

AGENDA

Denver Board of Water Commissioners

Denver Water Administration Building
1600 West 12th Avenue
Denver, CO
Board Room, Third Floor

Wednesday, November 7, 2018 9:00 a.m.

I. INTRODUCTORY BUSINESS

A. Call to Order and Determination of Quorum

B. Public Comment and Communications

At this point in the agenda, the Board may allow members of the public to address the Board on any item of interest within the jurisdiction of the Board, and not on the agenda for action. Speakers wishing to address a specific Action Item will be invited to address the Board when the item is being considered. Three minutes are allowed for each person unless the President determines otherwise.

1. Distributor Communications
2. Citizen Advisory Committee Communications

C. Ceremonies, Awards and Introductions

II. ACTION ITEMS

A. Consent Items

Items listed below are considered routine and may be enacted by one motion and vote. If any Board member desires discussion beyond explanatory questions, or corrections to the Minutes, the President may order that item to be considered in a separate motion and vote.

1. Minutes from October 10, 2018 - Open and Executive
2. Minutes from October 24, 2018 - Open and Executive
3. First Amendment to Denver Water Uniform Program - Contract 16104A/501061
4. Shared Funding Agreement 2018 Macroinvertebrate Monitoring – Contract 503697
5. Shared Funding Agreement 2018 Temperature monitoring – Contract 503698
6. Shared Funding Agreement 2018 Habitat Monitoring – Contract 503699

7. Interagency Agreement with Denver Parks - Central Control Build-Out - Contract 503591
8. 64th Ave Pump Station Modifications Contract 503064
9. Ninth Amendment to Contract 500861 (formerly 14978A) for Conduit 16 Replacement and Conduit 22 Abandonment
10. Surplus Property Declaration of Leetsdale Pump Station and Conduit 5 Property at S. Quebec Way
11. Intergovernmental Agreement with Jefferson County for Northwater Treatment Plant Contract 503692

B. Individual Approval Items

- | | | |
|--|-----------|-----------|
| 1. First Amendment to the Colorado River Cooperative Agreement 500705 and Agreement Regarding Use of Clinton Reservoir Dead Pool Storage – Contract 503671 | Mike King | 5 minutes |
|--|-----------|-----------|

III. POLICY MATTERS

- | | | |
|--------------------------------------|------------------|------------|
| A. System Development Charges | Fletcher Davis | 30 minutes |
| B. Urban Density | Jeannine Shaw | 60 minutes |
| C. Supplier Diversity | Aleah Menefee | 30 minutes |
| D. National Western Update | Abbey Antolovich | 20 minutes |

IV. EXECUTIVE UPDATE

- A. CEO Update**
- B. CFO Update**
- C. Operations Update**

V. BRIEFING PAPERS & REPORTS

A. Briefing Paper

1. Emergency Operations Plan
2. Growth, Density and Water Use

B. Report

VI. ADJOURNMENT

VII. TRUSTEE MATTERS

VIII. EXECUTIVE SESSION

The Board may adjourn the regular meeting and reconvene in executive session on topics authorized by C.R.S. Sec. 24-6-402 or D.R.M.C Sec. 2-34.

A. Confidential Report § 24-6-402(4)

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-3

First Amendment to Denver Water Uniform Program Contract 16104A / 501061

Action by Consent

Individual Action

Purpose and Background:

Denver Water has contracted with Servicewear Apparel, Inc. to provide consistently branded apparel (uniforms) for Denver Water employees. Standard uniforms help identify Denver Water's employees when interacting with the public, suppliers, contractors and others they encounter. Ordering from an established list of products also ensures appropriate gear is ordered for safety-specific applications (e.g. electrical arc-flash). This contract is set to expire on November 30, 2018.

In addition, certain field employees are provided an annual allowance to purchase safety boots and shoes for foot protection. Denver Water has a contract for safety boots and shoes with Intermountain Safety Shoe Store, which is set to expire December 31, 2018. Denver Water staff investigated the possibility of adding safety boots to the Servicewear contract in order to streamline ordering, reimbursement and allow greater employee flexibility as to how funds are spent. For example, in some years, an employee may need two pairs of boots due to working conditions and not as much apparel. For employees in remote locations, there will be an advantage of having boots shipped directly to their residence by Servicewear.

Denver Water is requesting this First Amendment to Servicewear Apparel, Inc. for additional scope (safety boots), time (two years) and funds (\$575,000).

Budget and Schedule:

Uniforms are currently budgeted, by division, in the category of Materials and Supplies. Safety shoes are budgeted within the Safety Section and the process for approving invoices and employee reimbursement is manual.

The total amount of the existing contract with Servicewear is \$735,000. This proposed First Amendment of \$575,000 would bring the total contract to \$1,310,000. Funds for this contract will come from the 2019-2020 budgets, which, if approved by the Board, will have sufficient funds to purchase both safety boots and uniforms. If the Board approves this First Amendment with Servicewear, funds that have been historically budgeted by Safety for safety boots will be transferred to division budgets for oversight and management.

Selection of Business Partner:

In July 2015, Denver Water issued a Request for Proposals (RFP) for administration of Denver Water's uniform program. This RFP was posted on the Denver Water website and the Rocky Mountain E-purchasing System. Denver Water also notified the Small Business Enterprise (SBE)/ Minority Women Business Enterprise (MWBE) trade organizations. Six vendors responded to the RFP: two were MWBE, three were SBE. Servicewear is neither an MWBE or SBE. Vendor selection criteria included price, service level (including website and online ordering capability), understanding of work, vendor's uniform program and vendor's experience.

Recommendation:

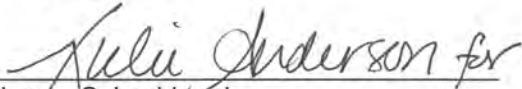
It is recommended that the Board approve the First Amendment to Contract 16104A / 501061 with Servicewear Apparel, Inc., adding safety boots to the scope of provided goods, extending the contract period through December 31, 2020 and adding \$575,000 for a total amended contract amount not to exceed \$1,310,000.

Approvals:

for 
Gail Cagle
Chief of Human Resources


Angela Bricmont
Chief Finance Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-4

Shared Funding Agreement for 2018 Macroinvertebrate Monitoring Contract 503697

Action by Consent

Individual Action

Purpose and Background:

The Grand County Learning By Doing cooperative effort ("LBD") is a unique partnership of East and West Slope water stakeholders in Colorado. The cooperative effort was formed by two Intergovernmental Agreements (IGAs) that establish long-term partnership and cooperation, not conflict, as the preferred approach to managing aquatic resources in Grand County. LBD's projects and monitoring efforts are successfully underway even though Denver Water's obligations do not become effective until acceptance of all permits for Denver Water's Gross Reservoir Expansion Project per the Colorado River Cooperative Agreement (CRCA).

As required in the IGAs, LBD prepared an Aquatic Resource Monitoring Plan for 2018. The plan was developed consistently with the existing Grand County Stream Management Plan. The overall goal of the plan is to detect changes in the aquatic environment over time through field sampling methods. Three shared-funding agreements were developed to cost-share the 2018 monitoring costs among the LBD parties. In addition to Denver Water, LBD parties to the funding agreements include the Board of County Commissioners of the County of Grand (Grand County), Northern Colorado Water Conservancy District (Northern Water), Colorado River Water Conservation District (River District) and the Colorado River Headwaters Chapter of Colorado Trout Unlimited ("TU").

Northern Water entered into a professional services contract with Timberline Aquatics, Inc. for the 2018 macroinvertebrate monitoring and sharing of data. The shared-funding agreement outlines the cost-share among the LBD parties and instructs Denver Water to pay Northern Water its share of the cost. The total cost of the 2018 macroinvertebrate monitoring is \$13,431.40. Of this, Denver Water's contribution totals \$3,264.00.


Budget and Schedule:

The total amount of Denver Water's contribution in this contract is \$3,264.00, and the term of the contract is November 17, 2018 to June 30, 2019. Funds for this contract will come from the 2019 budget for Environmental Planning which has enough funds.

Recommendation:

It is recommended that the Board approve Contract 503697 to cost-share the 2018 macroinvertebrate monitoring for a total contract amount not to exceed \$3,264.00.

Approvals:




Mike King
Chief External Affairs Officer



Angela Brimont
Chief Finance Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-5

Shared Funding Agreement for 2018 Stream Temperature Monitoring Contract 503698

Action by Consent

Individual Action

Purpose and Background:

The Grand County Learning By Doing cooperative effort ("LBD") is a unique partnership of East and West Slope water stakeholders in Colorado. The cooperative effort was formed by two Intergovernmental Agreements (IGAs) that establish long-term partnership and cooperation, not conflict, as the preferred approach to managing aquatic resources in Grand County. LBD's projects and monitoring efforts are successfully underway even though Denver Water's obligations do not become effective until acceptance of all permits for Denver Water's Gross Reservoir Expansion Project per the Colorado River Cooperative Agreement (CRCA).

As required in the IGAs, LBD prepared an Aquatic Resource Monitoring Plan for 2018. The plan was developed consistently with the existing Grand County Stream Management Plan. The overall goal of the plan is to detect changes in the aquatic environment over time through field-sampling methods. Three shared-funding Agreements were developed to cost-share the 2018 monitoring costs among the LBD parties. In addition to Denver Water, LBD parties to the funding agreements include the Board of County Commissioners of the County of Grand (Grand County), Northern Colorado Water Conservancy District (Northern Water), Colorado River Water Conservation District (River District), and the Colorado River Headwaters Chapter of Colorado Trout Unlimited (TU).

Grand County entered into a professional services contract with Grand County Water Information Network (GCWIN) for the 2018 stream temperature monitoring and sharing of data. The shared-funding agreement outlines the cost-share among the LBD parties for the monitoring and sharing of data and instructs Denver Water to pay Grand County its share of the cost. The total cost is \$4,240.00. Of this, Denver Water's contribution totals \$1,145.00.

Budget and Schedule:

The total amount of Denver Water's contribution in this contract is \$1,145.00, and the term of the contract is November 17, 2018 to December 31, 2018. Funds for this contract will come from the 2019 budget for Environmental Planning which has enough funds.

Recommendation:

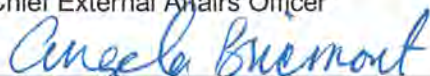
It is recommended that the Board approve Contract 503698 to cost-share the 2018 stream-temperature monitoring for a total contract amount not to exceed \$1,145.00.

Approvals:

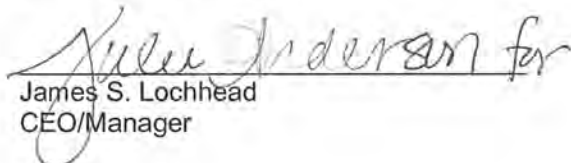
Respectfully submitted,



Mike King
Chief External Affairs Officer



Angela Bucmont
Chief Finance Officer



James S. Lochhead
CEO/Manager

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-6

Shared Funding Agreement for 2018 Stream Habitat Monitoring Contract 503699

Action by Consent

Individual Action

Purpose and Background:

The Grand County Learning By Doing cooperative effort ("LBD") is a unique partnership of East and West Slope water stakeholders in Colorado. The cooperative effort was formed by two Intergovernmental Agreements (IGAs) that establish long-term partnership and cooperation, not conflict, as the preferred approach to managing aquatic resources in Grand County. LBD's projects and monitoring efforts are successfully underway even though Denver Water's obligations do not become effective until acceptance of all permits for Denver Water's Gross Reservoir Expansion Project per the Colorado River Cooperative Agreement (CRCA).

As required in the IGAs, LBD prepared an Aquatic Resource Monitoring Plan for 2018. The plan was developed consistently with the existing Grand County Stream Management Plan. The overall goal of the plan is to detect changes in the aquatic environment over time through field-sampling methods. Three shared funding agreements were developed to cost-share the 2018 monitoring costs among the LBD parties. In addition to Denver Water, LBD parties to the funding agreements include the Board of County Commissioners of the County of Grand (Grand County), Northern Colorado Water Conservancy District (Northern Water), Colorado River Water Conservation District (River District) and the Colorado River Headwaters Chapter of Colorado Trout Unlimited (TU).

