



BEAR RIVER WATER CONSERVANCY DISTRICT DROUGHT RESILIENCY PLAN

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I. Introduction/Background

Bear River Water Conservancy District (District), with the assistance of Hansen Alan and Luce, Inc. (HAL), completed a Water Master Plan in 2017. The purpose of the 2017 Plan was to evaluate current water supplies and demands, project future water demands, and identify how the District can assist public water suppliers in meeting growing water demands for the future.

Planning Purpose: The District has felt the impact of drought over the past five years and has recognized the importance of updating and identifying which areas of their service area are most vulnerable to water shortages during a drought. Their intent is to develop a list of prioritized actions to mitigate possible drought effects. This addendum to their 2017 Water Master Plan is intended to serve as a guiding document to help manage water supply and delivery in the event of severe or prolonged drought, and to address drought-related vulnerabilities through consideration of drought response actions and mitigation measures. It is not intended to be a fully data-driven report or to include every aspect of a Drought Contingency Plan.

The District, working in conjunction with a consulting team, met and spoke with stakeholders to evaluate ways to increase drought resiliency throughout the District's service area using a regional approach. This addendum to the 2017 Water Master Plan will document the process used to determine drought monitoring, vulnerabilities, risks from drought, drought mitigation actions/priority projects, and recommendations to improve long-term drought resiliency. The District accomplished this through a multi-step process, which included:

1. Documenting a drought monitoring process
2. Evaluating potential drought vulnerabilities and associated risks
3. Identifying key mitigation objectives
4. Assessing potential mitigation actions – including actions within the 2017 Master Plan – to meet the objectives
5. Prioritizing mitigation actions

A summary of this process is detailed in **Appendix A-Drought Resiliency Addendum Process Outline.**

Drought History: Utah has experienced periods of water shortages since the pioneers first settled in Utah. The lengthy droughts of the 1930s and 1950s caused significant economic problems for the state. While the drought of 1976-77 was not as long, the consequences were still intense and costly. Precipitation fluctuates wildly in Utah's relatively arid climate. As the water demand continues to increase, even temporary shortages in supply can be disruptive to the normal process in urban and rural environments. Two or more consecutive years of a significant reduction in precipitation—particularly snowfall in the mountains—may have serious and far-reaching impacts. The winter of 2020 was one of the driest water years in Utah's history. The District's service area covers all of Box Elder County. According to the U.S. Drought Monitor, as of April 2021, 92 percent of Box Elder County is listed as being in a severe or extreme Drought. (Drought.gov)

II. Stakeholder Involvement

As part of the Drought Resiliency Planning, the District conducted several stakeholder meetings consisting of water systems with vested interests in water supply and water management within the District's service area. The District was divided into six regions in order to communicate better and improve the understanding of regional drought issues and needs within the service area: especially those within smaller regions. The regions are shown in **Figure 1** below.

Figure 1 – Region Map

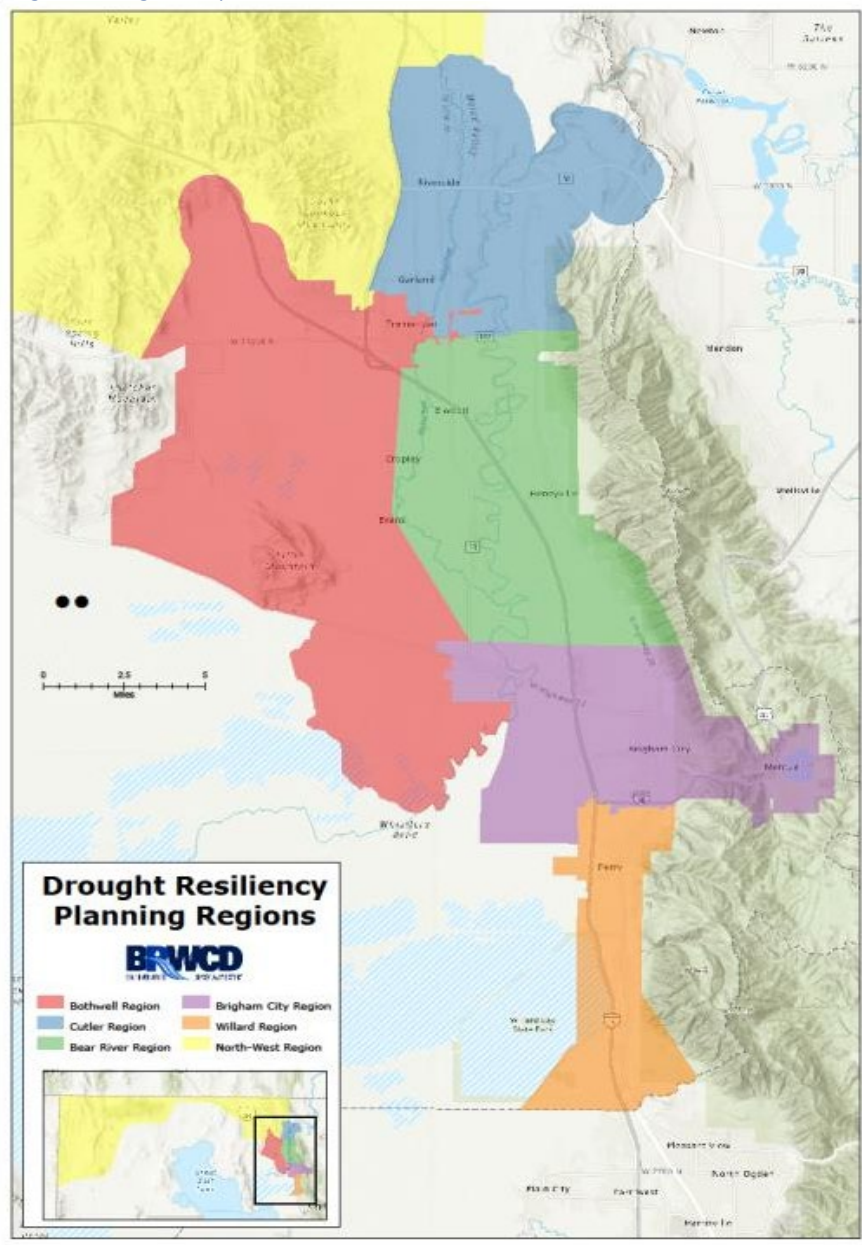


Table 1 below identifies each of the major water entities of the six regions that were invited to participate in the formal stakeholder process. It also includes the dates that the meetings were held. In addition to the below mentioned entities, there are also a small number of trailer parks with water systems within the district boundaries.

Table 1 Planning Regions and Stakeholders

BEAR RIVER REGION 02/04/2021	BOTHWELL REGION 01/21/2021	BRIGHAM REGION 02/03/2021	CUTLER REGION 01/29/2021	WILLARD REGION 02/04/2021	NORTH- WEST REGION 03/11/2021
Elwood Town	Tremonton City	Corinne City	BRWCD	Willard City	East Grouse Creek Pipeline
Box Elder County	Box Elder County	Box Elder County	Box Elder County	Box Elder County	Howell Town
Honeyville City	Thatcher - Penrose Service District	Brigham City	Willow Creek Water Co.	South Willard	Snowville Town
Deweyville	Bothwell Water Co.	Mantua*	Riverside-North Garland	Perry City	Portage Water Systems*
BRWCD	Marble Hill Water Co.		Ukon		Plymouth Town*
ACME Water Company*	West Corinne Water				
*Unable to attend					

The purpose of the regional stakeholder meetings was to:

- Build relationships between the District and the water system managers
- Give background to the stakeholders regarding the need for drought resiliency planning
- Share tools used to identify or assess current drought events
- Discuss past drought-related challenges
- Create a list of drought vulnerabilities
- Complete a risk assessment related to each identified vulnerability based on the perceptions of the stakeholders
- List potential mitigation actions for the identified vulnerabilities

Meeting minutes from Stakeholder Meetings can be reviewed in **Appendix B – Stakeholder Meeting Minutes and Vulnerability Tables**

III. Drought Monitoring

The District shared tools for monitoring drought to assist each region in understanding the drought classification. The U.S. Drought Monitor website listed the general areas of drought and intensity for the District’s overall service area. Another tool available for drought monitoring is the National Integrated Drought Information System (NIDIS); this tool gives more in-depth drought information for individual counties, cities, and even your exact location. It indicates precipitation, temperature, short- and long-

term drought indicators, and future conditions over a two-week or one-month timeline. This site also documents historical drought conditions going back as far as 1895. It was commonly felt that more local surface and ground water monitoring is desired.

IV. Vulnerabilities and Risks

An initial list of possible drought vulnerabilities from each regional meeting was developed and documented in a table format. See **Appendix B - Stakeholder Meeting Minutes and Vulnerability Tables** for each region's table. The tables list the vulnerabilities based on the likelihood of a given vulnerability, impact level, or consequence. Then the risk level is determined based on the Risk Level Matrix in **Figure 3** below. Also documented on each regional table are potential mitigation actions for the vulnerabilities.

The overall key vulnerabilities determined by each region included the following and were generally labeled as higher risk. These key vulnerabilities are summarized below:

- Lack of culinary water supply
- Reduced agricultural production
- Wasteful water usage
- Lack of public participation/education
- Lack of data – well water levels, local snowpack, etc.
- Loss of local water to other geographic areas

Figure 2 – Risk Level Matrix

		Risk Level				
Likelihood of Occurrence	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High
		Negligible	Marginal	Significant	Critical	Crisis
Impact or Consequence of Occurrence						

V. Potential Mitigation Actions

Using the 2017 Water Master Plan as a guide, stakeholders in each region developed a list of potential mitigation actions that, when completed, could increase drought resiliency and help mitigate vulnerabilities. Each region's lists of identified mitigation action items are included in the Vulnerabilities and Potential Mitigation Actions Tables in **Appendix B - Stakeholder Meeting Minutes and Vulnerability Table**.

A. District-Wide Potential Strategies

The stakeholder meetings provided many great ideas and concepts that the District can refer to in the future, including conservation strategies, secondary water sources, additional water sources, distribution, protection of water resources, monitoring, and other items. A complete list is included in **Appendix C – District-Wide Stakeholder Potential Strategies**.

B. Northwest Region

The North-West region met with the BRWCD General Manager to discuss water supply concerns. The meeting determined that the North-West region has important areas of concern, and the issues will need to be addressed. The items that were discussed in their meeting were not documented in a table format; however, they are listed within this section and will assist with monitoring drought conditions.

