CHAPTER 2 – ALTERNATIVES

Chapter 2 describes the Proposed Action and alternatives to the Proposed Action that were evaluated for the Cow Canyon Municipal Water Development Project. It identifies the screening criteria that were used to consider the practicability of potential alternatives; and it includes a summary of the alternatives that were considered but eliminated from detailed study. It also provides a full description and comparison of the alternatives that are studied in detail, which include:

- Alternative 1 – No Action;
- Alternative 2 – Proposed Action, Cow Canyon Spring #3 Development; and
- Alternative 3 – Full Utilization of Cow Canyon Springs #1 and #2.

2.1 Alternatives Screening Criteria

The Forest Service evaluated a wide range of potential alternatives that were identified during the scoping process. Four screening criteria were developed to determine the practicability of alternatives:

- The alternative must be responsive to the purpose of and need for the Proposed Action;
- The alternative must be responsive to issues identified during the scoping process;
- The alternative must be legally and administratively available to the Water District and compliant with applicable federal, State and/or local rules and regulations; and
- The alternative must be reasonable considering costs, logistics and existing technology.

Alternatives that did not meet these screening criteria were eliminated from further study and consideration.

2.2 Alternatives Considered but Eliminated from Detailed Study

2.2.1 Water Conservation Alternative

This alternative would include various actions to reduce the average water usage per connection such that the Water District could petition the State for a reduction in its ERC flow requirements. Actions considered for this alternative include: public education, conservation incentives and ordinances, infrastructure improvements to prevent leakage, and conversion to water efficient appliances. As discussed below, this alternative was eliminated because the sum total of its actions would not meet the Water District's long-term need for additional water supplies, and because some of its actions would not be cost effective.

The State of Utah 2001 Water Plan identified a municipal and industrial water conservation goal to reduce the *per capata* demand on public water supplies by 25% by the year 2050. Water Conservancy Districts with more than 500 connections are required to submit water conservation plans to the Utah Division of Water Resources.

The Water District presently has a water conservation plan that has two main components – public education and conservation incentives. The education component consists of various efforts to promote public awareness on the importance of water conservation. These efforts include cooperative programs with local schools to present water conservation seminars to primary students. The Water District has outreach materials available for use by various civic clubs and interest groups to help promote water conservation; and it has outdoor irrigation measuring devises that can be borrowed by users to evaluate their outdoor usage. The Water District regularly includes flyers in its monthly billings reminding users on the need to conserve water. Under this alternative, the Water District would continue its public education program as described above. It would also extend its educational seminars to include secondary students.

As a measure to discourage excessive water use, the Water District implements a graduated water rate schedule in which the unit cost of water increases with increased use. During the non-irrigation months, the Water District has a normal rate schedule based on a $30.00 base fee for the first 10,000 gallons of water usage; $1.00 per 1,000 gallons up to 20,000 gallons; and $0.50 per 1,000 gallons after that amount. The Water District's normal rate schedule is among the highest 6 percent of PWSs in the State of Utah (Horrocks Engineers 2003). During the irrigation months, the rate schedule is increased and is based on a $30.00 base fee for the first 10,000 gallons of water usage; $1.00 per 1,000 gallons up to 60,000 gallons; $1.25 per 1,000 gallons for 60,000 to 500,000 gallons; $2.00 per 1,000 gallons for 500,000 to 750,000 gallons; and $3.00 per 1,000 gallons over 750,000 gallons.

Under this alternative, the Water District would assess the practicability and economic hardships of adjusting its schedules to promote further reductions in water use. If peak water demands could be reduced by 10 percent, the Water District's water supply would be extended for an additional three years. However, at the end of this period the Water District would still be out of compliance with its State-mandated ERC flow requirements and there would be no available water for future demands.

In most PWS water systems, there is a certain amount of water lost to leakage and other losses. Older systems often leak more because of aging infrastructure. The infrastructure of the Water District's existing water system is about 10 years old and is in very good operating condition. The difference in water measurements between the system's master meters and the metered usage among the existing connections is approximately 3 percent (Horrocks Engineers 2003), which is relatively small considering the Water District's service area covers approximately 104 square miles. If water losses could be reduced to zero, the Water District's water supply would be extended for one year. The logistics and costs for detecting, correcting and maintaining zero losses throughout the 104 square mile service area would be impracticable, and the Water District still would not realize enough water savings to meet its long-term need for additional water supplies.

