1.0 PROJECT PROPOSAL SUMMARY SHEET

PROJECT TITLE: Castle Valley Restoration

LEAD PROJECT SPONSOR: State of Utah Division of Water Quality
Arne Hultquist, S.E. Colorado River WS Coordinator
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UDWQ Watershed Protection Section
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STATE: Utah **WATERSHED:** Castle Creek **HYDROLOGIC UNIT CODE:** 14030005

PROJECT TYPES	WATERBODY TYPES	NPS CATEGORY
[ ] Staffing & Support	[ ] Groundwater	[X] Agriculture
[X] Watershed	[ ] Lakes/Reservoirs	[X] Urban Runoff
[ ] Groundwater	[X] Rivers	[ ] Silviculture
[ ] I&E	[ ] Streams	[ ] Construction
	[ ] Other	[X] Resource

PROJECT LOCATION:

The projects are located within the Castle Valley watershed in the Grand County. The two restoration activities are located along the Castle Creek in the Town of Castle Valley and Placer Creek above Castle Creek.

SUMMARY OF MAJOR GOALS:

The purpose of these projects is to improve riparian and upland conditions in the Castle Valley watershed that will reduce accelerated soil erosion in the watershed, therefore improving overall watershed conditions. By improving riparian conditions and reducing erosion, this project would improve water quality conditions in Castle Creek as recommended in the 2004 TMDL. These projects will also be used to inform and educate public regarding Nonpoint Source (NPS) pollution and the importance of maintaining and improving water quality conditions within the Castle Valley watershed.

PROJECT DESCRIPTION:

In an effort to improve water quality in the Castle Valley watershed, Grand County Conservation District plans to assist City of Castle Valley, Rim to Rim Restoration, Plateau Restoration, local land owners, private citizens and the Moab Area Watershed Partnership (MAWP) to effect improvements in the watershed. The projects proposed in this project implementation plan intend to repair flood plain functionality, improve streambank stability, reduce erosion and increase stream shading. Specifically a portion of the Castle Creek will be restored and

revegetated and uplands of Placer Creek that were impacted by fire will reseeded with grasses for soil stabilization and decrease the fire hazard. These projects are supported by the MAWP and its watershed management plan.

FY13 EPA Funds:	**$12,530**
Match (cash & in-kind):	**$48,795**
Total:	**$61,325**

2. STATEMENT OF NEED

The Utah Division of Water Quality (UDWQ) has listed Castle Creek on the States 303(d) list of impaired waterbodies. According to this report Castle Creek and tributaries are currently not meeting the designated beneficial use (Class 4, protected for agricultural uses including irrigation and stock watering) due to Total Dissolved Solids (TDS). The Utah Division of Water Quality completed a TMDL to characterize the current load, the loading capacity, and the desired load reduction of TDS in Castle Creek. According to the TMDLs the TDS load reduction needed in Castle Creek occur during low flow conditions. The TMDL suggests a site specific standard be set for this creek because its TDS content is not deleteriously affecting agriculture. UDWQ initiated and completed a change of standard for the section of Castle Creek from a diversion below Castleton to the confluence of the Colorado River. The site specific standard for that reach has been increased from 1,200 to 1,800 mg/l of TDS. Recent data indicate the creek is now at least partially supporting its agricultural designated use in both sections, ie from the confluence with the Colorado to the Castleton Diversion and from the Diversion to the headwaters. However, a TDS load reduction of 5 to 10% should assure support of its designated use. Recent water rights investigations and discussions with land owners adjacent to the creek below the Castleton Diversion indicate the water is used for watering private gardens and fields used for pasture.

Another parameter of concern has been identified since the 2004 TMDL. Escheria Coliform in the lower section of Castle Creek is exceeding water quality standards of its 2A classification. The projects in this project implementation plan may not have a direct effect on E Coli concentrations but it is hoped through education and information outreach associated with these projects the E Coli concern could be reduced through changes in behavior. The MAWP has and will continue to consider projects that could reduce E Coli concentrations in the future.

The Moab Area Watershed Partnership (MAWP) has identified maintenance and improvement of the riparian corridor as a means of addressing TMDL issues in the recently completed Moab Area Watershed Management Plan. The Castle Valley Restoration project will focus mainly on the restoration of the watershed riparian corridors by implementing riparian restoration projects and upland soil stabilization projects. Project work will include, planting and maintaining the riparian corridor where passive revegetation is not occurring, continued removal of exotics like tamarisk and replanting with native species, and seeding upland areas impacted by catastrophic fire.

2.1 Project Water Quality Priority

As required by section 26-11-6 of the Utah Code Annotated 1953, Utah State waters are classed to protect against controllable pollution. The Castle Creek Assessment Unit (AU) is categorized for the following designated uses: 1C, 2A, 3B, and 4 (see Table 1).

Table 1. Beneficial Use Classifications

1C - Protected for domestic uses with prior treatment by treatment processes as required by drinking water.
2A - Protected for frequent primary contact recreation uses like swimming, diving, etc.
3B - Protected for warm-water species of game fish and other warm-water aquatic life, including the organisms in their food chain
4 - Protected for agricultural uses including irrigation of crops and stock watering.

Castle Creek in Castle Valley Watershed is listed on Utah's 303d list (Table 2). Impairment is high TDS. TDS in groundwater is the only identified source of TDS in Castle Creek. The groundwater is naturally high in TDS and is considered a non-point source of the contaminant in Castle Valley. The cumulative effect this naturally occurring substances/conditions are exacerbated by the reduction in stream flows. Sediment and diminishing summertime flows are also an issue for this watershed and could potentially be contributing to these impairments.

Table 2. Impaired or TMDL Approved Assessment Units in the Castle Valley Watershed (14030005).

Subwatershed	Waterbody	Use	Year Listed	Parameter	Year TDML Approved
Castle Creek	Castle Creek	Agriculture	2001	Temperature	2004

2.2 Watershed Description

The Castle Creek watershed is nested within a larger watershed known as the Southeast Colorado River Basin in Southeastern Utah. This area is often referred to as “Canyon Country” because of the varied landscape that includes high plateaus, buttes, igneous intrusive mountains, innumerable incised sandstone canyons and long narrow valleys resulting from the collapse of ancient salt anticlines. The rugged desert terrain defining these watersheds is the result of the erosional processes that are commonly associated with the Colorado Plateau and since these erosional processes are still taking place, canyons continue to increase in depth and number.

