Water-savings Guidance and Model Standards for the Colorado Headwaters Region

QQ Fall 2019

QQ Water Saving Standards Project

- Policy Scan and Code Review
- Best Practices Research
- Model Codes and Guidance

The Resource Guide

What Is In It?

- Recommendations
- Chapter 1: The Comprehensive Plan
- Chapter 2: Water Adequacy & Water Supply
- Chapter 3: Outdoor Water
- Chapter 4: Indoor Water
- Chapter 5: Model Codes
  - Water Adequacy and Supply
  - Landscape Code
  - Outdoor Water Conservation Code
  - Indoor Water Conservation Code
- Chapter 6: Policy and Code Scan
- Appendices
  - Resources
  - Methodologies to Assess Land Use Pattern

How To Use It?

- Understand your current conditions
- Lead discussions with water and land use professionals on greatest opportunities
- To understand best practices
- Inform updates to plan and/or code sections

Policy and Regulations Matter.

1 SMALLER LOT SINGLE FAMILY DEVELOPMENT

Studies found 10 to 60% water savings with increased density of single-family residences.

2 MULTI FAMILY DEVELOPMENT

Multifamily units consume 35 to 50% less water than single family detached homes. If a high-density development requires cooling towers, the savings may decrease or be eliminated.

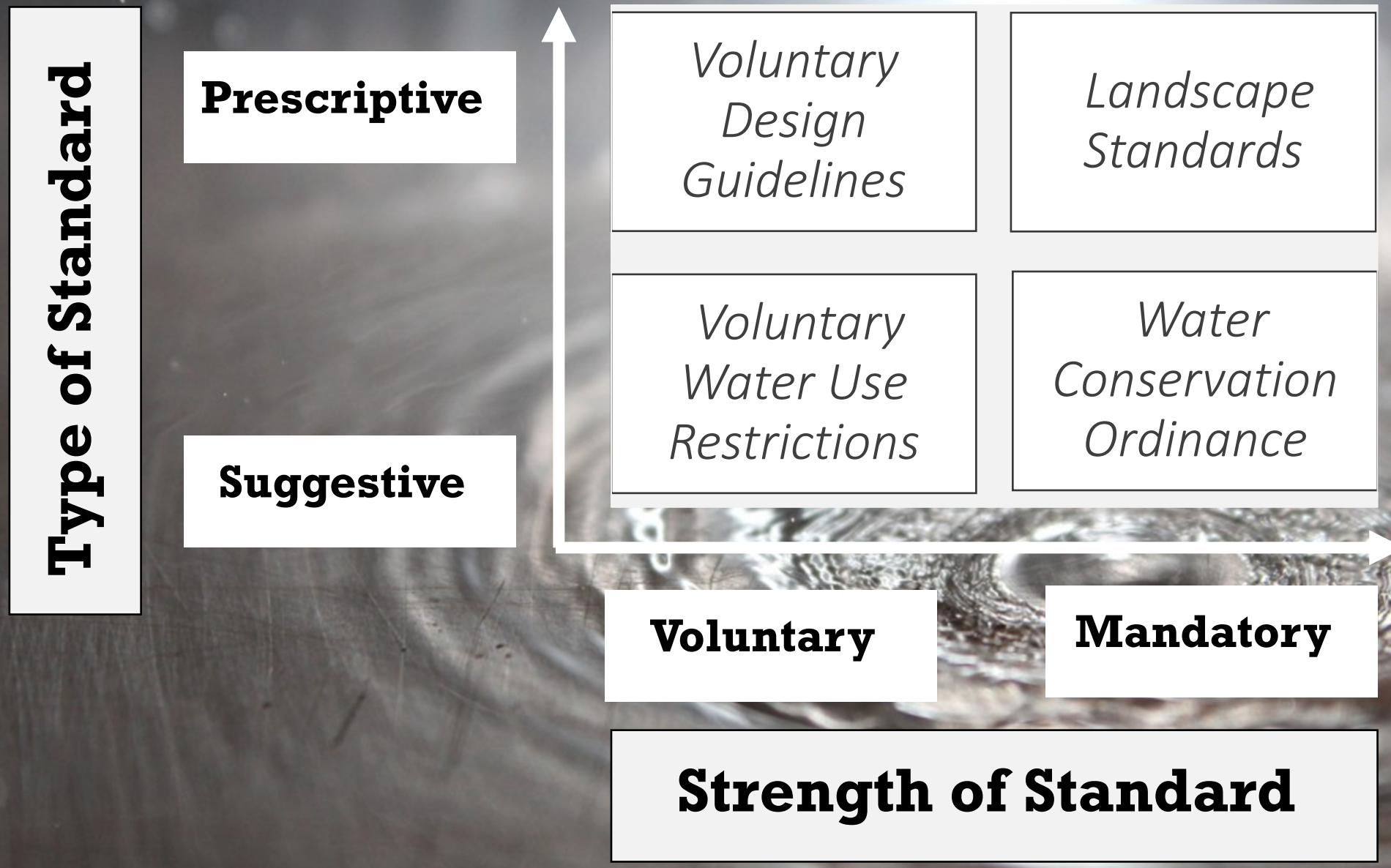
3 EFFICIENT LANDSCAPING AND IRRIGATION

Landscape code requirements can reduce outdoor water use by 35-50%.

4 INDOOR WATER USE

Water efficient fixtures and appliances, building and plumbing codes can have significant savings.

Land Use Regulations Are A Spectrum



RECOMMENDATIONS

1. Local governments need to think about water supply and demand, even if they are not municipal service providers.
2. Collaboration is essential.
3. Local community plans should include a vision for how to manage water resources.
4. Communities should consider Water Smart development patterns during comprehensive planning.
5. Development approval standards for adequate water supply should follow state statute.
6. Development regulations should use zone overlay districts for areas with limited water and/or recharge areas.
7. All communities should adopt or strengthen outdoor watering regulations.
8. Resort-based communities should explore opportunities for commercial water efficiency.

The Master Plan

Colorado Master Planning Requirements

"The general location and extent of an adequate and suitable supply of water."

