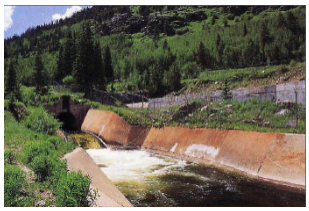

South Platte-Metro Basin Implementation Plan

DRAFT Technical Memorandum - Conservation

South Platte Basin Roundtable
Metro Basin Roundtable

Project Number 225388

March 3, 2014

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1 Executive Summary

This memorandum presents information to support updating the 2050 Municipal and Industrial (M&I) water supply gap with respect to conservation activities. This memorandum reviews existing M&I conservation programs, methods, and regulatory requirements in relation to existing Identified Projects and Processes (IPPs). Potential opportunities or methods for expansion of M&I conservation practices are discussed. Much of the material for this memorandum was extracted from the following documents:

1. SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, June 2011, CDM
2. SWSI 2010 Metro Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments, June 2011, CDM
3. SWSI 2010 Appendix K – Conservation Levels Analysis, June 2010, Great Western Institute
4. Municipal Water Efficiency Plan Guidance Document, July 2012, AMEC
5. SWSI 2010 Appendix L – Municipal and Industrial Water Conservation Strategies, January 2011, Aquacraft Inc & Headwaters Corporation
6. Draft Updated Metro Roundtable Conservation Strategy (November 2011)
7. No/Low Regrets Action Plan (September 2013)
8. Individual Municipal Water Conservation Plans approved by the CWCB.
9. Filling the East Slope Municipal Water Supply Gap – A Joint Statement of the South Platte, Arkansas, and Metro Roundtables (July 2013)

The South Platte and Metro Roundtables have performed significant analysis and planning to improve conservation efforts in their respective basins. The Water Conservation Act of 2004 requires covered entities to submit a Water Conservation Plan. This work has been guided by Colorado Water Conservation Board's (CWCB) nine-step conservation planning processes. Following the steps detailed, 45 South Platte and Metro entities have approved plans. Each plan includes components for information gathering, establishing goals, measures, and programs, and finally monitoring, evaluation, and revision activities. The specific requirements for defining goals, evaluating of performance, and scheduling reviews were introduced in the 2004 Act and are required of all plans submitted after July 2006.

There are six existing Conservation Identified Projects and Processes (IPPs) within the South Platte Basin as January 23rd, 2014; City of Greeley, City of Longmont, Town of Castle Rock, Centennial Water and Sanitation District, City of Northglenn, and the City of Thornton. These combine to provide a yield of 13,389 AF. These six conservation IPPs represent active conservation methods. Passive conservation is factored into M&I demand forecasts but is not shown as a unique IPP. Many of the existing approved Water Conservation Plans will soon be scheduled for review and revision. Evaluation of value and cost/benefit analysis may result in changes to existing goals and programs. With those changes, updated projections and estimates will improve the accuracy of the M&I gap analysis.

Recommendations per the *Draft Updated Metro Roundtable Conservation Strategy* from November 2011, a total use savings of 597,758 AF based on a 2050 medium population and water demand reductions associated with active and passive water conservation. This estimate includes a 22% savings in residential indoor use (45,026 AF), 15% savings in non-residential use (26,111 AF), 15% savings in outdoor use (43,169 AF), 14% savings in water loss (6,963 AF).

Recommendations specific to the South Platte Roundtable have yet to be detailed, however savings estimates per low, medium, and high conservation strategies are stated.

Per *Filling the East Slope Municipal Water Supply Gap* from July 2013, the east slope roundtables support encouraging political will for raising efficiency standards as well as improved coordination between urban land planning and water supply planning.

Based upon HDR's analysis of the existing information and the schedule for the Basin Implementation Plan, no modifications are made herein to previously developed estimates of conservation program reductions to the M&I supply shortage. To the extent that new information is received from South Platte/Metro providers regarding conservation IPPs, the M&I water supply gap will be updated within the draft Basin Implementation Plan.

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2 Overview of Issues and Interests

Conservation practices are divided into two components; passive and active. Based on previous SWSI work, passive conservation does not require implementation of new programs or special funding through the water utility whereas active conservation requires additional programs and funding as specified in the specific Water Conservation Plan created by the entity. Following are explanations of activities of both practices.

2.1 Passive Conservation

Passive savings, as defined in Statewide Water Supply Initiative (SWSI) I, are those water savings that result from the impacts of plumbing codes, ordinances and standards that improve the efficiency of water use. These conservation savings are called "passive" savings because water utilities do not actively fund and implement programs that produce these savings.

Reference Documents

The following discussion is extracted from:

- Appendix K – SWSI Conservation Levels – Section 5: Passive Water Savings
- SWSI 2010 Metro (& South Platte) Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments - Section 4

The National Energy Policy Act of 1992 set manufacturing standards for improved water efficiency for toilets, urinals, showerheads, and faucets. These standards became effective in 1994. The standards for commercial fixtures became effective in 1997. These standards affect the types of water-using fixtures available for new construction as well as remodeled or renovated facilities, and result in improved indoor water use efficiency. In addition, some municipalities have ordinances that limit turf or irrigated areas, which reduce outdoor water use.

For the SWSI 2010 analysis, passive water savings were calculated to occur as a result of retrofitting housing stock and businesses that exist prior to 2016 through the replacement of washing machines, toilets, and dishwashers. Future water demand reductions associated with passive savings were calculated for each year beginning in 1996, which was when benchmark toilet flushing volume data from Denver Water was available. The calculations used to estimate future demand reductions from passive conservation were developed for minimum and maximum scenarios based on the assumptions related to the retrofit of existing housing and commercial construction with high efficiency toilets, clothes washers, and dishwashers.