Another method of conserving water would be for the Water District to purchase water saving appliances for its users. Toilets typically account for the greatest percentage of indoor water use. Assuming all of the Water District's existing connections use the older 3-gallon toilets, conversion to 1.6-gallon, low-flow toilets could reduce water demands by approximately 3 percent (Horrocks Engineers 2003). This would extend the Water District's water supply for one

additional year at a cost of about $100,000, at which time the Water District would still be out of compliance with its State ERC flow requirements and there would be no additional water for future demands. Other water savings appliances such as frontloading washing machines would likely provide less water savings and would be cost prohibitive considering the actual water savings. At a cost of about $600 per machine, it would cost the Water District $324,600 to provide a new water efficient, frontloading washing machine to all of its obligated residential connections.

2.2.2 Groundwater Development

This alternative would entail the development of wells to supply culinary-grade water. Nearly all of the homes in the Water District's service area obtained their culinary water from wells before the Water District was formed. Insufficient yields and water quality concerns were the main reasons why the Water District was originally formed because the Water District's users could not depend on their wells for a safe and reliable water supply.

There are two principal sources of groundwater: 1) the shallow alluvium aquifer, and 2) the deeper bedrock aquifer. Both of these aquifers have problems with regard to water yield and water quality. A typical large well in the Water District's service area produces about 150 gpm. Both aquifers are subject to groundwater contamination due to the natural geology of the area (Horrocks Engineers 2003).

Three or more wells would have to be developed in order to meet the Water District's long-term needs. A groundwater investigation to identify potential wells sites would cost approximately $40,000 and take at least one year to complete, with no guarantees that a suitable aquifer would be identified. Assuming a suitable groundwater aquifer(s) could be found with regard to both water yield and water quality, it would likely take an additional two years to get a new well through the State permitting process, including the conversion and transfer of the Water District's existing water rights. Additional NEPA studies could be required if well sites were located on federal or Tribal lands.

Construction costs would be approximately $300,000 per well, plus costs to connect the wells to the existing culinary system (Horrocks Engineers 2003). Annual operation and maintenance costs would be approximately $35,000 per year, per well, assuming that there would be no significant water treatment costs. Assuming three or four wells would have to be developed, the total costs for this alternative over the 25-year planning period would probably range from $3.5 to $4.7 million.

This alternative was eliminated because it is not responsive to the Water District's immediate need for additional water supplies; there is no guarantee that a suitable groundwater source(s) could be identified that would meet the Water District's long-term water supply needs; and because the costs are too high given the Water District's existing financial situation regarding qualification for a loan (debt to equity ratio).

2.2.3 Development of Alternative Spring Sources

The 1992 EA for the original Spring #1 and #2 project considered the feasibility of developing alternative spring sources, including Yellowstone Spring, Rock Creek Spring, Little Water Spring, Crystal Spring and other springs in the Harmston Basin and Hell's Canyon areas. None of these springs have sufficient flows to meet the Water District's current water supply needs. In addition, no new springs have been identified since 1992 that would that would have sufficient flows to meet the Water District's current water supply needs. This includes a search for spring sources in the Yellowstone River drainage by Water District and Forest Service personnel in the summer of 2003 (Frontier Corporation 2004). Two potential spring sources with flows that were visually estimated to be approximately 1 cfs (449 gpm) were identified along the Yellowstone River on Forest Land. However, both of these springs were eliminated from detailed analysis because they are both situated within the active floodplain of the Yellowstone River. These two springs were determined to be unsuitable for development because they would require extensive armoring to prevent flood scour damage, and because the source water for these springs would probably have to be treated because of connectivity with the river's alluvial aquifer. Source protection for theses springs would also be problematic because of their location on the active floodplain. Therefore, this alternative was eliminated because there are no known springs in the vicinity of the Water District's service area with sufficient source flows that would be suitable for development.

