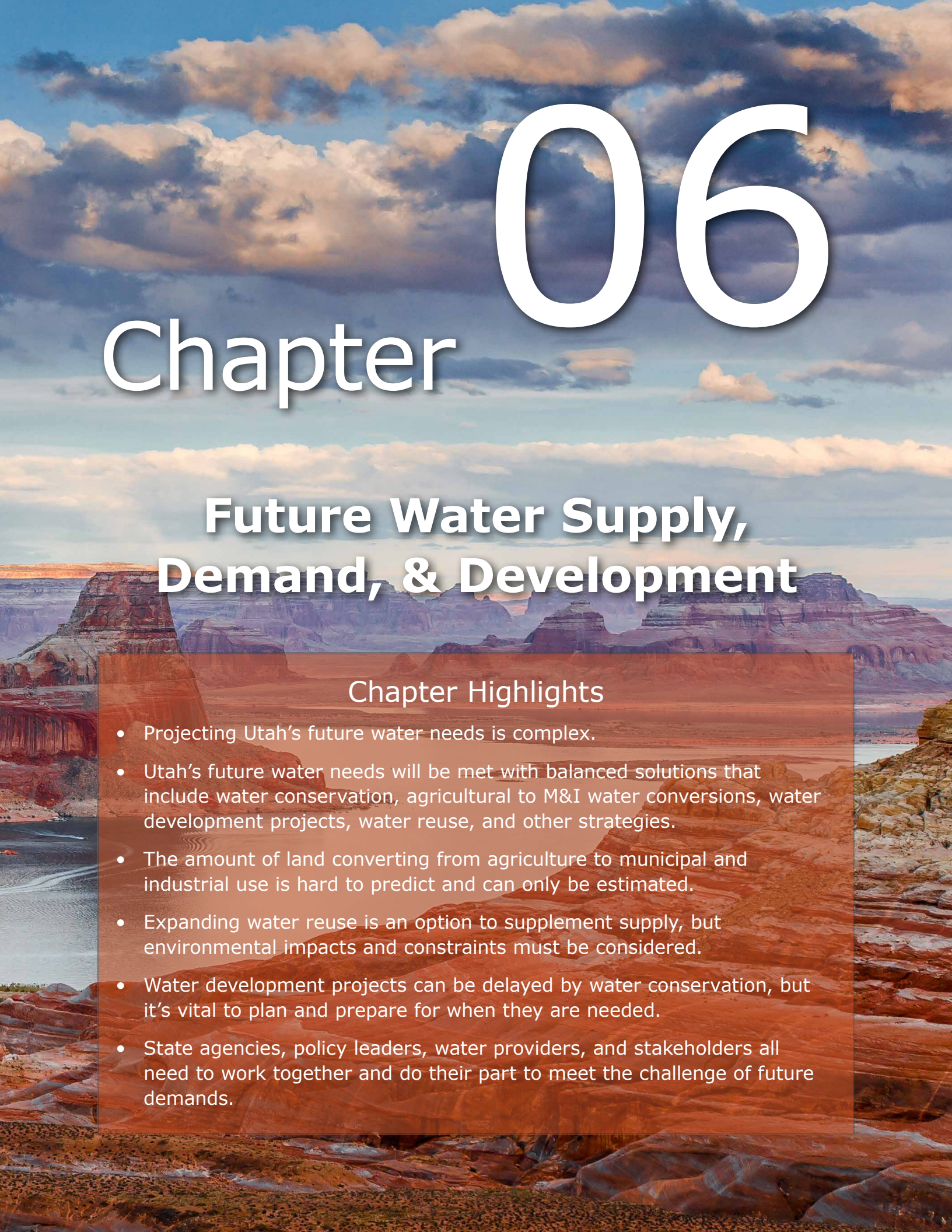


Chapter 06

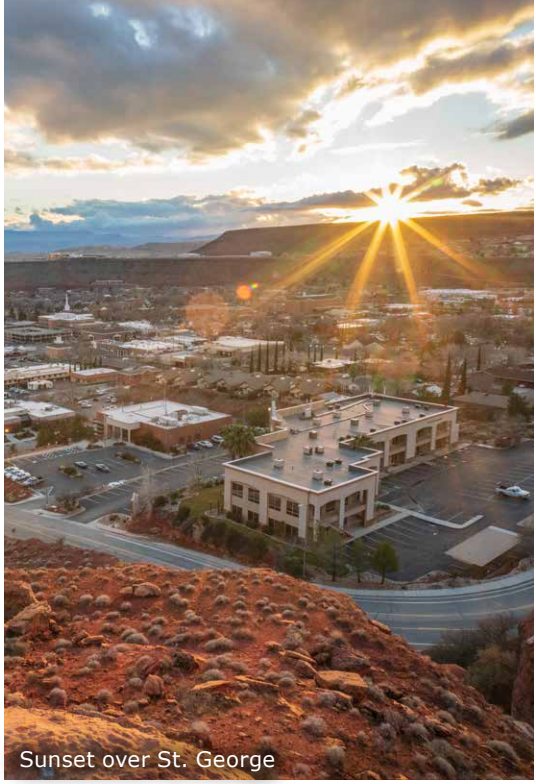
Future Water Supply, Demand, & Development

Chapter Highlights

- Projecting Utah's future water needs is complex.
- Utah's future water needs will be met with balanced solutions that include water conservation, agricultural to M&I water conversions, water development projects, water reuse, and other strategies.
- The amount of land converting from agriculture to municipal and industrial use is hard to predict and can only be estimated.
- Expanding water reuse is an option to supplement supply, but environmental impacts and constraints must be considered.
- Water development projects can be delayed by water conservation, but it's vital to plan and prepare for when they are needed.
- State agencies, policy leaders, water providers, and stakeholders all need to work together and do their part to meet the challenge of future demands.


Pelicans on Great Salt Lake


As new families move to Utah, water demands will increase
PC: Nate Bonney


Sunset over St. George

Water is complicated, and understanding when additional water will be needed requires a detailed accounting of current water and reasonable predictions of future water demands. Utah's future water supply will come from a combination of water conservation, agricultural to M&I water conversions, water development projects, water reuse, optimization, and other management strategies. Water conservation may delay the need for new development projects, but it's critical to continue to plan and prepare for when projects are needed.

When planning for water needs, environmental impacts and constraints must be considered. Solutions require collaboration among state agencies, policy leaders, water providers, and various stakeholders to meet the challenge of future demands. This chapter focuses on when and where future water supplies will be needed and identifies several projects and strategies that will help satisfy these needs.

Using Supply and System Demand Estimates to Predict Future Needs

Future water supply and demand uncertainties make predicting future needs challenging. However, when you put the Division's best estimates of 2015 reliable supplies (from Chapter 3) and the demand projections (from Chapter 4) together, a picture of possible future water needs begins to take shape.

Figure 6-1 depicts the reliable supply and system demand projections for the state. The chart's system demand projections are made up of the customer demand projection scenarios (from Chapter 4) with the addition of approximately 15% to account for water loss in water distribution systems (BCA & HAL 2018). The dark blue shaded area in Figure 6-1 shows the 2015 reliable supply for Utah – for simplicity, it is assumed to remain constant through 2070. This area does not

include any new supplies added since 2015 or into the future. This simplified figure demonstrates both the utility and limitations of the data collected.

A typical supply and demand curve illustrates a general timeline of when existing reliable supplies will be exceeded for an area. However, the figure can be misleading, which is the case with Figure 6-1. If all of the reliable supply in the state is and will be available to all M&I water users, the figure is a good illustration. Since communities and water supplies are widely dispersed and impossible to interconnect statewide, some regions and individual water systems throughout the state will run short of water sooner than Figure 6-1 indicates, and others will have an adequate supply for many more decades.

Demand Model Scenarios

No Change

- Expected growth rates
- Baseline (2015) rates of use
- No climate change considered

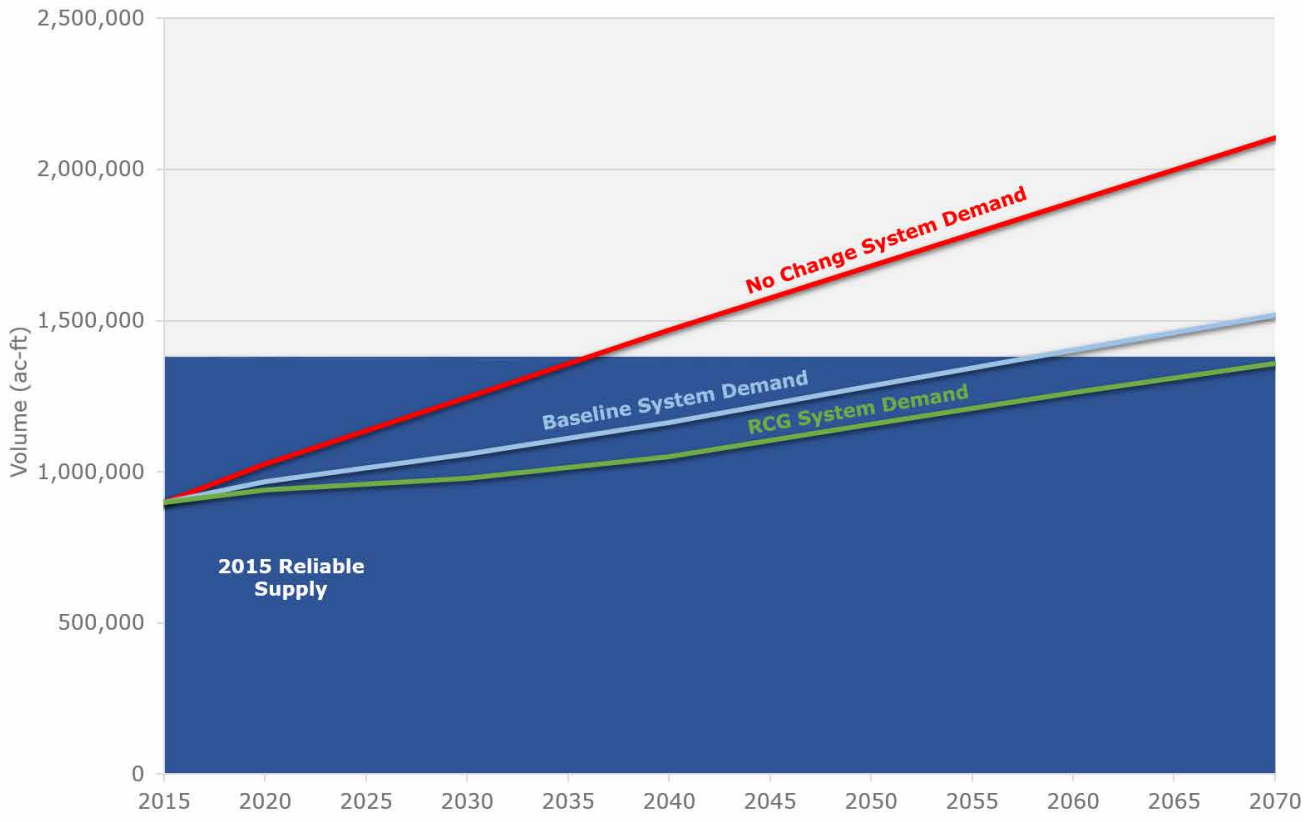
Baseline

- Expected growth rates
- Current (2019) conservation practices and trends in place
- Climate change increase of 11% ETNet by 2070

Regional Conservation Goals

- Expected growth rates
- Meeting regional conservation goals through additional conservation practices
- Climate change increase of 11% ETNet by 2070

Figure 6-1 Water Supply vs. System Demand for the State of Utah



Paddleboarding
PC: Candice Hasenyager

In a relatively small geographic area where the population is concentrated and water systems can share water supplies, the supply and demand curve can provide a good timeline of regional need. The St. George area is a good example of this (see Figure 6-4 presented later in this chapter). The Washington County Water Conservancy District connects many of the nearby cities through its regional supply pipeline network, allowing most of the population to be supplied through interconnected water distribution.

