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.

January 1, 2026

CITY OF ASPEN

Water Department

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DEFINITIONS

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

Backflow prevention assembly: a safety device used to prevent pollution or contamination of the water supply due to the reverse flow of water. These assemblies can be installed at a water service line or at a plumbing fixture to prevent a backflow contamination event, provided that the mechanical assembly is appropriate for the identified contaminant or pollutant at the cross connection and is an in-line field-testable assembly.

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 Consultants (ASIC) credentialed Irrigation Consultant, or other irrigation designer program labeled by U.S. Environmental Protection Agency's WaterSense program.

Certified/Licensed Landscape Contractor: Colorado State law governs the sizes and types of projects that unlicensed individuals can design independent of City requirements. For those projects that are exempt from State licensure, one of the following certifications are required: Associated Landscape Contractors of Colorado Landscape Industry Certified Technician, Qualified Water Efficient Landscaper (QWEL) program, or another 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, the Irrigation Association's Certified Landscape Irrigation Auditor program, the Qualified Water Efficient Landscaper (QWEL) program, a professional trade organization, or other program labeled by U.S. Environmental Protection Agency's WaterSense program.

Common interest community property: property within a common interest community that is owned and maintained by a unit owners' association, such as entryways, parks, and other common elements as defined in Colorado Revised Statute Section 38-33.3-103 (5) and Colorado Senate Bill 24-005.

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

Disturbance area: 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 stockpile areas. This includes areas disturbed within Right-of-Ways.

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

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

Establishment period: the period of time required for a plant to seed, germinate, and establish a healthy root system, which promotes long-term health and growth. Note: Temporary Irrigation Water Service Agreements, as defined below, specify the period of time in which Temporary Irrigation is allowed for plant 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."

Equivalent Capacity Unit (ECU): unit reflecting the part of the capacity of the water system necessary to serve a standard water customer, with multiples or fractions of the unit including a maximum number and type of water fixtures, a maximum irrigated area, certain cooking facilities or other water demand factors.

Exterior irrigation shut off valve – lockable ball valve or gate valve after the irrigation point of connection and outside of the building for the purposes of shutting off water to the irrigation system alone. It must have the capability to be manually closed and locked.

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 irrigation master valves. This combination flow meter/controller may also function as a landscape irrigation water meter or sub-meter.

Flow rate: the rate at which water flows through pipes and valves expressed as a volume of water per unit of time (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.

Hardscape: a landscape feature that is made of any durable material (pervious and impervious).

Hot Tubs and swimming pools: The surface area of hot tubs and swimming pools shall be included as a hydrozone of the irrigated landscape area. Water features, defined as a design element in which open water serves primarily an aesthetic or decorative use, are not allowed. Water features include, but are not limited to ponds, lakes, waterfalls, jets, fountains, artificial streams, water stairs, infinity pools, or cascades wherein water is artificially supplied to create or operate the feature. This includes water features supplied by raw water.

Hydrozone: a portion of the irrigated landscaped area having plants with similar water needs. Each irrigated hydrozone is served by a valve or set of valves with the same irrigation schedule. The surface area of hot tubs and swimming pools shall be included in the hydrozone calculation when determining the Maximum Applied Water Budget, as specified in Appendix A.

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

Irrigation Approval Letter: the document, signed by a Certified Landscape Irrigation Auditor, showing the project has been installed and inspected per the approved Irrigation Design Plan.

Irrigation audit: an in-depth evaluation of the performance of an irrigation system conducted by a third-party 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 Qualified Water Efficient Landscaper (QWEL) program, Irrigation Association's Landscape Irrigation Auditor Certification program, or another U.S. Environmental Protection Agency WaterSense-labeled auditing program.

Irrigation Design Plan: the irrigation system related 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 efficiency: the measurement of the amount of irrigation water beneficially used divided by the amount of irrigation 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 mainline: the pipe that runs from the irrigation water source to the irrigation valves. This is different from the City's water mainline.

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 the 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 area less the building footprint, driveways, non-irrigated portions of parking lots, hardscapes such as decks and patios, and other non-porous areas. Hot tubs and swimming pools are included in the calculation of the irrigated landscaped area. Areas dedicated to edible plants, such as orchards or vegetable gardens are not included.

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

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.

Licensed Landscape Architect: all states require candidates to pass the Landscape Architect Registration Examination (LARE) which is administered by the Council of Landscape Architecture Registration Boards (CLARB), to attain professional licensure.

Low flow 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, micro sprays, and bubblers. Low flow irrigation systems apply small volumes of water slowly at or near the root zone of plants.

Master shut off valve: A valve such as a gate or ball valve installed on potable systems and pressurized raw water systems, 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 mainline break) or routine repair.

Maximum Applied Water Budget: the upper limit of applied irrigation water (supplemental to precipitation) for the established irrigated 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 on 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.

Nonfunctional turf: Non-native or non-climate adaptive, cool season grass species that grow in a mat-like pattern, often located adjacent to streets, sidewalks, driveways, frontage areas, and medians — areas that are only for ornamental or aesthetic purposes and not regularly used for civic, community or recreational purposes.

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 (also known as dynamic pressure): the pressure at which the parts of an irrigation system are designed by the manufacturer to operate or the pressure measured within the system during normal operation.

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

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

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

Precipitation rate: the amount of water applied by a sprinkler head in a certain amount of time. Aspen Water Efficient Landscape Standards require all heads in the same zone to have "matched" precipitation rates.

Primary irrigation control valve (also known as irrigation master valve): an 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. It also works in conjunction with the flow sensor and controller to automatically shut down the irrigation system in the event of an unexpected flow event.

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.

Qualified Water Efficient Landscaper (QWEL): The QWEL program is an EPA WaterSense-labeled professional certification in irrigation system audits. QWEL is a program of the Sonoma-Marin Saving Water Partnership and is available through many organizations that have adopted the program. City of Aspen is one of the many organizations that have adopted this program and is one of several PCOs for QWEL in the state of Colorado.

Raw water: untreated non-potable water delivered through the City's non-pressurized or pressurized raw water systems under a Raw Water Service Agreement with the City. This water is used for landscape irrigation and is not intended for human consumption. Raw water rights may be owned by the City or by the customer. Only City-owned water rights are required to meet these Water Efficient Landscape Standards.

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

Record drawing (also known as "as-built" drawing): the approved City of Aspen stamped landscape and irrigation plans updated electronically with any changes or deviations. They show changes in the work made during construction which are usually based on drawings marked up in the field and other data furnished by the contractor. Final disposition, location, with dimensions of the installed landscape and irrigation equipment shall be shown on as-built drawing and submitted prior to final WELS inspection.

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 (Reference 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 (4–7") tall, cool-season grass that is well watered. Reference evapotranspiration (ET_o) is used as the basis for determining the Maximum Applied Water Budget. One inch is approximately 0.623 gallons per square foot (sq-ft).

Remote control valve: a device used to control the flow of water within the irrigation system and is operated by the irrigation controller/timer.

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

Runoff: water that 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 (precipitation rate exceeds infiltration rate), run times are set too long or a valve is stuck open, when there is a severe slope, etc.

Service line: the pipe that comes off the City's main water line into the building/structure.

Smart irrigation controller: an automatic timing device with nonvolatile memory used to remotely control valves that operate an irrigation system. Smart irrigation controllers can self-adjust and schedule irrigation events using either evapotranspiration (weather) or soil moisture data.

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 delivers/sprays water through a nozzle.

Static water pressure: the pipeline 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 irrigation water applied to the landscape that is installed after the primary utility water meter.

Subsurface irrigation pop-up indicator: An indicator at the end of a drip zone that rises up to provide a clear indication that the zone is pressurized and water is running through it.

Temporary Irrigation: temporarily installed irrigation for the sole purpose of low water use and drought tolerant plant establishment pursuant to the terms and conditions set forth in an approved City of Aspen Temporary Irrigation Water Service Agreement.

Temporary Irrigation Water Service Agreement: An agreement approved by the City of Aspen that specifies the property location at which the City of Aspen will provide potable water service for purposes of Temporary Irrigation of a predetermined amount of irrigated square feet for a predetermined period of time. The location, amount, plants, specifications, etc. of planned Temporary Irrigation on the subject property will be reviewed and approved prior to executing a Temporary Irrigation Water Service Agreement. Any sprinkler system or other infrastructure used for Temporary Irrigation must meet City requirements and shall be installed on grade, unless otherwise agreed to by the City, for ease of inspection and removal. A monetary deposit from property owner is also required prior to the city executing aa Temporary Irrigation Water Service Agreement. Information regarding the application process can be obtained from the Aspen Water Department.

Third Party Irrigation Audit: An independent evaluation of the irrigation system conducted by an external entity. 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 buffalograss 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.

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 and 2023), 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 reducing 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 as well as to Aspen raw water accounts utilizing City-owned water rights:

2.1.1 Landscaping, grading, installing or disturbing hardscapes, additions to structures, etc. that has a disturbance area greater than one thousand (1,000) square feet and greater than twenty-five percent (25%) of the entire lot or parcel.

2.1.2 Permit applications with more than ten thousand (10,000) square feet of affected area, which is defined as the square footage of the building footprint, plus the square footage of exterior disturbance.

2.1.3 Landscape and Grading Permit applications with any modifications to an existing irrigation system.

2.1.4 All permit applications with internal work that alters greater than 50% of the existing structure, based on the entire square footage of the existing building.