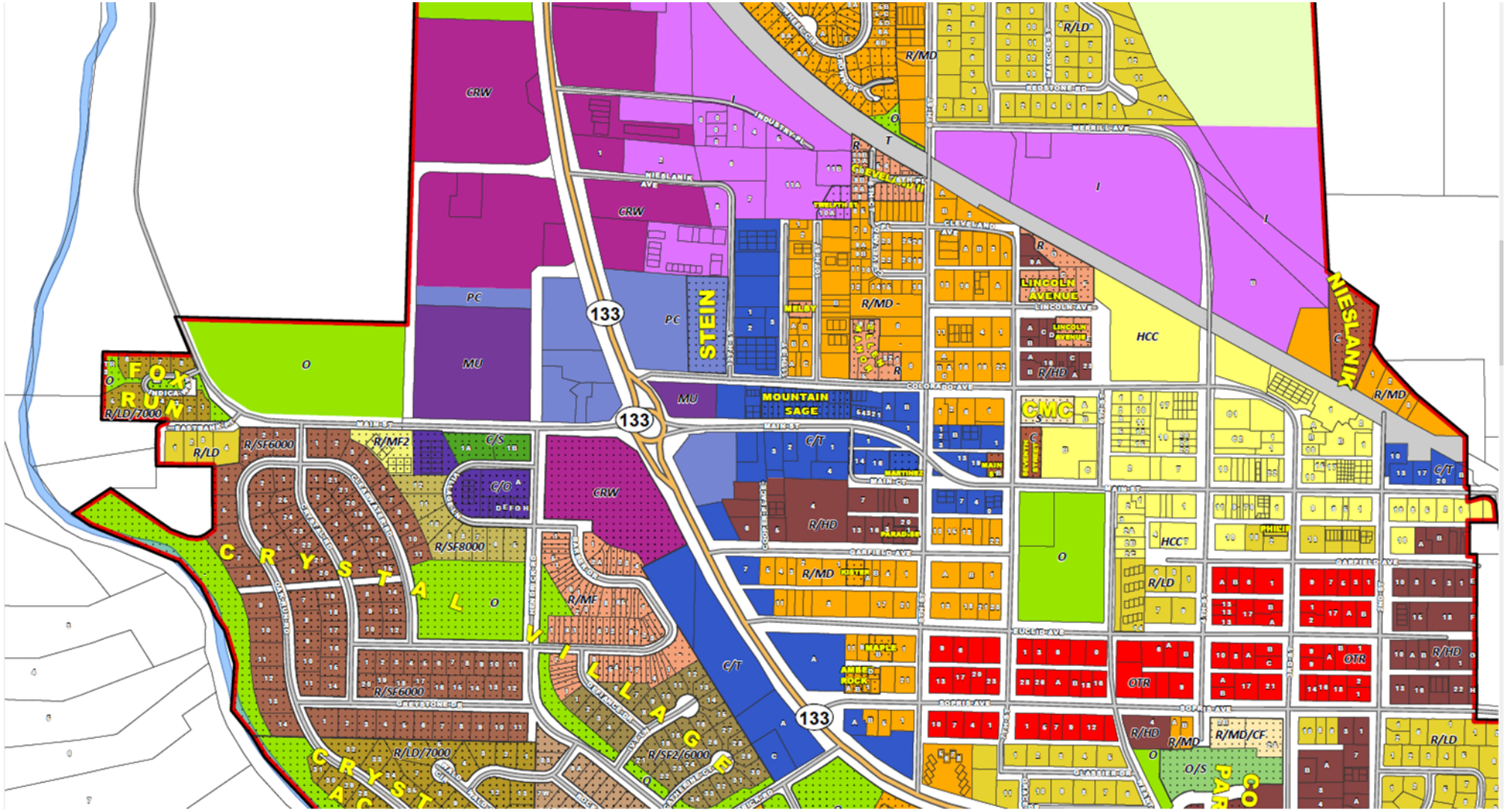
IF the master plan includes a water supply element, the planning commission **shall consult with the entities that supply water for use within the [jurisdiction] to ensure coordination on water supply and facility planning**, and the water supply element **shall identify water supplies and facilities sufficient to meet the needs of the public and private infrastructure** reasonably anticipated or identified in the planning process.

Integrating Water into the Comprehensive Plan

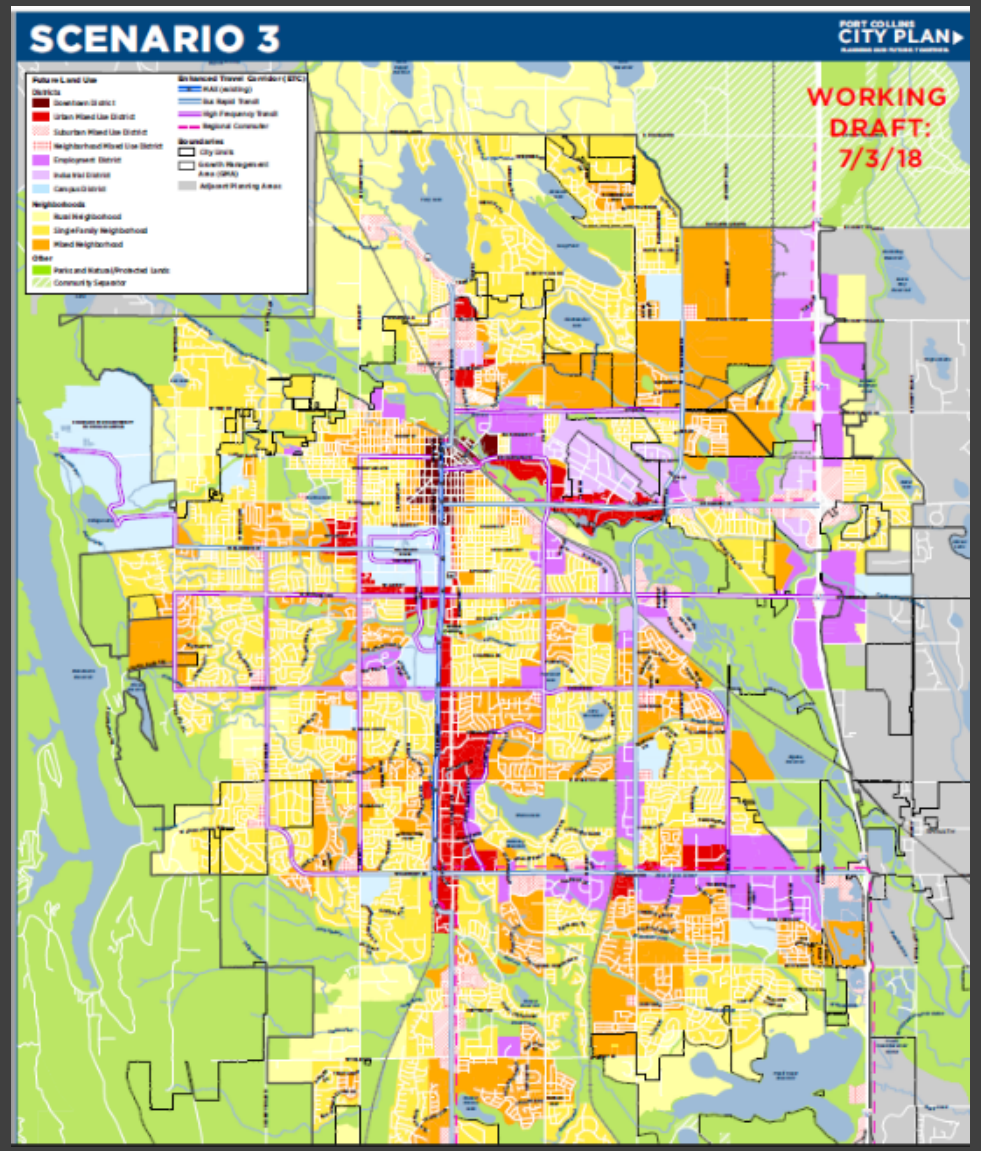
Plan Components	Definition and Description	Opportunities to Connect to Water
Vision	A statement of the desired future of the community and the ideals the community aspires to achieve.	• Integrate principles of sustainability and resiliency into the community's vision.
Community Profile	An overview of the community's trends and future demographics.	• Ensure the water supply projections and population projects are aligned, regardless of number of water providers. • Inventory and evaluate water infrastructure for conveyance, treatment and resiliency. • Assess watershed health. • Identify challenges and opportunities with managing water supply, water demand, watersheds and aquatic ecosystems.
Goals, Objectives and Strategies	A statement of desired community conditions, targets for achieving goals, and courses of action or tasks to achieve each objective.	• Identify water-resource related goals and desired policy actions, including regulatory recommendations.
Future Land-use Plan	A map and/or plan which identifies the types of land uses that are desired for different districts in the future.	• Identify specific geographic areas where future development should be mitigated to protect critical water resources. • Foster more efficient land-use development patterns through compact form. • Ensure future growth is designated in areas where water is available, sustainable and resilient.
Implementation Plan	A work plan that prioritizes future actions and investments.	• Ensure implementation of priority water-related projects, policies and programs by creating a detailed action plan.