Grand County entered into a professional services contract with Tetra Tech, Inc. and the shared funding agreement outlines the cost-share among the LBD parties for the monitoring and sharing of data. The shared funding agreement instructs Denver Water to pay Grand County its share of the cost. The total cost of the 2018 stream habitat monitoring is \$25,396.00. Of this, Denver Water's contribution totals \$6,727.00.

Budget and Schedule:

The total amount of Denver Water's contribution in this contract is \$6,727.00, and the term of the contract is November 17, 2018 to February 22, 2019. Funds for this contract will come from the 2019 budget for Environmental Planning which has enough funds.

Recommendation:

It is recommended that the Board approve Contract 503699 to cost-share the 2018 stream habitat monitoring for a total contract amount not to exceed \$6,727.00.

Approvals:



Mike King
Chief External Affairs Officer



Angela Brimont
Chief Finance Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager

Denver Water aspires to be the best water utility in the nation.

Integrity :: Vision :: Passion :: Excellence :: Respect



DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-7

Intergovernmental Agreement with Denver Parks and Recreation for Central Control Build-Out Contract 503591

Action by Consent

Individual Action

Purpose and Background:

The Water Efficiency Plan (WEP) incorporates multiple programs such as rebates for water-efficient fixtures, water efficiency audits, and partnerships with large water users to implement water-saving projects. These programs can be adjusted as needed to meet overall WEP goals without budget impacts.

Denver Water (Board) and Denver Parks and Recreation (Parks) have a history of collaboration to implement mutually beneficial water efficiency projects. The Board and Parks developed an intergovernmental agreement (IGA) to support the implementation of water efficiency projects. One project focused on converting parks from standard irrigation controls to a central control system. This project was included in the WEP, defined as 'Denver Parks IGA.' These conversions required installation of sensors, clocks and valves that can be remotely operated to maximize water efficiency and detect leaks. This work resulted in 126 acre-feet (AF) of annual water savings, which was three times greater than projected. The Board and Parks shared installation costs and the total implementation cost to the Board was \$3,000/AF, approximately 70% lower than original projections.

Parks has requested funding for additional conversions to central control in 2019:

- \$160,000 self-funded
- \$120,000 from Colorado Water Conservation Board (CWCB)
- \$120,000 from Denver Water

These conversions are projected to save 40 AF of water annually with an associated implementation cost to the Board of \$2,900/AF. Additionally, the Board will continue working with Parks to develop a long-term water management and funding strategy in 2019.

Budget and Schedule:

The total amount of this contract is \$120,000 and the term is November 2018 through December 2019. Funds for this contract are included in the 2019 WEP budget. The budget for rebates will be reduced by \$120,000 and those funds will be transferred to Denver Parks IGA to accommodate this funding request. Therefore, there will be no net impact to the 2019 WEP budget. The implementation cost in dollars per acre foot of the additional central control conversions is expected to be 10-20% lower than the implementation cost of rebates.

Recommendation:

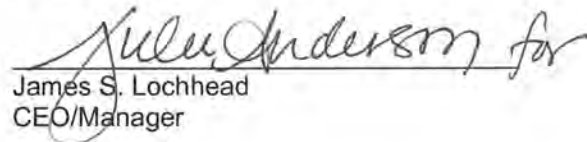
It is recommended to approve contract 503591 for \$120,000.

Approvals:


Respectfully submitted,



Mike King
Chief External Affairs Officer



James S. Lochhead
CEO/Manager



Angela Bricmont
Chief Finance Officer

Denver Water aspires to be the best water utility in the nation.

Integrity :: Vision :: Passion :: Excellence :: Respect



DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-8

64th Avenue Pump Station Modifications Contract 503064

Action by Consent

Individual Action

Purpose and Background:

The 64th Avenue Pump Station and Decentralization Station has been in use since it was constructed in 1994 to provide water to Green Valley Ranch from Conduit No. 93 and to DIA from Conduit No. 143 and Conduit No. 144. Currently, there is one pump feeding Conduit No. 93 with the capacity of 10 million gallons per day (MGD) and two pumps feeding Conduit No. 143 and Conduit No. 144 with a total capacity of 15 MGD. This project was initiated to add a second, redundant pump connected to Conduit No. 93 to delay the need for construction of the Smith Road Booster Pump Station and to provide for the added demand from the new homes and businesses being built in the Green Valley Ranch area.

This contract is to procure and install the necessary pump and motor in the 64th Avenue Pump Station. In addition, the motor controllers and pump station control system were fabricated by a manufacturer that is no longer in business, so replacement parts are difficult to procure. Due to our inability to consistently procure replacement parts, and to comply with the Denver Water Electrical Safety Plan's arcflash reduction program, which allows workers to safely perform work, the electrical service equipment for the Pump Station is also being replaced. Additional upgrades, such as installing a surge tank flush line, landscaping, and fixing leaking wall penetrations, are being performed in and around the Pump Station to ensure the Pump Station continues to be a reliable and long-lasting distribution station for years to come.

Budget and Schedule:

The total amount of this contract is \$5,528,400, and the term of the contract is November 7, 2018 to September 4, 2020. Funds for this contract will come from the 2019 budget for 64th Avenue Pump Station Modifications Project Business Unit, which has sufficient funds to pay the \$3,500,000 estimated for the 2019 expenditures. The remaining funds will be budgeted in the 2020 Capital Improvement Budget.

Selection of Business Partner:

Denver Water solicited bids from four General Contractors listed on the Prequalified Contractor List under the Heavy Civil General discipline. This Contract was a restricted bid process using Invitation to Bids on the QuestCDN platform. On October 23, 2018, bids were received from four General Contractors. Archer Western Construction, LLC of Illinois was selected based on the lowest cost bid.


S/MWBE Information:

There was a 5% Minority and Women Business Enterprise (MWBE) participation goal required for this construction portion of the project. Archer Western Construction, LLC achieved 5.76% participation.

Recommendation:


It is recommended that the Board approve Contract 503064 with Archer Western Construction, LLC for the 64th Avenue Pump Station Modifications Project for the contract period November 7, 2018 through September 4, 2020 for a total contract amount not to exceed \$5,528,400.

Approvals:


Robert J. Mahoney
Chief Engineering Officer


Angela Brimont
Chief Finance Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-9

Ninth Amendment to Contract 500861 (formerly 14978A) for Conduit No. 16 Replacement and Conduit No. 22 Abandonment

Action by Consent

Individual Action

Purpose and Background:

The Conduit No. 16 Project is an 8.5-mile-long, 66-inch diameter treated water pipeline that will replace the existing 42-inch Conduit No. 16 pipeline. The existing conduit currently conveys raw water from Ralston Reservoir to the Moffat Water Treatment Plant and was installed in 1937. In the past several years the conduit has required repairs for joint leaks and internal inspections have revealed extensive cracking. The replacement Conduit No. 16 will deliver treated water from the future Northwater Treatment Plant at Ralston Reservoir to the Moffat Facility. The entire project will be delivered in four bid packages: Tunnels Installations, West, Central, and East Segments. The Tunnels, West, and Central packages are currently under construction. The East Segment will be bid in 2020.

Amendment No. 9 is a continuation of the Design Consultant's scope of services necessary during construction for submittal reviews and other construction related tasks. The original Request for Proposal and Agreement stated future contract amendments are at Denver Water's discretion to retain the chosen consultant team to provide final design work and services during construction.

This amendment includes cost for HDR-Dewberry Water Supply Partners to provide construction services for the Conduit No.16 Central Segment:

Budget and Schedule:

The amount requested for Amendment No. 9 is \$469,081. A table showing the history of amendments is below.

Item	Cost	Description	Notes
Original Agreement	\$5,526,992	Design for 4 bid packages	Board Approved April 10, 2013, includes additional \$300,000 staff administered contingency
Amendment No. 1	\$0	Time extension	
Amendment No. 2	\$0	Fee Schedule update	
Amendment No. 3	\$135,056	CAD Standard conversion	Board Approved September 14, 2016
Amendment No. 4	\$133,430	Scope addition – design changes and additions	Executed using Board Approved Project Contingencies
Amendment No. 5	\$708,334	Services during construction for Conduit No. 16 tunnels/open cut segment	Board Approved April 12, 2017
Amendment No. 6	\$154,567	Interstate 70 tunnel extension	Executed using Board Approved Project Contingencies and Staff Administered Supplement Services
Amendment No. 7	\$6,654	Scope revision – Highway 93 tunnel extension	
Amendment No. 8	\$160,866	Services during construction for Conduit No. 16 West Segment, time extension	Executed during period of CEO signing authority of \$750,000
Amendment No. 9	\$469,081	Services during construction for Conduit No. 16 Central Segment	Pending Board Approval
Total Contract Amount	\$7,294,980		

Funds for Amendment No. 9 will come from the 2018 approved budget, and the October 24, 2018 Board approved variance for the Conduit No. 16 Business Unit, which has sufficient funds of \$22,043,680 for the forecasted 2018 expenditures of \$22,038,896.

This amendment fits within the current overall project budget of \$86,372,367 with prior awarded construction bid packages including the Tunnels for \$21,441,000, the West Segment for \$7,285,938, and the Central Segment for \$21,790,000. The work on this segment, Central, began in 2018 and will be completed in 2020.

S/MWBE Information:

Denver Water staff has encouraged HDR-Dewberry Water Supply Partners to add MWBE firms on all Amendments and Change Orders when possible, however the work that will be performed during the construction phase services by HDR-Dewberry Water Supply Partners is primarily executed by them. HDR-Dewberry Water Supply Partners did solicit Pinyon Environmental a MWBE firm that will observe the treatment of contaminated ground water. HDR-Dewberry Water Supply Partners has achieved nearly a 5% MWBE participation on previous Amendments through other MWBE's.

Recommendation:


It is recommended that the Board approve the Ninth Amendment to Contract 500861 with HDR-Dewberry Water Supply Partners for Construction Phase Services for an addition of \$469,081 for a total amended contract amount not to exceed \$7,294,980.

Approvals:


Robert J. Mahoney
Chief Engineering Officer


Angela Brimont
Chief Finance Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-A-10

Surplus Property Declaration of Leetsdale Pump Station and Conduit No. 5 Property at S. Quebec Way

Action by Consent

Individual Action

Purpose and Background:

Denver Water owns 0.6 acres of property located at approximately S. Quebec Way and E. Arkansas Avenue. This property, named the Leetsdale Pump Station, was acquired in 1929 and previously housed a chlorine injection well that served the adjacent 36-inch Conduit No. 5. More than 30 years ago the chlorine well was decommissioned, and the structure demolished. Currently, the property is vacant land except for 80 feet of Conduit No. 5 and one access vault located on the southeast corner of the parcel.

Denver Water Operations has determined that the extent of the property owned in fee in this location exceeds the current and future needs of Conduit No. 5. No other current or future operational needs could be identified for this land. Disposing of the fee property and reserving an exclusive easement for the conduit and access vault would be adequate, and in line with Denver Water's Property Policy for conduit property holdings.

Recommendation:

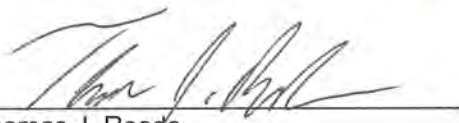
It is recommended that the Board declare 0.6 acres of Leetsdale Pump Station and Conduit No. 5 property surplus, with a reservation for an exclusive easement for Conduit No. 5, as the fee simple ownership is no longer needed for waterworks purposes.