The Towns of Snowville and Howell expressed interest in installing and/or upgrading SCADA to monitor wells. Monitoring wells in Snowville and Howell can be used for historical documentation and drought indicators for planning and future drought resiliency projects.

The East Grouse Creek Pipeline identified its continuing effort to address chlorination concerns and may require assistance to complete a water rate study. Stakeholders in this region also noted that a region-wide conservation planning process would be valuable to them to help address long-term drought resiliency and water needs for the entire District.

VI. Prioritization of Mitigation Actions

The District and the consulting team met and reviewed the lists of potential mitigation actions from the stakeholder meetings. This meeting was used to identify and prioritize projects that the District could implement to help facilitate district-wide drought resiliency.

A. Prioritization Process

The overall list of actions identified by stakeholders was reviewed, and projects were assessed based on the identified vulnerabilities, risk levels, and regional impact. The objectives and weighted criteria are listed below:

1. Minimize cost to user – cost/acre-foot of water/year/user
2. Regional Benefit – benefit to the most users or largest area
3. Supply/Demand – increase in supply or decrease in demand
4. Local Support – buy-in from water system managers and elected officials
5. Funding – availability of funding from state and/or federal grants.
6. Ease of Implementation

Appendix D – Mitigation Action Evaluation provides a detailed list of all mitigation actions evaluated and scoring, along with the criteria used to rank the actions. All the mitigation actions listed would assist the District in becoming more drought resilient. However, it was necessary to narrow the list to establish a realistic action plan and to ensure that the projects completed would benefit the greatest number of users, and at the same time, still be conscious of costs and funding availability.

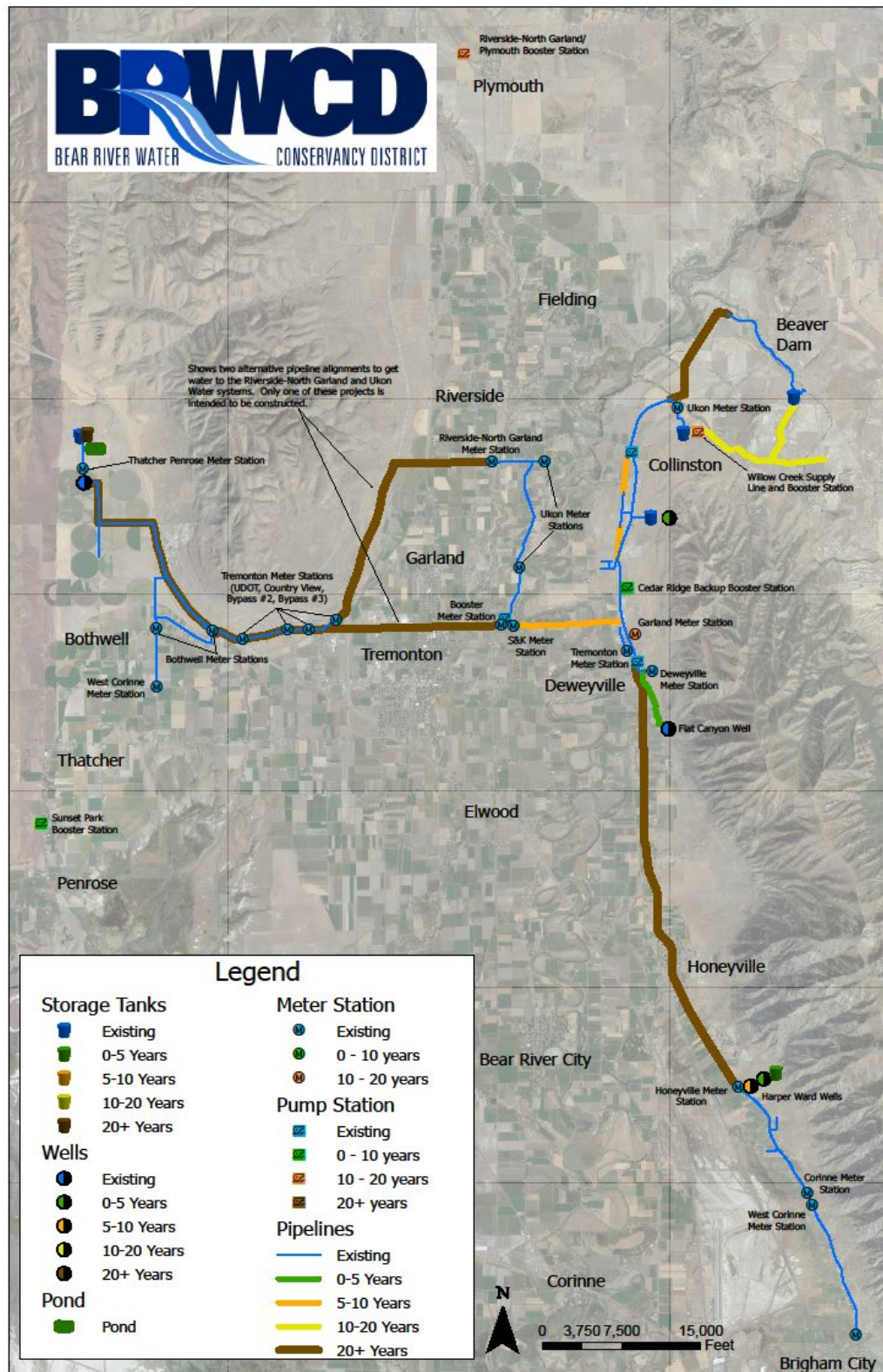
B. Prioritized Drought Mitigation Actions

The six mitigation actions that scored the highest when using the weighted criteria are listed in **Table 2** below. A general time frame to complete each action is listed in the table. Some of the actions that ranked higher than other actions may take longer to prepare for and coordinate. Detailed Opinions of Probable Cost for the construction projects (Actions 1, 3 and 4) are included in **Appendix E – Detailed Opinions of Probable Cost**. **Figure 3-Planned Projects** is a map of future improvements planned in the district that includes the priority drought capital improvement projects listed in **Table 2**.

Table 2 Drought Mitigation Actions

Drought Mitigation Actions					
Rank	Project Specifics	Region Vulnerabilities Addressed	Opinion of Probable Cost	Timeframe	Potential Funding Source(s)
1	Bothwell Well, Tank and Transmission Line - Obtain an additional well source which would free up culinary water that is currently being used for agricultural uses (sod farm). Upsize current culinary piping to 12 in. from Bothwell to Tremonton and add 10-inch pipe to deliver culinary water to Riverside/North Garland and Ukon Construct a new 1 MG tank (location TBD) to increase storage capacity	Bothwell/Cutler Regions -Lack of culinary water supply -Reduced agricultural production -Loss of local water to other geographic areas	\$10,400,000 (overall project cost. See description of phases in the report recommendations and smaller variations of the project in Appendix C)	2026-2030	Federal - Water Smart Grant Program through the Bureau of Reclamation (BOR) Federal/County - American Rescue Plan Funds
2	Regional Conservation Planning- Develop regional conservation plans for each region, install regional weather stations at key locations to assist with water monitoring and more precise predictions of available water. Development of a regional database to allow for water supply monitoring, track well levels, drawdowns, recovery times, etc.	District-Wide -Lack of culinary water (conservation of existing supply) -Wasteful water usage -Lack of public participation/education -Lack of data; well water levels, local snowpack, etc.	\$25,000 to \$30,000 for each region	2022-2026	Federal - Water Smart Grant Program through the Bureau of Reclamation (BOR) Federal/County - American Rescue Plan Funds State/County - Community Impact Fund Board (CIB)
3	Flat Canyon Pump Station and Pipeline – Construction of a pump station and 6,870 linear feet of pipe to serve Ukon, Tremonton, and District water systems.	Cutler Region -Lack of culinary water	\$1,050,000	2021-2022	Federal - Water Smart Grant Program through the Bureau of Reclamation (BOR) Federal/County - American Rescue Plan Funds
4	Harper Wells – Develop wells to help serve Corinne, West Corinne, and Harper ward areas.	Bear River Region -Lack of culinary water -Lack of data; well water levels, local snowpack, etc. -Loss of local water to other geographic areas	\$3,730,000	2021-2025	Federal - Water Smart Grant Program through the Bureau of Reclamation (BOR) Federal/County - American Rescue Plan Funds
5	District-Wide Drought Planning - Draft district-wide drought plan that would provide guidance for ongoing resiliency and mitigation efforts district-wide	District-Wide -Lack of culinary water (conservation of existing supply) -Wasteful water usage -Lack of public participation/education	\$100,000 to \$150,000	2022-2025	Federal - Water Smart Grant Program through the Bureau of Reclamation (BOR) Federal/County - American Rescue Plan Funds State/County - Community Impact Fund Board (CIB)
6	Collinston Well -Develop a new well in Collinston to provide needed water for increasing demand and to improve water quality for Ukon Water Company.	Bear River Region -Lack of culinary water -Lack of data: well water levels, local snowpack, etc. -Loss of local water to other geographic areas.	\$1,755,000	2021-2025	Federal - Water Smart Grant Program through the Bureau of Reclamation (BOR) Federal/County - American Rescue Plan Funds State/County - Community Impact Fund Board (CIB)

Figure 3-Planned Projects



VII. Operational and Administrative Framework and Plan Update

Plan updates, monitoring, evaluating this plan, as well as the operational and administrative procedures, will all be part of a future District-Wide Drought Planning document listed as priority four in the Drought Mitigation Actions table above. As we implement this larger data-driven drought plan, Reclamation requires Six Elements for Drought Contingency Planning, which will be addressed and documented as part of the plan.

VIII. Conclusions and Recommendations

Based on input from stakeholders, the District Manager and the consulting team have made the following conclusions, and they have come with recommendations for further planning and project development to decrease drought vulnerabilities regionally and district wide.

A. Conclusions

1. Identifying additional water sources and opportunities for conservation were consistent themes in stakeholder discussions. Water scarcity, irrigation, secondary, and culinary water use must be the highest priority and be put to its highest and best use.
2. Secondary water opportunities should be considered and investigated district-wide to reduce the strain on culinary water being used on lawns and gardens.
3. It is crucial that irrigation water be put to beneficial use to prevent the water rights from being diverted to other geographic areas outside the region.
4. Protection of water rights is a priority for stakeholders.
5. Long-term drought planning, data-driven responses, and water conservation education efforts across the entire District service area are needed. Discussions in stakeholder meetings acknowledged that a more in-depth, data-driven drought planning effort by the District is required to address long-term drought and effectively be applied across the entire District.
6. There is a more significant opportunity to combine efforts and achieve more public input and buy-in by addressing issues regionally. Conservation only happens when water users and irrigators plan to implement conservation projects and are educated on their water use.

