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Engineering

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City of Challis User Rate Analysis-Water Improvement Proejct DEQ Only

	Loan Amount	Interest Rate	Term (Years)	Users	Estimated O&M
DEQ	$3,000,000	1.25%	30	700	$281,000
USDA Loan		0.00%	30		

	Flow Charge per 1,000 gal	# Flat Fee Customers	Metered Flow used Each Month(thousands)	Total Fee Collected Monthly
	$0.00	700	0	$0.00

	Semi-Annual	Annual	Total Life-Semi	Total Life-Annual
DEQ Loan	$60,113.85	$120,535.63	$3,606,830.75	$3,616,068.91
USDA Loan	$0.00	$0.00	$0.00	$0.00

		DEQ Annual		USDA-Annual	Total
Annual Debt Service		$120,535.63		$0.00	$120,535.63
Monthly Debt Service		$10,044.64		$0.00	$10,044.64
Current # Users		700		700	
Monthly Debt Service per User		$14.35		$0.00	$14.35
Monthly Debt Service Reserve (10%)		$1.43		$0.00	$1.43
Monthly Capital Reserve (10%)		$1.43			$1.43
thly Fixed Costs (Debt+Reserves) per User		$17.22		$0.00	$17.22
Monthly Operations and Maintainance		$23,417		$0	$23,416.67
Monthly O&M per User		$33.45		$0.00	$33.45
Total Monthly Variable Costs per User		$33.45		$0.00	$33.45
Total Monthly Fixed Costs per User		$17.22		$0.00	$17.22
Total Monthly Variable Costs per User		$33.45		$0.00	$33.45
Total Monthly Cost per User		$50.67		$0.00	**$50.67**

Total Project	$3,050,000
Est. DEQ loan Forgivness	$200,000
Est. DEQ Loan	$2,850,000

DRINKING WATER PROTECTION PLAN FOR THE CITY OF CHALLIS

PUBLIC WATER SYSTEM NUMBER 7190013

REVIEW AND UPDATE BIANNUALLY

Date Reviewed	Reviewed By	Comments (attach additional document as needed)

Prepared by the Idaho Rural Water Association

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1.0 INTRODUCTION

Drinking Water Protection, which is essentially the same as Wellhead Protection for ground water systems, is a voluntary program implemented at the local level *(*Note 1)*. The City of Challis has developed this Drinking Water Protection Plan to outline the process that will be used to help prevent contamination of ground water and surface water that supplies the City of Challis's drinking water system. Because the City of Challis uses both ground water and surface water for its drinking water supply, protection of theses resources is critical to the health and welfare of the community. Drinking Water Protection will help protect these resources from ground water and surface water contamination by monitoring land use that occurs within the areas overlying the aquifer from which the wells and surface water intake draw water.

**Note 1. The term "Drinking Water Protection" is the same as Wellhead Protection for ground water sources of drinking water and Source Water Protection for ground water and surface water sources. The term "Drinking Water Protection" will be used throughout this Plan and is synonymous with Source Water/Wellhead Protection.*

Many materials such as pesticides, fertilizers, organic chemicals, and human and animal wastes can contaminate ground water. The degree of contamination depends on many factors including soil characteristics, volume of contaminant, contaminant properties, climate and ground water flow. Once ground water becomes contaminated, it is often difficult and expensive to clean up. A public water system that is supplied by an aquifer that has become contaminated may be required to do additional monitoring and may need to install water treatment equipment or find a new source of drinking water. The most cost-effective approach is to prevent contamination before it occurs, rather than attempting to remedy contamination problems after they have occurred.

1.1 Drinking Water System

The City of Challis, Idaho serves a community of approximately 1,073 people through 521 connections. The City of Challis is located along the Salmon River at the junction of Highway 93 and Highway 75 (Appendix A, Figure A1). The public drinking water system for the City of Challis is comprised of four ground water well sources and one surface water intake source.

Three of the ground water wells (West Well #1, West Well #2, and Well #3) are located near to or to the south of the Garden Creek intake. The fourth ground water well, East Well #1, is located on the eastern side of the City. Land use within the source water delineated area consists predominantly of rangeland, some irrigated agricultural land, some forested land, rural residential homes, recreational areas, and in the case of East Well #1, urban uses. Highway 93 and Garden Creek Road cross through some of the source water delineations.

The surface water intake (hereafter called the "Garden Creek intake") is located on Garden Creek. Water from the Garden Creek intake is processed through a slow sand filtration system; the filtered water is then manifolded to ground water Well #3 and is mixed prior to gaseous chlorination. Land use within the City of Challis' surface water delineated area consists predominantly of rangeland, some irrigated agricultural land, some forested land, rural residential homes, recreation, and mining facilities. Homes and businesses within the Garden Creek intake surface water delineated area operated with individual septic tanks and septic drain fields.

Water chemistry tests are routinely conducted on the City of Challis drinking water system. Contaminants detected in the drinking water system include the inorganic contaminants (IOCs) fluoride and nitrate, but at levels far below the current maximum contaminant levels (MCLs). From the wells on the western side of the City (West Well #1, West Well #2, Well #3), nitrate has been detected at levels below 1.0 milligrams per liter (mg/L), much less than the MCL of 10 mg/L. On the east side of the City (East Well #1), nitrate has been detected at levels below 2.0 mg/L. The difference pertains to the different aquifers that the wells are drawing from, though both measurements are background levels. Arsenic was not detected when tested for in February 2002. Water chemistry tests for the

Garden Creek intake have detected the IOC fluoride, but at levels which have not exceeded the MCL in accordance with the Safe Drinking Water Act Amendments of 1996. Total coliform bacteria were detected in the distribution system in August 1995 and in March 1999. Following the distribution system occurrences of total coliform bacteria, microbials were tested for at the wells. No bacteria were detected at the wells during these tests. Treatment efforts including slow sand filtration and gaseous chlorination have successfully prevented further occurrences. No volatile organic contaminants (VOCs) or synthetic organic contaminants (SOCs) have been detected in the wells.

Well construction directly affects the ability of the well to protect the aquifer from contaminants. System construction scores are reduced when information shows that potential contaminants will have a more difficult time reaching the intake of a well. Lower scores imply a system is less vulnerable to contamination. For example, if the well casing and annular seal both extend into a low permeability geological unit, then the possibility of contamination is reduced and the system construction score goes down. If the highest drinking water production interval is more than 100 feet below the static water level (water table), then the system is considered to have better buffering capacity. If the wellhead and surface seal are maintained to standards as outlined in Sanitary Surveys, then contamination down the well bore hole is less likely. If the well is protected from surface flooding and is outside the 100-year floodplain, then contamination from surface events is reduced.

The 2002 sanitary survey (an inspection conducted every five years with the purpose of determining the physical condition of a drinking water system's components and its capacity) performed by the Idaho Department of Environmental Quality (DEQ) indicated that the wellhead and surface seals of Challis' drinking water wells were maintained to current standards and that the wells were protected from surface flooding. Well #3, however, is quite close to Garden Creek and a flood condition could put this well in jeopardy. Table 1 includes a summary of the system construction for each ground water well. Driller's well logs were not available for West Well #2 and Well #3, limiting the amount of data available. Should these driller's well logs be provided to DEQ, the system construction ratings may change.

Table 1. City of Challis Well Construction Summary Information

Well	Well Depth (ft)	Water Table Depth (ft)	Casing: diameter/ thickness (in)	Casing: depth (ft)/ formation	Surface seal: depth (ft)/ formation	Screened Interval (ft)	Drill Year	Sanitary Survey Elements (A/B) [1]
West Well #1	665	2	10/0.250	103/broken rock	18/tan silty sand, gravel & cobbles, water	103 – 665 open hole	1981	Yes/Yes
West Well #2	602	317	12/0.375	157/NI	157/NI	NI	1980	Yes/Yes
East Well #1	341	157	12/0.250, 10/0.250	249/course clean sand & gravel, 341/solid red rock	18/ gravel, cobblestones & boulders mixed in tan sandy silt	243.5 – 266.8	1981	Yes/Yes
Well #3	800	NI	NI/NI	NI/NI	NI/NI	NI	NI	Yes/Yes

[1] A = Well and surface seal in compliance; B = Protected from surface flooding
NI = no information was available

West Well #1, drilled in 1981, is completed to an approximate depth of 665 feet below ground surface (bgs). A 10-inch diameter, 0.250-inch thick steel casing extends to 130 feet bgs into a geological unit described as "broken rock"; the remaining depth of the well borehole is not cased. The annular seal extends to 18 feet bgs into a geological unit described as "silty sand, gravel, and cobbles, with water". The static water level was approximately two feet bgs at the time the well was completed. Although the well may have met well drilling standards at the time, current standards are more stringent.