Approvals:


Robert J. Mahoney
Chief Engineering Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager


Thomas J. Roode
Chief Operating Officer

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 14, 2018

Board Item: II-A-11

Intergovernmental Agreement with Jefferson County For Northwater Treatment Plant Contract 503692

Action by Consent

Individual Action

Purpose and Background:

The purpose of this Board Item is to execute an Intergovernmental Agreement (IGA) with Jefferson County (County), Contract 503692, in support of the Northwater Treatment Plant (NTP) construction. The IGA is necessary to allow for phased County approval of Grading permits. Permits are anticipated to be obtained over the duration of construction as various components of work are undertaken, necessitating phased permitting. The IGA also serves as security to guarantee completion of all grading improvements undertaken in accordance with the issued permits.


Budget and Schedule:


There is no cost associated with the County IGA. Permitting costs will be paid directly by Denver Water, and are accounted for within the Total Project Cost. As such, there is no budget impact. The IGA will be terminated upon completion of NTP construction.

Recommendation:

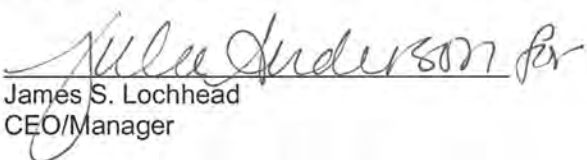
It is recommended that the Board approve the proposed IGA with Jefferson County, which has no associated cost.


Approvals:


Robert J. Mahoney
Chief Engineering Officer


Tom Roode
Chief Operations/Maintenance Officer

Respectfully submitted,


James S. Lochhead
CEO/Manager


Angela Brimont
Chief Finance Officer

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: II-B-1

First Amendment to the Colorado River Cooperative Agreement, Contract 500705 and Agreement Regarding Use of Clinton Reservoir Dead Pool Storage, Contract 503671

Action by Consent

Individual Action

Purpose and Background:

The First Amendment to the Colorado River Cooperative Agreement ("CRCA") modifies Attachment J to the CRCA and substitutes Attachment J with the Agreement Regarding Use of Clinton Reservoir Dead Pool Storage ("Dead Pool Storage Agreement" or "Agreement"). The Dead Pool Storage Agreement is an agreement with the Clinton Ditch & Reservoir Company ("Company") to allow the Company's shareholders to use water stored in Clinton Reservoir's dead pool to replace snowmaking and other depletions made against Denver Water's water rights.

Article III.C.4 of the CRCA provides that upon the resolution of Blue River Decree Issues, "Denver Water and the . . . Company will enter into the permanent Agreement regarding the Clinton Reservoir dead storage pool attached hereto as Attachment J." Blue River Decree Issues were resolved on March 9, 2018.

Attachment J modifies paragraph 1(a) of the Clinton Reservoir – Fraser River Water Agreement, which defines the amount of Clinton Reservoir yield used to repay Denver Water for snowmaking and other consumptive uses. Attachment J expands the available yield under the Clinton Agreement to include an additional 801 acre-feet of dead pool storage accessible by pumping. The Company was to install an operational pumping system capable of accessing the dead pool storage in Clinton Reservoir before the Company's shareholders could rely on the dead pool storage as replacement water for Denver Water.

The Dead Pool Storage Agreement modifies Attachment J to allow the Company's shareholders to rely on the dead pool storage in advance of installing an operational pumping system subject to the Reservoir Company's commitment to install a removable pumping system as certain conditions are met. Paragraph 4 of the Agreement will allow shareholders to access the dead pool storage while ensuring that Denver Water will have access to the replacement water if needed.

Budget and Schedule:

The Agreement does not involve any financial commitments on behalf of Denver Water.

Recommendation:

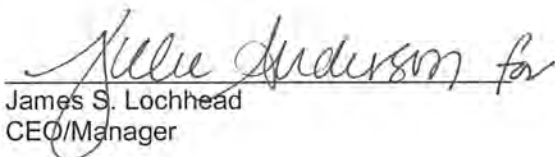
It is recommended that the Board approve the First Amendment to the CRCA and the Agreement Regarding Use of Clinton Reservoir Dead Pool Storage.

Approvals:

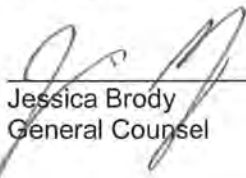
Respectfully submitted,



Mike King
Chief External Affairs Officer



James S. Lochhead
CEO/Manager



Jessica Brody
General Counsel

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: 11/7/2018

Board Item: V-A-1

Briefing Paper Emergency Operations Plan

Strategic Plan Alignment

The Emergency Operations Plan (EOP) serves as the framework document outlining how Denver Water will manage emergencies. This plan aligns with the strategic plan under all three lenses. Effective emergency management provides a comprehensive strategy of prevention, mitigation, response and recovery ensuring the mission of Denver Water can be delivered with high reliability.

Lenses: Customer Centric Industry Leader Long-Term View

This initiative is aligned with and supports the strategic plan under excellent operations.

Summary

The purpose of this briefing paper is to update the Board on Denver Water's emergency management activities. Specifically, the recently signed Enterprise Procedure SE-03b (attached) is the primary document outlining how Denver Water will manage emergencies. It also articulates the relationship between all of Denver Water's various emergency plans and documents. The publication of SE-03B and this Board Briefing Paper close out a 2015 internal audit on emergency management functions.

Background

Denver Water has experienced, and is vulnerable to, a variety of hazards. The board had a history of hardening its infrastructure against these hazards, but lacked expertise in emergency preparedness and response prior to 2012. An emergency management section was created in 2012 and tasked to develop, implement and maintain a comprehensive emergency management program. Denver Water's team interfaces and coordinates with local emergency management agencies/programs to share various emergency response plans and ensure that effective and efficient coordination occurs between agencies prior to, during and after any type of interruptions to Denver Water's system. In 2017 the Emergency Management section was combined with the Safety and Security section to further enhance the effectiveness of the program and take advantage of synergies among the three groups.

Since the 2012, the Emergency Management team at Denver Water has accomplished the following objectives:

- Established Continuity of Operations Plans across all Divisions
- Established a process that defines CEO authority to expedite purchasing in cases of emergency
- Coordinated Denver Water's response to the 2013 Floods. Identified those areas that were eligible for, and led the management of, the

reimbursement process of projects associated with repairing damaged infrastructure.

- Enhanced the training and exercise program to bring continuity/consistency in emergency response positioning Denver Water to be ahead of schedule to comply with EPA's regulatory changes to RMP requirements.
- Integrated the efforts of the IT Disaster Recovery Drill with an enterprise Continuity of Operations exercise that provided the opportunity to demonstrate the capability of operating the core functions of Denver Water remotely.
- Enhanced coordination with Emergency Management/Response organization in all communities and the state where Denver Owns and Operates its properties.
- Emergency Management staff have received specialized knowledge in Emergency Management through local and national trainings that culminated in having one of the only programs with Certified Emergency Managers and Master Exercise Practitioners. This expertise is sought out by other water utilities and agencies throughout the country.
- Staff participate in committees through AWWA, Critical Infrastructure Programs, Urban Area Security Initiative and the North Central Region to establish policy that recognizes the essential services water provides to all disaster efforts. Including the creation of an exercise design Guide Book for Dam Operators and an Emergency Preparedness Guide for Water Utilities pending publication.

As the consequences and frequency of disasters continue to rise, the Emergency Management team of Denver Water has implemented many proactive steps needed to increase capability to respond to and recover from large scale disasters in a coordinated manner. The publication of the EOP builds upon these efforts and positions the program to become a sustainable guidance to address the hazards of today and those we face in the future.

Next Steps:

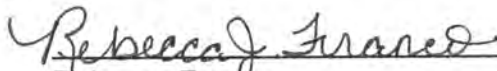
- Implement an enterprise a Preparedness/Recoverability Index that evaluates real time preparedness levels and provides specific actions that drive value
- Establish an Emergency Management Value Stream to address the gap between normal operations and disasters to better provide situational resource management capabilities
- Focus on the Operational Coordination elements that are not addressed by EPA and FERC
- Develop just in time training and response guides to aid staff in the execution of duties in high stress emergency situations

Budget No budget implications are associated with the Emergency Operations Plan.


Owner(s) Emergency Management/Administrative Services

Attachments SE-03b Emergency Operations Plan

Respectfully submitted,



Rebecca Franco
Emergency Manager



Jason Taussig
Director Emergency Management, Safety,
Security



Brian Good
Chief Administrative Officer

DENVER BOARD OF WATER COMMISSIONERS

Meeting Date: November 7, 2018

Board Item: V-A-2

Briefing Paper on Growth, Density and Water Use

I. Strategic Plan Alignment

Lenses: Customer Centric Industry Leader Long-Term View

As the Denver metro area changes, our organization, our customers and our community are working to understand both the immediate and long-term impacts of increased growth and density on how we live. By revisiting Denver Water's potential place in this conversation, and by reviewing, understanding, and possibly revising policies and processes that interface with growth and density, Denver Water can meet our customers' evolving needs, contribute to better outcomes in the complex world of land use and water coordination, and be best prepared to strategically address whatever comes our way.

II. Summary

In 2018, the Denver Board of Water Commissioners expressed a desire to "ensure that the board's water policy helps drive urban density." A review of Denver Water's system development charges (SDCs) also was scheduled to occur in 2018. Given the board's goal of driving urban density, staff began to discuss if and how SDCs could be modified to better support that goal as part of the SDC review. It became clear, however, that before diving into policy recommendations for specific tools, such as SDCs, it would be beneficial to first take a step back to look at growth, density and water use in a broader context and to document what Denver Water is already doing.

Denver Water works to remove barriers that could impede the ability for the service area to develop more densely, as well as works to influence efficient water use as development occurs in the city and throughout our service area. However, Denver Water's ability to drive urban density is complicated by several factors, including jurisdictional boundaries, questions of legal authority and available resources.

This white paper provides:

- Working definitions related to density and water use,
- Analysis on the relationship between density and water use,
- An overview of land and water use planning concepts and roles,
- A case study on density and water use changes on a single block,
- A summary of current Denver Water activities around the state, with City and County of Denver, and service-area-wide over roughly the past five years.

This is intended to provide substantial background information that can aide in future discussions on driving urban density.

III. Background

A. Working Definitions

Terms such as “density” can evoke vastly different meanings to different people. To avoid confusion, the below working definitions have been provided for this topic.

- *Building Density* - Number of dwelling units per building.
- *Population Density* - Number of people per square mile.
- *Total Water Use* - Total volume of water used in an amount of time.
- *Gallons per capita per day (GPCD)* - An approximate average volume of water used per day in a defined area divided by the number of people for the defined area (e.g. GPCD for an apartment or for the service area).
- *Water efficiency* - Regardless of water quality or source, using as little water as possible to accomplish an activity without negatively impacting performance or outcomes of that activity. This is associated with a specific benchmark, such as gallons per person per day indoors (40) or gallons per square foot of landscape outdoors (12).
- *One Water* - In addition to water efficiency considerations, making sure the right water quality and water source is being used for an activity. Example: Most toilets flush using potable water, treated to drinking water standards. Denver Water’s OCR project recognizes that we can reuse water from the site, and treat it on site to a safe and appropriate level for toilet flushing.
- *Site Scale* - Impact to a specific property. Example: OCR One Water and water efficiency measures.
- *System Scale* - Impact that crosses property boundaries or agencies. Example: Low Impact Development Guidelines for right of ways in Denver.

The below diagram demonstrates where staff believes Denver Water may or may not have the ability to influence density and other factors related to growth.

	Denver Water's Ability to Drive Outcomes			
	Low		High	
Issue	←—————→			Scale
Building Density	●			Site
Population Density	●			System
Total Water Use		●		Site and System
Water Use Efficiency			●	Site and System
One Water		●		Site and System

Takeaways: Working Definitions

Denver Water’s service area is expected to be home to more people in the future. Thus, the service area ultimately will have increased density any way you measure it. But, it is important to understand how we are defining “urban density,” and how a goal of driving urban density relates to Denver Water’s mission and vision. Given the selected definition and goals, we can understand how density does and does not affect water use and what Denver Water has available in its toolbox to measure, support, or drive densification.