Water Conservation, Agricultural to M&I Conversions, and Development Work Together

Planning now for future water supplies is necessary. While water conservation is important (see Chapter 5), water conservation alone will not be sufficient to meet all future needs. Agricultural to M&I conversions and further water development will also be necessary.

Utahns have communicated they value maintaining a vibrant agricultural sector. As communities grow, water that is currently tied to agricultural land and that can be converted to urban use as the land is developed will account for some of the needed supply – so there will likely be a decrease in agriculture land in urban areas. Historically, as Utah's population increased, the easily accessible water was developed. Most water development options that remain are larger, more costly projects. Water development decisions should be made using the best science, engineering, data, system

management, and accounting practices. Meeting future water needs will require the creative use of a variety of solutions.

Estimating Agricultural to M&I Conversions

As the state population grows, urban areas will grow and develop nearby agricultural lands. Where agricultural lands are developed, water associated with those lands will typically be transferred for municipal and industrial use. The Division developed a model to estimate the amount of water that could be added to M&I supplies through the transfer process. Statewide, the amount of water that may become available as a result of agricultural land conversion to M&I use from 2020 through 2070 is estimated between 147,000 acre-feet and 245,000 acre-feet. Table 6-1 shows potential water transfers over the review period by basin. The Wasatch Metro area is the sum of Jordan River, Utah Lake, and Weber basins.

These results are a general range of possible additional water supply. The Division does not predict when or which agricultural lands will be developed. This happens on a willing buyer, willing seller basis. These limitations make projecting future additional supply at a specific place and time impossible. The general projections inform planners of possible water resources and a general amount. More detailed research must be conducted at the local level to better understand actual transfers.

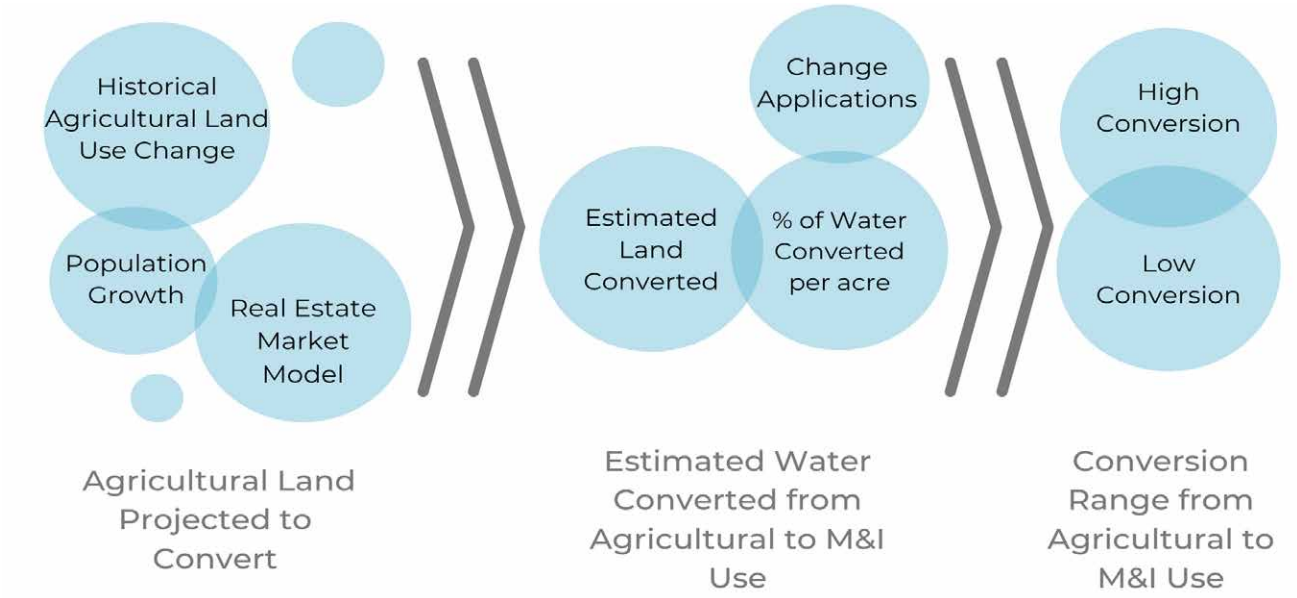
The Division's process for estimating future agricultural land and water transfers, shown

Table 6-1 Estimated Agricultural to Municipal and Industrial Conversion by Basin in acre-feet

	2020-2030		2030-2040		2040-2050		2050-2060		2060-2070	
Basin	Low	High	Low	High	Low	High	Low	High	Low	High
Bear	2,600	4,300	3,600	6,000	8,100	13,600	8,000	13,400	8,000	13,400
Cedar/Beaver	300	400	400	700	600	1,100	600	1,000	600	1,000
Kanab/Virgin	300	500	600	1,100	1,100	1,900	900	1,700	900	1,700
Jordan River	2,400	3,900	1,700	2,800	1,200	1,900	1,000	1,700	1,000	1,700
Utah Lake	8,200	13,700	8,100	13,400	10,500	17,600	8,700	14,500	8,700	14,500
Uintah	100	200	100	100	100	200	100	100	100	100
Sevier	1,000	1,600	1,400	2,300	1,900	3,100	1,700	2,900	1,700	2,900
West Desert	2,600	4,300	2,900	4,800	3,500	5,900	3,000	5,000	3000	5,000
Weber	9,500	15,800	7,400	12,300	7,300	12,200	5,900	9,800	5,900	9,800
*Wasatch Metro	20,100	33,400	17,200	28,500	19,000	31,700	15,600	26,000	15,600	26,000
State Total	**27,000**	**44,700**	**26,200**	**43,500**	**34,300**	**57,500**	**29,900**	**50,100**	**29,900**	**50,100**

*Wasatch Metro is the combined total of Jordan River, Utah Lake, and Weber basins.

Graphic 6-1 Agricultural to M&I Conversion Estimation Process



in simplified terms in Graphic 6-1, relies upon existing models and information from the following sources:

- Utah Division of Water Resources
- Utah Division of Water Rights
- Kem C. Gardner Policy Institute
- Wasatch Front Regional Council

The Division's Water-related Land Use Program survey results were used to determine how much land in each county changed from agricultural to urban use in the past. Water-related land use surveys published in 2000, 2010, and 2017 established a historic basis for Utah's projections. The Division found that 19 counties are trending toward decreasing agricultural land. The 19 counties are Beaver, Box Elder, Cache, Carbon, Daggett, Davis, Iron, Kane, Millard, Piute, Salt Lake, Sanpete, Sevier, Summit, Tooele, Uintah, Utah, Washington, and Weber.

The Division obtained water right change application data from the Division of Water Rights to determine how much water was transferred from agricultural to municipal use over that same period of record (2000 through 2017). The amount of water that is depleted by an irrigation water right varies geographically. The Division used an approximate statewide average value to estimate the amount of water allowed to be depleted under all approved change applications transferring agricultural water rights to new municipal uses.

Kem C. Gardner Policy Institute's county population projections (Gardner Policy Institute 2019) were used to calculate the growth rate and identify fast-growing counties. Of the 29 counties in Utah, 15 counties were eliminated from further review because the projected growth can likely be supported without significant agricultural land and water transfers. The remaining 14 counties are Box Elder,

Cache, Davis, Iron, Juab, Morgan, Salt Lake, Sanpete, Summit, Tooele, Utah, Wasatch, Washington, and Weber. A table of counties ranked by population growth rate is found in Appendix F. Juab County is particularly interesting because its population is growing rapidly, but its agricultural land area is also increasing. This indicates agricultural water transfers are likely not being used to provide water for the growing population. Therefore, Juab County was removed from further analysis. The Division created projections for the remaining 13 counties.

Land parcel development results came from the Wasatch Front Regional Council Real Estate Market Model (Real Estate Model). Although this model is specific to urban counties (i.e., Weber, Davis, Salt Lake, and Utah), the Division also used it to inform estimates of land transfers near urban areas in other counties. The Division assumed land transfers near fast-growing urban areas will occur in the same manner as the Real Estate Model projects.

After the historic land use data was analyzed and graphed (Appendix F), the Division correlated the findings with recent (2017 and 2018) data for population and water-related land use to generate a trendline. The trendline was extended to project out to 2065. A ratio of county agricultural area to the Wasatch Front Regional Council area was used to scale projected land transfers in each of the 13 counties that were analyzed.

The Utah Division of Water Rights' Utah Water Duty map (Appendix F) was used to estimate the amount of water associated with land transfers. The Division calculated an average water duty for each county (Appendix F) weighted by the irrigated area in each water duty zone. Agricultural land transferred to municipal use was multiplied by the average county water duty to estimate the amount of water which may become available for development.

Table 6-2 shows the results of this process. The "Low Range" value is 25% less than the calculated value, and the "High Range" value is 25% more than the calculated value. The wide range for the estimates reflect uncertainty in base assumptions.


Fruita Historical District, Capital Reef National Park

Kanarra Creek Upper Falls
PC: Todd Stonely

Table 6-2 Potential Conversion from Agricultural to Municipal and Industrial (M&I) Use

County	Low Range	Calculated Value	High Range
	ac-ft		
Box Elder	5,900	7,800	9,800
Cache	22,600	30,100	37,600
Davis	9,300	12,400	15,500
Iron	1,400	1,800	2,300
Morgan	1,100	1,400	1,800
Salt Lake	6,800	9,000	11,300
Sanpete	7,100	9,400	11,800
Summit	8,100	10,800	13,500
Tooele	11,700	15,600	19,500
Utah	38,500	51,300	64,100
Wasatch	600	800	1,000
Washington	4,100	5,500	6,900
Weber	15,700	20,900	26,100
Total	**132,900**	**176,800**	**221,200**

Estimated conversion for years 2020 through 2065. (Note: The Division of Water Resources' results have not been independently validated.)