West Well #2, drilled in 1980, is completed to an approximate depth of 602 feet bgs. A 12-inch diameter, 0.375-inch thick steel casing extends to 157 feet bgs. Information describing any geological units, screened intervals or the composition of the annular seal is lacking. The static water level was approximately 317 feet bgs at the time the well was completed. Although the well may have met well drilling standards at the time, current standards are more stringent.

East Well #1, drilled in 1981, is completed to an approximate depth of 341 feet bgs. A 12-inch diameter, 0.250-inch thick steel casing extends to 249 feet bgs into a geological unit described as "coarse clean sand and gravel". A ten-inch diameter, 0.250-inch thick steel casing extends to 341 feet bgs into a geological unit described as "solid red rock". The annular seal extends to 18 feet bgs into a geological unit described as "gravel, cobblestones, and boulders mixed in tan sandy silt". The well is screened from 243.5 feet bgs to 266.8 feet bgs. The static water level was approximately 157 feet bgs at the time the well was completed. Although the well may have met well drilling standards at the time, current standards are more stringent.

Well #3 was completed to 800 feet bgs. No other information is available. Although the well may have met well drilling standards at the time, current standards are more stringent.

The IDWR (Idaho Department of Water Resources) *Well Construction Standards Rules* (1993) requires all PWSs follow DEQ standards as well. *IDAPA 58.01.08.500* requires that PWSs follow the *Recommended Standards for Water Works* (1997) during construction. Table 1 of the *Recommended Standards for Water Works* (1997) lists the required steel casing thicknesses for various well diameters. An eight-inch diameter well requires a casing thickness of at least 0.322-inches, a ten-inch diameter well requires a casing thickness of at least 0.365-inches, and twelve-inch or greater diameter wells require a casing thickness of at least 0.375-inches. Well tests are required at the design pumping rate for 24 hours or until stabilized drawdown has continued for at least six hours when pumping at 1.5 times the design pumping rate. Casing is required to be sealed to a minimum of 18 feet bgs if there is a low permeability layer at that depth. Otherwise, surface seals must be extended into low permeability or consolidated units.

The construction of the Garden Creek intake directly affects the ability of the intake to protect the surface water source from possible contaminants. Information regarding whether the Garden Creek intake was constructed properly and located in a way to minimize impacts was unavailable, leading to a high rating for the intake. Table 2 includes a summary of the susceptibility evaluation of the Garden Creek intake.

Table 2. Summary of Garden Creek Intake Susceptibility Evaluation

Contaminant Inventory	System Construction	Final Susceptibility Ranking
IOC – Low	H	Medium (H*2)
VOC – Low	H	Medium (H*)
SOC – Low	H	Low (H*)
Microbials – Low	H	Low (H*)

L=Low Susceptibility; M=Moderate Susceptibility; H=High Susceptibility
IOC=Inorganic Contaminant; VOC=Volatile Organic Contaminant; SOC=Synthetic Organic Contaminant
H*2=Indicates source automatically scored as high susceptibility due to the presence of a potential contaminant source (Garden Creek Road bridge) suspended above the surface water.

1.2 Drinking Water Protection Steps

The City of Challis prepared this Drinking Water Protection Plan in accordance with the Idaho Source Water/Wellhead Protection Plan, and followed the 5-step process for Drinking Water Protection. These five steps are:

Step 1: Formation of a community planning team;
Step 2: Delineation of the land area to be protected;
Step 3: Identification of potential sources of contamination;
Step 4: Development and implementation of a management plan for the drinking water protection area; and
Step 5: Planning for the future through the development of a Contingency Plan and planning for future drinking water sources.

This plan was developed during 2003-2004 with technical assistance from the Idaho Rural Water Association (IRWA) and DEQ.

1.3 Drinking Water Protection and Source Water Assessment

Source Water Assessment involves two of the five drinking water protection steps discussed above. These two steps are delineation (Step 2) and contaminant inventory (Step 3). An additional Source Water Assessment step includes a susceptibility analysis, which helps identify contaminant threats to the system by evaluating land use, contaminant sources, well construction, and hydrologic conditions such as geology and soil type. By pursuing Drinking Water Protection, the City of Challis is addressing the primary goal of the Source Water Assessment process.

2.0 COMMUNITY TEAM (PLANNING TEAM)

The members of the City of Challis's Drinking Water Protection Planning Team include the following individuals listed in Table 3.

Table 3. City of Challis Drinking Water Protection Planning Team

Marion McDaniel	City Council Member; Mayor pro tem
Jerry Moss	City of Challis Maintenance Foreman
Bonnie Rowles	Local business owner; homeowner
Lance Moss	Challis Area Chamber President; homeowner
Corey Rice	City of Challis Maintenance Employee
Don Varney	City of Challis City Employee

Technical Assistance was provided by:

David Risley	DEQ State Office, Boise
Jack Rainey	DEQ Regional Office, Idaho Falls
John Bokor	DEQ Regional Office, Twin Falls
Melinda Harper	Ground Water Protection Specialist, IRWA

2.1 Duties of the Planning Team

The Maintenance Foreman for the City of Challis, Jerry Moss, was named by the Planning Team to be the Team Coordinator and as such, has the responsibility of planning future team meetings and coordinating the implementation schedule. The Team Coordinator will also be the designated contact in case of a water system emergency, and will be the lead contact for any outside references to this Plan. The DEQ and the IRWA will provide continued support and technical assistance to the Planning Team regarding any of the Plan's strategic components. Below is the "Scope of Work" that will be used by the Planning Team to implement their drinking water protection strategy outlined throughout this Plan.

2.2 Implementation Duties (Scope of Work)

The Planning Team will:

- Hold biannual meetings (meeting dates and locations will be announced and posted) to review and update the Plan and its components;
- Update the potential contaminant source inventory;
    - Remove potential contaminant sources that no longer exist or not longer pose a threat; and
    - Add any new sources of potential contaminants found in the protection area (see Tables 4-8);
- Evaluate new sources for their risk to the system;
- Prioritize the contaminant risk of point sources within Zone IA or IB, and then develop and implement a protection strategy to manage the potential contaminant;
- Assess nonpoint sources, determine potential risk, develop and implement a protection strategy, and add new strategies to the implementation schedule;
    - Review and update the Contingency Plan (Appendix E); and
    - Review and update the Implementation Schedule for Future Activities;
- Use information materials found in "*Protecting Drinking Water Sources in Idaho*" to implement public education and outreach activities in accordance with the Implementation Schedule;
    Examples:
    - Plan fertilizer (nutrient) management planning workshops with help of the University of Idaho Extension, Custer Soil and Water Conservation District, local fertilizer retailers, or the Natural Resources Conservation Service;
    - Hold annual household hazardous waste collection events;
    - Mail fact sheet summarizing the Drinking Water Protection Plan to public water system users;
    - Mail out frequent water quality reminders with the water bill; and
    - Make the drinking water protection materials listed throughout the Plan available;
- Evaluate the need and applicability of a City of Challis Drinking Water Protection Ordinance (Appendix D provides a sample Drinking Water Protection Ordinance); and
- Initiate discussions with Custer County Planning and Zoning to promulgate the process of establishing a County Drinking Water Protection Ordinance and/or Overlay District.

3.0 DRINKING WATER PROTECTION AREA DELINEATION

The City of Challis's *Source Water Assessment Report* (City of Challis PWS 7190013 Source Water Assessment Final Report, DEQ, June 30, 2002 and City of Challis PWS 7190013 Source Water Assessment Final Report Part 2, DEQ, May 10, 2004) provides a detailed description of the delineated Drinking Water Protection Area. The Source Water Assessment is excerpted in the following sections.