B. Density and Water Use

Higher density (number of people per square mile) leads to a lower number of gallons per dwelling unit per day (GPUD)¹, as shown in Figure 1. The impact density has on GPUD and water use efficiency, however, must be further analyzed from an indoor and outdoor² water use perspective. This narrows the focus to identify and select approaches that will achieve desired outcomes.

Figure 1: Multifamily Density and Average Gallons per Unit per Day (GPUD)

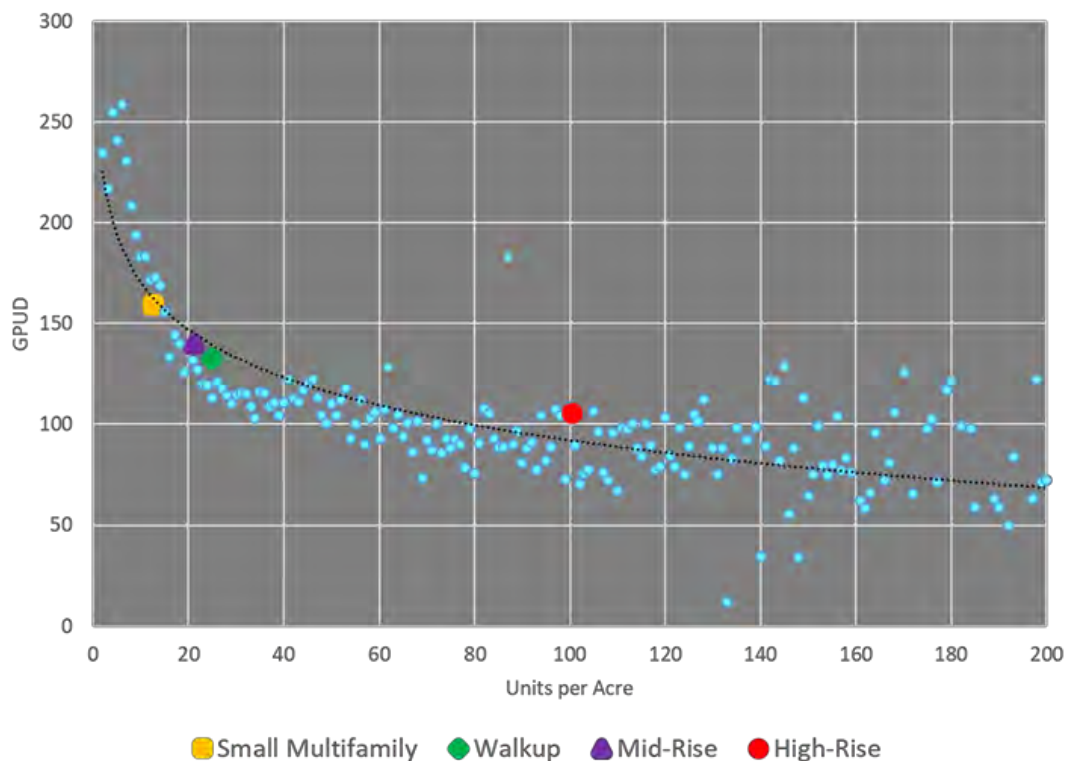


Figure 1: The chart shows that gallons per dwelling unit per day decreases as the number of units in a property increases. This is because occupants are sharing outdoor space, and therefore, outdoor water use is divided among more people.

¹ Average number of people per dwelling unit is approximately 2.6 in the Denver Metro area (US Census).

² Several terms are used in relation to outdoor water use and landscapes. Pervious area is any surface that water can infiltrate (e.g. grass, soil, mulched areas). Irrigated area is any area that receives supplemental irrigation outside of natural precipitation. Pervious area as a measurement will always be greater than or equal to irrigated area. This distinction is important because the gallons of water per square foot of landscape, which is a measure of water efficiency, can vary drastically depending on whether pervious area or irrigated area is used.

1. Indoor Use

The greatest influences on *indoor water use per person* are the characteristics (e.g., flow rate) of the indoor plumbing fixtures as well as a customer's behavior. Analysis of single family and multifamily billed consumption finds that indoor water use per person does not vary significantly across different densities. In other words, single-family homes, condos or apartment dwelling units use water indoors similarly. Therefore, density alone is not a significant variable influencing indoor water use per person.

Additionally, Colorado Senate Bill 14-103³ set more stringent standards for certain plumbing fixtures that go beyond the Federal US Energy Policy Act efficiency requirements and effectively sets a new baseline on indoor water efficiency for typical domestic uses. Fixtures covered include: tank-type toilets, urinals, showerheads and lavatory faucets. Consequently, nearly all new developments are equipped with plumbing fixtures that use water efficiently. However, it is important to note that there are opportunities to go beyond the new baseline by using ultra-high-efficiency fixtures that use even less water than SB14-103 requires. There are also opportunities in some instances to use One Water strategies, such as graywater that would reduce potable demand. Last, water used for cooling and industrial processes are quite variable and were not impacted by the new efficiency standards.

2. Outdoor Use

Customer analysis has shown that as residential density increases, the amount of pervious area per residential unit associated with that property decreases (Figure 2). This phenomenon is the primary driver leading to a lower overall average use per person with increasing density. As pervious area on a parcel is shared among more people, the volume of water per person required to irrigate that area decreases. The average pervious area per unit decreases sharply as residential density increases from low density single family to low density multifamily. The rate of change begins to flatten significantly as residential density increases beyond high density single family and low-density multifamily development types (e.g., townhomes and row houses).

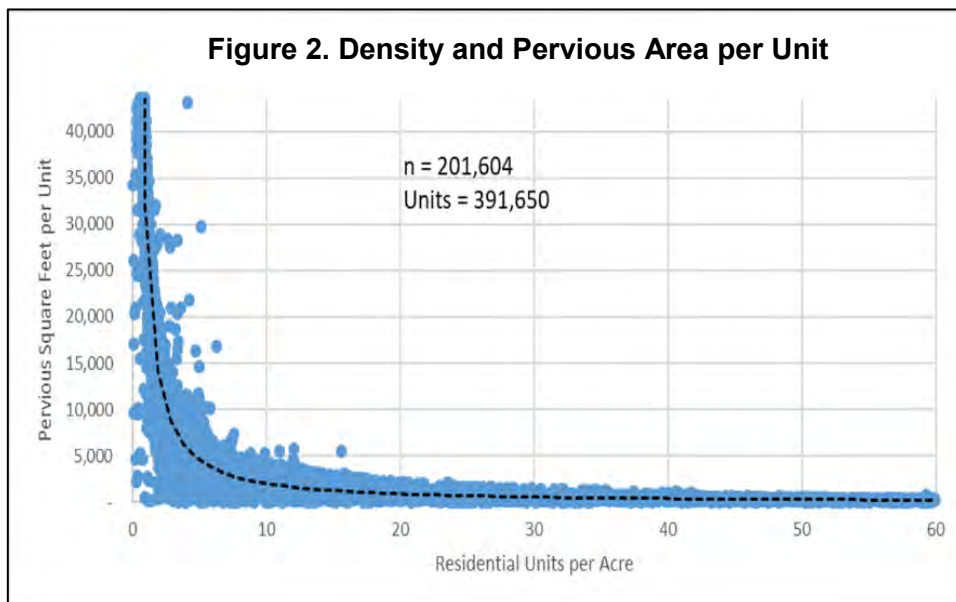


Figure 2: The graph shows that as the number of dwelling units increases, the amount of pervious area decreases. There is a stark difference between 1 unit and 10 units, with diminishing differences between 10 and 60 units. This is specific to property boundaries and does not consider adjacent greenspaces such as public parks.

³ Denver Water lead the effort for the creation and passage of SB14-103.

Interestingly, as the amount of pervious area decreases, the amount of water applied on a gallon-per-square-foot basis tends to increase substantially (Figure 3). This trend needs to be better understood, but the thought is that when irrigating relatively small spaces, price signals in water bills are not as noticeable. Additionally, occupants are typically not directly informed of, in control of, or paying for the water bill. It may be included in rental, management, or association fees and either the landscape and/or the water bill is likely managed by a third-party. Unless there is an issue with the landscape appearance, or the bills are exceptionally high, this is not a line item or issue most people pay attention to.⁴

Figure 3. Outdoor Water Efficiency by Type of Housing

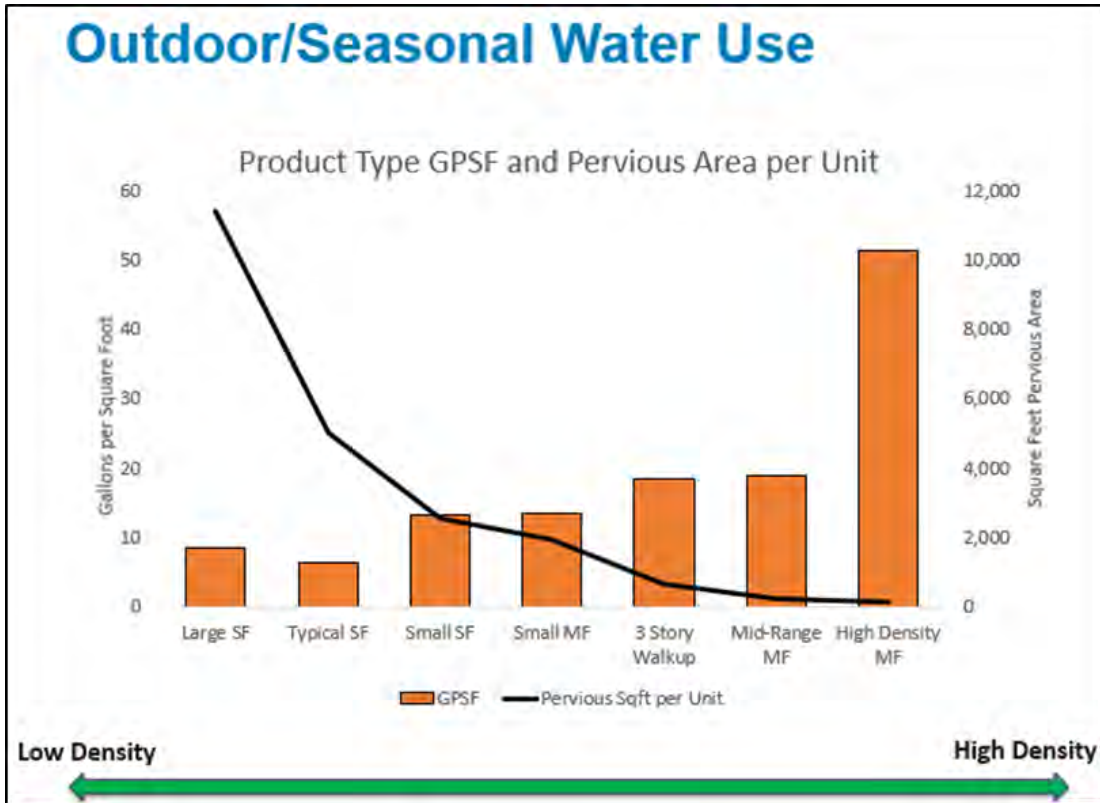


Figure 3: The chart shows that as density increases, outdoor efficiency, measured in gallons of water per square foot decreases. In other words, higher density developments use water less efficiently outdoors.

3. One Water

In addition to looking at water consumption based on how the water is used (e.g. sanitation, landscape irrigation, etc.), it is important to also consider the water source and the water quality for the intended use to ensure they align. The concept of ‘One Water’ or using the right water for the right use provides additional opportunities to improve how water is managed and has the potential to accelerate coordination between land and water use, though it may also add a level of complexity that overwhelms some stakeholders. A supplemental overview of One Water is provided as Attachment A for reference.