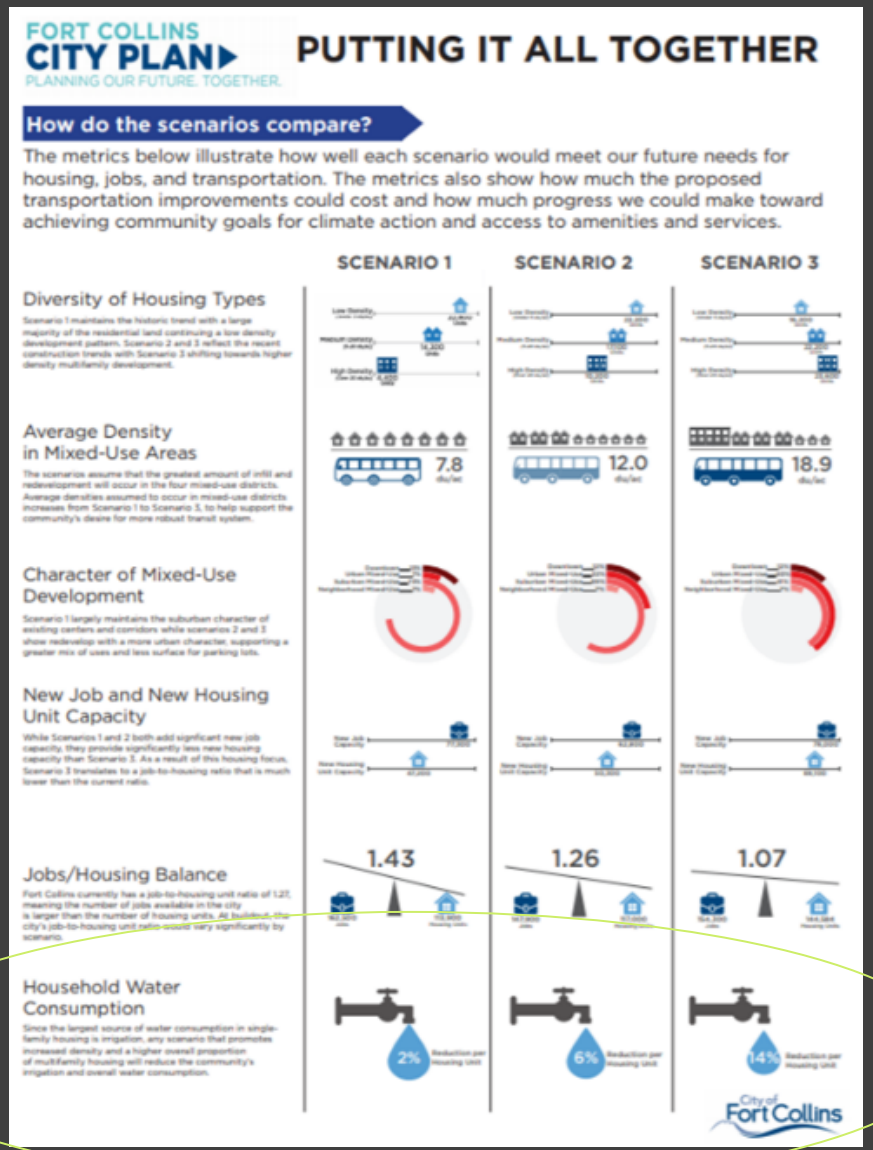
The Role of Compact Form in Water Savings

What percentage of total development pattern will yield water saving benefits?



Creating a Water Efficient FLUP and FLUM





Master Plan Outline

Current Conditions

A. The Water System
- Description of Water Sources and Supplies
- Ownership of Water Distribution Systems
- Water Systems Capacity
- Water Infrastructure and Financing

B. Current Water Demand
- Water Use Measurement
- Non-revenue Water
- Water Conservation Programs
- Water Reuse

C. Water Quality

D. Stormwater Management

E. Watershed Health and Management

Resiliency Considerations for the Future

A. Population Growth and Development Expectations

B. Projected Water Demand
- Future Water Demand Scenarios

C. Water Supply Sustainability
- Climate Trends and Drought Planning
- Transferable/Acquirable Water Rights and Groundwater Management
- Recharge/Recovery/Storage Program(s)
- Conservation and Efficiency Programs
- Water Equity