In 1989, the Idaho Legislature enacted the Ground Water Quality Protection Act that set forth the development of the State Wellhead Protection Plan, also known as Drinking Water Protection. The State Plan provides that the Drinking Water Protection Area (DWPA) is divided into four zones (IA, IB, II, and III). All zones are designed to prevent microbial or chemical contamination of the City of Challis' drinking water supply wells.

- Zone IA is the sanitary setback zone designed to prevent microbial contamination within a 100-foot radius of the well. This setback zone is established in the Idaho Rules for Drinking Water Supplies (IDAPA 58.01.08.900.01) and requires that: sewer lines, livestock, canals, and streams be 50 feet from the source water/wellhead and that: home septic tanks, seepage pits, disposal fields, and privies are 100 feet away;
- The 3-year time-of-travel (TOT) zone (zone indicating the number of years necessary for a particle of ground water to reach the wellhead) corresponds to DWPA Zone IA and IB;
- The 6-year TOT zone corresponds to DWPA Zone II; and
- The 10-year TOT zone corresponds to DWPA Zone III. Time related zones of contribution for the City of Challis's West Well #1, West Well #2, East Well #1 and Well #3 are presented in Appendix A.

To protect surface water systems from potential contaminant pathways, the Environmental Protection Agency (EPA) required that the entire drainage basin be delineated upstream from the Garden Creek surface water intake to the hydrologic boundary of the drainage basin (U.S. EPA, 1997b). This delineation is also referred to as a topographic delineation for systems consisting of small streams. Although the Garden Creek intake was not delineated with a topographic delineation, all the streams of the watershed upstream to their headwaters were delineated.

The EPA recognized that an intake on a large body of water, such as Garden Creek, could have an extensive drainage. Therefore, the EPA recommended that large drainage basins be segmented into smaller areas for the purpose of implementing a cost-effective potential contaminant source inventory and susceptibility analysis. The delineation process established the physical area around the Garden Creek intake that became the focal point of the assessment. The process included mapping the boundaries of the zone of contribution into a river buffer zone that extends from the intake upstream 25 miles or to the 4-hour stream flow time-of-travel (TOT) boundary, whichever is greater. In the case of Garden Creek, the headwaters of the creek are reached after approximately 12 hours. This buffer zone also extends up tributaries to the remainder of the 25-mile boundary or the 4-hour TOT boundary.

3.1 Geology

In 2003, the University of Idaho Water Resources Research Institute published "Hydrogeologic Analysis of the Water Supply for the Community of Challis, Custer County, Idaho". This work was funded through a grant from EPA Region 10 to the University of Idaho Water Resources Research Institute and the Idaho Geologic Survey. The discussions in Sections 3.1 and 3.2 are derived from this publication.

Several regional geologic features influence the hydrogeology of the Challis area. The community lies near the eastern margin of the Idaho batholith, near the northern margin of basin and range extension, and within the Eocene-age Challis volcanic field. This diverse assemblage of geologic environments provides a challenge to understanding the controls that structure and rock type play on the local area hydrogeology.
East Central Idaho lies in a geologic terrain dominated by Eocene-aged volcanic strata. These rocks erupted 51 to 40 million years ago (McIntyre et al, 1982) onto a steep mountainous topography, similar to that present today. The volcanics emanated primarily from stratovolcanoes (volcanoes that are constructed of alternating layers of lava and pyroclastic deposits, along with abundant dikes and sills) and large calderas (a large basin-shaped volcanic depression, more or less circular, the diameter of which is many times greater than that of the included vent or vents, irrespective of steepness of the walls or form of the volcanic floor). Challis resides in a structural basin bounded on the east by the northern extension of the Borah Peak fault and on the west by a series of smaller

parallel faults. Eocene-aged volcanic strata were deposited in a proto-Salmon River canyon deeply incised into Proterozoic-aged (2,700 million to 660 million years before present) quartzite, suggesting that the Challis basin formed at least 50 million years ago or before.

The Salmon River canyon near Challis formed initially by a combination of faulting and stream erosion during and before eruption of the Challis Volcanics. Faults active at the time of volcanism helped form the topography that largely controlled the thickness of volcanic strata blanketing the area. These volcanic strata now tilt gently to the east, reflecting rotation during renewed faulting. The thickness, distribution of strata and the geometry of faults largely control the location, flow volume, and flow direction of ground water. The following section discusses these aspects of the Challis area.

Basaltic Lava Flows

Basalt and andesite (a dark-colored, fine-grained igneous rock) lava flows form the lowest unit exposed in the study area. The flow sequence has a variable thickness with an unknown maximum; based on map distribution it is at least 1,000 feet thick in the Garden Creek drainage. Volcanic textures displayed in outcrops, such as pyroclastic splatter (rock or sediment composed principally of fragments derived from pre-existing rocks or minerals and transported some distance from their places of origin) and spindle bombs incorporated into lavas, indicate that the flows emanated from nearby sources. Age dates indicate this part of the sequence erupted approximately 50.3 million years ago (McIntyre et al, 1982). The basaltic lavas form most of the canyon of Garden Creek west of town. Basalt lavas underlie much of the recharge area for the aquifers that Challis uses. Joints formed during cooling and fractures formed during post-depositional deformation occur throughout the unit, providing avenues for entry and migration of ground water. West Well #2 is collared and terminated in the lavas, is 605 feet deep, and pumps an average of 450-500 gallons per minute.

Air-Fall Rhyolite Ash

The tuff of Penal Gulch, a white to pastel-green volcanic ash erupted from the large Van Horn Peak Caldera complex northwest of Challis, lies depositionally above the basaltic lava sequence. When erupted, the ash was composed of very fine-grained shards of volcanic glass. Later, the glass devitrified (the glass converted to a crystalline material) and now forms an aggregate with abundant interstitial clay. The ash probably blanketed the area evenly immediately following eruption, but was resedimented into topographically low areas, so its thickness varies as a function of the paleo land surface. Exposures in the Garden Creek drainage three miles west of town are less than 50 feet thick. The unit thickens progressively to the east, where immediately north of town it is over 200 feet thick. This change in thickness indicates that the faults bounding the Challis Valley were probably active during the eruptive cycle, at least ±45 million years ago.

The ash section provides important controls on the distribution of ground water in the Challis valley. It displays few open fractures or fluid pathways in outcrops and contains an abundance of clay, so likely impedes ground water flow. Erosion has stripped the unit away from most of the aquifer recharge area for the Challis water supply. Recharge water infiltrates the basalt aquifer and as it travels down gradient, it likely flows beneath the ash section. The unit underlies much of the community and the Salmon River canyon near Challis, so inhibits surface water from entering the underlying basalt aquifer in these areas. West Well #1 penetrates 92 feet of unconsolidated gravels, then cuts 125 feet of altered Penal Gulch tuff before entering the lower basalt lava unit.

Unconsolidated Sediments

Unconsolidated sediments in the study area include landslide deposits, clay beds deposited from lakes, alluvial-fan gravels derived from nearby sources, and gravels deposited by flowing streams. Landslides are common in the study area but generally do not influence the distribution or flow of ground water. One prehistoric slide, however,

flowed into Garden Creek from the north, blocked the drainage and formed a lake. Though the landslide dam has since eroded away, clay beds deposited at the bottom of the lake still occur along much of the Garden Creek drainage. The clay beds greatly impede the ability of Garden Creek water to enter the substrate and recharge the bedrock aquifer. Additionally, any contaminants entering Garden Creek upstream of the clay beds will tend to flow overland a greater distance rather than percolating and filtering into the substrate.

The Salmon River has flowed through the Challis valley since at least middle Tertiary time (approximately 65 million years before present) filling the valley with sand and gravel from contemporary and ancestral stream channels. The Salmon River provides water to the gravels, recharging the aquifer utilized by Challis East Well #1 and numerous other wells in the central part of the valley. Similar gravels also underlie tributary streams such as Garden Creek. Cone-shaped alluvial fans accumulate along mountain fronts in dry climates and are generally thickest along the range front near where streams emerge from incised canyons. They are composed of angular rock fragments embedded in a matrix of sand, clay, and fine-grained rock particles. Internally, the stratigraphy can be discontinuous, sinuous, and compositionally variable due to the temporal interplay of gravel deposited from flowing streams versus erosion and deposition from flash floods. These complicated stratigraphic patterns (the arrangement of the sequence of rock stata) create an equally complex regime for ground water flow. The City of Challis lies on the upper end of an alluvial fan emanating from the mouth of Garden Creek.