⁴ Anecdotally, community managers in the area have remarked that unless a line-item is greater than about 10 percent of the overall annual budget, it is not something that receives significant attention.

Takeaways: Density and Water Use

Higher density leads to a lower number of gallons per capita per day. This is almost entirely due to the difference in the amount of pervious area per person. At the same time, denser developments tend to irrigate at a higher rate than less dense developments. In other words, a volume of water can accommodate more people at a higher residential density than at lower residential densities primarily because irrigated landscape area is shared among more people; however, the water is not necessarily used as efficiently outdoors. Additionally, One Water approaches can be used to stretch water supplies further.

C. Land and Water Use Planning

Broadly speaking, land use planning is anything that attempts to influence how land is used to maximize public benefits and minimize potential harm. The scope of what land use planning encompasses is large and varied, and the major components are controlled by municipalities and counties. For land use planning to be successful, there must be enough political will and staff resources not only to go through the planning processes, but also to sustain these efforts over time.

1. Major Land Use Planning Components

- Long Range Planning (Comprehensive Plan) - Sets the vision for 20-50 years out. Adopted by governing bodies (e.g. planning commissions, cities), or in some instances, may remain strictly as guidance documents.⁵
- Zoning, Ordinances and Codes - Rules that put the vision into action. Enforcement is a key component of this.⁶
- Site Planning – Process for making sure standards are followed at the site level. Sequencing and coordination intra- and inter-agency are key aspects of this.

Denver Water provides water to numerous local jurisdictions, many through distributor agreements in which Denver Water may not have direct contact with an end water user due to the distributor contract type. Apart from Denver, water service does not neatly follow municipal or county boundaries. For example, the City of Lakewood has about half a dozen water districts, many of which are served by Denver Water, but not all. Additionally, many portions of Lakewood with large new developments, such as Rooney Valley, are outside of Denver Water's Combined Service Area. Another example is the City of Lone Tree, where about half of the city's water service is Denver Water and half is not. This is important because each jurisdiction Denver Water serves has its own long-range planning, zoning, ordinances, codes and site plan process and working with each jurisdiction in-depth in these areas would require a significant amount of resources.

Denver Water relies on county and municipal codes and ordinances for regulating and enforcing certain water-related standards such as stormwater or graywater. For example, Denver Water is supportive of graywater uses and was proactively involved in statewide legislation allowing for graywater use, but the City and County of Denver is the only municipality in Colorado that has adopted a graywater ordinance.

⁵ Colorado Department of Local Affairs (DOLA), in partnership with Colorado Municipal League (CML) and the Colorado Chapter of the American Planning Association, conduct a municipal land use survey to understand trends and to provide an inventory of Colorado land use planning efforts. <https://drive.google.com/file/d/0B-vz6H4k4SESSGdncWx3N0IxdFE/view>

⁶ There are ordinances in Denver related to water that are on the books but are not enforced, such as requiring all commercial properties to have rain sensors, or for all multifamily units to have submetered water use.

2. Authority Over Landscapes

Irrigated landscapes are a major driver in determining capacity planning for water utilities. Landscapes are also viewed as a valuable part of defining a community aesthetic and character for urban planners, developers and residents alike. And as noted above, water use for landscapes can change as the community's density changes.

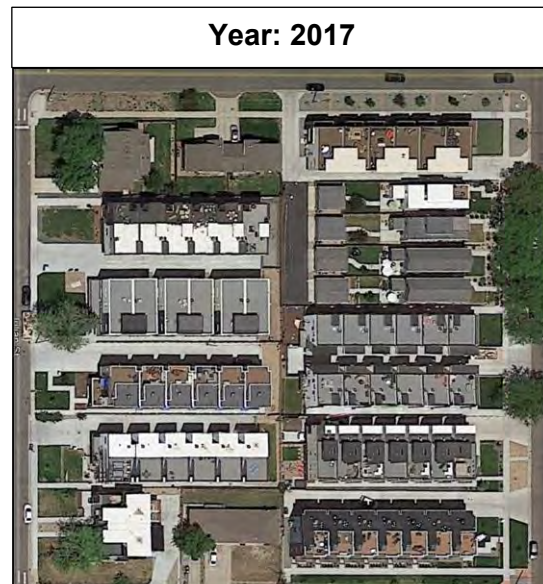
Land use authority for issues such as zoning, codes and ordinances falls within municipal government agencies. However, water utilities may also have operating rules or standards that impact water use, such as irrigation design or plant material requirements. A utility's regulatory authority over public or private landscapes is not one-size fits all and would depend on the legal mandate establishing a utility. In Denver Water's case, we would look to the Charter and analyze how potential requirements on irrigation or landscaping relate to Denver Water's directive to provide water service to the various jurisdictions. While Denver Water has requirements for new developments, the organization has largely taken an educational and incentive-based approach to promoting low-water and water-efficient landscapes⁷. Changing how we approach landscape management moving forward could have significant relationship and resource ramifications.

It is important to recognize that pervious areas or other forms of greenspace are considered a critical component of a vibrant, healthy city. Encouraging One Water solutions for greenspaces and landscapes can reduce the potable water demand needed to support them.

Takeaways: Land Use and Water Planning

Land use planning works to maximize public benefits and minimize potential harm and is typically conducted by cities and counties. Major components include long-range planning, codes and ordinances, and site plans. Landscapes can be a defining characteristic of a community and have a major impact on water demand. A water utility's authority over landscapes can vary depending on specific governing documents and directives. Authority over graywater is another example of where Denver Water relies on municipal partnerships.

D. Sloan's Lake Redevelopment Case Study



⁷ Low-water landscape would consist of xeric plant materials. A water-efficient landscape is any type of plant material that is watered efficiently.

This provides an example of how a single block changed over approximately two decades in terms of the total number of dwelling units, pervious area, and water use patterns. This case study is on the block between 18th and 19th avenues and between Julian and Irving streets⁸.

Figure 4 demonstrates that even with four times the number of dwelling units, total annual water use did not increase. Additional noteworthy comparisons include:

- The number of dwelling units went from sixteen to sixty-six between 1994 and 2018⁹
- None of the structures from fifteen years ago remain
- Pervious area now is less than half of what it was in 1994, going from roughly 131,000 sq. ft. to 61,000 sq. ft.
- Average gallons of water applied per square foot of pervious area increased from 5 to 18
- Gallons per capita per day decreased from 109 to 40
- Total annual water use in 1994 and 2018 are comparable
- Zoning code was changed in 2010 to allow for increased density (3-story units)¹⁰

Figure 4: Annual Consumption and Number of Dwelling Unit Changes Over Time (Kgals)

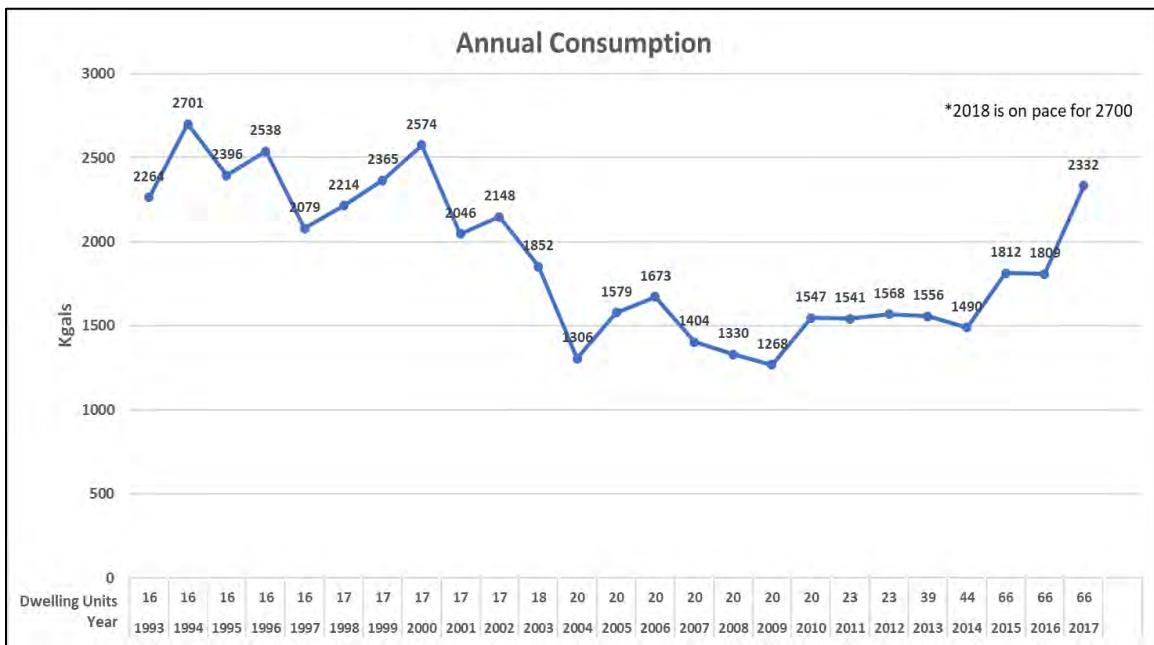


Figure 4: This graph demonstrates that the same amount of water can support more dwelling units.

For context of why this happened and how quickly the major changes occurred, it is important to view this from the zoning and market demand context. The area was upzoned to G-MU-3 in 2010 as part of Denver’s zoning code¹¹ changes. G-MU-3 means general urban, multi-unit building up to three stories tall, which is on the lower-end of density allowances. Most of the new structures are three stories, but are not stacked units (i.e. single-owner for each three-story unit). Both zoning and market

⁸ Specifically, block of 1800 – 1846 Julian; 1806 – 1841 Irving; between 18th and 19th avenues.

⁹ One type of development, called slot homes, are in this block but are no longer allowed to be built. This was because of design and community character considerations.

¹⁰ G-MU-3 zoning code, which means general urban, multi-unit, 3-story maximum height.

¹¹ Denver zoning maps available here: <https://denvergov.org/maps/map/zoning>.

forces will continue to be primary drivers of density. This case study shows there is still outdoor efficiency and drought response potential.

Takeaways: Case Study

This case study is one example of how density can change water use patterns. The major drivers in the development process are zoning and market forces, and there is significant room to continue water use efficiency efforts. Drought response

E. Current Denver Water Activities

Urban density a topic area that is relatively new for Denver Water to participate in. As such, much of staff's efforts have evolved organically over the last several years. By either taking advantage of new opportunities or by responding to issues that have come to our attention around growth, density and water use, staff has been able to gain a better understanding of the types of opportunities and challenges around this issue and where Denver Water might be able to influence outcomes. The information below demonstrates the range of efforts that staff have been involved in, as well as highlights the opportunity the organization has to take a step back and strategically refocus our efforts.

Denver Water currently works with a wide array of groups across local, regional and state levels on issues surrounding growth and water use. The below section covers staff member's activities over roughly the last five years around the state, within City and County of Denver, and within Denver Water's programs and rules that cover the entire service area. No single staff person works exclusively on these efforts, but approximately two dozen staff members spend time on this as part of their current job duties. The amount of time can fluctuate substantially based on external factors, such as legislation, new developments or outside planning efforts. Due to the multi-disciplinary nature of this topic, the subject matter experts span across many divisions within the organization. Excluding staff who work full-time on standard plan review, the FTE ranges from 2-5 among a couple dozen people in any given year.

1. Activities occurring around the state

As Colorado's population continues to grow, the relationship between municipal land use and water use has received increased attention. There has been a strong push from a variety of sources for these areas to be better integrated. While there are many groups working to tackle this issue, and Denver Water staff have contributed and participated in these efforts, there is still significant work to be done. Roles and best practices for processes/procedures are not clearly defined and results are not immediately or sufficiently actionable given how locally specific circumstances are. This theme is consistent throughout these efforts and additional direction from leadership on the desired outcomes of promoting density will allow staff to better allocate time and resources.