Sustainable Water Resources

A. Summary of Challenges and Opportunities

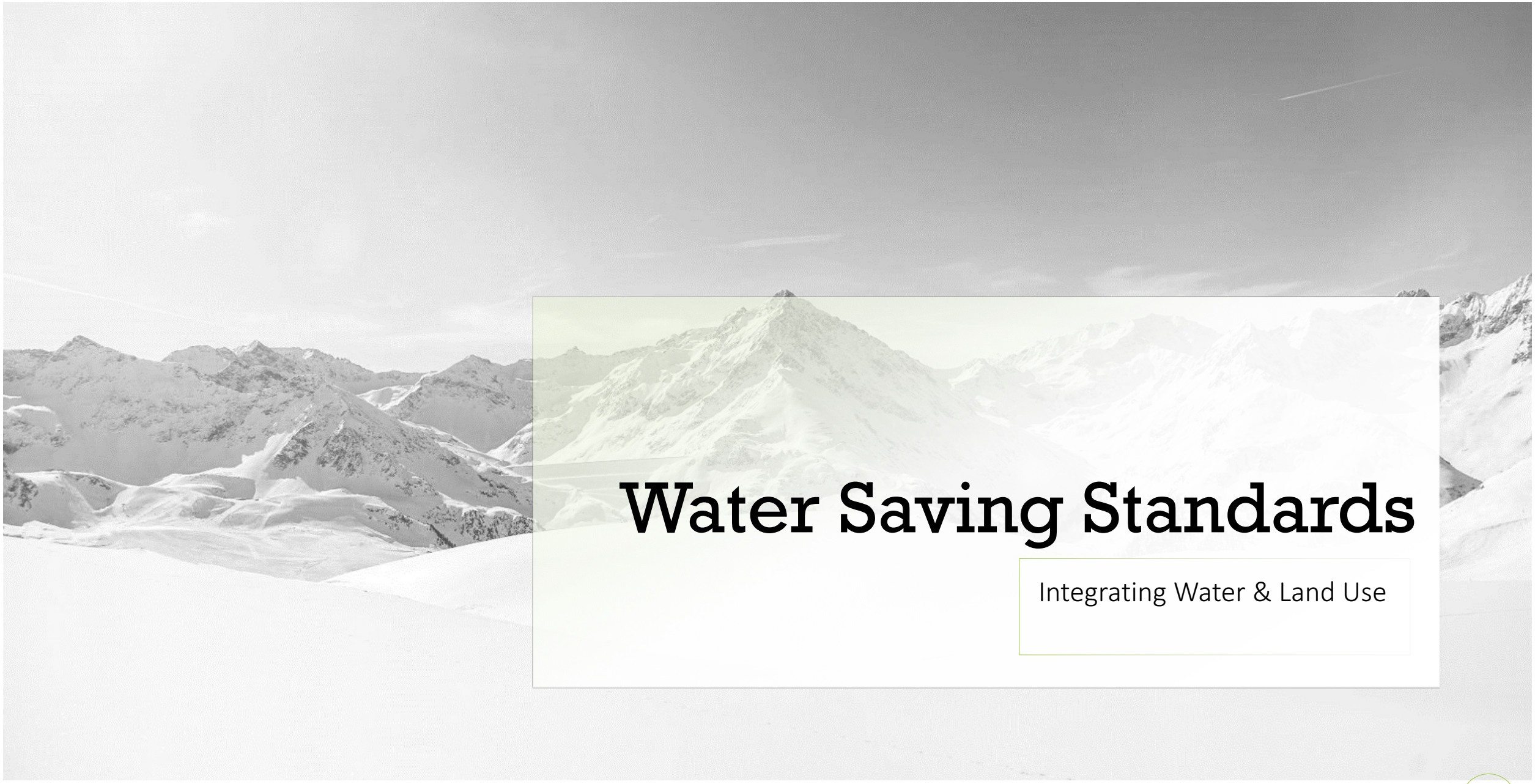
B. Vision for Sustainable Management of Water Resources

C. Goals and Objectives

D. Action Plan

E. Short- and Long-term Priorities

F. Future Land Use Plan



Water Saving Standards

Integrating Water & Land Use

A. ADEQUATE WATER SUPPLY

C.R.S. § 29-20-302(1)

"sufficient for build-out of the proposed development in terms of

quality, quantity, dependability, and availability

to provide a supply of water for the type of development proposed and

may include reasonable conservation measures *and* ***water demand management measures***

to account for hydrologic variability*"*

State of Colorado Requirement for Applying Water Adequacy Review		
	Counties	**Municipalities**
Size of Development for Adequacy Determination	2 or more lots	50 or more lots
State Engineer Review	Required	Not Required, Optional
Determination Timing	Flexible within development review	Flexible

BEST PRACTICES

1. Identify Permitted Water Source

2. Provide Proof of Water Rights

3. A Requirement/Methodology for New Development Water Demand

4. Specific Water Supply Adequacy Verification Process

5. Specific Water System, Distribution, and Connection Standards

6. Define Potable Water Standards and Verification Process

7. Link Water Supply and Zoning

8. Include Conservation & Efficiency Requirements

6. Clarify Timing for When Proof Required in Approval Process

§ 29-20-305 Adequate Water Supply Regulation Summary

If your water source is:

A. Water Entity w/o Water Plan	B. Water Entity w/ Water Plan on File w/ Government	C. Not a Water Entity

Proof of water supply application requirements should include:

A LETTER provided by a registered professional engineer or water supply expert from the entity stating:

(a) Willingness to commit service.
(b) Ability to provide service.

Ability to serve proven by:

- Estimate of water supply requirements for development through build out.
- Description of the physical source of water supply to serve development.
- Estimate of water yield under various hydrological conditions.
- Water conservation measures that may be implemented in the development.
- Water demand measures that may be implemented in the development.
- Such other information as may be required by local government.

The WATER SUPPLY PLAN must meet these requirements:

- Reviewed or updated by water entity board within last 10 years.
- Has a minimum 20 year planning horizon.
- Lists water conservation measures implemented within area.
- Lists water demand management measures, if any, for development.
- General description of the physical source of water supply for entity.
- General description of water supply entities obligations.
- Such other information as may be required by local government.

A WATER SUPPLY REPORT with the following information:

- Estimate of water supply requirements for development through build out.
- Description of the physical source of water supply to serve development.
- Estimate of the amount of water yield projected from proposed water supply under various hydrological conditions.
- Water conservation measures that may be implemented in the development.
- Water demand measures that may be implemented in the development.
- Such other information as may be required by local government.

It is the sole discretion of the local government as to whether an applicant has a water supply that is adequate to meet the requirements based on the following criteria:

(a) Documentation required above.
(b) If requested, a letter from the state engineer commenting on the documentation.
(c) Whether the applicant has paid required fees/charges for the purpose of acquiring water and/or expanding or constructing infrastructure to serve the development.
(d) Any other information deemed relevant by the local government pursuant to applicable local government land use regulations or state statutes.

Breaking Down The Water Supply Requirements

You Are Answering These Questions	That Match These Requirements
1. How much water is requires for the new development?	= water demand calculation
2. Where is the water going to come from?	= the water source(s)
3. Is the water supply adequate and sustainable?	= adequacy verification process
4. Is the water supply potable?	= water quality test
5. How will the water be delivered?	= water system design
6. When will you require proof?	= plan approval process

Adequacy Verification Process

Water Provider WITH Water Supply Plan On File

Commitment to serve.