The scenic and recreational value provided by the natural rock formations, the rivers flowing through the deep canyons, and the snow-capped mountains attracts thousands of visitors to Grand County area each year. Campsites, picnic areas, biking and hiking trails, four-wheel drive trails, and other facilities have been developed in the Canyonlands National Park, Dead

Horse Point State Park, and Manti- La Sal National Forest and on lands administered by the Bureau of Land Management. Many people float on the Green and Colorado Rivers through Cataract and Westwater Canyons and in other sections of these rivers each year.

Grand and San Juan counties are the homes of two popular national parks, Arches National Park and Canyonlands National Park. Arches National Park has consistently hosted from 700,000 to 800,000 visitors annually during the last decade. The City of Moab has benefitted from its proximity to Arches and the presence of Slickrock, perhaps the most renowned mountain bike destination in the world. Canyonlands National Park annual visitation trends are consistently above 350,000 visitors. The impact of tourism on the local economy in Grand County is demonstrated in traveler spending with in excess of $250 million occurring annually. According to recent adjusted economic models, tourism and travel are responsible for 5,000 jobs in the county. Hotel accommodation room tax collections have exceeded $1 million in Grand County; further verifying the impact of travel and tourism in Grand County. Although on a smaller scale, travel and tourism has a positive impact on the local economy. Traveler spending in San Juan County has exceeded $60 million annually in recent years. Tourism and travel is also responsible for 1,200 + jobs in San Juan County in recent years. Hotel accommodation revenues have been growing since 2003 and contribute more than $200,000 in tax collections annually.

Castle Valley is somewhat of a bedroom community to the more populous Spanish Valley which is the tourist center for Grand County. Castle Valley does have several “Bed and Breakfast” establishments but the majority of the population is either retired, employed outside of Castle Valley, or is associated with the agriculture industry. The population of the Town of Castle Valley is about 400 and the entire valley is probably less than 500 individuals. Land ownership is shown in Table 3.

Table 3: Land Ownership in Spanish Valley

Spanish Valley	BLM	USFS	State	Private	Total
Acres	7737	14928	6028	5462	34154
Percentage	22.7	43.7	17.6	16.0	100

The Castle Valley Watershed encompasses 34154 acres and is entirely within Grand County (Figure 1). Castle Creek originates in the La Sal Mountains, a laccolithic intrusion located in the southeastern part of the watersheds, with elevations of over 12,000 ft and travel across the desert and canyons below eventually discharging into the Colorado River at an elevation of approximately 4,320 ft. The mountain valleys provide contrast to the panoramic views of the deserts and canyons below. Mesas, buttes and sandstone fins with dramatically vertical rims create obvious watershed boundaries for both creeks and their tributaries.

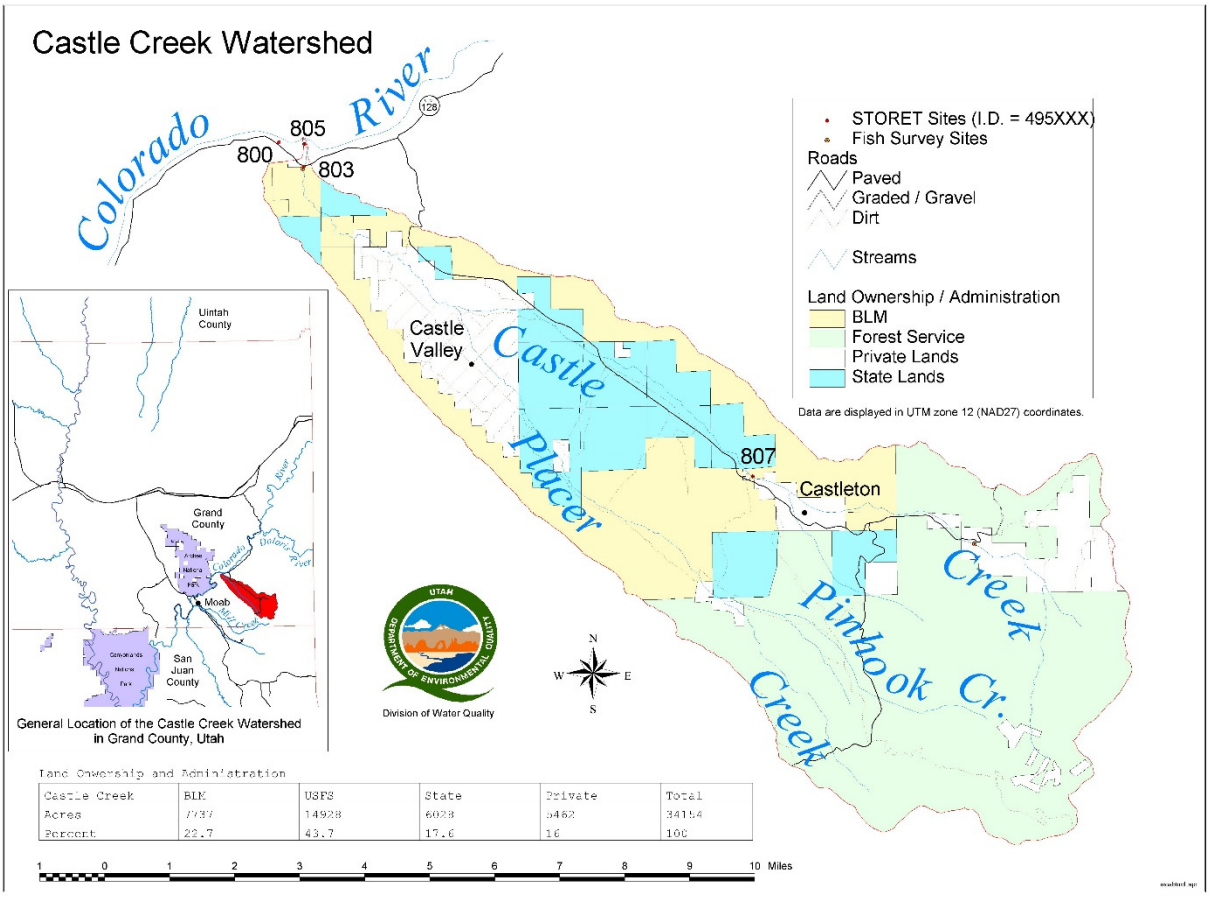

Figure 1: Castle Valley watershed and land ownership.