How Much Is Enough?

Knowing the reliable supply and agricultural conversion estimates helps water providers determine when additional water supply or infrastructure may be needed. Comparing the reliable supply of an individual system with its projected system water demands indicates approximately when the reliable supply will be exceeded. At a statewide level, the projections are more general and cannot be used to make specific conclusions about when and where additional water supplies will be needed.

As mentioned before, communities and water supplies are widely dispersed and impossible to interconnect statewide. So water supply

from northern Utah is not available to meet water demands in southern Utah. Local analysis results in more accurate projections. Nevertheless, statewide projections are useful to provide general observations. Figure 6-2 shows the supply and system demand for the State of Utah.

Individual reliable supply estimates for 2015 have been summed statewide and are shown in dark blue. The white-dashed line that curves down toward the right side of the figure represents the potentially diminished reliable supply due to the effects of climate change. Predicting the impacts of climate change on future water supplies is difficult, and the Division is preparing models to help refine these estimates in the future. Regional water providers have already seen the impacts of climate change on their supplies, and these observed trends are generally consistent with the projected 10% potential decrease by 2070 depicted. The lighter blue areas show the estimated quantities of additional M&I water coming from agricultural conversions over the next 50 years.

The solid lines show the system demand projections under various demand model scenarios. The solid red line depicts the 2015 M&I use rates applied to population growth without additional conservation or consideration of climate change. The solid, light-blue line depicts current conservation practices and trends plus increases in net ET (evapotranspiration) due to climate change. The solid green line depicts the same increases in net ET plus reaching Regional Conservation Goals (RCG).

When demands exceed the 2015 reliable supply depends upon population growth,

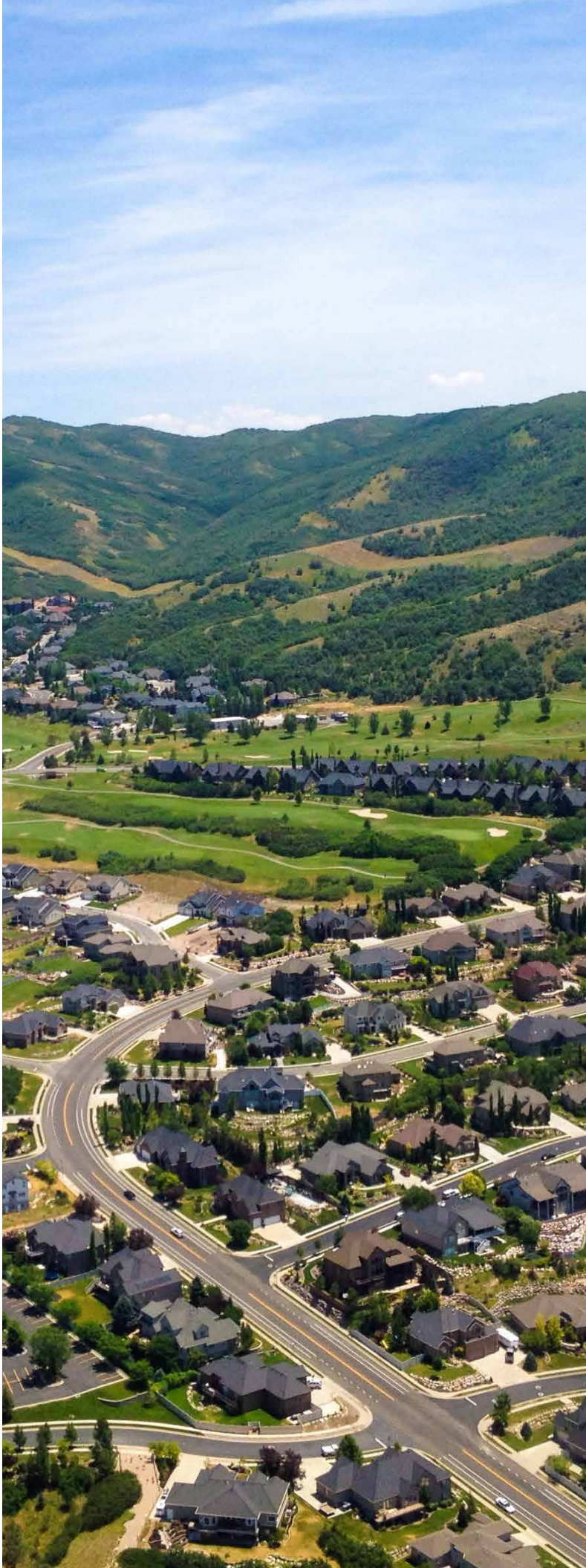
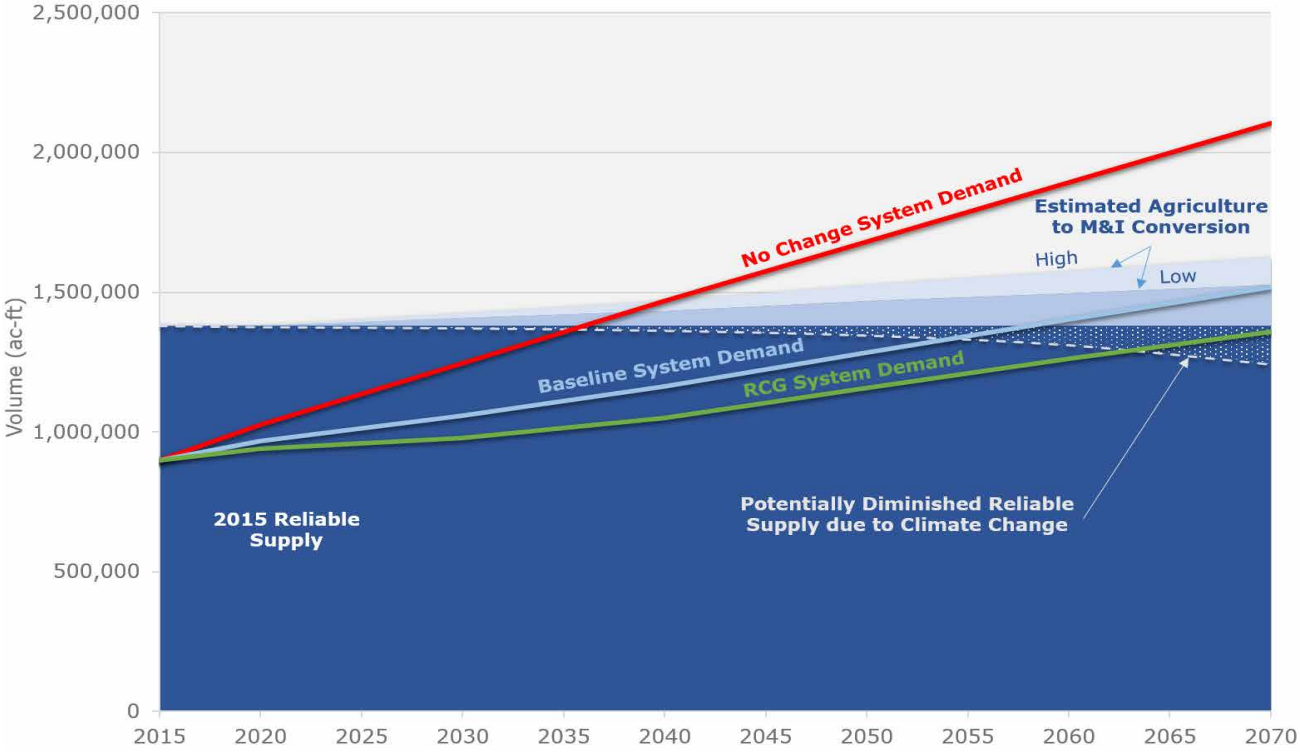


Figure 6-2 Water Supply and System Demand for the State of Utah

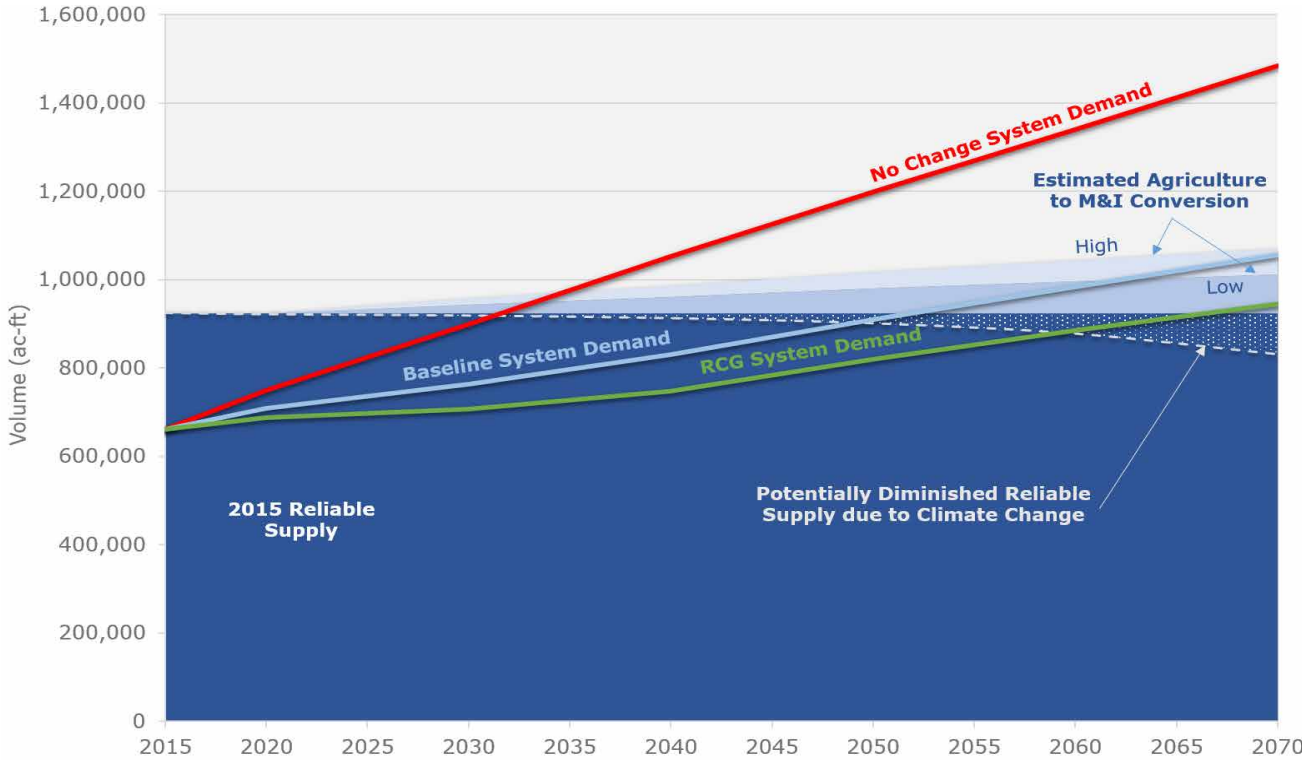


the level of conservation or water use reduction that is achieved, and the amount of water converted from irrigated agriculture. Projecting 2015 use forward with future population projections (red line) shows the 2015 reliable supply will be exceeded sometime between 2030 and 2040. If 2015 programs and efforts to promote water conservation are continued, that date may be pushed out nearly to 2055 (light blue line) even when considering estimated reductions in supply due to climate change. Add in agricultural conversions, and the state appears to have sufficient water through 2070. If the state meets the regional goals and the projected milestones, 2015 reliable supplies would be sufficient without agricultural conversions beyond 2060.