Plan must meet these standards and have reviewed/updated w/in last 10 years.

- Minimum 20-year planning horizon.
- Lists water conservation measures implemented in area.
- Lists water demand management measures for development, if any.
- Description of water source of entity.
- Description of water supply entities obligations.
- Any other info required by local government.

Water Provider W/O Water Supply Plan

Letter must prove willingness to serve and ability to serve and be prepared by profession engineer or water supply expert from entity.

- Estimate of water supply requirement for development.
- Description of water source.
- Estimate of water yield under different hydrological conditions.
- Water conservation measures for development, if any.
- Water demand measures for development, if any.
- Any other info required by local government.

Wells

Water Supply Report

- Estimate of water supply requirement for development.
- Description of water source.
- Estimate of water yield under different hydrological conditions.
- Water conservation measures for development, if any.
- Water demand measures for development, if any.
- Any other info required by local government.

Examples for Best Practices Included in Chapters

Colorado Counties with Cistern and Hauled Water Requirements and Standards		
Community	**Regulatory Description**	**Link to Development Regulations**
La Plata County	Available as a water source option only in cases where a well is impractical. Includes decision criteria for impracticality of a well. If a cistern is permissible, include a statement on plat note and in covenants about water source. Requires that, if a water system is developed within 400 feet of development, it must connect within 18 months.	Development Regulations Section III.E. Water Quality and Quantity Standards
Weld County	Applies to structures prior to 1993 that have not yet received a building permit and lack another approved source of water. Adopted to set standards to protect public health. Prohibits use of a cistern until obtaining a Cistern Usage Permit. Outlines process, including inspection and cistern standards, to obtain permit. Permit terminates when another water source becomes available.	Development Regulations Article III. Cistern Water
Fremont County	Required at submittal to obtain building permit when evidence of proof of water supply from either a well or water provider is required. Cisterns as a water source limited to parcels *greater than 35 acres* **and** *platted prior to June 1, 1972,* where an individual well has proven to be impossible.	Building Department Cistern Policy

B. WATER & ENERGY EFFICIENT OUTDOOR WATER USE

Methods

Decrease water waste by improving site-specific water efficiency through irrigation system design, best practices and technology.

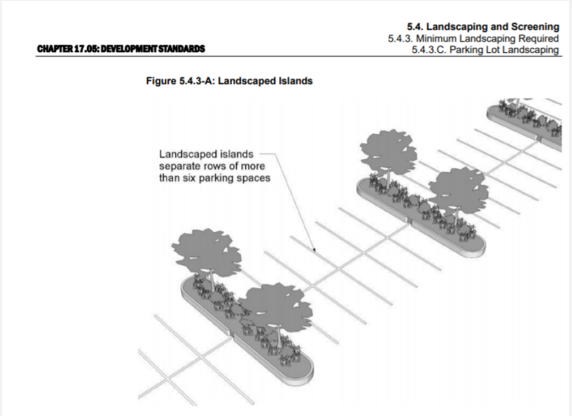
Reduce the amount of water needed for irrigation by enhancing soil conditions, appropriate plant types and landscape design.

Use water budgets to establish the maximum amount of water permitted for landscapes.

Outdoor Water Savings Best Practices

1. Add Soil Amendments
2. Specify Plant Material
3. Include Firewise and Water Efficient Landscapes
4. Require Mandatory Irrigation Scheduling
5. Require Efficient Irrigation System
6. Require Landscape Water Use Estimates and Maximum Allowable Water Budget
7. Separate Irrigation Meters
8. Prohibit Water Waste
9. Require Water Harvesting and Rain Gardens
10. Permit Alternative Water Sources
11. Require Restrictive Covenants
12. Utilize Water Connection Charge Incentives