B. Recommendations

Based on the ranked actions, it is recommended that the following plan be considered:

1. **Construct the Bothwell-Pocket / Cutler Region Waterline Connection:** Use a phased approach to design and construct the Bothwell, well, tank and transmission lines – Phase 1 is the well, Phase 2 is the tank, and Phase 3 is the transmission lines. Apply for three BOR Drought resiliency grants each year for the next three years.

2. **Complete Regional Conservation Plans:** The District should lead out on planning efforts that will consider specific region needs/vulnerabilities and overall efforts to increase conservation efforts. Regional Task Forces would aid in providing feedback specific to each region and coordinating public education campaigns. Regional and District conservation plans should be reviewed regularly to determine efficacy and to revise as needed. Local ground and surface water monitoring will be an essential part of creating and implementing a Regional Conservation Plan to the degree funding is possible.
3. **Construct Flat Canyon Pump Station and Pipeline:** Construct a pump station and pipeline to serve Ukon, Tremonton and other District water systems.
4. **Continue Development of Harper Wells:** Continue efforts to develop the Harper Wells and seek opportunities to connect to water systems in the area that could benefit from the additional water supply.
5. **Develop Collinston Well:** Develop a new well to provide needed water for increasing demand and to improve water quality for Ukon Water Company.
6. **Complete a District-Wide Drought Contingency Plan:** Apply for funding and complete a district-wide drought contingency plan. Consider combining the regional water conservation plans as part of the drought contingency plan to obtain more funding assistance to complete the conservation plans.
7. **Improve Coordination with County and Municipalities:** The District should encourage municipalities within the region to adopt standards that will require the use of secondary water for new developments and encourage existing development to switch to secondary water systems. Xeriscaping and other uses of drought-resistant landscaping should be encouraged. Adding Xeriscape planting may require municipalities to amend zoning ordinances and design standards within their jurisdictions.
8. **Promote Secondary Water:** Unincorporated areas throughout Box Elder County should also be encouraged to utilize secondary water. The Box Elder County Commission should consider requiring contractors/developers to implement secondary water systems to serve new construction. Brigham City has the potential for adding a secondary water system in the northeast area. This project scored high, but lacked a regional impact, so it was not listed as a high priority. Brigham City should continue its efforts to pursue secondary water opportunities.
9. **Seek Grants from Multiple Funding Sources:** The District should coordinate with local, county, state, and Federal agencies to obtain funding. Effective utilization of state funding through the Division of Water Resources, the Community Impact Board, Utah Department of Agriculture and Foods, combined with Federal grants, will assist the District in pursuing district-wide planning projects and infrastructure projects. Recent Federal funding through the American Rescue Plan may also be used for planning and infrastructure.

Appendix A

Drought Resiliency Addendum Process Outline

Water Master Plan Drought Resiliency

Addendum Process

Many communities and water districts have existing water system master plans with identified capital facility projects that are needed to continue to meet increasing demands. Many of these systems are trying to serve their customers with more limited supplies as a result of drought conditions. These drought conditions bring attention to water system drought vulnerabilities.

The following process, or steps, may be followed develop a drought resiliency addendum to an existing master plan that prioritizes master plan projects and other actions in terms of improved drought resiliency.

The major tasks in the process are:

- A. Identify existing drought monitoring tools
- B. Evaluate potential drought vulnerabilities
- C. Identify key mitigation objectives
- D. Evaluate potential mitigation projects
- E. Prioritize mitigation projects
- F. Write a drought resiliency addendum to the existing master plan

A detailed list of subtasks is provided below.

A. Identify Existing Drought Monitoring Tools

- 1. Prepare a list of existing drought monitoring tools that exist in the region to share with stakeholders

B. Evaluate Potential Drought Vulnerabilities

- 1. Develop a list of key stakeholders
- 2. Create an outline with potential questions for use to gather information during stakeholder meetings.
- 3. Create a vulnerability assessment table to be populated with data during the stakeholder meetings that lists each of the existing water master plan projects and includes rows for additional projects or actions that may be suggested by stakeholders.
- 4. Schedule and hold meetings with key stakeholders:
 - a. Identify potential drought vulnerabilities.
 - b. Assign a risk level for each identified vulnerability
 - c. Review planned projects from the master plan that could help reduce the effects of drought.
 - d. Brainstorm additional potential planning efforts or projects that could address the drought vulnerabilities.
 - e. Discuss and record how each of the discussed projects addresses the drought vulnerabilities.
- 5. Prepare a table that summarizes the vulnerabilities and associated risk levels.
- 6. Prepare minutes from the stakeholder meetings to include as part of the master plan addendum.

C. Identify Key Mitigation Objectives

1. Develop a list of objectives to evaluate and rank the projects including objectives to address the key vulnerabilities identified in the stakeholder meetings.
2. Assign metrics to measure how well each project meets the objectives.

D. Evaluate Potential Mitigation Projects

1. Update the opinions of probable cost for the master plan projects.
2. Evaluate how well each of the projects meets the identified objectives.

E. Prioritize Mitigation Projects

1. Rank each of the projects based on a scoring system

F. Write a Drought Resiliency Addendum to the Existing Master Plan

1. Prepare a written summary of the drought vulnerability assessment and the mitigation plan as an addendum to the master plan report.
2. Document the process followed.
3. Provide a table that lists the evaluated projects in order of priority and explain how the projects will make the water system more resilient in a drought.
4. Prepare a map showing the prioritization of the projects.
5. Present the addendum to council/board to be adopted as part of the master plan.

Appendix B

Stakeholder Meeting Minutes and Vulnerability Tables

BEAR RIVER REGION



MINUTES

BEAR RIVER WATER CONSERVANCY DISTRICT

DROUGHT CONTINGENCY PLAN

Bear River Region Meeting Minutes

Thursday February 4, 2021 10:00 a.m.

Introductions (5 Minutes)

Carl Mackley	General Manager, BRWCD
Weston Bellon	Project Engineer, J-U-B Engineers
Chris Slater	Project Manager, J-U-B Engineers
Stakeholders	See attached Stakeholder Information sheet

Drought Resiliency Plan Background (5 minutes)

- Last year was a very dry year that presented a lot of challenges to many in various areas of the District
 - We are currently in a drought. What might this summer look like if we don't get more precipitation?
- The District is creating a plan to identify and prioritize actions that will help the water users be more drought resilient.
- We are seeking your input to help identify potential drought vulnerabilities and ways that the district or individual water systems can be more prepared for drought.
- We have divided the district into six geographical regions. We have met with representatives from two of the six regions prior to this meeting. We plan to finish meeting with stakeholders from each of the regions over the next week to gather input.

Identification of Drought Events (10 minutes)

- The following website can be accessed to see the current drought status in our area and other areas of the country:

<https://droughtmonitor.unl.edu/>

- Another online tool and information database to track precipitation is the Community Collaborative Rain, Hail & Snow (CoCoRaHS) Network website:

<https://www.cocorahs.org/>

The Utah Avalanche Center website also provides good information about snowpack:

<https://utahavalanchecenter.org/>

Past Drought Related Challenges and Vulnerabilities (30 minutes)

Challenges

- There are no consistent drought indicators, so you always have to plan for the worst case water scenario
- There is a need for more local drought data specific to this area
- Large fluctuations in spring flows
- Costs associated with watering livestock
- Poor winters in recent past
- Reduced flows from springs
- Shallow wells that are used to water yards sometimes dry up and then more demand is placed on the city drinking water systems
- Population growth and a lack of available water rights
- Lack of education
- Overwatering/people watering for too long
- Large lawn areas
- Need for training or education of water users
- Lack of support for water conservation
- Existing water leaks on private water services that are not being fixed

Drought Vulnerabilities

- What are your biggest drought-related concerns?
- What are the potential risks and impacts of drought?
- What challenges would a drought create for you?

The stakeholders reviewed and added to a list of potential vulnerabilities that were identified in earlier stakeholder meetings (See the attached Vulnerabilities and Potential Mitigation Actions table).

Drought Risk Assessment (20 minutes)

- What is the likelihood of a given vulnerability?
- What is the impact or consequence of occurrence?

The stakeholders reviewed and adjusted the risks they perceived associated with each vulnerability (See the attached Vulnerabilities and Potential Mitigation Actions table).

		Risk Level				
Likelihood of Occurrence	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High
		Negligible	Marginal	Significant	Critical	Crisis
Impact or Consequence of Occurrence						

Possible Mitigation Actions (25 Minutes)

A mitigation action is something we can do now or prior to a drought to lessen the impacts of a drought.

- What specific mitigation actions do you think could be investigated for this area?
- What actions might help address the vulnerabilities listed?

See the attached Vulnerabilities and Potential Mitigation Actions table.

The Harper Ward wells that are planned in the master plan (1, 2 or 3) may help areas north of Brigham and maybe in Corinne.

Next Steps

- **Mitigation Action List** - J-U-B will use the information collected from stakeholders to help create a list of potential drought mitigation actions. Stakeholders please review the list and contact Weston Bellon if you have any comments or questions or suggestions in the next couple of weeks. Weston can be reached at:

Email: wbellon@jub.com

Phone: 435-713-9514

- **Evaluate Actions** - J-U-B will evaluate the actions based on how the actions address the drought risks and meet other key objectives such as cost.
- **Prioritize Actions** - J-U-B will create a list of prioritized actions and prepare a draft report that documents the process.
- **Draft Plan for comments** - J-U-B will send the stakeholders a copy of the draft plan for to review and provide comments.



- **Present to District Board (in about 2 to 3 months)** - J-U-B will present the report to the district board after making edits based on the comments. Stakeholders can attend that meeting.

