff: water which is not absorbed by the soil or landscape to which it is applied and flows from the area. For example, runoff may result from water that is applied at too great a rate (application rate exceeds infiltration rate), run times are set too long or a valve is stuck open, when there is a severe slope, etc.

Smart irrigation controller: an automatic timing device with nonvolatile memory used to remotely control valves that operate an irrigation system. Smart irrigation controllers are able to self-adjust and schedule irrigation events using either evapotranspiration (weather-based), soil moisture data or flow data or a combination of methods.

Soil moisture sensing device or soil moisture sensor: a device that measures the amount of water in the soil. The device may also suspend or initiate an irrigation event.

Sprinkler head: a device that sprays water through a nozzle.

Static water pressure: the pipeline or municipal water supply pressure when water is not flowing.

Station: typically an area served by one valve; for very large properties, a station could control two or more valves in a given “zone”.

Sub meter: a metering device to measure water applied to the landscape that is installed after the primary utility water meter.

Turf or turfgrass: a surface layer of earth containing mowed grass with its roots. Annual bluegrass, Kentucky bluegrass, Perennial ryegrass, fescue, and Tall fescue are cool-season grasses. Bermudagrass, Blue Grama, and Buffalo grass are warm-season grasses.

Valve: a device used to control the flow of water in the irrigation system.

Watering window: the period in which irrigation is allowed (e.g. time of day, days of the week, amount over a period of a week, etc.).

Zone: typically, an area served by a single control valve, sometimes referred to as a “station”. Zones are comprised of plant materials and soil types with similar water requirements.

4. DOCUMENTATION

The following documentation is required for all projects subject to the Water Efficient Landscaping Standards. The City of Aspen reserves the right to conduct audits as deemed necessary, at the expense of the customer, if there is indication that the criteria have not been followed.

4.1 Landscape and Irrigation Documentation Package

The Landscape and Irrigation Documentation Package shall include the following six (6) elements:

4.1.1 Checklist of all documents in Landscape and Irrigation Documentation Package.

4.1.2 Project information

a. Date

b. Project contacts for the project applicant, landscape and irrigation system installer, and property owner

c. Project address (if available, parcel and/or lot number(s))

d. Total landscape area and total irrigated area (square feet)

e. Project type (e.g., new, rehabilitated, public, private, homeowner-installed)

f. Water supply type (e.g., potable, recycled, well)

g. For Pitkin County residents only: Recorded Site Plan and Activity Envelope.

4.1.3 Applicant signature and date with statement, "I agree to comply with the requirements of the Water Efficient Landscaping Standards and submit a complete Landscape and Irrigation Documentation Package".

4.1.4 Water Efficient Landscape Worksheet

4.1.5 Landscape Design Plan with Soil Information

a. All applicable soil criteria and standards shall be noted on the landscape design plan.

b. A soil analysis report and associated information shall be provided if the project applicant chooses to appeal the standard soil amendment criteria.

4.1.6 Irrigation Design Plan

4.2 Compliance with the Landscape and Irrigation Documentation Package

4.2.1 Prior to construction, the City of Aspen shall:

a. Provide the project applicant with the standards and procedures for permits, plan checks, or design reviews.

b. Review the Landscape and Irrigation Documentation Package submitted by the project applicant.

c. Approve or deny the Landscape and Irrigation Documentation Package.

d. Issue a permit or approve the plan check/design review for the project applicant.

4.2.2 Prior to construction, the project applicant shall:

a. Submit a Landscape and Irrigation Documentation Package to the City of Aspen.

b. Receive the authorization to proceed.

4.2.3 Upon approval of the Landscape and Irrigation Documentation Package by the City of Aspen, the project applicant shall:

a. Receive a permit or approval of the plan check or design review and retain record to include the date of the permit in the Approval Letter.

b. Submit a copy of the approved Landscape and Irrigation Documentation Package along with the record drawings, and any other information to the property owner or his/her designee.

5. LANDSCAPE CRITERIA

Unless otherwise specified, the criteria within this section shall apply to all applicable projects. The City of Aspen reserves the right to conduct inspections as deemed necessary, at the expense of the project applicant, if there is indication that the criteria have not been followed.

5.1 Soil Criteria

5.1.1 Soil Amendment

a. Topsoil of irrigated grasses (including turf), shrubs, perennials, and annuals shall be a sandy loam to a depth of at least 6 inches (6”) containing at least 5 percent (5%) organic matter by volume.

b. Tree soil should have a minimum depth of 3 feet (3’). Both topsoil and subsoil layers shall be sandy loam. The top soil shall be at least 6 inches (6”) and have 5 percent (5%) organic matter by weight and subsoil shall have at least one to three percent (1 - 3%) organic matter by weight.

c. A minimum of four (4) cubic yards of organic matter soil amendment per one-thousand square feet of landscaped area shall be required as necessary to meet the 5 percent (5%) organic matter specification.

d. Soil amendment organic matter shall consist of either Class I and Class II compost.

e. Soil Evaluation and Improvement

The following soil evaluation procedure may be utilized if the project applicant chooses to appeal the standard soil amendment criteria and/or if the City of Aspen requires verification of the soil amendment. The soil evaluation determines the condition of the soil related to texture, acidity, salts, and plant nutrient availability.

i. The applicant must discuss the appeal with the City of Aspen to determine the procedures and submittal requirements.

ii. The applicant shall submit an explanation in narrative form explaining the appeal and attach any information including site-specific data and the following soil analyses:

(a) A soil analysis shall be conducted by a professional soil scientist at a certified soils laboratory.

(b) Soil sample(s) shall be taken after over-lot grading, if applicable, and prior to landscaping.

(c) The soil sample must represent a uniform area. Differences in texture (sand, silt, clay), color, slope, degree of erosion, drainage, past management practices, types of plant materials designed for each area should be taken into account when collecting the sample. The soil scientist shall determine the sample sites, depth and frequency necessary to reflect a representative sample of the site and to coincide with the plant material intended for the area in the design. Recommended sampling frequency is no less than one (1) sample per five-thousand (5,000) square feet. Any sampling less than this frequency shall be justified by the soil scientist.

(d) The soil analysis shall determine the organic and inorganic composition of native/indigenous soil in landscaped areas, and shall include:

- Soil texture;
- Total exchange capacity;
- Conductivity;
- Organic matter;
- Acidity; and
- Content of nitrogen (NO3, Phosphorus, Potassium, Zinc, Iron, Copper, Manganese and Lime).

iii. The soil analysis shall include specific recommendations based on the soil test results for the type of plant material to be grown in each landscaped area. The type and volume of soil amendment shall be determined by the soil scientist and be consistent with the indigenous soil and the needs of the plant materials in each area of the landscape.

iv. Upon receipt of the information, the City of Aspen shall approve or deny the soil amendment. If the amendment is denied, the City of Aspen shall provide information to the project applicant regarding additional requirements.

5.1.2 Soil Preparation

a. Amendment shall be tilled to a minimum depth of six inches (6”).

b. Site shall be graded to within two-tenths of a foot (2/10th’) of the grading plan.

c. Site shall be free of rocks and debris over one inch (1”) diameter in size. Rocks and debris 0.5 inch (0.5”) to one inch (1”) shall not exceed 5 percent (5%) by volume and gravel 0.6 inch (0.6”) to 1.25 inches (1.25”) shall not exceed 5 percent (5%) by volume. Particles such as concrete, brick, glass, metal, wood or plastic greater than one inch (1”) shall not be allowed. The total volume of these materials smaller than one inch (1”) shall not exceed 5 percent (5%).

d. Site shall be free of dirt clods over three-quarter inch (3/4”) diameter in size. Dryland seed areas may contain dirt clods up to two inch (2”) diameter in size.

i. Stockpiling - Stripping and stockpiling of indigenous soil (topsoil) shall be required during construction (except as waived by the City of Aspen). The replacement of this soil, plus additional soil amendments, are critical to successful plant material establishment, ongoing health, and efficient use of water through the life of the project.

e. The soil shall have no herbicides, heavy metals, biological toxins or hydrocarbons that impact plant growth or exceed the EPA’s standards for soil contaminant.

f. All applicable soil criteria and standards shall be noted on the landscape design plan. Written verification of approved soil amendment type and volume is required. Projects with inadequate soil amendment and preparation will not be approved.

5.1.3 Soil Inspection

a. Soil inspections prior to installation of plant material may be conducted by the City of Aspen as deemed necessary and shall include a review of adherence to all criteria and performance standards.

b. Written documentation reflecting approved volume and type of soil amendment is required upon inspection.

5.3 Non-Living General Landscape Design Criteria

5.3.1 Organic Mulch

a. Shall be applied at one (1) cubic yard per eighty (80) square feet at a depth of four (4) inches, and as appropriate to each species.

b. Shall be applied to the soil surface, not against the plant stem or high against the base of trunks to minimize disease.

c. Organic mulch material includes bark and wood chips. Avoid mulch consisting of construction debris such as pallets.

5.3.2 Inorganic Mulch

a. Inorganic mulch includes rock, gravel, or pebbles.

b. Rock mulch shall have a minimum depth of two inches (2”).

5.4 Landscape Criteria

5.4.1 Plant Material[1]

a. All irrigated landscaped areas must be included in the water budget calculation and the total irrigation water need for all zones cannot exceed the Maximum Applied Water Budget of 7.5 gallons/season/square-foot of irrigated landscape area (12 inches/season). Aside from the use of invasive and/or noxious plant species, any plant can be utilized in the landscape plan. The GreenCO Plant List provides water use categories that can be used for calculating the plant water need. An estimate of the plant water need, in gallons per square foot per season, must be provided for any plants that are not currently included in the GreenCO Plant List. See Appendix A for details regarding the Maximum Applied Water Budget calculation and Appendix B for the GreenCO Plant List.

b. Each hydrozone shall have plant materials with similar water use.

c. Plants shall be selected and planted appropriately based upon their adaptability to the climatic, soils, and topographical conditions of the project site. To encourage the efficient use of water, the following are highly recommended:

[1] *See also*:
Pitkin County Revegetation Guide http://pitkincounty.com/documentcenter/view/2937;
Pitkin County Riparian Revegetation Guide http://www.pitkincounty.com/DocumentCenter/View/2938; and
Pitkin County Approved Seed Mixes http://pitkincounty.com/DocumentCenter/View/2936.

i. Selection of plants from the GreenCO Plant List included in Appendix B, in keeping with the character of the community, and particularly water-conserving plant and turf species.

ii. Protection and preservation of native species and natural vegetation.

iii. Selection of plants based on disease and pest resistance.

iv. The use of invasive and/or noxious plant species is strongly prohibited[2].

v. Selection of trees based on applicable local tree ordinance or tree shading guidelines.

vi. Recognize the horticultural attributes of plants (i.e., mature plant size, invasive surface roots) to minimize damage to property or infrastructure (e.g., buildings, sidewalks, power lines).

vii. Consider the solar orientation for plant placement to maximize summer shade and winter solar gain.

d. Turf is not allowed on slopes greater than twenty-five percent (25%) where the toe of the slope is adjacent to an impermeable hardscape and where 25% means 1 foot of vertical elevation change for every 4 feet of horizontal length (rise divided by run x 100 = slope percent).

e. Avoid fire-prone plant materials and highly flammable mulches. See Appendix C for a recommended list of plants to best prepare for wildfire[3] and Appendix D for the City and Pitkin County Wildfire Hazard Assessment Maps.

i. A landscape design plan for projects in fire-prone areas shall address fire safety and prevention.

ii. All landscape plantings for properties located in the Moderate or High Wildfire Hazard zone of the City must be firewise (see Appendices C and D).

iii. Properties located outside of the City limits should consult with Pitkin County.

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[2] *See:* Pitkin County Noxious List & Weed Management Plan http://pitkincounty.com/430/Noxious-Weed-Information;

[3] *See:* City of Aspen Firewise Plant Materials recommendations: http://www.aspenpitkin.com/Portals/0/docs/City/wildfire/FireWise%20Information_Landscaping-Plants%20(2).pdf

f. The architectural guidelines of a common interest development, which include community apartment projects, condominiums, planned developments, and stock cooperatives, shall not include conditions that have the effect of prohibiting the use of low-water use plants as a group.

5.4.2 Water Features

a. Recirculating water systems shall be used for water features.

b. Where available, recycled water is recommended as a source for decorative water features.

c. The surface area of a water feature shall be included in the high water use hydrozone area of the water budget calculation.

d. Pool and spa covers are highly recommended.

5.4.3 Stormwater Management

a. Stormwater management practices minimize runoff and increase infiltration which recharges groundwater and improves water quality. Implementing stormwater best management practices into the landscape and grading design plans to minimize runoff and to increase on-site retention and infiltration are encouraged.

b. Project applicants shall refer to the City of Aspen for information on any applicable stormwater ordinances and stormwater management plans.

5.5 Landscape Plan

The landscape design plan, at a minimum, shall:

5.5.1 Delineate and label each hydrozone by number, letter, or other method.

5.5.2 Identify each hydrozone as low, moderate, or high water use. Temporarily irrigated areas of the landscape shall be included in the low water use hydrozone for the water budget calculation.

5.5.3 Identify recreational areas.

5.5.4 Identify areas permanently and solely dedicated to edible plants.

5.5.5 Identify areas irrigated with recycled water.

5.5.6 Identify type of mulch and application depth.

5.5.7 Identify soil amendments, type, and quantity.

5.5.8 Identify type and surface area of water features.

5.5.9 Identify hardscapes (pervious and non-pervious).

5.5.10 Identify location and installation details of any applicable stormwater best management practices that encourage infiltration of stormwater. Stormwater best management practices are encouraged in the landscape design plan and examples include, but are not limited to:

a. Infiltration beds, swales, and basins that allow water to collect and soak into the ground.

b. Constructed wetlands and retention ponds that retain water, handle excess flow, and filter pollutants.

c. Pervious or porous surfaces (e.g., permeable pavers or blocks, pervious or porous concrete, etc.) that minimize runoff.

5.5.11 Identify any applicable rain harvesting or catchment technologies (e.g., rain gardens, cisterns, etc.).

5.5.12 Contain the following statement: "I have complied with the criteria of the Water Efficient Landscaping Standards and applied them for the efficient use of water in the landscape design plan".

5.5.13 The signature of a licensed landscape architect, or licensed/certified landscape contractor.

6. IRRIGATION SYSTEM CRITERIA

This section applies to landscaped areas requiring permanent irrigation. For the efficient use of water, an irrigation system shall be planned and designed according to the most current version of the *Landscape Irrigation Best Management Practices*, by the Irrigation Association and the American Society of Irrigation Consultants.

6.1 Irrigation System Requirements

6.1.1 Backflow prevention devices shall be required to protect the potable water supply from contamination by the irrigation system and comply with local plumbing codes.

6.1.2 Manual shut-off valves (such as a gate valve, ball valve, or butterfly valve) shall be required, as close as possible to the point of connection of the water supply and to isolate sections of mainline on larger systems, to minimize water loss in case of an emergency (such as a main line break) or routine repair.

6.1.3 Master shut-off valves (lockable) and flow sensors, integrated with the automatic irrigation controller are required on all projects.

a. City of Aspen staff reserve the right to operate this valve when the City has declared a water shortage under the City's Water Shortage Ordinance or when more than fifty percent (50%) of the account usage occurs in water rate tier four (4).

6.1.4 Dedicated landscape water meters/sub-meters shall be installed for all non-residential irrigated landscapes of 5,000 square feet or more.

6.1.5 Smart irrigation controllers labeled by U.S. Environmental Protection Agency's WaterSense Program or with published reports posted on the Smart Water Application Technologies website are recommended for residential projects and required for all non-residential projects. If a flow meter is used, then the controller shall be able to use inputs from the flow meter/sensor to control irrigation if flows are abnormal.

6.1.6 Sensors (e.g., rain, freeze, wind, and/or soil moisture etc.), either integral or auxiliary, that suspend or alter irrigation operation during unfavorable weather conditions or when sufficient soil moisture is present shall be required on all irrigation systems.

6.1.7 The irrigation system shall be designed to prevent runoff, low head drainage, overspray, or other similar conditions where irrigation water flows onto non-targeted areas, such as adjacent property, non-irrigated areas, hardscapes, roadways, or structures. Restrictions regarding overspray and runoff may be modified if the landscape area is adjacent to permeable surfacing and no runoff occurs or if the adjacent non-permeable surfaces are designed and constructed to drain entirely to landscaping.

6.1.8 Minimum pop-up height for sprinklers in turfgrass areas shall be six inches (6").

6.1.9 Check valves or anti-drain valves are required on all sprinkler heads.

6.1.10 The irrigation system shall be designed to ensure that the operating pressure at each emission device is within the manufacturer's recommended pressure range for optimal performance.

a. To control excessive pressure above the required operating pressure of the irrigation system emission devices, pressure-regulating devices such as valve pressure regulators, sprinkler head pressure regulators, inline pressure regulators, or other devices shall be installed to meet the required operating pressure of the emission devices.

b. If water pressure is below the required operating pressure of the emission devices, then a booster pump shall be installed so that emission devices shall operate at the manufacturer's recommended pressure.

c. The pressure and flow measurements shall be identified at the design stage and verified prior to the installation of the system.

6.1.11 All irrigation emission devices shall meet the requirements set in the American National Standards Institute (ANSI) standard, ASABE/ICC 802-2014 "Landscape Irrigation Sprinkler

and Emitter Standard" authored by the American Society of Agricultural and Biological Engineers and the International Code Council and verified by an independent third-party.

6.1.12 The design of the irrigation system shall conform to the hydrozones of the landscape design plan.

6.1.13 Sprinklers within a zone shall have matched precipitation rates, unless otherwise directed by the manufacturer's recommendations.

6.1.14 Sprinkler spacing shall be designed to achieve the highest possible distribution uniformity using the manufacturer's recommendations. Spacing must achieve head-to-head coverage. All sprinkler heads installed in the turfgrass areas shall have a distribution uniformity of 0.65 or higher using the protocol defined in ASABE/ICC 802-2014 standard.

6.1.15 The irrigation system must be designed and installed to meet, at a minimum, any water windows or restrictions for operation such as day of the week and hours of the day.

6.2 Hydrozone Requirements

6.2.1 Each remote control valve shall irrigate a hydrozone with similar microclimate, soil conditions, slope, and plant materials with similar water demand.

6.2.2 Relevant soils information such as soil type and infiltration rate shall be utilized when designing irrigation systems.

6.2.3 Narrow or irregularly shaped areas, including turfgrass areas, less than ten feet (10 ft) in dimension in any direction shall not utilize overhead sprinkler irrigation.

6.2.4 Slopes greater than twenty-five percent (25%) shall not use sprinklers with an application rate exceeding 0.75 inches per hour. Exception: If the irrigation designer specifies an alternative design or technology and clearly demonstrates no runoff or erosion will occur. Prevention of runoff and erosion shall be confirmed during the irrigation audit.

6.2.5 Sprinkler heads and other emission devices shall be selected based on what is appropriate for the plants and soil type within that hydrozone. Individual hydrozones that mix high and low water use plants shall not be permitted.

6.2.6 In mulched planting areas, the use of low flow irrigation is required for any vegetation that will exceed twelve inches (12") mature height.

6.2.7 Where feasible, trees shall be placed on separate valves from shrubs, groundcovers, and turfgrass to facilitate the appropriate irrigation of trees. The mature size and extent of the root zone shall be considered when designing irrigation for the tree.

6.2.8 Hydrozone areas shall be designated by number, letter, or other designation on the landscape design plan and irrigation design plan. On the irrigation design plan, designate the areas irrigated by each valve, and assign a number to each valve. Use this valve designation

in the Hydrozone Information Table (see Appendix A). This table can also assist with the irrigation audit and programming the controller.

6.2.9 Source water, such as non-potable water should be considered.

6.3 Irrigation Design Plan

An irrigation design plan meeting the following design criteria shall be submitted for review and approval by the City of Aspen.

6.3.1 Plan Requirements

The irrigation design plan, at a minimum, shall contain:

a. A scaled plan showing property lines, easements, existing or proposed structures, impervious surfaces, and existing natural features.

b. Location and size of the point of connection to the water supply and meter locations along with static water pressure at the point of connection to the water supply and dynamic water pressure for proper system operation.

c. Reclaimed/recycled water or alternative water sources such as graywater shall comply with local plumbing codes including marking of pipes and system components.

d. Location, type and size of all components of the irrigation system, including backflow preventer, flow sensor, master valve, smart irrigation controllers, main and lateral lines, manual valves, remote control valves, sprinkler heads, moisture sensing devices, rain switches, on-site weather monitoring sensors, quick couplers, pressure regulators.

e. An irrigation legend showing the identification of irrigation components.

f. Flow rate (gallons per minute), application rate (inches per hour), and design operating pressure (pressure per square inch) for each irrigation zone.

g. Installation details for each of the irrigation components.

h. Designer statements and signature:

   i. The following statement: “I have complied with the criteria of the Water Efficient Landscaping Standards and applied them accordingly for the efficient use of water in the irrigation design plan.”

   ii. The signature of a qualified irrigation professional such as licensed landscape architect with irrigation credentials, certified irrigation designer, or licensed/certified landscape contractor.

6.5 Landscape Irrigation Audit

6.5.1 All landscape irrigation audits shall be conducted by a third party certified landscape irrigation auditor. Irrigation audits shall not be conducted by the person or company who installed the irrigation system.

6.5.2 The project applicant shall submit an irrigation audit report with the Approval Letter request to the City of Aspen. The irrigation audit report shall include, but is not limited to: inspection; system tune-up; system test with distribution uniformity; reporting overspray or run off that causes overland flow; and preparation of an irrigation schedule, including configuring irrigation controllers with application rate, soil types, plant factors, slope, exposure and any other factors necessary for accurate programming.

6.5.3 The City of Aspen may administer programs that include, but not be limited to, irrigation water use analysis, irrigation audits, and irrigation surveys for compliance with the Maximum Applied Water Budget.

6.6 Approval Letter

6.6.1 Proper installation and management of the irrigation system shall conform to the approved irrigation design plan.

6.6.2 The Approval Letter request shall include the following six (6) elements:

a. Project information sheet that contains:

i. Date.

ii. Project name.

iii. Project address and location.

iv. Project applicant name, telephone, and mailing address.

v. Property owner name, telephone, and mailing address.

b. Certification by the irrigation designer and the licensed landscape/irrigation contractor that the irrigation system has been installed per the approved irrigation design plan.

c. Record drawings (as-builts), provided in electronic format, showing all changes from the approved plan shall be included with the certification.

d. A diagram of the irrigation system showing hydrozones and the irrigation scheduling parameters used to set the controller shall be kept with the irrigation controller for subsequent management purposes.

e. Irrigation system maintenance schedule.

f. Irrigation audit report.

6.6.3 The project applicant shall:

a. Submit the signed Approval Letter to the City of Aspen for review.

b. Ensure that copies of the Approval Letter are submitted to the City of Aspen and property owner or his or her designee.