Case Studies and Examples

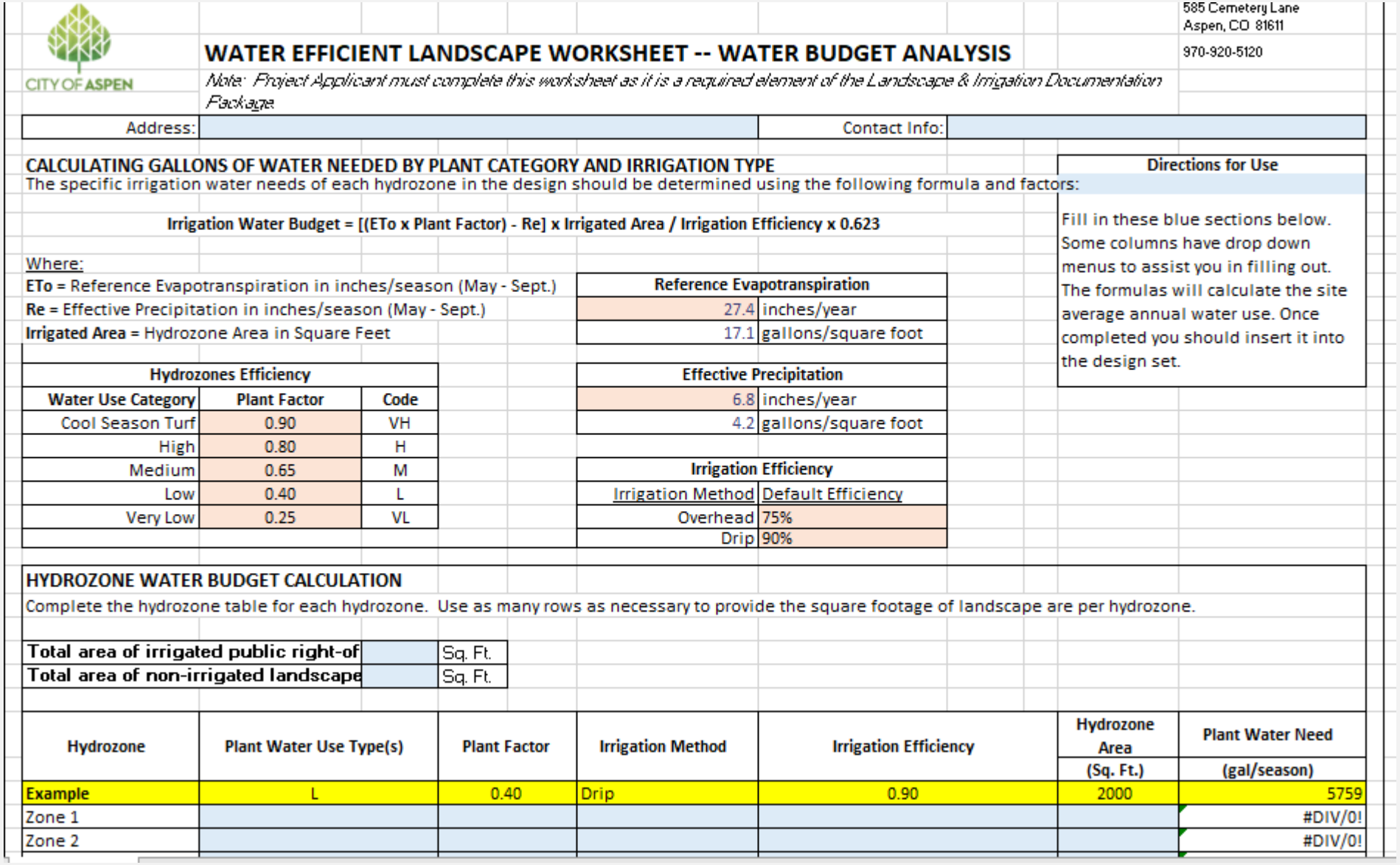


Descriptions for Best Practices for Each Method

Water Efficient Irrigation Systems

- Water-use management plan or water budget.
- Hydrozones that group similar water demands by irrigation zone.
- Non-potable water source.
- Separate irrigation meters.
- Irrigation system design.
- Smart irrigation system controllers.
- Irrigation shutoff valve.
- Master valves and flow sensors.
- Rain sensors.
- Soil moisture sensors.
- Efficient emitters.
- Overhead (spray) irrigation.
  - Allowable only where sufficient width exists to prevent waste.
  - Pop-up height consistent with mature height of plants being watered – minimum of 6 inches.
  - Pop-up spray heads equipped with internal check valves, internal pressure regulations, and matched precipitation rate spray and rotary nozzle.
  - Rotors equipped with internal check valves and pressure regulations are more efficient than spray heads.
  - Head-to-head coverage.
- Drip systems.
  - Point source drip or subsurface drip irrigation for all trees, shrubs, perennials and annuals.
  - Internal check valves at each drip emitter and for subsurface drip systems.
  - Subsurface drip irrigation may be used for turf or grass areas.
  - Bubblers may be substituted for drip emitters.

Options: Aspen Water Efficient Landscape Standards



CITY OF ASPEN

585 Cemetery Lane
Aspen, CO 81611
970-920-5120

WATER EFFICIENT LANDSCAPE WORKSHEET -- WATER BUDGET ANALYSIS

Note: Project Applicant must complete this worksheet as it is a required element of the Landscape & Irrigation Documentation Package

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 should be 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 - Sept.)

Re = Effective Precipitation in inches/season (May - Sept.)

Irrigated Area = Hydrozone Area in Square Feet

Reference Evapotranspiration	
27.4	inches/year
17.1	gallons/square foot

Effective Precipitation	
6.8	inches/year
4.2	gallons/square foot

Hydrozones Efficiency		
Water Use Category	Plant Factor	Code
Cool Season Turf	0.90	VH
High	0.80	H
Medium	0.65	M
Low	0.40	L
Very Low	0.25	VL

Irrigation Efficiency	
Irrigation Method	Default Efficiency
Overhead	75%
Drip	90%

Directions for Use

Fill in these blue sections below. Some columns have drop down menus to assist you in filling out. The formulas will calculate the site average annual water use. Once completed you should insert it into the design set.

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.

Total area of irrigated public right-of		Sq. Ft.
Total area of non-irrigated landscape		Sq. Ft.

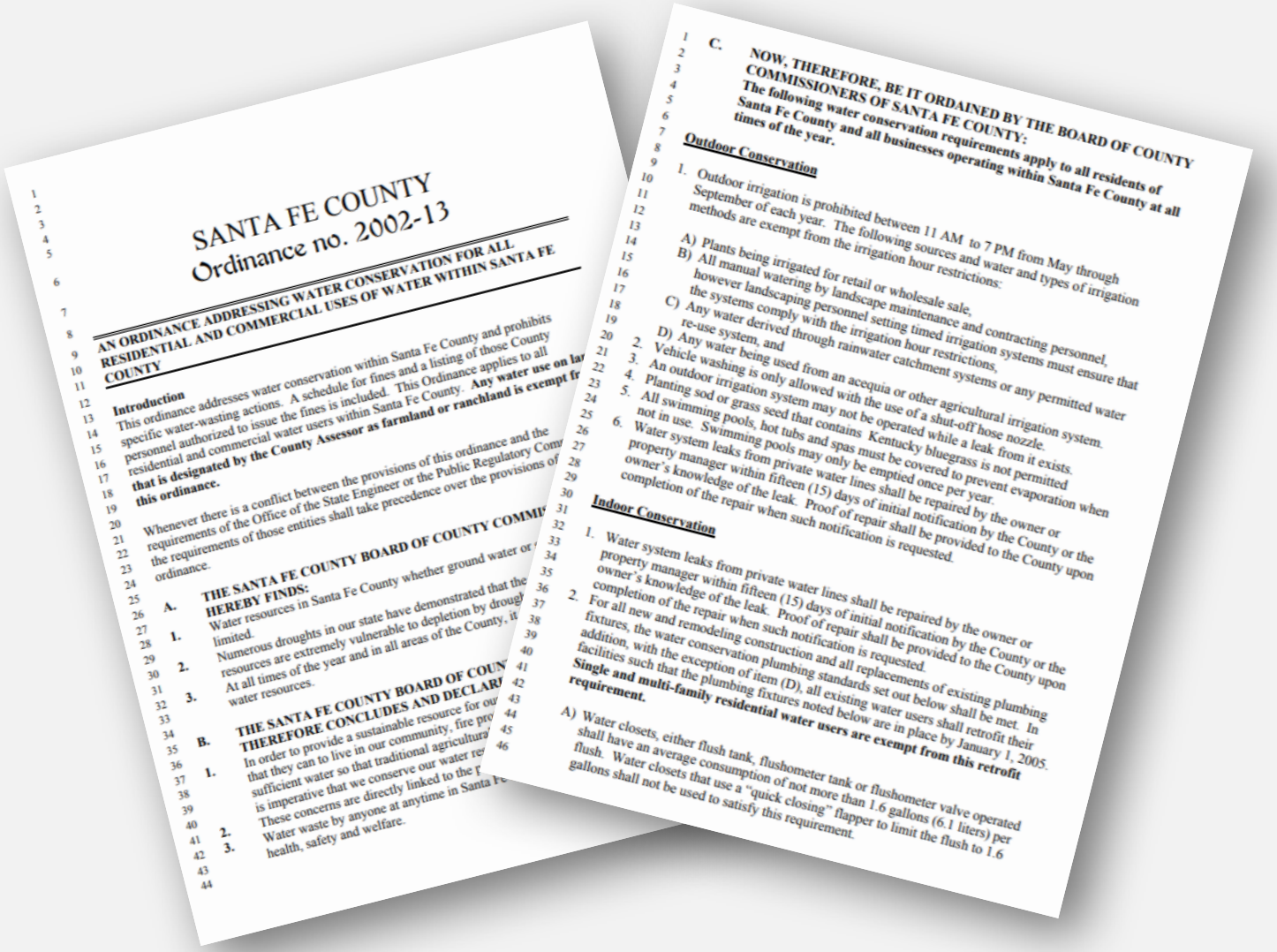
Hydrozone	Plant Water Use Type(s)	Plant Factor	Irrigation Method	Irrigation Efficiency	Hydrozone Area (Sq. Ft.)	Plant Water Need (gal/season)
Example	L	0.40	Drip	0.90	2000	5759
Zone 1						#DIV/0!
Zone 2						#DIV/0!