Structure

Faulting is principally responsible for landforms visible in the Challis area, including the Salmon River valley. Beyond visible landforms, faulting also formed the present distribution and geometry of volcanic rock units underlying the area. The Challis basin is a half graben (an elongate, relatively depressed crustal unit or block that is bounded by faults on its long sides) bound on the east side by the northern extension of the Borah Peak fault, which last moved in 1983. The Borah Peak fault and subsidiary structures drop rocks on the west side of the faults down relative to the east side. This relationship is visible in the strata exposed on the bluffs north of town, where the beds are gently inclined from west to east.

Mapped faults in the study area are numerous, and conform to two general orientations. Most of the faults strike (the direction taken by a structural surface) north-northwest and dip steeply to the west. A subsidiary set of faults strikes northeasterly and dips northerly. The pattern created by the intersection of these two sets of faults is rectilinear. The broken, or gouge zones that occur in fault planes are commonly clay rich and act to reduce or preclude flow of water. Ground water migrating down gradient, along the dip of the volcanic beds from west to east may be interrupted by the zones of faulting. The fault geometry defines a set of rectilinear blocks in which concentrations of ground water cannot easily flow into strata of adjacent blocks. The concentration of clay beds in Garden Creek in combination with the presence of faults is possibly the reason that surface water does not recharge strata adjacent to West Well #1.

Location of faults was used in the delineation of the western wells. Given the complexity of the geology in the area, the delineations for the ground water wells in the City of Challis system are approximations (Appendix A, Figures A2, A3, A4, and A5). The actual data used by DEQ in determining the source water assessment delineation areas is available upon request.

3.2 Hydrogeology

Rock composition and type of occurrence of volcanic strata impart great influence on a rock's ability to store and transmit ground water. Most volcanic strata have little intercrystalline (within and between crystals) porosity, suggesting that fractures formed when the rock crystallized from molten magma. Cooling fractures are less likely to form in low-temperature, air-fall ash deposits. At Challis, an aquifer in basaltic lava flows provides much of the community's drinking water supply.

Three primary factors influence ground water hydrology of the Challis basin:

1. Climate;
2. Rock characteristics, including fracture density, porosity, and permeability; and
3. Distribution of faults.

Challis lies in an arid part of the state and sees less than 10 inches of precipitation annually. Greater amounts of precipitation fall on the higher terrain west of town. Therefore, remote, higher elevation sources largely supply the water utilized by Challis.

Fractures created during deformation form preferentially in hard, brittle rocks. Two types of volcanic rocks in the Challis area fall into this category, namely, basaltic lava flows and rhyolite ash-flow tuff. Ash-flow tuff, an accumulation of high-temperature ash when deposited, fuses into a dense, vitreous (having the luster and appearance of glass) rock. Lower temperature air-fall ash deposits commonly contain abundant clay, which allows the rock to deform without developing through-going fractures. Lava flows and densely welded ash-flow tuff generally create the best aquifers in volcanic rocks because they form the greatest fracture permeability. The terrain surrounding Challis displays an abundance of faults, which influence ground water distribution and flow.

Geologic mapping indicates that gently inclined volcanic strata in combination with a rectilinear network of faults places strong controls on how and where ground water in the Challis basin flows. This, coupled with low recharge volumes due to the dry climate, provides a unique challenge in locating a sustainable source of ground water.

A recent hydrological study by the Idaho Water Resources Research Institute (Bruce R. Otto, et. al, 2003) indicates that water is derived from three separate and independent sources: surface water from Garden Creek, and two separate ground water aquifers. Challis's West Well #1 and West Well #2 penetrate an aquifer within fractured basaltic lavas. The second ground water system, tapped by East Well #1, occurs in unconsolidated sand and gravel that fill the Salmon River Valley. A third ground water system, not presently utilized, lies within shallow sand and gravel zones that underlie Garden Creek Valley.

When drilled in 1989, the depth to water in West Well #2 (approximately 317 feet bgs) suggests isolation from the surrounding aquifer sources. This measurement places the static water level at about 300 feet lower than in any surrounding well. Attempts to obtain a new depth to ground water level failed. Four-hundred and fifty feet of water level measurement tape was run down the borehole in an attempt to obtain the static water level, but no water was encountered; this could be due to either a drop in the static water table from 317 feet bgs to below 450 feet bgs, or that the tape used to measure the static water level somehow got hung up in the well. The fact that the original static water level in West Well #2 was much lower than in the surrounding wells suggests that this well taps a different aquifer than the surrounding wells.

Analysis of pumping records from West Well #2 failed to reveal evidence of long-term water level decline; the records did not show a consistent decline in pumping rate commonly associated with declining water levels. In fact, current pumping rates occasionally exceed the rates recorded when the well was first brought on line. This observation suggests that the aquifer penetrated by West Well #2 does receive some recharge. The source of recharge for the West Well #2 aquifer remains unclear, since static water level elevation in this well, when drilled, exceeds the elevation of the Salmon River. The Salmon River cannot act as the source of water for West Well #2 simply because water will not flow up hill. The Garden Creek drainage remains the only other possible recharge source.

Currently, no evidence exists suggesting that static water level decline presents a major problem in the alluvial aquifer tapped by East Well #1. The depth to water observed in December 1980 was 157 feet bgs; in December 2001, the depth to water ranged between 159 feet bgs and 165 feet bgs. This suggests that the declining water

levels pose no problems in the Salmon River Valley alluvium. Comparable historic and present water levels suggest that the Salmon River is the probable source of recharge; the elevation of the East Well #1 aquifer is nearly the same as the elevation of the Salmon River. This large hydrologic system contains abundant storage and has a large recharge supply. Although East Well #1 taps this robust system, it is recommended that water levels continue to be monitored to ensure demand does not exceed recharge.

Garden Creek flows into Challis from the west. Diverted surface water flows from the stream through slow sand filters, is chlorinated, and then flows into the City's distribution system. Two factors impact the quality and quantity of this water:

1. Upstream domestic and agricultural development and use of Garden Creek water will have a negative impact on the quality and supply of water that reaches the City of Challis diversion; and

2. The amount of annual precipitation, particularly winter snow pack, impacts flow levels of Garden Creek.

Alluvial gravels underlie Garden Creek near West Well #1. Garden Creek flows directly above a 90-foot-thick gravel aquifer in this area, indicating a direct hydraulic connection with Garden Creek. ***The viability of obtaining water from this alluvial aquifer depends on the amount of water in storage and the annual recharge received from Garden Creek.*** Monitoring of new upstream water use will allow an accurate understanding of impacts to this fragile supply. Upstream contamination likely travels rapidly downstream due to clay-rich paleo lake bed sediments that provide a natural lining along much of the Garden Creek drainage.

3.3 Delineation

The delineation process establishes the physical area around a well that will become the focal point of the assessment. The process includes mapping the boundaries of the zone of contribution into time-of-travel (TOT) zones (zones indicating the number of years necessary for a particle of ground water to reach a well) for water in the aquifer. DEQ ascertained an approximation for the source water delineations using a refined computer model approved by the EPA to determine the capture zone delineations for the City of Challis wells. The computer model used site-specific data assimilated by DEQ from a variety of sources including local area well logs and hydrogeologic reports summarized below (from IWRRI, 2003).

4.0 POTENTIAL SOURCES OF GROUND WATER CONTAMINATION

The third step of a drinking water protection plan consists of conducting an inventory of potential point and nonpoint sources of potential contamination. Point sources are facilities and/or activities that store, use, or produce potential contaminants regulated under the Safe Drinking Water Act. There must be a potential for a release of those potential contaminants at a high enough level that could affect drinking water quality. It is important to understand that a release may never occur from a listed point source, particularly if the facility is using best management practices (BMPs) that are designed to reduce contamination risks. If a business, facility, or property is identified as a potential contaminant source, this should not be interpreted to mean that they are in violation of any local, state, or federal environmental law or regulation. What it does mean is that the ***potential*** for contamination exists due to the nature of the business, industry, or operation.