The calculations based on these assumptions were used to estimate a range of future passive water savings in each county for each year starting in 2000 and continuing until 2050. The total range of savings expected from passive conservation through 2050 is 19 to 33 gallons per capita per day (gpcd). The upper range of these savings were applied to the county level baseline estimates described above to assess what the 2050 demands would be on a low, medium, and high basis with passive conservation. As stated in the SWSI Conservation Levels Analysis Report there are three major reasons for applying the high passive conservation savings:

1. Water and energy savings will become increasingly important to water customers as water and fuel costs rise. As water customers seek more efficiency in their homes and businesses, high efficiency fixtures and appliances will become increasingly efficient as technology improves and customers strive to reduce their variable costs related to water and energy.
2. The potential exists to realize substantial permanent water demand reductions in the future if appropriate regulations and ordinances are developed to address water use in existing and new construction[1].
3. The impact of commercial retrofits (e.g., restaurants, motels, ski area condominiums, centralized laundries, commercial laundries, bars, etc.), is not well captured in the passive savings analyses since information regarding numbers of and ages of individual types of commercial properties were not available.

Typically, estimates of passive savings for a given water utility service area, or other planning area, are a function of characteristics of the service area such as the percent of water efficient fixtures present at some base period in time and subsequent new construction and remodeling. Other factors to be considered in estimating passive savings are (1) the percent of new construction in compliance with standards and codes, including an accounting for proper installation, (2) the presence of end uses in the service area, and (3) the intensity, or frequency of use, of relevant end uses.

The estimation and allocation of total water use among various end uses may be seasonal. For example, irrigation is expected to be a larger component of total water use in summer months than in winter months. Locations affected by landscaping ordinances may have a greater impact from passive conservation in the summer months, while locations without landscaping ordinance may find the impact of passive conservation to be more noticeable in winter months.

The estimation of conservation savings requires an initial baseline forecast of water demand without conservation. The baseline water demand forecast is driven by projections of future demographic growth for the study area and does not account for the effects of future water conservation. Impacts of conservation savings can then be determined from the baseline water demand forecast. Figure 2-1 and Table 2-1 show this baseline year as 2008.

Reference Documents

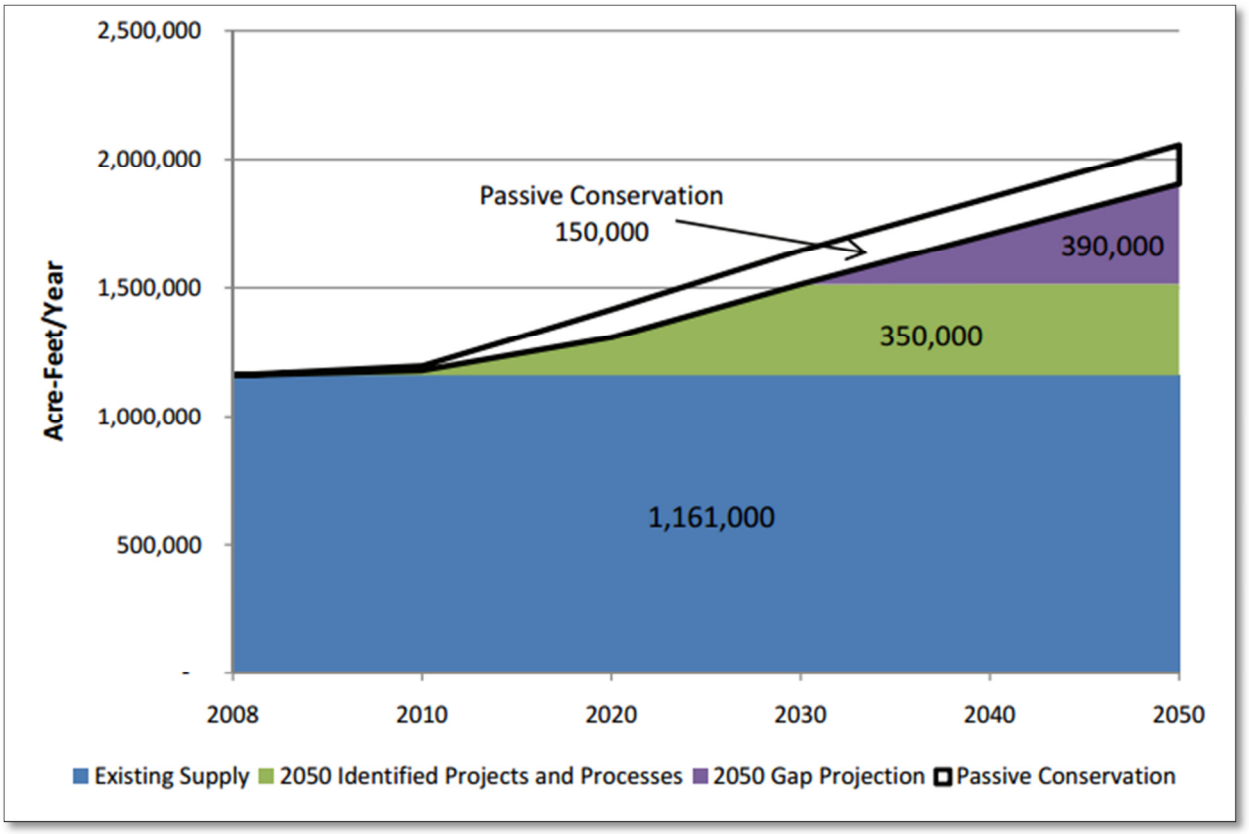
The following discussion is extracted from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments - Section 5 – South Platte Basin Consumptive Projects and Methods and the M&I Gap

Figure 2-1 shows the passive conservation effects on the statewide M&I gap assuming medium demand growth and a 70% success rate for all IPPs. Note that while this plot does illustrate the temporal evolution of existing supplies, IPPs, and the gap, it is not intended to serve as a definitive timeline for the development of these parameters. A level of uncertainty remains for most components of this analysis; demand increases may come sooner or later than projected and IPPs may have more or less success than anticipated in these calculations. Thus, the figure functions as a representation of the interrelated nature of IPPs and the gap. The direct contribution of passive conservation savings is further detailed in Table 2-1, 2-2, and 2-3 as savings in each county and collectively per basin. For

[1] An example of such has been proposed by the Colorado Legislature: *"A Bill For An Act Concerning the Phase-out of the Sale of Certain Low-Efficiency Plumbing Fixtures"*

2050, there is a range of demand provided (low, medium, high) due to the nature of 36 year estimates.