The reliable supply of a region, such as a river basin or several basins, can also be represented by summing the supply of individual systems as shown in Figure 6-3, for the Wasatch Metropolitan (Metro) Area. In this area, a lot of irrigated land has been converted and is being used by cities and water conservancy districts. The estimated amount of future agricultural water conversions will not satisfy the needs of the growing population of the Wasatch Metro Area beyond 2070 without more conservation.

Although the Wasatch Metro Area has some interconnectivity between supplies and systems, local shortages will occur sooner than Figure 6-3 indicates. Additional demand could be met through agricultural conversions alone through 2050 if the Regional Conservation Goals are met. Much of the remaining irrigation water comes from Utah Lake because it's unsuitable for M&I use without extensive filtration.

Figure 6-3 Water Supply and Demand for Wasatch Metro Area



Also, a portion of the current, reliable supply is secondary water. Supplementing potable water with secondary water will require additional treatment capacity to convert secondary water to culinary use when it's needed. Converting existing communities to a dual water system using poorer quality secondary water will also require new infrastructure. The complexities of water supply for local demands are not easily illustrated in these figures.

Figure 6-4 illustrates the need for water in southwest Utah. Even with water conservation and agricultural to M&I conversions, additional water will be needed in the Kanab Creek/Virgin River basin within the next 10 years to accommodate projected population growth. Agricultural conversions will only contribute a small amount to the reliable water supply due to limited irrigated agriculture remaining.

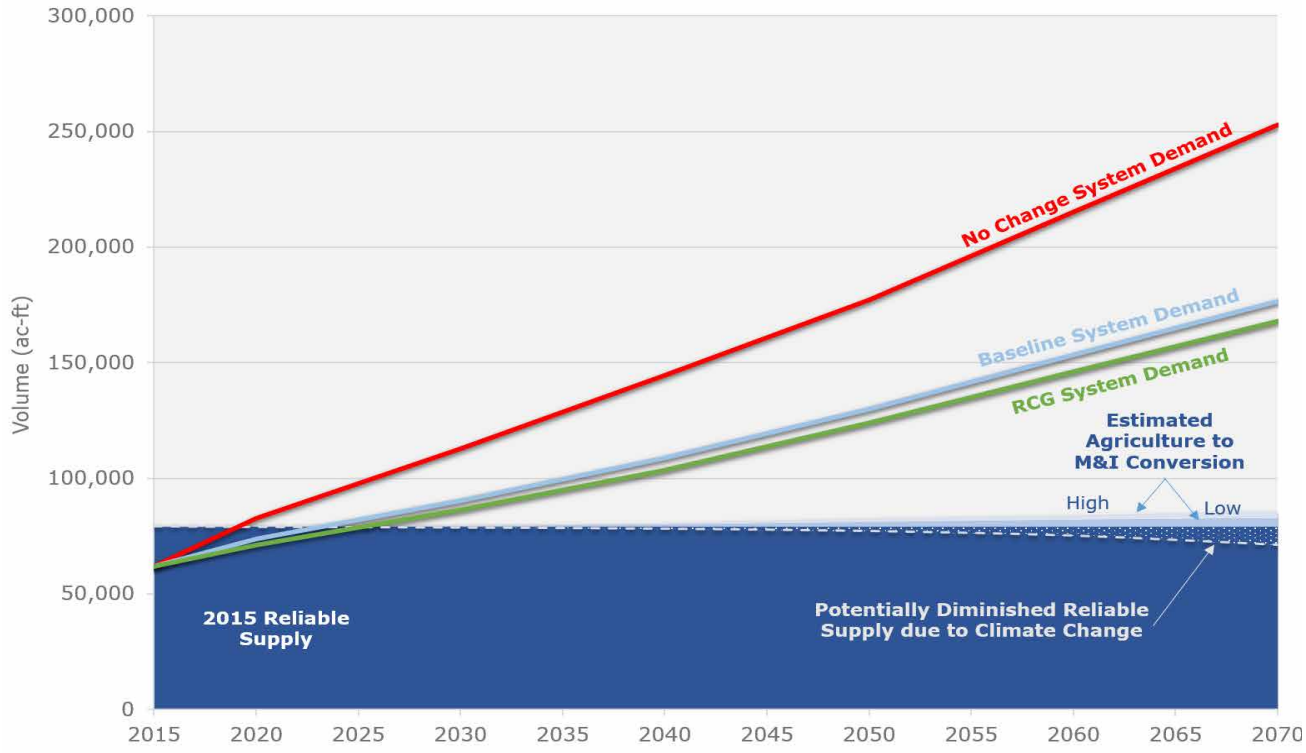
Figure 6-4 represents 2015 reliable water supplies for the region. The population is served by an interconnected water supply system with limited water supply options.

The Santa Clara River and Virgin River flows are fully developed. Washington County residents achieved a 25% water-use reduction by 2015 and have continued to make progress. Reaching the target regional conservation goal will only extend water supplies by two or three years. The addition of approximately 84,000 acre-feet of water from the proposed Lake Powell Pipeline project will delay water shortages.

Water Supply Infrastructure Needs

Water infrastructure refers to all of the components of water systems (dams, pipelines, water treatment plants, pumping

Figure 6-4 Water Supply and Demand for Kanab/Virgin River Basin



Note: Similar figures for each basin with a brief description of conditions are located in Appendix G.

plants, wells, etc.) that move and treat water. Once installed, system components gradually degrade or become inadequate. Corrosion and wear weaken metals and concrete, and soil pressures stress pipes. Pipelines, originally installed with capacities anticipating future needs, may soon be inadequate due to accelerated development, growing populations, and changing standards. Keeping up with system maintenance and growth requirements is expensive, so many water systems address issues as they occur. With the projected population growth anticipated over the next 50 years, the existing infrastructure will need to be replaced and upgraded in most areas.

In 2020, the major water conservancy districts in the state (also known as Prepare60) and Division of Water Resources updated the Statewide Water Infrastructure Plan (SWIP). The SWIP is a roadmap to plan for Utah's long-term future water needs. The plan focuses on conservation, infrastructure repair and replacement, regional and federal projects, and state projects. It evaluates water supply needs, conservation efforts, and infrastructure investments necessary to serve Utah's rapidly growing population. The plan only considers municipal and industrial water and excludes stormwater, wastewater, and agricultural needs.

*The following two pages were provided by Prepare60 and summarize the 2020 SWIP.

STATEWIDE WATER INFRASTRUCTURE PLAN

To prepare for substantial population and economic growth, Utah and its municipal water providers will need to spend an estimated $38 billion on repair & replacement, conservation, and new supply projects.

ACTIONS NEEDED

Looking to the future requires more than just projections. Each river basin in Utah will need to take action in the following areas:

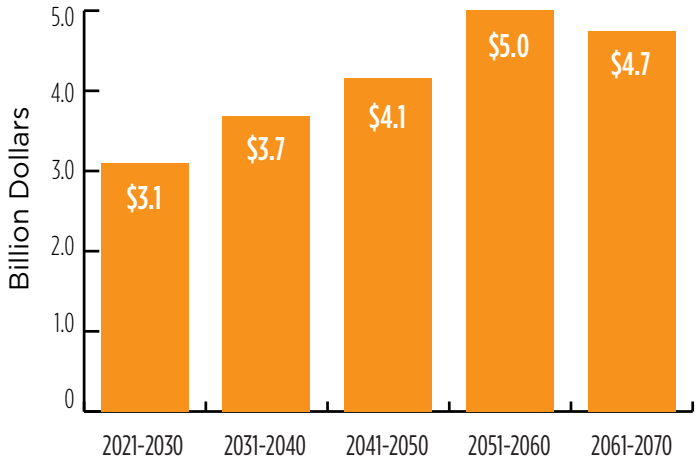
- Water conservation
- Repair and replacement of aging infrastructure
- Watershed protection
- Conversion of agricultural water as land is developed
- Water reuse projects
- Development of new infrastructure and water supplies, both local and regional

ESTIMATED STATEWIDE INFRASTRUCTURE COSTS

Below is a summary of anticipated costs. Detailed cost breakdowns for each basin are available on pages 6-16 of this report.