Sonoran Institute: [Growing Water Smart](#)

Internal Lead: Water Resource Strategy

City of Littleton staff applied to participate in a land use and water use planning multi-day workshop this fall, and as that city's water provider, Denver Water staff members were asked to participate as well. The workshop is designed to provide communities with the full range of communications, public engagement, planning and policy implementation tools to realize their watershed health and community resiliency goals. The overall goal is to have participating jurisdictions and water providers to come out of the workshop with an actionable plan.

Colorado Water Plan (Plan)

Internal Leads: Water Resource Strategy, Public Affairs

The plan's goal is to have 75 percent of the state's population live in communities that have integrated water and land use planning by 2025. At the time of the plan's adoption in 2015, that number was estimated to be about 12 percent. The Colorado Water Conservation Board (CWCB) and Department of Local Affairs (DOLA) have put on numerous trainings on how to integrate land and water planning and Denver Water staff have participated in these trainings. Additionally, Denver Water staff members are part of a newly formed stakeholder group that has a desired outcome of developing a process that will allow water agencies and local land planners to share information about the impacts on water use given different land use decisions and development types. The group is also going to explore modeling to bring water demand models and land use planning models (Urban Sim) together.

Legislation¹²

Internal Leads: Public Affairs, Water Resource Strategy

Over the past several years, legislation attempting to better integrate water efficiency or demand and land use planning has been a regular occurrence, with a new bill being introduced virtually each year. Generally, these bills have little to no substantive impact directly on Denver Water or our service area. This is a tool that we have not fully explored for influencing or driving outcomes of land use issues, such as density. Attachment B provides a complete list of bills for reference.

Keystone Policy Center Colorado Water and Growth Dialogue

Internal Leads: Water Resource Strategy

This group of experts was formed in 2014 to begin a dialogue involving land planners, water planners, policymakers and development interests about what data and information may be needed to successfully integrate land use and water planning. Denver Water staff members are on the steering committee, and have provided significant amounts of data and technical analysis, including on the topic of water use and density. Denver Water staff developed and beta-tested a water demand tool for land use planners. All project materials, including case studies and research reports, are expected to be published on the Keystone Center website and communicated at events throughout the state later this year.

Land Use Leadership Alliance (LULA)

Internal Leads: Water Resource Strategy, Denver Board of Water Commissioners (Gougeon)

The Land Use Law Center at PACE Law School developed the LULA training, which seeks to put needed technical and process tools in the hands of staff and elected officials whose decisions impact land use patterns and resource use. Several years ago, Western Resource Advocates partnered with PACE to bring the LULA training to Colorado. Several Denver Water representatives have gone through this extensive training program. The culmination of the training was a discussion of a Best Practices Guide Western Resource Advocates is reportedly on the verge of publishing.

Takeaways: State Activities

The relationship between municipal land use and water use has received increased attention over the past several years. The result has been an increase in training and partnership opportunities, as well as an increase in legislative efforts attempting to influence this. Broad application of roles and best practices are particularly challenging given how locally specific land use is.

2. Activities within City & County of Denver (CCD)

¹² See Attachment B for a complete list of recent bills.

Over the past several years, Denver Water and CCD staff have increased their collaboration. CCD is the only jurisdiction that does not go through a distributor in some form. Working together directly has been advantageous in understanding how to streamline processes and policies that impact development inside Denver. There has been notable progress as outlined below and we are on a good trajectory, but there is significant room to do more.

Dense Development Value Stream

Internal Leads: Customer Relations, Water Resource Strategy, Distribution Engineering, Water Distribution, Hydraulics

Using Continuous Improvement tools, Denver Water assembled a project team of internal and external subject matter experts in early 2015 to further understand and solve barriers to dense development and water efficiency. The scope of this value stream included townhomes, duplexes and row homes and excluded vertically stacked units in a common building (i.e. apartments or condominiums) inside Denver has lasted three years.

One change that came out of this effort was alternative meter and tap configurations being allowed for densely developed areas. Thorough research, including looking at utility practices both nationally and internationally, as well as conducting pilot studies with six different meter and tap configurations occurred prior to staff recommending changes to Denver Water's Operating Rules and Engineering standards to allow manifold taps and licenses.¹³

Denver Water's Denver minimum 30-foot easement standard was also evaluated because developers wanted to have larger building footprints on lots. The 30-foot easement widths allow Denver Water crews to safely operate and maintain the system. Easements are used when public right-of-way is not available for the placement of a water main. Dedication of the public right-of-way by developers is in accordance with city codes. Changes to the easement standard would impact staff and financial resources required to maintain the system; staff did not make recommendations to change the standard.

Additionally, staff members were part of a plumbing fixture count study. The plumbing fixture count is used to determine tap sizes, meters and service lines. Traditional fixture count calculation methods, IPC, UPC and AWWA M-22, are based off variations of Hunter's Method which was developed in the 1940s. These approaches are not flexible, and do not take into consideration end user characteristics, which ultimately may result in overestimating demand requirements and not rewarding efficiency. By studying water use patterns within the combined service area and looking at emerging fixture count models staff members are working to develop a fair and accurate approach to sizing domestic taps, meters, and service lines.

Development System Performance Steering Committee

Internal Leads: Customer Relations, Public Affairs, Distribution Engineering

Beginning in late 2016, the Mayor's Office created the Development System Performance Steering Committee to help identify pain points for developers when working with the city. Then, using continuous improvement-style methods and tools, the city has worked intra- and inter-agency to find solutions and new ways of doing things. Denver Water staff members were invited to work with Community Planning and Development to focus on improving coordination between our agencies in

¹³ A manifold tap is a physical device, pipe fitting or connection that connects to a distribution main and branches off to serve multiple licensee-owned service lines and meter pits, each of which then serves a single property within a common interest community. A manifold tap license for service line configurations is consistent with the definition of Manifold Tap. Each manifold tap shall have its own license and shall be owned by the governing authority or instrument (HOA, party wall, or other type of agreement), unless Denver Water, in the exercise of its reasonable discretion, determines that other means are more suitable.

the plan review process. These efforts have yielded positive results for the city, Denver Water and developers. The sequencing of agency plan reviews was changed to reduce the likelihood of resubmittals and rework, and to ensure anything that could significantly impact the cost or feasibility of a project is identified much earlier in the review process. By Denver Water being at the table early in the process, with the city, our agencies are a more united front and can identify unique challenges as well as patterns that we may need to jointly address. This has also set the stage for being able to more effectively work together on codes, ordinances and standards that impact our agency goals and operations. Through a review of past projects, the areas identified as causing pain points for either the city, Denver Water or developers are:

- *Sufficient fire flow protections*
- *Easements and right of way*
- *Building footprint*
- *Timing coordination of developer projects and other utility/city projects impacting same area*

Due to a series of retirements in key positions both at Denver Water and at the City of Denver, staff is focusing on maintaining relationships during transition, and will begin working on proactive process and policy changes once we have appropriate staff on board by late fall.

Master Planned and Multi-Phase Developments

Internal Leads: Distribution Engineering, Water Resource Strategy, Customer Relations, Public Affairs

Denver is embarking on a level of large redevelopment that it hasn't experienced in several decades. There are numerous projects that are in the beginning stages and when implemented, will have big impacts in the heart of the city.

A few examples of these large redevelopments include:

- National Western Center - 250 acres
- River Mile/Elitch Gardens Redevelopment - 60+ acres
- Sun Valley Eco-District - 80 acres

Denver Water's participation on the National Western Center as a project partner with Colorado State University served as a catalyst for a more proactive plan review approach for these particularly large and complex developments. National Western Center has sustainability goals for water, energy, and solid waste. The site partners conducted a One Water evaluation and identified recycled water as the best source of non-potable water for the site. They are still working through stormwater management options and are planning on selecting a sitewide energy service provider. One interesting lesson learned on this project is that the number of visitors may not drive alternative water source options. For example, greywater systems were not feasible for the site since major water use is anticipated to occur intermittently and there would not be a steady feed into a greywater system to support non-potable uses.

Beyond National Western Center, developers for the other two projects met with Denver Water to learn more about options they may have around One Water, water efficiency, or understanding and finding mutually beneficial and reasonable ways of meeting standards and requirements at the concept and design stages. For example, River Mile developers are interested in having a localized reclaimed water system to both treat wastewater and produce reclaimed water. The water use profile on site is expected to align with this goal, as the development expects a large volume of steady state water usage due to its design as a multifamily residential/mixed use site.

Denver Water is new to working with such large developments in this way and is developing a revised outlook and workflow for doing so. CCD Community Planning and Development is in a similar

position with these types of projects and Denver Water will be coordinating closely with their staff. When projects require rezoning, the city can also employ tools to encourage or require certain objectives, such as affordable housing or increased density.

Denverright: Denver 2040 Comprehensive Plan and Supplemental Plans

Internal Lead: Water Resource Strategy

In 2016, Denver launched the Denverright process to update their comprehensive plan and the supplemental plans adopted by city council, which include Blueprint Denver, Parks and Recreation Game Plan, and Denver Moves. The updated Comprehensive Plan 2040 will serve as the vision for Denver from now until 2040 and is designed to be a high-level document to guide city leaders, institutions and citizens to shape the city we will become over the next 20 years.

Blueprint Denver specifically focuses on Land Use and Transportation and is used to update zoning decisions to focus development to places where development is most appropriate while making an inclusive city made of “complete” neighborhoods. The Parks and Recreation Game Plan helps refine new parks and recreations offerings, relevant programs, and how existing assets are maintained and enhanced under current challenges. Denver Moves focuses on transit, pedestrians and trails.

Denver Water staff are involved in these plans in several ways, including:

- Meeting with staff early in the process and participating in workshops to understand how water and climate change were being incorporated into Blueprint and how Denver Water may be able to help or be incorporated.
- Providing language on water efficiency measures for the comprehensive plan.
- Reviewing internal drafts of Blueprint Denver to make recommendations on water efficiency language.
- Presenting water efficiency, One Water and drought information to Blueprint Denver Taskforce.
- Participating as a partner agency for the Parks and Recreation Game Plan, with the objectives of expanding the use of recycled water, accelerating implementation of water-saving technologies, and creating drought-tolerant and climate-resilient landscapes throughout the parks system.

Water Efficiency Goal with Denver

Internal Lead: Water Resource Strategy

The Denver Office of Sustainability staff was a stakeholder in the Water Efficiency Plan development and provided significant value and input to the final product. Due to this collaboration, Denver Water staff have been included in Denver Sustainability standards on water efficiency and reuse for the acquisition of new and existing buildings. Recommendations included moving to LEED Gold standards for water efficiency for indoor use and a water budgeting approach for outdoor use.

Ultra-urban green infrastructure guidelines

Internal Lead: Water Resource Strategy

The City and County of Denver wrote the Ultra-Urban Green Infrastructure Guidelines to be site-scale green infrastructure best management practices (BMPs) to provide guidance for city staff, engineers, planners, landscape architects and developers for use on both public and private projects where space is limited. Denver Water staff reviewed the guidance document and provided comments to the City on landscape water use, the need for drought tolerant species, access to water for irrigation and access for Denver Water infrastructure including taps, meters and vaults. The projects piloting these guidelines, primarily in River North on Brighton Boulevard, will have many of the outdoor components that go beyond code requirements and exemplify water efficiency. This could be as a cost-effective way to test the effectiveness and acceptance of design mandates for new development; however, public land vs. private property differences need to be considered.

Low Impact Design (LID)

Internal Lead: Water Resource Strategy

Denver Water's Water Efficiency Team is working on a collaborative project with the City and County Public Works department and Denver Botanic Gardens staff to pilot Low Impact Design into medians and bump-out stormwater planters.¹⁴ in high water use and high stormwater priority neighborhoods. The goal is to demonstrate landscape change that could address both water efficiency and stormwater retention. The scope of work is to be created this year with installation and monitoring and evaluation goals to follow.