2.2.4 Storage of Unused Flows from Spring #1 and #2

The Water District utilizes the full 531 gpm of its permitted flow during peak summer demands. During other times of the year, the unused flow is bypassed with the mitigation flows. Based on the metered usage of the Water District's water supply from Springs #1 and #2, approximately half of the permitted flow, or 350 ac-ft (114 million gallons), is unused (Horrocks Engineers 2003). Under this alternative, the Water District would construct storage facilities (either tanks or reservoirs) to hold the unused water until it is needed. Because the unused water would have to be held up to eight months, the Water District would also have to treat the stored water in order to meet water quality standards (Horrocks Engineers 2003). The estimated cost to construct, maintain and operate storage and water treatment facilities over the 25-year planning period is $15 to $20 million (Horrocks Engineers 2003).

This alternative would provide enough water supplies for the Water District's projected 25-year need. However, UDDW rules do not allow for the use of water storage as a substitute for source flow supply requirements (Horrocks Engineers 2003). Thus, this alternative was eliminated because culinary storage is not administratively available to the Water District. In addition, the costs for this alternative are prohibitive given the Water District's current financial situation regarding qualification for a loan (debt to equity ratio).

2.2.5 Surface Water Storage Alternative

This alternative would entail the use of surface water presently stored in existing reservoirs such as Starvation Reservoir, Big Sand Wash Reservoir, or Moon Lake Reservoir (see Figure 1-1 for reservoir locations). Starvation and Sand Wash Reservoirs are located in the Uintah Basin at

elevations below the Water District's service area. Moon Lake Reservoir is located on the Ashley National Forest at an elevation above the Water District's service area.

The Water District would have to either obtain or transfer its water rights to the storage location. The Water District would have to negotiate use of the existing Duchesne Valley Water Treatment Plant, or construct a new water treatment plant, in order to use water stored at Starvation Reservoir. The cost to build a new water treatment facility would be approximately $2 million, with annual operation and maintenance costs of approximately $100,000 (Horrocks Engineers 2003). Approximately 24 miles of water distribution pipes and 12 pump stations would have to be built in order to connect the water from Starvation Reservoir to the Water District's existing culinary system. This would be a costly system to maintain and operate.

New water treatment facilities would have to be built in order to use water stored at Big Sand Wash Reservoir or Moon Lake Reservoir. Pumping stations and pipelines would also have to be constructed in order to connect water from Big Sand Wash Reservoir to the Water District's existing culinary system. Water from Moon Lake Reservoir could probably be gravity fed into the Water District's existing culinary system, but would require the construction of at least 12 miles of new distribution pipelines.

Total costs to construct, operate, and maintain water developed from any of these three reservoir sites over the 25-year planning period would probably range from $4.5 to $10 million. It could take an additional two to three years to obtain all of the necessary State and Federal permits and approvals for this alternative. Additional NEPA studies would be required for actions affecting Starvation Reservoir, Big Sand Wash Reservoir, and Moon Lake because these are federally administered facilities, and because any new pipelines from Moon Lake Reservoir would have to cross Forest Service land, and possibly Tribal land on the Uintah and Ouray Indian Reservation.

The various scenarios under this alternative would likely provide enough water supplies for the Water District's projected 25-year need or beyond. However, it was eliminated because it is not responsive to the Water District's immediate need for additional water supplies, and because of the substantial costs relative to the Water District's existing financial situation regarding qualification for a loan (debt to equity ratio).

The development of a new reservoir site was also considered under this alternative but eliminated because of additional costs to design, build and permit a new reservoir; and because the construction of a new reservoir would probably have substantially more environmental impact compared to the Proposed Action.

2.2.6 Surface Water Diversion Alternative

This alternative would involve the treatment of surface water diverted directly from either the Yellowstone River or the Lake Fork River. The Water District would have to either obtain or transfer its water rights for use at a new point of diversion. In order to meet its long-term needs, the Water District would have to construct a new 650-gpm water treatment facility at a cost of approximately $2 million, with annual operation and maintenance costs of approximately $100,000. Depending on location, the treated water would be connected to the Water District's

culinary distribution system via gravity flow or pumps. The total cost for this alternative over the 25-year planning period would be approximately $4.5 to $5.5 million.