Annual precipitation on the Castle Valley watershed varies from less than 8 inches in their lower reaches near the Colorado River to more than 30 inches at the headwaters in the La Sal Mountains. The quantity of precipitation falling on the Castle Valley watershed is estimated at 50,000 acre-feet per year. These quantities can vary substantially from year to year depending on changing weather patterns and climatic conditions.

Several streams or portions of streams in the Castle Valley watershed are perennial. Although the majority of precipitation that falls on the watershed is returned to the atmosphere by evaporation or intercepted and used by vegetation, the remaining runoff and snowmelt along with base flow supports perennial flow in most of Castle Creek and the upper reaches of Placer Creek. Springs discharging into the drainage in the Manti-La Sal National Forest also support perennial flow at higher altitudes. The main tributary to Castle Creek, Placer Creek, is an intermittent stream in its lower reach, but mostly perennial above diversions. The area drained by Placer Creek and Castles Creek above the confluence is about the same (Placer Creek -~15,500 acres and Castle Creek-~14,500 acres). Surface flow peaks in November after riparian-zone plants have ceased water uptake and diversions for irrigation are shut down. Surface flow out of the watershed is the least in mid-summer when evaporation, transpiration, and irrigation use are the greatest.

The diversion of Castle Creek below the area called Castleton dewaters the stream for the majority of the year. The stream is dry for a few miles until it gains groundwater from springs as it enters the Town of Castle Valley. There are several other diversions of Castle Creek in and below the Town of Castle Valley but generally Castle Creek is perennial after entering Town of Castle Valley to its confluence with the Colorado River.

There are 26 approved or perfected surface flow/spring diversions for the Castle Creek drainage area listed in the Utah Division of Water Rights data base. There are 7 approved or perfected flow/spring diversions listed for the Placer Creek drainage area. The quantity of surface water being diverted for use at present (2012) is uncertain.

Peak flows can cause considerable erosion and destruction of property. From 1993 to 2012 the highest recorded flow at the gage on Castle Creek was greater than 3,000 cubic feet per second (cfs). Flows of more than 100 cfs have occurred in 9 out of the 18 years of record available (USGS Gaging Station 09182400).

Ground water in the Castle Creek watershed occurs primarily in the valley fill sediments of Castle valley (alluvial aquifer) and in the Cutler Formation (Cutler aquifer) along the western side of the valley. It has been presumed that ground water in the Cutler aquifer originates from precipitation infiltrating into the rocks of the La Sal Mountains, and that ground water in the alluvial aquifer of Castle Valley originates from stream flow, excess applied irrigation, and direct precipitation infiltrating into the unconsolidated sediments. On the basis of water levels in wells that penetrate the alluvial aquifer and the Cutler aquifer and from chemical analysis of water from these wells, ground water in the Cutler aquifer moves laterally into the alluvial aquifer on the southwest border of Castle valley.

A potentiometric contour map (altitude of the top of the saturated zone of an aquifer) generally shows direction of ground-water movement. The potentiometric contours indicate ground water moves northwest from higher altitudes in the valley to lower altitudes at an average gradient of 0.026 ft/ft. The shape of the contours as they cross Castle Creek indicate the stream loses water to the aquifer in the upper reaches (between the altitude of 4,750 ft and 4,650 ft) and gains water from the aquifer in the lower reaches (between the altitudes of 4,560 ft to 4,320 ft).

The quantity of water entering and exiting the aquifers of the Castle Creek watershed has not been determined. A numerical model of the flow system was developed by Downs and Lasswell (undated), but the inflow and outflow quantities used in the simulation were not reported.

Ground water in the alluvial aquifer of the Castle Creek watershed exits the aquifer in several ways. Ground water discharges into the lower reaches of Castle Creek; is used by riparian vegetation where their roots can penetrate to the top of the saturated zone; or is pumped to supply households, water livestock, or irrigate crops. Ford (2006, p. 10) estimated that household use of ground water in 2005 was about 63 acre-feet.

In Castle Creek, only 1.75% of the watershed is Agricultural, and 3.5% is developed, mostly rated at low density. 34% is Pinyon Juniper Woodland and Shrubland, with 6% Intermountain West Aspen Mixed Conifer and Woodland Complex, and 2% Rocky Moutain Aspen Forest and

Woodland. . The remaining areas are of sagebrush and desert grasslands, as well as various Mountain vegetation types, with small percentages of bedrock and slickrock. No areas in the Castle Creek Watershed are categorized in this data set as being recently chained Pinyon-Juniper. Figure 2 is a pie chart of percent land cover by vegetation type in Spanish Valley.