Accessory Dwelling Units (ADUs)

Internal Lead: Water Resource Strategy, Customer Relations, Rates

ADUs are considered one housing tool that can help fill the gap in available housing stock, and do so in a way that can support increased density and affordability. Currently, Denver Water operating rules do not require a separate license, tap or meter for an ADU. If an ADU is added after the main structure is built, the property would need to get an updated water supply license (not a separate license, but one that incorporates the ADU into the existing license), and would also be charged an SDC. If the ADU is built at the same time as the main building the ADU would be included in the water supply license and the associated water use would also be considered when calculating SDC.

Denver staff provided Denver Water staff with a list of the properties on which an ADU was constructed and Denver Water staff are performing a water use analysis specific to ADUs, which can help in determining any policy changes related to SDCs. Additionally, Denver Water, Denver Housing Authority and Habitat for Humanity are piloting a program with SDCs and ADUs for affordable housing that would discount ADU SDCs when efficiency measures were made in the primary existing home.

Tiny Home Village Working Group

Internal Lead: Customer Relations, Public Affairs, Distribution Engineering

Denver Water sits on a working group run by CPD, with council participation, to figure out how to remove barriers for tiny home villages in the city that help provide housing options to people experiencing homelessness. The group is working to understand zoning, building, fire, municipal code and housing code regulations that exist today and their impact on the tiny home village priorities. The group also is looking at whether there are opportunities to possibly modifying existing regulations for temporary or permanent tiny home villages.

Green Roof Ordinance and Review Taskforce

Internal Lead: Water Resource Strategy, Public Affairs

Denver's Green Roof Ordinance that passed in 2017 is the strictest green roof ordinance in North America. Community Planning and Development convened a taskforce to help figure out how to reduce unintended consequences, while still maintaining the desired benefits. Denver Water was invited to serve on the taskforce to provide expertise on water efficiency, water demand, drought and water source (One Water). The taskforce is providing a recommendation to City Council to remove the requirement for retention of rain water from roofs, in a way that would comply with existing water law.

Transit-Oriented Development (TOD) Analysis

Internal Lead: Water Resource Strategy

¹⁴ Stormwater planters are a type of bioretention facility located within street right-of-way in an enlarged amenity zone between the street and the sidewalk created when the curb and gutter is moved out into the portion of the roadway normally reserved for parking.

As part of attending the Urban Land Institute Conference in 2016, Denver Water staff sought to do a quick analysis on the relationship between water efficiency and transit-oriented developments. The analysis used one example of each type of TOD outlined in CCD's TOD strategic plan. The analysis showed that water use was significantly different at each TOD and that the usage correlates with the underlying land use patterns more than the fact that it is located within a TOD. The variation in TOD land use patterns can vary substantially, ranging from downtown urban to suburban town centers.

Takeaways: Denver Activities

Denver Water staff work closely with Denver. However, the coordination between these efforts could be enhanced and the unprecedented level of growth and large redevelopments provide Denver Water with an opportunity to shape certain aspects of development and policies that will have impacts for decades to come. This will need the dedication of additional staff resources to best coordinate. The main departments for focused coordination would be Community Planning and Development, Public Works, Denver Department of Public Health and Environment, and Parks and Recreation.

3. Denver Water Programs and Rules

Denver Water has programs and policies that can influence growth and efficiency in specific ways. This is not a comprehensive list, but it highlights some important examples ranging from collaborative to incentive to rule-based.

High Line Canal Transformation

Internal Leads: Operations and Maintenance, Distribution Engineering, Water Resource Strategy, Public Affairs, Finance

The work occurring to transform the High Line canal from an inefficient irrigation delivery system to managed stormwater infrastructure with adjacent recreational benefits is just one of the many examples of One Water concepts in action. Transforming the 71-mile canal is politically, socially and technically complex and has the opportunity to serve as a model for other projects.

System Development Charge Water Efficiency Credit Pilot

Internal Leads: Water Resources Strategy, Rates, Customer Relations

Denver Water's current system development charge schedule is based on the maximum estimated gallons per minute (gpm) for non-residential commercial taps and the total lot area for potable irrigation taps. Both calculations accurately predict the maximum flows from these taps, but do not provide enough weight to a customer's overall annual demand. As a result, there is little incentive for developers to install high-efficiency fixtures, irrigation products and landscape designs to reduce overall annual demand and operation costs.

Beginning in the fall of 2014, developers began approaching staff requesting a reduction in System Development Charges (SDC) with a commitment to install high-efficiency fixtures to lower water demand. Denver Water staff began developing a process to allow developers to effectively lower the cost of SDCs for new construction projects through an Efficiency Credit provided upon verification of the installation of high-efficiency fixtures, high-efficiency irrigation products and water-wise landscapes.

Over the past several years, Denver Water has been piloting this new System Development Charge Efficiency Credit program designed to encourage new development projects to install the most efficient fixtures, irrigation products and landscape designs by providing a monetary credit to the system development charge that reflects the validated lower water demand. Qualifying customers include commercial, single-ownership multifamily (not condos), hotels, and irrigation customers

developing new sites or redeveloping sites where the taps must be resized or additional taps must be purchased. Customers can be Inside City, Read and Bill, Total Service or Master Meter (with approval from the Master Meter District).

This program rewards efficiency, not density in its current form. There are opportunities to further explore using SDCs to support other outcomes, such as affordability, ADUs, and whether growth should pay for growth. Currently, inside city customers receive a discounted SDC.

Operating Rules

Internal Lead: Customer Relations

Chapter 2 of Denver Water's Operating Rules, which covers licenses and conditions for water service, states the following:

2.01.2 Eligibility for Service.

a. Inside Denver. All property inside the corporate boundaries of the City and County of Denver as the same may exist from time to time shall be eligible to receive water service from Denver Water upon compliance with these rules and payment of such fees and charges as may be applicable and necessary to extend Denver Water's system to the property concerned. The timing and method for extending or providing service shall be at the sole discretion of Denver Water.

b. Outside Denver. Only those properties outside of Denver located within the Combined Service Area shall be eligible for a water supply license from Denver Water. Eligibility for service in such included areas shall be conditioned upon the approval of the Distributor, compliance with the rules and procedures of the Distributor and Denver Water and payment of such fees and charges as may be assessed by the Distributor and Denver Water.

In practice, Denver Water incentivizes more efficient development because larger taps cost more, but will generally not require water efficiency measures as a condition of water service. However, places such as City of Westminster and Town of Castle Rock do have such requirements for large developments. In Westminster, developers submit applications and compete for a limited number of taps available each year. With small infill development, it may be overly burdensome to require this, but for larger developments it could be effective to systematically include.

Chapter 14 of Denver Water's Operating Rules, has several relevant provisions related to landscapes and irrigation, including:

14.02.3 Irrigation of Narrow Strips of Land.

Spray irrigation of narrow strips of land almost inevitably results in water waste. Therefore, the following irrigation system and design requirements apply to irrigation of any strip of land less than 25 feet in width, including medians, parkways, traffic islands, parking lot islands and perimeters, rights-of-way along streets and other public or private areas along roadways.

- a. For strips of land less than 6 feet in width - Spray irrigation shall be prohibited. Low-flow irrigation systems are required.*
- b. For strips of land between 6 feet and 15 feet in width - Only low-flow irrigation, or spray irrigation using low-angle spray nozzles designed for the specific width to be irrigated shall be permitted. All spray heads must be pressure reducing and designed to prevent low head drainage.*

- c. *For strips of land between 15 feet and 25 feet in width - Only gear-driven rotors with low angle nozzles may be used to irrigate turf areas. Planting beds may be irrigated with low-flow or spray irrigation. All spray heads must be pressure reducing and designed to prevent low head drainage.*

14.02.4 Soil Amendment for Irrigation of Turf at Newly Licensed Premises.

Proof of proper soil preparation is required before installation of plant material. Penalties may apply if soil amendment is not completed prior to the installation of plant material. Proper soil amendment is the equivalent of adding approved compost at a rate of four cubic yards per 1,000 square feet of permeable area, incorporated (roto tilled) to a depth of six inches.

In practice, enforcing the operating rules around irrigating narrow strips of land would take significant resources. If there is more than an acre of irrigated area, an irrigation plan review is required, but this does not cover most developments. The right of ways make up a large portion of the small strips of landscape, and these are also an area that many stakeholders are interested in influencing the use of. From a utility perspective, this is where infrastructure, such as meters go. This is the same area where urban tree canopies and other significant design elements interface.

Takeaways: Service Area Activities

Denver Water is piloting programs to influence development and has operating rules to influence irrigated landscapes. The resources and impacts to relationships it would take to bolster these tools needs to be evaluated. Right of ways are a good example of an area that would benefit from improved coordination and policy cohesion between agencies.

Conclusion

As demonstrated in this white paper, organizational efforts have organically evolved over the past several years and staff members have been able to gather information and understand potential opportunities better. We now have a chance to take a step back and align future efforts with strategic goals. At a high-level, Denver Water engages in conversations that are at the forefront of the land use and water use planning efforts. This paper serves as a starting point for a discussion around what driving urban density means for Denver Water. By having 1) agreed-upon definitions related to density and water use, 2) analysis exploring the relationship between density and water use, 3) an overview of land use planning concepts, 4) a case study, and 5) a summary of Denver Water's current activities related to growth and development, we can have productive conversations that tease out the desired outcomes of this issue, and then come back to the board at a future date with recommended tools and approaches to achieve the desired outcomes.

Owners

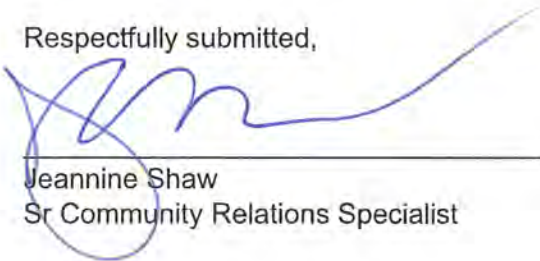
Prepared by Jeannine Shaw, External Affairs with substantial contributions from:

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- Katie Ross (Engineering)
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Attachments (2)

One Water Overview
State Legislation Overview

Respectfully submitted,



Jeannine Shaw
Sr Community Relations Specialist



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Attachment A: One Water Overview

Background:

One Water simply means using the right water for the right use. Water scarcity, degradation of water quality, changing regulations and aging infrastructure are causing water management agencies to use a new approach for holistic water management, the “One Water” concept. Historical and institutional barriers have created perceptions that certain types of water are more valuable than others and regulatory frameworks have resulted in fractured water management agencies. One Water treats all types of water as valuable resources and creates opportunities for increased collaboration across water management agencies.

Definition:

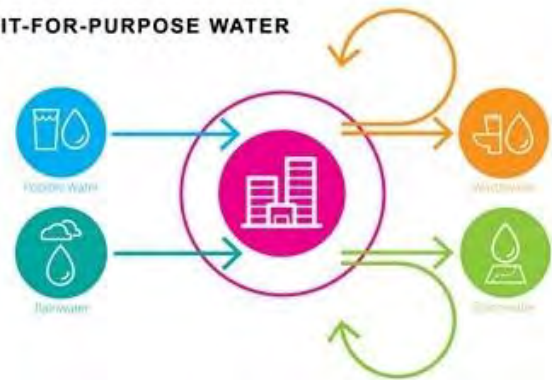
One Water is a holistic approach to the urban water cycle matching water source, quantity and quality with its intended use. One Water achieves the following outcomes:

- Matches the most appropriate water source for each use.
- Maximizes efficient use of all water.
- Uses potable water only for potable uses.
- Minimizes discharge of wastewater and stormwater to the environment.

CONVENTIONAL WATER FLOWS



FIT-FOR-PURPOSE WATER



Additional information:

Denver Water has a long history of using the right water for the right use.

The One Water approach creates a common framework for developing sustainable water supply options and can be integrated into land-use planning to support changing urban water needs. Since the goal of any One Water project is to address water supply and demand needs in a localized setting, One Water projects may include different components, like recycled water, greywater reuse or rainwater harvesting, depending on the site-specific needs. This allows developers to use common approaches to create customized projects based on local needs.