A potential scenario under this alternative would use the existing diversion for the Moon Lake Hydroelectric Project on the Yellowstone River. River flows diverted through the hydroelectric generators would be collected and piped directly to a water treatment facility. This would preclude the need to construct a new river diversion, thereby avoiding environmental impacts. The new water treatment facility would be located at a year-round accessible location either on or off Forest Service land. The Water District would have to negotiate the use of the hydroelectric diversion with the Moon Lake Hydroelectric Company and may have to obtain approvals from the Federal Energy Regulatory Commission. This scenario would require additional NEPA studies and perhaps Tribal approvals depending on the location of the water treatment plant.

Another potential scenario would be to construct a new diversion structure on either the Yellowstone or Lake Fork Rivers. This scenario could also require additional NEPA studies and/or Tribal approvals depending on the locations of the new river diversion and water treatment plant. A Section 404 Permit would have to be obtained from the USACE and a Stream Alteration Permit would have to be obtained from the State Engineer.

The various scenarios under this alternative would likely provide enough water supplies for the Water District's projected 25-year need. However, it was eliminated because it is not responsive to the Water District's immediate need for additional water supplies, and because of the substantial costs relative to the Water District's existing financial situation regarding qualification for a loan (debt to equity ratio).

2.3 Alternatives Considered in Detail

2.3.1 Alternative 1 - No Action

Under the No Action Alternative, the Forest Service would not amend the Special Use Permit for the Water District to develop Cow Canyon Spring #3. The Water District would have to pursue other administratively available alternatives, on or off National Forest System lands, to address its need for additional water supplies. In the interim, the Water District would have to continue its moratorium on the issuance of new connections to its culinary system, and would have to remain out of compliance with State-mandated ERC flow requirements.

The Water District would continue operate and maintain the existing spring developments and associated infrastructure in accordance with the terms and conditions that are currently specified in the Special Use Permit. This would include periodically checking the conditions of the existing spring boxes and livestock exclosure fences, and measuring the spring flows and mitigation bypass flows.

2.3.2 Alternative 2 - Proposed Action, Cow Canyon Spring #3 Development

Development Features: Under the Proposed Action, the Water District would develop Spring #3 and incorporate 413 gpm (0.9 cfs) directly into its existing culinary water system (Figure 2-1). No water treatment or pumping would be required. The spring would be encapsulated with a clay cap and 10-foot thick earthen mound, and enclosed with a wooden buck and rail (or post and rail), livestock exclosure fence to protect the water quality of the source flows. Fill material would be obtained from a new borrow site, approximately 8,000 sq-ft in size, located in an upland area on the south side of the spring. Both the earthen mound and borrow area would be regarded to a maximum 2:1 slope and revegetated with native plant species.

Based on the Water District's recent measurements, the source flow of Spring #3 is estimated to be approximately 525 gpm (1.2 cfs) (Horrocks Engineers 2003). The source flows would be collected with 18-inch PVC pipe and transferred underground with 10-inch PVC pipe to the existing box for Spring #2. The spring box would be modified by installing additional piping to accommodate flows from Spring #3 (Figure 2-2). Thus, the modified spring box would be used to manage flows from both Spring #2 and #3. A total of approximately 120 feet of buried pipeline would be installed.

Mitigation: Approximately 112 gpm (0.25 cfs) from Spring #3 would be continually bypassed at the redesigned spring box as mitigation flows for the maintenance of a pond and downstream aquatic and wetland habitats. The remaining 413 gpm (0.9 cfs) (or about 79 percent of the total available flow) would be available for the Water District's use. The Water District has agreements with the Moon Lake Hydroelectric Project to release up to 2.0 cfs (898 gpm) of additional flows to compensate for depletion in the Yellowstone River. The redesigned spring box would also have a separate outlet to continuously bypass approximately 112 gpm (0.25 cfs) for the maintenance of existing downstream aquatic and wetland habitats below Spring #2 (Figure 2-2).