Note: Separate permits within three years for the same property that have a combined total disturbance area that meets any of the above triggers will be subject to compliance with WELS.

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 Projects in the City of Aspen R-3 (high density) planning zone.

2.2.3 Projects with less than 250 sq-ft of total irrigated area including any adjoining irrigated public Right-of-Way.

2.2.4 Projects with greater than 75% of the total irrigated area occurring within the adjoining public Right-of-Way.

2.2.5 Variances approved by the City Utilities Director (See Section 2.4.1 Variances and Existing Compliance)

2.3 Pilot Phase

An 18-month pilot phase began on June 22, 2017, after the adoption of Ordinance 16, Series 2017, and ended on December 31, 2018. For all permit applications accepted by the City during the pilot phase, all documentation described in this document was required, and irrigation and landscaping installation requirements needed to be met. During the pilot phase, the City encouraged applicants to meet the 7.5 gallons/season/sq-ft water budget, however, failure to meet the Maximum Applied Water Budget during the 18-month pilot phase did not hold up applicants' building permit and/or certificate of occupancy. Effective January 1, 2019, full compliance with the City of Aspen Water Efficient Landscaping Ordinance and Standards shall be required.

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.

There may be special circumstances, including but not limited to the following, in which portions of the standards shall not apply.

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. Ecological restoration projects that do not require a permanent irrigation system.
e. Mined-land reclamation projects that do not require a permanent irrigation system.
f. Stormwater treatment facilities that require irrigation.
g. Wildfire mitigation areas planned to establish defensible space.
h. Properties undergoing Pitkin County Scenic Review.
i. Areas receiving solely authorized alternative water sources such as rain catchment.
j. Registered local, state, or federal historical sites.
k. Pools and spas that occupy at least 80% of the total landscape area as determined through the water budget calculation sheet.
l. Functional turf in common interest properties and public rights-of-way.

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:

a. Criteria under which the applicant seeks a variance;
b. Justification for not complying with the standards or a portion of the standards;
c. Proposed alternate criteria or standards to comply with the intent of the criteria;
d. Supporting documentation, including necessary calculations;
e. The proposed variance's potential adverse impacts on adjacent landowners; and
f. 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 or portions of existing properties in sufficient compliance 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:

a. WELS Application Package; and
b. Irrigation audit report performed by a third-party Certified Landscape Irrigation Auditor (see Section 6.1 for details).

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 file an appeal with the Administrative Hearing Officer, pursuant to the procedures set out in Chapter 26.316 of the City of Aspen Municipal 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.

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. WELS APPLICATION PACKAGE

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

3.1 WELS Application Package

The WELS Application Package shall include the following six (6) elements:

3.1.1 Optional City-provided pre-submission checklist of all documents in WELS Application Package.

3.1.2 Project information

a. Project contacts for the project applicant, landscape and irrigation system installer, and property owner
b. Project address (if available, parcel and/or lot number(s))
c. Total landscaped area and total irrigated area (sq-ft), including adjoining public Right-of-Way areas.
d. Project type (e.g., new, rehabilitated, public, private, homeowner-installed)
e. Water supply type (e.g., potable, recycled, well, City-owned raw)
f. For Pitkin County residents only: Recorded Site Plan and Activity Envelope.

3.1.3 Applicant signature and date with statement, "I agree to comply with the requirements of the Water Efficient Landscaping Standards and submit a complete WELS Application Package."

3.1.4 Completed Outdoor Water Budget Worksheet (see Appendix A).

3.1.5 Signed Landscape Design Plan (signed by a Licensed Landscape Architect or Certified/Licensed Landscape Contractor) with certifying statement as described in Section 4.4.14. See description of "Licensed Landscape Architect" and "Certified/Licensed Landscape Contractor" in the Definitions section.

3.1.6 Signed Irrigation Design Plan (signed by a Certified Irrigation Designer) with certifying statement as described in Section 5.3.9.

3.2 Compliance with the WELS Application Package

3.2.1 Prior to submission of an application, the City of Aspen Landscape Plan Reviewer shall, upon request of the project applicant:

a. Provide the project applicant with the standards and procedures for permits, plans check, or design reviews.
b. Review the WELS Application Package and sign optional Pre-Submission Checklist.

3.2.2 Upon approval of the WELS Application Package by the City of Aspen, the project applicant shall:

a. Receive approval of plan set and retain record to include the date of the permit in the Irrigation Approval Letter (see Section 6.2 below). A permit will be issued once all review agencies have approved their respective plan sets.
b. Submit a copy of the approved WELS Application Package along with the record drawings and any other information to the property owner or his/her designee.

4. 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.

4.1 Soil Criteria

4.1.1 Soil Amendment

a. Topsoil of irrigated grasses (including turfgrass), 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 must be a sandy loam and 36 inches (36") deep for areas where trees are planted. The total soil depth shall have at least one to three percent (1-3%) organic matter by volume. Use native soils from the site to the extent possible and add organic matter and till and mix into soil as needed. (NOTE: If in turfgrass, topsoil should be 6 inches (6") and have 5% organic matter by volume). In good existing soils, dig and turn the soils to three times the dimension of the root ball. Hard or compacted sub soil or lower soil layers should be broken up to create adequate drainage and avoid trapping water creating saturated and anaerobic conditions in the upper soil layer. In newly developed planting sites, soil depth shall be 20 feet (20) diameter around the trees to a depth of 36" or meet the requirements for soil volume as described in Appendix E.

c. Soil amendment organic matter (compost) shall be fully finished, stabilized, and mature product, derived from organic materials such as leaves, grass clippings, wood chips, and other yard wastes. Finished compost is dark and crumbly, does not resemble the original contents, and has an earthy smell. Acceptable compost will not contain any human or animal waste.

d. Soil Evaluation and Improvement

i. 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.

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

iii. 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, and types of plant materials intended for each area should be considered 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) sq-ft. 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 soil in irrigated 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).

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

v. 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.

4.1.2 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, dirt clods, and debris 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. Stripping and stockpiling of native 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. Stockpiling may not occur on existing native vegetation outside of the disturbance area.

d. 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.
e. 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 shall not be approved.
f. Written documentation of soil amendment type and volume must be retained and made available to the City of Aspen upon request.

4.1.3 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.

i. Soil may be inspected by the City of Aspen for depth and type of organic matter.

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

4.2 Mulch Criteria

4.2.1 Organic Mulch

a. Shall be applied at one (1) cubic yard per eighty (80) sq-ft 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 tree trunks to minimize disease.
c. Organic mulch material includes bark and wood chips. Avoid mulch consisting of construction debris such as pallets.

4.2.2 Inorganic Mulch

a. Inorganic mulch includes rock, gravel, or pebbles.
b. Rock mulch shall have a minimum depth of two inches (2”).

4.3 Planting and Water Use Criteria

4.3.1 Water Budget

a. All irrigated landscaped areas, including in the public right-of-way, must be included in the water budget calculation. See Appendix A for details on calculating the Maximum Applied Water Budget.
b. The total irrigation water need for all hydrozones cannot exceed a Maximum Applied Water Budget of 7.5 gallons/season/sq-ft of irrigated landscape area (12 inches/season).

4.3.2 Plant Material[1]

a. Aside from the use of invasive and/or noxious plant species[2], 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 sq-ft per season, must be provided for any plants that are not currently included in the GreenCO Plant List. See Appendix B for the GreenCO Plant List.
b. Each hydrozone shall have plant materials with the same 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:
    i. Protection and preservation of native species and natural vegetation.
    ii. Selection of plants based on disease and pest resistance.
    iii. Selection of trees based on applicable local tree ordinance or tree shading guidelines.
    iv. 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).
    v. Consider the solar orientation for plant placement to maximize summer shade and winter solar gain.

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[1] Pitkin County Revegetation Guide: https://pitkincounty.com/DocumentCenter/View/1696/Revegetation-Guide-PDF?bidId=

[2] Colorado Department of Agriculture Noxious Weed List: https://ag.colorado.gov/conservation/noxious-weeds/species-id

d. Invasive and/or noxious plant species are prohibited.[3]
e. Turfgrass 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).
f. Nonfunctional turf and artificial turf shall not be permitted on commercial properties, common interest community properties, or public rights-of-way in new construction or during redevelopment in accordance with Colorado State Law SB24-005 "Prohibit Landscaping Practices for Water Conservation". This applies to City of Aspen buildings.
g. Avoid fire-prone plant materials and highly flammable mulches. See Appendix C for a recommended list of plants to best prepare for wildfire[4] and landscape design fact sheet Appendix D for the City and Pitkin County Wildfire Hazard Assessment Maps.
h. A Landscape Design Plan for projects in fire-prone areas shall address fire safety and prevention.
i. 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) pursuant to Pitkin County and The City of Aspen's Community Development Department requirements.
    i. Properties located outside of the City limits should consult with Pitkin County.
j. The architectural guidelines of a common interest development, which include community apartment projects, condominiums, and planned developments shall not include conditions that have the effect of prohibiting the use of low-water-use plants as a group. The guidelines must also not require turf in common areas or Right-of-Ways unless it can be proven to be functional turf.
k. Removing vegetation and amending soil under existing trees requires a City of Aspen tree permit to be submitted, reviewed, and approved by the City Forester.
l. All irrigation work performed within the drip line of existing trees requires a City of Aspen tree permit to be submitted, reviewed, and approved by the City Forester.