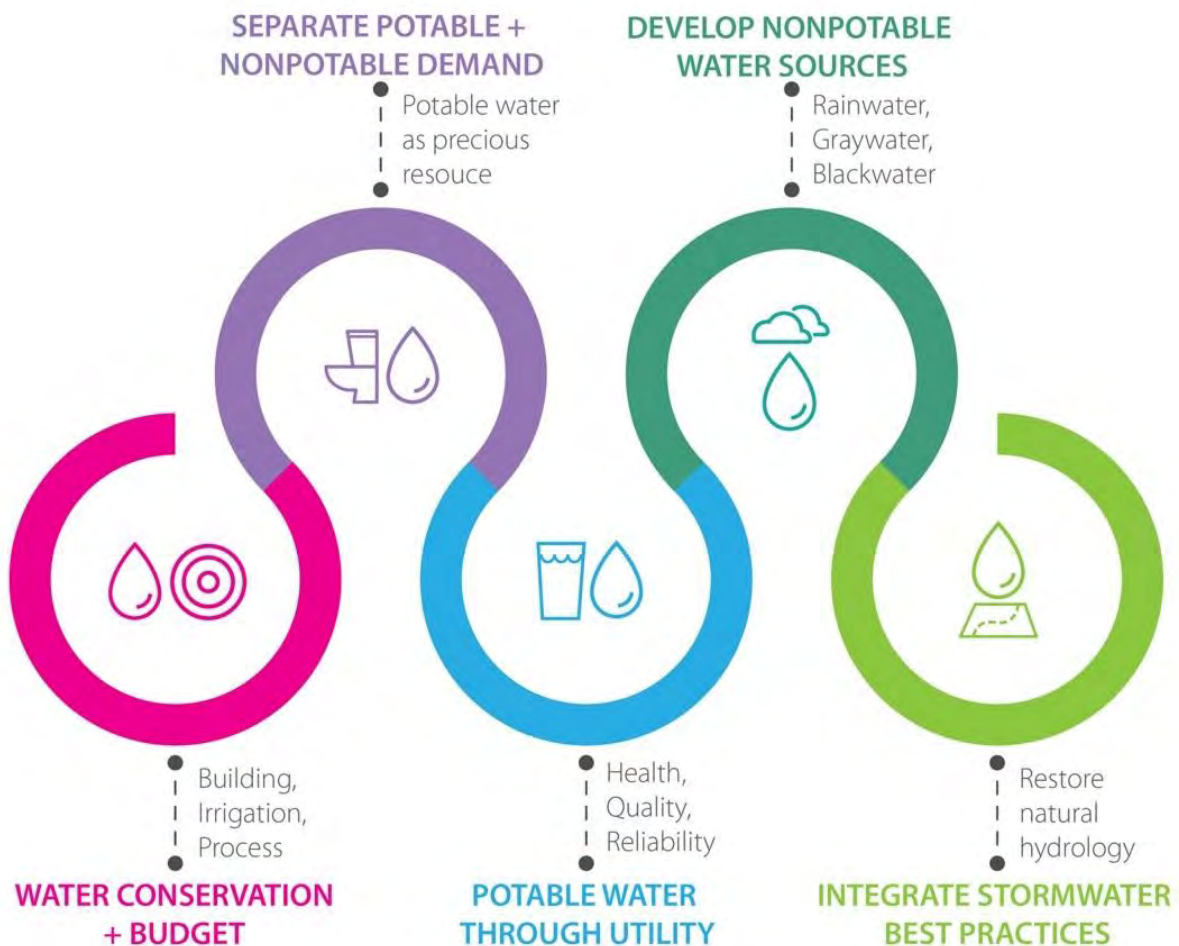
In Denver, One Water opportunities are fostering collaboration across water management agencies, policymakers, and regulators to develop the best solutions for urban water needs.

Benefits:

- Environmental:
 - Water can be sourced locally rather than imported.
 - Environmental stewardship can be shared across municipalities and customers.
 - Pollution prevention can be achieved by harvesting storm and wastewater.

- Economic:
 - Municipalities can share facilities and minimize impacts to other's operations.
 - Local systems can be built to meet local demands rather than building large-scale systems awaiting infill.
- Social:
 - Developers can utilize alternative water sources to meet low-impact design standards such as the Living Building Challenge and LEED.
 - Customers can implement appropriate solutions within their control to achieve sustainable water outcomes.
 - Water infrastructure can be diversified and ultimately increase resiliency across the water cycle.

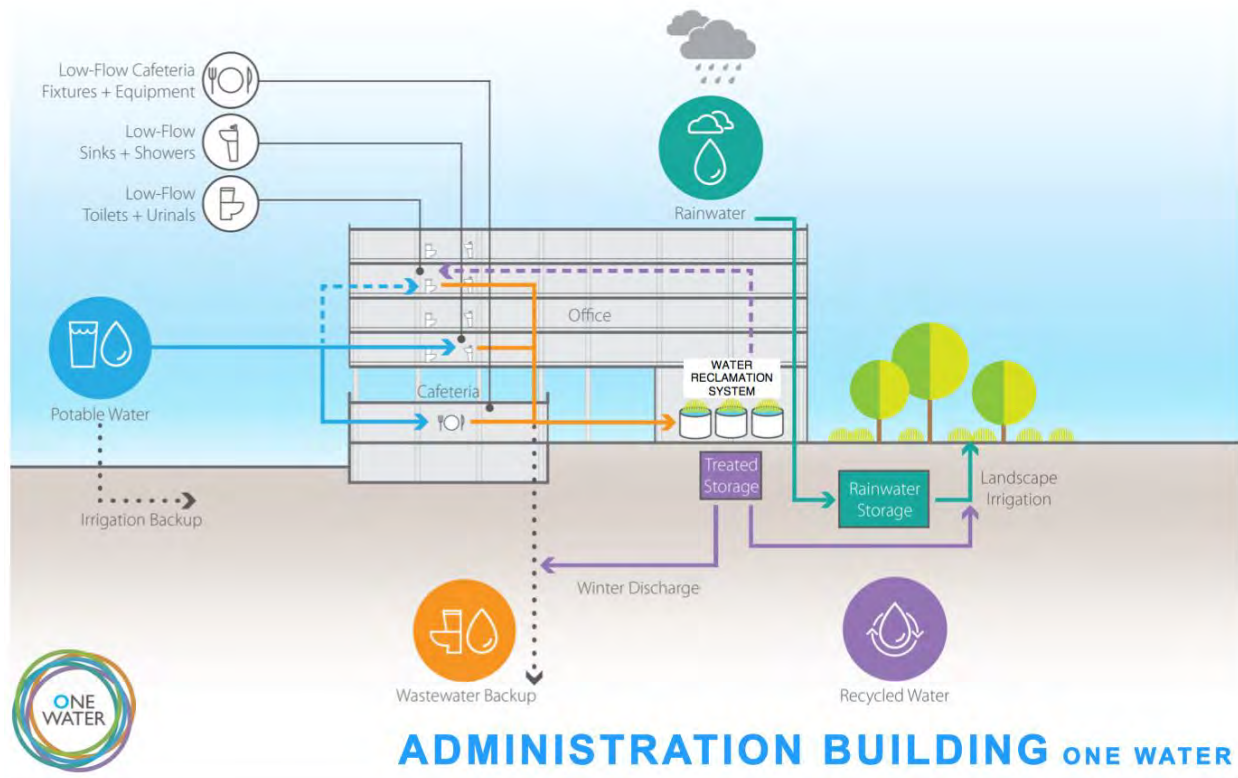
One Water benefits:



What is Denver Water doing to support One Water approaches?

- One Water is a key element in long-range planning.
- Recycled water offsets potable-water supply for large water users.
- The Operations Complex Redevelopment incorporates a localized water recycling system and rain water harvesting into the design.

One Water design for Denver Water's new Administration Building:



- The National Western Complex stormwater management approach will improve water quality in the Platte River and recycled water will be used for irrigation, dust control, and other major demands.
- The Sun Valley Economic District design goals include minimizing total water consumption, maximizing alternative water sources, and minimizing wastewater discharges.

What's Next?

Denver Water will continue working with other water management agencies, the development community and customers to increase our knowledge base on One Water approaches and address challenges around technical complexity, policy, cost and perception. One Water principles will promote Denver Water's approach of working across a broad group of stakeholders to develop the best water solutions for the communities we serve and provide the right water for the right use.

Attachment B: State Legislation

HB17-1364 Authority Local Government Master Plan Include Water Plan Goal

- This bill would specify that master plans for developments **must include** water conservation policies, to be determined by the county or municipality and **may include** goals specified in the state water plan and **may include** policies to implement water conservation and other state water plan goals as a condition of development approvals. This bill would have mandated the inclusion of water conservation into master plans but left the determination of those goals up to local governments.
- Rep Arndt sponsored and then asked that this late bill be postponed indefinitely.
- Denver Water did not take a position but did not see how this bill would have made much progress on linking land use planning and water planning.

HB16-1313 Authority Local Government Master Plan Include Water Plan Goal

- This bill would specify that master plans for developments **may incorporate** water conservation and water management goals including those specified in the state water plan and **may consider including** recommended policies to implement the goals as a condition of development approvals. This bill would have been completely voluntary by local governments in including water conservation into master plans.
- This bill made it through the House and was postponed indefinitely in the Senate.
- Denver Water did not take a position but did not see how this bill would have made much progress on linking land use planning and water planning.

SB15-008 Promote Water Conservation in Land Use Planning

- The bill directs the Colorado water conservation board (CWCB), in consultation with the division of planning in the department of local affairs (DOLA), to develop and provide free training programs regarding best management practices for water demand management and water conservation, and make recommendations regarding how to better integrate water demand management and conservation planning into land use planning. Taking the training can be a factor in obtaining certain state funding.
- This bill passed and was signed into law.
- Denver Water supported this bill.

SB14-017 Limit Use of Ag Water for Lawn Irrigation

- The bill prohibits a local government from approving an application for a development permit unless the local government has adopted an enforceable resolution or ordinance that limits, as a prerequisite for approval of the development permit, the amount of irrigated grass on residential lots in the development to no more than 15% of the total aggregate area of all residential lots in the development. Irrigated means supplied with water for lawn grass and does not include the use of raw water for irrigation. The 15% limit applies only if any part of the water supply for the development is changed from agricultural irrigation purposes to municipal or domestic use on or after January 1, 2016.
- This bill passed and was signed into law.

- Denver Water did not take a position on this bill since it is really a land use issue and not a water rights issue.

HB08-1141 Sufficient Water Supplies for Land Use Approval (as amended by HB17-1273)

- For a new development of more than 50 single-family equivalents that includes new water use, a local government shall not approve the application unless it determines there is an adequate water supply. There are three types of requirements for new developments based on their source of water supply:
 1. For developments served by a water provider that has a water supply plan as defined in the bill and the plan is on file with the local government that approves the application, then the development has fulfilled the adequate water supply plan requirement,
 2. For developments served by a water provider that does not have a defined water supply plan, the water provider must supply to the developer a letter describing the water supply and must include; an estimate of the water supply requirements, description of the physical water supply, estimate of the water yield, water conservation measures that will be taken, water demand management measures that will be taken, and any other information required by the local government.,
 3. For developments that are not served by a water provider, the developer must generate a report that must include: an estimate of the water supply requirements; description of the physical water supply; estimate of the water yield; water conservation measures that will be taken; water demand management measures that will be taken; and any other information required by the local government.
- In 2017 this statute was amended by HB17-1273 The bill amends the definition of an adequate water supply to include reasonable conservation measures and water demand management measures to reduce water needs and account for hydrologic variability and prohibits the local government from approving the permit application unless the applicant demonstrates that appropriate water conservation and demand management measures have been included in the water supply plan.