Approximately 0.21 acre of unavoidable impacts to open water (i.e., shallow pond) and wetland habitats would be mitigated on-site and in-kind. The loss of 1,300 sq-ft (0.03 acre) of shallow pond (<2 feet deep) associated with the spring source would be mitigated at a 1:1 surface area ratio with the creation of an approximately 1,510 square foot (0.03 acre) pond with similar features and characteristics. The created pond would be sustained by the 112 gpm of mitigation bypass flows from Spring #3. The bypass flows would be conveyed via a buried pipeline that would have a bubble outlet to simulate the groundwater action that currently sustains the shallow pond at Spring #3. The substrates, plant materials and macroinvertebrates in the existing pond would be removed and transplanted into the created mitigation pond. Thus, the mitigation pond would be created with the same water source, substrates, plant materials, and macroinvertebrates found in Spring #3. The created pond would be a flow-through system, and the overflows would maintain the existing downstream aquatic and wetland habitats below Spring #3 (Figure 2-1).

The 0.18 acre of wetland impacts would be mitigated at a 2.2:1 surface area ratio by restoring the hydrology to an abandoned beaver pond/wetland complex located approximately 200 feet east of Spring #3 (Figure 2-1). The unused portions of the permitted flows (i.e., surplus flows) from Spring #2 and #3 would be conveyed by a buried pipeline and applied to approximately 17,700

Figure 2-1. Proposed development plan for Cow Canyon Spring #3.

Figure 2-2. Proposed spring box design for Cow Canyon Spring #3.

sq-ft (0.4 acre) of remnant drainages that were once supplied by overflows from a series of beaver ponds that were built in the Spring #1 drainage (Figure 2-1). The hydrologic restoration of this area would reestablish, expand and enhance aquatic and riparian-wetland habitats.

Surplus flows would be continuously bypassed to the wetland restoration area beginning at the outset of the Spring #3 development. The surplus flows would decrease over time as the Water District sells more connections to its culinary system. The amount of surplus flows would remain relatively constant throughout the non-irrigation months, but the amount of surplus flows during the summer months would diminish over time as the Water District's user demand increases. Based on the Water District's growth projections, it is possible that there may be no surplus flows 25 years in the future during the peak summer demand period, which has historically occurred during the month of July.

The Water District would be responsible for installing and maintaining wooden buck and rail (or post and rail) fencing to exclude livestock from the pond creation and wetland restoration mitigation areas. The existing livestock exclosure fences around the Spring #1 and Spring #2 development sites would remain in place and would be maintained by the Water District.

The Water District would have to obtain a CWA Section 404 Permit from the USACE prior to amending the Special Use Permit; and a detailed mitigation and monitoring plan for the pond and wetland mitigation areas would have to be approved by the Forest Service and the USACE prior to the development of Spring #3. The Water District would be responsible for the maintenance and monitoring of the pond and wetland mitigation areas for a period of three years, or until the mitigation areas have been successfully established. The Water District would be responsible for making any necessary adjustments to ensure the effectiveness of the pond and wetland mitigation areas while the Special Use Permit is in effect. The Water District would be responsible for all work to restore the three spring development areas should the Special Use Permit be terminated.

Other mitigation measures would include:

- The Water District would be responsible for implementing and maintaining erosion and sediment control best management practices (BMPs) to protect water quality during project construction and until 70 percent plant cover is reestablished in disturbed areas.

- The Water District would submit a spill prevention plan and an erosion and sediment control plan to the Forest Service prior to the mobilization of any construction equipment to the spring development area.

- Construction activities would be restricted to non-nesting periods (September 15 - March 15) as a measure to avoid/minimize potential impacts to migratory birds.

- Construction equipment would have to use the Water District's existing pipeline right-of-way to cross the Yellowstone River and to access the spring development area.

- A latrine site for construction workers would be designated outside of the wetland areas and spring source areas.

- The Water District would be responsible for revegetating disturbed areas by applying a native seed mixture approved by the Forest Service and spreading certified weed-free straw mulch.

- The Water District would be responsible for monitoring and treating noxious weeds until desired vegetation is reestablished.

- Any vehicle or equipment going off system roads would be cleaned (including tracks and underside) prior to use on National Forest System lands in order to avoid introducing seeds of noxious or aggressive plants, invasive aquatic species, or other potential contaminants of soil or water.

- The Water District would obtain a letter from the Utah State Engineer's office confirming it has adequate water rights for culinary development prior to amendment of Forest Service Special Use Permit.