Options: Fountain Water Efficiency Tap Fee Incentive

2019 Tap Fees			
Lot Size in Square Feet	**Standard Water Acquisition Fee**	**Water Acquisition Fee with Conservation Incentive: 50% or Less Irrigated Area**	**Water Acquisition Fee with Conservation Incentive: 30% or Less Irrigated Area**
< 9,000	$4,875	$2,438	$1,024
9,001 – 13,000	$5,688	$2,844	$1,706
>13,001	$6,500	$3,250	$1,950

Options: Water Conservation Ordinance

Alternative and Complement to Landscape Ordinance



SANTA FE COUNTY
Ordinance no. 2002-13

AN ORDINANCE ADDRESSING WATER CONSERVATION FOR ALL RESIDENTIAL AND COMMERCIAL USES OF WATER WITHIN SANTA FE COUNTY

Introduction

This ordinance addresses water conservation within Santa Fe County and prohibits specific water-wasting actions. A schedule for fines and a listing of those County personnel authorized to issue the fines is included. This Ordinance applies to all residential and commercial water users within Santa Fe County. **Any water use on land that is designated by the County Assessor as farmland or ranchland is exempt from this ordinance.**

Whenever there is a conflict between the provisions of this ordinance and the requirements of the Office of the State Engineer or the Public Regulatory Comm... the requirements of those entities shall take precedence over the provisions of ordinance.

A. **THE SANTA FE COUNTY BOARD OF COUNTY COMMI... HEREBY FINDS:**

1. Water resources in Santa Fe County whether ground water or ... limited.
2. Numerous droughts in our state have demonstrated that the... resources are extremely vulnerable to depletion by drough...
3. At all times of the year and in all areas of the County, it... water resources.

B. **THE SANTA FE COUNTY BOARD OF COUN... THEREFORE CONCLUDES AND DECLARE...**

1. In order to provide a sustainable resource for our... that they can to live in our community, fire pro... sufficient water so that traditional agricultura... is imperative that we conserve our water re... These concerns are directly linked to the p...
2. Water waste by anyone at anytime in Santa Fe...
3. health, safety and welfare.

C. **NOW, THEREFORE, BE IT ORDAINED BY THE BOARD OF COUNTY COMMISSIONERS OF SANTA FE COUNTY:**
The following water conservation requirements apply to all residents of Santa Fe County and all businesses operating within Santa Fe County at all times of the year.

Outdoor Conservation

1. Outdoor irrigation is prohibited between 11 AM to 7 PM from May through September of each year. The following sources and water and types of irrigation methods are exempt from the irrigation hour restrictions:
   A) Plants being irrigated for retail or wholesale sale,
   B) All manual watering by landscape maintenance and contracting personnel, however landscaping personnel setting timed irrigation systems must ensure that the systems comply with the irrigation hour restrictions,
   C) Any water derived through rainwater catchment systems or any permitted water re-use system, and
   D) Any water being used from an acequia or other agricultural irrigation system.
2. Vehicle washing is only allowed with the use of a shut-off hose nozzle.
3. An outdoor irrigation system may not be operated while a leak from it exists.
4. Planting sod or grass seed that contains Kentucky bluegrass is not permitted
5. All swimming pools, hot tubs and spas must be covered to prevent evaporation when not in use. Swimming pools may only be emptied once per year.
6. Water system leaks from private water lines shall be repaired by the owner or property manager within fifteen (15) days of initial notification by the County or the owner's knowledge of the leak. Proof of repair shall be provided to the County upon completion of the repair when such notification is requested.