Bear River Region (Vulnerabilities and Potential Mitigation Actions)

No.	Vulnerability	Likelihood	Impact	Risk Level	Potential Mitigation Actions
1	Lack of indoor culinary supply	Likely	Crisis	High	Construct secondary irrigation systems Develop Ordinances requiring that new developments provide water rights (farmland irrigation shares) and secondary infrastructure Some questions and thoughts related to this are: Who would maintain the system? Some municipalities have mixed shares assigned to certain parcels Some have never been irrigated. Elwood is almost 100% covered with shares, but Honeyville is not Develop additional sources Exercise emergency water connections for use during droughts or emergencies Develop ASR projects
2	Outdoor water supply limitations (aesthetics, gardens, stock water)	Very Likely	Critical	High	Promote landscaping initiatives Start a "Yard of the Month" program highlighting conservation type landscaping Enforce existing ordinances
3	Public Health - Poor drinking water quality	Very Unlikely	Critical	Low	
4	Reduced agricultural production	Likely	Critical	High	
5	Limited future growth				
6	Poor water management - lack of information/data acquisition	Unlikely	Significant	Moderate	Install additional weather stations in Wellsville Mountain range to help understand local drought conditions better Consider doing more monitoring at the city level
7	Lack of public participation	Very Likely	Significant	High	Make sure people know when we are in a drought through mailed letters, websites, use of facebook, etc.
8	Lack of outdoor water conservation	Unlikely	Significant	Moderate	Utilize slow the flow watering guide and home water use audits by USU (Will USU do these in Box elder County? Is there a fee?) Promote attendance at the "Green Conference" Distribute informational fliers Implement tiered water rates Promote or incentivize smart controllers for sprinkler systems Distribute water use comparison reports to homeowners to compare use with others nearby
9	Loss of local water to other geographic areas	Unlikely	Significant	Moderate	Stay engaged in discussions
11	Lowered ground water levels (well levels) - significant drop	Likely	Significant	High	This was discussed with the shallow wells in mind. A water right is needed to pump water from shallow wells.
12	Loss of revenue	Likely	Significant	High	
13	Changes in irrigation practice	Likely	Significant	High	Consider potential effects on ground water levels when piping or lining canals. There are questions about how lining or piping irrigation canals in the area might affect water levels in wells, particularly in shallow wells.

BOTHWELL REGION



MINUTES

BEAR RIVER WATER CONSERVANCY DISTRICT

DROUGHT CONTINGENCY PLAN

Bothwell Region Meeting Minutes

Thursday, January 21, 2021. 10:00 a.m.

Introductions (5 Minutes)

Carl Mackley - General Manager, BRWCD
Jill Jeppsen - Administrative Assistant, BRWCD
Weston Bellon - Project Engineer, J-U-B Engineers
Chris Slater - Project Manager, J-U-B Engineers
Stakeholders - See attached Stakeholder Information sheet

Drought Resiliency Plan Background (5 minutes)

- Last year was a very dry year that presented a lot of challenges to many in various areas of the District
 - We are currently in a drought. What might this summer look like if we don't get more precipitation?
- The District is creating a plan to identify and prioritize actions that will help the water users be more drought resilient.
- We are seeking your input to help identify potential drought vulnerabilities and ways that the district or individual water systems can be more prepared for drought.
- We have divided the district into six geographical regions. We plan to meet with stakeholders from each of the regions over the next few weeks to gather input.

Past Drought Related Challenges (10 minutes)

- We have residential growth and water supply isn't increasing.
- We have old culinary systems (40+ years) that are aging.

Identification of Drought Events (10 minutes)

The following website can be accessed to see the current drought status in our area and other areas of the country:

<https://droughtmonitor.unl.edu/>

Drought Vulnerabilities (25 minutes)

- What are your biggest drought-related concerns?
- What are the potential risks and impacts of drought?
- What challenges would a drought create for you?

The stakeholders brainstormed and developed a list of potential vulnerabilities (See the attached Vulnerabilities and Potential Mitigation Actions table).

Drought Risk Assessment (20 minutes)

- What is the likelihood of a given vulnerability?
- What is the impact or consequence of occurrence?

		Risk Level				
Likelihood of Occurrence	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High
		Negligible	Marginal	Significant	Critical	Crisis
Impact or Consequence of Occurrence						

See the attached Vulnerabilities and Potential Mitigation Actions table.

Possible Mitigation Actions (25 Minutes)

A mitigation action is something we can do now or prior to a drought to lessen the impacts of a drought.

- What specific mitigation actions do you think could be investigated for this area?
- What actions might help address the vulnerabilities listed

See the attached Vulnerabilities and Potential Mitigation Actions table.

Reviewed of map of potential future projects listed in the District master plan.



Next Steps

- **Mitigation Action List** - J-U-B will use the information collected from stakeholders to help create a list of potential drought mitigation actions. Stakeholders please review the list and contact Weston Bellon if you have any comments or questions or suggestions in the next couple of weeks. Weston can be reached at:

Email: wbellon@jub.com

Phone: 435-713-9514

- **Evaluate Actions** - J-U-B will evaluate the actions based on how the actions address the drought risks and meet other key objectives such as cost.
- **Prioritize Actions** - J-U-B will create a list of prioritized actions and prepare a draft report that documents the process.
- **Draft Plan for comments** - J-U-B will send the stakeholders a copy of the draft plan for to review and provide comments.
- **Present to District Board (in about 2 to 3 months)** - J-U-B will present the report to the district board after making edits based on the comments. Stakeholders can attend that meeting.

Stakeholder Information

Client: Bear River Water Conservancy District
 Project: Drought Resiliency Plan
 Date: January 21, 2021

Name	Representing	Email Address	Office Phone #	Cell Phone	If Present Initial
Andy Crozier	thatcher water service dis	Andy Crozier@gmail.com	Same.	435 279 4760	MC
Paul Fulgham	Tremonton City	pfulgham@tremontn.ci.ut.us		435-230-0831	W
Russ Feltner	THATCHER PENROSE			435 279 0935	RF
Joseph Summers	Bothwell water	jsummers13@gmail.com		435-230-0034	JS
Alan Thompson	Bothwell water	alandval@Frontier.com		435-494-2475	AT
Lyle Vance	TREMONTON CITY	LYLEVANCE@GMAIL.COM		435.279-3843	LV
Mayor Fredel	Tremonton City	mayor@tremontn.ci.ut.us		435 279-0828	RF
Rick Seamons	Tremonton City	meekokat38@frontiernet.net		435-257-7199	RS
Scott Lyons	Box Elder County	slyons@boxeldercounty.org	435 734 3316		SL
Chad Holmgren	Thatcher Penrose			435-279-4125	CH
SITAMUN WARNEK	TREMONTON				
Katrina Oram	Marble Hill Water Co	marblehillwater2018@gmail.com Katrinaoram@gmail.com	208-406-1992		KO
Lyle Holmgren	Tremonton City	lyle.holmgren@gmail.com	435 279 4406	Same	LH
Cary McFarland	West Corinne water	Cary West Corinne@gmail.com	435-230-0792		
Chance Baxter	West Corinne Water	cbaxter1991@gmail.com	435-720-3306	Same	CB

Bothwell Pocket (Vulnerabilities and Potential Mitigation Actions)

No.	Vulnerability	Likelihood	Impact	Risk Level	Potential Mitigation Actions
1	Lack of culinary supply and upset customers	Very Likely	Crisis	High	Develop additional water sources, maybe north of the Bothwell pocket. Make piping and pumping changes to use existing non-drinking water quality Oiler Well to water the sod farm so existing drinking quality well can be used for drinking water Use agricultural wells for non-drinking uses Improve water conservation Require developers of new developments to install secondary water systems
2	Outdoor water supply limitations (aesthetics, gardens, stock water)	Very Likely	Critical	High	Provide Education about less water dependent landscaping (xeriscape, local scape, etc.) Develop additional water sources, maybe north of the Bothwell pocket.
3	Public Health - Poor drinking water quality	Very Likely	Critical	High	
4	Reduced agricultural production	Very Likely	Critical	High	
5	Limited future economic growth	Very Likely	Significant	High	Follow policies related to growth
6	Poor water management	Unlikely	Critical	Moderate	Establish appropriate rate adjustments to operate and maintain systems
7	Lack of public knowledge	Very Likely	Marginal	Moderate	Provide information on the water district or city websites
8	Lack of outdoor water conservation	Very Likely	Marginal	Moderate	Provide conservation information packets for new developments
9	Lack of system data	Likely	Significant	High	Utilize mobile apps showing water usage
10	Wasteful water usage	Likely	Critical	High	Adjust billing structures so that wasteful water users pay appropriately and fairly Provide water usage comparison data to water users (compare to average use in vicinity) Provide a funding incentive to install conservative landscaping Investigate grant opportunities for water conservation promotion
11	Loss of local water to other geographic areas	Likely	Significant	High	Stay fully engaged in water development conversations and planning
12	Climate change	Likely	Marginal	Moderate	
13	Inability to put water to beneficial local use when it is plentiful	Unlikely	Significant	Moderate	Utilize a water share lease pool
14	Lowered ground water levels (well levels)	Very Likely	Critical	High	Develop secondary water systems
15	Lack of understanding of drought levels	Unlikely	Marginal	Low	

BRIGHAM REGION



MINUTES

BEAR RIVER WATER CONSERVANCY DISTRICT

DROUGHT CONTINGENCY PLAN

Brigham Region Meeting Minutes

Wednesday February 3, 2021 10:00 a.m.

Introductions (5 Minutes)

Carl Mackley	General Manager, BRWCD
Weston Bellon	Project Engineer, J-U-B Engineers
Chris Slater	Project Manager, J-U-B Engineers
Stakeholders	See attached Stakeholder Information sheet

Drought Resiliency Plan Background (5 minutes)

- Last year was a very dry year that presented a lot of challenges to many in various areas of the District
 - We are currently in a drought. What might this summer look like if we don't get more precipitation?
- The District is creating a plan to identify and prioritize actions that will help the water users be more drought resilient.
- We are seeking your input to help identify potential drought vulnerabilities and ways that the district or individual water systems can be more prepared for drought.
- We have divided the district into six geographical regions. We have met with representatives from two of the six regions prior to this meeting. We plan to finish meeting with stakeholders from each of the regions over the next week to gather input.

Identification of Drought Events (10 minutes)

- The following website can be accessed to see the current drought status in our area and other areas of the country:

<https://droughtmonitor.unl.edu/>

Past Drought Related Challenges and Vulnerabilities (30 minutes)

Challenges

- Low spring flows
- Increased pumping costs
- Planning for future growth

Needs Related to Growth

- Who should operate secondary system in unincorporated county areas (HOA's, County, Water District, small irrigation companies)?

Drought Vulnerabilities

- What are your biggest drought-related concerns?
- What are the potential risks and impacts of drought?
- What challenges would a drought create for you?

The stakeholders reviewed and added to a list of potential vulnerabilities that were identified in earlier stakeholder meetings (See the attached Vulnerabilities and Potential Mitigation Actions table).

Drought Risk Assessment (20 minutes)

- What is the likelihood of a given vulnerability?
- What is the impact or consequence of occurrence?