Construction Schedule/Costs: A construction schedule for the Proposed Action is provided in Appendix B. Construction would be done with the use of two or three pieces of tracked equipment and would be completed within two weeks. No new road construction would be required. The equipment would use the Water District's existing pipeline right-of-way to cross the Yellowstone River and access the construction area.

The Proposed Action would cost approximately $75,000 to construct. Maintenance and operational costs would be minimal. Mitigation monitoring and maintenance would cost approximately $5,000 per year (a total $15,000 for three post-construction monitoring years).

2.3.3 Alternative 3 – Full Utilization of Cow Canyon Springs #1 and #2

Development Features: Under this alternative, the Water District would fully use the entire 756 gpm (1.7 cfs) combined flow of Springs #1 and #2. This would equate to 675 ERCs. The Water District has an agreement with the Moon Lake hydroelectric project to release up to 2.0 cfs (898 gpm) of additional flows to compensate for depletion.

A minor amount of work would be required to reconfigure the existing spring boxes so as to eliminate the 225 gpm (0.5 cfs) of continuous mitigation bypass flows. The additional water would be fully used during the irrigation months when user demands are the greatest. During the non-irrigation months when user demands are the least, all unused water (i.e., surplus water) would be bypassed into the existing spring channels to maintain downstream aquatic and wetland habitats.

Mitigation: The Water District would be responsible for installing a wooden buck and rail (or post and rail) livestock exclosure fence around the source area of Spring #3 to protect the shallow pond and adjacent wetland areas. At a minimum, 0.4 acre of open water and wetlands associated with the Spring #3 source area would be protected. The existing livestock exclosure fences around Spring #1 and Spring #2 development sites would remain in place and would be maintained by the Water District.

Alternative 3 would require an amendment to the Section 404 permit that was previously issued for the Spring #1 and #2 development project by the USACE. The Water District would be responsible for obtaining the Section 404 permit amendment, and for implementing any additional mitigation measures required by the USACE. The Forest Service would amend the Special Use Permit accordingly.

Other mitigation measures would include:

- The Water District would be responsible for implementing and maintaining erosion and sediment control best management practices (BMPs) to protect water quality during project construction and until 70 percent plant cover is reestablished in disturbed areas.

- The Water District would submit a spill prevention plan and an erosion and sediment control plan to the Forest Service prior to the mobilization of any construction equipment to the spring development area.

- Construction activities would be restricted to non-nesting periods (September 15 – March 15) as a measure to avoid/minimize potential impacts to migratory birds.

- Construction equipment would have to use the Water District's existing pipeline right-of-way to cross the Yellowstone River and to access the spring development area.

- A latrine site for construction workers would be designated outside of the wetland areas and spring source areas.

- The Water District would be responsible for revegetating disturbed areas by applying a native seed mixture approved by the Forest Service and spreading certified weed-free straw mulch.

- The Water District would be responsible for monitoring and treating noxious weeds until desired vegetation is reestablished.

- Any vehicle or equipment going off system roads would be cleaned (including tracks and underside) prior to use on National Forest System lands in order to avoid introducing seeds of noxious or aggressive plants, invasive aquatic species, or other potential contaminants of soil or water.

- The Water District would obtain a letter from the Utah State Engineer's office confirming it has adequate water rights for culinary development prior to amendment of Forest Service Special Use Permit.

Construction Schedule/Costs: The cost to reconfigure the spring boxes and install additional livestock exclosure fencing around the Spring #3 protection area would be approximately $5,000, excluding any additional mitigation costs that may be required by the USACE. There would be no additional operational or maintenance costs. Work would be done either without the use of heavy machinery or with one piece of equipment. Work could probably be done

within a period of one week. If equipment were used, routes crossing the Yellowstone River would be identical as described in Alternative 2.

2.4 Comparison of Alternatives

A brief comparison of the environmental consequences that would result from the implementation of the three Project alternatives is provided below in Table 2.1.

Table 2.1. Comparison of Environmental Consequences among Project Alternatives.