Figure 2-1. Statewide M&I and SSI Gap Summary Medium Scenario (IPPs at 70% Success Rate)



Source: Figure 5-3 from SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessment

Table 2-1. South Platte Basin Forecast by County

County	Water Demand (AF)	Baseline Water Demands (AFY)				Water Demands with Passive Conservation (AFY)				Reduction in Demand (AFY)			
	2008	2035	2050 Low	2050 Medium	2050 High	2035	2050 Low	2050 Medium	2050 High	2035	2050 Low	2050 Medium	2050 High
Boulder	59,000	77,000	86,000	89,000	97,000	69,000	77,000	80,000	88,000	8,000	9,000	9,000	9,000
Cheyenne – South Platte Basin Portion	58	68	72	80	90	61	64	72	82	7	8	8	8
Clear Creek	2,400	3,800	4,300	4,700	5,300	3,600	4,000	4,400	5,000	200	300	300	300
Gilpin	450	700	850	1,100	1,300	550	680	900	1,200	150	170	200	100
Kit Carson	3,100	3,600	4,000	4,300	4,700	3,400	3,800	4,100	4,500	200	200	200	200
Larimer	59,000	95,000	110,000	110,000	120,000	86,000	97,000	100,000	110,000	9,000	13,000	10,000	10,000
Lincoln – South Platte Basin Portion	220	280	310	340	370	260	290	320	350	20	20	20	20
Logan	7,900	12,000	13,000	14,000	15,000	11,000	12,000	13,000	14,000	1,000	1,000	1,000	1,000
Morgan	7,800	13,000	14,000	15,000	16,000	12,000	14,000	14,000	16,000	1,000	0	1,000	0
Park	2,200	4,900	5,300	5,500	5,900	4,400	4,700	4,900	5,200	500	600	600	700
Phillips	2,000	2,200	2,300	2,400	2,700	2,100	2,200	2,300	2,500	100	100	100	200
Sedgwick	950	1,100	1,200	1,300	1,300	1,000	1,100	1,200	1,300	100	100	100	0
Teller– South Platte Basin Portion	10,000	16,000	17,000	19,000	20,000	14,000	15,000	17,000	19,000	2,000	2,000	2,000	1,000
Washington	1,700	1,800	1,900	2,000	2,200	1,700	1,800	1,900	2,100	100	100	100	100
Weld	53,000	120,000	130,000	140,000	150,000	110,000	120,000	130,000	140,000	10,000	10,000	10,000	10,000
Yuma	3,200	3,800	4,000	4,300	4,700	3,500	3,700	4,000	4,500	300	300	300	200
Totals	**210,000**	**360,000**	**390,000**	**410,000**	**450,000**	**320,000**	**360,000**	**380,000**	**410,000**	30,000	40,000	30,000	30,000
Source: Table 4-3 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments.										Source: HDR Analysis			

Table 2-2. Metro Basin Forecast by County

County	Water Demand (AF)	Baseline Water Demands (AFY)				Water Demands with Passive Conservation (AFY)				Reduction in Demand (AFY)			
	2008	2035	2050 Low	2050 Medium	2050 High	2035	2050 Low	2050 Medium	2050 High	2035	2050 Low	2050 Medium	2050 High
Adams	69,000	110,000	120,000	130,000	140,000	98,000	110,000	110,000	120,000	12,000	10,000	20,000	20,000
Arapahoe	100,000	150,000	170,000	170,000	190,000	140,000	150,000	160,000	170,000	10,000	20,000	10,000	20,000
Broomfield	11,000	17,000	19,000	20,000	22,000	16,000	17,000	18,000	20,000	1,000	2,000	2,000	2,000
Denver	110,000	140,000	160,000	160,000	180,000	130,000	140,000	140,000	160,000	10,000	20,000	20,000	20,000
Douglas	46,000	81,000	90,000	93,000	100,000	73,000	81,000	84,000	93,000	8,000	9,000	9,000	7,000
Elbert – Metro Basin Portion	86	240	260	270	280	230	250	260	270	10	10	10	10
Jefferson	94,000	120,000	130,000	140,000	150,000	100,000	120,000	120,000	130,000	20,000	10,000	20,000	20,000
Total	**430,000**	**620,000**	**690,000**	**710,000**	**780,000**	**560,000**	**620,000**	**630,000**	**690,000**	**60,000**	**70,000**	**80,000**	**90,000**
Source: Table 4-3 SWSI 2010 Metro Platte Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments										Source: HDR Analysis			

Table 2-3. South Platte Basin and Metro Basin Forecast

County	Water Demand (AF)	Baseline Water Demands (AFY)				Water Demands with Passive Conservation (AFY)				Reduction in Demand (AFY)			
	2008	2035	2050 Low	2050 Medium	2050 High	2035	2050 Low	2050 Medium	2050 High	2035	2050 Low	2050 Medium	2050 High
South Platte	210,000	360,000	390,000	410,000	450,000	320,000	360,000	380,000	410,000	40,000	30,000	30,000	40,000
Metro	430,000	620,000	690,000	710,000	780,000	560,000	620,000	630,000	690,000	60,000	70,000	80,000	90,000
Total	**640,000**	**980,000**	**1,080,000**	**1,120,000**	**1,230,000**	**880,000**	**980,000**	**1,010,000**	**1,100,000**	**100,000**	**100,000**	**110,000**	**130,000**
Source: Table 4-3 SWSI 2010 South Platte Basin Report Basinwide Consumptive and Non consumptive Water Supply Needs Assessments & Table 4-3 SWSI 2010 Metro Basin Report Basinwide Consumptive and Non consumptive Water Supply Needs Assessments										Source: HDR Analysis			

2.2 Active Conservation

Reference Documents

The following discussion is extracted from:

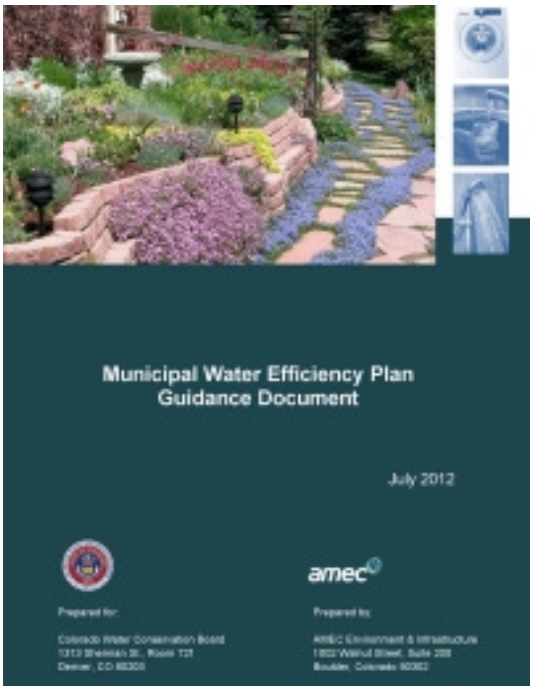
- Appendix K – SWSI Conservation Levels – Section 5: Passive Water Savings
- SWSI 2010 Metro (& South Platte) Basin Report Basinwide Consumptive and Nonconsumptive Water Supply Needs Assessments - Section 4
- Municipal Water Efficiency Plan Guidance Document

Active conservation savings are water savings that result from utility-sponsored water conservation programs. Such programs may include education programs, incentives and rebates, fixture replacement programs, audits, and conservation rates and surcharges. Emergency conservation programs and drought-response restrictions are not included as long-term water conservation programs.

The 2004 Act expanded the duties of the CWCB's Office of Water Conservation and Drought Planning and amended the list of minimum required plan elements. The Water Conservation Act of 2004 requires covered entities to submit a Water Conservation Plan. Covered entities are defined as "each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of 2,000 AF or more."

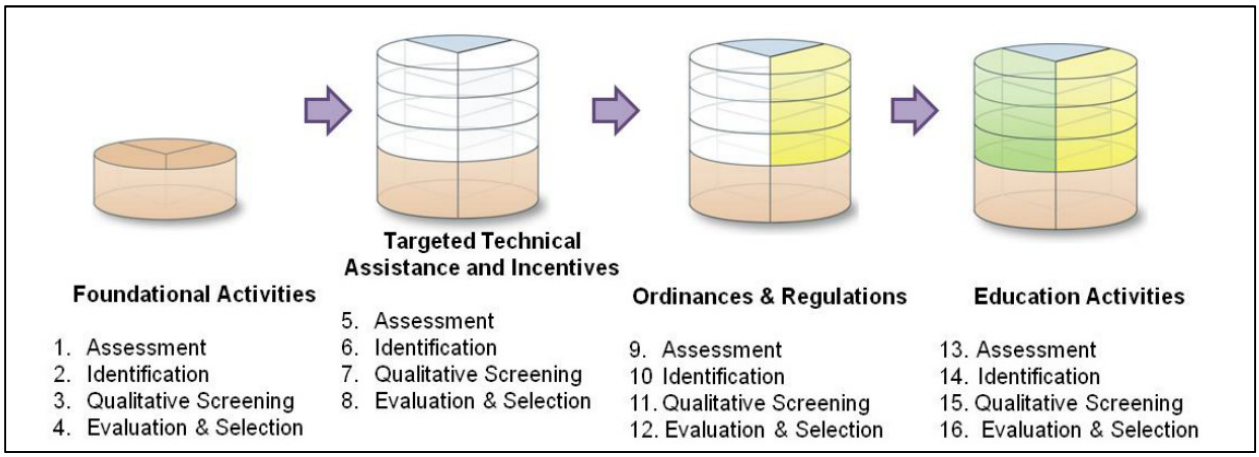
As outlined in CWCB's Municipal Water Efficiency Plan Guidance Document[2], the nine required elements of a Water Conservation Plan include:

1. Profile existing water system
2. Characterize water use and forecast demand
3. Profile proposed facilities
4. Identify conservation goals
5. Identify conservation measures and programs
6. Evaluate and select conservation measures and programs
7. Integrate resources and modify forecasts
8. Develop implementation plan
9. Monitor, evaluate and revise conservation activities and the conservation plan



[2] Municipal Water Efficiency Plan Guidance Document, CWCB, July 2012, AMEC Environment & Infrastructure

Figure 2-2. Conservation Plan Framework Components



Source: Figure 23 from Municipal Water Efficiency Plan Guidance Document, CWCB, July 2012, AMEC Environment & Infrastructure

Foundational Activities –

Water Rates & Tap Fees - Water efficiency pricing has been one of the most effective methods in influencing customer behavior and reducing water use. A common water efficiency pricing structure consists of inclining block rate structures that discourage excessive customer water use. Customers are charged more money per gallon as they use more water. According to C.R.S. 37-60-126(4)[3], a water efficiency oriented rate structure shall be fully evaluated for implementation during the water efficiency planning process. Some providers currently implement inclining block rate structures that do not encourage water savings. The blocks are either too large or not effectively tied to excessive water use.

Alternatively, some provider's water bills have a very small percentage of the bill directly tied to water use. There are other more significant charges such as costs for new infrastructure and for securing new water supplies. In these cases, inclining block rates can be insignificant when compared to the other charges and consequently do not effectively influence customer behavior.

In order for a block rate structure to be effective and considered a demand management activity, there must be noticeable difference in the pricing rates of each block to incentivize efficiency water use.

Tap rate fees may also be used as a means to reduce water usage for new development. Various incentives could be attached to the tap fee to encourage efficient water use. For instance, new homes outfitted with water efficient fixtures and appliances could receive a discount on their tap fee.

System Loss Management and Control - Leaks in water distribution systems can reduce the system's effectiveness and impact overall profitability. Effective leak detection and repair is critical to a provider's overall water resource management program. However, in

[3] C.R.S.37-60-126 (4) Requirement: Water rate structures designed to encourage water efficiency in a fiscally responsible manner must be fully evaluated

Colorado some small utilites and water companies have reported losses as high as 50%. These losses are a combination of apparent and real losses (non-revenue water).