4.3.3 Hot Tubs and Swimming Pools

a. For purposes of the water budget calculation, the surface area of a hot tub and/or swimming pool shall be included as a water use hydrozone area with a very high (VH) water use rating and 75% irrigation efficiency.
b. Pool and spa covers are highly recommended.

4.3.4 Stormwater Management

a. Stormwater management practices that minimize runoff and increase infiltration are encouraged, to the extent permissible by law. Please refer to the City of Aspen's Urban Runoff Management Plan for more information. Project applicants shall refer to the City of Aspen Engineering Department for information on any applicable stormwater ordinances and stormwater management plans.

[3] Pitkin County Noxious List & Weed Management Plan: http://pitkincounty.com/430/Noxious-Weed- Information
[4] See: City of Aspen Firewise Plant Materials recommendations: https://www.aspen.gov/DocumentCenter/View/2710/Fire-Resistant-Landscapes-by-CSU-Extensions

4.4 Landscape Design Plan

The Landscape Design Plan, at a minimum, shall:

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

4.4.2 Identify each hydrozone's Water Use Category.

a. Identify proposed plants by common and botanical names within each hydrozone. Provide a legend of graphic symbols for each proposed plant and/or seed mixture.

4.4.3 Identify recreational areas.

4.4.4 Identify public Right-of-Ways.

4.4.5 Identify areas permanently and solely dedicated to edible plants.

4.4.6 Identify areas dedicated to annuals.

4.4.7 Identify areas irrigated with recycled/gray water.

4.4.8 Identify type of mulch and application depth.

4.4.9 Identify soil amendments, type, and quantity.

4.4.10 Identify type, surface area, and volume of hot tubs and/or swimming pools.

4.4.11 Identify hardscapes (pervious and impervious).

4.4.12 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.

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

4.4.14 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."

4.4.15 Contain the signature of a Licensed Landscape Architect or Certified/Licensed Landscape Contractor. See description of "Licensed Landscape Architect" and "Certified/Licensed Landscape Contractor" in the Definitions section.

5. IRRIGATION SYSTEM CRITERIA

This section applies to landscaped areas requiring permanent irrigation. Temporary Irrigation pursuant to a Temporary Irrigation Water Service Agreement must comply with the terms specified in the separate agreement.

5.1 Irrigation System Requirements

5.1.1 Backflow prevention assemblies shall be required on potable systems to protect the potable water supply from contamination by the irrigation system and comply with local plumbing codes.

5.1.2 Shut-off valves (i.e. curb box) shall be installed on potable systems and pressurized raw water systems, as close as possible to the point of connection of the water supply and to isolate sections of service line on larger systems, to minimize water loss in case of an emergency (such as a service line break) or routine repair. See City of Aspen Water Distribution Standards Section 5.2.[5]

5.1.3 Exterior irrigation shut off valve (such as a lockable gate or ball valve) after the irrigation point of connection and outside of the building for the purposes of shutting off water to the irrigation system alone are required on all projects supplied with potable water and pressurized raw water systems. It must have the capability to be manually closed and locked.

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).

5.1.4 A Primary irrigation control valve (also known as irrigation master valve), electronically connected to the smart controller is required.

5.1.5 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 required.

5.1.6 Flow sensors integrated with the automatic irrigation controller are required on all projects to control irrigation if flows are abnormal.

5.1.7 Dedicated landscape water sub-meters shall be installed for all non-residential irrigated landscapes of 5,000 sq-ft or more.

5.1.8 Sensors (e.g., rain, freeze, wind, 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.

5.1.9 A soil moisture sensor is required for all physically separate, irrigated green roofs.

5.1.10 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.

5.1.11 Minimum pop-up height for spray heads and rotors in turfgrass areas shall be six inches (6").

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

5.1.13 Drip emitters and sub-surface drip shall be equipped with internal check valves at each emitter.

5.1.14 It is recommended that each drip irrigation zone (subsurface and point source) shall have a visual indicator to ensure proper functioning of the zone and assist with identifying maintenance issues.

5.1.15 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.

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[5] See: City of Aspen Distribution Standards:
https://www.aspen.gov/DocumentCenter/View/12882/Water-Distribution-Standards-2024-PDF

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.

5.1.16 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.

5.1.17 The design of the irrigation system shall conform to the hydrozones of the Landscape Design Plan.

5.1.18 Sprinklers within a zone shall have matched precipitation rates.

5.1.19 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 turfgrass areas shall have a distribution uniformity of 0.65 or higher using the protocol defined in the ASABE/ICC 802-2014 standard.

5.1.20 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.

5.1.21 Raw water pumps and appurtenant infrastructure shall be shown on plans and must maintain complete separation from potable supplies.

5.2 Hydrozone Requirements

5.2.1 Each remote-control valve shall irrigate a hydrozone with similar microclimate, soil conditions, slope, and plant materials with similar water demand. Individual hydrozones that mix high, moderate, low, and/or very low water use plants shall not be permitted.

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

5.2.3 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; only drip and subsurface irrigation systems are allowed.

5.2.4 Slopes greater than twenty-five percent (25%) shall not use sprinklers with a precipitation 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.

5.2.5 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, moderate, low, and/or very low water use plants shall not be permitted.

5.2.6 Generally, trees, shrubs, perennials, and groundcover shall be irrigated with drip irrigation.

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

5.2.8 Trees shall be placed on separate valves from shrubs, perennials, 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.

5.2.9 Hydrozone areas shall be designated by color, 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. The valve designations shall be listed for each of the corresponding hydrozones on the Outdoor Water Budget Worksheet (see Appendix A). The Outdoor Water Budget Worksheet can also assist with the irrigation audit and programming of the controller.

5.2.10 Source water, such as potable, non-potable, recycled, reclaimed, graywater, and rainwater should be considered.

5.3 Irrigation Design Plan

Proper installation and management of the irrigation system shall conform to the approved Irrigation Design Plan. The Irrigation Design Plan, at a minimum, shall contain the following design criteria:

5.3.1 A scaled plan showing property lines, Right-of-Way, easements, existing or proposed structures, impervious surfaces, and existing natural features.

5.3.2 Location and size of the point of connection to the irrigation 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 of potable and pressurized raw supply connections.

5.3.3 Raw water, reclaimed water, recycled water, or alternative water sources such as graywater shall comply with local plumbing codes including marking of pipes and system components.

5.3.4 Location, type, and size of all components of the irrigation system, including backflow prevention assembly (for systems supplied with potable water), flow sensor, irrigation master valve, smart irrigation controllers, irrigation mainline and lateral lines, manual valves, remote control valves, sprinkler heads, drip layout, moisture sensing devices, rain switches, on-site weather monitoring sensors, quick couplers, pressure regulators, etc.

5.3.5 An irrigation legend showing the identification of irrigation components.

5.3.6 Flow rate (gallons per minute) and precipitation rate (inches per hour) for each irrigation zone.

5.3.7 Installation details for each of the irrigation components.

5.3.8 Temporary Irrigation must be clearly called out on the irrigation plans with a note that it will remain on grade and requires a special water use agreement with the City (fees apply).

a. Two (2) Water Budget Worksheets are required to be submitted; One (1) showing all permanent irrigation and the other showing all irrigation including the temporary.

b. Two (2) ECU Calculators are required to be submitted; One (1) showing all permanent ECUs and the other showing only temporary ECUs.

5.3.9 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.”

5.3.10 The signature of a qualified irrigation professional such as a Licensed Landscape Architect with irrigation credentials, Certified Irrigation Designer, or Certified/Licensed Landscape Contractor with irrigation credentials. The City of Aspen may require proof of credentials.

5.4 Irrigation System Maintenance Schedule

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

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

5.4.2 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 (note that only the zone needs to be replaced and not the entire irrigation system).

5.4.3 Project applicants are encouraged to implement sustainable and environmentally friendly practices for overall landscape maintenance.

5.5 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:

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

5.5.2 Overhead irrigation shall be scheduled between 6:00 p.m. and 9:00 a.m. unless weather conditions prevent it or an alternate schedule is declared under the City's Water Shortage Ordinance per Title 25 of the Municipal Code. Operation of the irrigation system outside the normal watering window is allowed for irrigation auditing and system maintenance.

a. See also the Voluntary Valley-wide Irrigation Schedule in Section 25.28.021 of the Municipal Code.

5.5.3 Parameters used to set the automatic controller shall be developed and submitted for:

a. Plant establishment period.
b. The established landscape.
c. Temporarily irrigated areas.

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

a. Irrigation interval (days between irrigation).
b. Irrigation run times (minutes per irrigation event to avoid runoff).
c. Number of cycle starts required for each irrigation event to avoid runoff.
d. Amount of irrigation water scheduled to be applied on a weekly basis, in gallons.
e. Precipitation rate setting.
f. Root depth setting.
g. Plant type setting.
h. Soil type.
i. Slope factor setting.
j. Shade factor setting.
k. Distribution uniformity or efficiency setting, based on irrigation audit information.

5.6 Irrigation Management

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

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

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

6. INSPECTION REQUIREMENTS

A Landscape Inspection Package and an Irrigation Inspection Package are required to be provided to the City of Aspen Landscape Plan Reviewer **prior to requesting a final inspection**.

6.1 Initial Irrigation Audit

The project applicant shall submit an Irrigation Audit Report with the Irrigation Approval Letter request (see Section 6.2) to the City of Aspen Landscape Plan Reviewer. The irrigation system must be fully operational before an audit can take place.