Environmental Resource	Alternative #1 No Action	Alternative #2 Proposed Action Spring #3 Development	Alternative #3 Full Utilization of Springs #1 & #2
High Uinta Wilderness	No Effect	No Effect	No Effect
Inventoried Roadless Areas/Recreation	No effect to existing roadless attributes or recreation.	There would be less than 0.5 acre of temporary earth disturbance within a designated roadless area. The development of Spring #3 and installation of additional livestock exclosure fencing would slightly reduce the natural integrity and the apparent naturalness roadless attributes of the Project Area. There would be a temporary impact to solitude and dispersed recreation during the 2-week construction period, which would occur between September 15 and March 15. There would be no long-term impacts to solitude or to opportunities for dispersed recreation.	Overall, there would be little impact to roadless attributes. Installation of additional livestock exclosure fencing and reduction in spring bypass flows during peak user demand would be a minor reduction in the natural integrity and apparent naturalness of the Project Area. There would be a temporary impact to solitude and dispersed recreation during the 1-week construction period, which would occur between September 15 and March 15. There would be no long-term impacts to roadless attributes or to opportunities for dispersed recreation.
Land Use/Grazing	No Effect	The installation of fencing around Spring #3 development site, the pond creation area, and wetland restoration area would remove an additional 0.5acre of potential livestock forage from the grazing allotment. All spring channels located outside of the fencing would remain accessible for livestock watering.	The installation of fencing around Spring #3 open water and wetlands would remove an additional 0.4 acre of potential livestock forage from the grazing allotment. All spring channels located outside of the fencing would remain accessible for livestock watering. Portions of the channels associated with Springs #1and #2 could be dewatered during periods of peak user demand in the summer (irrigation season).

Visual Resources	No Effect	Minor change to the natural apparentness of the Project Area. No visual changes would be discernable from existing Forest Roads or Campgrounds.	Minor change to the natural apparentness of the Project Area. No visual changes would be discernable from existing Forest Roads or Campgrounds.
Air Quality	No Effect	Temporary construction-related dust in local area, approximately 2 weeks.	Temporary construction-related dust in local area, approximately 1 week.
Water Resources/ Wetlands/ Water Quality	No Effect	The existing Spring #1 and #2 development sites continue as per the terms and conditions of the current Special Use Permit. Spring #3 is developed and capped with an earthen mound for culinary use: 413 gpm (0.9 cfs) would be made available for the Water District's water supply, and 112 gpm (0.25 cfs) would be dedicated as mitigation bypass flows. Construction requires use of right-of-way to cross the Yellowstone River by 2-3 pieces of heavy equipment. Wetland/Pond Impacts: Filling of 0.21 acre of spring-fed pond and associated wetlands. Wetland/Pond mitigation: creation of 0.03-acre pond using bypass flows; hydrologic restoration of 0.4 acre of abandoned beaver pond /wetland complex using surplus flows from Spring #2 and #3. Livestock exclosure fence to protect developed spring #3, and pond/wetland mitigation areas. Springs #1 and #2 and their aggregate bypass flows remain unchanged. Consistency with Executive Order 11988: Floodplains, and Executive Order 11988: Wetlands. Agreement with Moon Lake Hydroelectric Project results in no net depletion of flows into Yellowstone River. Water quality of Springs #1, #2, and #3 and the Yellowstone River would be unaffected.	Spring #3 remains undeveloped (525 gpm/1.2 cfs). Total flow of Springs #1 and #2 available for culinary use. No minimum bypass flows from Springs #1 and #2. Unused water is bypassed into spring channels as in Alternatives#1 and #2. Additional livestock exclosure fencing installed around 0.4 acre of open water and wetland habitats at Spring #3. Water quality is unchanged and may improve seasonally at Spring #3 due to livestock fence eliminating bank trampling and possible surface water contamination. Wetland/Pond Impacts: Reduction of water to streamside riparian wetland vegetation along a portion of 2,800 feet of spring-fed channels during periods of peak user demand (mid-summer) when allocation is maximized and no surplus flow is available for bypass release. Wetland/Pond mitigation: Enhancement of quality and/or quantity of 0.4 acre of open water and wetland habitats at Spring #3. Consistent with Executive Orders on Floodplains and Wetlands. No net depletion of flows into Yellowstone River. Spring #3 is in functional-at-risk condition (PCF) with an upward trend possibility. Water quality of Springs #1, #2, and #3 and the Yellowstone River would be unaffected.