C.R.S. 37-60-126 (4)[4] requires providers to fully evaluate leak detection and repair for implementation. As general maintenance protocol, providers should have a reliable leak repair program. System-wide audits assess real and apparent losses thus defining how much loss is from physical leaks, rather than metering inaccuracies or data errors.

Data Tracking – While metering and data collection may not directly result in water savings, it makes sense from a practical business perspective to initially invest in a means to track water usage and identify areas where water efficiency can be improved. These areas can then be targeted with other demand management activities.

The majority of Colorado's municipal water supply systems are now metered. However, meter testing as well as meter upgrades can be an important component to managing water use. Large multi-family units and raw water systems (non-treated water for irrigation purposes) are often not metered and are an area for improvement. Additionally, metering not only provides information on customer usage, but is essential for measuring non-revenue water. Data to be tracked includes total annual and monthly production, total annual and monthly retail sales, monthly tabulation of number of connections and/or customer accounts, annual and monthly water use by customer and customer type, monthly non-revenue water use by utility. All of this information will support analysis for targeted programs.

Targeted Technical Assistance and Incentives – A collection of activities that rely on indoor water efficient technologies and water-wise outdoor practices. These activities may be implemented on three levels based on the following type of targeted customers: 1) utility/municipality facility water efficiency; 2) customers with the largest water use; and 3) management of remaining customer demands.

Ordinances and Regulations - A series of ordinances and regulations that promote or enforce water efficiency. Similar to the Targeted Technical Assistance and Incentives, Ordinances and Regulations may be implemented on three levels based for the following targeted groups: 1) existing service area; 2) ordinances for new construction; and 3) ordinances for point of sale of existing building stock.

Educational Activities - Variety of techniques and venues to convey water efficiency information to the public. These activities may be comprised of: Level 1, one-way education; Level 2, one-way education with feedback; or Level 3, two-way education. Stakeholder steering committees where information from the public is used directly for implementation of water efficiency activities is an example of the Level 3, two-way education.

Table 2-4 displays the breakdown of individual components as described in SWSI's Appendix K SWSI Conservation Levels for each entity.

[4] C.R.S 37-60-126(4) Requirement: Distribution system leak identification and repair must be fully evaluated .

Table 2-4. Active Conservation Framework per Entity

Covered Entity	Basin	Foundational			Ongoing Water Program Level (1, 2, 3, or none)	Ordinances & Regulatory Level (1, 2, 3, or none)	Education Program Level (1, 2, 3, or none)
		Rates	Leak Detection	Tracking			
Arapahoe County Water & Wastewater	Metro	X	X				2
City of Arvada	Metro	X					
City of Aurora	Metro	X	X			1	2
City of Boulder	Metro	X					3
City of Brighton	Metro	X	X			1	1
Castle Pines Metropolitan District[2]	Metro	X					3
Castle Pines North Metropolitan District[2]	Metro	X	X				3
Town of Castle Rock	Metro	X				2	3
Centennial Water and Sanitation District	Metro	X	X			1	2
Central Weld County Water District[1]	South Platte	X					
Commerce City[1]	Metro	X					
Consolidated Mutual Water Company	Metro	X					
City of Dacono[2]	South Platte	X					
Denver Water	Metro	X				2	2
Douglas County Regional Plan	Metro	X					
East Larimer County Water District	South Platte	X	X			2	1
Town of Eaton	South Platte	X					
City of Englewood	Metro	X					
Town of Erie	South Platte	X				1	2
Town of Estes Park	South Platte	X					
City of Evans	South Platte	X				2	2
Town of Firestone[2]	South Platte	X	X				2
City of Fort Collins	South Platte	X					
Fort Collins-Loveland Water District	South Platte	X				1	2
City of Fort Lupton	Metro	X	X				2
City of Fort Morgan	South Platte	X	X			2	1
Town of Frederick	South Platte	X					
City of Golden[1]	Metro	X					
City of Greeley	South Platte	X				2	3
City of Lafayette	Metro	X					
Left Hand Water District	South Platte	X	X			2	2
Little Thompson Water District	South Platte	X					
City of Longmont	South Platte	X				2	2
City of Louisville[1]	Metro	X					
City of Loveland	South Platte	X					
Meridian Metropolitan District[2]	Metro	X					
Morgan County Quality Water District[1]	South Platte	X					
North Table Mountain WSD	Metro	X	X			2	2
North Weld County Water District	South Platte	X					2
City of Northglenn	Metro	X				1	3
Parker Water and Sanitation District	Metro	X	X			3	2
Pinery Water and Wastewater District	Metro	X					
City of Sterling	South Platte	X					
Town of Superior[2]	Metro	X					
South Adams County Water & Sanitation District	South Platte	X					
City of Thornton	Metro	X					
City of Westminster	Metro	X					
Town of Windsor	South Platte	X	X			2	2

Source: Table A-1; Appendix K SWSI Conservation Levels. June 2010. CWCB Approved Conservation Plan List, Individual Approved Water Conservation Plans (2006-2013)

[1] Covered entity (provides 2,000 AF or more) without Conservation Plan on file with the CWCB

[2] Not a covered entity

Note: Highlighted fields (Tracking & Ongoing Water Program) to be confirmed with entities through IPP data sheets

3 Existing IPPs

Although there has been a high percentage of Approved Water Conservation Plans in the South Platte basin, there are just six IPPs included in the Basin Needs Decision Support System (BNDSS) IPP list.

Table 3-1. Existing Conservation IPPs

Provider	Basin	Year Updated	BNDSS Yield (Acre-Feet)
City of Greeley	South Platte	2008	3000
City of Longmont	South Platte	2008	3500
Town of Castle Rock	Metro	2006	1025
Centennial Water and Sanitation District	Metro	2007	1764
City of Northglenn	Metro	2007	600
City of Thornton	Metro	2009	3500

Source: BNDSS IPP ID 2013_04_04 As part of Basin Implementation Plan Data Package; December 2013.
Note: Highlighted fields maybe updated with information from provider IPP data sheets.