		Risk Level				
Likelihood of Occurrence	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High
		Negligible	Marginal	Significant	Critical	Crisis
Impact or Consequence of Occurrence						

See the attached Vulnerabilities and Potential Mitigation Actions table.

Possible Mitigation Actions (25 Minutes)

A mitigation action is something we can do now or prior to a drought to lessen the impacts of a drought.

- What specific mitigation actions do you think could be investigated for this area?
- What actions might help address the vulnerabilities listed?

See the attached Vulnerabilities and Potential Mitigation Actions table.



The group was asked if there are any regional type projects that they think they may possibly consider doing together or in cooperation with the District that would help mitigate the effects of future droughts. Some ideas were:

- Secondary irrigation in the north part of Brigham City
- Smart controllers for sprinkler systems
- Water Treatment plant for water coming out of Mantua

Next Steps

- **Mitigation Action List** - J-U-B will use the information collected from stakeholders to help create a list of potential drought mitigation actions. Stakeholders please review the list and contact Weston Bellon if you have any comments or questions or suggestions in the next couple of weeks. Weston can be reached at:

Email: wbellon@jub.com

Phone: 435-713-9514

- **Evaluate Actions** - J-U-B will evaluate the actions based on how the actions address the drought risks and meet other key objectives such as cost.
- **Prioritize Actions** - J-U-B will create a list of prioritized actions and prepare a draft report that documents the process.
- **Draft Plan for comments** - J-U-B will send the stakeholders a copy of the draft plan for to review and provide comments.
- **Present to District Board (in about 2 to 3 months)** - J-U-B will present the report to the district board after making edits based on the comments. Stakeholders can attend that meeting.

Brigham Region (Vulnerabilities and Potential Mitigation Actions)

No.	Vulnerability	Likelihood	Impact	Risk Level	Potential Mitigation Actions
1	Lack of culinary supply	Unlikely	Crisis	High	Develop secondary irrigation systems (Brigham requires new developments to install dry systems) Create additional Storage (More storage in tanks or possibly ASR) Acquire new sources from existing wells or springs that maybe aren't being utilized Exercise/maintain emergency water connections between communities to be prepared for usage Evaluate a water treatment plant for water coming from Mantua versus development of secondary water
2	Outdoor water supply limitations (aesthetics, gardens, stock water)	Likely	Significant	High	Develop secondary water systems (Consider secondary water for the north part of Brigham City) Develop and implement landscaping requirements (land use code) Promote smart controllers for sprinkler systems
3	Public Health - Poor drinking water quality	Very Unlikely	Critical	Low	
4	Reduced agricultural production				
5	Limited future growth	Likely	Significant	High	Include drought scenarios in water system models for cities to better understand potential drought effects
6	Poor water management - lack of information/data acquisition	Unlikely	Significant	Moderate	
7	Lack of public participation	Likely	Significant	High	Improve enforcement of water codes
8	Lack of outdoor water conservation	Unlikely	Significant	Moderate	Implement tiered rate structures, possibly adjust existing tiered rate structures Include the usage data for surrounding water users in water bills
9	Loss of local water to other geographic areas	Unlikely	Significant	Moderate	Develop ordinances improve local engagement in broad issues Stay engaged in planning efforts
11	Lowered ground water levels (well levels) - significant drop	Unlikely	Critical	Moderate	keep sourcing points of diversion (well locations) spread out as much as possible Develop some ASR projects
12	Loss of revenue	Likely	Critical	High	Set changes in water rates depending on drought levels

CUTLER REGION

MINUTES

BEAR RIVER WATER CONSERVANCY DISTRICT

DROUGHT CONTINGENCY PLAN

Cutler Region Meeting Minutes

Friday January 29, 2021. 10:00 a.m.

Introductions (5 Minutes)

Carl Mackley	General Manager, BRWCD
Jill Jepps	Administrative Assistant, BRWCD
Weston Bellon	Project Engineer, J-U-B Engineers
Chris Slater	Project Manager, J-U-B Engineers
Stakeholders	See attached Stakeholder Information sheet

Drought Resiliency Plan Background (5 minutes)

- Last year was a very dry year that presented a lot of challenges to many in various areas of the District
 - We are currently in a drought. What might this summer look like if we don't get more precipitation?
- The District is creating a plan to identify and prioritize actions that will help the water users be more drought resilient.
- We are seeking your input to help identify potential drought vulnerabilities and ways that the district or individual water systems can be more prepared for drought.
- We have divided the district into six geographical regions. We plan to meet with stakeholders from each of the regions over the next few weeks to gather input.

Identification of Drought Events (10 minutes)

- The following website can be accessed to see the current drought status in our area and other areas of the country:

<https://droughtmonitor.unl.edu/>

Past Drought Related Challenges and Vulnerabilities (30 minutes)

Past Challenges

- Reduced spring flows during a drought that occurred around 1975 -1976
 - Not enough water for outdoor watering
 - Some systems have implemented an outside watering every other day schedule or in worse conditions not allowed outdoor watering

Current Challenges

- Lack of use of irrigation water for outdoor watering because it is inconvenient
- Many people are willing to pay high prices for water and as a result waste a lot of water
- Reduced Spring flows We have residential growth and water supply isn't increasing

Needs Related to Growth

- A plan is needed to outline how to manage growth
- Water systems need to work together
- Developers need to show they have water for all connections for a development before starting
 - It can be hard to commit water to a development for a long time if it takes many years for a development to get constructed and occupied.
- County and water suppliers need a good process to communicate

Drought Vulnerabilities (25 minutes)

- What are your biggest drought-related concerns?
- What are the potential risks and impacts of drought?
- What challenges would a drought create for you?

The stakeholders brainstormed and developed a list of potential vulnerabilities (See the attached Vulnerabilities and Potential Mitigation Actions table).

Drought Risk Assessment (20 minutes)

- What is the likelihood of a given vulnerability?
- What is the impact or consequence of occurrence?

		Risk Level				
Likelihood of Occurrence	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High
		Negligible	Marginal	Significant	Critical	Crisis
Impact or Consequence of Occurrence						

See the attached Vulnerabilities and Potential Mitigation Actions table.



Possible Mitigation Actions (25 Minutes)

A mitigation action is something we can do now or prior to a drought to lessen the impacts of a drought.

- What specific mitigation actions do you think could be investigated for this area?
- What actions might help address the vulnerabilities listed?

See the attached Vulnerabilities and Potential Mitigation Actions table.

The group reviewed of map of potential future projects listed in the District master plan and discussed a potential joint effort to develop a well (Tower Well) near Tremonton and I-15 with supply piping to the Ukon and Riverside North Garland water companies. Also, possibly pipe 1,600 ac. ft. of water out of the Bothwell Pocket around BR Mountain to supply areas that the two companies serve.



Next Steps

- **Mitigation Action List** - J-U-B will use the information collected from stakeholders to help create a list of potential drought mitigation actions. Stakeholders please review the list and contact Weston Bellon if you have any comments or questions or suggestions in the next couple of weeks. Weston can be reached at:

Email: wbellon@jub.com

Phone: 435-713-9514

- **Evaluate Actions** - J-U-B will evaluate the actions based on how the actions address the drought risks and meet other key objectives such as cost.
- **Prioritize Actions** - J-U-B will create a list of prioritized actions and prepare a draft report that documents the process.
- **Draft Plan for comments** - J-U-B will send the stakeholders a copy of the draft plan for to review and provide comments.
- **Present to District Board (in about 2 to 3 months)** - J-U-B will present the report to the district board after making edits based on the comments. Stakeholders can attend that meeting.

Cutler Region (Vulnerabilities and Potential Mitigation Actions)

No.	Vulnerability	Likelihood	Impact	Risk Level	Potential Mitigation Actions
1	Lack of culinary supply	Very Likely	Crisis	High	Develop new sources - wells, treat Bear River water, purchase springs Upgrade storage facilities Construct interconnects (may not help in very severe drought) Build secondary irrigation systems (outdoor use may be 60%-70% of summer demand) Require rights from developers through transition from ag to municipal use Store spring flows (Aquifer Storage and recovery or above ground storage) Potential regional projects: 1- Develop "Tower" well near I-15 with pipes to connect Ukon and Riverside North Garland possible coordination with BRWCD). May utilize a possible water right that has been applied for. 2- Pipe 1,600 ac. ft out of the Bothwell pocket around BR Mountain to Cutler Region.
2	Outdoor water supply limitations (aesthetics, gardens, stock water)	Likely	Marginal	Moderate	Implement wise management practices (letters to customers about drought conditions, other programs based on supply levels) Provide incentives or education for use of efficient landscaping
3	Public Health - Poor drinking water quality	Unlikely	Critical	Moderate	Not likely to be caused by drought
4	Reduced agricultural production				This is a potential concern for other groups or stakeholders
5	Limited future economic growth	Very Likely	Negligible	Low	
6	Poor water management - lack of information/data acquisition	Likely	Marginal	Moderate	Install well telemetry systems Install well transducers Install transducers in Ukon wells and make a possible connection to the BRCWD telemetry system
7	Lack of public knowledge	Very Likely	Marginal	Moderate	Inform the public through websites/social media Share information between suppliers (potential development of drought indicators by region posted online)
8	Lack of outdoor water conservation	Very Likely	Significant	High	Develop and implement tiered water rates
9	Loss of local water to other geographic areas	Likely	Significant	High	Maintain involvement in regional water development discussions and planning
10	Climate change				
11	Lowered ground water levels (well levels) - significant drop	Likely	Crisis	High	
12	Changes in irrigation practices	Likely	Significant	High	
13	Earthquake and other disasters	Unlikely	Crisis	High	

WILLARD REGION



MINUTES

BEAR RIVER WATER CONSERVANCY DISTRICT

DROUGHT CONTINGENCY PLAN

Willard Region Meeting Minutes

Wednesday February 10, 2021 10:00 a.m.

Introductions (5 Minutes)

Carl Mackley	General Manager, BRWCD
Weston Bellon	Project Engineer, J-U-B Engineers
Chris Slater	Project Manager, J-U-B Engineers
Stakeholders	See attached Stakeholder Information sheet

Drought Resiliency Plan Background (5 minutes)

- Last year was a very dry year that presented a lot of challenges to many in various areas of the District
 - We are currently in a drought. What might this summer look like if we don't get more precipitation?
- The District is creating a plan to identify and prioritize actions that will help the water users be more drought resilient.
- We are seeking your input to help identify potential drought vulnerabilities and ways that the district or individual water systems can be more prepared for drought.
- We have divided the district into six geographical regions. We have met with representatives from four of the six regions prior to this meeting. We plan to finish meeting with stakeholders from each of the regions over the next week to gather input.