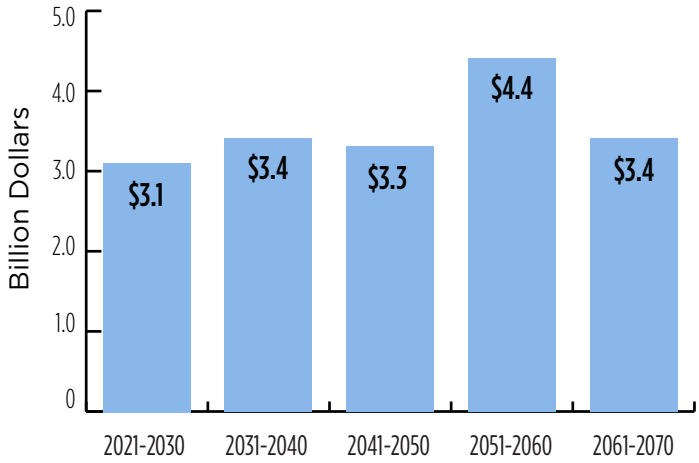
REPAIR & REPLACEMENT OF AGING INFRASTRUCTURE

$20.6 BILLION



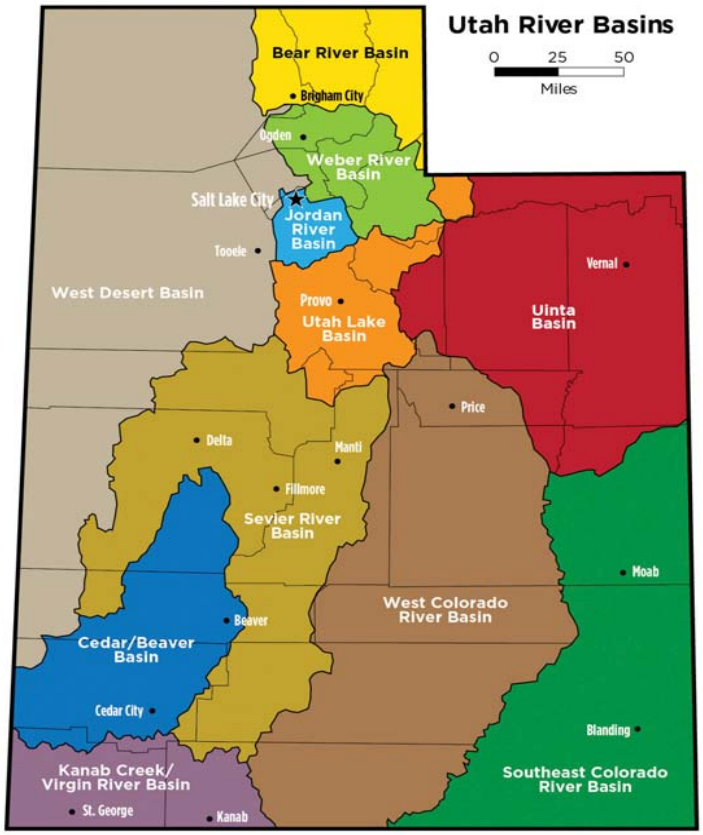
NEW INFRASTRUCTURE, WATER SUPPLIES, and WATER SUPPLIER CONSERVATION COSTS

$17.6 BILLION



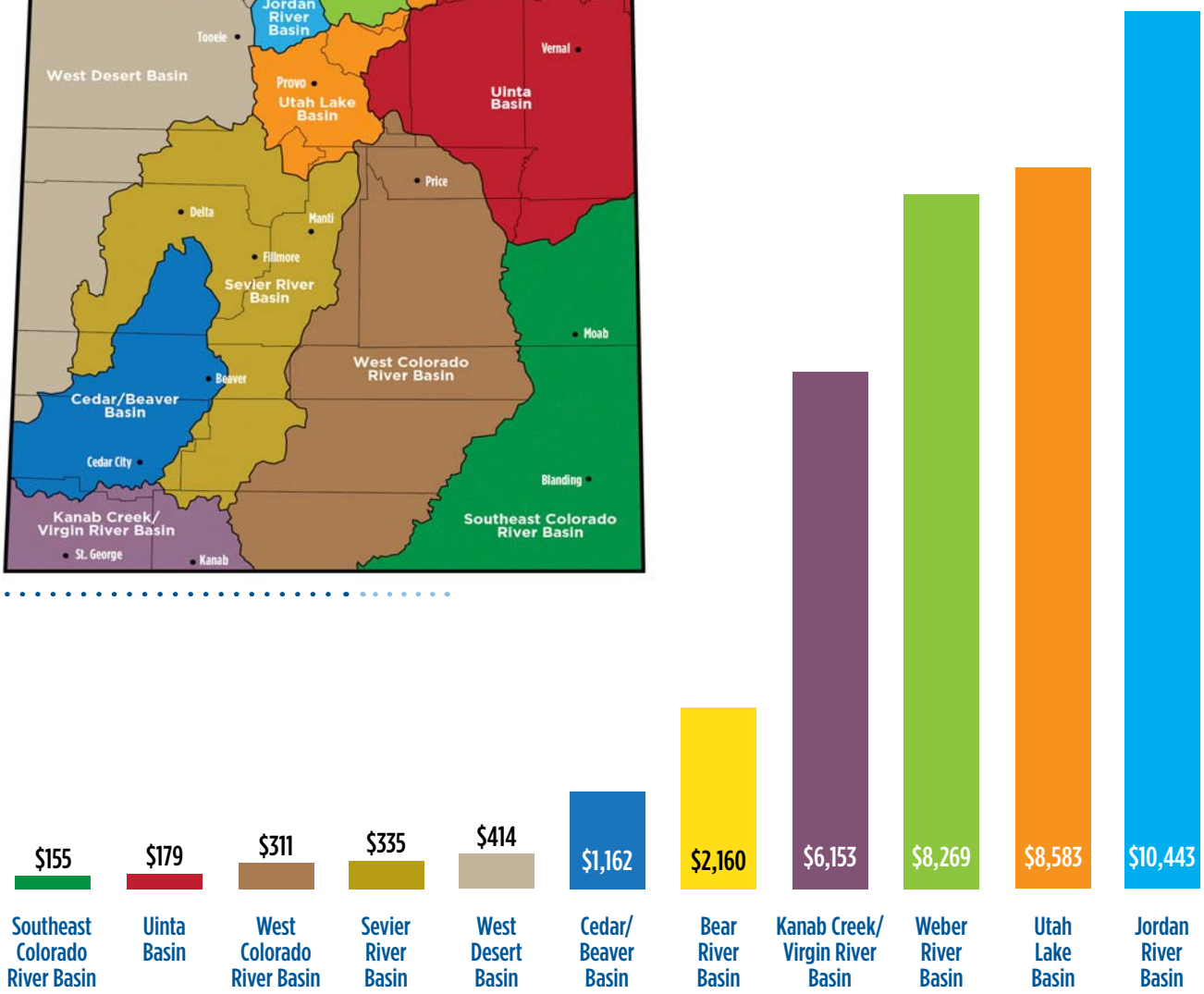
Statewide cost projections by decade in billions of dollars, not including **$9.5 billion** in conservation costs paid by businesses and homeowners.

TOTAL INVESTMENT NEEDED in Millions of Dollars



Totals include:

- Water Conservation (supplier costs)
- Supply & Infrastructure
- Repair & Replacement



Securing current and future generations' water supply =

$38 BILLION

(not including an additional $9.5B in community conservation costs)

Development Projects

If you turn on the tap and water comes out, you've benefited from a water development project. Past water planners and managers recognized the need to develop supplies for future generations, and Utahns have water as a result. Today's water planners and managers are committed to ensuring future generations have a clean, safe, and accessible water supply via various solutions, including water development projects. The dialogue below describes some major water developments already in place or currently being planned, including several mandated by legislation. Notwithstanding these directives, not everyone agrees with the need for, or the specifics of, the proposed projects. Each project will go through a National Environmental Policy Act process, which allows for public comment and input before the best course of action is determined.

Central Utah Project

The Central Utah Project (CUP) began in the 1950s under the direction of the U.S. Bureau of Reclamation. The purpose of the project was to provide water from the Green River to the Great Basin (Wasatch Front), using some of Utah's Colorado River allocation. Initially, the project consisted of six units: Bonneville, Jensen, Vernal, Uintah, Upalco, and Ute Indian. The largest and most complex of these is the Bonneville unit, which diverts water from the Uintah Basin to the densely populated Wasatch Front. The Central Utah Water Conservancy District (CUWCD) operates the Bonneville Unit. The other units were designed to provide for the development of local water supplies within the Uintah Basin. The CUP develops water for irrigation, municipal and industrial use, and power generation. The project is also managed to provide flood control, recreation, environmental, and water quality benefits.

Central Water Project

CUWCD has taken on another unique project, the Central Water Project. This project will provide approximately 53,300 acre-feet of culinary water to customers in northern Utah County and southern Salt Lake County. The district purchased the water rights for this project from the former Geneva Steel owner, U.S. Steel Company. The project is estimated to be fully developed over 25 years.

Lake Powell Pipeline Project

In 2006, the Utah Legislature passed the Lake Powell Pipeline Development Act (Utah Code 73-28), directing the Board of Water Resources (Board) to construct the Lake Powell Pipeline (LPP). At full capacity, this water delivery project will deliver up to approximately 84,000 acre-feet of water to diversify and augment the water resources needed to serve the expanding economy and growing population in southwest Utah. Population growth projections in Washington County show that water demand will exceed local supplies, resulting in shortages if additional water sources aren't developed in the next decade despite increased conservation achievements.

According to the Kem C. Gardner Policy Institute, Washington County is projected

to experience the most rapid growth rate (229%) in the state. As of 2020, the county is home to almost 200,000 residents and is projected to exceed 500,000 by 2065. The county also has many seasonal residents and more than 6 million annual visitors.

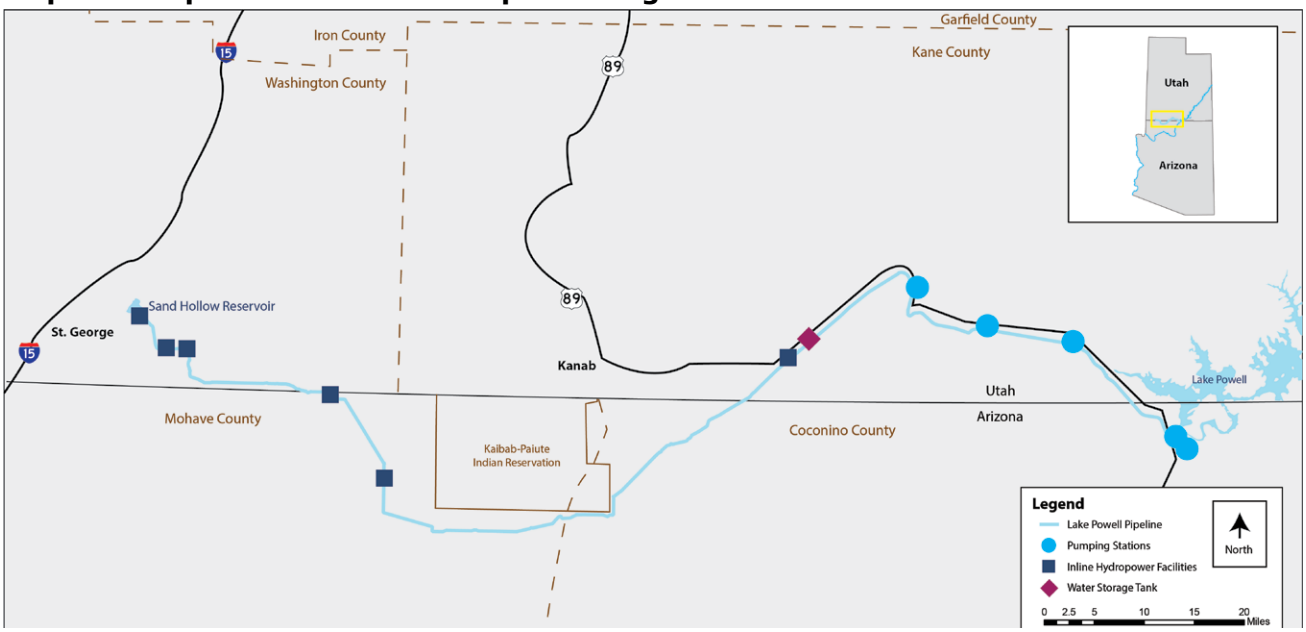
Unlike the residents of the Wasatch Front who receive water from local and imported sources (such as the Colorado River), most residents in Washington County are primarily dependent upon a single water source – the Virgin River basin. This river basin has variable water quality and quantity. The LPP will diversify the region's water sources and build more resiliency and reliability for current and future residents. The LPP will consist of approximately 140 miles of underground pipeline, five pump stations, and six hydroelectric generation facilities (see Map 6-1).