6.1.1 All landscape irrigation audits shall be conducted by a third-party Certified Landscape Irrigation Auditor.

6.1.2 Prior to the irrigation audit, the applicant shall inform the City of Aspen Landscape Plan Reviewer that the site is ready for irrigation audit.

6.1.3 The Irrigation Audit Report shall include, but is not limited to:

a. Inspection details.
b. System test with distribution uniformity for all turfgrass areas and at least 10% of remaining zones or a well-represented collection of zones. All sprinkler heads installed in turfgrass areas shall have a distribution uniformity of 0.65 or higher using the protocol defined in the ASABE/ICC 802-2014 standard.
c. Pressure test of all drip irrigation zones with a minimum requirement of 50 percent of drip zones to be tested at the beginning and end of each zone. The variance in pressure between the beginning and end of the drip zone shall not exceed 20 percent.
d. Reporting overspray or runoff that causes overland flow.
e. Examination of an irrigation schedule, or preparation of one as necessary, including irrigation controller's configuration with precipitation rate, soil types, plant factors, slope, exposure, and any other factors necessary for accurate programming.
f. System tune-up recommendations or punch list. The project applicant shall work with the third-party Certified Landscape Irrigation Auditor to reconcile recommendations and sign off the punch list to meet the standards.
g. Irrigation audits shall also include verification of location, type, and size of all components of the irrigation system including backflow prevention assembly, flow sensors, Exterior irrigation shut off valve, master shut off valve, primary irrigation control valve, smart irrigation controllers, irrigation mainline and lateral lines, manual valves, remote control valves, sprinkler heads, moisture sensing devices, rain switches, on-site weather monitoring sensors, quick couplers, and pressure regulators, etc.

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

6.2 Irrigation Approval Letter

6.2.1 The Irrigation 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 qualified irrigation professional that the irrigation system has been installed per the approved Irrigation Design Plan.

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

i. Deviations from approved plan set are subject to inspection delays and/or additional fees.

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 (See Section 5.4).

f. Irrigation audit report and punch list of recommendations.

g. An Outdoor Water Budget Worksheet for the as-built irrigation system and landscaping shall be required.

6.2.2 The project applicant shall:

a. Submit the certified Irrigation Approval Letter request with the required information listed above to the City of Aspen for review.

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

6.2.3 Upon receiving the certified Irrigation Approval Letter request from the project applicant, the City of Aspen shall approve or deny the Irrigation Approval Letter request. If the Irrigation Approval Letter is denied, the City of Aspen shall provide information to the project applicant regarding reapplication, appeal, or other assistance.

6.3 Landscape Inspection Package

6.3.1 Professionally prepared plant list and drawings reflecting the landscape design and installed landscaping.

6.3.2 Soil inspection report if applicable (see Section 4.1.3 for more information).

6.3.3 Written documentation of soil amendment type and volume.

6.4 Irrigation Inspection Package

6.4.1 Professionally prepared drawings reflecting the as-built irrigation system.

6.4.2 Irrigation Audit Report prepared by a third-party Certified Landscape Irrigation Auditor, as described in Section 6.1 above.

6.4.3 Updated Outdoor Water Budget Worksheet for the as-built irrigation system and landscaping.

6.4.4 Irrigation Approval Letter.

6.5 Compliance with the Inspection

6.5.1 Prior to requesting a final WELS inspection by the City of Aspen, the project applicant must appoint a project lead for final packet submittal.

6.5.2 The project applicant must submit a complete Landscape Inspection Package and Irrigation Inspection Package through the City's permit portal and notify the City of Aspen Landscape Plan Reviewer before final inspection will be scheduled by City of Aspen staff.

6.5.3 Final Inspections must be scheduled between April 1st and October 31st of each year. If the Audit or inspection cannot be conducted in this time frame, see Section 6.5.6 for the Temporary Certificate of Occupancy process.

6.5.4 The City of Aspen reserves the right to conduct inspections and audits as deemed necessary, at the expense of the customer, if there is an indication that the criteria have not been followed.

6.5.5 All projects must meet the requirements and criteria explained in this document and as approved for building permit, regardless of whether the City conducts an inspection.

6.5.6 The City 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 these standards.

7. TEMPORARY CERTIFICATE OF OCCUPANCY

If a Temporary Certificate of Occupancy is issued after the onset/persistence of winter conditions when landscaping and irrigation systems cannot be inspected for compliance, the Aspen Water Department will require a refundable deposit as set out below.

7.1.1 If a property owner, or their representative, requests a Temporary Certificate of Occupancy prior to complete installation of the irrigation system and landscaping, and/or completion of an irrigation audit by a third-party Certified Landscape Irrigation Auditor with the Irrigation Approval Letter request, the property owner shall submit an estimate of the cost to complete the remaining irrigation and landscaping work. Cost estimates shall include details regarding plant material, irrigation system, and associated labor costs.

7.1.2 The property owner shall pay a deposit according to the schedule below prior to issuance of the Temporary Certificate of Occupancy.

Remaining Project Cost Estimate	Deposit (As a % of Remaining Project Cost Estimate)
$0—$1,000,000	50% or a minimum $10,000, whichever is greater
$1,000,001 to $999,999,999	30%

7.1.3 Development on properties with a Temporary Certificate of Occupancy issued after the onset/persistence of winter conditions must complete the associated irrigation and landscaping installation per submitted plans along with an irrigation audit performed by a third-party auditor and the City of Aspen Final Inspection prior to July 15th of the subsequent irrigation season.

7.1.4 Once compliance with all the requirements of the Water Efficient Landscaping Standards has been confirmed by the City of Aspen, the deposit will be returned in full.

8. ONE-YEAR POST PROJECT AUDIT REQUIREMENTS

The project applicant shall submit an irrigation audit report prepared by a third-party Certified Landscape Irrigation Auditor to the City of Aspen Landscape Plan Reviewer one year after the date of the final project approval. The audit report shall include the information described in Section 6.1 above. Failure to submit the report may impact property's treated water service and/or billing rate until compliance is achieved.

APPENDIX A – OUTDOOR WATER BUDGET WORKSHEET

CITY OF ASPEN

City of Aspen Water Efficient Landscaping Ordinance

OUTDOOR WATER BUDGET WORKSHEET

City of Aspen Utilities
427 Rio Grande Place
Aspen, CO 81611
970-920-5110

Notes:
1. Project Applicant must complete this worksheet as part of the 2024 ECU Calculator Workbook.
2. Information entered here in the Outdoor Water Budget Worksheet will autopopulate in the ECU Calculator.
3. Project cannot exceed maximum applied water budget or the maximum residential ECU rating per Title 25.
4. Hot tubs and swimming pools are included in the calculation of the average Maximum Applied Water Budget.

Directions for Use: Fill in the green sections below. Some columns have drop down menus to assist in filling out the cells. The formulas will calculate the site average seasonal water use. Once completed, insert the Hydrozone Water Budget Calculation table on the Irrigation Design Plan.

Address:		**Contact Info:**	

CALCULATING GALLONS OF WATER NEEDED BY PLANT CATEGORY AND IRRIGATION TYPE

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

Irrigation Water Budget = [(ETo x Plant Factor) - Re] x Irrigated Area / Irrigation Efficiency x 0.623

Where:

ETo = Reference Evapotranspiration in inches/season (May - Oct.)
Re = Effective Precipitation in inches/season (May - Oct.)
Irrigated Area = Hydrozone Area in square feet

Water Use Category	Code	Plant Factor
Swimming Pool/Hot Tub	VH	0.90
Cool Season Turf	VH	0.90
High	H	0.80
Medium	M	0.65
Low	L	0.40
Very Low	VL	0.25

Parameter	inches/season	gal/sf/season
Reference Evapotranspiration	27.4	17.1
Effective Precipitation	6.8	4.2

Irrigation Category	Irrigation Efficiency
Swimming Pool/Hot Tub	75%
Overhead	75%
Drip	90%
Bubbler	82.5%

HYDROZONE WATER BUDGET CALCULATION

Complete the hydrozone table for each hydrozone. Use as many rows as necessary to provide the square footage of landscape are per hydrozone. Update the calculation formulas at the bottom if additional rows are inserted.

Maximum Applied Water Budget (gal/sf/season)	7.5
Hot Tub Volume (gallons)	0
Swimming Pool Volume (gallons)	0

Hydrozone	Water Use Code	Plant Factor	Irrigation Category	Irrigation Efficiency	Hydrozone Area (sf)	Plant Water Need (gal/season)
Example	*L*	*0.40*	*Drip*	*0.90*	*2000*	*5759*
Zone 1						0
Zone 2						0
Zone 3						0
Zone 4						0
Zone 5						0
Zone 6						0
Zone 7						0
Zone 8						0
Zone 9						0
Zone 10						0
Other Outdoor Features	**Water Use Code**	**Plant Factor**	**Irrigation Category**	**Irrigation Efficiency**	**Hydrozone Area (sf)**	**Portion of Water Budget (gal/season)**
Hot Tub	VH	0.90	Swimming Pool/Hot Tub	0.75		0
Swimming Pool	VH	0.90	Swimming Pool/Hot Tub	0.75		0
				Sub-total, Hot Tub/Swimming Pool	0	0
				Sub-total, Overhead	0	0
				Sub-total, Drip	0	0
				Sub-total, Bubbler	0	0
				TOTAL	0	0

AVERAGE IRRIGATION WATER NEED - ALL ZONES (gallons/sf/season) = 0.0

updated: 12.28.23

Example A: This landscape plan includes a 9,844 sq-ft area comprised of four irrigated hydrozones and a hot tub. This plan successfully meets the 7.5 gal/sf/season Maximum Applied Water Budget, with an Average Irrigation Water Need of 5.6 gal/sf/season.