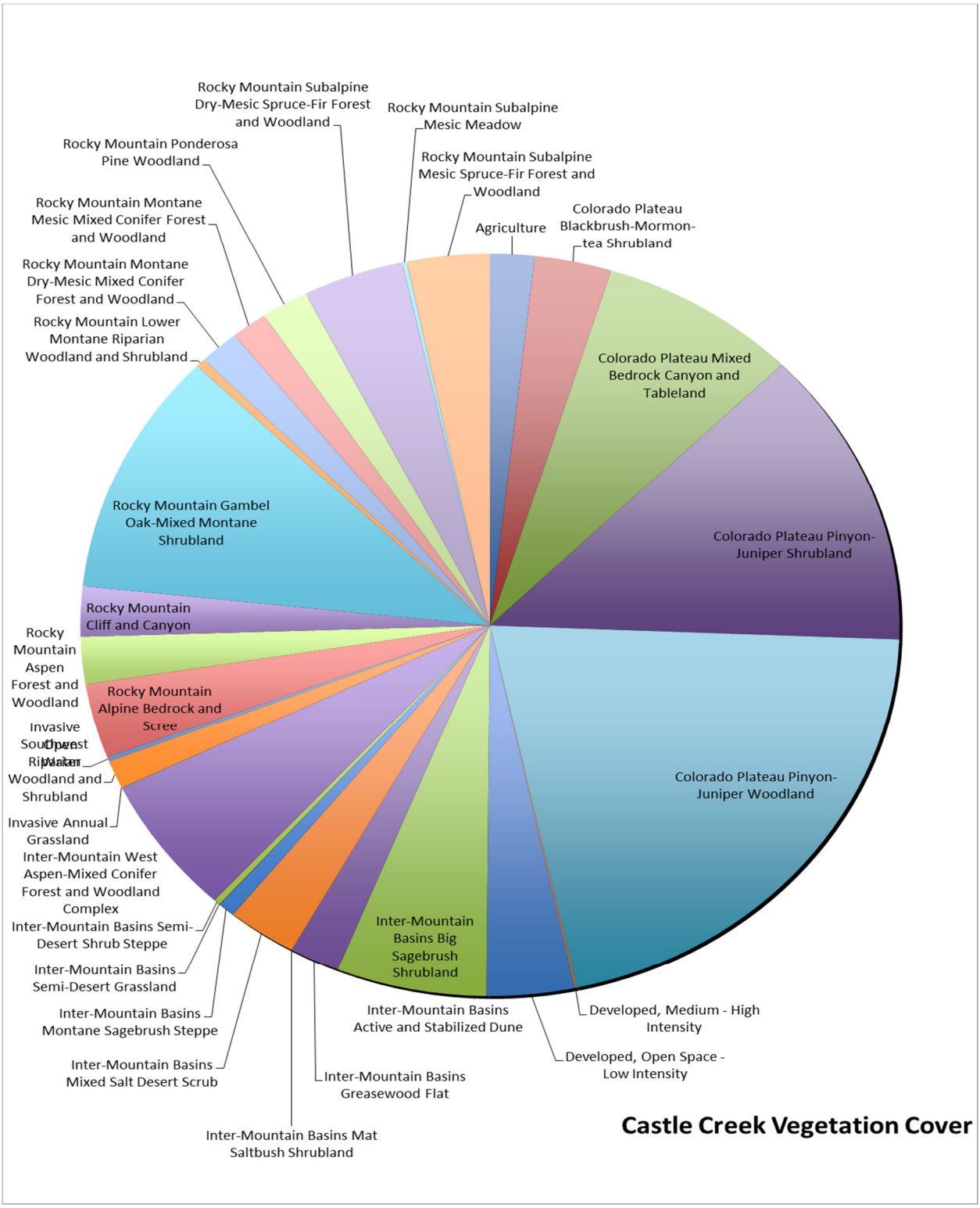

Figure 2: Pie chart of percent land cover by vegetation type in Castle

In relation to water quality and quantity, there are some areas of concern that may need further exploration as a part of the overall watershed planning process. In the lower elevations of the watersheds, development and recreation have an impact on vegetation communities including in riparian areas. The prevalence of invasive species in the riparian areas is of concern as these plants impact flood flows and their removal, if not done carefully, may result in enormous changes in erosion in the watershed.

Two significant impacts on vegetation condition in the upper areas of the watershed include grazing and urbanization. Grazing rotation has been occurring in the mountain areas due to recent drought. It is agreed within the MAWP that there are some locations, most notably springs and some riparian areas, where fencing and water diversions may be important to protecting water quality.

Urbanization has also increased in this watershed in past years. Springs and riparian areas sensitive to these impacts are also highly attractive development areas. This raises concern related to soil compaction, loss of vegetation, spread of noxious weed seeds, and increases in erosion. The Town of Castle Valley has been addressing these issues through education and discussions with land owners.

2.4 Spanish and Castle Valley Watershed Plan

The Moab Area Watershed Management Plan has been developed under the direction of the Moab Area Watershed Partnership. The plan has identified riparian corridor maintenance and improvements and upland soil stabilization as a priority for the Castle Valley watershed. The Watershed Management Plan identified the lower section of Castle Creek as critical area for riparian improvements and the fire affected Pinhook area as a critical area for upland soil stabilization. These projects are located within those areas and the water quality improvements, including TDS mitigation, associated with habitat improvement projects should help reduce loadings for the TMDL, improve water quality in general, and provide public awareness and participation in watershed health.

3. Project Description

Castle Creek has an approved TMDL for TDS. The desired goal for the TMDL and this proposal is to meet water quality standards for the designated beneficial uses. The projects will address this issue by improving riparian and upland conditions at multiple locations. The improvements include flood plain restoration, seeding of uplands impacted by fire, and riparian corridor improvements. Some of these practices are as follows: seeding of over 100 acres of fire impacted uplands, restoration of the floodplain riparian complex, streambank stabilization, removal of invasive vegetation and re-vegetation in the riparian corridor. A map of the project areas is shown in Figure 3.

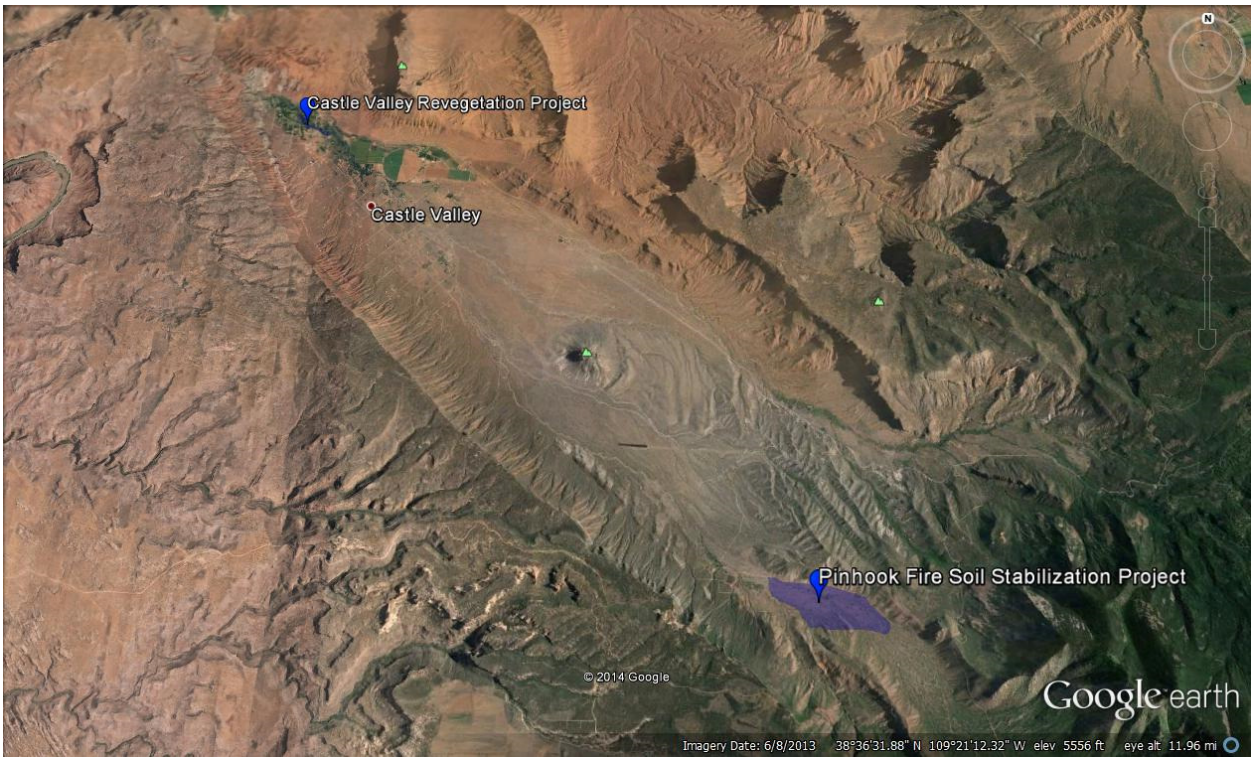

Figure 3: Castle Valley projects and the areas associated with them.