Identification of Drought Events (10 minutes)

- The following website can be accessed to see the current drought status in our area and other areas of the country:

<https://droughtmonitor.unl.edu/>

- BRWCD completed a master plan in 2017 that includes maps that show estimates of the projected water supply versus demands for each of the drinking water systems in the district for years 2020, 2030, 2040, 2050, and 2060. The master plan can be viewed on the BRWCD web page at the following link (See pages 34-38 of the 101 pdf pages).

<http://brwcd.com/wp-content/uploads/2019/06/BRWCD-Master-Plan-FINAL-REPORT.pdf>

Past Drought Related Challenges and Vulnerabilities (30 minutes)

Challenges

- Lack of/or not enough coordination of water table data
- People that waste water
- Overwatering of yards
- Lack of education about water conservation
- Water rates may be too low to allow for funding through grants
- Some water users use their full month allocation even if they may not need it because they have a right to do so.
- How can we encourage conservation without punishing those that do conserve?

Possible Solutions

- Create a common well and spring supply databased.
 - Could the water systems share and post water table data to be evaluated over time?
 - Track well levels, draw-downs, recovery times, etc.
- Promote xeriscaping or local scaping
- Share ideas for conservation or articles to raise conservation awareness in city newsletters or on social media
- Forgive overages if homeowner arranges for someone to come review their water use and give tips on how to avoid overages in the future
- Utilize social media to point people to a regional website that has more information about water conservation

Drought Vulnerabilities

- What are your biggest drought-related concerns?
- What are the potential risks and impacts of drought?
- What challenges would a drought create for you?

The stakeholders reviewed and added to a list of potential vulnerabilities that were identified in earlier stakeholder meetings (See the attached Vulnerabilities and Potential Mitigation Actions table).

Drought Risk Assessment (20 minutes)

- What is the likelihood of a given vulnerability?
- What is the impact or consequence of occurrence?

The stakeholders reviewed and adjusted the risks they perceived associated with each vulnerability (See the attached Vulnerabilities and Potential Mitigation Actions table).

		Risk Level				
Likelihood of Occurrence	Very Likely	Low	Moderate	High	High	High
	Likely	Low	Moderate	High	High	High
	Unlikely	Low	Low	Moderate	Moderate	High
	Very Unlikely	Low	Low	Low	Low	High
		Negligible	Marginal	Significant	Critical	Crisis
Impact or Consequence of Occurrence						

Possible Mitigation Actions (25 Minutes)

A mitigation action is something we can do now or prior to a drought to lessen the impacts of a drought.

- What specific mitigation actions do you think could be investigated for this area?
- What actions might help address the vulnerabilities listed?

See the attached Vulnerabilities and Potential Mitigation Actions table.

Focus on conservation of existing water resources. The group was asked about the long-term future and a possible need to bring water from other regions of the district. It may be that someday BRWCD or another entity may need to help provide water to this region from another region. For now, there is a desired focus on conserving the existing resources in the area.

Next Steps

- **Mitigation Action List** - J-U-B will use the information collected from stakeholders to help create a list of potential drought mitigation actions. Stakeholders please review the list and contact Weston Bellon if you have any comments or questions or suggestions in the next couple of weeks. Weston can be reached at:

Email: wbellon@jub.com

Phone: 435-713-9514

- **Evaluate Actions** - J-U-B will evaluate the actions based on how the actions address the drought risks and meet other key objectives such as cost.

- **Prioritize Actions** - J-U-B will create a list of prioritized actions and prepare a draft report that documents the process.
- **Draft Plan for comments** - J-U-B will send the stakeholders a copy of the draft plan for to review and provide comments.
- **Present to District Board (in about 2 to 3 months)** - J-U-B will present the report to the district board after making edits based on the comments. Stakeholders can attend that meeting.

Willard Region (Vulnerabilities and Potential Mitigation Actions)

No.	Vulnerability	Likelihood	Impact	Risk Level	Potential Mitigation Actions
1	Lack of indoor culinary supply	Likely	Crisis	High	Expand Pineview secondary water system if possible. Constuct more interconnects - Interconnects can provide some redundancies for when systems fail, but may not help a lot for a long drought period unless water is brought from somewhere outside of this region Develop ASR - ASR may not be very beneficial in this region because there is very little excess source water in the spring months
2	Outdoor water supply limitations (aesthetics, gardens, stock water)	Very Likely	Critical	High	Promote localscapes/xeriscapes
3	Public Health - Poor drinking water quality	Very Unlikely	Critical	Low	
4	Reduced agricultural production	Likely	Critical	High	
5	Limited future growth	Unlikely	Marginal	Low	
6	Poor water management - lack of information/data acquisition	Unlikely	Significant	Moderate	Develop a regional database to provide basin wide water supply monitoring (available to neighboring communities) to track well levels, draw-downs, recovery times, etc.
7	Lack of public participation	Very Likely	Significant	High	Develop billing methods that (data presentation, tiered rates, base rate adjustments) Meet with city leadership/water boards to inform about the current water supply situation Create more available "real time" data for users to be able to view
8	Lack of outdoor water conservation	Unlikely	Significant	Moderate	Implement regulations/ordinances for waterwise landscaping and water use Share ideas for conservation or articles to raise conservation awareness in city newsletters or on social media Implement odd/even water use days Start a localized slow the flow campaign - potential to hire a social media manager to provide regional customized templates for mail or facebook Utilize social media to point people to a regional website that has more information about water conservation
9	Loss of local water to other geographic areas	Unlikely	Significant	Moderate	
10	Lowered ground water levels (well levels) - significant drop	Likely	Significant	High	
11	Loss of revenue	Likely	Significant	High	Adjust base rates to allow for adequate revenue to maintain systems during low water use periods Drought status rate adjustments?
12	Changes in irrigation practice (enclosed delivery systems)	Likely	Significant	High	

NORTH-WEST REGION

Notes from Drought Planning Meeting Held with North-West Region 3/11/21

I met with Julie Tanner (East Grouse Creek Pipeline), Craig Hawkes (Mayor and Water System Operator of Howell Town), Alan Terry (Snowville Water Operator) and Tim Hyder (Snowville Mayor) for our final Drought Planning Meeting. I was not able to meet with the operator of Portage Water System because she had other commitments to keep. But I did talk to her on the phone this morning.

At the meeting, I got a run-down on each system from the operators. **Snowville Town** is looking for some grant \$ to develop their second well, which has mineral smell to it. It produces about 300 gpm. They do have a backup spring that they lease for stock watering that they could use if they really needed to. They need a new transducer in their well for monitoring levels. They also want to do more SCADA updates. **Howell Town** has a backup well, but they do not have SCADA, but were interested in it.

East Grouse Creek Pipeline (EGCP) Company has a ton of problems. They are working with Eric Duersteller to rectify an enforcement action for their chlorination system. They have 47 connections, and they need to raise \$400K to fix the problem. That will need to raise their rates significantly to qualify for funding. We discussed how they might need help with a rate study. Perhaps Curt Ludvigsen or someone can help them. After that is all taken care of, they will still need to get an additional source.

Typed-Up Notes from North-West Region Drought Meeting Held 3/11/2021 (Taken from Hand-Written Notes):

- Snowville needs grant money to develop a second well that they have that has smelly water. They do have a backup spring that they could use that is currently leased for stock watering that they could use in a water emergency.
- The springs out in Bluecreek are down (Howell).
- The spring (in Idaho) feeding Deep Creek (Snowville) is doing well.
- Snowville needs a pressure transducer in their well to monitor water levels. They are also interested in some SCADA upgrades. There could be some funding for that.
- Howell Town does not have any SCADA but does have a backup well.
- East Grouse Creek Pipeline Company (EGCP) is under enforcement action by DDW for chlorination issues. They have a \$400K Project upgrade to install. They are working with Eric Duersteller with Forsgren Engineers. They are trying to get a 50/50 grant/loan from BRAG for \$200K. They have 47 connections. Most are seasonal to some degree. They will have to increase monthly bills by 400% to \$60/month minimum to qualify for funding. It is entirely possible that the bills will have to increase even more than that to say, \$100 to \$110 per month per customer. EGCP may have to do an income study to determine the appropriate Median Adjusted Gross Income (MAGI) for Grouse Creek.
- EGCP's system is mostly supplied by springs and they have two 40K gallon tanks. The springs are located seven miles from town. They have a well that fills the lower tank. There is a lot of winter water waste from troughs running continuously to avoid icing over. I guess if the springs are running either way and the water isn't being pumped from anywhere, it really isn't "wasted".

- There was a discussion regarding sanitary surveys that each water system must have done every three years. There have been some frustrations regarding record keeping and the review process by the State DDW where the Public Water Supplier can be in trouble if good records are not kept...by BOTH sides.
- There was a discussion about a gold mine on Black Pine Mountain (north of Snowville) that will be beginning production soon that will bring in 500 to 700 new employees over the next 20 years. This will bring growth to Snowville and the surrounding areas, even into Tremonton.
- There was a general discussion on how rural Box Elder County needs help with funding interests because of significant infrastructure spread over greater distances and to fewer customer bases than developed areas. This creates more local financial burden on these rural water systems. They also do not have the benefit of interconnects between systems and must be self-sustaining.

Appendix C

District-Wide Stakeholder Potential Strategies

District-Wide Concepts Based on Stakeholder Input

Conservation

Provide education about less water dependent landscaping (xeriscape, local scape, etc.)

Provide conservation information packets for new developments

Utilize mobile apps showing water usage

Adjust billing structures so that wasteful water users pay appropriately and fairly

Provide water usage comparison data to water users (compare to average use in vicinity)

Provide a funding incentive to install conservative landscaping

Provide conservative landscaping information

Investigate grant opportunities for water conservation promotion

Start a "Yard of the Month" program highlighting conservation type landscaping

Enforce existing conservation related ordinances

Utilize slow the flow watering guide and home water use audits by USU (Will USU do these in Box elder County? Is there a fee?)