CITY OF ASPEN

City of Aspen Water Efficient Landscaping Ordinance

OUTDOOR WATER BUDGET WORKSHEET

City of Aspen Utilities
427 Rio Grande Place
Aspen, CO 81611
970-920-5110

Notes:
1. Project Applicant must complete this worksheet as part of the 2024 ECU Calculator Workbook.
2. Information entered here in the Outdoor Water Budget Worksheet will autopopulate in the ECU Calculator.
3. Project cannot exceed maximum applied water budget or the maximum residential ECU rating per Title 25.
4. Hot tubs and swimming pools are included in the calculation of the average Maximum Applied Water Budget.

Directions for Use: Fill in the green sections below. Some columns have drop down menus to assist in filling out the cells. The formulas will calculate the site average seasonal water use. Once completed, insert the Hydrozone Water Budget Calculation table on the Irrigation Design Plan.

Address:		**Contact Info:**	

CALCULATING GALLONS OF WATER NEEDED BY PLANT CATEGORY AND IRRIGATION TYPE

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

Irrigation Water Budget = [(ETo x Plant Factor) - Re] x Irrigated Area / Irrigation Efficiency x 0.623

Where:

ETo = Reference Evapotranspiration in inches/season (May - Oct.)
Re = Effective Precipitation in inches/season (May - Oct.)
Irrigated Area = Hydrozone Area in square feet

Water Use Category	Code	Plant Factor
Swimming Pool/Hot Tub	VH	0.90
Cool Season Turf	VH	0.90
High	H	0.80
Medium	M	0.65
Low	L	0.40
Very Low	VL	0.25

Parameter	inches/season	gal/sf/season
Reference Evapotranspiration	27.4	17.1
Effective Precipitation	6.8	4.2

Irrigation Category	Irrigation Efficiency
Swimming Pool/Hot Tub	75%
Overhead	75%
Drip	90%
Bubbler	82.5%

HYDROZONE WATER BUDGET CALCULATION

Complete the hydrozone table for each hydrozone. Use as many rows as necessary to provide the square footage of landscape are per hydrozone. Update the calculation formulas at the bottom if additional rows are inserted.

Maximum Applied Water Budget (gal/sf/season)	7.5
Hot Tub Volume (gallons)	1372
Swimming Pool Volume (gallons)	0

Hydrozone	Water Use Code	Plant Factor	Irrigation Category	Irrigation Efficiency	Hydrozone Area (sf)	Plant Water Need (gal/season)
Zone 1 (A1, A6, A7)	VH	0.90	Overhead	0.75	1117	16571
Zone 2 (A2, A3)	L	0.40	Drip	0.90	2891	8325
Zone 3 (A8, A9)	L	0.40	Overhead	0.75	3688	12744
Zone 4 (A4, A5)	M	0.65	Drip	0.90	2037	15525
Other Outdoor Features	**Water Use Code**	**Plant Factor**	**Irrigation Category**	**Irrigation Efficiency**	**Hydrozone Area (sf)**	**Portion of Water Budget (gal/season)**
Hot Tub	VH	0.90	Swimming Pool/Hot Tub	0.75	111	1647
Swimming Pool	VH	0.90	Swimming Pool/Hot Tub	0.75	0	0
				Sub-total, Hot Tub/Swimming Pool	111	1647
				Sub-total, Overhead	4805	29316
				Sub-total, Drip	4928	23850
				Sub-total, Bubbler	0	0
				TOTAL	9844	54812

AVERAGE IRRIGATION WATER NEED - ALL ZONES (gallons/sf/season) = 5.6

Confirmed: Value does not exceed Maximum Applied Water Budget

updated: 12.28.23

Example B: This landscape plan includes a 10,153 sq-ft area comprised of eight irrigated hydrozones with no hot tub or swimming pool. This plan successfully meets the 7.5 gal/sf/season Maximum Applied Water Budget, with an Average Irrigation Water Need of 3.2 gal/sf/season.

CITY OF ASPEN

City of Aspen Water Efficient Landscaping Ordinance

OUTDOOR WATER BUDGET WORKSHEET

City of Aspen Utilities
427 Rio Grande Place
Aspen, CO 81611
970-920-5110

Notes:
1. Project Applicant must complete this worksheet as part of the 2024 ECU Calculator Workbook.
2. Information entered here in the Outdoor Water Budget Worksheet will autopopulate in the ECU Calculator.
3. Project cannot exceed maximum applied water budget or the maximum residential ECU rating per Title 25.
4. Hot tubs and swimming pools are included in the calculation of the average Maximum Applied Water Budget.

Directions for Use: Fill in the green sections below. Some columns have drop down menus to assist in filling out the cells. The formulas will calculate the site average seasonal water use. Once completed, insert the Hydrozone Water Budget Calculation table on the Irrigation Design Plan.

Address:		**Contact Info:**	

CALCULATING GALLONS OF WATER NEEDED BY PLANT CATEGORY AND IRRIGATION TYPE

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

Irrigation Water Budget = [(ETo x Plant Factor) - Re] x Irrigated Area / Irrigation Efficiency x 0.623

Where:

ETo = Reference Evapotranspiration in inches/season (May - Oct.)
Re = Effective Precipitation in inches/season (May - Oct.)
Irrigated Area = Hydrozone Area in square feet

Water Use Category	Code	Plant Factor
Swimming Pool/Hot Tub	VH	0.90
Cool Season Turf	VH	0.90
High	H	0.80
Medium	M	0.65
Low	L	0.40
Very Low	VL	0.25

Parameter	inches/season	gal/sf/season
Reference Evapotranspiration	27.4	17.1
Effective Precipitation	6.8	4.2

Irrigation Category	Irrigation Efficiency
Swimming Pool/Hot Tub	75%
Overhead	75%
Drip	90%
Bubbler	82.5%

HYDROZONE WATER BUDGET CALCULATION

Complete the hydrozone table for each hydrozone. Use as many rows as necessary to provide the square footage of landscape are per hydrozone. Update the calculation formulas at the bottom if additional rows are inserted.

Maximum Applied Water Budget (gal/sf/season)	7.5
Hot Tub Volume (gallons)	0
Swimming Pool Volume (gallons)	0

Hydrozone	Water Use Code	Plant Factor	Irrigation Category	Irrigation Efficiency	Hydrozone Area (sf)	Plant Water Need (gal/season)
Zone 1 (B1, B6, B7)	VH	0.90	Overhead	0.75	645	9569
Zone 2 (B2, B3)	VH	0.90	Drip	0.90	135	1669
Zone 3 (B8, B9)	H	0.80	Overhead	0.75	40	502
Zone 4 (B4, B5)	M	0.65	Drip	0.90	932	7103
Zone 5 (B10)	L	0.40	Overhead	0.75	2595	8967
Zone 6 (B11, B14)	L	0.40	Drip	0.90	1686	4855
Zone 7 (B12)	VL	0.25	Overhead	0.75	2340	97
Zone 8 (B13)	VL	0.25	Drip	0.90	1780	62
Other Outdoor Features	**Water Use Code**	**Plant Factor**	**Irrigation Category**	**Irrigation Efficiency**	**Hydrozone Area (sf)**	**Portion of Water Budget (gal/season)**
Hot Tub	VH	0.90	Swimming Pool/Hot Tub	0.75	0	0
Swimming Pool	VH	0.90	Swimming Pool/Hot Tub	0.75	0	0
				Sub-total, Hot Tub/Swimming Pool	0	0
				Sub-total, Overhead	5620	19136
				Sub-total, Drip	4533	13689
				Sub-total, Bubbler	0	0
				TOTAL	10153	32825

AVERAGE IRRIGATION WATER NEED - ALL ZONES (gallons/sf/season) = 3.2

Confirmed: Value does not exceed Maximum Applied Water Budget

updated: 12.28.23

Example C: This landscape plan includes a 10,845 sq-ft area comprised of four irrigated hydrozones and a hot tub. This plan fails to meet the 7.5 gal/sf/season Maximum Applied Water Budget, with an Average Irrigation Water Need of 7.8 gal/sf/season.

CITY OF ASPEN

City of Aspen Water Efficient Landscaping Ordinance

OUTDOOR WATER BUDGET WORKSHEET

City of Aspen Utilities
427 Rio Grande Place
Aspen, CO 81611
970-920-5110

Notes:
1. Project Applicant must complete this worksheet as part of the 2024 ECU Calculator Workbook.
2. Information entered here in the Outdoor Water Budget Worksheet will autopopulate in the ECU Calculator.
3. Project cannot exceed maximum applied water budget or the maximum residential ECU rating per Title 25.
4. Hot tubs and swimming pools are included in the calculation of the average Maximum Applied Water Budget.

Directions for Use: Fill in the green sections below. Some columns have drop down menus to assist in filling out the cells. The formulas will calculate the site average seasonal water use. Once completed, insert the Hydrozone Water Budget Calculation table on the Irrigation Design Plan.