There are a number of methods water systems can use to work cooperatively with facilities generating a potential contaminant source. These involve education and encouraging regular inspections of stored materials. Identifying activities that may pose a potential threat to ground water quality provides communities with an understanding of the possibility of contamination and basic information that can be useful for designing different controls and determining the areas in which they should be applied. Sources that could potentially contaminate the drinking water supply for the City of Challis include both point and nonpoint sources of contamination. Point sources of contamination occur at *distinct* locations. They are often regulated and require permits or registration for

facilities that sell, use or store those materials (such as chemical storage sheds). Nonpoint sources of contamination often occur *over large areas* and can result from normal every day activities such as agricultural activities or lawn chemical usage.

4.1 Potential Point Sources of Contamination

A two-phased potential contaminant source inventory of the study area was conducted in September 2002 for the Garden Creek source water delineation and in the spring of 2004 for the ground water wells and is excerpted below (City of Challis PWS 7190013 Source Water Assessment Final Report, DEQ, May 10, 2004). The first phase involved identifying and documenting potential contaminant sources within the City of Challis's source water delineation areas (Appendix A, Figures A2-A6) through the use of computer databases and Geographic Information System (GIS) maps developed by DEQ. The second, or enhanced phase of the potential contaminant inventory, involved allowing the City of Challis's Maintenance Foreman, Jerry Moss, adequate time to verify DEQ's information and provide local knowledge to the process and add any potential contaminant sources in the area.

The source water delineation of West Well #1 has three potential sources of contamination (Table 4; Appendix A, Figure A2;), the source water delineation for West Well #2 has two potential sources of contamination (Table 5; Appendix A, Figure A3), the source water delineation of Well #3 has five potential sources of contamination (Table 6; Appendix A, Figure A4), the source water delineation of East Well #1 has nine potential sources of contamination (Table 7; Appendix A, Figure A5) and the Garden Creek Inlet has 11 potential sources of contamination (Table 8; Appendix A, Figure A6). These potential contaminant sources include underground storage tanks (USTs), a Superfund Amendments Reauthorization Act (SARA) site, an aboveground storage tank (AST), private septic tanks and drain fields, inactive mining prospects, City waste filtration ponds, a road, a surface water source (Garden Creek), and seasonal and all year grazing.

Table 4. West Well #1 Potential Contaminant Source Inventory

SITE #	Source Description[1]	TOT[2] Zone (years)	Source of Information	Potential Contaminants[3]
	Waste Filtration Ponds	0 – 6	GIS Map	IOC, Microbes
	Garden Creek Road	0 – 10	GIS Map	IOC, VOC, SOC, Microbes
	Seasonal Streams	0 – 10	*Enhanced Inventory*	IOC, VOC, SOC, Microbes

1=Potential point/nonpoint source of contamination
2=TOT=time-of-travel (in years) for a particle of ground water to reach the wellhead.
3=IOC=Inorganic Compound; VOC=Volatile Organic Compound; SOC=Synthetic Organic Compound; M=Microbes (total coliform).

Table 5. West Well #2 Potential Contaminant Source Inventory

SITE #	Source Description[1]	TOT[2] Zone (years)	Source of Information	Potential Contaminants[3]
	Private Road	0 – 3	*Enhanced Inventory*	IOC, VOC, SOC, Microbes
	Seasonal Streams	0 – 10	*Enhanced Inventory*	IOC, VOC, SOC, Microbes

1=Potential point/nonpoint source of contamination
2=TOT=time-of-travel (in years) for a particle of ground water to reach the wellhead.
3=IOC=Inorganic Compound; VOC=Volatile Organic Compound; SOC=Synthetic Organic Compound; M=Microbes (total coliform).

Table 6. Well #3 Potential Contaminant Source Inventory

SITE #	Source Description[1]	TOT[2] Zone (years)	Source of Information	Potential Contaminants[3]
	Water Filtration Ponds	0 – 3	GIS Map	IOC, Microbes
	Garden Creek	0 – 10	GIS Map	IOC, VOC, SOC, Microbes
	Seasonal and Perennial Streams	0 – 10	*Enhanced Inventory*	IOC, VOC, SOC, Microbes
	Garden Creek Road	6 – 10	GIS Map	IOC, VOC, SOC, Microbes
	Private Septic Tanks and Drain Fields	6 – 10	*Enhanced Inventory*	IOC, SOC, Microbes

2=TOT=time-of-travel (in years) for a particle of ground water to reach the wellhead.
3=IOC=Inorganic Compound; VOC=Volatile Organic Compound; SOC=Synthetic Organic Compound; M=Microbes (total coliform).

Table 7. East Well #1 Potential Contaminant Source Inventory

SITE #	Source Description[1]	TOT[2] Zone (years)	Source of Information	Potential Contaminants[3]
1, 3, 4, 5, 6	UST Site – Open; Petroleum distributor; SARA site; AST site	0 – 3	Database Search	IOC, VOC, SOC
2	General Contractors	0 – 3	Database Search	IOC, VOC, SOC
	Highway 93	0 – 10	GIS Map	IOC, VOC, SOC, Microbes
	Seasonal streams	0 – 10	*Enhanced Inventory*	IOC, VOC, SOC, Microbes
	Unpaved Jeep Trail	6 – 10	*Enhanced Inventory*	IOC, VOC, SOC, Microbes

1=UST=Underground Storage Tank; SARA= Superfund Amendments Reauthorization Act; AST=Above Ground Storage Tank.
2=TOT=time-of-travel (in years) for a particle of ground water to reach the wellhead.
3=IOC=Inorganic Compound; VOC=Volatile Organic Compound; SOC=Synthetic Organic Compound; M=Microbes (total coliform).

Table 8. Garden Creek Intake Potential Contaminant Source Inventory

SITE #	Source Description[1]	Source of Information	Potential Contaminants[2]
1	Mining Prospect (Fluorine); *Inactive*	*Enhanced Inventory*	IOC
2	Mining Prospect (Lead); *Inactive*	*Enhanced Inventory*	IOC
3	Mining Prospect (Fluorine); *Inactive*	*Enhanced Inventory*	IOC, VOC
4	Mining Prospect (Lead); *Inactive*	*Enhanced Inventory*	IOC
5	Mining Prospect (Lead); *Inactive*	*Enhanced Inventory*	IOC
6	Mining Prospect (Fluorine); *Inactive*	*Enhanced Inventory*	IOC
7	Mining Prospect (Lead); *Inactive*	*Enhanced Inventory*	IOC, VOC
	Garden Creek Road	Database Search	IOC, VOC, SOC, Microbes
	Private Septic Tanks and Drain Fields	*Enhanced Inventory*	IOC, SOC, Microbes
	Private Retreat and Campground; Septic Tanks and Drain Fields; Pond	*Enhanced Inventory*	IOC, VOC, SOC, Microbes
	Season and all year grazing	*Enhanced Inventory*	IOC, VOC, SOC, Microbes

1=Potential point/nonpoint source of contamination
2=IOC=Inorganic Compound; VOC=Volatile Organic Compound; SOC=Synthetic Organic Compound; M=Microbes (total coliform).

An effective drinking water protection program is tailored to the particular local drinking water protection area. A community with a fully developed drinking water protection program will incorporate many strategies. For the City of Challis, drinking water protection activities should first focus on maintaining the requirements of the Sanitary Survey (an inspection conducted every five years with the purpose of determining the physical condition of a water system's components and its capacity). Any spills from the potential contaminant sources listed in Tables 4 - 8 of this report should be carefully monitored, as should any future development in the delineated area of the Garden Creek inlet. Other practices aimed at reducing the leaching of agricultural chemicals from agricultural land within the designated Drinking Water Protection Areas should be implemented. Also, disinfection practices should be maintained if microbial contamination becomes a problem. No chemicals should be stored or applied within the 50-foot radius of the wellheads or the Garden Creek intake. Most of the designated Drinking Water Protection Areas are outside the direct jurisdiction of the City of Challis making partnerships with state and local agencies and industry groups critical to success of drinking water protection.