6.6.4 The City of Aspen shall:

a. Receive the signed Approval Letter from the project applicant.

b. Approve or deny the Approval Letter. If the Approval Letter is denied, the City of Aspen shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

6.7 Irrigation System Maintenance Schedule

6.7.1 Irrigation systems shall be maintained to ensure proper operation and function for water use efficiency. A regular maintenance schedule shall be submitted with the Approval Letter.

6.7.2 A regular maintenance schedule shall include, but not be limited to, routine inspection, auditing, adjustment and repair of the irrigation system and its components. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

6.7.3 Repair of all irrigation equipment shall be done with the originally installed components. If equipment components with greater efficiency are used in replacement, the entire zone must be changed to maintain consistency.

6.7.4 Project applicants are encouraged to implement sustainable or environmentally-friendly practices for overall landscape maintenance.

6.8 Irrigation Scheduling

For the efficient use of water, all irrigation schedules shall be developed, managed, and evaluated to utilize the minimum amount of water required to maintain plant health. Irrigation schedules shall meet the following criteria:

6.8.1 Irrigation scheduling shall be regulated by smart irrigation controllers that utilize evapotranspiration data or soil moisture data.

6.8.2 Overhead irrigation shall be scheduled between 6:00 p.m. and 8:00 a.m. unless weather conditions prevent it or an alternate schedule is declared under the City's Water Shortage Ordinance[4]. Operation of the irrigation system outside the normal watering window is allowed for auditing and system maintenance.

6.8.3 Parameters used to set the automatic controller shall be developed and submitted for each of the following:

a. The plant establishment period.

b. The established landscape.

c. Temporarily irrigated areas.

6.8.4 Each irrigation schedule shall consider, for each station, all of the following that apply.

a. Irrigation interval (days between irrigation).

b. Irrigation run times (hours or minutes per irrigation event to avoid runoff).

c. Number of cycle starts required for each irrigation event to avoid runoff.

d. Amount of applied water scheduled to be applied on a monthly basis.

e. Application rate setting.

f. Root depth setting.

g. Plant type setting.

h. Soil type.

i. Slope factor setting.

j. Shade factor setting.

k. Irrigation uniformity or efficiency setting, based on audit information.

6.9 Irrigation Management

6.9.1 Irrigation management includes planning water use, monitoring water use, and verifying that equipment is maintained and properly adjusted for optimal performance.

[4] *See:* City Municipal Code Sec. 25.28.010.

6.9.2 As the landscape matures, adjustments to the system should be in harmony with the original intent of the irrigation design.

6.9.3 Scheduling of irrigation events should match the needs of the plants to maintain health, appearance and meet the function of the landscape.

APPENDIX A – WATER EFFICIENT LANDSCAPE WORKSHEET

This worksheet is completed by the project applicant and is a required element of the Landscape and Irrigation Documentation Package.

SECTION A. GALLONS OF WATER NEEDED BY PLANT CATEGORY AND IRRIGATION TYPE

The specific irrigation water needs of each hydrozone in the design should be determined using the following formula and factors:

Irrigation Water Budget = [(ETo × Plant Factor) – Re] × Irrigated Area ÷ Irrigation Efficiency × 0.623

Where:

ETo = Reference Evapotranspiration = 27.4 inches/season (May through September)
Re = Effective Precipitation = 6.8 inches/season (May through September)
Irrigated Area = hydrozone area in square feet

Water Use Category	Plant Factor
Cool-Season Turf	0.90
High	0.80
Medium	0.65
Low	0.40
Very Low	0.25

Irrigation Method	Default Efficiency
Overhead	75%
Drip	90%

SECTION B. HYDROZONE INFORMATION TABLE AND WATER BUDGET CALCULATION

Complete the hydrozone table for each hydrozone. Use as many rows as necessary to provide the square footage of landscape area per hydrozone.

Hydro-zone	ETo (in/season)	Plant Water Use Category	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq-ft)	Irrig Water Need (gal/season)
						TOTAL		

AVERAGE IRRIGATION WATER NEED ALL ZONES*: _____ gal/sf/season

The average must be less than the Maximum Applied Water Budget of 7.5 gal/sf/season.

Total area of irrigated public right-of-way: _____ sq-ft
Total area of non-irrigated landscape:_____ sq-ft

An example is provided below.

Example Hydrozone Information Table and Water Budget Calculation:

Hydro-zone	ETo (in/season)	Plant Water Use Category	Plant Factor	Re (in/season)	Irrigation Method	Irrigation Efficiency	Hydrozone Area (sq-ft)	Irrig Water Need (gal/season)
Zone 1	27.4	L	0.40	6.8	Drip	0.90	2000	5759
Zone 2	27.4	M	0.65	6.8	Overhead	0.75	500	4573
Zone 3	27.4	Turf	0.90	6.8	Overhead	0.75	2000	29671
Zone 4	27.4	VL	0.25	6.8	Drip	0.90	1000	35
						TOTAL	**5500**	**40038**

AVERAGE IRRIGATION WATER NEED ALL ZONES*: 7.3 gal/sf/season

Total area of irrigated public right-of-way: 0 sq-ft
Total area of non-irrigated landscape: 300 sq-ft

APPENDIX B – GREENCO PLANT LIST

The Plant Water Use Category (VL = Very Low, L = Low; M = Medium; H = High) used to calculate the Irrigation Water Budget in Appendix A should be selected from the plant list provided in the "Green Industry Best Management Practices (BMPs) for the Conservation and Protection of Water Resources in Colorado: Moving Toward Sustainability" Appendix E, Third Release, May 2008. GreenCO's Appendix E plant list categorizes plant water needs for various regions of Colorado based on elevation, including the East Slope (<6,500 ft), West Slope (6,500 to 8,500 ft), and Mountain Areas (>8,500 ft). Accordingly, Aspen is located in the "West Slope" category. Relevant pages from the GreenCO Appendix E are included below. Applicant shall provide references for the Plant Water Use Category for any plant that is not included in this plant list.

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Abeliophyllum distichum	Forsythia, White	S	M	10					M	10
Abies balsamea 'Nana'	Fir, Dwarf Globe Balsam	T	M	17	M	3	M	2	M	22
Abies concolor	Fir, White	T	M	43	M	10	M	12	M	65
Abies fraseri	Fir, Fraser	T	M	16	M	4	M	4	M	24
Abies koreana 'Horstmann's Silberlocke'	Fir, Silver Korean	T	M	7	M	3	M	3	M	13
Abies lasiocarpa	Fir, Subalpine	T	M	19	M	7	M	9	M	35
Acer campestre	Maple, Hedge	T	M	24	L	7	M	5	M	36
Acer ginnala	Maple, Amur	S T	L	45	L	9	L	10	L	64
Acer glabrum	Maple, Rocky Mountain	S	L	29	L	4	L	8	L	41
Acer grandidentatum	Maple, Bigtooth	S T	L	39	L	8	L	6	L	53
Acer griseum	Maple, Paperbark	T	M	19	M	4	M	3	M	26
Acer japonicum 'Aconitifolium'	Maple, Cutleaf Fullmoon	S	H	8	L	2	M	1	M	11
Acer miyabei	Maple, Miyabi	T	M	11	M	3	L	2	M	16
Acer negundo	Box Elder	T	L	34	M	9	L	4	L	47
Acer nigrum 'Greencolumn'	Maple, Greencolumn Black	T	M	9	M	2	M	1	M	12
Acer palmatum	Maple, Japanese	T	M	25	H	3	H	2	H	30
Acer platanoides	Maple, Norway	T	M	36	M	5	M	3	M	44
Acer pseudoplatanus	Maple, Sycamore	T	M	14	M	2	M	1	M	17
Acer rubrum	Maple, Red	T	M	35	M	5	M	3	M	43
Acer saccharinum	Maple, Silver	T	M	40	M	6	M	3	M	49
Acer saccharum	Maple, Sugar	T	M	28	M	4	M	3	M	35
Acer tataricum	Maple, Tatarian	S T	L	38	L	9	L	7	L	54
Acer truncatum	Maple, Shantung	T	M	8	M	2	M	1	M	11
Acer x freemanii	Maple, Freeman	T	M	27	M	5	M	4	M	36
Achillea 'Coronation Gold'	Yarrow, Golden Yellow	P	L	31	L	6	L	4	L	41
Achillea 'Moonshine'	Yarrow, Moonshine	P	L	31	L	7	L	5	L	43
Achillea 'Summer Pastels'	Yarrow, Mixed Pastels	P	L	28	L	6	L	5	L	39
Achillea ageratifolia	Yarrow, Greek	P	L	25	L	5	L	3	L	33
Achillea filipendulina	Yarrow, Tall Yellow	P	L	25	L	6	VL	5	L	36
Achillea lanulosa	Yarrow, Wooly White	P	L	21	L	4	L	3	L	28
Achillea millefolium	Yarrow, Common White	P	L	30	L	7	L	7	L	44
Achillea ptarmica 'The Pearl'	Yarrow, The Pearl	P	L	21	L	4	L	3	L	28
Achillea serbica	Yarrow, Serbian	P	L	21	L	4	L	1	L	26
Achillea tomentosa	Yarrow, Wooly Yellow	P	L	24	L	5	L	3	L	32
Aconitum columbianum	Monkshood, Columbian	P	H	11	M	1	H	1	H	13
Aconitum napellus	Monkshood, Garden	P	M	19	H	3	H	2	H	24
Aconitum x cammarum	Monkshood, Bicolor	P	M	11					M	11
Actinidia arguta	Kiwi, Hardy	P	M	8					M	8
Actinidia kolomikta	Kiwi, Variegated	V	M	10					M	10
Adiantum pedatum	Fern, Western Maidenhair	P	H	11	H	2			H	13
Aegopodium podograria	Bishop's Weed	GCP	M	26	M	4	M	3	M	33
Aesculus glabra	Buckeye, Ohio	T	M	37	M	5	M	3	M	45
Aesculus hippocastanum	Horsechestnut	T	M	33	M	3	H	2	M	38
Aesculus octandra	Buckeye, Yellow	T	M	19	M	3	L	2	M	24
Aesculus parviflora	Buckeye, Bottlebrush	S	M	14	M	2	H	2	M	18
Aesculus x carnea	Horsechestnut, Red	T	M	23	M	3	M	3	M	29
Aethionema coridifolium	Stonecress, Lebanon	P	L	9	M	3	M	1	L	13
Aethionema grandiflorum	Stonecress, Persian	P	L	11	L	3			L	14
Agapanthus africanus	Lily of the Nile	A	M	14			M	1	M	15
Agastache 'Blue Fortune'	Hyssop, Blue Fortune Anise	P	L	21	L	3	L	1	L	25
Agastache aurantiaca 'Coronado'	Hyssop, Coronado	P	L	30	L	3	L	1	L	34
Agastache barberi	Giant Hummingbird's Mint	P	L	20	L	3	L	1	L	24
Agastache cana	Double Bubblemint	P	L	28	L	4	L	1	L	33
Agastache foeniculum	Hyssop, Anise	P	L	18	L	2	L	1	L	21
Agastache rupestris	Hyssop, Sunset	P	L	31	L	4	L	2	L	37
Ageratum houstonianum	Ageratum	A	M	18	L	3	M	4	M	25
Agropyron cristatum	Crested Wheatgrass	TU	L	20	L	3	L	2	L	25
Agrostis palustris	Bentgrass	TU	H	10			H	1	H	11
Ajania pacifica	Daisy, Pacific	P	L	6	L	1	L	1	L	8
Ajuga genevensis 'Pink Beauty'	Carpet Bugle, Pink Beauty	GC	M	19	M	3	L	2	M	24
Ajuga pyramidalis 'Metallica Crispa'	Carpet Bugle, Pyramid	GC	M	19	M	2			M	21
Ajuga reptans	Carpet Bugle, Green	GC	M	26	M	2	M	2	M	30
Akebia quinata	Chocolate Vine	V	M	7					M	7
Alcea rosea	Hollyhock	P	L	32	L	4	L	3	L	39
Alchemilla alpina	Lady's Mantle, Alpine	P	M	12	L	1	L	1	M	14
Alchemilla erythropoda	Lady's Mantle, Red	P	M	9	M	2			M	11
Alchemilla mollis	Lady's Mantle	P	M	24	M	2	L	1	M	27
Allium cernuum	Nodding Onion	P	L	17	L	1	L	2	L	20
Allium geyeri	Geyer Onion	P	L	10	L	1	M	1	L	12
Allium schoenoprasum	Chives	P	L	25	M	1	M	1	L	27
Alnus glutinosa	Alder, Black	S T	H	28	M	7	M	6	M	41
Alnus rubra	Alder, Red	S	H	9	H	2	H	2	H	13
Alnus tenuifolia	Alder, Thinleaf	S T	M	37	M	8	M	9	M	54
Alyssum montanum 'Mountain Gold'	Basket of Gold, Mountain	P	L	27	L	5	L	3	L	35
Alyssum sp.	Alyssum	A	M	23	L	2	L	4	M	29
Amaranthus spp.	Amaranth	A	L	15	M	2	L	2	L	19
Amelanchier alnifolia	Serviceberry, Saskatoon	S	L	32	L	9	L	8	L	49
Amelanchier canadensis	Serviceberry, Shadblow	S T	L	39	L	9	L	9	L	57
Amelanchier laevis	Serviceberry, Allegheny	S T	M	28	L	4	L	4	L	36
Amelanchier lamarckii	Serviceberry, Lamarck	S T	L	20	L	5	L	5	L	30
Amelanchier stolonifera	Serviceberry, Running	S	L	14	L	4	L	5	L	23
Amelanchier utahensis	Serviceberry, Utah	S	L	18	L	5	L	5	L	28
Amelanchier x grandiflora	Serviceberry, Apple	S T	M	27	L	6	L	5	L	38
Amorpha canescens	Leadplant	S	VL	31	VL	6	VL	1	VL	38

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Amorpha fruticosa	False Indigo	S	L	25	L	5	L	4	L	34
Amorpha nana	Fragrant False Indigo	S	VL	20	VL	3	VL	2	VL	25
Ampelopsis brevipendunculata	Porcelain Berry Vine	V	M	16	M	1			M	17
Amsonia jonesii	Jones' Bluestar	P	L	12	M	2			L	14
Anacyclus pyrethrum var. depressus	Daisy, Mt. Atlas	P	L	21	L	3	M	1	L	25
Anaphalis margaritacea	Pearly Everlasting	P	L	12	L	3	L	3	L	18
Anchusa spp.	Bugloss	A P	M	17	L	2	L	1	M	20
Andropogon gerardii	Bluestem, Big	P	L	23	L	3	L	1	L	27
Andropogon saccharoides	Bluestem, Silver	P	L	15	L	1	L	1	L	17
Anemone biarmiensis	Anemone, Yellow	P	M	10	M	3	L	2	M	15
Anemone canadensis	Anemone, Meadow	P	M	15	M	3	L	1	M	19
Anemone cylindrica	Thimbleweed	P	M	10	M	3	M	1	M	14
Anemone multifida	Windflower	P	M	15	M	3	M	3	M	21
Anemone sylvestris	Anemone, Snowdrop	P	M	19	L	2	M	1	M	22
Anemone tomentosa 'Robustissima'	Anemone, Grape-leaved	P	M	16	M	2	M	1	M	19
Anemone x hybrida	Anemone, Hybrid	P	M	18	M	2	M	1	M	21
Angelonia spp.	Summer Snapdragon	A	M	9					M	9
Antennaria dioica 'Rubra'	Pussytoes, Pink	P	L	25	VL	3	VL	4	L	32
Antennaria parvifolia	Pussytoes, Dwarf	P	L	24	VL	5	VL	5	VL	34
Anthemis marschalliana	Daisy, Filigree	P	L	8	L	1			L	9
Anthemis tinctoria	Daisy, Marguerite	P	L	18	L	2	L	1	L	21
Antirrhinum majus	Snapdragon	A	M	19	L	4	M	4	M	27
Aquilegia alpina	Columbine, Alpine	P	M	24	M	5	L	4	M	33
Aquilegia barnebyi	Columbine, Barneby's	P	L	15	L	4	M	2	M	21
Aquilegia caerulea	Columbine, Rocky Mountain	P	M	36	M	8	M	8	M	52
Aquilegia canadensis	Columbine, Dwarf Red	P	M	22	M	6	L	4	M	32
Aquilegia chrysantha	Columbine, Yellow	P	L	32	M	7	L	4	L	43
Aquilegia cultivars	Columbine	P	M	27	M	5	M	6	M	38
Aquilegia discolor	Columbine, Spanish	P	M	11	M	3	M	2	M	16
Aquilegia elegantula	Columbine, Dwarf Red	P	M	18	M	3	M	3	M	24
Aquilegia flabellata 'Kurilensis'	Columbine, Compact Pink	P	M	15	M	4	M	2	M	21
Aquilegia formosa	Columbine, Western Red	P	M	15	M	4	M	2	M	21
Aquilegia saximontana	Columbine, Dwarf Blue	P	M	21	M	4	M	3	M	28
Aquilegia vulgaris	Columbine, Garden	P	M	21	M	3	M	4	M	28
Arabis blepharophylla 'Spring Charm'	Rockcress, Spring Charm	P	M	13	L	3	L	2	L	18
Arabis caucasica 'Snowcap'	Rockcress, White Alpine	P	L	19	L	4	L	2	L	25
Arctostaphylos nevadensis	Bearberry, Nevada	GCP S	L	26	L	5	L	2	L	33
Arctostaphylos patula	Manzanita, Greenleaf	S	L	17	L	3	VL	1	L	21
Arctostaphylos uva-ursi	Kinnikinnick	GCP S	L	36	L	8	L	9	L	53
Arenaria montana	Sandwort, Mountain	P	L	14	L	3	L	2	L	19
Argyranthemum	Marguerite Daisy	A	M	14			M	1	M	15
Aristolochia durior	Dutchman's Pipe	V	M	13					M	13
Armeria 'Victor Reiter'	Sea Pinks, Victor Reiter	P	M	12	L	2	M	1	M	15
Armeria maritima	Sea Pinks	P	M	24	M	3	M	1	M	28
Armeria pseudarmeria	Sea Pinks, Wide-leaved	P	M	10	L	2			M	12
Arnica cordifolia	Arnica, Heartleaf	P	M	7	L	2	L	2	M	11
Aronia arbutifolia 'Brilliantissima'	Chokeberry, Brilliant Red	S	M	24	L	4	L	3	M	31
Aronia melanocarpa	Chokeberry, Black	S	L	29	L	5	L	3	L	37
Aronia x prunifolia	Chokeberry, Purple	S	L	17	L	2	L	2	L	21
Artemisia 'Powis Castle'	Sage, Powis Castle	P	L	22	L	6	L	3	L	31
Artemisia abrotanum	Sage, Southernwood	S	L	16	VL	3	VL	3	VL	22
Artemisia absinthium	Sage, Common Wormwood	P	VL	11	VL	2	VL	1	VL	14
Artemisia cana	Sagebrush, Silver	S	VL	26	VL	5	VL	6	VL	37
Artemisia filifolia	Sagebrush, Sand	S	VL	25	VL	6	VL	6	VL	37
Artemisia frigida	Sage, Fringed	P S	VL	34	VL	8	VL	8	VL	50
Artemisia ludoviciana	Sagewort, Prairie	S	VL	19	VL	5	VL	6	VL	30
Artemisia schmidtiana	Sage, Silver Mound	P	L	25	VL	3	VL	2	L	30
Artemisia stellerana 'Silver Brocade'	Sage, Silver Brocade	P	L	18	L	4	VL	2	L	24
Artemisia tridentata	Sagebrush, Tall Western	S	VL	32	VL	9	VL	9	VL	50
Artemisia tripartita	Sagebrush, Three Parted	S	VL	18	VL	3	VL	3	VL	24
Aruncus dioicus	Goats Beard	P	M	13	L	1			M	14
Arundo donax	Grass, Giant Reed	P	M	10	H	1			M	11
Asclepias incarnata	Milkweed, Swamp	P	M	17	H	1	H	1	M	19
Asclepias speciosa	Milkweed, Showy	P	L	14	L	2	L	2	L	18
Asclepias tuberosa	Gay Butterfly	P	L	23	L	5	L	1	L	29
Aster 'Wood's Purple'	Aster, Wood's Purple	P	M	12	M	3	M	2	M	17
Aster alpinus	Aster, Alpine	P	L	22	L	4	L	1	L	27
Aster bigelovii	Aster, Plains	P	L	14	L	2	M	1	L	17
Aster laevis	Aster, Smooth	P	L	11	L	2	L	2	L	15
Aster novae-angliae	Aster, New England	P	M	21	M	3	M	2	M	26
Aster novi-belgii	Aster, Dwarf Fall	P	M	26	M	5	VL	1	M	32
Aster porteri	Aster, Porter	P	L	11	L	1			L	12
Aster tongolensis 'Wartburg Star'	Aster, Purple	P	M	15	L	2			M	17
Aster x frikartii 'Monch'	Aster, Monch Frikart's	P	M	22	L	3	M	1	M	26
Astilbe chinensis	False Spirea, Chinese	P	H	17	M	3	H	1	H	21
Astilbe x arendsii	False Spirea	P	H	16	M	3	H	1	H	20
Astilbe x japonica	False Spirea	P	H	15	M	3	M	1	H	19
Astilbe x simplicifolia '	False Spirea, Star	P	H	11	M	1	H	1	H	13
Astilbe x thunbergii	False Spirea	P	H	10	H	2	H	1	H	13
Astrantia carniolica	Masterwort, Giant	P	M	5	H	1			M	6
Astrantia major	Masterwort	P	M	8	H	1			M	9
Athyrium filix-femina	Fern, Lady	P	H	12	H	1	H	1	H	14
Athyrium nipponicum 'Pictum'	Fern, Japanese Painted	P	H	14	H	1	M	1	H	16
Atriplex canescens	Saltbush, Four Wing	S	VL	26	VL	7	VL	4	VL	37