Address:		**Contact Info:**	

CALCULATING GALLONS OF WATER NEEDED BY PLANT CATEGORY AND IRRIGATION TYPE

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

Irrigation Water Budget = [(ETo x Plant Factor) - Re] x Irrigated Area / Irrigation Efficiency x 0.623

Where:

ETo = Reference Evapotranspiration in inches/season (May - Oct.)
Re = Effective Precipitation in inches/season (May - Oct.)
Irrigated Area = Hydrozone Area in square feet

Water Use Category	Code	Plant Factor
Swimming Pool/Hot Tub	VH	0.90
Cool Season Turf	VH	0.90
High	H	0.80
Medium	M	0.65
Low	L	0.40
Very Low	VL	0.25

Parameter	inches/season	gal/sf/season
Reference Evapotranspiration	27.4	17.1
Effective Precipitation	6.8	4.2

Irrigation Category	Irrigation Efficiency
Swimming Pool/Hot Tub	75%
Overhead	75%
Drip	90%
Bubbler	82.5%

HYDROZONE WATER BUDGET CALCULATION

Complete the hydrozone table for each hydrozone. Use as many rows as necessary to provide the square footage of landscape are per hydrozone. Update the calculation formulas at the bottom if additional rows are inserted.

Maximum Applied Water Budget (gal/sf/season)	7.5
Hot Tub Volume (gallons)	935
Swimming Pool Volume (gallons)	0

Hydrozone	Water Use Code	Plant Factor	Irrigation Category	Irrigation Efficiency	Hydrozone Area (sf)	Plant Water Need (gal/season)
Zone 1 (C1, C6, C7)	VH	0.90	Overhead	0.75	1297	19242
Zone 2 (C2, C3)	M	0.65	Overhead	0.75	4795	43853
Zone 3 (C8, C9)	L	0.40	Overhead	0.75	3720	12855
Zone 4 (C4, C5)	M	0.65	Drip	0.90	970	7393
Other Outdoor Features	**Water Use Code**	**Plant Factor**	**Irrigation Category**	**Irrigation Efficiency**		**Portion of Water Budget (gal/season)**
Hot Tub	VH	0.90	Swimming Pool/Hot Tub	0.75	63	935
Swimming Pool	VH	0.90	Swimming Pool/Hot Tub	0.75	0	0
				Sub-total, Hot Tub/Swimming Pool	63	935
				Sub-total, Overhead	9812	75950
				Sub-total, Drip	970	7393
				Sub-total, Bubbler	0	0
				TOTAL	10845	84277

AVERAGE IRRIGATION WATER NEED - ALL ZONES (gallons/sf/season) = 7.8

ERROR: Value exceeds Maximum Applied Water Budget

updated: 12.28.23

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 Appendix E of the GreenCO BMP Manual Third Release, May 2008 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

Appendix E
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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
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

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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
Carex flagellifera	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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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	ST	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	ST	M	23	H	4	M	3	M	30
Cornus mas	Dogwood, Cornelian Cherry	ST	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	ST	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	ST	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	ST	L	13	L	3	L	3	L	19
Crataegus crus-galli	Hawthorn, Cockspur	ST	L	40	L	7	L	5	L	52
Crataegus crus-galli 'Inermis'	Hawthorn, Thornless Cockspur	ST	L	37	L	6	L	5	L	48
Crataegus douglassii	Hawthorn, Douglas	ST	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	ST	L	28	L	6	L	4	L	38
Crataegus phaenopyrum	Hawthorn, Washington	ST	L	40	L	7	L	4	L	51
Crataegus punctata	Hawthorn, Thicket	T	L	9	L	1			L	10
Crataegus rivularis	Hawthorn, River	ST	M	16	L	3	L	3	L	22
Crataegus succulenta	Hawthorn, Colorado	ST	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

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
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 fortunelii	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

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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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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 (kaempferi)	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

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
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

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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
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
Moluccella 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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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

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
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 Flow	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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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
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	ST	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	ST	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	ST	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	ST	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

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
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	ST	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	ST	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 Cana	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	ST	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	SV	M	22	M	4	M	1	M	27
Vitis riparia	Grape, Frost	SV	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 recurvifolia	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 & LANDSCAPE DESIGN FACT SHEET

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.

Colorado State University
Extension

Fire-Resistant Landscaping

Fact Sheet No. 6.303 Natural Resources Series|Forestry

by F.C. Dennis*

Colorado's population is growing, its urban areas are rapidly expanding, and people are building more homes in what was once natural forest and brushlands. Newcomers to rural areas need to know how to correctly landscape their property to reduce wildfire hazards.

Improper landscaping worries land managers and fire officials because it can greatly increase the risk of structure and property damage from wildfire. It is a question of *when*, not *if*, a wildfire will strike any particular area.

Vegetative clearance around the house (defensible space) is a primary determinant of a home's ability to survive wildfire. Defensible space is, simply, room for firefighters to do their job. If grasses, brush, trees and other common forest fuels are removed, reduced, or modified to lessen a fire's intensity and keep it away from the home, chances increase that the structure will survive. It is a little-known fact that in the absence of a defensible space, firefighters will often bypass a house, choosing to make their stand at a home where their safety is more assured and the chance to successfully protect the structure is greater.

Landscaping Defensible Space

People often resist creating defensible space because they believe that it will be unattractive, unnatural and sterile-looking. It doesn't have to be! Wise landowners carefully plan landscaping within the defensible space. This effort yields a many-fold return of beauty, enjoyment and added property value. Development of defensible space is outlined in fact sheet 6.302, *Creating Wildfire-Defensible Zones.*

Colorado has great diversity in climate, geology and vegetation. Home and cabin sites can be found from the foothills through 10,000-foot elevations. Such extremes present a challenge in recommending plants. While native plant materials generally are best, a wide range of species can be grown successfully in Colorado.

Many plant species are suitable for landscaping in defensible space. Use restraint and common sense, and pay attention to plant arrangement and maintenance. It has often been said that *how* and *where* you plant are more important than *what* you plant. While this is indeed true, given a choice among plants, choose those that are more resistant to wildfire.

Consider the following factors when planning, designing and planting the FireWise landscape within your home's defensible space:

- Landscape according to the recommended defensible-space zones. That is, the plants near your home should be more widely spaced and lower growing than those farther away.
- Do not plant in large masses. Instead, plant in small, irregular clusters or islands.
- Use decorative rock, gravel and stepping stone pathways to break up the continuity of the vegetation and fuels. This can modify fire behavior and slow the spread of fire across your property. It is highly recommended that the first 3-5 feet away from the house be gravel, flagstone, pavers, or some other non-flammable material.
- Incorporate a diversity of plant types and species in your landscape. Not only will this be visually satisfying, but it should help keep pests and diseases from causing problems within the whole landscape.
- In the event of drought and water rationing, prioritize plants to be saved. Provide available supplemental water to plants closest to your house.
- Use mulches to conserve moisture and reduce weed growth. To reduce fire danger, it is best to use a non-organic mulch such as pea gravel or stone, but leaf

*Staff Forester (retired), Colorado State Forest Service.
1/2012

Quick Facts

- More people are moving into Colorado's rural areas, increasing the chances of wildfire.
- "Defensible space" is the primary determinant of a structure's ability to survive wildfire.
- Native species are generally the best plant materials for landscaping in defensible space, but others can be grown successfully in Colorado.
- To be a FireWise homeowner, plan well, plant well and maintain well.

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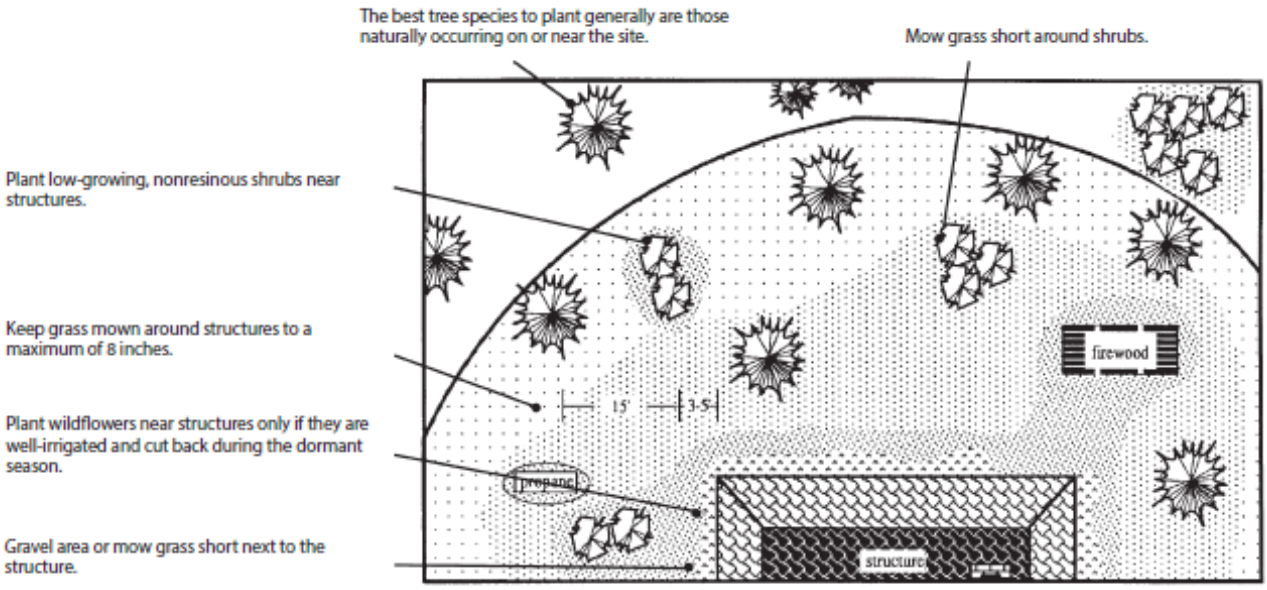


Figure 1: Forested property surrounding a homesite shows optimum placement of vegetation near the structure.

mold or compost is also acceptable. Do not use pine bark, thick layers of pine needles or other mulches that readily carry fire.