Many of the existing approved Water Conservation Plans will soon be scheduled for review and revision. Evaluation of value and cost/benefit analysis may provide changes to existing goals and programs. With those changes, updated projections and estimates will affect the M&I gap analysis.

4 Opportunities

Per the *No/Low Regrets Action Plan*, conservation efforts should contribute to meeting the projected 2050 M&I supply gap while preventing substantial changes to quality of life, minimizing agricultural dry-up, and maintaining important environmental and recreational values. The portfolios developed by the Interbasin Compact Committee (IBCC) and Basin Roundtables indicated a desire to at least reach low to medium conservation levels statewide, regardless of what future demand scenario may arise. However, when it came to the amount of conserved water that could be applied to the projected 2050 water supply gap, the portfolios reflected a wide range of possibilities—0 percent to 60 percent.

Reference Documents

The following discussion is extracted from No/Low Regrets Action Plan, September 2013 Draft – Section 3 – Establish Low/Medium Conservation Strategies

The CWCB defines water conservation as those methods and programs that enable measurable and verifiable permanent water savings. The conservation strategy outlined in the SWSI seeks to periodically update the range of potential future water conservation savings to meet a projected 2050 M&I water supply gap. While trajectories of water providers' conservation savings may currently appear on the path to achieve the medium conservation levels described in SWSI 2010, without active support, medium levels will most likely not be achieved.

Table 4-1 details the potential actions for improved conservation to help make conservation savings a more reliable part of the solution to meeting Colorado's future water needs.

Table 4-1. Opportunities for Conservation Action

Potential Future Actions
1) Improve Tracking and Quantification of Conservation a. Implement HB 1051 b. Develop Basin Implementation Plans (BIPs)
2) Establish a Statewide Conservation Goal with Intermittent Benchmarks a. Develop general political support for a statewide conservation goal b. Develop statewide agreement tying conservation to new supply development and agricultural transfers c. Support local entities in their efforts to outline and report their own approaches to help achieve the statewide goal. d. Explore best approach to implementation of standards to achieve goal e. Develop and implement conservation standards
3) Continue to Support Local Implementation of Best Practices a. Continue implementation of state conservation programs b. Encourage use of levels framework and best practices guidebook
4) Promote Enabling Conditions for Use of Conserved Water a. Maintain and develop storage and infrastructure for the use of conserved water b. Promote incentives for the use of conserved water c. Identify and, where possible, resolve legal and administrative barriers to the use of conserved water d. Identify and explore barriers to sharing conserved water
5) Develop New Incentives for Conservation a. Explore funding options in support of the Water Efficiency Grant Program b. Develop professional education and certification programs c. Develop new eligibility requirements for state grants and loans that include certain conservation levels or indications of commitment to conservation d. Develop conservation standards for communities planning to use agricultural transfers or new supplies for future water needs e. Develop incentives that incorporate the following concepts f. Support and encourage land use practices that help reduce water consumption, focusing as much as possible on incentives
6) Explore Legislative Concepts and Develop Support a. Explore legislative options and support for indoor plumbing code standards b. Explore legislative options and support for outdoor water efficiency standards c. Engage in outreach and education efforts to explain the need for legislation; develop political support
7) Implement Education and Outreach Efforts a. Track public attitudes through baseline and ongoing surveys b. Develop statewide messaging and use focus groups to refine and guide implementation c. Develop decision-maker outreach strategies d. Pursue a coordinated media campaign

Source: No/Low Regrets Action Plan proposed by the Interbasin Compact Committee (IBCC) for CWCB on September 13, 2013

Per the Metro Roundtable Conservation Strategy, Water providers will continue to take an active role in continued water savings. Recommended measures include:

Reference Documents

The following discussion is extracted from "DRAFT Updated Metro Roundtable Conservation Strategy"– November 14, 2011.

- Continue educational, marketing and advertising programs to ensure recent savings become permanent;
- Pursue statewide legislation to require only high-efficient indoor water fixtures can be sold ;
- Provide audits and incentives to residential, commercial, industrial, and institutional customers to replace inefficient fixture and improve processes;
- Provide targeted audits for inefficient use, both indoors and out;
- Capitalize on and assist customers' willingness to change landscapes;
- Prepare financially for the future investment by water utilities and their customers to maintain distribution systems and hold water loss rates down as much as practically possible;
- Continually monitor and evaluate conservation programs and pursue new conservation opportunities.

Ultimately, the success in achieving higher levels of conservation will rest on improving technology of water using fixtures and landscapes; the political will to encourage greater efficiency in water use through codes and regulations; and seizing new opportunities to save water as they emerge leveraging partnerships between water utilities, state and local officials, NGOs and our citizenry.

The above opportunities for conservation measures and actions will be included to each Conservation Plan in varying degrees. While the measures introduced by the Metro Roundtable have been recommended for Metro entities, they may not all applicable in all situations. The South Platte Roundtable similarly has an opportunity to adopt and recommend measures for its entities. The variance in conservation measures should reflect the variance in foundational activities (system loss management and control, data tracking, & water rates and tap fees) for each Conservation Plan. In situations where population density and water use (outdoor, industry, water loss) differ greatly from Metro to South Platte, one should expect to see differences in their goals and measureable outcomes.

Per the discussions held on July 24, 2013 at the East Slope Roundtables Joint Meeting the following Conservation Recommendations received an approval (agree or strongly agree) of greater than 75%:

- The selling of only high efficiency plumbing fixtures and appliances in Colorado (78%)
- High efficiency standards in new residential and commercial development for plumbing fixtures, appliances, and landscaping (95%)
- Coordination of urban land planning and water supply planning (92%)

Coordination of urban land planning and water supply planning was voted as the most important topic for further discussion.