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Atriplex confertifolia	Saltbush, Spiny	S	VL	18	VL	3	VL	2	VL	23
Atriplex corrugata	Saltbush, Mat	S	VL	14	VL	4	VL	2	VL	20
Atriplex garderni	Saltbush, Gardner's	S	VL	9	VL	3	VL	2	VL	14
Aubrieta deltoidea 'Purple Gem'	Rockcress, Purple	P	L	18	L	2	L	1	L	21
Aubrieta x cultorum	Rockcress, Hybrid	P	L	11	M	1			L	12
Aurinia saxatilis 'Gold Ball'	Basket-of-Gold Alyssum	P	L	27	L	5	L	3	L	35
Baccharis glutinosa	Seep-Willow	S	L	5	H	1	H	1	M	7
Baccharis pilularis	Coyote Brush	S	L	5	H	1	H	1	M	7
Bacopa spp.	Water Hyssop	A	M	10			M	2	M	12
Baileya multiradiata	Desert Marigold	P	VL	8	L	2	L	1	VL	11
Baptisia australis	False Indigo	P	L	21	L	3	L	2	L	26
Begonia semperflorens	Wax Begonia	A	H	17			H	2	H	19
Belamcanda chinensis	Lily, Blackberry	P	L	14	M	1			L	15
Bellis perennis	Daisy, English	A P	M	10			M	1	M	11
Bellium minutum	Daisy, Miniature Mat	P	M	10					M	10
Berberis koreana	Barberry, Korean	S	L	25	L	3	L	2	L	30
Berberis thunbergii	Barberry, Japanese	S	L	36	L	4	L	4	L	44
Berberis x 'Tara'	Barberry, Emerald Carousel	S	L	18	L	3	L	2	L	23
Berberis x gladwynensis 'William Penn'	Barberry, William Penn	S	M	14	L	2	M	3	M	19
Berberis x mentorensis	Barberry, Mentor	S	L	26	L	3	L	2	L	31
Bergenia cordifolia	Bergenia, Heart-Leaved	P	M	21	L	2			M	23
Berlandiera lyrata	Chocolate Flower	P	L	20	VL	3	L	1	L	24
Betula 'Crimson Frost'	Birch, Crimson Frost	S T	H	25	H	4	M	4	H	33
Betula fontinalis /occidentalis	Birch, Native River	S T	H	34	M	6	M	6	M	46
Betula jacquemontii	Birch, Himalayan White	S T	H	21	M	3	M	3	H	27
Betula maximowicziana	Birch, Monarch Clump	T	H	12	H	1	H	1	H	14
Betula nigra	Birch, River	T	H	37	H	4	M	3	H	44
Betula papyrifera	Birch, Paper	T	H	35	H	3	M	3	H	41
Betula pendula	Birch, Weeping	T	H	31	H	3	M	3	H	37
Betula platyphylla	Birch, White	T	H	22	H	2	H	2	H	26
Betula x 'Rocky Mountain Splendor'	Birch, Rocky Mt Splendor	T	M	15	M	2	H	3	M	20
Boltonia asteroides	Boltonia	P	M	18	L	2	L	1	M	21
Bouteloua curtipendula	Grass, Side Oats Grama	P	L	15	L	6	L	3	L	24
Bouteloua gracilis	Grass, Blue Grama	P TU	VL	25	VL	5	VL	4	VL	34
Brachycome iberidifolia	Daisy, Swan River	A	M	11			M	2	M	13
Brassica oleracea	Ornamental Cabbage or Kale	A	M	14			M	3	M	17
Bromus inermis	Smooth Brome	TU	L	10	VL	1	M	3	L	14
Browallia speciosa	Bush Violet	A	M	11			H	1	M	12
Brunnera macrophylla	False Forget-Me-Not	P	M	20	L	2	M	1	M	23
Buchloe dactyloides	Buffalograss	TU	VL	28	VL	4	VL	2	VL	34
Buddleja alternifolia	Butterfly Bush, Alternate	S	L	30	L	5	L	2	L	37
Buddleja davidii	Butterfly Bush	S	M	38	L	4	L	2	M	44
Buddleja x weyeriana	Butterfly Bush, Yellow	S	M	12	L	1	L	1	L	14
Buxus microphylla	Boxwood, Littleleaf	S	M	23	M	2	M	1	M	26
Buxus sempervirens	Boxwood, Common	S	M	23	M	3	M	2	M	28
Calamagrostis acutiflora	Grass, Feather Reed	P	L	27	M	6	M	1	L	34
Calamagrostis brachytricha	Grass, Korean Feather Reed	P	L	11	M	3	M	1	L	15
Calandrinia umbellata 'Ruby Tuesday'	Rock Purslane	P	L	6					L	6
Calendula officinalis	Calendula	A	M	19	M	1	L	2	M	22
Callicarpa japonica	Beautyberry, Japanese	S	M	11	M	2	M	2	M	15
Callirhoe alcaeoides 'Logan Calhoun'	Prairie Winecups, White	P	L	14	L	1			L	15
Callirhoe involucrata	Prairie Winecups	P	L	30	VL	5	L	1	L	36
Calocedrus decurrens	Cedar, Incense	T	M	7	L	2	L	2	M	11
Calochortus gunnisonii	Mariposa Lily	P	VL	9	VL	1	L	2	L	12
Caltha leptosepala	Marsh Marigold, White	P	H	7	H	2	H	2	H	11
Caltha palustris	Marsh Marigold, Yellow	P	H	8	H	2	H	1	H	11
Calycanthus floridus	Carolina Allspice	S	H	4	H	1	H	1	H	6
Calylophus hartwegii fendleri	Sundrops, Fendler's	P	L	18	VL	6	L	1	L	25
Calylophus serrulatus	Shrubby Evening Primrose	P	L	4					L	4
Campanula carpatica	Harebell, Carpathian	P	M	19	M	3	M	1	M	23
Campanula cochleariifolia	Bluebells, Little	P	M	15	M	3	M	1	M	19
Campanula garganica	Bellflower, Greek	P	M	14	M	3	M	1	M	18
Campanula glomerata	Bellflower, Clustered	P	M	21	M	3	M	1	M	25
Campanula lactiflora	Bellflower, Milky	P	M	10	L	2			M	12
Campanula medium	Canterbury Bells	A P	M	16	M	3	H	2	M	21
Campanula persicifolia	Bellflower, Peach-Leaved	P	M	22	M	3	M	1	M	26
Campanula portenschlagiana	Bellflower, Dalmatian	P	M	16	L	2	M	1	M	19
Campanula poscharskyana	Blue Bells, Adriatic	P	M	18	L	2	M	1	M	21
Campanula punctata 'Cherry Bells'	Bellflower, Cherry Bells	P	M	11	L	1			M	12
Campanula rotundifolia	Harebell, Blue Native	P	L	27	L	5	L	3	L	35
Campsis radicans	Trumpet Vine	P V	L	23					L	23
Campsis x tagliabuana	Trumpet Vine	P V	L	13					L	13
Canna x generalis	Canna	A	H	19	H	1	H	1	H	21
Caragana arborescens	Peashrub, Siberian	S	L	33	VL	8	L	7	L	48
Caragana frutex	Peashrub, Russian	S	L	19	VL	4	L	2	L	25
Caragana maximowicziana	Peashrub, Maximowics	S	VL	12	L	2	L	1	VL	15
Caragana microphylla	Peashrub, Littleleaf	S	VL	12	VL	3	L	1	VL	16
Caragana pygmaea	Peashrub, Pygmy	S	L	22	VL	6	VL	3	L	31
Carex aquatilis	Sedge, Water	P	H	8	H	2	H	1	H	11
Carex buchananii	Sedge, Leatherleaf	P	M	12	M	2			M	14
Carex comans	Sedge, New Zealand Hair	A	M	4					M	4
Carex conica	Sedge, Dwarf	P	M	4	M	1			M	5
Carex elata	Sedge, Tufted	P	M	5	M	1	H	1	M	7
Carex flacca	Sedge, Blue Green	P	M	5					M	5

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Carex flagelifera	Sedge, Copperleaf	P	M	4	H	1			M	5
Carex glauca	Sedge, Blue	P	M	4	M	1			M	5
Carex lanuginosa	Sedge, Hairy	P	H	5	H	2	H	1	H	8
Carex morrowii	Sedge, Japanese	P	M	7	H	1			M	8
Carex muskingumensis	Sedge, Palm	P	M	4	H	1			M	5
Carex nebraskensis	Sedge, Nebraska	P	H	5	H	1	H	1	H	7
Carex rostrata	Sedge, Beaked	P	H	4	H	2	H	1	H	7
Carpinus betulus	Hornbeam, European	T	M	21	M	2	M	2	M	25
Carpinus caroliniana	Hornbeam, American	T	M	21	M	3	M	3	M	27
Carpinus japonica	Hornbeam, Japanese	T	M	5	M	1	M	1	M	7
Caryopteris incana	Spirea, Blue Mist	S	L	25	L	5	VL	3	L	33
Caryopteris x clandonensis	Spirea, Blue Mist	S	L	40	L	6	VL	5	L	51
Castilleja integra	Indian Paintbrush, Orange	P	L	20	VL	3	L	2	L	25
Castilleja linariaefolia	Indian Paintbrush, Wyoming	P	L	12	VL	1	L	2	L	15
Castilleja miniata	Indian Paintbrush, Scarlet	P	L	12	VL	1	M	1	L	14
Castilleja rhexifolia	Indian Paintbrush, Rose	P	L	10	VL	1	H	2	L	13
Catalpa ovata	Catalpa, Chinese	T	M	18	L	3	L	3	L	24
Catalpa speciosa	Catalpa, Western	T	L	44	L	6	L	3	L	53
Catananche caerulea	Cupid's Dart	P	L	14			L	1	L	15
Catharanthus roseus	Periwinkle, Madagascar	A	L	14	L	1	L	2	L	17
Ceanothus fendleri	Deerbrush	S	L	13	VL	4	L	5	L	22
Ceanothus gloriosus	Point Reyes Creeper	S	L	4	L	2	L	2	L	8
Ceanothus velutinus	Snowbrush	S	L	8	M	1	M	1	M	10
Cedrus deodora	Cedar, Deodar	T	M	11	M	3	L	2	L	16
Cedrus libani atlantica	Cedar, Blue Atlas	T	M	11	M	1	M	1	M	13
Celastrus scandens	American Bittersweet	S V	L	20	L	3	L	2	L	25
Celosia argentea plumosa	Cockscomb	A	M	19	M	1	L	2	M	22
Celtis laevigata	Sugarberry	T	L	8	L	2	L	2	L	12
Celtis occidentalis	Hackberry, Western	T	L	40	L	7	L	5	L	52
Celtis reticulata	Hackberry, Canyon	S T	L	22	L	4	L	4	L	30
Centaurea cyanus	Bachelor Button	A	L	25	L	3	L	3	L	31
Centaurea dealbata	Bachelor Button, Pink	P	L	15	L	1	L	1	L	17
Centaurea montana	Bachelor Button, Perennial	P	M	23	VL	1	M	1	L	25
Centranthus ruber	Valerian, Red	P	L	29	L	4	L	3	L	36
Cerastium alpinum lanatum	Wooly Cerastium	P	L	4	L	1			L	5
Cerastium arvense	Chickweed, Mouse-ear	P	L	9	L	1	L	1	L	11
Cerastium tomentosum	Snow-In-Summer	P	L	30	VL	4	VL	3	L	37
Ceratostigma plumbaginoides	Plumbago	P	L	21	M	1			L	22
Cercidiphyllum japonicum	Katsura Tree	T	M	11	H	2	H	2	M	15
Cercis canadensis	Redbud, Eastern	S T	M	42	M	7	L	4	M	53
Cercocarpus breviflorus	Mountain Mahogany, Little Flower	S	VL	19	VL	5	VL	4	VL	28
Cercocarpus ledifolius	Mountain Mahogany, Curlleaf	S T	VL	40	VL	11	VL	7	VL	58
Cercocarpus montanus	Mountain Mahogany, Common	S T	VL	38	VL	11	VL	9	VL	58
Chaenomeles japonica	Quince, Japanese Flowering	S	M	28	L	4	L	3	L	35
Chaenomeles speciosa	Quince, Flowering	S	M	23	L	3	L	3	L	29
Chaenomeles x superba	Quince, Hybrid Flowering	S	L	15	L	1	L	1	L	17
Chamaebatiaria millefolium	Fernbush	S	VL	25	VL	4	VL	4	VL	33
Chamaecyparis obtusa	Cypress, Hinoki	S	M	13	M	1	M	1	M	15
Chamaecyparis pisifera	Cypress, Japanese False	T	M	10	L	2	L	2	M	14
Chamaemelum nobile	Chamomile	P	L	8	L	1	M	1	L	10
Chamerion angustifolium	Fireweed	P	L	9	L	1	L	3	L	13
Chasmanthium latifolium	Sea Oats, Northern	P	M	16	M	1			M	17
Chilopsis linearis	Desert Willow	S	L	12	VL	3	L	2	L	17
Chionanthus retusus	Fringe Tree, Chinese	S T	M	11	L	3	L	3	M	17
Chionanthus virginicus	Fringe Tree, White	S T	M	19	L	3	M	3	M	25
Chitalpa tashkentensis	Chitalpa	S	L	8	L	2	L	2	L	12
Chrysanthemum x morifolium	Garden Mum	P	M	28	M	3	M	2	M	33
Chrysothamnus nauseosus	Rabbitbrush	S	VL	36	VL	9	VL	5	VL	50
Chrysothamnus viscidiflorus	Rabbitbrush, Sticky	S	VL	24	VL	6	VL	2	VL	32
Cimicifuga racemosa	Black Snakeroot	P	M	16	M	1			M	17
Cimicifuga simplex 'White Pearl'	White Bottlebrush	P	M	10	M	1			M	11
Cladrastis lutea	Yellowwood	T	M	19	M	3	L	3	M	25
Clematis alpina	Clematis, Alpine	P V	M	13			M	1	M	14
Clematis columbiana	Clematis, Columbian Virgin's Bow	P V	M	7			M	2	M	9
Clematis cultivars	Clematis	P V	M	29	L	2	M	1	M	32
Clematis hirsutissima	Clematis, Woolly	P	L	10	VL	1	L	2	L	13
Clematis integrifolia	Clematis, Bush	P	M	13			L	1	M	14
Clematis ligusticifolia	Clematis, Western Virgin's Bower	P V	L	17	VL	2	L	3	L	22
Clematis montana rubens	Clematis, Pink Anemone	P V	M	11					M	11
Clematis paniculata	Clematis, Spring	P V	M	16	M	1	M	1	M	18
Clematis pitcheri	Clematis, Purple Leatherflower	P V	M	9					M	9
Clematis tangutica	Clematis, Yellow Lantern	P V	L	16			L	1	L	17
Clematis terniflora	Clematis, Sweet Autumn	P V	L	16	L	1	M	1	L	18
Clematis texensis	Clematis, Scarlet	P	M	9					M	9
Clematis virginiana	Clematis, Virgin's Bower	P V	L	8			H	1	M	9
Clematis viticella	Clematis, Italian	P V	M	9					M	9
Cleome hassleriana	Spiderflower	A	M	15	M	1	H	2	M	18
Cleome serrulata	Rocky Mountain Beeplant	A	L	10	L	1	L	3	L	14
Clethra alnifolia	Summersweet	S	H	8	H	2	H	1	H	11
Coleus spp.	Coleus	A	M	25			M	3	M	28
Colutea arborescens	Bladder Pod	S	L	8	L	2	M	1	L	11
Convallaria majalis	Lily-of-the-Valley	GCP	M	25	M	1	M	1	M	27
Coreopsis 'Limerock Ruby'	Coreopsis, Limerock Ruby	P	M	14					M	14
Coreopsis auriculata	Coreopsis, Eared	P	L	20	VL	1			L	21

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Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Coreopsis grandiflora	Coreopsis, Large-flowered	P	L	23	L	2	L	1	L	26
Coreopsis lanceolata	Coreopsis, Lance-leaf	P	L	25	L	3	L	2	L	30
Coreopsis rosea	Coreopsis, Pink	P	M	18	L	2	L	1	M	21
Coreopsis tinctoria	Coreopsis, Plains	A	L	19	L	1	L	2	L	22
Coreopsis verticillata	Coreopsis, Thread Leaf	P	L	25	L	3	L	1	L	29
Cornus alba	Dogwood, Tatarian	S	M	21	M	2	M	2	M	25
Cornus alternifolia	Dogwood, Pagoda	S T	M	26	M	3	M	2	M	31
Cornus anomum	Dogwood, Silky	S	M	7	H	1	H	1	H	9
Cornus canadensis	Dogwood, Bunchberry	S	M	11	M	2	M	3	M	16
Cornus florida	Dogwood, Flowering	T	H	20	H	3	M	2	M	25
Cornus kousa	Dogwood, Kousa	S T	M	23	H	4	M	3	M	30
Cornus mas	Dogwood, Cornelian Cherry	S T	M	25	M	5	M	3	M	33
Cornus pumila	Dogwood, Dwarf Red Tipped	S	M	12	H	1	H	1	M	14
Cornus racemosa	Dogwood, Gray	S T	M	23	M	5	M	4	M	32
Cornus sericea (stolonifera)	Dogwood, Redosier	S	M	23	M	3	H	4	M	30
Cornus stolonifera 'Kelseyi'	Dogwood, Kelsey Dwarf	S	M	28	M	4	M	2	M	34
Cortaderia selloana	Grass, Pampas	P	L	11					L	11
Corylus americana	Filbert, American	T	M	19	M	3	M	3	M	25
Corylus avellana 'Contorta'	Harry Lauder's Walkingstick	S	M	21	M	3	M	2	M	26
Corylus colurna	Filbert, Turkish	T	L	20	M	3	L	3	L	26
Corylus cornuta	Filbert, Beaked	S	M	10	M	2	M	2	M	14
Cosmos bipinnatus	Cosmos	A	L	27	L	1	L	2	L	30
Cotinus coggygria	Smoke Tree	S	M	27	L	4	L	2	M	33
Cotoneaster adpressa praecox	Cotoneaster, Creeping	S	M	13	M	3	L	2	M	18
Cotoneaster apiculatus	Cotoneaster, Cranberry	S	L	33	M	5	L	3	L	41
Cotoneaster congestus	Cotoneaster, Pyrenees	S	L	8	L	1	L	1	L	10
Cotoneaster dammeri	Cotoneaster, Bearberry	S	M	24	M	3	L	2	M	29
Cotoneaster divaricatus	Cotoneaster, Spreading	S	L	27	L	5	L	5	L	37
Cotoneaster glaucophyllus	Cotoneaster, Grey	S	L	10	L	1	L	1	L	12
Cotoneaster horizontalis	Cotoneaster, Rock	S	M	27	L	2	L	2	M	31
Cotoneaster lacteus /parneyi	Cotoneaster, Parney's Red	S	M	10	L	2	L	2	M	14
Cotoneaster lucidus /acutifolius	Cotoneaster, Peking	S	L	33	L	5	L	4	L	42
Cotoneaster multiflorus	Cotoneaster, Many Flowered	S	L	18	L	2	L	2	L	22
Cotoneaster nanshan	Cotoneaster, Creeping	S	L	9	L	1	L	1	L	11
Cowania mexicana	Cliffrose	S	VL	28	VL	5	VL	5	VL	38
Crambe cordifolia	Colewort	P	M	11					M	11
Crataegus 'Skinner Dwarf'	Hawthorn, Skinner Dwarf	T	L	10	L	1	L	1	L	12
Crataegus ambigua	Hawthorn, Russian	S T	L	40	L	8	L	6	L	54
Crataegus arnoldiana	Hawthorn, Arnold	T	M	12	L	2	L	2	L	16
Crataegus chrysocarpa	Hawthorn, Fire Berry	S T	L	13	L	3	L	3	L	19
Crataegus crus-galli	Hawthorn, Cockspur	S T	L	40	L	7	L	5	L	52
Crataegus crus-galli 'Inermis'	Hawthorn, Thornless Cockspur	S T	L	37	L	6	L	5	L	48
Crataegus douglassii	Hawthorn, Douglas	S T	L	23	L	6	L	4	L	33
Crataegus laevigata	Hawthorn, English	T	M	24	L	3	L	3	L	30
Crataegus mollis	Hawthorn, Downy	S T	L	28	L	6	L	4	L	38
Crataegus phaenopyrum	Hawthorn, Washington	S T	L	40	L	7	L	4	L	51
Crataegus punctata	Hawthorn, Thicket	T	L	9	L	1			L	10
Crataegus rivularis	Hawthorn, River	S T	M	16	L	3	L	3	L	22
Crataegus succulenta	Hawthorn, Colorado	S T	L	17	L	3	L	3	L	23
Crataegus x mordenensis	Hawthorn, Morden	T	L	18	L	2	L	2	L	22
Cuphea spp.	Cigar Flower	A	M	7			M	1	M	8
Cupressocyparis leylandii	Cypress, Leyland	T	M	6	L	2	L	2	M	10
Cupressus arizonica	Cypress, Arizona	T	L	12	L	3	L	2	L	17
Cytisus purgans 'Spanish Gold'	Broom, Spanish Gold	S	L	31	VL	3	L	3	L	37
Cytisus scoparius	Broom, Scotch	S	L	23	L	2	L	3	L	28
Cytisus x praecox	Broom, Warminster	S	L	22	L	2	L	1	L	25
Dahlia pinnata	Dahlia	A	M	21			M	2	M	23
Dalea formosa	Indigo Bush	P	L	7					L	7
Dalea purpurea	Clover, Purple Prairie	P	L	14			M	1	L	15
Daphne cneorum	Daphne, Rose	S	M	15	L	3	M	3	M	21
Daphne x burkwoodi	Daphne, Burkwood	S	M	31	L	3	M	3	M	37
Dasylirion wheeleri	Sotol Yucca	S	L	10	L	2	M	1	L	13
Datura sp.	Angel's Trumpet	A	L	16			M	1	L	17
Davidia involucrata	Dove Tree	T	M	6	M	1	M	1	M	8
Delosperma Mesa Verde	Iceplant, Mesa Verde	P	L	21	L	2	L	2	L	25
Delosperma Table Mountain	Iceplant, Table Mountain	P	L	21	L	2	L	2	L	25
Delosperma cooperi	Iceplant, Purple	P	L	31	L	4	L	2	L	37
Delosperma floribundum 'Starburst'	Iceplant, Starburst	P	L	24	L	3	L	2	L	29
Delosperma nubigenum	Iceplant, Yellow Hardy	P	L	27	L	4	L	2	L	33
Delphinium grandiflorum	Larkspur, Chinese	P	M	21	M	4	L	4	M	29
Delphinium nelsonii	Larkspur, Nelson	P	L	8	M	1	M	1	L	10
Delphinium species	Larkspur,	P	M	18	M	4	M	5	M	27
Delphinium x Pacific Giant	Larkspur, Mixed	P	M	23	M	3	M	4	M	30
Dendranthema weyrichii 'Pink Bomb'	Daisy, Pink Bomb	P	M	8	M	1	M	1	M	10
Dendranthema x rubellum 'Clara Curtis'	Daisy, Rose Pink	P	M	13	M	1	M	1	M	15
Deschampsia cespitosa	Grass, Tufted Hair	P	M	15	M	2	H	2	M	19
Deutzia gracilis	Deutzia, Slender	S	M	10	M	2	M	2	M	14
Dianthus anatolicus	Pinks, Anatolian	P	L	9	L	1	L	2	L	12
Dianthus barbatus	Sweet William	P	M	24	L	2	M	3	M	29
Dianthus caryophyllus	Carnation, Hardy	P	M	18	L	1	L	2	M	21
Dianthus cultivars	Pinks	A P	M	24	L	2	L	3	M	29
Dianthus deltoides	Pinks, Maiden	P	M	20	L	2	L	2	M	24
Dianthus graniticus	Pinks, Granite	P	M	13	L	2	M	3	M	18
Dianthus gratianopolitanus	Pinks, Pincushion	P	M	17	L	2	L	2	M	21