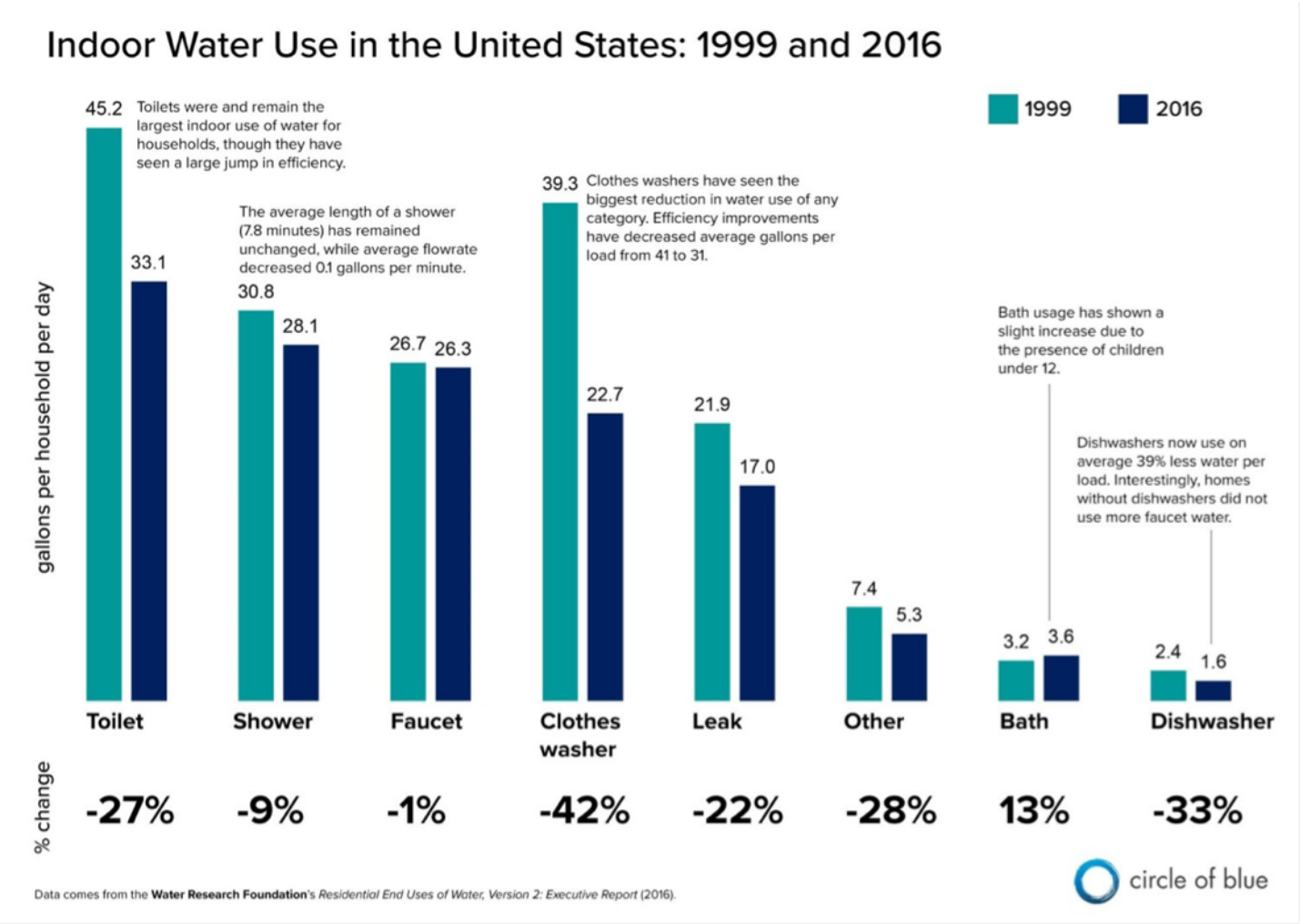
Indoor Conservation

1. Water system leaks from private water lines shall be repaired by the owner or property manager within fifteen (15) days of initial notification by the County or the owner's knowledge of the leak. Proof of repair shall be provided to the County upon completion of the repair when such notification is requested.
2. For all new and remodeling construction and all replacements of existing plumbing fixtures, the water conservation plumbing standards set out below shall be met. In addition, with the exception of item (D), all existing water users shall retrofit their facilities such that the plumbing fixtures noted below are in place by January 1, 2005. **Single and multi-family residential water users are exempt from this retrofit requirement.**

A) Water closets, either flush tank, flushometer tank or flushometer valve operated shall have an average consumption of not more than 1.6 gallons (6.1 liters) per flush. Water closets that use a "quick closing" flapper to limit the flush to 1.6 gallons shall not be used to satisfy this requirement.

- Outdoor irrigation is prohibited between 11 AM to 7 PM from May through September of each year.
- Vehicle washing is only allowed with the use of a shut-off hose nozzle.
- An outdoor irrigation system may not be operated while a leak from it exists.
- Planting sod or grass seed that contains Kentucky bluegrass is not permitted
- All swimming pools, hot tubs and spas must be covered to prevent evaporation when not in use. Swimming pools may only be emptied once per year.
- Water system leaks from private water lines shall be repaired by the owner or property manager within fifteen (15) days of initial notification by the County or the owner's knowledge of the leak. Proof of repair shall be provided to the County upon completion of the repair when such notification is requested.

C. WATER EFFICIENT INDOOR FIXTURES & APPLICANCES



Colorado WaterSense Law *(products sold)*

https://studylib.net/doc/18255074/colorado-s-indoor-watersense-fixture-requirement#targetText=A%3A%20The%20law%20requires%20that,in%20the%20State%20of%20Colorado.

Headwaters Region

Need to Update Requirements to Match Evolution of State Standards

EAGLE COUNTY ECOBUILD

Since 2006
Mandatory Point System

RESIDENTIAL

Point Options

- Reduce irrigated turf, use drip where appropriate
- Water efficient landscaping
- Water efficient appliances and fixtures

COMMERCIAL

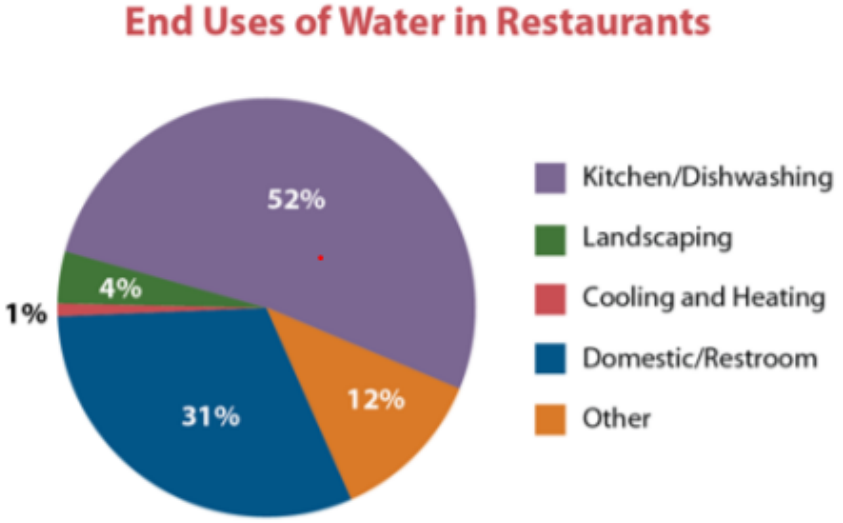
Point Options

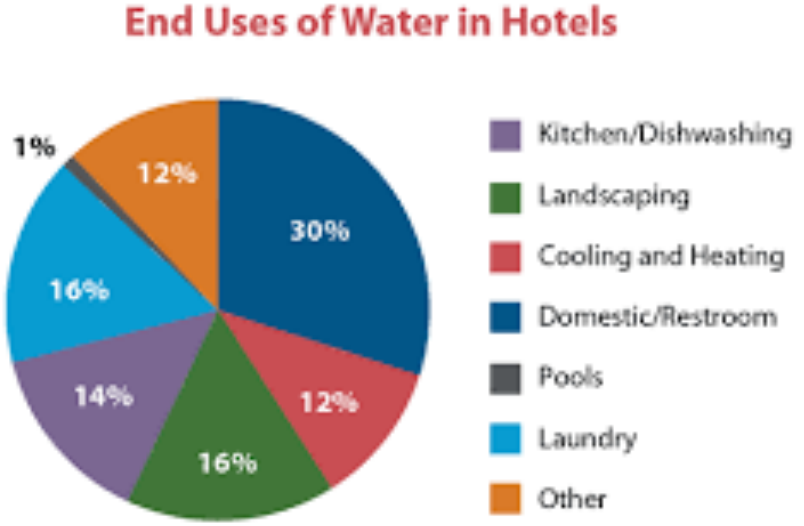
- Submeters for buildings over 50,000 sq feet
- Efficient toilets
- Efficient urinals
- Submeters for irrigation
- Efficient irrigation design

Indoor Efficiency

How to Maximize Indoor Water Efficiency

High-Preformance + Water Savings
1.15 GPM
EXCEEDS **WaterSense** STANDARDS





Marjo Curgus
(505) 699-8532
delcorazonconsulting@gmail.com
www.delcorazonconsulting.com