The LPP is part of a comprehensive, long-term water supply plan that includes new resource development and increased water conservation. The Bureau of Reclamation is leading the project through the National Environmental Policy Act (NEPA) review. The draft Environmental Impact Statement (EIS) was released on June 9, 2020. A supplemental draft EIS is currently underway to address comments received during the public comment period. Visit LPPUtah.org for more information and project updates.

Central Iron County Water Supply Projects

Cedar Valley, in Iron County, is a terminal basin with little surface water (supplied primarily from Coal Creek) and declining groundwater. The aquifer that supplies water to the residents and businesses within the valley is being overdrawn by about 7,000 acre-feet annually (DWRi 2012). Groundwater is "mined" when it's pumped from an aquifer faster than it can be refilled. A consequence of extensive groundwater

Map 6-1 Proposed Lake Powell Pipeline Alignment



Source: Washington County Water Conservancy District.

Man & dog kayaking on Lake Powell
PC:Marcie McCartney

mining in the Cedar Valley resulted in consolidation (subsidence) of soils, reduced aquifer capacity, and surface fissures. In layman terms, over time the aquifer materials compact. In response, the Central Iron County Water Conservancy District (Central Iron County) and many relying on the aquifer, have started groundwater recharge using excess flows and unused winter flow from Coal Creek.

Airport Recharge Project

In the first winter of operation, the Airport Recharge Project replaced about 2,000 acre-feet of water into the aquifer. Although this is a great step forward, the State Engineer is responsible for developing a groundwater management plan for the aquifer that will balance recharge and withdrawl. Even with a balancing plan, the needs of a growing population will have to be met by other means in the near future. Conservation and recharge alone won't meet the increasing needs in the valley, and water will need to be imported from other areas.

Pine Valley Water Supply and Conservation Project

In 2006, Central Iron County filed an application with the State Engineer for groundwater in the Hamlin (10,000 acre-feet), Pine (15,000 acre-feet), and Wah Wah (12,000 acre-feet) valleys, located to the northwest of Cedar Valley. The first phase of the West Desert Pumping Project is the Pine Valley Water Supply and Conservation Project (Pine Valley Project). It proposes pumping available groundwater from Pine Valley and delivering it to Cedar Valley.

Central Iron County began working on the permitting process for the project in 2013 by drilling test wells, conducting studies, and beginning the NEPA process. As part of the process, Central Iron County began working with Water Rights to create a groundwater management plan. This plan will outline the process to restore the Cedar Valley aquifer. In 2018, Central Iron County submitted an application for an EIS with

the BLM. A Record of Decision for the EIS is expected in 2022. The timeline is illustrated in Graphic 6-2.

If the project is approved, the pipeline will utilize new and existing rights-of-way to deliver the water. The preliminary cost estimate for the Pine Valley Project is about $254 million. The components of the two main lines will include approximately 66 miles of underground pipe, 13-16 wells, 5-8 pump stations, and a solar power generation plant. The Pine Valley Project will help bring balance to the Cedar Valley aquifer and provide for growth in the valley.

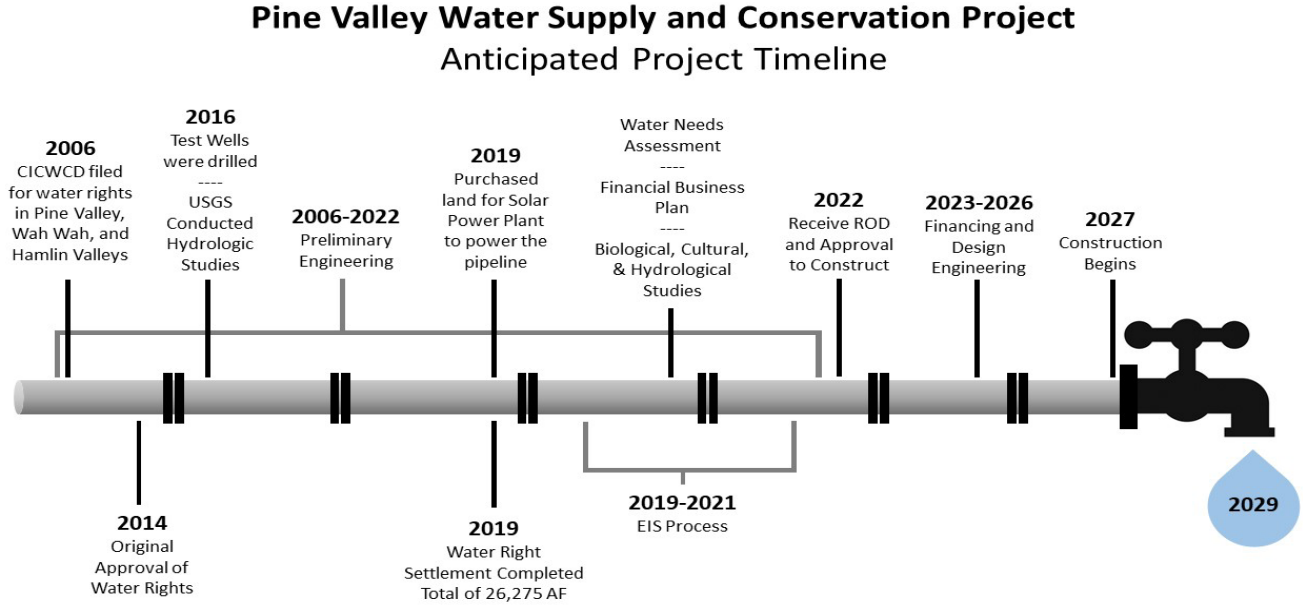
Bear River Development

In 1991, the Utah Legislature passed the Bear River Development Act (Act) (Utah Code 73-26). The Act directs the Division to "develop the surface waters of the Bear River and its tributaries through the planning and construction of reservoirs and associated facilities as authorized and funded by the Legislature." The "associated facilities" include pipelines, pump stations, and reservoirs.

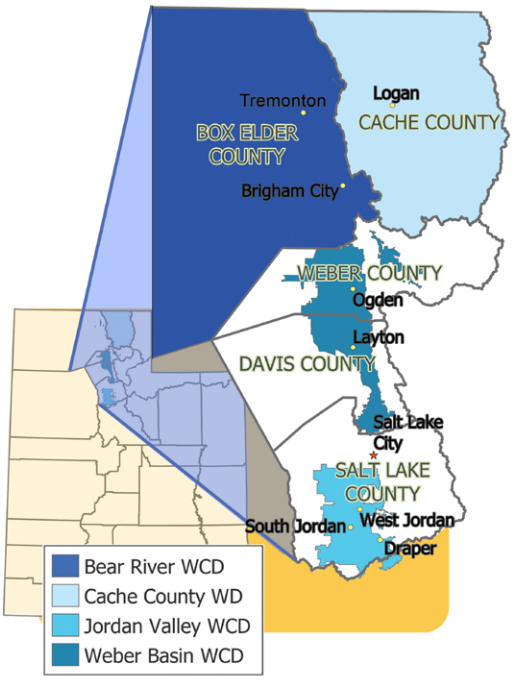
A large-diameter pipeline will be needed to convey water through Box Elder County to the West Haven Treatment Plant that will be built jointly by Weber Basin Water Conservancy District and Jordan Valley Water Conservancy District. Another pipeline may be needed to convey water to Cache County from a reservoir in Box Elder County. Reservoirs will be needed to store water after it is diverted.

When the legislation passed in 1991, the need for water from the Bear River Development (BRD) was expected in 2015. Conservation efforts, technology improvements (e.g. secondary meters), and smaller water projects have delayed the need. It's currently anticipated that BRD water will not be needed until after 2045-2050 or later. Graphic 6-3, details how much water will be used by each benefiting water district of the project.

Graphic 6-2 Timeline of Pine Valley NEPA Process & Development



Graphic 6-3 Bear River Development Allocation



Allocation

The Bear River Development will provide 220,000 ac-ft of water at full development to be distributed by the following water districts:

- Bear River WCD 60,000 ac-ft
- Cache WD 60,000 ac-ft
- Jordan Valley WCD 50,000 ac-ft
- Weber Basin WCD 50,000 ac-ft

Although the need for BRD water is projected to be three decades away, it's vital to continue the planning process by preserving rights-of-way for a large-diameter pipeline through Box Elder and Weber counties. Due to the potential size of this pipeline, 8 to 10 feet in diameter, as much as 100 feet in width of right-of-way is needed for future construction, placement, and maintenance purposes. The increasing development in Box Elder and Weber counties has heightened the need to begin the early acquisition of right-of-way. This will reduce future impacts to the surrounding communities.

In 2019, the Division completed a Bear River Development Feasibility Study to identify potential reservoir sites and pipeline corridors that could work together as one system. The study is a conceptual engineering overview of how the associated facilities and reservoirs would work together. It also provides a plan to phase construction so water is provided incrementally as needed.

Cost estimates were produced for 13 scenarios of reservoir combinations. These estimates range between $1.5 and $2.8 billion. An updated cost estimate will be prepared when the environmental studies are complete and alignment and design are determined. As stated in the Act, the cost of construction and environmental mitigation will be repaid to the state by the participating water districts. These districts will also pay for the operation, maintenance, and repair of the system, as well as any costs for water treatment.

An environmental review process, in accordance with the NEPA, will need to be completed prior to any construction.

Board of Water Resources Funding

The Board of Water Resources (Board) is the policymaking body of the Division. The Board was established to provide funding for water infrastructure projects (Utah Code 73-10). The financing comes from revolving funds established by the Utah Legislature. As projects are repaid, the funds are utilized again to assist in financing additional projects. Since the Board was established in 1947, it has provided over $850 million in funding for over 1,600 projects totaling approximately $2.3 billion.

The four accounts managed by the Board and specific funding programs within the funds are shown in Graphic 6-4.

Further information about the Board's funding programs is available on the Board Funding webpage.