Due to the time involved with the movement of ground water, drinking water protection activities should be aimed at long-term management strategies even though these strategies may not yield results in the near term. However, the relatively short time involved with the movement of surface water requires drinking water protection activities aimed at short-term management strategies with an emphasis on dealing with log-term future impacts from these same sources. The Garden Creek Bridge crosses Garden Creek approximately one mile upstream of the intake structure. A strong public education program should be a primary focus of any drinking water protection plan as the delineations are near urban and residential land use areas. Public education topics could include proper lawn and garden care practices, household hazardous waste disposal methods, proper care and maintenance of septic systems, and the importance of water conservation to name but a few. There are multiple resources available to help communities implement protection programs, including the Drinking Water Academy of the EPA. As there are transportation corridors near the delineations, the Idaho Department of Transportation (ITD), Custer County and local Road and Bridge departments should be involved in protection activities. Drinking water protection activities for agriculture should be coordinated with the Idaho State Department of Agriculture, the Soil Conservation Commission, the Custer Soil and Water Conservation District, and the Natural Resources Conservation Service. Activities such as recreation should be coordinated with the Bureau of Land Management (BLM), the Idaho Fish & Game Department, and other related agencies.

4.2 Potential Nonpoint Sources of Contamination

The dominate land use outside the City of Challis delineated Drinking Water Protection Area is non-irrigated agricultural land for seasonal and all year grazing. Highway 95 runs north-south through Challis. Land use within the immediate area of the wellheads consists of both urban, commercial, and residential properties and agricultural land. Nonpoint sources of contamination associated with these land uses are primarily agricultural chemicals including pesticides (insecticides and herbicides) and fertilizers. Additional potential nonpoint sources within the Drinking Water Protection Area, especially within the town boundaries, include incorrect usage and disposal of hazardous household chemicals such as cleaning solvents, used motor oils and degreasers. Throughout the Drinking Water Protection Area, pesticides used by area homeowners and home fuel storage also pose threats to ground water quality.

5.0 DRINKING WATER PROTECTION MANAGEMENT TOOLS

Two broad categories of management measures are available to most community water systems. These are regulatory and non-regulatory measures. In choosing the most appropriate measures, local government officials and water systems operators should consider their situation, and may need to prioritize the implementation of specific measures to make the most of the resources available to them.

Non-regulatory methods will primarily be utilized to manage contaminant sources located within the Drinking Water Protection Area. Non-regulatory approaches rely on voluntary implementation of education and information outreach programming to be effective. The ultimate goal of public education is to empower the public so they can implement drinking water protection efforts.

Regulatory approaches rely on the assistance of City and County enforcement agencies such as Planning and Zoning to provide an "umbrella" of protection to the City of Challis. Without such an approach to the City of Challis Planning and Zoning, Custer County Planning and Zoning, or the Custer County Commissioners, the City of Challis's desire to protect its delineated Drinking Water Protection Areas from further encroachment may fall short of its intended goal. Although the City of Challis must have the final decision regarding regulatory actions, it is strongly suggested and encouraged that Challis register their drinking water protection plan with Custer County so that, in the future, the drinking water protection plan must be recognized prior to activities that may put the protection areas in jeopardy.

5.1 Regulatory Management Measures

Regulatory management measures to drinking water protection are used by municipalities who have the authority to pass laws or ordinances.

The City of Challis will cite the Idaho Rules Governing Public Drinking Water Systems, which prohibit any potential contaminant source within the setback area of a public drinking water source. The City of Challis will also consider applying for changes in the Custer County zoning overlay and registering their Drinking Water Protection Plan with Custer County Planning and Zoning to protect the City's drinking water from potential contaminating activities that occur outside the City of Challis's jurisdiction. Should the City of Challis desire, a city ordinance may be passed to help protect that portion of the Drinking Water Protection Area located within the city limits of the City of Challis. Other regulatory management measures the City of Challis may pursue include overlay district development, zoning, and comprehensive plan modifications. All of these management measures can be used to help reduce ground water contamination risks from specific potential contaminant sources. An example of a drinking water protection ordinance designed to protect drinking water can be found in Appendix D. Section 9.5.1 discusses regulatory management measures that could be adopted by the City of Challis to protect drinking water quality.

5.2 Non-Regulatory Management Measures

Non-regulatory management measures are intended to reach as broad a spectrum of the community as possible. Protection of the communities' drinking water is really possible only if the whole community cooperates to achieve protection. Public education is an essential tool for drinking water protection, and the majority of the non-regulatory management measures discussed below rely on public education for effective implementation. The implementation strategy is also discussed in many of the following approaches.

5.2.1 Public Education

Ongoing public education will be provided to the general public, the business community, and municipal officials on the necessity of protecting the water supply. This education includes many of the public participation activities and events described below within Sections 6.0 and 9.0. These public participation activities and events include public hearings, town meetings, informational mailings in water bills, and school district activities.

5.2.2 Pollution Prevention

Pollution prevention is waste prevention and resource conservation. Today, the emphasis is on preventing the waste from being generated in the first place, versus recycling an unused, over- purchased, waste material. The goals are to conserve natural resources and protect the quality of the land, water and air, work toward the reuse of items, use products with long lives, use natural resources efficiently and use processes that reduce consumption

and waste. Pollution prevention is source reduction or any practice that reduces the amount of any pollutant entering any waste stream.

A good example of a pollution prevention problem is the runoff and downward leaching of lawn fertilizer applications. The primary source of the problem is the over-application of fertilizer associated with an over-application of water, or a normal application of fertilizer associated with an over-application of water. One pollution prevention answer would be to address applying the appropriate amount of fertilizer and other chemicals to a lawn, along with the proper application of water. The use of BMPs is strongly suggested (Section 5.2.5).

5.2.3 Groundwater Guardian Community Membership

The Groundwater Guardian Program supports, recognizes, and connects communities protecting ground water. It is designed to empower local citizens and communities to take voluntary steps toward protecting their ground water resources and can be a catalyst for programs such as drinking water protection. An implementation schedule consists of Result Orientated Activities (ROAs) that a community planning team develops to ensure measures are taken to protect the community's drinking water. To achieve Groundwater Guardian status, a community must submit annual entry forms and develop and implement Result Oriented Activities (ROAs). The Groundwater Guardian Program application materials are available on-line via the Groundwater Foundation's web site – www.groundwater.org – in the Groundwater Guardian section.

The City of Challis will make information available on pollution prevention practices relevant to homeowners and businesses alike. Pollution prevention will be most effective at reducing the amount of household hazardous waste stored on site by creating the awareness of recycling opportunities. The DEQ Pollution Prevention Program and a non-profit pollution prevention organization called GEMStars are available to carry out pollution prevention activities for businesses. Information on GEMStars is available for review via the GEMStars web site at www.idahogemstars.org. In addition, the owners of each potential contaminant source will be made aware of Idaho's "Voluntary Pollution Prevention Program" and the additional assistance these program personnel can provide.

5.2.4 Home*A*Syst and Farm*A*Syst

The Home*A*Syst Project (H*A*S) and Farm*A*Syst Project (F*A*S) is designed to help homeowners become aware of conditions or practices on their property that increase the risk of drinking water contamination. The H*A*S materials allow a homeowner, farmer, or rancher to assess practices and activities for their potential to contaminate ground water. The fact sheets provide information about practices and structures that can help reduce the risk of ground water contamination. The project is coordinated by the Idaho Association of Soil Conservation Districts and is available at no cost to interested parties. Copies of Home*A*Syst and Farm*A*Syst Project materials will be made available through the City of Challis, or on-line at www.uwex.edu/homeasyst/.

5.2.5 Best Management Practices

Best Management Practices (BMPs) applicable to many potential contaminant sources will either be distributed to those listed in Tables 4-8 or made available through the City of Challis. These BMPs can be applicable to both point and nonpoint sources of contamination such as abandoned wells, agricultural and homeowner usage of fertilizers and pesticides, spill prevention within businesses where chemicals are handled, USTs, and agrichemical mixing and storage. Information on how to obtain technical and financial assistance for BMP implementation will also be provided where available. The DEQ is available to assist the City of Challis in identifying appropriate BMPs or identifying agencies or entities that can help provide BMPs and implementation assistance.

5.2.6 Household Hazardous Waste Collection

Planning Team members will encourage the development of a local household hazardous waste collection day and, at a minimum, will inform residents of household hazardous waste collection events within Custer County or neighboring Challis communities.