Main Goals:

1 Improve riparian conditions on Castle Creek.
2 Reduce accelerated soil erosion in the Castle Creek watershed.
3 Inform and educate local landowners and the community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed

3.1 Goals, Objectives, and Tasks

Goal 1: Improve riparian conditions on Castle Creek.

Objective 1: Stabilize the stream bank with native vegetation.

Task 1 – Planting willow wattles (horizontal and/or vertical) and cottonwood and willow pole-plantings to stabilize eroding sections of the incised stream channel.
Task 2 – Transplanting rushes and sedges in appropriate locations in order to vegetate bare areas adjacent of the stream channel.

Total Cost: $21,344 319: $12,530 Match: $8,814

Goal 2: Reduce the rapid surface run-off occurring in the Porcupine Fire area that results in sediment laden flows and reduce the threat of catastrophic fire in Placer Creek.

Objective 1: Establish grasses and forbs in areas impacted by fire.

Task 1 – Identify areas of bare ground or excessive cheat growth in the area impacted by fire.
Task 2 – Selectively hand seed 100 of 195 acres identified on map in the Blue outlined areas with a seed mix recommended by the Moab-Monticello Ranger District.

Total: $26,981 319: $0 Match: $26,981

Goal 3: Inform and educate local landowners and the community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed.

Objective 1: Work with stakeholders/public to educate them on how employed BMPs positively affect water quality in Castle Valley.

Task 1: Conduct tours on restoration work.
Task 2: Share information via press releases, fact sheets MAWP website

Total: $2,500 319: $0 Match: $2,500

Goal 4: Monitor Castle Creek to determine project effectiveness

Objective 1: Collect chemical, biological, and physical data at long term monitoring sites on Castle Creek to measure the project effectiveness

Task 1: Collect water quality and flow data 10 times per year at Castle Valley and UDWQ ambient monitoring sites before, during, and after the contract period
Task 2: Monitor riparian characteristics using Multiple Indicator Monitoring pre-project, post-project and five years after project completion

Total: $8,000.00 319: $0.00 Match: $8,000.00

Goal 5: Satisfy documentation funding requirements

Objective 1: Appropriately document and report project progress.
Task 1: Track project progress.
Task 2: Provide annual and final reports to UDWQ and EPA

Total: $2,500 319: $0 Match: $2,500

Grand Total: $61,325 319: $12,530 Match: $48,795

3.2 Milestone Table

Goals/ Objectives	Output	Implementation Date
Goal 1- Improve riparian conditions on Castle Creek.	Planting willow, cottonwood, rushes and sedges in appropriate locations.	May 2015 – May 2018
Goal 2 - **:** Reduce the rapid surface run-off occurring in the Porcupine Fire area.	Identify areas of bare ground or excessive cheat growth and selectively hand seed 100 of 195 acres of those areas.	July 2014 – July 2017
Goal 3: Inform and educate local landowners and the community concerning non-point source pollution and the importance of maintaining and improving water quality within the watershed	Conduct tours on restoration work and share information via press releases, fact sheets MAWP website	Ongoing
Goal 4: Monitor Castle Creek to determine project effectiveness	Collect water quality samples, survey physical habitat, and take photos	Water Quality is ongoing. Physical Habitat: Pre: October 2014; Post: October after project completion and five years after that
Goal 6: Administration services to track match and write progress reports	Documented match records, ongoing for duration of project. Semi-annual, annual, and final reports.	May 2015 – May 2018

3.3 Permits

Project BMPs will adhere fully to all state, local and federal regulations and permitting requirements regarding wetlands, cultural resources, and sensitive aquatic habitats. Any required permits will be obtained in a timely manner and maintained in project files for review by DEQ during project inspections. The environmental permitting that we anticipate encountering during this project are: CWA Section 404 permitting if any stream alteration is to occur; Cultural Resource permits and adherence to sensitive aquatic habitat guidance from EPA Region 8. Additionally, we will use native plant materials in our restoration and re-vegetation projects when possible

3.4 Assurance of Project Operation and Maintenance

No long-term funding is planned for operation or maintenance of these projects. Long-term maintenance of these projects will be the responsibility of the private landowner; however, staff from the lead project sponsor will be available to provide assistance (requesting funding, providing assistance) in the case that major repairs are required. Staff from the lead project sponsor will inspect projects annually. The operation and maintenance of the designed systems will be thoroughly explained to the landowner and they will sign a document indicating their comprehension and willingness to participate. If the landowner does not operate or maintain the system for the projected life of the practice or structure according to DWQ typical practice lifespan, they will be in violation of their 319 contract. Additionally they may risk having to pay back the federally contributed portion of their project funding.

4. COORDINATION PLAN

4.1 Lead Project Sponsor

The Utah Division of Water Quality (UDWQ) will be the lead project sponsor and will manage the fiscal portion of the projects. The UDWQ is empowered by the State of Utah to devise and implement measures for the prevention of nonpoint water pollution. Additionally, the UDWQ is able to enter into contracts, receive and administer funds from agencies, and contract with other agencies and corporate entities to promote conservation and appropriate development of natural resources. Memoranda of Understanding with state, federal, and local agencies along with individual cooperator agreements empower the UDWQ and individual cooperators to accomplish this work.

UDWQ will contract with Town of Castle Valley for completion of goals 1 and 2. The Watershed Coordinator for Grand County Conservation District will track and oversee implementation activities, monitor, and reports.