- Be creative! Further vary your landscape by including bulbs, garden art and containers for added color.

Grasses

During much of the year, grasses ignite easily and burn rapidly. Tall grass will quickly carry fire to your house. Mow grasses low in the inner zones of the defensible space. Keep them short closest to the house and gradually increase height outward from the house, to a maximum of 8 inches. This is particularly important during fall, winter and before green-up in early spring, when grasses are dry, dormant and in a "cured" fuel condition. Given Colorado's extremely variable weather, wildfires can occur any time of the year. Maintenance of the grassy areas around your home is critical.

Mow grasses low around the garage, outbuildings, decks, firewood piles, propane tanks, shrubs, and specimen trees with low-growing branches.

Ground Cover Plants

Replace bare, weedy or unsightly patches near your home with ground covers, rock gardens, vegetable gardens and mulches. Ground cover plants are a good alternative to grass for parts of your defensible space. They break up the monotony of grass and enhance the beauty of your landscape. They provide a variety of textures and color and help reduce soil erosion. Consider ground cover plants for areas where access for mowing or other maintenance is difficult, on steep slopes and on hot, dry exposures.

Ground cover plants are usually low growing. They are succulent or have other FireWise characteristics that make them useful, functional and attractive. When planted in beds surrounded by walkways and paths, in raised beds or as part of a rock garden, they become an effective barrier to fire spread. The ideal groundcover plant is one which will spread, forming a dense mat of roots and foliage that reduces soil erosion and excludes weeds.

Mulch helps control erosion, conserve moisture and reduce weed growth. It can be organic (compost or leaf mold) but inorganic mulch is preferred (gravel, rock, decomposed granite). Mulches that carry such as bark chips, straw, pine needles or other flammable material should not be used, as that can carry fire to the structure. When using organic mulches, use just enough to reduce weed and grass growth. Avoid thick layers. When exposed to fire, they tend to smolder and are difficult to extinguish.

Wildflowers

Wildflowers bring variety to a landscape and provide color from May until frost. Wildflower beds give a softer, more natural appearance to the otherwise manicured look often resulting from defensible space development.

A concern with wildflowers is the tall, dense areas of available fuel they can form, especially in dormancy. To reduce fire hazard, plant wildflowers in widely separated beds within the defensible space. Do not plant them next to structures unless the beds are frequently watered and weeded and vegetation is promptly removed after the first hard frost. Use gravel walkways, rock retaining walls or irrigated grass areas mowed to a low height to isolate wildflower beds from each other and from other fuels.

Shrubs

Shrubs lend color and variety to the landscape and provide cover and food for wildlife. However, shrubs concern fire

Structural Elements of a FireWise Landscape

When building a deck or patio, use concrete, flagstone or rock instead of wood. These materials do not burn and do not collect flammable debris like the space between planks in wooden decking.

Where appropriate on steeper ground, use retaining walls to reduce the steepness of the slope. This, in turn, reduces the rate of fire spread. Retaining walls also act as physical barriers to fire spread and help deflect heat from the fire upwards and away from structures.

Rock or masonry walls are best, but even wooden tie walls constructed of heavy timbers will work. Put out any fires burning on tie walls after the main fire front passes.

On steep slopes, consider building steps and walkways around structures. This makes access easier for home maintenance and enjoyment. It also serves as a physical barrier to fire spread and increases firefighters' speed and safety as they work to defend your home.

professionals because, as the next level in the "fuel continuum," they can add significantly to total fuel loading. Because of the woody material in their stems and branches, they are a potential source of fire brands. When carried in the smoke column ahead of the main fire, fire brands can rapidly spread the fire in a phenomenon known as "spotting."

But the primary concern with shrubs is that they are a "ladder fuel" – they can carry a relatively easy-to-control surface grass fire into tree crowns. Crown fires are difficult, sometimes impossible, to control (see Figure 2).

To reduce the fire-spreading potential of shrubs, plant only widely separated, low-growing, nonresinous varieties close to structures. Do not plant them directly beneath windows or vents or where they might spread under wooden decks. Do not plant shrubs under tree crowns or use them to screen propane tanks, firewood piles or other flammable materials. Plant shrubs individually, as specimens, or in small clumps apart from each other and away from any trees within the defensible space.

Mow grasses low around shrubs. Prune dead stems from shrubs annually. Remove the lower branches and suckers from species such as Gambel oak to raise the canopy away from possible surface fires.

Trees

Trees provide a large amount of available fuel for a fire and can be a significant source of fire brands if they do burn. Radiant heat from burning trees can ignite nearby shrubs, trees and structures.

Colorado's elevation and temperature extremes limit tree selection. The best species to plant generally are those already growing on or near the site. Others may be planted with careful selection and common sense.

If your site receives enough moisture to grow them, plant deciduous trees such as aspen or narrow-leaf cottonwood. These species, even when planted in dense clumps, generally do not burn well, if at all. The greatest problem with these trees is the accumulation of dead leaves in the fall. Remove accumulations close to structures as soon as possible after leaf drop.

When site or available moisture limits recommended species to evergreens, carefully plan their placement. Do not plant trees near structures. Leave plenty of room between trees to allow for their growth. Spacing within the defensible space should be at least 10 feet between the edges of tree crowns. On steep ground, allow even more space between crowns. Plant smaller trees initially on a 20- to 25-foot spacing to allow for tree growth. At some point, you will have to thin your trees to retain proper spacing.

As the trees grow, prune branches to a height of 10 feet above the ground. Do not overprune the crowns. A good rule of thumb is to remove no more than one-third of the live crown of the tree when pruning. Prune existing trees as well as ones you planted.

Some trees (for example, Colorado blue spruce) tend to keep a full crown. Other trees grown in the open may also exhibit a full growth habit. Limit the number of trees of this type within the defensible space. Prune others as described above and mow grasses around such specimen trees.

Maintenance

A landscape is a dynamic system that constantly grows and changes. Plants considered fire resistant and that have low fuel volumes can lose these characteristics over time. Your landscape, and the plants in it, must be maintained to retain their FireWise properties.

- ☐ Always keep a watchful eye towards reducing the fuel volumes available to fire. Be aware of the growth habits of the plants within your landscape and of the changes that occur throughout the seasons.
- ☐ Remove annuals and perennials after they have gone to seed or when the stems become overly dry.
- ☐ Rake up leaves and other litter as it builds up through the season.
- ☐ Mow or trim grasses to a low height within your defensible space. This is particularly important as grasses cure.
- ☐ Remove plant parts damaged by snow, wind, frost or other agents.
- ☐ Timely pruning is critical. Pruning not only reduces fuel volumes but also maintains healthier plants by producing more vigorous, succulent growth.

Figure 2: Ladder fuels enable fire to travel from the ground surface into shrubs and then into the tree canopy.

☐ Landscape maintenance is a critical part of your home's defense system. Even the best defensible space can be compromised through lack of maintenance. The old adage "An ounce of prevention is worth a pound of cure" applies here.

References

6.302, *Creating WildFire-Defensible Zones*
6.304, *Forest Home Fire Safety*
6.305, *FireWise Plant Materials*
7.233, *Wildflowers for Colorado*
7.406, *Flowers for Mountain Communities*
7.413, *Ground Covers for Mountain Communities*
7.423, *Trees and Shrubs for Mountain Areas*

FIREWISE is a multi-agency program that encourages the development of defensible space and the prevention of catastrophic wildfire.

Colorado State FOREST SERVICE

This fact sheet was produced in cooperation with the Colorado State Forest Service.