5.2.7 Water Conservation

Another non-regulatory management approach that will be pursued by the City of Challis will be to encourage water conservation. Water conservation can help a community in many ways, including:

1) Allowing the most efficient use of water within the drinking water system to defer capital expenditures to increase the water system capacity;
2) Reducing the load on municipal or private waste treatment facility;
3) Reducing the total quantity of water withdrawn from a ground water aquifer, thus slowing the movement of contaminants within the aquifer and allowing a longer period of time for natural processes to degrade them; and
4) Controlling the over-application of lawn irrigation water to limit the leaching of agricultural chemicals into the ground water.

5.2.8 Water Quality Data Reviews

Water quality data from the City of Challis's West Well #1, West Well #2, Well #3, East Well #1, the Garden Creek intake, and any ground water quality monitoring results in the vicinity of the City of Challis's Drinking Water Protection Area will be reviewed by the City of Challis's Drinking Water Protection Coordinator and DEQ at least once every three years prior to recertification (currently, certification is for a period of three years), or more often if significant new data is made available or water quality problems are identified in the vicinity. This will help evaluate trends or identify threats to the City of Challis's drinking water. Ground water quality monitoring results from private wells in the Challis area can be provided by the DEQ, the Idaho State Department of Agriculture, the Idaho Department of Water Resources or the U.S. Geological Survey (USGS). Relevant information will be made available to the community via the City of Challis's Drinking Water Protection Coordinator or the appropriate state or federal agencies.

6.0 MANAGEMENT TOOLS AND PROTECTION MEASURES FOR POTENTIAL CONTAMINANT SOURCES

The City of Challis's Drinking Water Protection Planning Team has identified development upstream of the Garden Creek intake as its most serious threat to the City's drinking water. Efforts are underway to protect this drinking water source from the possibility of further contamination due to encroachment as well as ensuring that the City is fairly represented and its drinking water needs may still be met by monitoring water usage upstream of the intake. As this involves land owned by private individuals, the focus of initial implementation will be public education and awareness.

The Planning Team will evaluate and identify any specific potential contaminant sources as part of the biannual plan review. Appropriate management tools and protection measures will be initiated as potential contaminate sources are identified.

6.1 Management Tools

An education program will be initiated and utilized to create public awareness of the vulnerability of the City of Challis's drinking water to potential contaminant sources as well as its currently limited capacity development. Section 9 outlines a proposed implementation strategy and schedule.

7.0 CONTINGENCY PLAN

A contingency plan is the blueprint outlining roles and responsibilities in the event that the system experiences a disruption due to contamination, loss of power, natural disasters such as drought or flooding, or other circumstances where it cannot provide services. The development and implementation of a contingency plan increases the likelihood that correct and immediate action will be taken and that any damage or potential health

risk, both in the long and short term, will be minimized. The Contingency Plan is designed to assist and facilitate community actions in the event of a drinking water emergency. The Contingency Plan will help the City of Challis make well thought-out, educated decisions under the most adverse of conditions. Appendix E contains the Contingency Plan for the drinking water supply for the City of Challis. Copies of the Contingency Plan will be located in the Challis's City Hall, and at the Public Works shop.

7.1 Emergency Spill Response

The primary concern during any hazardous materials spill is immediate public health and safety. In the event of a release of hazardous materials, the designated personnel will contact appropriate state and federal agencies for a rapid and concise response. The Idaho Bureau of Hazardous Materials Action Plan and Emergency Spill Response Flow Chart (Appendix F, Figure F1) will be referred to. The City of Challis will also implement their Contingency Plan in case the water system is impacted. Additional information on state and federal agencies with emergency planning roles, including phone numbers, can be found in Section VII of the Contingency Plan.

8.0 PLANNING FOR NEW WATER SOURCES

This plan includes a review of water quality/supply and evaluation of the need for a new water source. When a potential need is identified, drinking water protection areas will be estimated to determine the safest location for a new water source. New drinking water sources will be delineated in a manner consistent with the delineation process for existing drinking water sources. In addition, if there are major changes to an existing source's construction, discharge rate or pumping rate, then the existing delineation should be reviewed to ensure that it still represents the appropriate source water protection zones. Delineations may be updated or modified if significant new information becomes available.

The delineation for any new or modified well site will be inventoried for any potential contaminant sources, and the risk evaluated. The anticipated pumping rate and existing knowledge of the aquifer will be used to determine which proposed location for potential new wells would provide the least risk of contamination. The City of Challis will then take appropriate actions to prevent unwanted development near the new well site.

8.1 Encroachment

Encroachment is an issue that is now affecting more and more public water systems throughout the State of Idaho. With increasing populations, industrial and commercial developments and the seemingly never-ending sprawl of suburbs, communities with ground water wells and surface intakes once located in isolated areas are now facing challenges associated with the steadily increasing number of potential contaminant sources surrounding the area. Although a daunting task, the responsibility of addressing such an issue and taking actions including but not limited to purchasing land where a new water source will be eventually located must rest with the governing members of the community. By taking control of and managing the site where the new drinking water source will be located, community leaders are in a position of serving their community by guarding its most valuable resource, clean, safe drinking water.

9.0 IMPLEMENTATION STRATEGY

The strategy for implementing this Drinking Water Protection Plan is an important component of any local drinking water protection program. Without the continued efforts and support of the Community Planning Team and the community as a whole, the protection of the City of Challis's drinking water may not be accomplished as intended within this Plan. Table 9 contains the schedule outlining the implementation strategy developed by the Planning Team; it was determined that goal dates should commence with the City's fiscal years, beginning October 1 and ending September 30.

This Implementation Schedule is a guide that the City of Challis will use to implement drinking water protection activities. The Implementation Schedule is designed to implement drinking water protection activities that will create a sustainable Drinking Water Protection Program that addresses the potential contaminant sources identified in the Source Water Assessment.

Table 9. Implementation Schedule

Goal Date	Protection Activity/ Scope of Work	Potential Contaminant Source Addressed/Method
Year 1, 2004 Oct. 1 thru Sept. 30	1. Complete Security Vulnerability Self-Assessment Guide for Small Drinking Water Systems.	All sources/Public awareness and education; pollution prevention; water conservation; threat and security preparedness; BMPs.
	2. Erect fencing for West Well #1 and West Well #2.	All sources/Pollution prevention; threat and security preparedness.
	3. Investigate feasibility of extending City impact area.	All sources/Pollution prevention.
	4. Initiate program to regularly test Garden Creek for total and fecal coliform.	Microbes/Pollution prevention; BMPs.
	5. Contact District 7 Health Department and Idaho Department of Water Resources regarding compliance of any new construction on Garden Creek.	Capacity development; pollution prevention; BMPs.
	6. Regularly monitor along Garden Creek for potential pollution activities.	All sources/Pollution prevention; BMPs.
	7. Remind citizens and make available yearly Consumer Confidence Report.	All sources/Public awareness and education; pollution prevention; water conservation.
	8. Implement water restrictions as needed during high demand periods.	Public awareness and education; water conservation; BMPs.
	9. IRWA to host "Water Awareness Day" at local school.	All sources/Public awareness and education; pollution prevention; water conservation; threat and security preparedness; BMPs.
	10. Evaluate potential contaminant source inventory; update as needed.	All sources/Pollution prevention; BMPs.
Year 2, 2005 Oct. 1 thru Sept. 30	1. Review security measures; upgrade as needed.	All sources/Pollution prevention; threat and security preparedness.
	2. Apply for change in City impact area.	All sources/Pollution prevention.
	3. Continue regular testing of Garden Creek for total and fecal coliform.	Microbes/Pollution prevention; BMPs.
	4. Continue to monitor development on Garden Creek.	Capacity development; pollution prevention; BMPs.
	5. Remind citizens and make available yearly Consumer Confidence Report.	Public awareness and education; pollution prevention; water conservation.
	6. Implement water restrictions as needed during high demand periods.	Capacity development; water conservation; threat and security preparedness; BMPs.