4.2 Local Support

The MAWP has developed a watershed management plan and has reviewed all implementation activities associated with this proposal. The MAWP has endorsed and has recommended implementation of these projects. The MAWP membership includes:

Utah Division of Water Quality
Grand County
San Juan County
City of Moab
Town of Castle Valley
Moab Irrigation Company
Grand Water & Sewer Service Agency
US Bureau of Land Management
US Forest Service
The School and Institutional Trust Lands Administration

Utah Department of Agriculture/Grazing Improvement Program
Moab Solutions
Canyonlands Watershed Council
Utah Department of Natural Resources/Forestry Fire and State Lands
Grand Conservation District
Natural Resource Conservation Service

4.3 Coordination and Linkages

The District and the MAWP (the local work group) anticipate coordinating efforts with the following entities, agencies, and organizations:

- Landowners/cooperators – assist with on-the-ground implementation, provide long-term monitoring and minor repair of fencing and watering infrastructure
- Utah Division of Water Quality -- Standard program monitoring, technical assistance
- Environmental Protection Agency - Financial assistance
- Utah Division of Water Rights- Permits as needed
- Town of Castle Valley
- Utah DNR Division of Forestry, Fire & State Lands
- Manti-La Sal District, United State National Forest Service
- Rim to Rim Restoration
- Plateau Restoration
- Castle Valley Special Service District for Fire Protection

4.4 Public Involvement

The local watershed group will combine on-the-ground discussions with landowners within the project area, press releases, and updates to the MAWP website to inform the general public about the projects. Other potential opportunities for public interaction identified in the MAWP Watershed Management Plan may also be used.

5.0 EVALUATION AND MONITORING PLAN

5.1 Sampling and Analysis Plan

The monitoring goals of this project are to: 1) document progress in achieving improved water quality conditions as non-point source control programs are implemented and 2) document improvement in the riparian corridor. Water quality monitoring is currently being conducted at several crucial crick locations on a monthly and continual basis. Riparian health will be monitored on a point-in-time basis, before and after project implementation and can be conducted relatively quickly and relatively inexpensively. Statistically rigorous studies that

defensibly predict overall watershed health and trend are beyond the scope of this project's monitoring plan and should be coordinated closely with the Department of Water Quality (DWQ) at the state level. The state Quality Assurance Project Plan (QAPP) is included in Appendix A.

Work activities associated with these goals include the following:

1. Monitor long term sites (established and maintained by the MAWP and the Utah Division of Water Quality) for water quality to demonstrate sustained and overall improvements in water quality. This will be conducted by the Utah Division of Water Quality, the Grand County Conservation District Watershed Coordinator and Volunteer Monitoring through Utah Water Watch.
2. Monitor riparian areas for overall improvement of vegetation, and riparian structure and function. This will be conducted by the watershed coordinator and appropriate partners, including the Division of Water Quality.
3. Review data and include data summaries in annual reports. Performed as sub-tasks within tracking and reporting.

5.2 General Design and Parameters

Water quality parameters are being tracked within the watershed. Water quality sampling will continue to be done monthly and will not require additional sampling funded through this project. Riparian condition will not likely be significantly different, but are expected to improve over time. The long term monitoring envisioned for Castle Valley should capture those improvements and trends in water quality.

5.2.1 Water Quality Monitoring for Castle Valley

Utah Water Watch and the watershed coordinator have developed a long term Sampling Analysis Plan (SAP) for Castle Valley. Details of the SAP can be found in the Moab Area Watershed Management Plan. The SAP was developed to capture information about parameters of concern in Castle Valley. The sites were chosen such that the data collected complements data collected by the UDWQ during their intensive monitoring efforts and are also located at critical points in the watershed. The sites are shown in Figure 4 and are listed in Table 5.

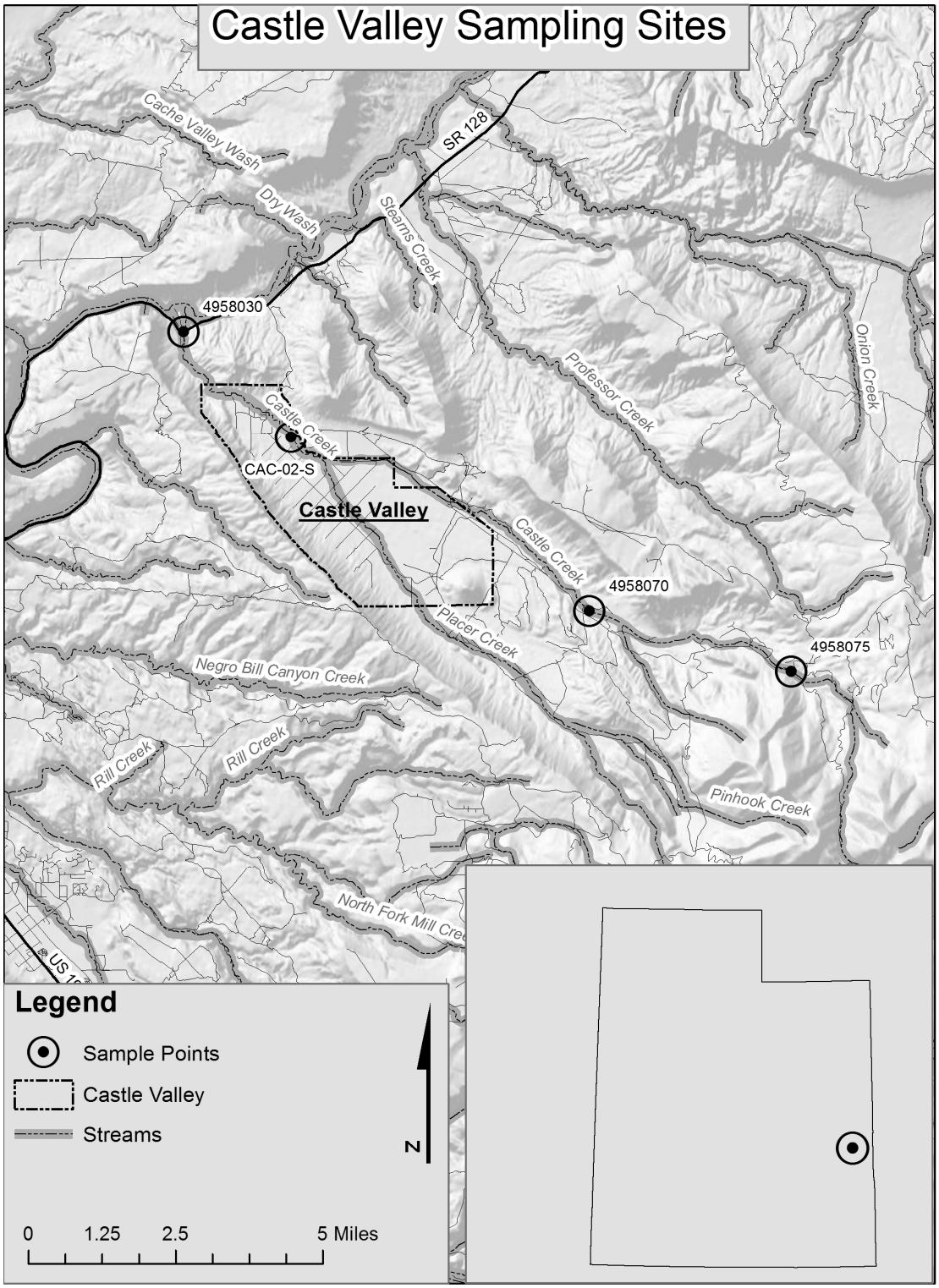

Figure 4: Monitoring Sites for Castle Valley. Visit the UWW Map for an interactive map.