Promote attendance at the "Green Conference"

Distribute conservation fliers

Develop and implement tiered water rates

Promote or incentivize smart controllers for sprinkler systems

Share ideas for conservation or articles to raise conservation awareness in city newsletters or on social media

Implement odd/even water use days

Start a localized slow the flow campaign - potential to hire a social media manager to provide regional customized templates for mail or Facebook

Utilize local social media sites to point people to a regional website that has more information about water conservation

Develop and implement landscaping requirements (land use code)

Promote smart controllers for sprinkler systems

Implement tiered rate structures, possibly adjust existing tiered rate structures

Secondary Water

Require installation of secondary water systems in new developments

Develop secondary water systems

Develop ordinances requiring that new developments provide water rights (farmland irrigation shares) and secondary infrastructure

Additional Source

Acquire new sources from existing wells or springs that maybe aren't being utilized

Develop ASR projects

Distribution

Construct interconnects (specific interconnect for a region)

Exercise/maintain emergency water connections between communities to be prepared for usage

Water Resource Protection

Stay fully engaged in water development conversations and planning

Utilize a water share lease pool

Monitoring

Install additional weather stations in Wellsville mountain range to help understand local drought conditions better

Install well transducers and telemetry systems on sources that are not yet equipped

Share information between suppliers (potential development of drought indicators by region posted online)

Other

Consider potential effects on ground water levels when piping or lining canals. There are questions about how lining or piping irrigation canals in the area might affect water levels in wells, particularly in shallow wells.

Require rights from developers through transition from ag to municipal use

Include drought scenarios in city water system models to better understand potential drought effects

Keep sourcing points of diversion (well locations) spread out as much as possible

Drought Management (Response Actions)

Implement wise management practices (letters to customers about drought conditions, other programs based on supply levels)

Set changes in water rates depending on drought levels

Make sure people know when we are in a drought through mailed letters, websites, use of Facebook, etc.

Meet with city leadership/water boards to inform about the current water supply situation

Appendix D

Mitigation Action Evaluation

Drought Mitigation Actions					Objectives					
	Cost	Groups Served		Demand	Minimize Costs to Users	Regional Benefit	Local Support	Ease of Implementation	Funding	
	Objective Weights				5.00	4.00	3.00	2.00	3.00	
					Metrics					
	Capital Cost (\$)	Public Water Systems	Population Served	Supply added or demand removed (Acre-Feet/Yr)	Captital Cost/Acre Foot of Water/Year/User	Communities or Water Systems that Benefit (Number)	Level of Support from Water System Managers and Political Leaders	Feasability	Level of Grant Funding	Points
None <0.75					More than 5	High	Very High	75%	4	
Low 0.75-1.5					4 - 5	Medium	High	50%	3	
Medium 1.5-2.25					2 -3	Low	Medium	25%	2	
High >2.25					1	None	Low	None	1	
Bothwell Region										
Marble Hills Backup Source - Interconnect to West Corrinne with booster station (possible exchange with BRWCD)	\$1,740,000.00	Marble Hills, West Corinne, BRWCD	2285	0	1.00	2.00	3.00	4.00	3.00	39
Obtain Existing Well - Obtain additional well source and water rights in Bothwell. (650 AC FT). 0.75 miles of 12" pipe.	\$2,315,863.24	BRWCD (Sod Farm)	0	650	1.00	1.00	2.00	3.00	1.00	24
Purchase Rights and drill a New Well - Obtain water rights in Bothwell. Drill new well (650 AC FT). Install 0.75 miles of 12" pipe.	\$1,860,000.00	Tremonton, WCWC, TPSD, Bothwell, BRWCD	9231	650	4.00	5.00	4.00	3.00	3.00	67
Bothwell to Tremonton Pipe and Tank - Install a new 12" pipe to Tremonton and pay for 50% of a 1 million gallon tank.	\$3,560,418.13	Tremonton, BRWCD	8820	660	4.00	2.00	3.00	3.00	3.00	52
Region Conservation Plan - Identify regional conservation goals through a stakeholder process. Develop a regional database to provide basin wide water supply monitoring (available to neighboring communities) to track well levels, draw-downs, recovery times, etc. Add a weather Station.	\$30,000.00	Marble Hills, Tremonton, TPSD, West Corrine, BWC	11873	552	4.00	4.00	3.00	3.50	3.00	61

Drought Mitigation Actions					Objectives					
	Cost	Groups Served		Demand	Minimize Costs to Users	Regional Benefit	Local Support	Ease of Implementation	Funding	
	Objective Weights				5.00	4.00	3.00	2.00	3.00	
					Metrics					
	Capital Cost (\$)	Public Water Systems	Population Served	Supply added or demand removed (Acre-Feet/Yr)	Captital Cost/Acre Foot of Water/Year/User	Communities or Water Systems that Benefit (Number)	Level of Support from Water System Managers and Political Leaders	Feasability	Level of Grant Funding	Points
					None <0.75	More than 5	High	Very High	75%	4
Low 0.75-1.5					4 - 5	Medium	High	50%	3	
Medium 1.5-2.25					2 -3	Low	Medium	25%	2	
				High >2.25	1	None	Low	None	1	
Cutler Region										
East Point Lookout Well - Investigate source potential by drilling a test well on the east side of point lookout mountain (BR Mountain). Partnership with District, Ukon, and RNG. If test well is good, Develop with pipes to connect Ukon and Riverside North Garland possible coordination with BRWCD). May utilize a possible water right that has been applied for.	\$ 2,468,000.00	BRWCD, Ukon, RNG, Garland	5965	250	2.00	3.00	3.50	2.00	3.00	45.5
Collinston Well - Develop a new well in Collinston to needed water for increasing demands and to improve water quality for Ukon Water Company.	\$ 1,755,000.00	BRWCD, Ukon, Tremonton	10770	500	4.00	3.00	3.00	3.00	3.00	56
Flat Canyon Pump Station and Pipeline - Construct	\$ 1,216,000.00	BRWCD, Ukon, Tremonton	10770	250	4.00	3.00	3.50	4.00	3.00	59.5
New Well, Tank and Connections - Source based on purchase of existing water rights, drill a new well near Riverside, 1 million gallon tank, and 2 miles of 12" pipe.	\$ 4,251,000.00	BRWCD, Ukon, RNG	3145	650	2.00	2.00	3.00	3.00	3.00	42
Collinston Secondary Irrigation System - New secondary system for development in Collinston	\$ 1,200,000.00	BRWCD	160	102	1.00	1.00	4.00	3.00	4.00	39
Extend Existing Bothwell Line and build a Tank - Extend existing 10" mainline 7.5 miles. Pipe out of the Bothwell pocket around BR Mountain to Cutler Region. Include 50% of 1 million gallon tank.	\$ 4,431,804.72	Tremonton, Ukon, RNG, BRWCD, Garland	14785	660	4.00	3.00	3.50	4.00	3.00	59.5
Add Telemetry Equipment to Ukon Wells - Install transducers in Ukon wells and make a possible connection to the BRWCD telemetry system, Provide well depth data to regionwide database. Purpose is to identify and communicate well level.	\$ 3,000.00	Ukon, RNG, Garland, BRWCD	5965	0	1.00	3.00	2.50	4.00	3.00	41.5
Region Conservation Plan - Identify regional conservation goals through a stakeholder process. Develop a regional database to provide basin wide water supply monitoring (available to neighboring communities) to track well levels, draw-downs, recovery times, etc.	\$ 30,000.00	RNG, Ukon, Garland, Collinston, Beaver Dam, Willow Creek	6235	166.8	4.00	4.00	3.00	3.50	3.00	61

Drought Mitigation Actions					Objectives						
	Cost	Groups Served		Demand	Minimize Costs to Users	Regional Benefit	Local Support	Ease of Implementation	Funding		
	Objective Weights				5.00	4.00	3.00	2.00	3.00		
					Metrics						
	Capital Cost (\$)	Public Water Systems	Population Served	Supply added or demand removed (Acre-Feet/Yr)	Captital Cost/Acre Foot of Water/Year/User	Communities or Water Systems that Benefit (Number)	Level of Support from Water System Managers and Political Leaders	Feasability	Level of Grant Funding	Points	
None <0.75					More than 5	High	Very High	75%	4		
Low 0.75-1.5					4 - 5	Medium	High	50%	3		
Medium 1.5-2.25					2 -3	Low	Medium	25%	2		
High >2.25					1	None	Low	None	1		
Brigham Region											
North East Secondary System - Develop secondary water system for the north part of Brigham City.	\$ 1,150,000.00	Brigham City,	20440	506	4.00	1.00	4.00	3.00	4.00	54	
Brigham Water Treatment - Construct a water treatment plant for water coming from Mantua instead of development of secondary water.	Unknown, but expensive	Brigham City, Perry, BRWCD, Corrine	26200	506	1.00	3.00	2.00	2.00	3.00	36	
Region Conservation Plan - Identify regional conservation goals through a stakeholder process. Develop a regional database to provide basin wide water supply monitoring (available to neighboring communities) to track well levels, draw-downs, recovery times, etc.	\$ 30,000.00	Brigham City, Perry, BRWCD, Corrine	26200	3930	4.00	4.00	3.00	3.50	3.00	61	
Existing Irrigation Rrights and Sources - Aquire irrigation rights if available (per acre foot).	\$ 2,000.00	Brigham City	8	1	1.00	1.00	3.00	3.00	3.00	33	
Bear River Region											
Develop Two New Wells - Develop two test wells in Harper Ward, If favorable, develop production wells. (Currently have approved water right and own the property. Make water available to Corinne West Corinne, up to collinston. (Assumed full right is developed)	\$ 3,730,000.00	BRWCD, Brigham, Corinne, West Corinne, Honeyville, Deweyville	25685	900	4.00	4.00	2.50	3.00	3.00	58.5	
Region Conservation Plan - Identify regional conservation goals through a stakeholder process. Develop a regional database to provide basin wide water supply monitoring (available to neighboring communities) to track well levels, draw-downs, recovery times, etc.	\$ 30,000.00	BRWCD, Brigham, Corinne, West Corinne, Honeyville, Deweyville	25685	120.75	4.00	4.00	3.00	3.50	3.00	61	