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Dianthus plumarius (lumnitzer)	Pinks, Cottage	P	M	13	L	1	L	2	M	16
Dianthus x chinensis	Border Pink	A	M	17			L	2	M	19
Diascia barberae	Twinspur	A	M	15	L	1			L	16
Diascia integerrima 'Coral Canyon'	Twinspur, Coral Canyon	A P	L	26	L	2	L	2	L	30
Dicentra eximia	Bleeding Heart, Fringed	P	M	22	H	2	H	2	M	26
Dicentra formosa	Bleeding Heart, Fringed	P	M	21	M	3	M	4	M	28
Dicentra spectabilis	Bleeding Heart, Old Fashioned	P	M	24	M	3	M	4	M	31
Dictamnus albus	Gas Plant	P	M	6					M	6
Diervilla lonicera	Honeysuckle, Bush	S	L	20	L	4	L	2	L	26
Digitalis 'Mertonensis'	Foxglove, Perennial Pink	P	M	19	M	1	M	1	M	21
Digitalis grandiflora	Foxglove, Perennial Yellow	P	M	19	L	3	M	2	M	24
Digitalis purpurea	Foxglove, Common	P	M	23	M	1	M	2	M	26
Digitalis thapsi	Foxglove, Spanish	P	M	23	M	1	M	1	M	25
Dodecatheon pulchellum	Shooting Star	P	M	14			M	1	M	15
Doronicium grandiflorum	Leopard's Bane	P	M	9	L	1	L	1	M	11
Draba hispanica	Draba, Spanish	P	L	9					L	9
Dracocephalum botryoides	Dragonhead, Evergreen	P	L	5					L	5
Dryopteris dilatata	Fern, Broad Buckler	P	H	8					H	8
Dryopteris erythrosora	Fern, Autumn	P	M	10	M	1			M	11
Dryopteris filix-mas	Fern, Leatherwood Male	P	M	14			M	1	M	15
Dryopteris marginalis	Fern, Leatherwood	P	H	10					H	10
Duchesnea indica	Strawberry, Mock	P	L	18	L	1	L	2	L	21
Dyssodia tenuiloba	Daisy, Dahlberg	A	L	6					L	6
Echinacea angustifolia	Coneflower, Narrow Leaf Purple	P	L	22	L	1	L	1	L	24
Echinacea purpurea	Coneflower, Purple	P	L	35	L	4	M	2	L	41
Echinops ritro	Globe Thistle	P	L	21	L	2	L	1	L	24
Elaeagnus commutata	Silverberry	S	L	19	L	2	L	3	L	24
Eleagnus umbellata	Autumn Olive	S T	L	22	VL	5	L	4	L	31
Ephedra torreyana	Joint Fir, Torrey	S	VL	16	VL	4	VL	4	VL	24
Ephedra viridis	Mormon Tea	S	VL	22	VL	4	VL	4	VL	30
Epilobium fleischeri	Willowherb, Alpine	P	M	11	L	2	L	2	M	15
Epimedium x cantabrigiense	Bishop's Hat	P	M	9					M	9
Equisetum hyemale	Rush, Scouring	P	H	8			H	1	H	9
Eragrostis trichodes	Grass, Sand Love	P	L	6	L	1			L	7
Erica carnea (herbacea)	Heath, Winter	P	M	5					M	5
Erigeron compositus	Daisy, Cut-Leaf	P	L	17	VL	1	VL	3	L	21
Erigeron divergens	Daisy, Spreading	P	L	9	VL	1	L	1	L	11
Erigeron flagelleris	Daisy, Whiplash	P	L	13	VL	2	L	2	L	17
Erigeron speciosus	Fleabane, Showy	P	L	14	L	1	L	2	L	17
Erigeron subtrinervis	Fleabane, Three-nerved	P	L	9	L	1			L	10
Erigeron vetensis	Daisy, Early Bluetop	P	L	5	L	1			L	6
Eriogonum jamesii	Sulphur Flower, Creamy	P	L	13	L	3	L	4	L	20
Eriogonum umbellatum	Sulphur Flower	P	VL	25	L	4	VL	6	VL	35
Erodium reichardii	Heron's Bill	P	M	8			L	1	M	9
Eryngium alpinum 'Superbum'	Sea Holly	P	L	10	L	1	L	1	L	12
Eryngium amethystinum	Sea Holly, Amethyst	P	L	8	L	1	L	1	L	10
Eryngium planum 'Blaukappe'	Sea Holly, Blue Cap	P	L	11	L	1	L	1	L	13
Eryngium variifolium	Sea Holly, Moroccan	P	L	10	L	1	L	1	L	12
Eryngium yuccifolium	Button-Snakeroot	P	L	11	L	1	L	1	L	13
Erysimum asperum	Wallflower	P	L	14	M	1	L	2	L	17
Erysimum kotschyanum	Wallflower, Alpine	P	M	9	M	1	M	2	M	12
Eschscholzia californica	Poppy, California	P	L	28	VL	3	L	4	L	35
Euonymus alatus	Burning Bush	S	M	33	M	5	M	3	M	41
Euonymus europaeus	Spindle Tree	S T	M	28	M	5	M	3	M	36
Euonymus fortunei 'Coloratus'	Wintercreeper, Purpleleaf	GCP	L	21	L	2	M	1	L	24
Euonymus fortuneii	Euonymus	S	M	30	M	4	M	3	M	37
Euonymus kewensis	Eyonymus, Kew	GC	M	13	M	1			M	14
Euonymus kiautschovica 'Manhattan'	Euonymus, Manhattan	S	M	28	M	4	M	2	M	34
Eupatorium purpureum	Joe-Pye Weed	P	M	5					M	5
Euphorbia amygdaloides	Spurge, Wood	P	L	13	VL	1	L	1	L	15
Euphorbia polychroma	Spurge, Cushion	P	L	22			L	1	L	23
Eurotia lanata	Winterfat	S	VL	14	VL	5	VL	3	VL	22
Fagus sylvatica	Beech, European	T	M	27	H	3	M	3	M	33
Fallopia japonica compacta	Fleeceflower, Dwarf	P	L	12	VL	1	VL	1	L	14
Fallugia paradoxa	Apache Plume	S	VL	43	VL	6	VL	6	VL	55
Fendlera rupicola	Mockorange, False	S	VL	15	VL	3	VL	3	VL	21
Festuca arundinacea	Tall Fescue	TU	M	17	M	3	M	3	M	23
Festuca glauca	Fescue, Blue	P	L	25	L	3	L	2	L	30
Festuca idahoensis	Fescue, Idaho	P	L	7			M	1	L	8
Festuca ovina	Fescue, Sheep	P TU	L	18	M	3	M	3	L	24
Festuca ovina duriuscula	Hard Fescue	TU	M	8	H	1	H	1	M	10
Festuca rubra	Fescue, Red	TU	M	12	M	2	H	1	M	15
Festuca rubra commutata	Fescue, Chewings	P TU	L	9	H	1	H	1	M	11
Filipendula rubra	Meadowsweet	P	M	13					M	13
Filipendula ulmaria	Meadow Sweet	P	M	10					M	10
Forestiera neomexicana	Privet, New Mexico	S	L	30	VL	5	VL	5	L	40
Forsythia cultivars	Forsythia	S	M	32	M	4	M	3	M	39
Forsythia viridissima 'Broxensis'	Forsythia, Dwarf	S	M	20	M	3	L	2	M	25
Forsythia x intermedia	Forysthia	S	M	26	M	3	M	2	M	31
Fothergilla gardenii	Fothergilla, Dwarf	S	M	12	L	2	L	2	M	16
Fothergilla major	Fothergilla, Large	S	M	10	VL	1	L	2	M	13
Fragaria americana	Strawberry, Wild	GCP	L	21	L	2	L	2	L	25
Fragaria cultivars	Strawberry	GCP	M	22	M	1	M	1	M	24
Fragaria vesca	Strawberry, Runnerless	GCP	M	13			M	1	M	14

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Fragaria virginiana glauca	Strawberry, Scarlet	P	L	6			M	1	M	7
Frasera speciosa	Gentian, Green	P	M	4			H	1	M	5
Fraxinus americana	Ash, White	T	M	36	M	4	M	3	M	43
Fraxinus angustifolia 'Raywood'	Ash, Raywood	T	M	8	M	2	M	1	M	11
Fraxinus anomala	Ash, Single-Leaf	S T	L	18	L	4	L	2	L	24
Fraxinus excelsior	Ash, European	T	M	16	M	2	M	1	M	19
Fraxinus latifolia	Ash, Oregon	T	M	6	M	1	M	1	M	8
Fraxinus mandshurica 'Mancana'	Ash, Mancana Manchurian	T	M	20	M	2	M	2	M	24
Fraxinus nigra	Ash, Black	T	M	20	M	3	M	3	M	26
Fraxinus pennsylvanica	Ash, Green	T	M	43	M	5	M	4	M	52
Fraxinus quadrangulata	Ash, Blue	T	M	12	M	2	M	2	M	16
Fraxinus velutina	Ash, Arizona	T	M	10	M	3	L	2	M	15
Gaillardia aristata	Blanket Flower, Native	P	L	31	VL	3	L	2	L	36
Gaillardia x grandiflora	Blanket Flower	P	L	25	VL	1	L	2	L	28
Galium boreale	Northern Bedstraw	P	L	8					L	8
Galium odoratum	Sweet Woodruff	P	M	30	L	2	VL	1	M	33
Gaura lindheimeri	Whirling Butterflies	P	L	28	L	2			L	30
Gazania krebsiana Tanager	Gazania, Orange Hardy	A P	L	19			L	1	L	20
Gazania linearis 'Colorado Gold'	Gazania, Colorado Gold Hardy	P	L	21			L	1	L	22
Gazania rigens	Treasure Flower	A	L	12			L	1	L	13
Genista pilosa 'Vancouver Gold'	Broom, Vancouver Gold	S	L	11	L	1	L	1	L	13
Genista tinctoria 'RoyalGold'	Woadwaxen, Royal Gold	S	L	11	L	2	L	1	L	14
Gentiana affinis	Gentian, Northern Pleated	P	M	11			H	1	M	12
Gentiana cachemirica	Gentian, Himalayan	P	M	6					M	6
Gentiana calycosa	Gentian, Explorer's	P	M	5			L	1	L	6
Gentiana septemfida lagodechiana	Gentian, Crested	P	M	8			H	1	M	9
Geranium caespitosum	Cranesbill, Purple Wild	P	L	15			M	1	L	16
Geranium cinereum 'Ballerina'	Cranesbill, Ballerina Grayleaf	P	M	20			M	1	M	21
Geranium cultivars	Cranesbill	P	M	23	M	1	M	1	M	25
Geranium dalmaticum	Cranesbill, Compact Rose	P	M	13			M	1	M	14
Geranium endressii 'Wargrave Pink'	Cranesbill, Pink	P	M	15	M	1	M	1	M	17
Geranium himalayense	Cranesbill, Lilac	P	M	17			M	1	M	18
Geranium macrorrhizum	Cranesbill, Adriatic	P	L	14	VL	1	L	2	L	17
Geranium maculatum	Geranium, Wild	P	L	16			M	1	M	17
Geranium magniflorum La Veta Lace	Geranium, La Veta Lace	P	M	11					M	11
Geranium platypetalum	Cranesbill, Broad-petaled	P	M	10			M	1	M	11
Geranium psilostemon	Cranesbill, Armenian	P	M	9			M	1	M	10
Geranium sanguineum	Cranesbill, Bloody	P	M	23	L	3	M	1	M	27
Geranium viscosissimum	Geranium, Sticky	P	L	13	L	1	M	1	L	15
Geranium x cantabrigiense	Cranesbill, Cambridge	GCP	L	16	M	1	M	1	M	18
Geranium x magnificum	Cranesbill, Showy	P	M	13	M	1	M	1	M	15
Geranium x oxonianum 'Claridge Druce'	Cranesbill, Lilac Pink	P	M	18	L	2			M	20
Geum chiloense	Avens, Chilean	P	M	17	M	1	L	1	M	19
Geum coccineum 'Borisii'	Avens, Orange	P	M	15			L	1	M	16
Geum triflorum	Avens, Prairie Smoke	P	L	19	M	2	L	1	L	22
Ginkgo biloba	Maidenhair Tree	T	M	24	M	3	M	1	M	28
Glechoma hederacea	Ivy, Ground	GCP	M	11			L	1	M	12
Gleditsia triacanthos inermis	Honeylocust, Thornless	T	L	42	L	6	L	3	L	51
Globularia cordifolia	Daisy, Dwarf Globe	GCP	L	12			L	1	L	13
Gomphrene globosa	Globe Amaranth	A	L	15			L	2	L	17
Grindelia squarrosa	Gumweed, Curly-cupped	P	L	7			VL	1	L	8
Gutierrezia sarothrae	Snakeweed	P	VL	12	VL	2	L	1	VL	15
Gymnocarpium dryopteris	Fern, Oak	P	L	1					L	1
Gymnocladus dioica	Kentucky Coffeetree	T	L	38	L	5	L	3	L	46
Gypsophila paniculata	Baby's Breath	P	L	33	M	1	VL	1	L	35
Gypsophila repens	Baby's Breath, Creeping	P	L	24	M	1	L	2	M	27
Hakonechloa macra	Grass, Japanese Forest	P	H	6					H	6
Hamamelis vernalis	Witchhazel, Vernal	S T	M	16	M	3	M	3	M	22
Hamamelis virginiana	Witchhazel, Common	S T	M	18	M	4	M	4	M	26
Haplopappus glutinosus	Golden Star	P	L	8			VL	1	L	9
Hebe albicans	Hebe	P	M	3					M	3
Hedera helix	Ivy, English	V	M	25	L	2	M	1	M	28
Helenium autumnale	Sneezeweed	P	M	17	M	1	L	1	M	19
Helianthemum	Sunrose	P	L	25	M	1	L	1	L	27
Helianthus maximiliana	Sunflower, Maximilian	P	L	27	L	2	VL	1	L	30
Helianthus pumilus	Sunflower, Dwarf	P	L	7					L	7
Helichrysum bracteatum	Strawflower	A	L	11			L	1	L	12
Helichrysum sibthorpii	Everlasting	P	L	5					L	5
Helictotrichon sempervirens	Grass, Blue Avena	P	L	28	L	3	M	1	L	32
Heliopsis helianthoides	False Sunflower	P	M	19			L	1	M	20
Heliotropium arborscens	Heliotrope	A	M	13	M	2	M	1	M	16
Helleborus argutifolius	Hellebore	P	M	14					M	14
Helleborus orientalis	Lenten Rose	P	M	4	M	1			M	5
Hemerocallis	Daylily	P	L	36	L	3	M	3	L	42
Hesperaloe parviflora	Yucca, Red	S	VL	18	VL	3	VL	2	VL	23
Heterotheca horrida	Aster, Golden	P	L	8					L	8
Heterotheca villosa	Aster, Hairy Golden	P	L	12			VL	1	L	13
Heuchera americana	Coral Bells, American	P	M	21			M	1	M	22
Heuchera cultivars	Coral Bells	P	M	27	L	2	M	1	M	30
Heuchera micrantha	Coral Bells, Smallflowered	P	M	19			M	1	M	20
Heuchera sanguinea	Coral Bells	P	M	24	M	1	M	1	M	26
Heuchera x brizoides	Coral Bells, Hybrid	P	M	11					M	11
Heucherella alba	Heucherella, White	P	M	12	M	1			M	13
Hibiscus moscheutos	Rose Mallow	P	M	21					M	21

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Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Hibiscus syriacus	Althea	S	M	29	M	5	M	2	M	36
Hieracium lanatum	Hawkweed, Felted	P	L	8	L	1			L	9
Hierochloe odorata	Grass, Indian Sweet	P	L	5					L	5
Hippophae rhamnoides	Sea Buckthorn	S T	L	28	VL	6	VL	5	L	39
Holodiscus discolor	Ocean-Spray	S	L	15	VL	2	VL	2	L	19
Holodiscus dumosus	Rock Spirea	S	L	23	VL	5	VL	5	L	33
Hosta cultivars	Hosta	P	M	31	L	2	M	1	M	34
Hosta sieboldiana	Hosta, Sieboldiana	P	M	24	M	1	M	1	M	26
Hosta x fortunei	Hosta, Fortunei	P	M	20			M	1	M	21
Hosta x tardiana 'Halcyon'	Hosta, Halcyon	P	M	15					M	15
Hosta x undulata	Hosta, Wavy	P	M	20	M	1	M	2	M	23
Houttuynia cordata 'Chameleon'	Chameleon Plant	P	M	10					M	10
Humulus lupulus neomexicanus	Hop Vine, Native	P V	L	16	L	1	L	2	L	19
Hydrangea anomala	Hydrangea, Climbing	S	M	14	L	2	L	2	M	18
Hydrangea anomala petiolaris	Hydrangea, Climbing	V	M	11					M	11
Hydrangea arborescens 'Annabelle'	Hydrangea, Annabelle Smooth	S	M	25	M	3	M	2	M	30
Hydrangea macrophylla	Hydrangea, Bigleaf	S	M	13	M	2	M	2	M	17
Hydrangea paniculata	Hydrangea, Panicle	S	M	19	L	2	L	2	M	23
Hydrangea quercifolia	Hydrangea, Oakleaf	S	M	13	L	2	L	2	M	17
Hymenoxys acaulis	Daisy, Angelita	P	L	5			L	1	L	6
Hypericum 'Hidcote'	St. John's Wort, Hidcote	P S	M	27	L	4	L	2	M	33
Hypericum calycinum	St. John's Wort, Mounding	GCP	M	13	M	1			M	14
Hypericum kalmianum	St. John's Wort, Kalm	S	L	16	M	3	L	2	M	21
Hypericum patulum	St. John's Wort, Goldencup	P	M	12	M	1			M	13
Hypericum reptans	St. John's Wort, Creeping	GCP	L	14	M	1			L	15
Hyssopus officinalis	Hyssop	P	L	6					L	6
Iberis gibraltarica	Candytuft, Lilac	GCP	L	13			M	1	L	14
Iberis sempervirens	Candytuft, Evergreen	GCP	L	26	M	1	M	1	L	28
Ilex glabra 'Compacta'	Holly, Compact Inkberry	S	M	10	M	2	M	2	M	14
Ilex x meserveae	Holly, Blue	S	M	19	M	3	M	2	M	24
Ilex x verticillata 'Winter Red'	Holly, Winter Red	S	H	7	M	2	M	2	M	11
Impatiens wallerana	Impatiens	A	H	23	H	1	M	2	H	26
Imperata cylindrica 'Red Baron'	Grass, Japanese Blood	P	M	17					M	17
Incarvillea delavayi	Gloxinia, Hardy	P	M	11					M	11
Ipomea batatas	Sweet Potato Vine	A	M	17			L	1	M	18
Ipomopsis aggregata	Gilia, Scarlet	P	L	17	L	2	L	2	L	21
Ipomopsis candida	Fairy Trumpet, White	P	L	7			L	1	L	8
Iris ensata (kaempheri)	Iris, Japanese	P	M	19	M	1	M	1	M	21
Iris missouriensis	Iris, Western Blue Flag	P	M	21	L	2	L	2	L	25
Iris orientalis	Iris, Yellow Butterfly	P	L	8					L	8
Iris pallida 'Variegata'	Iris, Variegated Sweet	P	L	21			M	1	L	22
Iris pseudacorus	Iris, Yellow Flag	P	M	17			H	1	M	18
Iris setosa artica	Iris, Dwarf Blue Flag	P	M	14			M	1	M	15
Iris siberica	Iris, Siberian	P	M	27	L	1	L	2	M	30
Iris x germanica	Iris, Bearded	P	L	33	L	1	L	3	L	37
Iris x pumila	Iris, Dwarf Bearded	P	L	19	M	1	M	1	L	21
Itea virginica	Sweetspire	S	M	7	M	2	M	2	M	11
Jamesia americana	Waxflower	S	L	20	L	5	L	6	L	31
Jasminum fruticans	Jasmine, Evergreen Yellow	P	M	4					M	4
Juglans nigra	Walnut, Black	T	L	35	L	4	L	3	L	42
Juncus balticus	Rush, Baltic	P	H	5			H	1	H	6
Juncus compressus	Rush, Round-fruit	P	H	5			H	1	H	6
Juncus effusus	Rush, Corkscrew	P	H	5			H	1	H	6
Juncus torreyi	Rush, Torrey	P	H	5			H	1	H	6
Juniperus chinensis	Juniper, Chinese	S T	L	39	L	7	L	8	L	54
Juniperus communis	Juniper, Common	S	L	36	L	6	L	8	L	50
Juniperus horizontalis	Juniper, Creeping	S	L	30	L	6	L	5	L	41
Juniperus monosperma	Juniper, One Seed	S T	VL	37	VL	9	VL	9	VL	55
Juniperus procumbens	Juniper, Japanese Garden	S	L	24	L	4	L	3	L	31
Juniperus sabina	Juniper, Savin	S	L	26	L	5	L	5	L	36
Juniperus scopulorum	Juniper, Rocky Mountain	S T	VL	42	VL	9	VL	10	VL	61
Juniperus squamata	Juniper, Flaky	S	L	26	L	4	L	3	L	33
Juniperus utahensis	Juniper, Utah	S T	VL	28	VL	8	VL	6	VL	42
Juniperus virginiana	Juniper, Eastern Red Cedar	T	L	35	L	5	L	5	L	45
Juniperus x media	Juniper, Hybrid Spreading	S	L	16	L	3	L	4	L	23
Kerria japonica 'Pleniflora'	Kerria, Japanese	S	M	10	L	2	L	2	M	14
Knautia macedonica	Knautia, Purple	P	L	16			M	1	L	17
Kniphofia	Torch Lily	P	L	22			L	1	L	23
Koelreuteria paniculata	Golden Rain Tree	T	L	37	L	5	L	3	L	45
Kolkwitzia amabilis	Beauty Bush	S	L	29	L	2	L	2	L	33
Laburnum x watereri	Golden-Chain Tree	T	M	18	H	2	M	1	M	21
Lamiastrum galeobdolon	Yellow archangel	GCP	M	14	M	1	M	1	M	16
Lamium maculatum	Nettle, Spotted	GCP	M	20	M	1	M	1	M	22
Lantana spp.	Lantana	A	L	18			L	2	L	20
Larix decidua	Larch, European	T	M	23	M	3	M	4	M	30
Lathyrus latifolius	Sweet Pea, Perennial	P	L	15			L	1	L	16
Lathyrus odoratus	Sweet Pea, Annual	A	M	19			M	1	M	20
Lavandula angustifolia	Lavender, English	P	L	27	L	2	L	2	L	31
Lavandula dentata	Lavender, French	P	L	16					L	16
Lavandula x intermedia	Lavender, Hybrid	P	L	15					L	15
Lavatera thuringiaca	Shrub Mallow	P	L	20	M	1	M	1	L	22
Leontopodium alpinum	Edelweiss	P	L	13	M	1	L	2	L	16
Lespedeza thunbergii	Japanese Bush-clover	P	L	6					L	6
Leucanthemum x superbum	Daisy, Shasta	P	M	29	M	1	M	2	M	32