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

FIGURE D1. CITY OF ASPEN WILDFIRE HAZARD ASSESSMENT MAP

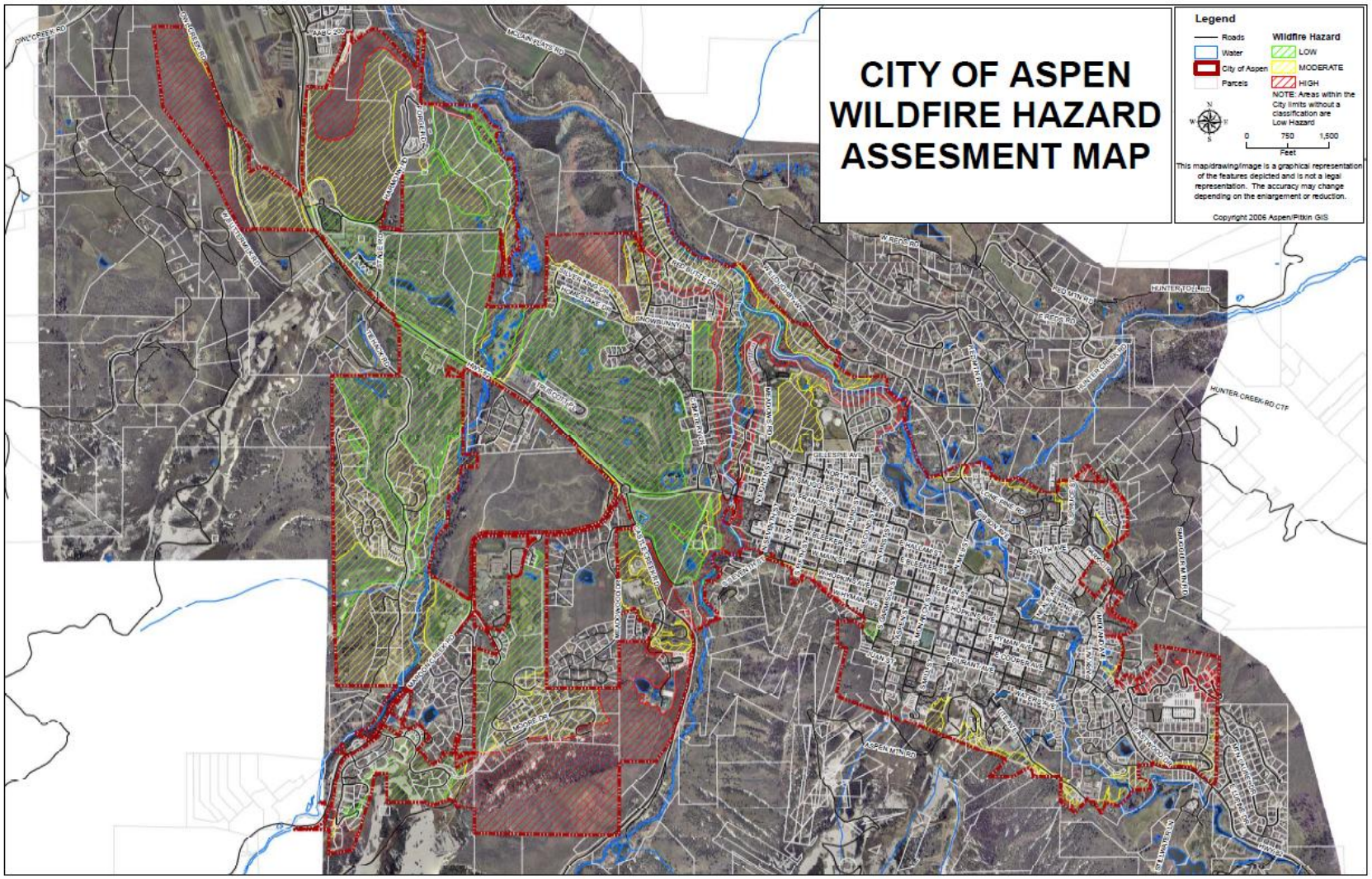
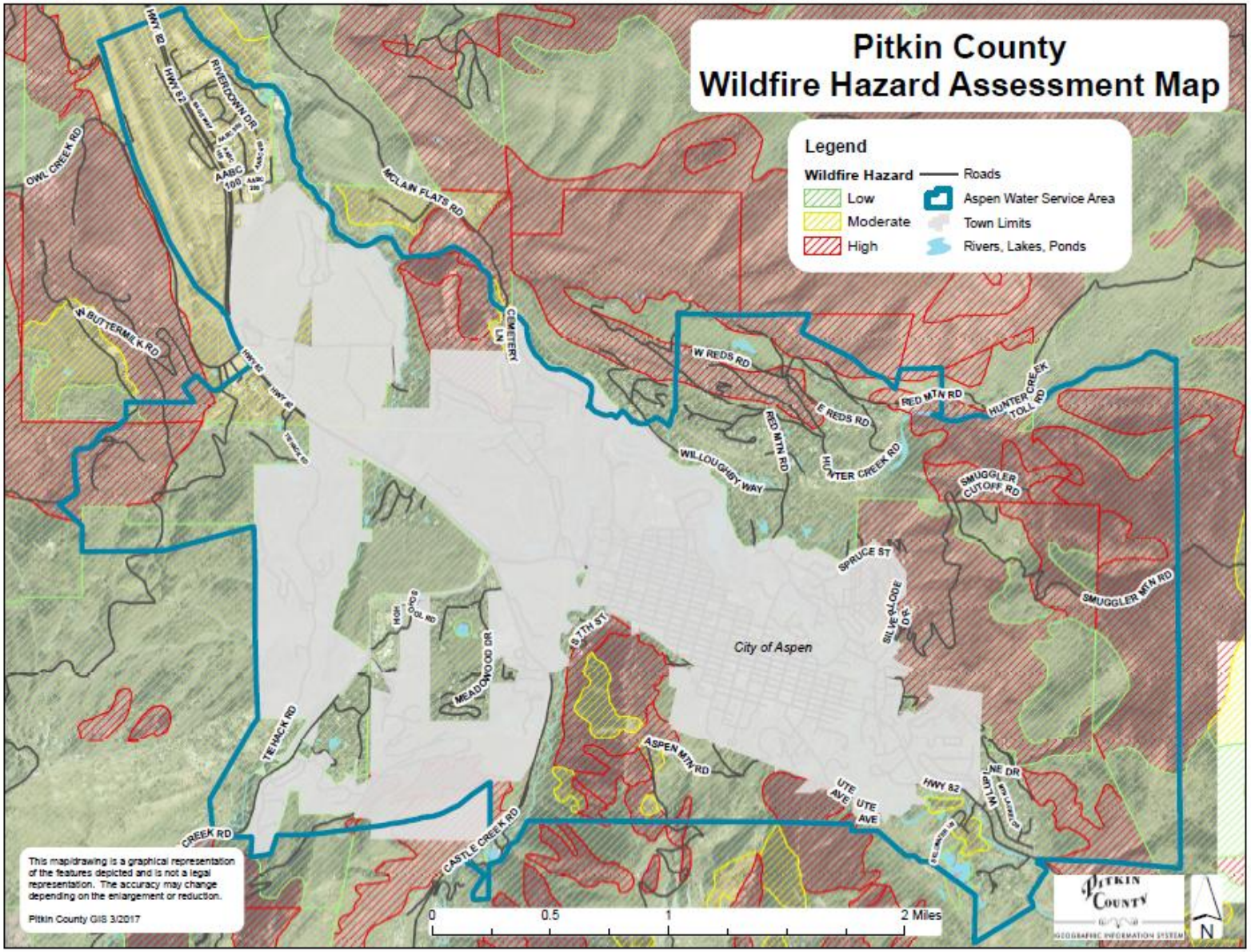
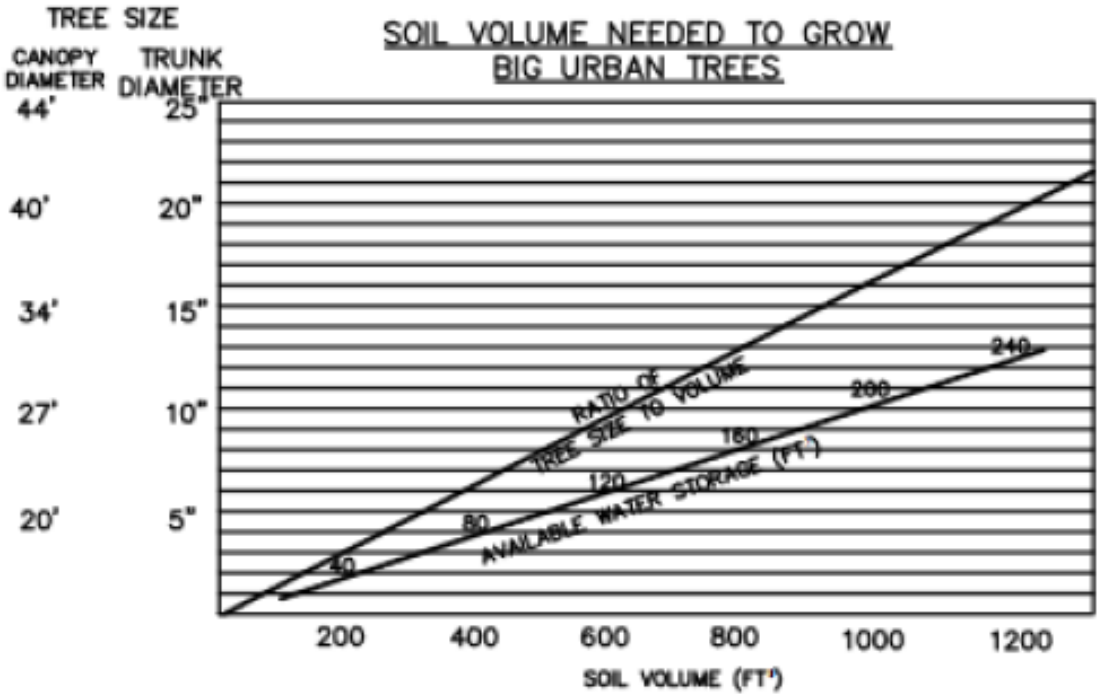


FIGURE D2. PITKIN COUNTY WILDFIRE HAZARD ASSESSMENT MAP



APPENDIX E – TREE SOIL INFORMATION CHARTS



TREES AT MATURITY IN ASPEN, CO			
SIZE CATEGORY & SPECIES	CANOPY DIAMETER (FEET)	TRUNK DIAMETER (INCHES)	REQUIRED SOIL VOLUME (CUBIC FEET)
SMALL –CRABAPPLE –HAWTHORN –MTN. ASH –JAPANESE LILAC	15' – 20'	4" – 10"	240 FT ³
MEDIUM –BIRCH –BOXELDER –CHOKECHERRY	20' – 30'	8" – 12"	600 FT ³
LARGE –COTTONWOOD –ASH –MAPLE	30' – 60'	12" – 50"	1200 FT ³