Other Water Project Funding

Other state and federal agencies, boards, and commissions provide funding for water projects through grants and loans. The following is a list of some of the more common funding sources:

State

- Utah Community Impact Board
- Utah Community Development Block Grant Program
- Utah Division of Drinking Water
- State Revolving Fund
- Utah Wastewater Loan Funds (Utah Water Quality Board)
- Utah Department of Agriculture and Food
- Agricultural Resource Development Loans
- Agriculture Water Optimization Funding

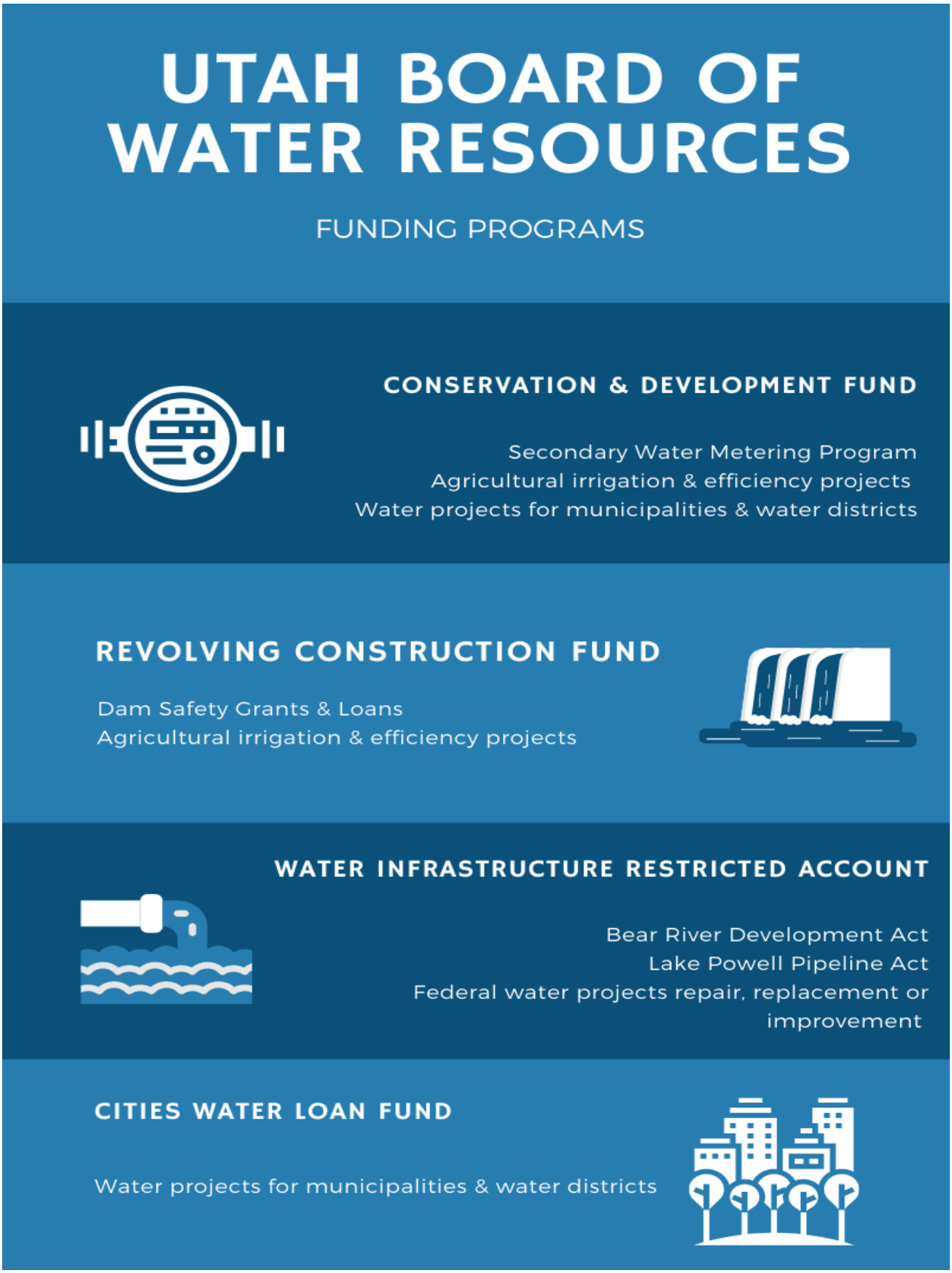
Federal

- Federal Safe Drinking Water Act, Administered by the Utah Division of Drinking Water
- Safe Drinking Water Revolving Fund
- United States Department of Agriculture (USDA)
- Clean Water Act (Administered by Utah Division of Drinking Water)
- Clean Water State Revolving Fund (Administered by Utah Division of Water Quality)
- Rural Development Grants and Loans
- Natural Resources Conservation Services (NRCS) Financial Assistance
- Environmental Protection Agency (EPA)
- Water Infrastructure Finance and Innovative Act (WIFIA)
- Farm Service Agency
- Farm Loan Programs

Bureau of Reclamation

- WaterSMART Grant Program
- Colorado River Basin Salinity Control Program

Graphic 6-4 Board of Water Resources' Funding Programs



Water Reuse

Wastewater effluent (treated wastewater) from sewage treatment plants is typically discharged into streams. That water is diverted, treated, and indirectly reused by other users downstream of these discharges. This can occur many times as effluent is returned to the river. The phrase "we all live downstream" is literally true. In the context of this report, "water reuse" refers to the direct reuse of wastewater, which involves treatment and disinfection, and the planned use of the resulting effluent for a beneficial purpose. A water right is necessary in order to reuse water. Water reuse is an important option to supplement future water supplies.

Potential Water Reuse Benefits and Applications

The 2021 National Water Reuse Action Plan (WRAP) was developed in collaboration with partners across the water sector. Actions in the plan are intended to drive progress on reuse and address local and national barriers across a range of topics including technical, institutional, and financial. According to the U.S. Environmental Protection Agency (EPA), reuse water may be used for:

- Agriculture, landscape, public park, and golf course irrigation
- Cooling water for power plants and oil refineries
- Processing water for mills and plants
- Toilet flushing
- Direct potable use
- Indirect potable use
- Dust control, concrete mixing, and other construction activities
- Artificial water-bodies – such as ornamental ponds and golf course water features

Water Reuse in Utah

In 1995, the Utah Legislature enacted the Water Reuse Act (Utah Code 73-3c-302) to govern the reuse of treated wastewater. The current administrative rule requires submitting a project plan to Water Rights that, among other things, includes:

- A description of the underlying water right.
- A description of the quantity, quality, and use of the treated wastewater to be delivered, and the location of the site.
- A description of public notification.
- Requirements for any necessary groundwater discharge permits, underground injection control permits, etc.
- A detailed operation and management plan that includes: a copy of the contract with the user, a plan for the prevention of cross-connections between the treated effluent distribution lines and potable water lines, schedules for routine maintenance, and a contingency plan for system failure or upsets.

Before wastewater can be reused, it is required to undergo treatment to protect public health and the environment. There are two levels of treatment required, depending upon the intended use:

- Type II is acceptable mainly for agriculture irrigation purposes where it is not likely to come in direct contact with the edible parts of crops or humans.

- Type I is required for municipal irrigation purposes and other uses where human contact is likely. It requires Type II treatment plus additional filtration and disinfection.

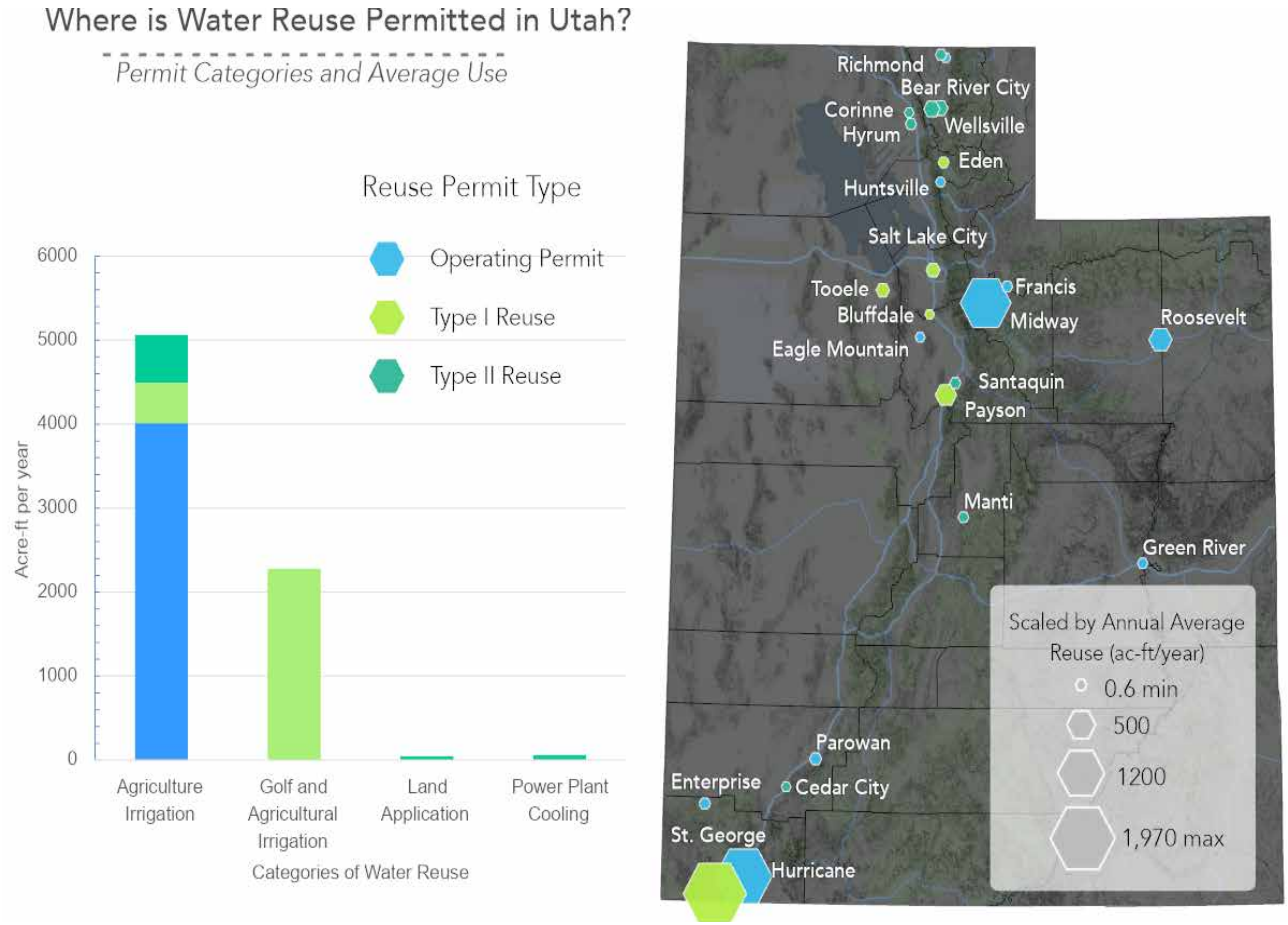
Graphic 6-5 shows the existing water reuse projects that have been permitted in Utah.