Water Rights	The Water District's water rights currently in use in Spring #1 and Spring #2 continue; water rights expiring in 2015 would need to be replaced or extended. Forest Service livestock water rights in Cow Canyon Springs fully usable in Spring #3. The Water District continues to provide the Forest Service's domestic use water right through its pipeline. The Water District's water rights in Starvation Reservoir are unaffected.	The Water District's water rights currently in use in Spring #1 and Spring #2 continue; Water rights expiring in 2015 would be replaced or extended. State Engineer would approve Water District water rights for the Spring #3. Forest Service would file Change Application to transfer livestock use from the springs to stream channels. The Water District continues to provide the Forest Services domestic use water right through its pipeline. Water District water rights in Starvation Reservoir unaffected.	The Water District's would increase water rights in Spring #1 and Spring #2 per approval by the State Engineer. Water District water rights expiring in 2015 would need to be replaced or extended. Forest Service livestock water rights in Cow Canyon Springs fully usable in Spring #3. Water District water rights in Starvation Reservoir are unaffected.
Soils/Plants	No Effect	Approximately 0.5 acre of upland soils and vegetation would be temporarily disturbed by project construction. Approximately 24 trees removed. Upland borrow site and would be rehabilitated to blend into the natural landscape. BMPs installed to erosion and sediment. Disturbed areas would be revegetated with native plants. No effect to T&E plants. No impacts to FSS plants.	Modifications to the existing spring boxes would have minimal impacts to soils and upland plant communities. BMPs installed to erosion and sediment. Disturbed areas would be revegetated with native plants. No effect to T&E plants. No impacts to FSS plants.
Terrestrial Wildlife	No Effect	Temporary impact to wildlife; individuals may be displaced during construction, which would occur during the non-nesting season (September 15-March 15). No long-term effect to T&E wildlife, FSS wildlife, MIS wildlife, or migratory birds.	Temporary impact to wildlife; individuals may be displaced during construction, which would occur during the non-nesting season (September 15-March 15). No long-term effect to T&E wildlife, FSS wildlife, MIS wildlife, or migratory birds.
Aquatic Wildlife	No Effect	Temporary impact by heavy machinery crossing the Yellowstone River. No net loss of open water habitat at the Project Area. No effect to T&E fish. No effect to FSS or MIS species.	Temporary impact by heavy machinery crossing the Yellowstone River. No net loss of open water habitat at the Project Area. No effect to T&E fish. No effect to FSS or MIS species.
Cultural Resources	No Effect	No Effect	No Effect

Socio-Economics	Water District's water system is currently over-appropriated by a total of 262 ERCs, and is out of compliance with State-mandated ERC flow requirements. The Water District does not have sufficient water supplies to service all of its obligated connections. Water District would continue its moratorium on the issuance of water new connections to its taxpaying users, and would remain non-complaint with State-mandated ERC flow requirements, until an alternative water supply is made available. Socio-economic impacts could be substantial.	The development of Spring #3 would meet the Water District's projected ERC requirements for 15 years, and user demands for 21 years. The moratorium on new connections could be lifted because the Water District would have sufficient water supplies for all of its obligated connections and for foreseeable growth. The Water District would have 15 years to develop a solution for meeting its long-term water supply needs.	The full utilization of Springs #1 and #2 would meet the Water District's projected user demands for approximately 11 years, but would not meet the ERC requirements for its existing obligated connections. Water District would continue its moratorium on the issuance of water new connections to its taxpaying users, and would remain non-complaint with State-mandated ERC flow requirements, until an alternative water supply is made available. Socio-economic impacts could be substantial.
Irreversible and Irretrievable Commitments of Resources	No irreversible or irretrievable commitments of resources.	No irreversible commitments of resources. Spring flows diverted into the Water District's culinary system would be irretrievable. The loss of wetland soil productivity associated with the encapsulation of the spring source would be irretrievable.	No irreversible commitments of resources. Spring flows diverted into the Water District's culinary system would be irretrievable.