Drought Mitigation Actions					Objectives					
	Cost	Groups Served		Demand	Minimize Costs to Users	Regional Benefit	Local Support	Ease of Implementation	Funding	
	Objective Weights				5.00	4.00	3.00	2.00	3.00	
					Metrics					
	Capital Cost (\$)	Public Water Systems	Population Served	Supply added or demand removed (Acre-Feet/Yr)	Captital Cost/Acre Foot of Water/Year/User	Communities or Water Systems that Benefit (Number)	Level of Support from Water System Managers and Political Leaders	Feasability	Level of Grant Funding	Points
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Low 0.75-1.5					4 - 5	Medium	High	50%	3	
Medium 1.5-2.25					2 -3	Low	Medium	25%	2	
				High >2.25	1	None	Low	None	1	
Willard Region										
Expand Pineview Secondary System if Possible - Pineview does not know how much area they will be capable of serving. They are performing an internal audit on water use now to get a better idea of how much usable water they have. May be a good idea to monitor results of study.	???	Willard, South Willard, Perry, BRWCD, Brigham	???	???	3.00	2.00	3.00	4.00	3.00	49
Regional Conservation Plan - Identify regional conservation goals through a stakeholder process. Develop a regional database to provide basin wide water supply monitoring (available to neighboring communities) to track well levels, draw-downs, recovery times, etc. Add a weather stations in Willard.	\$ 40,000.00	Willard, South Willard	3970	174	4.00	4.00	3.00	3.50	3.00	61
Develop New Wells - Develop new wells up to 6 wells? 1600 acre feet per year. 2 miles of pipe for each well.	\$ 9,600,000.00	BRWCD	15000	1600	4.00	1.00	2.00	2.50	1.00	38
Mund Well Development - Develop with pump, cost of redrilling 300' well, 1.5 mile 12" pipeline (includes cost of sewer collection system and piping to treatment plant). DWQ will not allow use of this well for culinary purposes. If a sewer collection were installed in the area, it might be allowed.	\$ 11,500,000.00	BRWCD, South Willard	9000	900	3.00	2.00	4.00	0.50	3.00	45
Interconnect from Brigham - Construct a new supply line from outside of the region (from Brigham or BRWCD) - 20" Brigham to South Willard		Perry, Willard, South Willard, BRWCD		0	1.00	3.00	2.00	0.50	2.00	30
NorthWest Region										
Install Well Monitoring Equipment Throughout the Region -	Not evaluated - Additional information needed									
Regional Conservation Plan	\$ 30,000.00	Entire Region	1000	50	4.00	4.00	3.00	3.50	3.00	61

Drought Mitigation Actions					Objectives						
	Cost	Groups Served		Demand	Minimize Costs to Users	Regional Benefit	Local Support	Ease of Implementation	Funding		
	Objective Weights				5.00	4.00	3.00	2.00	3.00		
					Metrics						
	Capital Cost (\$)	Public Water Systems	Population Served	Supply added or demand removed (Acre-Feet/Yr)	Captital Cost/Acre Foot of Water/Year/User	Communities or Water Systems that Benefit (Number)	Level of Support from Water System Managers and Political Leaders	Feasability	Level of Grant Funding	Points	
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Low 0.75-1.5					4 - 5	Medium	High	50%	3		
Medium 1.5-2.25					2 -3	Low	Medium	25%	2		
High >2.25					1	None	Low	None	1		
District Wide											
Bothwell Pocket / Culter Region Waterline Connection - New source, tank and transmission line combined project. 12" line from Bothwell Pocket to Tremonton, 10" line from Tremonton to RNG and Ukon.	\$ 10,400,000.00	Tremonton, BRWCD, Ukon, RNG	11,875	1200	4.00	3.00	4.00	3.50	3.00	60	
District Wide Drought Contingency Plan	\$ 150,000.00	All in county	58,000	6430.4	4.00	4.00	2.50	3.00	3.00	58.5	

Appendix E

Detailed Opinions of Probable Cost



OPINION OF PROBABLE COST

Client: Bear River Water Conservancy District
Project: Flat Canyon Water System
Project No.: 57-20-045
Date: September 1, 2021

J-U-B ENGINEERS, INC.



**THE
LANGDON
GROUP**



**GATEWAY
MAPPING
INC.**

J-U-B FAMILY OF COMPANIES

Flat Canyon Water System

Item #	Description	Unit	Estimated Quantity	Unit Price	Total
1	Pitless Adapter Installed	Lump Sum	1	\$ 15,000.00	\$ 15,000.00
2	Submersible Pumping System, 140 gpm 25 hp	Lump Sum	1	\$ 30,000.00	\$ 30,000.00
3	Pumping System Electrical and Controls	Lump Sum	1	\$ 20,000.00	\$ 20,000.00
4	Pump Station Complete w/Vault, Valves & Piping	Lump Sum	1	\$ 75,000.00	\$ 75,000.00
5	Onsite Pond or Buried Discharge for Flushing	Lump Sum	1	\$ 25,000.00	\$ 25,000.00
6	Air Gap Structure	Lump Sum	1	\$ 7,500.00	\$ 7,500.00
7	Telemetry Station	Lump Sum	1	\$ 15,000.00	\$ 15,000.00
8	RMP Powerline Extension	Lump Sum	1	\$ 93,000.00	\$ 93,000.00
9	Trenching, 4-inch Conduit and Backfill by District	Feet	1,600	\$ 12.00	\$ 19,200.00
10	6" Diameter DR 11 160 psi HDPE Water Pipeline	Linear Feet	6,780	\$ 40.00	\$ 271,200.00
11	Connection at Buried Pump Station	Lump Sum	1	\$ 3,000.00	\$ 3,000.00
12	Connection at Existing 12-Inch Dia. Pipeline	Lump Sum	1	\$ 7,500.00	\$ 7,500.00
13	Chlorine Room in South Booster Station	Lump Sum	1	\$ 45,000.00	\$ 45,000.00
Subtotal					\$ 626,400.00
Mobilization				10%	\$ 62,640.00
Construction Total					\$ 689,040.00
Design and Construction Engineering		% Construction Total		15%	\$ 103,356.00
Construction Contingency		% Construction Total		15%	\$ 103,356.00
Environmental Evaluation and Clearance		Lump Sum			\$ 20,000.00
Total Construction Cost w/Contingency, Rounded					\$ 916,000.00
Property and Easements Purchases					\$ 280,000.00
Mitigation to Bitners					\$ 20,000.00
Grand Total					\$ 1,216,000.00

OPINION OF PROBABLE COST

Client: Bear River Water Conservancy District
Project: Harper Ward OPC
Project No.: 57-20-045
Date: May 21, 2021

Harper Ward Wells

Item #	Description	Unit	Estimated Quantity	Unit Price	Total	Inflation Rate	Years	Inflation Adjusted Cost
1	Mobilization	Lump Sum	1	\$ 260,000.00	\$ 260,000.00			\$ 260,000.00
2	Traffic Control	Lump Sum	1	\$ 125,000.00	\$ 125,000.00			\$ 125,000.00
3	Test Well	Lump Sum	2	\$ 200,000.00	\$ 400,000.00			\$ 400,000.00
4	Production Well (Wellhouse, Pump, Generator, Treatment)	Lump Sum	2	\$ 1,100,000.00	\$ 2,200,000.00			\$ 2,200,000.00
5	12" Waterline	Linear Feet	3,000	\$ 56.23	\$ 168,690.00	4%	2021	\$ 168,690.00
6	12" Fittings	Each	3	\$ 1,100.00	\$ 3,300.00	4%	2021	\$ 3,300.00
7	12" Valve	Each	2	\$ 2,000.00	\$ 4,000.00	4%	2021	\$ 4,000.00
8	Asphalt Surface Repair	Ton	109	\$ 50.00	\$ 5,437.50	4%	2018	\$ 6,116.45
9	Untreated Roadbase	Cubic Yard	167	\$ 40.00	\$ 6,670.00	4%	2018	\$ 7,502.84
10	Trench Backfill	Ton	1,495	\$ 17.00	\$ 25,415.00	4%	2021	\$ 25,415.00
								\$ -
Construction Total								\$ 3,200,024.29
Preliminary Engineering		% Construction Total					8%	\$ 256,001.94
Construction Engineering		% Construction Total					6%	\$ 192,001.46
Environmental		Lump Sum						\$ 80,000.00
Project Total								\$ 3,728,027.69

OPINION OF PROBABLE COST

Client: Bear River Water Conservancy District
Project: Bothwell Pocket / Cutler Region Connection
Project No.: 57-20-045
Date: May 14, 2021

Bothwell Pocket / Culter Region Waterline Connection

Item #	Description	Unit	Estimated Quantity	Unit Price	Total	Inflation Rate	Years	Inflation Adjusted Cost
General					Subtotal			\$ 4,358,681.49
1	Mobilization	Lump Sum	1	\$ 750,000.00	\$ 750,000.00			\$ 750,000.00
2	Traffic Control	Lump Sum	1	\$ 350,000.00	\$ 350,000.00			\$ 350,000.00
3	1 MG Tank	Lump Sum	1	\$ 1,452,573.89	\$ 1,452,573.89	4%	2021	\$ 1,452,573.89
4	12" Waterline	Linear Feet	32,120	\$ 56.23	\$ 1,806,107.60	4%	2021	\$ 1,806,107.60
5	12" Fittings	Each	12	\$ 1,100.00	\$ 13,200.00	4%	2021	\$ 13,200.00
6	12" Valve	Each	2	\$ 2,000.00	\$ 4,000.00	4%	2021	\$ 4,000.00
7	10" Waterline	Linear Feet	39,850	\$ 41.50	\$ 1,653,775.00	4%	2018	\$ 1,860,271.96
8	10" Fittings	Each	10	\$ 1,000.00	\$ 10,000.00	4%	2018	\$ 11,248.64
9	10" Valve	Each	10	\$ 2,895.00	\$ 28,950.00	4%	2018	\$ 32,564.81
10	Asphalt Surface Repair	Ton	9,520	\$ 50.00	\$ 476,000.00	4%	2018	\$ 535,435.26
11	Untreated Roadbase	Cubic Yard	15,111	\$ 40.00	\$ 604,440.00	4%	2018	\$ 679,912.80
12	Trench Backfill	Ton	65,450	\$ 17.00	\$ 1,112,650.00	4%	2021	\$ 1,112,650.00
13	Pipe Bedding	Ton	38,080	\$ 15.00	\$ 571,200.00	4%	2018	\$ 642,522.32
14	50 hp Pump	Each	2	\$ 9,850.00	\$ 19,700.00	4%	2018	\$ 22,159.82
15	Generator	Each	1	\$ 48,500.00	\$ 48,500.00	4%	2018	\$ 54,555.90
16	Electrical/SCADA Connections	Each	1	\$ 143,159.00	\$ 143,159.00	4%	2018	\$ 161,034.41
17	Acquire Existing Well	Acre Foot	650	\$ 2,000.00	\$ 1,300,000.00			\$ 1,300,000.00
								\$ -
Construction Total					\$ 9,044,255.49			\$ 9,488,237.41