A few wastewater treatment plants have current operating permits that allow the disposal of their wastewater through land-application. These land-application waste streams can be applied to crops, but sometimes are simply spread on the ground to evaporate. Lists of existing Type I and Type II water reuse projects and operating permits are included in Appendix H. The Division of Water Quality (Water Quality) regulates water reuse, while Water Rights evaluates compliance with the associated water rights. Water Quality is currently developing a clearer distinction between a reuse permit and a land-application permit.

The Future of Water Reuse

As the state's population continues to grow, so does the demand for water and the need for water reuse. In the 2005 report [Water Reuse in Utah](), the Division estimated that there could be about 490,000 acre-feet of wastewater per year produced statewide by 2030. Current wastewater volumes support this estimate.

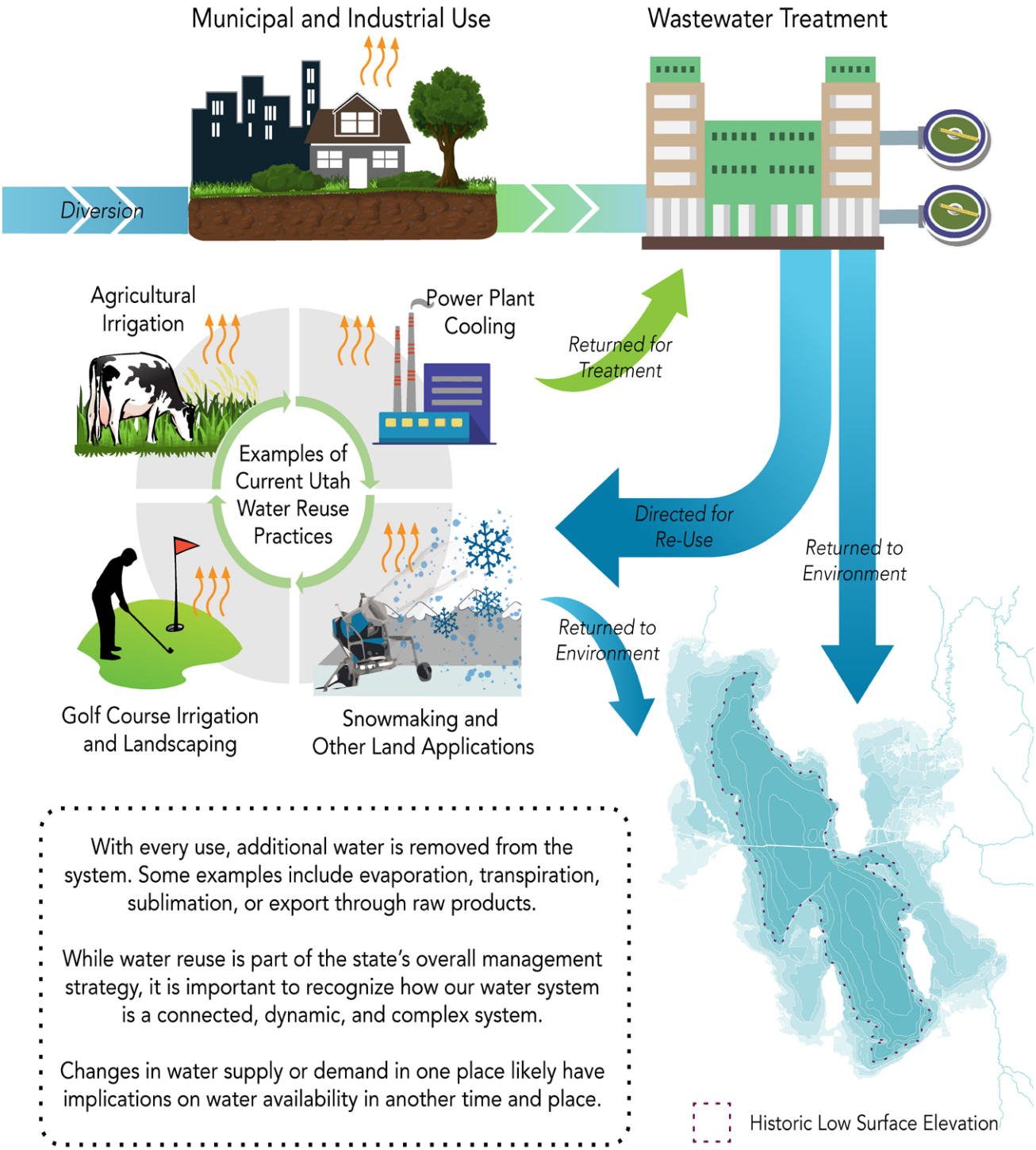
Graphic 6-5 Reuse Projects in Utah



Graphic 6-6 How Does Water Reuse Impact Great Salt Lake?

Did you know:

Water reuse includes intentionally capturing wastewater and treating it so it can be reused for another beneficial purpose. However, these practices will reduce the volume of water which would have otherwise been discharged and returned to natural systems like Great Salt Lake.



With every use, additional water is removed from the system. Some examples include evaporation, transpiration, sublimation, or export through raw products.

While water reuse is part of the state's overall management strategy, it is important to recognize how our water system is a connected, dynamic, and complex system.

Changes in water supply or demand in one place likely have implications on water availability in another time and place.

This potential water source could relieve the load on potable water treatment plants by using reuse water for non-potable demands, like irrigation. It should be noted that water reused, rather than returned to the natural system, increases depletions (Chapter 3), and may have a negative impact on the environment.

For example, effluent flows within the Great Salt Lake Basin may be needed to help sustain lake levels, and if that water is reused it would likely adversely impact lake levels (see Graphic 6-6).

Utah's future water needs will be met utilizing a variety of water management strategies. Water conservation, agricultural to M&I water conversions, new water development, water reuse and other innovative tools will all play an important role. As these strategies are implemented, preserving the state's agricultural heritage and responsibly mitigating environmental impacts will be critical. The water supply challenges Utah faces are complex and the solutions will need to be balanced. The Division is confident that Utah is up to the challenge.

Recommendations

The Division will work with cooperating partners to implement the following recommendations:

- Refine the Division's Agricultural to M&I water conversion estimates.
- Complete the National Environmental Policy Act process for the Lake Powell Pipeline.
- Acquire right-of-way property for the proposed Bear River Development project.
- Continue planning for and studying options for Bear River Development.
- Prepare and plan for water development projects to ensure water supplies are available when needed.
- Recommend water reuse projects for suitable areas.
- Partner with secondary water providers to utilize available secondary metering funding.

Chapter 6 Links

Open Water Data Website - dwre-utahdnr.opendata.arcgis.com

Vibrant Agricultural Sector (Your Utah Your Future) - https://yourutahyourfuture.org/topics/water

Utah Division of Water Resources Water Related Land Use Data - https://dwre-utahdnr.opendata.arcgis.com/pages/wrlu-data

Wasatch Front Regional Council Real Estate Market Model - https://wfrc.org/programs/models-forecasting/

Utah Division of Water Rights Utah Water Duty Map - https://www.waterrights.utah.gov/gisinfo/maps/aduty.pdf

2015 Legislative Audit: A Performance Audit of Projections of Utah's Water Needs - https://olag.utah.gov/olag-doc/15_01rpt.pdf

Central Utah Water Conservancy District Website - http://www.cuwcd.com

Lake Powell Pipeline Development Act (Utah Code 73-28) - https://le.utah.gov/xcode/Title73/Chapter28/73-28.html

LPPUtah Website - https://lpputah.org/

Groundwater Management Plan for Cedar Valley - https://www.waterrights.utah.gov/groundwater/ManagementReports/CedarValley/CedarValley.asp

Pine Valley Water Supply and Conservation Project - https://cicwcd.org/pvwsproject/

Bear River Development Act (Utah Code 73-26) - https://le.utah.gov/xcode/Title73/Chapter26/73-26-S103.html

Bear River Development Feasibility Study - https://water.utah.gov/bear-river/

Reuse Water - https://www.epa.gov/waterreuse

Water Reuse Act (Utah Code 73-3c-302) - https://le.utah.gov/xcode/Title73/Chapter3C/73-3c-S302.html

Water Reuse in Utah - https://water.utah.gov/wp-content/uploads/2019/12/Water-Reuse-in-Utah-Water-Resources-2005.pdf

WaterSMART Grant Program - https://www.usbr.gov/watersmart/weeg/

Colorado River Basin Salinity Control Program - https://www.usbr.gov/uc/progact/salinity/

Farm Service Agency Farm Loan Programs - https://www.fsa.usda.gov/programs-and-services/farm-loan-programs/index

Water Infrastructure Finance and Innovation Act - https://www.epa.gov/wifia

Board of Water Resources (Utah Code 73-10) - https://le.utah.gov/xcode/Title73/Chapter10/73-10-S1.html

Secondary Water Metering Program - https://water.utah.gov/wp-content/uploads/2019/Funding/PDF/Secondary-Water-Meter-Funding-Guidelines.pdf

Board Funding website - https://water.utah.gov/development-branch/funding/

Utah Community Development Block Grant Program - https://jobs.utah.gov/housing/community/cdbg/index.htmll

State Revolving Fund - https://deq.utah.gov/drinking-water/drinking-water-boards-srf-program-funding-opportunities

Agricultural Resource Development Loans - https://ag.utah.gov/farmers/conservation-division/what-is-the-ardl-program/

Federal Safe Drinking Water, Revolving Fund - https://deq.utah.gov/drinking-water/federal-state-revolving-fund-srf-program-drinking-water

U.S. Department of Agriculture Rural Development - https://www.usda.gov/topics/farming/grants-and-loans

Natural Resources Conservation Services - https://www.nrcs.usda.gov/wps/portal/

Citations

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DWRi 2012. Utah Division of Water Rights, Beryl Enterprise Ground Water Management Plan, December 21, 2012. (https://www.waterrights.utah.gov/groundwater/ManagementReports/BerylEnt/BerylEnterprise_Management_Plan.pdf)

Gardner Policy Institute 2019. Kem C. Gardner Policy Institute, Utah's Long-Term Demographic and Economic Projections Summary, Research Brief, [July 2017] February 2019; (https://gardner.utah.edu/wp-content/uploads/Projections-Brief-Final-Updated-Feb2019.pdf).

Construction crew working on the stability berm at Millsite Dam near Ferron, Utah.
PC: Tom Cox