DWQ Assessment Unit Name / UWW Stream Name	AWMQS Monitoring ID	UWW ID	Description	Latitude Longitude

Castle Creek -1 / Castle Creek	4958030	CAC-01-S	Castle Creek at U128 Xing	38°40'38.936"N 109°26'57.423"W
Castle Creek -1 / Castle Creek	4958088	CAC-02-S	Castle Creek in Town ab Diversion	38°39'3.19"N 109°24'57.67"W
Castle Creek -1 / Castle Creek	4958070	CAC-03-S	Castle Valley Creek @ Castleton	38°36'23.946"N 109°19'23.417"W
Castle Creek -2 / Castle Creek	4958075	CAC-04-S	Castle Ck ab USFS Rd Xing to CO	38°35'25.950"N 109°15'36.415"W

Table 5: Sampling Locations

Parameters being sampled include:

Qualitative Parameters: UWW Field Observations – Observed Flow, Water Surface, Water Clarity, Water Color, Water Odor, Visual Algae Cover, # of Dead Fish, Present Weather, Past 24 HR weather, Estimated Inches of Rain fall in past 72 hours, Comments

Field Parameters: Temperature, pH, Conductivity, Salinity, & TDS; Turbidity & Total Depth;

Biological Parameters: Coliforms and *E. coli*

Continuous monitoring: Hobo Temperature loggers and Pressure Transducers (Pressure Transducers also measure temperature concurrently)

Water quality and quantity components being collected at each site are listed in Table 6. Frequency of collection in Table 7.

DWQ Assessment Unit Name / UWW Stream Name	AWMQS Monitoring ID	UWW ID	Monitoring
Castle Creek -1 / Castle Creek at U128 Xing	4958030	CAC-01-S	Qualitative parameters Field Parameters Biological Parameters (USGS has a continuous gauging station at this location)
Castle Creek -1 / Castle Creek in Town ab Diversion	4958088	CAC-02-S	Qualitative parameters Field Parameters Biological Parameters
Castle Creek -1 / Castle Valley Creek @ Castleton	4958070	CAC-03-S	Qualitative parameters Field Parameters Biological Parameters Continuous monitoring: Pressure Transducer

Castle Creek -2 / Castle Ck ab USFS Rd Xing to CO	4958075	CAC-04-S	Qualitative parameters Field Parameters Biological Parameters

Table 6 Water Quality Parameters being collected at each site.

Parameters	**Responsible Party**	**Frequency**	**Timeline**
Field Observations and Field Parameters	UWW volunteer	Once a month	December 2013 – December 2014
Biological Parameters	UWW volunteer & WC	Once a month May – Sept	December 2013 – December 2014
Continuous monitoring	WC	Collecting data every 30 min.	March 2013 – March 2014

Table 7: Frequency of Sampling for parameters.

5.2.2 Riparian monitoring methods

The MAWP has agreed to use the Multiple Indicator Monitoring protocol developed by the BLM to measure riparian project effectiveness. Monitoring will take place between May 1 and June 30 at the project sites pre-project, post project and five years after project completion.

Additional monitoring may include parameters appropriate for the specific project. Such parameters may include acreage (of plantings, seeding, or weed control), or linear feet of streambank stabilization. Upland projects in this project implementation plan have previously been monitored by students at Brigham Young University and there monitoring design will be used post project and five years after project completion.

5.3 Data Management, Storage, and Reporting

The water quality data collected from the Castle Valley Sampling Analysis Plan is eventually entered into the Utah Division of Water Quality database. That data is uploaded to the Water Quality Exchange (WQX) database and is available via the internet to all interested parties and organizations. Quality Assurance and Quality Control will be conducted according to the guidelines established in the Utah Water Quality Monitoring Manual. Only those data that meet QA/QC standards will be entered into the project database.

Field measurements are hand entered into the Utah Water Watch Database by the collector or watershed coordinator. Since the Spanish Valley SAP is tier II monitoring and eligible for assessment use, Utah Water Watch regularly uploads the data into the DWQ database.

Coliform data is hand entered by the analyst or the watershed coordinator into spreadsheets provided by DWQ. The spreadsheets are sent to DWQ for uploading to the DWQ database.

Measured flow data, pressure transducer data, flow curve generation files, and generated flow tables will be maintained by the watershed coordinator and sent to the UDWQ southeastern non-point source coordinator annually.

Multiple Indicator Monitoring data is recorded directly into a spreadsheet while being collected. The watershed coordinator and the project sponsor will each maintain a copy of file.

5.4 Models Used

It is not anticipated that mechanistic models will be used in developing or evaluating the projects. However, models such as STEPL or other empirical models may be used to estimate annual load reduction and such reductions for TDS, phosphorous, nitrogen, and sediment will be reported annually to DWQ.