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Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Lewisia cotelydon	Bitterroot	P	L	9	L	1	L	2	L	12
Leymus arenarius 'Glauca'	Grass, Blue Lyme	P	L	8					L	8
Liatris punctata	Gayfeather, Native	P	L	25	L	2	L	2	L	29
Liatris pycnostachya	Gayfeather, Thickspike	P	L	13					L	13
Liatris spicata	Gayfeather, Spike	P	L	26	L	3	L	2	L	31
Ligularia dentata 'Othello'	Groundsel, Golden	P	H	15					H	15
Ligularia przewalskii	Groundsel, Shavalski's	P	H	8					H	8
Ligularia stenocephala 'The Rocket'	Ragwort, The Rocket	P	H	19					H	19
Ligustrum obtusifolium 'Regalianum'	Privet, Regal	S	L	11	L	2	L	2	L	15
Ligustrum vulgare	Privet, Common	S	L	30	L	5	L	3	L	38
Ligustrum x vicaryi	Privet, Golden Vicary	S	M	27	M	4	M	2	M	33
Lilium cultivars	Lily cultivars	P	M	24			M	1	M	25
Limonium latifolium	Sea Lavender, Wide-leaved	P	L	18					L	18
Limonium sinuatum	Statice	A	L	14	L	1	L	1	L	16
Linum flavum	Flax, Yellow	P	L	17	L	1			L	18
Linum perenne	Flax, Blue	P	L	33	VL	3	VL	4	L	40
Liquidambar styraciflua	Sweetgum, American	T	M	14	M	3	L	2	M	19
Liriodendron tulipifera	Tulip Tree	T	M	21	M	2	L	2	M	25
Liriope muscari	Lily Turf	A	M	9			M	1	M	10
Lithospermum incisum	Puccoon, Narrow-leaf	P	L	5					L	5
Lithospermum multiflorum	Puccoon, Many-flowered	P	L	5					L	5
Lobelia cardinalis	Cardinal Flower	P	H	17	L	1			H	18
Lobelia fulgens 'Queen Victoria'	Lobelia, Scarlet	P	M	12					M	12
Lobelia sp.	Lobelia	A	M	20			M	3	M	23
Lobularia martitma	Sweet Alyssum	A	M	16					M	16
Lolium perenne	Perennial Ryegrass	TU	M	12	M	2	H	1	M	15
Lonicera caerulea edulis	Honeysuckle, Bearberry	S	M	11	L	2	L	2	M	15
Lonicera fragrantissima	Honeysuckle, Winter	S	M	8	L	2	L	2	M	12
Lonicera involucrata	Honeysuckle, Twinberry	S	M	19	L	4	L	5	M	28
Lonicera japonica	Honeysuckle, Japanese	S V	L	23	M	3	L	3	L	29
Lonicera korolkowii v. floribunda 'Blue Velv	Honeysuckle, Blue Velvet Bluelea	S	L	24	L	3	L	4	L	31
Lonicera periclymenum	Woodbine, Yellow Flowering	V	M	7					M	7
Lonicera sempervirens 'Magnifica'	Honeysuckle, Scarlet Trumpet	V	M	18	L	1	L	1	M	20
Lonicera syringantha 'Wolfii'	Honeysuckle, Tiny Trumpet	S	M	16	L	2	L	3	M	21
Lonicera tartarica 'Arnold's Red'	Honeysuckle, Arnold's Red Tartar	S	L	24	L	4	L	4	L	32
Lonicera x 'Honeyrose'	Honeysuckle, Honeyrose	S	M	14	M	3	L	4	M	21
Lonicera x brownii 'Dropmore Scarlet'	Honeysuckle, Dropmore Scarlet E	V	M	15	L	1	L	1	M	17
Lonicera x heckrotti 'Goldflame'	Honeysuckle, Goldflame	P S V	M	24	L	2	L	2	M	28
Lonicera x xylosteoides	Honeysuckle, European Fly	S	L	19	L	4	L	3	L	26
Lunaria annua	Money Plant	A	L	9			L	1	L	10
Lupinus	Lupine	P	M	25	L	2	L	2	M	29
Lupinus argenteus	Lupine, Silvery	P	L	11			L	1	L	12
Lychnis chalcedonica	Maltese Cross	P	M	15	M	1	L	1	M	17
Lychnis coronaria	Rose Campion	P	L	20	M	1	VL	1	L	22
Lysimachia clethroides	Loosestrife, Gooseneck	P	M	13			H	1	M	14
Lysimachia nummularia	Moneywort	P	M	20	H	1	M	1	M	22
Lysimachia punctata	Loosestrife, Yellow	P	M	11			M	1	M	12
Maackia amurensis	Amur Maackia	T	M	20	M	3	L	4	M	27
Machaeranthera bigelovii	Aster, Santa Fe	P	L	9			L	1	L	10
Machaeranthera pattersoni	Aster, Patterson	P	L	7					L	7
Macleaya cordata	Poppy, Plume	P	M	10					M	10
Macleaya microcarpa	Poppy, Plume	P	M	6					M	6
Magnolia grandiflora	Magnolia, Large-flowered	S	M	6	M	1	M	1	M	8
Magnolia kobus	Magnolia, Kobus	S	M	8	M	2	M	1	M	11
Magnolia stellata	Magnolia, Star	S T	M	28	M	6	M	4	M	38
Magnolia virginiana	Magnolia, Sweetbay	S	M	7	M	3	M	2	M	12
Magnolia x loebneri	Magnolia, Loebner	S	M	11	M	1	M	1	M	13
Magnolia x soulangiana	Magnolia, Saucer	S T	M	28	M	6	M	4	M	38
Mahonia aquifolium	Oregon Grape Holly	S	L	34	L	5	L	2	L	41
Mahonia fremonti	Fremont Holly Grape	S	L	18	VL	5	L	2	VL	25
Mahonia repens	Creeping Colorado Holly	GCP S	L	36	L	5	L	5	L	46
Malus crabapple	Crabapple	T	M	41	M	5	L	4	M	50
Malus sylvestris	Apple, Orchard	T	M	27	L	3	L	2	M	32
Malus x zumi 'Calocarpa'	Crab, Zumi	T	M	10	L	2	L	2	M	14
Malva alcea 'Fastigiata'	Hollyhock, Miniature	P	M	16	M	1	L	1	M	18
Marrubium rotundifolium	Horehound, Silvery	GCP	VL	10					VL	10
Matteuccia struthiopteris	Fern, Ostrich	P	H	10			M	1	H	11
Mazus reptans	Mazus	GCP	M	5					M	5
Melampodium leucanthum	Daisy, Blackfoot	P	L	12			VL	1	VL	13
Melinis (Rhynchelytrum) nerviglumis	Grass, Ruby	A	M	10			M	1	M	11
Mentha requienii	Mint, Corsican	P	L	6					L	6
Mentha spicata	Spearmint	P	M	11			M	1	M	12
Mentzelia decapetala	Evening-star	P	VL	9					VL	9
Mertensia lanceolata	Chiming Bells	P	M	8					M	8
Mertensia virginica	Bluebells	P	M	10			H	1	M	11
Metasequoia glyptostroboides	Redwood, Dawn	T	M	14	M	4	M	3	M	21
Microbiota decussata	Cypress, Siberian	S	M	10	L	2	M	3	M	15
Mimulus cardinalis	Monkey Flower, Scarlet	P	H	9					H	9
Mimulus guttatus	Monkey Flower, Yellow	P	H	8			H	2	H	10
Mimulus lewisii	Monkey Flower, Pink	P	M	9			H	1	M	10
Mimulus spp.	Monkey Flower, Annual	A	H	7			H	2	H	9
Mirabilis jalapa	Four O'Clock, Annual	A	L	22	L	1	VL	1	L	24
Mirabilis multiflora	Four-O'-Clock, Desert	P	VL	26	VL	3	VL	3	VL	32
Miscanthus floridulus	Grass, Giant Chinese Silver	P	M	12					M	12

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Miscanthus sinensis	Grass, Maiden	P	M	26	L	2	M	1	M	29
Molinia caerulea	Grass, Purple Moor	P	M	13	L	1			M	14
Molucella laevis	Bells of Ireland	A	M	9			M	1	M	10
Monarda didyma	Bee-Balm	P	M	28	L	2	L	2	M	32
Monarda fistulosa menthaefolia	Bee-Balm, Native Lavender	P	L	25	L	1	L	2	L	28
Moneses uniflora	One-Flowered Wintergreen	P	M	4			H	2	M	6
Morus alba	Mulberry	T	M	25	M	3	M	3	M	31
Muhlengergia capillaris	Grass, Muhly	P	L	3			M	1	L	4
Myosotis alpestris	Forget-Me-Not	P	M	18	M	1	M	1	M	20
Myrica pennsylvanica	Bayberry	S	M	7	L	2	L	2	M	11
Nandina domestica	Bamboo, Heavenly	S	M	20	M	1	M	2	M	23
Nepeta racemosa	Catmint	P	L	18	L	2			L	20
Nepeta x faassenii	Catmint, Faassen's	P	L	24	L	2	VL	1	L	27
Nicotiana spp.	Flowering Tobacco	A	M	21			M	2	M	23
Nierembergia hippomanica	Cup Flower	A	M	8			M	1	M	9
Nolina microcarpa	Grass, Bear	P	L	13			M	1	L	14
Nyssa sylvatica	Sourgum	T	H	11	H	2	M	2	M	15
Ocimum basilicum	Basil	A	M	21			M	2	M	23
Oenothera berlandieri 'Siskiyou'	Primrose, Siskiyou	P	L	19	VL	1	L	1	L	21
Oenothera brachycarpa	Primrose, Leatherleaf	P	L	11	VL	1	M	1	L	13
Oenothera caespitosa	Primrose, White Evening	P	VL	18	VL	4	L	2	VL	24
Oenothera fruticosa glauca	Sundrops	P	L	11	VL	1	M	1	L	13
Oenothera macrocarpa	Primrose, Missouri Evening	P	L	27	VL	2	M	1	L	30
Oenothera speciosa 'Rosea'	Primrose, New Mexico Evening	P	L	22	VL	1	L	1	L	24
Oenothera strigosa	Evening Primrose, Common	P	L	11	VL	1			L	12
Opuntia polyacantha	Cactus, Prickly Pear	P	VL	25	VL	2			VL	27
Origanum lavevigatum 'Herrenhausen'	Oregano, Purple	P	L	16					L	16
Origanum vulgare	Oregano, Common	P	L	15	M	1			L	16
Oryzopsis hymenoides	Grass, Indian Rice	P	L	10	VL	1	L	1	L	12
Osteospermum 'Lavender Mist'	Sun Daisy, Lavender Mist	P	L	22	VL	1			L	23
Osteospermum barberiae compactum 'Purp	Sun Daisy, Purple Mountain	P	L	21	VL	1			L	22
Ostrya virginiana	American Hophornbeam	T	M	16	M	3	M	3	M	22
Oxytropis lambertii	Loco Weed, Lambert's	P	VL	9			L	2	L	11
Pachysandra terminalis	Spurge, Japanese	GCP	M	15	M	2	M	1	M	18
Paeonia lactiflora	Peony	P	M	23	M	1	M	1	M	25
Panicum virgatum	Grass, Switch	P	L	25	L	2	M	1	L	28
Papaver alpinum	Poppy, Alpine	P	M	19	L	2	L	3	L	24
Papaver miyabeanum	Poppy, Japanese Alpine	P	M	10			M	1	M	11
Papaver nudicaule	Poppy, Iceland	P	M	23	L	2	M	3	M	28
Papaver orientale	Poppy, Oriental	P	L	27	L	2	M	3	L	32
Parrotia persica	Persian Parrotia	T	M	7	M	2	L	2	M	11
Parthenocissus quinquefolia	Virginia Creeper	V	L	26	L	3	L	2	L	31
Parthenocissus tricuspidata	Ivy, Boston	P V	M	22	M	1			M	23
Paxistima canbyi	Mountain Lover	P	L	12	L	1	M	2	M	15
Paxistima myrtifolia	Mountain Lover	P	L	7			M	1	L	8
Pedicularis groenlandica	Elephant's Head	P	M	8			H	2	H	10
Pelargonium hybrids	Geranium	A	M	22			M	2	M	24
Pennisetum alopecuroides	Grass, Fountain	P	L	23	L	2			L	25
Pennisetum orientale	Grass, Oriental Fountain	P	L	11	L	1			L	12
Pennisetum setaceum	Grass, Annual Fountain	A	M	21			L	2	M	23
Penstemon 'Elfin Pink'	Penstemon, Pink	P	L	19	VL	1	L	2	L	22
Penstemon 'Hyacinth Flowered'	Penstemon, Hyacinth Flowered	P	M	7					M	7
Penstemon acuminatus	Penstemon, Sand Dune	P	L	7					L	7
Penstemon alpinus	Penstemon, Alpine	P	L	15	L	2	L	2	L	19
Penstemon ambiguus	Penstemon, Sand	P	VL	15	L	2			VL	17
Penstemon angustifolius	Penstemon, Narrowleaf	P	VL	11					VL	11
Penstemon attenuatus	Penstemon, Taper-leaved	P	L	6					L	6
Penstemon barbatus	Penstemon, Scarlet Bugler	P	L	22	VL	3	L	2	L	27
Penstemon caespitosus	Penstemon, Mat	P	L	15	L	3	L	2	L	20
Penstemon cardinalis	Penstemon, Crimson	P	L	11	VL	1	M	1	L	13
Penstemon clutei	Penstemon, Sunset	P	L	11	L	1			L	12
Penstemon cyananthus	Penstemon, Wasatch	P	L	12	L	1			L	13
Penstemon davidsonii	Penstemon, Davidson's	P	L	8					L	8
Penstemon deustus	Penstemon, Hotrock	P	VL	5			VL	1	VL	6
Penstemon digitalis 'HuskerRed'	Penstemon, Husker Red	P	L	29	VL	1	M	1	L	31
Penstemon eatonii	Penstemon, Firecracker	P	L	22	VL	1	M	1	L	24
Penstemon ellipticus	Penstemon, Rockvine	P	VL	3					VL	3
Penstemon fruticosus	Penstemon, Shrubby	P	L	9					L	9
Penstemon glaber	Penstemon, Saw-sepal	P	L	8					L	8
Penstemon gracilis	Penstemon, Slender	P	L	6					L	6
Penstemon grandiflorus	Penstemon, Shell Leaf	P	L	21	VL	1			L	22
Penstemon hirsutus 'Pygmaeus'	Penstemon, Pygmy Purple	P	L	13	L	1	L	2	L	16
Penstemon jamesii	Penstemon, James	P	VL	8	L	1			VL	9
Penstemon linarioides	Penstemon, Blue Mat	P	VL	14			L	1	VL	15
Penstemon neomexicanus	Penstemon, New Mexican Blue	P	L	7					L	7
Penstemon nitidus	Penstemon, Smooth Blue	P	VL	8					VL	8
Penstemon palmeri	Penstemon, Palmer	P	L	17	VL	3			L	20
Penstemon parryi	Penstemon, Parry	P	L	9					L	9
Penstemon pinifolius	Penstemon, Pineleaf	P	L	25	VL	3	L	2	L	30
Penstemon procerus	Penstemon, Small-Flowered	P	L	8	L	1			L	9
Penstemon pseudospectabilis	Penstemon, Desert	P	L	12	L	1			L	13
Penstemon rostriflorus	Bridge's Penstemon	P	L	4					L	4
Penstemon secundiflorus	Penstemon, One-sided	P	L	12					L	12
Penstemon strictus	Penstemon, Rocky Mountain	P	L	27	VL	3	L	3	L	33

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Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Penstemon teucrioides	Penstemon, Grayleaf Creeping	P	L	7					L	7
Penstemon triphyllus	Penstemon, Whorled	P	VL	2					VL	2
Penstemon utahensis	Penstemon, Utah	P	L	8					L	8
Penstemon venustus	Penstemon, Blue Mountain	P	VL	5					VL	5
Penstemon virens	Penstemon, Blue Mist	P	L	15	VL	2	L	2	L	19
Penstemon virgatus asagrayi	Penstemon, Tall	P	VL	7					VL	7
Penstemon whippleanus	Penstemon, Whipple's	P	L	15			L	2	L	17
Penstemon wilcoxii	Penstemon, Wilcox	P	VL	2					VL	2
Penstemon x mexicali	Penstemon, Mexicali Hybrids	P	L	23	VL	2			L	25
Perovskia atriplicifolia	Sage, Russian	S	L	35	VL	6	VL	6	VL	47
Persicaria affinis	Himalayan Border Jewel	P	L	17	L	1	L	2	L	20
Persicaria virginiana 'Painter's Palette	Border Jewel, Painter's Palette	P	L	9					L	9
Petrophytum caespitosum	Rock Spirea	P	L	4					L	4
Petunia x hybrida	Petunia	A	M	22	L	1	M	4	M	27
Phacelia campanularia	California Bluebell	A	L	6			L	1	L	7
Phalaris arundinacea	Grass, Ribbon	P	M	17	M	1	M	1	M	19
Philadelphus coronarius	Mockorange, Sweet	S	L	19	L	2	L	3	L	24
Philadelphus lewisii	Mockorange, Lewis	S	L	22	L	5	L	3	L	30
Philadelphus microphyllus	Mockorange, Littleleaf	S	L	20	VL	5	L	3	L	28
Philadelphus x 'Buckley's Quill'	Mockorange, Buckley's Quill	S	M	15	L	3	L	3	M	21
Philadelphus x 'Snowbelle'	Mockorange, Snowbelle	S	M	9	L	2	L	3	L	14
Philadelphus x cymosus 'Bouquet Blanc'	Mockorange, Bouquet Blanc	S	M	14	L	2	L	3	M	19
Philadelphus x virginalis	Mockorange, Virginal	S	M	19	L	4	L	3	M	26
Phlomis cashmeriana	Sage, Himalayan	P	M	11	M	1			M	12
Phlomis russeliana	Sage, Jerusalem	P	L	9			L	1	L	10
Phlox borealis	Phlox, Artic	P	M	4			M	1	M	5
Phlox divaricata	Phlox, Wild Sweet William	P	M	14					M	14
Phlox douglasii	Phlox, Cushion	GCP	L	9			L	1	L	10
Phlox paniculata	Phlox, Garden	P	M	22	M	1	M	1	M	24
Phlox procumbens	Phlox, Creeping	GCP	L	5	M	1	M	1	M	7
Phlox stolonifera	Phlox, Creeping	GCP	M	10					M	10
Phlox subulata	Phlox, Creeping	GCP	L	25	M	2	L	2	L	29
Phyllostachys aurea	Bamboo, Golden	P	M	7					M	7
Phyllostachys aureosulcata	Bamboo, Yellow Groove	P	M	8					M	8
Physocarpus monogynus	Ninebark, Native	S	L	24	VL	5	L	7	L	36
Physocarpus opulifolius	Ninebark	S	L	23	L	5	L	5	L	33
Physostegia virginiana	Obedient Plant	P	M	21			L	1	M	22
Picea abies	Spruce, Norway	S T	M	32	L	6	L	6	M	44
Picea engelmannii	Spruce, Engelmann	T	M	31	L	6	M	9	M	46
Picea glauca 'Conica'	Spruce, Dwarf Alberta	S T	M	35	M	7	M	6	M	48
Picea glauca 'Densata'	Spruce, Black Hills	T	M	29	M	5	M	7	M	41
Picea omorika	Spruce, Serbian	T	M	17	M	3	M	4	M	24
Picea orientalis	Spruce, Oriental	T	M	9	M	2	M	2	M	13
Picea pungens	Spruce, Colorado	S T	M	44	L	7	M	11	M	62
Pieris japonica	Pieris, Japanese	S	H	11	M	2	M	2	M	15
Pieris taiwanensis	Pieris, Taiwan	S	H	6	M	2	M	2	M	10
Pinus aristata	Pine, Bristlecone	S T	L	41	L	8	VL	11	L	60
Pinus bungeana	Pine, Lacebark	T	L	15	M	4	L	4	L	23
Pinus cembra	Pine, Compact Swiss Stone	S	L	15	L	5	L	4	L	24
Pinus contorta latifolia	Pine, Lodgepole	T	L	26	L	7	L	11	L	44
Pinus densiflora	Pine, Tanyosho	S T	L	21	L	6	L	5	L	32
Pinus edulis	Pine, Pinon	T	VL	41	VL	8	VL	8	VL	57
Pinus flexilis	Pine, Limber	T	L	36	L	6	L	10	L	52
Pinus heldreichii (leucodermis)	Pine, Bosnian	S T	L	28	L	6	L	4	L	38
Pinus mugo	Pine, Mugo	S	L	36	L	6	L	6	L	48
Pinus nigra	Pine, Austrian	T	L	40	L	7	L	6	L	53
Pinus parviflora	Pine, Lacebark	T	L	9	L	3	L	3	L	15
Pinus ponderosa	Pine, Ponderosa	T	L	41	L	8	L	10	L	59
Pinus resinosa	Pine, Red	T	M	11	L	2	L	2	M	15
Pinus strobiformis	Pine, Border	T	L	20	L	4	L	4	L	28
Pinus strobus	Pine, Eastern White	T	M	32	L	5	M	4	M	41
Pinus sylvestris	Pine, Scotch	T	L	34	L	7	L	7	L	48
Pinus thunbergii	Pine, Japanese Black	T	L	10	L	4	L	4	L	18
Pinus virginiana 'Wates Golden'	Pine, Wates Golden Virginia Scru	T	M	5	M	2	M	2	M	9
Platanus occidentalis	Sycamore	T	M	22	M	4	M	3	M	29
Platanus x acerifolia	Planetree, London	T	M	16	M	6	M	3	M	25
Platycladus orientalis 'Aurea Nana'	Arborvitae, Dwarf Golden Orienta	S	M	16	M	3	M	2	M	21
Platycodon grandiflorus	Balloon Flower	P	M	23	M	1	M	1	M	25
Plectranthus argentatus	Silver Dollar Plant	A	L	10			VL	1	L	11
Poa praetensis	Bluegrass	TU	H	25	H	2	M	2	H	29
Polemonium caeruleum	Jacob's Ladder	P	M	15	M	1	M	1	M	17
Polemonium carneum	Jacob's Ladder, Salmon	P	M	6					M	6
Polemonium reptans	Jacob's Ladder, Creeping	P	M	7					M	7
Polemonium viscosum	Sky Pilot	P	L	5			M	1	L	6
Polygonum aubertii	Vine, Silver Lace	P V	L	22	L	2	L	2	L	26
Polystichum polyblepharum	Fern, Tassle	P	H	6					H	6
Polystichum setiferum	Fern, English Hedge	P	H	7					H	7
Populus alba	Poplar, Silver	T	M	27	M	6	L	4	M	37
Populus angustifolia	Cottonwood, Narrowleaf	T	M	42	M	7	M	8	M	57
Populus balsamifera	Poplar, Balsam	T	M	14	H	3	H	3	H	20
Populus deltoides 'Siouxland'	Cottonwood, Soiuxland	T	M	38	M	8	M	4	M	50
Populus fremontii	Cottonwood, Fremont	T	M	26	M	6	M	4	M	36
Populus nigra	Poplar, Lombardy Black	T	H	16	H	6	H	2	H	24
Populus sargentii	Cottonwood, Plains	T	M	40	M	7	M	4	M	51