The following next steps were proposed:

- Educate the Colorado Municipal League (CML) and Colorado Counties, Inc. (CCI) about the nexus between land use planning and water planning. The CML has an annual convention which might be a good opportunity to give a presentation on land use planning and water planning. CWCB would be the appropriate body to give this presentation.
- Reintroduce low flow toilet legislation.
- Identify exactly where the water supply gap really exists. Is it at the large municipality level or instead in the aggregate of smaller districts?
- Expand threshold requirements for conservation plans to include providers who divert less than 2,000 acre-feet (af) per year. Alternatively, requirements for conservation plans could take into account a provider's potential for growth in ten years.
- Utilize incentives, not mandates, when implementing high efficiency standards for home resale.
- Standardize criteria for water supply planning in comprehensive plans using best management practices, not metrics.

5 Metro Roundtable Conservation Recommendations

Given the objectives and programs discussed above, it is necessary to establish specific goals and measurable outcomes with respect to conservation. Outlined below are the conservation goals decided upon by the Metro Roundtable for 2050.

5.1 Residential Indoor Use

The low, medium and high strategies from the 2010 SWSI report are shown in Table 5-1, 5-3, 5-5, and 5-6 below.

Table 5-1. Residential Indoor Use Strategies

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	43.7	40	35	30
Reduction		8%	20%	31%

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

According to the SWSI 2010 reports, 100,000 acre feet could be saved through indoor use from residential and non-residential customers. The estimates suggest that indoor residential use could be driven down to nearly 30 gpcd (the high scenario) through the passive replacement of water fixtures. This is an aggressive projection that will likely need active participation among water providers to be successful.

To illustrate this point, the assumption in the passive savings report is that in 2050 the average flush volume of toilets will be 1.0 gallons per flush (gpf). In 2005 Denver studied its residential customer's use and found that the average flush volume was 3.14 gpf. There are very few 1.0 gpf toilets in the residential sector right now, and they are not yet widely available at "big box" retailers. This means that a high percentage of toilets would have to be replaced with 1.0 gpf toilets within 40 years. With a replacement rate of 1-4 percent per year, new regulations would have to be put into place within the next five years to reach the projected flush volume.

Currently the Metro basin is among the lowest in indoor residential use at 44 gpcd; the statewide average is 51 gpcd. Given the aggressive projections of passive savings and the need to enact regulations quickly in order to meet the high strategy, a more realistic goal is the medium strategy. This will still require water providers to actively pursue new ordinances or legislation.

Table 5-2. Residential Indoor Use – Medium Strategy 20 to 25% Savings

Measure	Baseline 2010	2050	Reduction
Gpcd	43.7	34.0	9.7
Total AF	202,850	157,824	45,026
Reduction			**22%**

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

5.2 Non-Residential Indoor Use

Table 5-3. Non-Residential Indoor Use Strategies

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	37.5	31.9	28.1	26.3
Reduction		15%	25%	30%

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

There may be fewer opportunities to save water in non-residential indoor use. As the Metro area continues to grow its economy, water needs will grow as well. The non-residential

customer base is a diverse group of customers that have had varying degrees of success reducing water use. Less is known about this group of customers, as the last Water Research Foundation study was done in the early 1990s.

Many Metro water providers offer programs to improve efficiency in commercial, industrial and institutional water uses. In our experience, increasing business productivity and economic growth can mask achieved efficiencies. As an example, Denver Water's industrial class of customers has reduced their use by only 2 percent since 2000, while the residential class has reduced their use by more than 20 percent. Denver Water has entered into several contracts with industrial customers to improve efficiency. The results have shown the companies using water more efficiently and productively, but corresponding increases in production have diminished the total water savings.

Economic growth will continue to be promoted and water use will increase to meet those growing needs. Efficiencies will be gained through replacing bathroom fixtures, changing industrial processes and reducing cycle concentrations on cooling towers. Water providers can offer a variety of programs from audits, education and incentives. Additionally, rules for new developments are being implemented in more and more Metro communities.

Table 5-4. Non-Residential Indoor Use – Low Strategy 15 to 20% Savings

Measure	Baseline 2010	2050	Reduction
Gpcd	37.5	31.9	5.6
Total AF	174,070	147,960	26,111
Reduction			**15%**

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

5.3 Outdoor Use

Table 5-5. Outdoor Use Strategies

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	62.8	53.5	48.0	43.3
Reduction		15%	24%	31%

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

Outdoor use has changed dramatically over the last ten years. The 2002-2004 drought gave a new appreciation for outdoor water use. Many customers have lowered their water use to at or below efficient levels for bluegrass. The Metro area is seeing more and more conversions from bluegrass to low water using landscapes.

There are still opportunities to save water by targeting inefficient users and capitalizing on a willingness to change landscapes. Approximately 20 percent of Denver Water customers use more than 18 gallons per square foot, which is the efficient level of watering bluegrass in our climate. The average use in the Denver Water service area, however, is approximately 16 gallons per square foot. This means that some customers are deficit irrigating and others have converted their landscapes to need less water.

There is some risk of losing outdoor savings. Many Metro providers have seen a sharp decline in outdoor use in the past three years, particularly in the residential sector. Some of this could be due to the economic decline and, as the economy recovers, water use could rebound as homeowners recover lawns and landscapes.

Table 5-6. Outdoor Use – Low Strategy 15% Savings

Measure	Baseline 2010	2050	Reduction
Gpcd	62.8	53.5	9.3
Total AF	291,510	28,340	43,169
Reduction			**15%**

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

5.4 Water Loss

In the next 40 years, water providers will incur great costs to repair and maintain the water infrastructure that currently provides reliable tap water to their customers. The vast majority of water infrastructure in the Metro basin has been built since the 1950s and no water provider has been faced with large replacement and upgrade needs to this point; however as water infrastructure ages, it is likely to require increasingly large repair and maintenance costs.

In addition, water distribution leaks and other water loss (both real and apparent) are expected to increase if proper best management practices are not implemented. Currently, system water loss for water providers in the Metro Basin ranges from 3 to 15%, averaging about 10%.