6.0 Budget

6.1 Funding Sources

Funding Sources	Total Cost FY15
EPA Section 319 Funds	$12,530
State/Local Match	$17,138 Town of Castle Valley (in kind) $2,500 Rim to Rim Restoration (Donated Plants) $29,157 UDWQ
TOTAL	$61,325

6.2 Funding

Work Element	Total Costs	319 Funds	Match	Source of Match
Goal 1 - Improve riparian conditions on Castle Creek.	$21,344	$12,530	$6,314 2,500	Town of Castle Valley Rim to Rim Restoration
Goal 2: Reduce the rapid surface run-off in the Porcupine Fire area.	$26,981	$0	$16,157 $10,824	UDWQ Town of Castle Valley

Goal 3: Inform and educate.	$2,500	$0	$2,500	UDWQ
Goal 4: Monitoring	$8,000	$0	$8,000	UDWQ
Goal 6: Administration Services	$2,500	$0	$2,500	UDWQ
Total	$61,325	**$**12,530	**$**48,795	

Appendix A

Document Title: **Quality Assurance Project Plan for the Castle Valley Watershed**

Date: July 31, 2014

Cooperating Organizations and contacts:

1. Grand County Conservation District
   Watershed Coordinator
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2. Utah Association of Conservation Districts
   Roger Barton
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3. Utah Division of Water Quality
   Mike Allred
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QAPP Approval:

_____ _____

Jim Bowcutt
Nonpoint Source Program Manager
Utah Division of Water Quality

Date

_____ _____

Jim Harris
Quality Assurance Officer
Utah Division of Water Quality

Date

2. Table of Contents (A-2):

3. Project/Task Organization (A-4):

Please refer to Figure 2 in the State of Utah QAPP for an organization chart detailing the agencies and entity relationships. At the sponsor and field level, primary involvement will include the watershed coordinator for Grand County Conservation District who will oversee monitoring, data collection, data storage, restoration activities and evaluate projects and BMPs.

4. Problem Definition/Background (A-5):

Please refer to Section 2.1 in the Castle Valley PIP for a full description of water quality problems.

5. Project/Task Description (A-6)

Please refer to section 3 in the Castle Valley PIP for a full description of project goals and tasks.

6. Data Quality Objectives and Criteria (A-7)

Specific data quality objectives for accuracy, precision and completeness for laboratory analyses are discussed in the Division of Laboratory Services Quality Assurance Program Plan (QAPP), appendix 13 of the Quality Assurance and Standard Operating Procedures Manual. Specific tasks identified for the Castle Valley Watershed are highlighted in the monitoring matrix (Table 1). In addition, habitat and other biological data may be limited to areas in the watershed where projects are being implemented.

Table 1. Sample project task identification and description (monitoring matrix).

Activity	Schedule	Responsible Agency	Methods
Sample Water Quality for Escheria Coliform. Sampling will be conducted at four sites selected upon review of existing data.	Ongoing, Monthly from May through September.	DWQ, GC Watershed Coordinator	Refer to Utah DWQ's Standard Operating Procedures and see SAP in Moab Area Watershed Management Plan.
Field water quality parameters to including Temp., Conductivity and pH.	Ongoing, Monthly and year round	DWQ, GC Watershed Coordinator	See SAP in Moab Area Watershed Management Plan.
Monitor Riparian Habitat: channel geomorphology, substrate size, riparian greenline and transect vegetation, stream shading and photopoints.	Pre and Post-Project and five years after project completion, unless site specific response necessitates frequency adjustment.	DWQ & MAWP Team	Trend analysis for channel adjustment data, riparian vegetation transect data to document BMP effectiveness, and habitat quality improvement according to MIM monitoring SOPs.
Determine flows at one site, calculate flow curve, and produce flow tables.	Monthly and during high water periods, produce table annually.	DWQ & GC Watershed Coordinator	Refer to Utah DWQ's Standard Operating Procedures and see SAP in Moab Area Watershed Management Plan.
Evaluate chemical water quality data to document BMP effectiveness to improve water quality.	Every five years DWQ monitors selected sites in Castle Valley monthly for one water year.	DWQ	Examine chemical data against beneficial use criteria, trend analysis.
Consolidate chemical, biological and physical data for reporting process	Annually and as needed for project FINAL REPORT	Watershed Coordinator & DWQ	Report at November MAWP meeting
Evaluate monitoring program and determine where and when additional water quality monitoring may be needed to document BMP effectiveness	Annually	MAWP & DWQ	Feedback loop analysis

7. Sampling Process Design (B-1)

Table 1 lists all the parameters, frequency of sampling, referenced SOPs and responsible agencies for each task.

A total of 4 water quality sampling sites have been established to support projects. See Section 5.1 for a full description of each site. These sites are located at long term sites that are representative of defined stream segments and are also part of the Intensive Basin Rotational

Sampling that is scheduled for FY 2017-18. At least one site will be established inside each project area for riparian monitoring.

8. Sample Methods Requirements (B-2)

Sampling methods, equipment used, sample containers and preservation requirements are listed in DWQ's approved QA/QC Manual that also addresses SOPs in Section 4 of the Quality Assurance and Standard Operating Procedures Manual, and Section 7 the Division of Laboratory Services QAPP.

9. Sample Handling and Custody Requirements (B-3)

Please refer to Section 14 in the State of Utah Guidance For Sampling and Analysis Plans/Quality Assurance Project Plans (QAPPs).

10. Analytical Methods Requirements (B-4)

Analytical methods for this project utilize standard methods as identified in the Division of Laboratory Services QAPP. This QAPP is in Appendix 13 of the DWQ's QA/QC Manual.

11. Quality Control Requirements (B-5)

Please refer to Sections 8 and 11 in the State of Utah Guidance For Sampling and Analysis Plans/Quality Assurance Project Plans (QAPPs).

12. Instrument Calibration and Frequency (B-7)

Please refer to Appendix 13 of the Quality Assurance and Standard Operating Procedures Manual and the State of Utah Guidance For Sampling and Analysis Plans/Quality Assurance Project Plans (QAPPs).

13. Assessments and Response Actions (C-1)

All field and laboratory procedures may be reviewed by state and EPA quality assurance officers at any time or as requested. Any identified procedural problems will be corrected based on recommendations from DWQ's QA Officer. This may include more frequent instrument calibration, additional training of field or laboratory personnel, etc.

14. Data Review, Validation and Verification Requirements (D-1)

Data reduction and reporting are presented in Section 16 of the DWQ's QA/QC Manual. Data procedures, flow charts, and example of reports are detailed in that document. Laboratory validation and verification processes are detailed in the Division of Laboratory Services QAPP.

15. Validation and Verification Methods (D-2)

Please refer to the State of Utah Guidance For Sampling and Analysis Plans/Quality Assurance Project Plans (QAPPs).

16. Reconciliation with Data Quality Objectives (D-3)

Results from the monitoring activities will be routinely scrutinized in a timely manner against the data quality objectives established for 319 projects. The NPS monitoring coordinator will be responsible for determining whether the objectives of the nonpoint source monitoring effort have been attained and whether to reestablish new data quality objectives based upon the

data collected from the projects. Sections B-7 and D-1 in this document and Sections 16, 17, and Appendix 13 and 14 in the QA/QC Manual list appropriate equations used to assure representative and accurate data are and have been collected.