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Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Populus tremuloides	Aspen	T	M	45	M	8	M	11	M	64
Populus x acuminata	Cottonwood, Lanceleaf	T	M	35	M	8	M	6	M	49
Populus x canescens	Cottonwood, Gray	T	M	16	M	5	M	4	M	25
Portulaca grandiflora	Moss Rose, Portulaca	A	L	21	VL	1	L	3	L	25
Potentilla (Drymocallis) fissa	Cinquefoil, Leafy	P	L	8			L	1	L	9
Potentilla atrosanguinea	Cinquefoil, Red	P	L	15	M	1	L	1	L	17
Potentilla fruticosa	Potentilla, Shrub	S	L	36	L	6	L	8	L	50
Potentilla hippiana	Cinquefoil, Wooly	P	L	14	L	1	VL	1	L	16
Potentilla nepalensis 'Miss Willmott'	Cinquefoil, Miss Wilmott	P	M	20	M	1	L	1	M	22
Potentilla neumanniana	Cinquefoil, Creeping	GCP	L	13	L	1	L	2	L	16
Potentilla nevadensis	Cinquefoil, Native Silvery	GCP	L	18	L	2	L	2	L	22
Potentilla pensylvanica	Cinquefoil, Prairie	P	L	9					L	9
Potentilla species	Cinquefoil, Creeping	GCP S	L	25	L	5	L	4	L	34
Potentilla thurberi	Cinquefoil, Silver	P	L	5					L	5
Primula 'Colossea'	Primrose, Hardy English	P	M	11					M	11
Primula denticulata	Primrose, Drumstick	P	M	12					M	12
Primula elatior	Primrose, Oxlip	P	M	9					M	9
Primula parryi	Primrose, Rocky Mountain	P	H	8	M	1	H	3	H	12
Primula veris	Primrose, Cowslip	P	M	8					M	8
Primula vulgaris	Primrose, English	P	M	12					M	12
Prinsepia sinensis	Prinsepia, Cherry	S	M	4	M	1	M	1	M	6
Prunella grandiflora	Self-Heal	P	M	8					M	8
Prunella laciniata	Lacy Self-Heal	P	L	14	L	2	M	1	L	17
Prunus americana	Plum, American	S T	L	41	L	8	L	7	L	56
Prunus armeniaca	Apricot	T	M	28	L	7	L	4	M	39
Prunus avium	Cherry, Sweet	T	M	25	L	6	L	3	M	34
Prunus besseyi	Cherry, Western Sand	S	L	36	L	6	L	5	L	47
Prunus cerasifera	Plum, Cherry	T	M	30	L	6	L	4	M	40
Prunus cerasus	Cherry, Sour	T	M	23	L	4	L	2	M	29
Prunus fruticosa	Cherry, European Dwarf	S	M	11	L	2	L	2	L	15
Prunus glandulosa 'Rosea Plena'	Almond, Pink Flowering	S	M	23	L	3	L	2	M	28
Prunus maackii	Chokecherry, Amur	T	M	30	L	4	L	4	M	38
Prunus maritima	Plum, Beach	T	M	6	L	1	L	1	M	8
Prunus nigra 'Princess Kay'	Plum, Princess Kay Canadian	T	M	28	L	4	L	3	M	35
Prunus padus	Mayday Tree	T	M	28	L	5	L	5	M	38
Prunus pensylvanica saximontana	Cherry, Pin	S	M	11	L	1	L	1	M	13
Prunus pesica	Peach	T	M	23	M	4	L	2	M	29
Prunus sargentii	Cherry, Sargent	T	M	14	L	3	L	3	M	20
Prunus serrulata 'Kwanzan'	Cherry, Kwanzan Japanese Flowe	T	M	15	M	3	M	3	M	21
Prunus subhirtella 'Pendula'	Cherry, Weeping Spring	T	M	13	M	3	L	2	M	18
Prunus tenella	Almond, Dwarf Russian	S	L	14	L	4	L	3	L	21
Prunus tomentosa	Cherry, Nanking	S	L	29	L	4	L	3	L	36
Prunus triloba	Rose Tree of China	S	M	17	L	4	L	2	M	23
Prunus virginiana 'Shubert'	Chokecherry, Canada Red	S T	M	42	L	8	L	8	L	58
Prunus virginiana melanocarpa	Chokecherry	S	L	32	L	5	L	7	L	44
Prunus x 'Snow Fountains'	Cherry, Weeping White	S	M	10	L	2	L	2	M	14
Prunus x americana 'Toka'	Plum, Toka	T	M	16	M	3	L	4	M	23
Prunus x cistena	Plum, Purple-Leaf	S T	M	38	L	8	L	5	M	51
Prunus x domestica 'Stanley'	Plum, Stanley Prune	T	M	19	L	2	L	2	M	23
Pseudotsuga menziesii	Fir, Douglas	S T	M	35	L	6	L	10	M	51
Psilostrophe tagetina	New Mexico Paper Flower	P	VL	11	L	1	L	1	VL	13
Ptelea trifoliata	Ash, Wafer	T	L	27	L	5	L	4	L	36
Pulmonaria 'Roy Davidson'	Bethlehem Sage, Roy Davidson'	P	M	14					M	14
Pulmonaria rubra 'Redstart'	Lungwort, Redstart	P	M	11	M	1			M	12
Pulmonaria saccharata	Bethlehem Sage	P	M	13					M	13
Pulsatilla patens	Pasqueflower, Lavender	P	L	13			L	2	L	15
Pulsatilla vulgaris	Pasqueflower, European	P	L	18	L	2	L	3	L	23
Purshia tridentata	Bitterbrush Antelope	S	VL	22	VL	4	VL	6	VL	32
Pyracantha angustifolia	Firethorn, Narrowleaf	S	M	19	L	3	L	2	L	24
Pyracantha coccinea	Firethorn, Scarlet	S	L	22	L	4	L	2	L	28
Pyrus calleryana	Pear, Ornamental	T	M	32	L	3	L	3	M	38
Pyrus communis	Pear, Orchard	T	M	18	L	4	L	4	M	26
Pyrus fauriei	Pear, Korean Wild Pear	T	L	11	L	4	L	4	L	19
Pyrus ussuriensis	Pear, Ussurian	T	L	24	L	6	L	5	L	35
Quercus acutissima	Oak, Sawtooth	T	M	12	M	3	L	2	M	17
Quercus alba	Oak, White	T	M	25	L	5	L	2	M	32
Quercus bicolor	Oak, Swamp White	T	L	31	L	5	L	3	L	39
Quercus coccinea	Oak, Scarlet	T	M	23	L	4	L	2	M	29
Quercus ellipsoidalis	Oak, Northern Pin	T	M	17	L	4	L	2	M	23
Quercus gambelii	Oak, Gambel	S T	L	42	VL	9	VL	6	VL	57
Quercus imbricaria	Oak, Shingle	T	M	15	L	2	L	1	M	18
Quercus macrocarpa	Oak, Bur	T	L	39	L	6	L	4	L	49
Quercus muehlenbergii	Oak, Chinkapin	T	L	16	M	3	L	2	L	21
Quercus palustris	Oak, Pin	T	M	24	M	3	L	2	M	29
Quercus phellos	Oak, Willow	T	M	13	L	2	L	2	M	17
Quercus prinus	Oak, Chestnut	T	M	13	L	3	L	2	M	18
Quercus robur	Oak, English	T	M	30	L	5	L	3	M	38
Quercus rubra	Oak, Northern Red	T	M	30	L	5	L	3	M	38
Quercus shumardi	Oak, Shumard Oak	T	M	21	M	3	L	2	L	26
Quercus turbinella	Oak, Shrub Liveoak	S	VL	13	L	2	L	2	VL	17
Quercus undulata	Oak, Wavyleaf	T	L	16	L	2	L	2	L	20
Ranunculus gramineus	Buttercup, European	P	M	9			M	1	M	10
Ranunculus repens	Creeping Buttercup	P	M	15			H	1	M	16
Ratibida columnifera	Coneflower, Prairie	P	L	26	VL	3	L	2	VL	31

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Rhamnus catharticus	Buckthorn, Common	S	L	29	L	3	L	2	L	34
Rhamnus frangula 'Asplenifolius'	Buckthorn, Glossy Cutleaf	S	M	19	L	4	L	3	L	26
Rhamnus frangula 'Columnaris'	Buckthorn, Tall Hedge	S	L	26	L	5	L	2	L	33
Rhamnus saxitile	Buckthorn, Rock	S	L	10	L	2	L	2	L	14
Rhamnus smithii	Buckthorn, Smith's Alder	S	L	16	VL	5	L	2	L	23
Rheum rhabarbarum	Rhubarb	P	M	20			M	1	M	21
Rhododendron	Rhododendron	S	H	19	M	4	H	2	H	25
Rhus aromatica	Sumac, Fragrant	S	L	24	L	5	L	4	L	33
Rhus glabra	Sumac, Smooth	S	L	28	L	6	L	4	L	38
Rhus lanceolata	Sumac, Flameleaf	S	L	8	L	4	L	3	L	15
Rhus microphylla	Sumac, Little Leaf Desert	S	VL	12	L	4	L	3	VL	19
Rhus trilobata	Sumac, Three-Leaf	S	VL	33	L	6	VL	7	VL	46
Rhus typhina	Sumac, Staghorn	S	L	28	L	6	L	4	L	38
Ribes alpinum	Currant, Alpine	S	L	33	L	7	L	6	L	46
Ribes aureum	Currant, Yellow Flowering	S	L	26	L	6	L	6	L	38
Ribes cereum	Currant, Squaw	S	L	22	L	6	L	7	L	35
Ribes hirtellum 'Pixwell'	Gooseberry, Pixwell	S	L	20	L	5	L	6	L	31
Ribes inerme	Gooseberry, Whitestem	S	L	10	L	5	L	6	L	21
Ribes leptanthum	Currant, Black	S	L	12	L	3	L	4	L	19
Ribes nigrum	Currant, Black	S	L	9	L	3	L	3	L	15
Ribes odoratum	Currant, Clove	S	L	19	L	5	L	4	L	28
Ribes sanguineum	Currant, Red Flowering	S	L	7	L	1	L	1	L	9
Ribes silvestre 'Red Lake'	Currant, Red Lake	S	L	19	L	3	L	4	L	26
Ribes uva-crispa 'Red Jacket'	Gooseberry, Red Jacket	S	L	14	L	3	L	3	L	20
Ricinus communis	Castor Bean	A	M	9					M	9
Robinia neomexicana	Locust, New Mexico	S T	L	35	VL	9	VL	5	L	49
Robinia pseudoacacia	Locust, Black	T	L	35	L	6	L	4	L	45
Rosa	Rose, Shrub	S	M	21	L	3	L	4	M	28
Rosa foetida 'Bicolor'	Rose, Austrian Copper	S	L	23	L	4	L	4	L	31
Rosa foetida 'Persiana'	Rose, Persian Yellow	S	L	21	L	4	L	4	L	29
Rosa glauca	Rose, Red-Leaved	S	L	22	L	4	L	5	L	31
Rosa pomifera	Rose, Apple	S	L	9	L	3	L	3	L	15
Rosa rugosa	Rose, Rugosa	S	L	23	L	3	L	5	L	31
Rosa woodsii	Rose, Native Pink	S	L	25	L	4	L	5	L	34
Rosa xanthina hugonis	Rose, Yellow Shrub	S	L	16	L	3	L	3	L	22
Rosmarinus officinalis	Rosemary	A P	L	16			L	1	L	17
Rosularia globulariifolia	Rosularia, Roundleaf	P	L	5					L	5
Rubus deliciosus	Boulder Raspberry	S	L	28	L	4	L	6	L	38
Rubus idaeus	Raspberry	S	M	16	L	1	L	2	M	19
Rubus odoratus	Raspberry, Purple-flowering	S	L	12	L	2	L	2	L	16
Rubus parviflorus	Thimbleberry	S	M	15	L	4	L	5	L	24
Rudbeckia fulgida	Black-Eyed Susan	P	L	28	L	2	L	1	L	31
Rudbeckia hirta	Black-Eyed Susan	P	M	25	L	2	M	2	M	29
Rudbeckia laciniata 'Double Gold'	Black Eyed Susan, Double Gold	P	M	18			H	1	M	19
Saccharum ravennae	Grass, Plume	P	M	13					M	13
Sagina subulata	Pearlwort	GCP	M	10			M	1	M	11
Sagittaria latifolia	Arrowhead, Broadleaf	P	H	8			H	1	H	9
Salix 'Prairie Cascade'	Willow, Prairie Cascade Weeping	T	H	25	H	3	H	2	H	30
Salix alba 'Tristis'	Willow, Golden Weeping	S T	H	32	H	6	M	4	H	42
Salix alba vitellina	Willow, Russian Golden	S T	H	23	M	5	M	6	H	34
Salix amygdaloides	Willow, Peach Leaf	S T	M	26	M	6	M	7	M	39
Salix arenaria	Willow, Silver Creeping	S	M	11	M	3	M	3	M	17
Salix bebbiana	Willow, Bebb's	S	M	9	M	2	M	3	M	14
Salix caprea	Willow, Goat	S	H	10	H	1	H	1	H	12
Salix discolor	Willow, Pussy	S	H	21	H	3	M	3	H	27
Salix drummondiana	Willow, Drummond	S	H	8	M	2	M	3	M	13
Salix exigua	Willow, Coyote	S	M	19	M	3	H	4	M	26
Salix fragilis	Willow, Crack	S	H	10	M	3	H	4	H	17
Salix geyeriana	Willow, Geyer's	S	H	8	M	2	M	3	M	13
Salix integra 'Hakuro Nishiki'	Willow, Dappled	S	H	11	H	2	H	2	H	15
Salix irrorata	Willow, Blue Stem	S	M	20	M	3	M	5	M	28
Salix lutea ligulifolia	Willow, Strapleaf Yellow	S	M	9	M	2	M	2	M	13
Salix matsudana 'Umbraculifera'	Willow, Globe	S T	H	29	H	6	M	3	H	38
Salix monticola	Willow, Yellow Mountain	S	H	11	M	4	M	5	M	20
Salix pentandra	Willow, Laurel Leaf	T	H	16	M	3	M	2	M	21
Salix purpurea	Willow, Basket	S	H	18	M	4	M	3	M	25
Salix repens	Willow, Creeping	S	M	13	M	3	M	3	M	19
Salix scouleriana	Willow, Scoulers	S	M	7	M	2	M	2	M	11
Salix x sepulcralis chrysocoma	Willow, Niobe Weeping	T	H	17	M	3	M	2	H	22
Salvia argentea	Salvia, Silver	P	L	18	L	2	L	2	L	22
Salvia azurea grandiflora	Salvia, Blue	P	L	15	L	2			L	17
Salvia farinacea	Mealycup sage	A	M	10			L	1	M	11
Salvia greggii	Sage, Autumn	P	L	15	L	1			L	16
Salvia jurisicii	Salvia, Cutleaf	P	L	13					L	13
Salvia leucantha	Sage, Mexican Bush	P	L	7					L	7
Salvia lyrata	Sage, Lyre-leaf	P	L	5					L	5
Salvia microphylla	Salvia, Red Baby	P	L	8					L	8
Salvia nemorosa	Salvia, Blue	P	L	19	L	2	M	1	L	22
Salvia officinalis	Sage, Garden	P	L	21	L	2			L	23
Salvia pitcheri	Sage, Pitcher	P	L	9					L	9
Salvia sclarea	Clary Sage	A P	L	21	VL	1	M	1	L	23
Salvia splendens	Scarlet Salvia	A	M	11			L	2	M	13
Salvia superba	Salvia, Hybrid	P	L	13			M	1	L	14
Sambucus canadensis	Elder, American	S	M	26	M	5	M	5	M	36

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Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Sambucus nigra 'Marginata'	Elder, Variegated	S	M	16	M	3	M	4	M	23
Sambucus pubens	Elder, Native Red Berried	S	M	18	L	4	L	6	M	28
Sambucus racemosa	Elder, European Red	S	M	15	M	4	M	4	M	23
Santolina chamaecyparissus	Lavender Cotton	P	L	24	L	2	VL	1	L	27
Santolina rosmarinifolia	Lavender Cotton, Green	P	L	18	VL	1	VL	1	L	20
Sanvitalia procumbens	Creeping Zinnia	A	L	11			L	2	L	13
Sapindus drummondii	Soapberry, Western	S T	L	8	L	3	L	2	L	13
Saponaria ocymoides	Rock Soapwort	P	L	20	L	2	M	1	L	23
Saxifraga oppositifolia 'Purple Robe'	Saxifrage, Purple Robe	P	M	12	M	1	H	2	M	15
Saxifraga x arendsii	Saxifrage, Rose Mound	P	M	10			H	1	M	11
Scabiosa caucasica	Pincushion Flower	P	M	19	M	1	L	1	M	21
Scabiosa columbaria	Pincushion Flower	P	L	16			L	1	L	17
Scabiosa lucida	Pincushion Flower, Dwarf	P	L	15	M	1	L	1	L	17
Scabiosa ochroleuca	Pincushion, Yellow	P	L	12					L	12
Scaevola aemula	Fan Flower	A	M	11			M	2	M	13
Schizachyrium scoparium	Bluestem, Little	P	L	22	VL	3	L	2	L	27
Schizophragma hydrangeoides	Vine, Japanese Hydrangea	P	M	4					M	4
Schoenoplectus lacustris	Bulrush, Common	P	H	6					H	6
Schoenoplectus validus	Bulrush, Softstem Great	P	H	6					H	6
Scirpus acutus	Bulrush, Hardstem	P	H	7			H	1	H	8
Scirpus americanus	Bulrush, Three-square	P	H	7			H	1	H	8
Scirpus microcarpus	Bulrush, Small-fruited	P	H	7			H	1	H	8
Scutellaria alpina 'Arcobaleno'	Skull Cap, Rainbow	P	M	8			M	1	M	9
Scutellaria resinosa	Skull Cap, Prairie	P	L	8					L	8
Sedum 'Autumn Joy'	Stonecrop, Autumn Joy	P	L	28	L	1	L	1	L	30
Sedum 'Blue Spruce'	Stonecrop, Blue Creeping	GCP	L	14	L	2	L	2	L	18
Sedum 'Robustum'	Stonecrop, Red-leaf Showy	P	L	11			L	1	L	12
Sedum 'Vera Jameson'	Stonecrop, Vera Jameson	P	L	17	L	1	M	1	L	19
Sedum acre evergreen	Stonecrop, Goldmoss-Utah	GCP	L	16	L	2	VL	3	L	21
Sedum hybridum	Stonecrop, Oak-leaf	GCP	L	12	VL	1	L	2	L	15
Sedum kamtschaticum	Stonecrop, Russian	P	L	13	L	1	VL	1	L	15
Sedum lanceolatum	Stonecrop, Native	P	VL	11			VL	2	VL	13
Sedum populifolium	Stonecrop, Herbacious	P	L	8					L	8
Sedum sieboldii 'October Daphne '	Stonecrop, October Daphne	P	L	8					L	8
Sedum spectabile 'Indian Chief'	Stonecrop, Russet Showy	P	L	15	L	1	L	1	L	17
Sedum spurium	Stonecrop, Two-row	GCP	L	17	L	2	VL	2	L	21
Sempervivum species	Hens and Chicks	GCP	VL	32	VL	4	L	4	VL	40
Senecio cineraria	Dusty Miller	A	L	22	L	1	L	2	L	25
Senecio longilobus	Groundsel, Threadleaf	P	L	8			L	1	L	9
Senecio spartioides	Groundsel, Broom	P	L	5			L	1	L	6
Sequoiadendron giganteum	Giant Sequoia	T	M	10	M	2	L	2	M	14
Shepherdia argentea	Buffaloberry	S T	L	35	VL	8	VL	7	VL	50
Shepherdia canadensis	Buffaloberry, Russet	S	L	19	VL	5	L	6	L	30
Shepherdia rotundifolia	Buffaloberry, Roundleaf	S	VL	15	VL	5	VL	4	VL	24
Sibiraea laevigata	Sibiraea	S	L	11	L	3	L	3	L	17
Sidalcea malviflora	Mallow, Prairie	P	M	17			M	1	M	18
Silene acaulis	Moss Campion	P	M	8			M	1	M	9
Silene alpestris	Alpine Catchfly	P	M	10			M	1	M	11
Silphium perfoliatum	Cup Flower	P	M	5					M	5
Sisyrinchium angustifolium	Grass, Blue-Eyed	P	M	15			M	1	M	16
Sisyrinchium macrocephalum	Grass, Yellow-Eyed	P	M	9					M	9
Sisyrinchium montanum	Grass, Blue-Eyed	P	M	10			M	1	M	11
Solidago 'Golden Baby'	Goldenrod, Golden Baby	P	L	15			L	1	L	16
Solidago decumbens	Goldenrod, Dwarf	P	L	13			H	1	L	14
Solidago missouriensis	Goldenrod, Prairie	P	L	9			M	1	L	10
Sophora japonica	Japanese Pagoda Tree	T	M	26	L	6	M	3	M	35
Sorbaria sorbifolia	Spirea, Ural False	S	L	22	M	3	M	4	M	29
Sorbus alnifolia	Mountain Ash, Korean	T	M	15	L	2	L	2	M	19
Sorbus aucuparia	Mountain Ash, European	S T	M	35	M	6	L	5	M	46
Sorbus decora	Mountain Ash, Showy	T	M	12	L	2	L	2	M	16
Sorbus hybrida	Mountain Ash, Oak Leaf	S	M	9	L	2	L	2	M	13
Sorbus intermedia	Whitebeam, Swedish	T	M	8	M	1	M	1	M	10
Sorbus mougeotii	Whitebeam, Austrian	T	M	6	M	1	M	1	M	8
Sorbus scopulina	Mountain Ash, Native	S T	M	24	M	3	M	4	M	31
Sorghastrum nutans	Grass, Indian	P	L	19	L	2			L	21
Spartina pectinata	Grass, Prairie Cordgrass	P	M	12	L	1	H	1	M	14
Sphaeralcea coccinea	Prairie Mallow	P	VL	17	VL	2	VL	1	VL	20
Sphaeralcea munroana	Globe Mallow, Orange	P	VL	12					VL	12
Spiraea albiflora	Spirea, Japanese White	S	M	15	M	3	M	2	M	20
Spiraea argunta 'Compacta'	Spirea, Compact Garland	S	L	9	M	2	M	2	M	13
Spiraea decumbens	Spirea, White Lace	S	L	6	M	2	M	2	L	10
Spiraea fritschiana	Spirea, Fritschiana	S	L	10	M	3	M	2	M	15
Spiraea japonica	Spirea, Japanese	S	M	21	L	4	M	3	M	28
Spiraea nipponica	Spirea, Snowmound	S	L	23	M	5	M	3	M	31
Spiraea prunifolia	Spirea, Bridalwreath	S	L	23	M	4	M	3	L	30
Spiraea thunbergii	Spirea, Thunberg	S	L	5	M	1	M	1	L	7
Spiraea trilobata	Spirea, Threelobe	S	L	9	M	3	M	3	M	15
Spiraea x 'Goldmound'	Spirea, Goldmound	S	M	22	M	4	M	3	M	29
Spiraea x billardii	Spirea, Billard	S	M	9	M	3	M	3	M	15
Spiraea x bumalda	Spirea, Bumald	S	M	17	M	3	M	2	M	22
Spiraea x cineria 'Grefsheim'	Spirea, Grefsheim	S	M	11	M	2	M	3	M	16
Spiraea x vanhouttei	Spirea, Vanhoutte	S	M	25	M	4	M	3	M	32
Sporobolus wrightii	Grass, Giant Sacaton	P	VL	5	L	1			L	6
Stachys byzantina	Lamb's Ears	GCP	L	25	VL	1	VL	2	L	28