Any goal to improve water loss, given what water providers are facing in maintenance costs will involve better management practices, system wide water audits and other third party water accounting reviews. Currently, few water providers utilize these practices; however, it is unlikely that overall system wide water loss management can reduce losses to less than 7% on average based on the current state of the industry based on joint-industry research. The goal presented below assumes a reduction in the baseline water loss of 10.9% to 8.5 % (or potential demand reduction of 11,140 AF).

Table 5-7. Water Loss Savings

Measure	Baseline 2010	2050	Reduction
Gpcd	10.9	9.4	1.5
Total AF	50,596	43,634	6,963
Reduction			**14%**

Source: Updated Metro Roundtable Conservation Strategy – 11-14-11

6 South Platte Roundtable Conservation Recommendation

Following are the low, medium, and high 2050 strategies from SWSI 2010. These tables offer ranges and may be further determined as an appropriate estimate by the South Platte Basin Roundtable.

6.1 Residential Indoor Use

Table 6-1. Residential Indoor Use Strategies

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	60.1	40	35	30
Reduction		8%	20%	31%

Source: SWSI 2010 Appendix L – Municipal and Industrial Water Conservation Strategies

6.2 Non-Residential Indoor Use

Table 6-2. Non-Residential Indoor Use Strategies

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	39.2	33.4	29.4	27.5
Reduction		15%	25%	30%

Source: SWSI 2010 Appendix L – Municipal and Industrial Water Conservation Strategies

6.3 Outdoor Use

Table 6-3. Outdoor Use Strategies

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	73.7	53.5	48.0	43.3
Reduction		15%	24%	31%

Source: SWSI 2010 Appendix L – Municipal and Industrial Water Conservation Strategies

6.4 Water Loss

Table 6-4. Water Loss

Measure	Baseline 2010	2050		
		Low	Medium	High
Use (gpcd)	15.0	10.2	7.7	7.0
Reduction		7%	6%	6%

Source: SWSI 2010 Appendix L – Municipal and Industrial Water Conservation Strategies

7 East Slope Conservation Recommendations

Front Range water providers are national leaders in conservation and are committed to aggressively increasing efficiencies in the future. Utilities encourage conservation through water rate designs, education, watering schedules, and rebate programs, as well as water waste rules. Enacting ordinances and legislation to require more efficient plumbing fixtures, appliances and landscaping — the next major steps in water conservation —requires unity in political will beyond the authority of water providers. The recently unsuccessful attempts to propose legislation to require the sale of more efficient toilets typifies the need for political will to gain higher levels of efficiencies and the difficulty in accomplishing this.

Reference Documents

The following discussion is extracted from "DRAFT Filling the East Slope Municipal Water Supply Gap – A Joint Statement of the South Platte, Arkansas, and Metro Roundtables" July 23, 2013

Increasing residential density has the potential to significantly increase water use efficiency and will continue to result in a lower impact on natural resources. The highly urbanized areas of the Front Range corridor have many opportunities to redevelop lands for greater job and population densities. This will take broad political support to achieve.

Conservation by existing customers may in some case reduce stream flow available for downstream agricultural use; however it might be mitigated by less diversions of water. We will explore this connection in our basin implementation plans, report on the effects, and offer recommendations to lessen impacts consistent with achieving enhanced levels of municipal conservation.

The recommendations provided in the Joint Statement of the South Platte, Arkansas, and Metro Roundtables are to reach enhanced levels of conservations, municipal providers need political and legislative support for:

1. The selling of only high efficiency plumbing fixtures and appliances in Colorado.
2. High efficiency standards in new residential and commercial development for plumping fixtures, appliances, and landscaping.
3. High efficiency standards for the resale of residences for plumbing fixtures and irrigation system audits.
4. Coordination of urban land planning and water supply planning.

8 Conclusions

This memorandum reviews existing M&I conservation programs, methods, and regulatory requirements in relation to existing IPPs. Potential opportunities or methods for expansion of M&I conservation practices are discussed.

The South Platte and Metro Roundtables have performed significant analysis and planning to improve conservation efforts in their respective basins. This work has been guided by Colorado Water Conservation Board's (CWCB) nine-step conservation planning processes. Following the steps detailed, 45 South Platte and Metro entities have approved plans. Each plan includes components for information gathering, establishing goals, measures, and programs, and finally monitoring, evaluation, and revision activities.

There are six existing Conservation IPPs within the South Platte Basin as of January 23, 2014; City of Greeley, City of Longmont, Town of Castle Rock, Centennial Water and Sanitation District, City of Northglenn, and the City of Thornton. These combine to provide a yield of 13,389 AF. These six conservation IPPs represent active conservation methods. Passive conservation is factored into M&I demand forecasts but is not shown as a unique IPP.

Recommendations per the Updated Metro Roundtable Conservation Strategy (November 2011) provide a total use savings of 597,758 AF based on a 2050 medium population and water demand reductions associated with active and passive water conservation. This estimate includes a 22% savings in residential indoor use (45,026 AF), 15% savings in non-residential use (26,111 AF), 15% savings in outdoor use (43,169 AF), 14% savings in water loss (6,963 AF).

The South Platte Roundtable has an opportunity to adopt and recommend measurable outcomes for conservation. Recommendations specific to the South Platte Roundtable have yet to be detailed, however savings estimates per low, medium, and high conservation strategies are stated.

Per Filling the East Slope Municipal Water Supply Gap from July 2013, the east slope roundtables support encouraging political will for raising efficiency standards as well as improved coordination between urban land planning and water supply planning.

Based upon HDR's analysis of the existing information and the schedule for the Basin Implementation Plan, no modifications are made herein to previously developed estimates of conservation program reductions to the M&I supply shortage. To the extent that new information is received from South Platte/Metro providers regarding conservation IPPs, the M&I water supply gap will be updated within the draft Basin Implementation Plan.

9 References

AMEC 2011.Municipal Water Efficiency Plan Guidance Document.

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CWCB 2011. Colorado's Water Supply Future, SWSI 2010 Appendix L – Municipal and Industrial Water Conservation Strategies, January 2011, Aquacraft Inc & Headwaters Corporation

IBCC 2013. No/Low Regrets Action Plan (September 2013)

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