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Stachys coccinea	Nettle, Scarlet Hedge	P	L	10					L	10
Stanleya pinnata	Prince's Plume	P	VL	11	VL	1	L	2	VL	14
Stewartia koreana	Korean Stewartia	S	M	5	H	1	H	1	M	7
Stipa comata	Grass, Needle-and-Thread	P	L	10	L	2			L	12
Stipa gigantea	Needlegrass, Giant	P	L	4					L	4
Stipa lettermani	Grass, Needle	P	L	7					L	7
Stipa neomexicana	Needlegrass, New Mexico	P	L	8					L	8
Stipa tenuissima	Grass, Mexican Feather	P	L	16	L	2	L	2	L	20
Stokesia laevis	Aster, Stokes'	P	M	10			L	1	M	11
Styrax japonicus	Snowbell, Japanese	T	H	6	H	2	H	2	H	10
Sutera cordata	Bacopa	A	L	9			M	2	M	11
Symphoricarpos albus	Snowberry, White	S	L	24	L	4	L	3	L	31
Symphoricarpos occidentalis	Wolfberry	S	L	13	L	3	L	4	L	20
Symphoricarpos orbiculatus	Coralberry, Red	S	L	20	L	3	M	3	L	26
Symphoricarpos oreophilus	Snowberry, Mountain	S	L	15	L	5	L	5	L	25
Symphoricarpos x chenaultii	Coralberry, Chenault	S	L	18	L	3	M	1	L	22
Symphoricarpos x doorenbosii	Snowberry	S	L	13	L	3	L	2	L	18
Symphytum grandiflorum	Comfrey	P	M	12			M	1	M	13
Syringa laciniata	Lilac, Cutleaf	S	L	14	L	3	L	3	L	20
Syringa meyeri 'Palibin'	Lilac, Dwarf Korean	S	L	27	L	5	L	4	L	36
Syringa microphylla	Lilac, Littleleaf	S	L	14	L	3	L	3	L	20
Syringa oblata 'Cheyenne'	Lilac, Cheyenne Early	S	L	15	L	4	L	4	L	23
Syringa patula 'Miss Kim'	Lilac, Miss Kim Dwarf	S	L	27	L	5	L	4	L	36
Syringa pekinensis	Lilac, Peking	S T	L	28	L	6	L	5	L	39
Syringa reflexa	Lilac, Nodding	S	L	8	L	3	L	2	L	13
Syringa reticulata	Lilac, Japanese Tree	S T	M	34	L	7	L	5	L	46
Syringa vulgaris	Lilac, Common Purple	S	L	35	L	6	L	6	L	47
Syringa x chinensis	Lilac, Chinese	S	L	21	L	4	L	4	L	29
Syringa x hyacinthiflora	Lilac, Hybrid	S	L	18	L	4	L	4	L	26
Syringa x josiflexa 'Royalty'	Lilac, Hybrid Purple Singl	S	L	13	M	3	M	3	L	19
Syringa x persica	Lilac, Persian	S	L	15	L	5	L	3	L	23
Syringa x prestoniae	Lilac, Canadian	S	L	22	M	5	L	4	L	31
Tagetes spp.	Marigold	A	L	23	L	1	L	3	L	27
Tanacetum densum amani	Partridge Feather	GCP	VL	19	VL	1	VL	1	VL	21
Tanacetum niveum	Tansy, Snow Daisy	P	L	15	L	1	VL	1	L	17
Tanacetum parthenium 'White Star'	Feverfew, White	P	L	16	M	1			L	17
Tanacetum x coccineum	Painted Daisy	P	L	17			M	1	L	18
Taxodium distichum	Bald Cypress	T	M	23	H	2	H	2	M	27
Taxus cuspidata	Yew, Spreading Japanese	S	M	21	H	4	H	2	M	27
Taxus x media	Yew, Anglojap	S	M	25	H	4	H	2	M	31
Teucrium canadensis	Germander, Creeping	P	L	10					L	10
Teucrium chamaedrys	Germander, Wall	GCP	L	14			L	1	L	15
Thalictrum aquilegifolium	Meadowrue, Columbine	P	M	17	M	1	M	1	M	19
Thalictrum delavayi 'Hewitt's Double'	Meadowrue, Hewitt's Double	P	M	9			M	1	M	10
Thalictrum dipterocarpum	Meadowrue, Yunnan	P	M	9			M	1	M	10
Thalictrum fendleri	Meadowrue, Fendler's	P	M	7	M	1	M	1	M	9
Thalictrum flavum glaucum	Meadowrue, Yellow	P	M	11					M	11
Thalictrum rochebrunianum	Meadowrue, Lavender Mist	P	M	10			M	1	M	11
Thelesperma ambiguus	Navajo Tea	P	L	6	VL	1			VL	7
Thelesperma filifolium	Threadleaf Thelesperma	P	L	10			VL	2	L	12
Thermopsis divaricarpa	Golden Banner	P	L	10	L	2	M	3	M	15
Thermopsis rhombifolia	Golden Banner, Arroyo	P	L	6	L	1	L	2	L	9
Thuja occidentalis	Arborvitae, American	T	M	32	M	4	M	3	M	39
Thuja orientalis	Arborvitae, Oriental	T	M	23	H	3	M	3	M	29
Thuja plicata	Arborvitae, Giant	T	M	15	H	1	H	1	M	17
Thymus 'Elfin'	Thyme, Elfin	GCP	L	15	L	1	VL	1	L	17
Thymus argentia	Thyme, Silver Posy	P	L	7			VL	1	L	8
Thymus praecox 'Pseudolanuginosus'	Thyme, Woolly	GC	L	6	L	1	VL	1	L	8
Thymus praecox arcticus	Thyme, Mother of	GCP	L	19	L	2	L	4	L	25
Thymus serphyllum	Thyme, Wild	GCP	L	16	L	2	L	2	L	20
Thymus vulgaris	Thyme, Garden	P	L	15			VL	1	L	16
Thymus x citriodorus	Thyme, Lemon	P	L	19	L	1	L	1	L	21
Tiarella cordifolia	Foamflower	P	M	11			M	1	M	12
Tiarella wherryi	Foamflower, Wherry's	P	M	11			M	1	M	12
Tilia 'Euchlora'	Linden, Crimean	T	M	17	M	3	M	3	M	23
Tilia americana	Linden, American	T	M	33	M	6	L	4	M	43
Tilia cordata	Linden, Littleleaf	T	M	36	M	5	M	3	M	44
Tilia mongolica	Linden, Mongolian	T	M	11	M	2	L	2	M	15
Tilia tomentosa	Linden, Silver	T	M	16	M	3	M	2	M	21
Tithonia rotundifolia	Sunflower, Mexican	A	L	15			L	1	L	16
Townsendia exscapa	Easter Daisy, White	P	L	10			L	2	L	12
Townsendia grandiflora	Easter Daisy, Large-flower	P	L	7			L	1	L	8
Townsendia parryi	Easter Daisy, Violet-Blue	P	L	4			L	1	L	5
Tradescantia andersoniana	Spiderwort	P	M	20	M	1	M	1	M	22
Tradescantia occidentalis	Spiderwort, Western Blue	P	L	16	VL	1	M	1	L	18
Tricyrtis hirta	Toad Lily	P	M	6					M	6
Trollius chinensis	Globeflower	P	M	16	M	1	M	1	M	18
Trollius pumilus	Globeflower, Dwarf	P	M	8					M	8
Tropaeolum majus	Nasturtium	A	L	21			L	2	L	23
Tsuga canadensis 'Cole's Prostrata'	Hemlock, Canadian Creeping	S	H	10	H	2	H	2	H	14
Tsuga canadensis 'Gracilis'	Hemlock, Dwarf Spreading Canad	S	H	10	H	2	H	2	H	14
Typha angustifolia	Cattail, Narrowleaf	P	H	10			H	1	H	11
Typha latifolia	Cattail, Common	P	H	10			H	1	H	11
Ulmus americana	Elm, American	T	M	30	M	4	M	3	M	37

Appendix E
Plant Water Requirement Estimates (GreenCO-CSU Crop Coefficient Survey 2004)

Estimated Water Usage for Plant: VL=Very Low < 25% ETo; L=Low 25%-50% ETo; M=Medium 50%-75% ETo; H=High >75% ETo
Plant Type: A=Annual ; P=Perennial; T=Tree; V=Vine; GC=Ground Cover; S=Shrub; TU=Turf

Botanic Name	Common Name	Plant Type	East Slope	East Slope Votes	West Slope	West Slope Votes	Mountain	Mountain Votes	All Regions	Total Votes
Ulmus cultivars	Elm	T	M	23	L	2	L	2	M	27
Ulmus glabra	Elm, Scotch	T	L	12	L	3	L	2	L	17
Ulmus parvifolia	Elm, Lacebark	T	L	19	M	3	L	4	M	26
Ulmus wilsoniana	Elm, Wilson	T	M	8	M	3	M	3	M	14
Vaccinium	Blueberry	S	M	8	H	2	H	2	M	12
Valeriana officinalis	Garden Heliotrope	P	M	8					M	8
Verbascum 'Helen Johnson'	Mullein, Peach	P	L	4					L	4
Verbascum bombyciferum	Mullein, Wooly	P	L	16			VL	1	L	17
Verbascum undulatum	Mullein, Wavy-leafed	P	L	4					L	4
Verbena bipinnatifida	Verbena, Native	P	L	19					L	19
Verbena bonariensis	Verbena, Tall	A	L	16	VL	1			L	17
Verbena canadensis	Verbena, Rose	P	L	12	M	1			M	13
Verbena hastata	Vervain, Blue	P	M	5					M	5
Verbena x hybrida	Verbena, Garden	A	L	16	L	1	L	3	L	20
Veronica 'Royal Candles'	Speedwell, Royal Candles	P	L	4					L	4
Veronica 'Sunny Border Blue'	Speedwell, Sunny Border Blue	P	L	18	L	2	M	1	L	21
Veronica Crystal River	Speedwell, Crystal River	GCP	L	10	L	2	L	2	L	14
Veronica allionii	Speedwell, Allioni	GCP	L	15	L	2	L	2	L	19
Veronica austriaca	Speedwell, Hungarian	P	L	12	L	1	M	1	L	14
Veronica filiformis	Speedwell, Birdseye	GCP	L	11	VL	1	L	2	L	14
Veronica gentianoides	Speedwell, Gentian	P	L	8					L	8
Veronica liwanensis	Speedwell, Turkish	GCP	L	21	L	3	L	2	L	26
Veronica longifolia	Speedwell, Long Leaf	P	L	5					L	5
Veronica orientalis	Speedwell, Oriental	P	L	6					L	6
Veronica pectinata	Speedwell, Wooly Creeping	GCP	L	20	L	4	L	2	L	26
Veronica peduncularis 'Georgia Blue'	Speedwell, Georgia Blue	P	L	10	L	1			L	11
Veronica prostrata	Speedwell, Prostrate	GCP	L	12	L	2	L	2	L	16
Veronica repens	Speedwell, Creeping	GCP	L	17	L	3	L	2	L	22
Veronica spicata	Speedwell, Spike	P	M	18	L	1	L	1	M	20
Veronica spicata incana	Speedwell, Wooly	P	L	16			L	1	L	17
Veronicastrum virginicum	Bowman's Root	P	M	11					M	11
Viburnum carlesii	Viburnum, Koreanspice	S	M	30	M	3	L	2	M	35
Viburnum dentatum	Viburnum, Arrowwood	S	M	24	M	4	L	2	M	30
Viburnum dilatatum	Viburnum, Linden	S	L	6	M	1	M	1	M	8
Viburnum lantana	Wayfaringtree	S T	L	34	L	7	L	4	L	45
Viburnum lentago	Viburnum, Nannyberry	S	L	26	L	5	M	3	L	34
Viburnum opulus	Viburnum, European	S	M	26	M	5	L	2	M	33
Viburnum plicatum tomentosum	Viburnum, Doublefile	S	M	18	M	3	M	2	M	23
Viburnum prunifolium	Viburnum, Blackhaw	S	M	16	L	4	L	2	M	22
Viburnum rufidulum	Viburnum, Rusty Blackhaw	S	M	5	M	1	M	1	M	7
Viburnum sargentii	Viburnum Sargent	S	M	13	L	3	L	2	L	18
Viburnum trilobum	Viburnum, American Cranberrybu	S	M	24	L	5	L	2	M	31
Viburnum x bodnantense 'Pink Dawn'	Viburnum, Pink Dawn	S	M	15	M	2	M	2	M	19
Viburnum x burkwoodii	Viburnum, Burkwood	S	M	27	L	4	L	1	M	32
Viburnum x carlcephalum	Viburnum, Fragrant Snowball	S	M	16	L	3	L	2	M	21
Viburnum x juddii	Viburnum, Judd	S	M	18	M	3	L	2	M	23
Viburnum x rhytidophylloides 'Alleghany'	Viburnum, Alleghany	S	L	23	L	4	L	2	L	29
Viguiera multiflora	Showy Goldeneye	P	L	5					L	5
Vinca major	Periwinkle, Big-Leaf	GCP	M	16	M	2	M	2	M	20
Vinca minor	Periwinkle	GCP	L	24	L	3	M	2	L	29
Viola canadensis	Violet, Canadian	P	M	6			M	1	M	7
Viola cornuta	Pansy, Tufted	P	M	15	M	1	M	1	M	17
Viola corsica	Violet, Corsican	P	M	16	M	1	M	1	M	18
Viola odorata	Violet, English	P	M	13			M	1	M	14
Viola tricolor	Viola, Johnny-jump-up	A	M	22			M	2	M	24
Viola x wittrockiana	Pansy	A	M	21			M	3	M	24
Vitis cultivars	Grape cultivars	S V	M	22	M	4	M	1	M	27
Vitis riparia	Grape, Frost	S V	M	11	M	3	M	1	M	15
Waldsteinia ternata	Strawberry, Barren	GCP	L	20	L	3	L	2	L	25
Weigela florida	Weigela	S	M	22	M	4	M	2	M	28
Wisteria floribunda	Japanese Wisteria	V	L	2					L	2
Wisteria sinensis	Wisteria, Chinese	V	M	16					M	16
Xanthoceras sorbifolium	Yellowhorn	T	L	10	L	2	H	1	M	13
Yucca baccata	Yucca, Banana	S	VL	26	VL	6	VL	4	VL	36
Yucca elata	Soap Tree	S	VL	23	VL	5	VL	4	VL	32
Yucca filamentosa	Adam's Needle	S	L	27	VL	5	VL	3	L	35
Yucca glauca	Soapweed	S	VL	28	VL	6	VL	6	VL	40
Yucca recurivifolia	Yucca, Spineless	S	VL	15	VL	4	VL	3	VL	22
Zauschneria californica latifolia	Hummingbird Flower	P	L	19	VL	1			L	20
Zauschneria garrettii 'Orange Carpet'	California Fuchsia, Orange	P	L	23	VL	2			L	25
Zelkova serrata	Zelkova, Japanese	T	M	11	M	3	M	2	M	16
Zinnia elegans	Zinnia	A	L	23	L	1	L	2	L	26
Zinnia grandiflora	Paper Flower	P	VL	23	VL	3	VL	1	VL	27

APPENDIX C – COLORADO STATE UNIVERSITY FIREWISE PLANT LIST

All landscape plantings for properties located in the Moderate or High Wildfire Hazard zone of the City (see Appendix D) must be firewise. Plants should be selected from the plant list provided by the Colorado State University Extension Office, which is copied below and can be found here:
http://extension.colostate.edu/topic-areas/natural-resources/firewise-plant-materials-6-305/
Applicant shall provide references for any proposed firewise plant that is not included in this plant list.

FireWise Plant List

The following list was prepared by Phil Hoefer (retired) Colorado State Forest Service. It was reviewed by Jim Knopf, a landscape architect in Boulder, and two landscape architects on Colorado's Western Slope. Bloom time is approximate (observed in Boulder at 5,600 feet).

Key: Water needs: VL = very low L = low M = medium H = high
Sun/Shade: S = sun PS = part sun Sh = shade
Elevation: Y = Yes N = No ? = Questionable or unknown

Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Elevation (1,000 ft.) 5	6	7	8	9	Approx. Bloom Month
Flowers and Ground Covers										
Achillea lanulosa [a]	Native yarrow	L-H	S/PS	1.5 - 2'	Y	Y	Y	Y	Y	Jul
Achillea tomentosa [b]	Woolly yarrow	M-H	S/PS	.5'	Y	Y	N	N	N	Jul
Aconitum spp.[c]	Monkshood	M-H	S	2'	Y	Y	Y	Y	Y	Jun-Jul
Aconitum columbianum [ac]	Columbian monkshood	M-H	S	2'	Y	Y	Y	Y	Y	Jun-Jul
Ajuga reptans [b]	Bugleweed	H	Sh	< .5'	Y	Y	Y	Y	Y	Jun-Jul
Alchemilla sp.	Lady's mantle	M-H	PS/Sh	1'	Y	Y	Y	Y	?	Jun-Jul
Allium cernuum [ac]	Nodding onion	L-H	S/PS	1'	Y	Y	Y	Y	Y	Jun
Allium geyeri [ac]	Geyer onion	L-H	S/PS	1'	Y	Y	Y	Y	?	Jun
Anaphalis margaritacea [a]	Pearly everlasting	L-H	S	1.5 - 2.5'	Y	Y	Y	Y	?	Aug
Anemone blanda	Windflower	M-H	S/PS	1'	Y	Y	Y	Y	?	Apr-May
Antennaria parvifolia [ab]	Small-leaf pussytoes	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun
Antennaria rosea [ab]	Rosy pussytoes	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun
Aquilegia spp.	Columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Jul
Aquilegia coerulea [a]	Colorado blue columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Jul
Aquilegia chrysantha [a]	Yellow columbine	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
Arabis sp.[b]	Rockcress	L-H	S	< 1'	Y	Y	Y	Y	Y	May-Jun
Armeria maritima	Sea thrift	L-H	S/PS	.5'	Y	Y	Y	Y	Y	Apr-Jun
Artemisia caucasica	Caucasian sage	L-M	S/PS	1- 2'	Y	Y	Y	?	?	n/a
Artemisia frigida [ac]	Fringed sage	L-M	S	1 - 1.5'	Y	Y	Y	Y	Y	n/a
Artemisia ludoviciana [a]	Prairie sage	L-M	S	1 - 1.5'	Y	Y	Y	?	?	n/a
Aster laevis [a]	Smooth aster	L-H	S/PS	1 - 3'	Y	Y	Y	Y	?	Aug-Sep
Aster porteri [a]	Porter aster	L-M	S	1'	Y	Y	Y	?	?	Aug-Sep
Aubrieta sp.[b]	False rockcress	M	S	1'	Y	Y	Y	Y	Y	Apr-May
Aurinia sp.[b]	Basket of gold	M	S/PS	1'	Y	Y	Y	Y	Y	Apr-May
Calochortus gunnisonii [a]	Mariposa lily	M-H	S	.5 - 2'	Y	Y	Y	Y	?	Jul-Aug
Campanula rotundifolia [a]	Common harebell	M-H	S	.5 - 1'	Y	Y	Y	Y	Y	May-Oct
Centranthus ruber	Jupiter's beard	L-H	S/Sh	2 - 2.5'	Y	Y	Y	Y	?	May-Oct
Cerastium strictum [ab]	Mouse ear chickweed	M	S/PS	1'	Y	Y	Y	Y	?	May-Jun
Cerastium tomentosum [b]	Snow-in-summer	L-M	S/PS	1'	Y	Y	Y	Y	Y	May-Jun
Claytonia lanceolata [a]	Spring beauty	M	Sh	.5 - 1.5'	Y	Y	Y	?	?	Mar-Apr
Convallaria majalis [bc]	Lily-of-the-valley	H	Sh	< 1'	Y	Y	Y	Y	?	May-Jun
Delosperma nubigenum [b]	Hardy yellow iceplant	M-H	S	.5'	Y	Y	Y	?	?	Jun
Delphinium spp.[c]	Delphinium	M-H	S/PS	.5 - 3'+	Y	Y	Y	Y	Y	Jun-Jul
Dianthus spp.	Pinks	L-H	S	<.5' - 2'	Y	Y	Y	Y	Y	May-Aug
Doronicum sp.	Leopard's bane	H	S/PS	2 - 3'	Y	Y	Y	Y	?	Jul-Aug
Echinacea purpurea[a]	Purple coneflower	M	S	2 - 3'	Y	Y	Y	Y	Y	Jul-Aug
Epilobium angustifolium	Fireweed	H	S/PS	3'	N	Y	Y	Y	Y	Jul-Aug
Erigeron flagellaris [a]	Whiplash daisy, trailing fleabane	L-M	S	< 1'	Y	Y	?	?	?	Jun-Jul
Eriogonum umbellatum [a]	Sulphur flower	M	S/PS	<.5'	Y	Y	Y	Y	Y	Jun-Jul
Erysimum asperum [a]	Western wallflower	M	S/PS	1'+	Y	Y	Y	Y	?	Jun-Jul
Gaillardia aristata [a]	Blanket flower	L-M	S	1 - 1.5'	Y	Y	Y	Y	Y	Jul-Sep
Galium boreale [ab]	Northern bedstraw	M-H	Sh	<1'	Y	Y	Y	Y	Y	May-Jun
Geranium spp.	Hardy geraniums	M	Sh/PS	2'	Y	Y	Y	Y	Y	May-Oct
Geranium caespitosum [a]	Wild geranium	M	Sh/PS	2'	Y	Y	Y	Y	Y	May-Oct
Geum triflorum	Prairie smoke	M-H	S/PS	1.5'	Y	Y	Y	?	?	Jun
Helianthella quinquenervis [a]	Aspen sunflower	M	S	1'	?	?	?	Y	Y	?
Helianthemum nummularium	Rockrose	M-H	S	< 1'	Y	Y	Y	?	?	May-Jun
Helianthus pumilus [a]	Small sunflower	M	S	1 - 2'	Y	Y	Y	?	?	Jun-Jul
Heuchera spp.	Coral bells	M-H	PS/Sh	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
Ipomopsis aggregata [a]	Scarlet gilia	M	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug

Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Elevation (1,000 ft.) 5	6	7	8	9	Approx. Bloom Month
Iris germanica	Bearded iris	L-M	S	1 - 3'	Y	Y	Y	Y	Y	May-Jun
Iris missouriensis [ac]	Missouri iris	M-H	S	1 - 2'	Y	Y	Y	Y	Y	May
Lamium sp.[b]	Dead nettle	M-H	Sh	< 1'	Y	Y	Y	Y	?	May-Jun
Lavandula spp.	Lavender	L-M	S	1 - 2'	Y	Y	Y	?	?	Jun-Nov
Leucocrinum montanum [a]	Sand lily	L-M	S	< 1'	Y	Y	Y	?	?	May
Liatris punctata [a]	Dotted gayfeather	VL-L	S	1 - 2'	Y	Y	Y	Y	Y	Aug-Oct
Linum lewisii [ac]	Wild blue flax	L-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	May-Sep
Lupinus argenteus [ac]	Silver lupine	M	Sh/PS	1 - 3'	Y	Y	Y	Y	Y	Jun-Jul
Mertensia lanceolata [a]	Narrow-leaved chiming bells	M-H	Sh/PS	1 - 2'	Y	Y	Y	Y	Y	May-Jun
Mimulus guttatus [a]	Yellow monkey-flower	H	Sh	1'	?	Y	Y	Y	Y	?
Monarda fistulosa [a]	Native beebalm	M-H	S/PS	1 - 2'	Y	Y	Y	Y	Y	Jul-Oct
Oenothera caespitosa [a]	White stemless evening primrose	L-M	S	1 - 2'	Y	Y	Y	Y	Y	Jun-Aug
Papaver orientale	Oriental poppy	H	S/Sh	2 - 3'	Y	Y	Y	Y	Y	May-Jun
Penstemon caespitosus [ab]	Mat penstemon	L-M	S	< .5'	Y	Y	Y	Y	Y	Jun
Penstemon secundiflorus	Sidebells	L-M	S	1 - 2'	Y	Y	Y	Y	?	May-Jun
Penstemon teucrioides [a]	Germander penstemon	L-M	S	.5'	Y	Y	Y	?	?	Jun-Jul
Penstemon virens [ac]	Blue mist penstemon	M	S/PS	.5'	Y	Y	Y	Y	Y	May-Jun
Phlox subulata	Moss phlox	M	S	< .5'	Y	Y	Y	Y	Y	May
Polemonium sp.	Jacob's ladder	H	S/PS	1 - 2'	Y	Y	Y	Y	Y	May-Aug
Potentilla fissa [a]	Leafy potentilla	M-H	PS	1'	Y	Y	Y	Y	?	?
Potentilla verna [b]	Spring potentilla	M-H	PS	< .5'	Y	Y	Y	Y	Y	Mar-May
Pulsatilla patens [a]	Pasque flower	M	S/PS	1'	Y	Y	Y	Y	Y	Mar-May
Ratibida columnifera [a]	Prairie coneflower	L-M	S	2'	Y	Y	Y	Y	Y	Jul-Sep
Rudbeckia hirta [a]	Black-eyed Susan	M-H	S	2 - 3'	Y	Y	Y	Y	Y	Jul-Sep
Salvia officinalis	Cooking sage	L-M	S/PS	2'	Y	Y	Y	Y	?	Jun
Saxifraga hirsuta	Saxifrage	H	S/PS	.5'+	Y	Y	Y	Y	Y	May-Jun
Scutellaria brittonii [a]	Skullcap	M	S/PS	.5 - 1'	Y	Y	Y	Y	?	Aug-Sep
Sedum spp.[b]	Stonecrop	M	S/PS	1 - 1.5'	Y	Y	Y	Y	Y	Jul-Aug
Sedum lanceolatum [a]	Yellow stonecrop	M	S/PS	.5'	Y	Y	Y	Y	Y	Jul-Aug
Sempervivum sp.	Hens and chicks	L-M	S/PS	.5'	Y	Y	Y	Y	Y	n/a
Senecio spartioides [ac]	Broom groundsel	VL-L	S	2 - 3'	Y	Y	?	?	?	Sep-Oct
Solidago missouriensis [a]	Smooth goldenrod	L-M	S	1 - 2'	Y	Y	Y	Y	?	Jul-Aug
Thalictrum fendleri [a]	Fendler meadowrue	H	S/PS	2 - 3'	?	?	Y	Y	Y	Jul-Aug
Thermopsis divaricarpa [a]	Spreading golden banner	M-H	S/PS	2'	Y	Y	Y	Y	?	May
Tradescantia occidentalis [a]	Western spiderwort	M	S/PS	1.5'	Y	Y	Y	Y	?	Jun-Aug
Thymus spp.[b]	Thyme	L-M	S	< .5'	Y	Y	Y	Y	Y	Jun-Jul
Veronica pectinata	Speedwell	L-M	S	< .5'	Y	Y	Y	Y	Y	Apr-Jul
Vinca minor [b]	Periwinkle, myrtle	H	Sh	< 1'	Y	Y	Y	Y	?	Apr-Jun
Waldsteinia sp.[b]	Barren strawberry	M-H	Sh/PS	< 1'	Y	Y	Y	Y	?	May-Jun
			Shrubs							
Arctostaphylos nevadensis [ab]	Pinemat manzanita	M	S/PS	1 - 2'	Y	Y	Y	N	N	n/a
Arctostaphylos patula [a]	Greenleaf manzanita	M	S/PS	3 - 4'	Y	Y	Y	N	N	n/a
Arctostaphylos uva-ursi [ab]	Kinnikinnick, bearberry	M	S/Sh	1'	Y	Y	Y	Y	Y	n/a
Betula glanulosa [a]	Bog birch	H	S/PS	6 - 8'	Y	Y	Y	Y	Y	n/a
Calluna sp.	Heather	H	S/PS	2'	Y	Y	Y	?	?	Jul-Aug
Ceanothus fendleri [a]	Buckbrush, mountain lilac	M	S	2'	Y	Y	Y	?	?	Jul
Cercocarpus intricatus [a]	Little-leaf mountain mahogany	VL-L	S	4 - 6'	Y	Y	Y	Y	?	n/a
Cercocarpus montanus [ac]	True mountain mahogany	L-M	S	4 - 6'	Y	Y	Y	Y	?	n/a
Chrysothamnus spp.[a]	Rabbitbrush	VL-L	S	2 - 6'	Y	Y	Y	Y	Y	Jul-Aug
Cornus stolonifera [a]	Redtwig dogwood	H	S/Sh	4 - 6'	Y	Y	Y	Y	Y	n/a
Cotoneaster horizontalis	Spreading cotoneaster	M	S/PS	2 - 3'	Y	Y	Y	Y	?	May-Jun
Daphne burkwoodii	Burkwood daphne	M	S/PS	2 - 3'	Y	Y	Y	?	?	Apr-Jun
Erica sp.	Heath	H	S/PS	1'	Y	Y	Y	?	?	Jan-Mar
Euonymus alatus	Burning bush euonymus	M	S/Sh	1 - 6'	Y	Y	Y	?	?	n/a

Scientific Name	Common Name	Approx. Water Needs	Sun/Shade Preference	Approx. Mature Height	Elevation (1,000 ft.) 5	6	7	8	9	Approx. Bloom Month
Fallugia paradoxa [a]	Apache plume	VL-L	S	2 - 4'	Y	Y	Y	Y	Y	Jun-Oct
Holodiscus dumosus [a]	Ocean spray, cliff/rock spirea	L-M	S/PS	4'	Y	Y	Y	Y	Y	Jun
Jamesia americana [a]	Wax flower	M-H	S/Sh	2 - 6'	Y	Y	Y	Y	Y	Jun
Lonicera tatarica	Tatarian honeysuckle	M	S/PS	4 - 6'	Y	Y	Y	Y	Y	May-Jun
Mahonia aquifolium	Oregon grape holly	M-H	S/Sh	4 - 6'	Y	Y	Y	?	?	May-Jun
Mahonia repens ab	Creeping grape holly	L-H	S/Sh	1 - 2'	Y	Y	Y	Y	Y	Mar-May
Philadelphus microphyllus [a]	Little-leaf mockorange	M	S	2 - 3'	Y	Y	Y	Y	?	Jun
Physocarpus monogynus [a]	Mountain ninebark	M	S/Sh	2 - 4v	Y	Y	Y	Y	Y	Jun
Potentilla fruticosa [a]	Shrubby cinquefoil	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	May-Sep
Prunus besseyi [a]	Western sand cherry	L-M	S	1 - 3'	Y	Y	Y	Y	?	May
Purshia tridentata [a]	Antelope bitterbrush	L-M	S	1 - 2'	Y	Y	Y	?	?	Jun-Aug
Ribes aureum [a]	Golden currant	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	Apr-May
Rosa woodsii [a]	Woods' or native wild rose	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	Jun-Jul
Shepherdia canadensis [d]	Russet buffaloberry	M-H	S	5 - 6'	Y	Y	Y	Y	Y	n/a
Symphoricarpos spp. [d]	Snowberry, coralberry	M	S/PS	2 - 3'	Y	Y	Y	Y	Y	n/a
Viburnum edule [a]	Highbush cranberry	H	S	6 - 8'	Y	Y	Y	Y	Y	May-Jun
Yucca baccata [a]	Banana or broad-leaf yucca	VL-L	S/PS	2 - 3'	Y	Y	Y	N	N	Jun
Yucca filamentosa	Adam's needle	M	S/PS	2 - 3'	Y	Y	Y	N	N	Jun
Yucca glauca [a]	Spanish bayonet, small soapweed, Great Plains yucca	VL-L	S/PS	2 - 3'	Y	Y	Y	Y	?	Jun
Large Shrubs and Trees										
Acer ginnala	Ginnala maple	M-H	S	6 - 10'	Y	Y	Y	Y	Y	n/a
Acer glabrum [a]	Rocky Mountain maple	M-H	S/Sh	6 - 10'	Y	Y	Y	Y	Y	n/a
Acer grandidentatum [a]	Wasatch maple	M	S/PS	10 - 20'	Y	Y	Y	Y	?	n/a
Alnus tenuifolia [a]	Thinleaf alder	H	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr
Amelanchier alnifolia [ac]	Saskatoon alder-leaf serviceberry	M	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr-May
Amelanchier utahensis [a]	Utah serviceberry	VL-M	S	4 - 6'	Y	Y	N	N	N	May
Betula fontinalis [a]	River birch	H	S/PS	6 - 8'	Y	Y	Y	Y	?	n/a
Cercocarpus ledifolius [a]	Mountain mahogany	VL-L	S	6 - 15'	Y	Y	?	N	N	n/a
Corylus cornuta [a]	Filbert, beaked hazelnut	H	S/Sh	5 - 6'	Y	Y	Y	?	?	n/a
Crataegus spp.[a]	Hawthorn (several native)	M	S	6 - 8'	Y	Y	Y	Y	?	May
Fraxinus pennsylvancia	Green ash	M-H	S	20 - 25'	Y	Y	Y	Y	?	n/a
Gleditsia triacanthos	Honeylocust	M-H	S	60 - 70'	Y	Y	N	N	N	May
Malus sp.	Crabapple	M	S	10 - 15'	Y	Y	Y	Y	N	Apr-May
Physocarpus opulifolius [a]	Tall ninebark	M	S/PS	4 - 6'	Y	Y	Y	?	N	May
Populus tremuloides [a]	Aspen	M	S	8 - 25'	Y	Y	Y	Y	Y	n/a
Prunus americana [a]	American wild plum	M	S/PS	4 - 6'	Y	Y	Y	Y	N	Apr
Prunus cerasifera[c]	Flowering plum	M	S/PS	8 - 10'	Y	Y	Y	?	N	Apr
Prunus pensylvanica [ac]	Pin/fire/wild/red cherry	M	S/PS	6 - 8'	Y	Y	Y	?	N	May
Prunus virginiana melanocarpa [ac]	Western chokecherry	M-H	S/PS	6 - 8'	Y	Y	Y	Y	Y	Apr-May
Rubus deliciosus [a]	Boulder raspberry, thimbleberry	M	S/Sh	4 - 6'	Y	Y	Y	Y	Y	Apr-May
Salix amygdaloides [a]	Peachleaf willow	H	S/PS	20 - 30'	Y	Y	Y	Y	?	n/a
Shepherdia argentea [a]	Silver buffaloberry	M	S/PS	4 - 6'	Y	Y	Y	Y	?	Apr
Sorbus scopulina [a]	Western mountain ash	M-H	S/Sh	6 - 8'	Y	Y	Y	Y	?	May
Syringa vulgaris	Common lilac	M	S	6 - 8'	Y	Y	Y	Y	Y	May

[a] Native species.

[b] Ground cover plant.

[c] This species, or some species in this genus, may be poisonous to livestock, pets, wildlife and/or people under some conditions. Before planting, check with Colorado State University Extension, Colorado State Forest Service, or other knowledgeable personnel.

[d] Several species of symphoricarpos are native.

APPENDIX D – CITY OF ASPEN AND PITKIN COUNTY WILDFIRE HAZARD ASSESSMENT MAPS

FIGURE D1. CITY OF ASPEN WILDFIRE HAZARD ASSESSMENT MAP

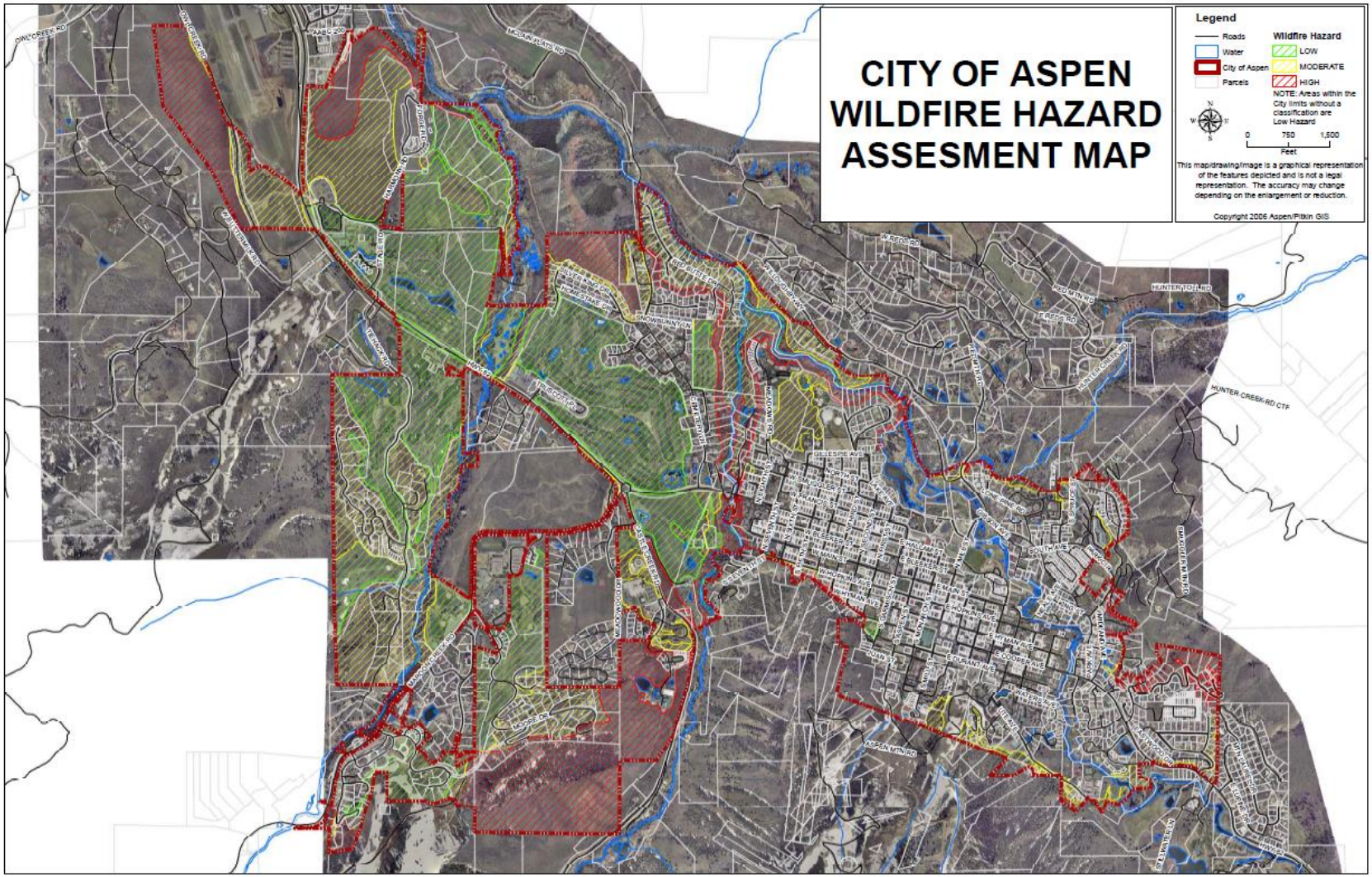
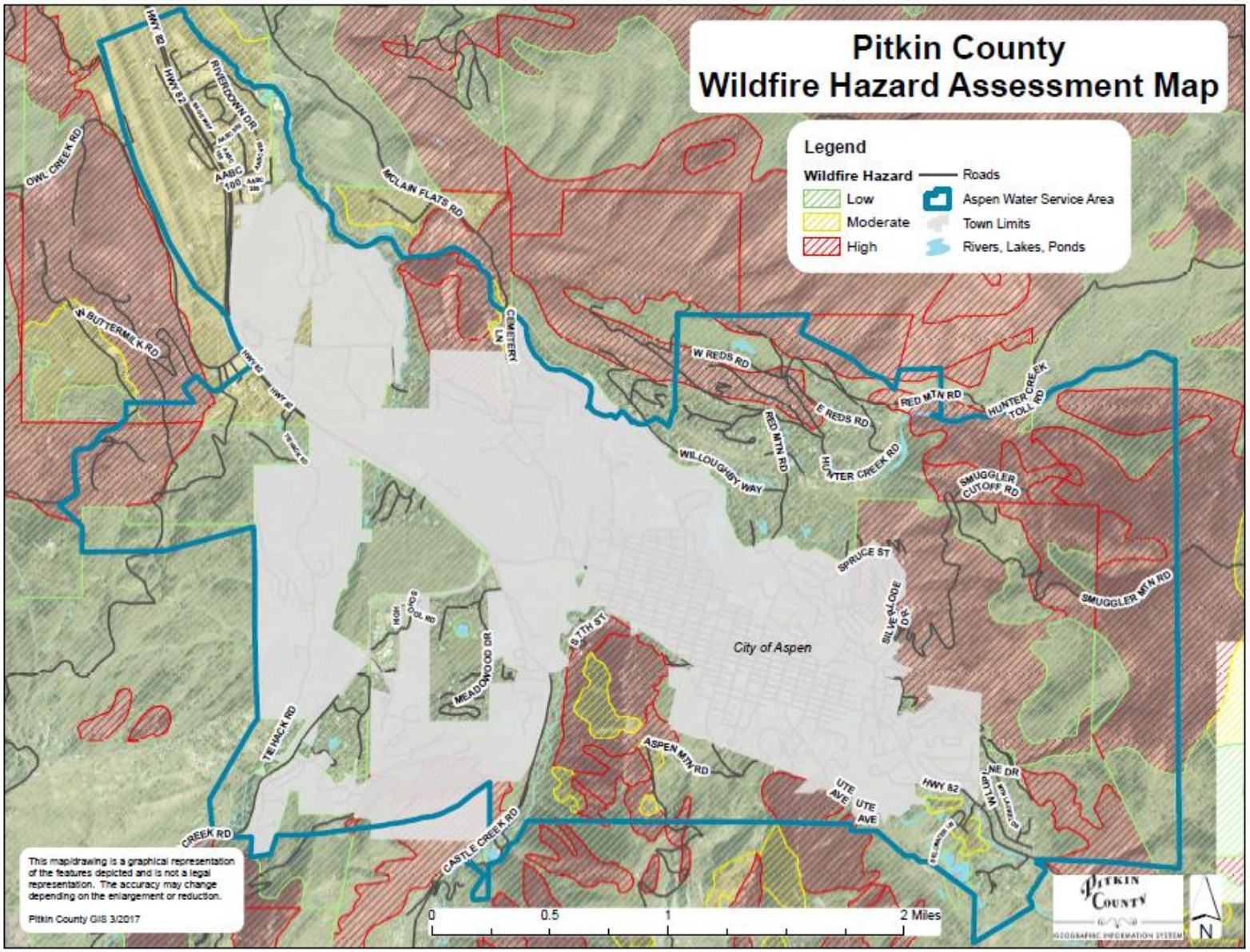


FIGURE D2. PITKIN COUNTY WILDFIRE HAZARD ASSESSMENT MAP



COLORADO
Colorado Water Conservation Board
Department of Natural Resources

1313 Sherman Street, Room 718
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3/1/2017

Lee Ledesma
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The City of Aspen's Landscape Code revision is an excellent example of how local efforts tie into larger statewide efforts to reduce outdoor water use in Colorado. Comprehensive landscape codes are key to reducing outdoor demand and 'building it smart from the start". I consider the City of Aspen's effort as the most comprehensive on the West Slope for requiring soil amendment, irrigation system standards, and auditing the installed irrigation system.

In Colorado's Water Plan, the CWCB set a goal of 400,000 acre feet municipal demand reduction by 2050 with one of the largest drivers being more efficient outdoor use. In Chapter 6.3 of Colorado's Water Plan, the CWCB created an action supporting local ordinances to reduce outdoor demand as well as reducing water use in new development:

> **Support local water smart ordinances:** Over the next two years, the CWCB will provide trainings that support local regulatory efforts that shape the ways in which new construction interacts with water use. For example, local jurisdictions could craft landscape and irrigation ordinances, tap fees that reflect actual water uses, education or certification for landscape professionals, green-infrastructure ordinances, and more stringent green-construction codes that include higher-efficiency fixtures and appliances and water-wise landscapes. It is imperative that this action explore the societal and environment benefits of urban landscapes.

The City of Aspen's landscape code revision fits squarely in this action, will contribute to the 400,000 acre foot statewide demand reduction goal and will serve as an excellent example for other water providers on the West Slope to follow.

Sincerely,

Kevin D. Reidy

Kevin D. Reidy
State Water Conservation Specialist
Colorado Water Conservation Board