Table 9 (continued). Implementation Schedule

Goal Date	Protection Activity/Scope of Work	Potential Contaminant Source Addresses/Method
Year 2, 2005 Oct. 1 thru Sept. 30	7. IRWA to host "Water Awareness Day" at local school.	All sources/Public awareness and education; pollution prevention; water conservation; BMPs.
	8. Evaluate potential contaminant source inventory; update as needed.	All sources/Pollution prevention; BMPs.
Year 3, 2006 Oct. 1 thru Sept. 30	1. Review security measures; upgrade as needed.	All sources/Public awareness and education; water conservation; pollution prevention; threat and security preparedness; BMPs.
	2. Continue regular testing of Garden Creek for total and fecal coliform.	Microbes/Pollution prevention; BMPs.
	3. Continue to monitor development on Garden Creek.	Capacity development; pollution prevention; BMPs.
	4. Remind citizens and make available yearly Consumer Confidence Report.	Public awareness and education; pollution prevention; water conservation.
	5. Implement water restrictions as needed during high demand periods.	Capacity development; water conservation; threat and security preparedness; BMPs.
	6. IRWA to host "Water Awareness Day" at local school.	All sources/Public awareness and education; pollution prevention; water conservation; BMPs.
	7. Evaluate potential contaminant source inventory; update as needed.	All sources/Pollution prevention; BMPs.
Year 4, 2007 Oct. 1 thru Sept. 30	1. Renew State Certification of drinking water protection plan.	All sources/Public awareness and education; pollution prevention; water conservation; threat and security preparedness; BMPs.

9.1 Planning for the future

To assure a safe drinking water supply for the City of Challis, the Planning Team will implement this Drinking Water Protection Plan as a long-term protection strategy for the City's drinking water supply. The strategy outlined in this Plan will be reviewed and updated on a regular basis (preferably biannually) to accommodate changes due to population growth, economic development or changes in land use. Table 9 is the implementation schedule for the City of Challis fiscal years 2004 - 2007. It will need to be updated along with the Contingency Plan when the Planning Team meets to update this Plan. The City of Challis's Source Water Assessment will be utilized as a tool to help assess potential hazards to drinking water quality. The DEQ is available to provide technical assistance to the Planning Team whenever new potential contaminant sources need to be addressed.

9.2 Community Team

The Drinking Water Protection Planning Team for the City of Challis will meet biannually to coordinate drinking water protection activities and to review and update the Implementation Schedule. The meetings should focus on evaluating how well the drinking water protection activities are working and to determine whether more outreach needs to be done. These meetings should also review and update the potential contaminant inventory, the Contingency Plan, and other sections as appropriate. Meeting notices should be made public to increase participation from members within the community.

9.3 Delineation

New drinking water sources will be delineated in a manner consistent with the delineation process used for the existing drinking water sources. If there are major changes to an existing source's construction, discharge rate or pumping rate, then the existing delineation should be reviewed to ensure that it still represents the appropriate drinking water protection zones. Delineation's may be updated or modified if significant new information becomes available.

9.4 Potential Contaminant Inventory

The Community Planning Team will update the potential contaminant inventory for the Drinking Water Protection Area as new, significant potential contaminant sources are noted within the Drinking Water Protection Area through general observations. If new sources of contamination are found, they will need to be added to the existing inventory. New sources will also need to be assessed for pollution prevention.

9.5 Contaminant Management Practice

The Planning Team will coordinate efforts to implement the contaminant management practices within Section 5.0 in accordance with the Drinking Water Protection Implementation Schedule. The implementation strategy for the City of Challis includes both regulatory and non-regulatory approaches, with the focus on non-regulatory approaches. Public education and community involvement are important implementation components. The Planning Team will organize public education with the assistance of partnering state and federal agencies.

9.5.1 Approaches to Regulatory Management Methods

The planning team will evaluate the need and desirability of various approaches to regulatory management means as described below:

Bonding- Facilities may be required to post a bond prior to operation in a drinking water protection area. Bonds can cover costs associated with spill response or remediation efforts.

Building Codes- Local building codes offer protection through special standards applicable to facilities which are remodeled or constructed in a drinking water protection area. Building codes can require low flow fixtures, backflow prevention and other design features to conserve and protect water quality.

Design Standards- Design standards typically are regulations that apply to the design and construction of buildings or structures. This tool can be used to ensure that new buildings or structures placed within a drinking water protection area are designed so as not to pose a threat to the water supply, such as requiring an impermeable liner on a settling pond.

Operating Standards- Operating standards are regulations that apply to ongoing land-use activities to promote safety or environmental protection. Such standards can minimize the threat to a drinking water protection area from ongoing activities such as the storage and use of hazardous substances through requirements such as secondary containment and spill response capabilities, or requiring that septic systems be properly maintained.

Performance Standards- Performance standards are used to regulate development within drinking water protection areas by enforcing predetermined standards for water quality. They may be applied at a predetermined ground water monitoring compliance point, at the point of injection, or through the use of contaminant source modeling. One example is the requirement that the amount of storm water runoff be the same before and after construction when developing or improving a site.

Potential Source Prohibitions or Restrictions- Source prohibitions or restrictions are regulations that prohibit or place restrictions on the use of certain chemicals that pose a high risk to water contamination such as Atrazine or

Trichloroethene, or prohibit or place restrictions on the placement of some high-risk potential contaminant sources such as underground storage tanks, underground injection wells, lagoons, feedlots, or landfills.

Site Plan Review- Site plan reviews are regulations requiring developers to submit for approval plans for developments occurring within a given area. This tool ensures compliance with regulations or other requirements made within a drinking water protection area.

Special Permitting or Reviews- Special permits or reviews are used to set conditions for certain uses and activities that pose a high risk to water contamination within drinking water protection areas if left unregulated. One example is to require that new feedlots within certain drinking water protection area zones be required to have a city or county permit or review that requires ground water quality monitoring and the use of certain water quality protection management practices.

Subdivision Ordinances- Subdivision ordinances are applied to land divided into two or more subunits for sale or development. Local governments use this tool to protect drinking water areas in which ongoing development is causing contamination. An example of a subdivision ordinance would be to require a minimum lot size for single family homes using septic systems so as to limit septic system density and subsequent ground water contamination.
Transport Prohibitions- The transport of chemical compounds, which pose a high risk to water quality if spilled, can be restricted within a drinking water protection area by requiring alternative transportation routes.

Zoning Ordinance- Zoning ordinances typically are comprehensive land-use requirements designed to direct the development of an area. Many local governments have used zoning to restrict or regulate certain land uses, which have the potential to contaminate water within drinking water protection areas.

Zoning Overlay-Overlay zones can be used in conjunction with conventional zoning to create special districts that protect a drinking water protection area. Overlay zones are applied to areas singled out for special protection, such as a drinking water protection area, and add regulations to those controls already in place. This method helps address "grandfathered" potential contaminant sources in drinking water protection areas.

9.5.2 Approaches to Non-Regulatory Management Methods

The Planning Team will coordinate efforts to implement approaches to non-regulatory management methods to drinking water protection, with the City of Challis taking the lead role toward implementing many of the approaches found in Section 5.2, including Groundwater Guardian Community membership and educational activities discussed under Sections 5.2.1 and 5.2.2. A major component of the Implementation Strategy is to work with the local community and the various local, state, and federal programs and personnel available for implementation assistance. This includes obtaining assistance from the Home*A*Syst and/or Farm*A*Syst program coordinator and DEQ Pollution Prevention Program personnel as discussed under Sections 5.2.3 and 5.2.4.

The DEQ Source Water/Wellhead Protection Coordinator located at the DEQ Idaho Falls Regional Office and other appropriate DEQ support personnel, as requested by the Planning Team, can assist in the area of coordinating support among the various local, state, and federal programs. The DEQ Source Water/Wellhead Protection Coordinator will also help with water quality data reviews (Section 5.2.8) and can assist with public education outreach on best management practices (Sections 5.2.2 and 5.2.5).

The Planning Team will work with the local community where desirable to help identify and pursue available funding opportunities for implementing different approaches. This can include working with the Natural Resources Conservation Service to obtain Environmental Quality Improvement Project funds for agricultural BMP implementation or working with the DEQ to obtain Nonpoint Source Section 319 BMP implementation funding.

Chapter 4 of the Idaho Nonpoint Source Management Plan contains a comprehensive list of funding sources available for implementation of BMPs. Idaho Rural Water Association is also available to assist in the pursuit of funding.

9.6 Additional Implementation Considerations

The City of Challis's Contingency Plan and efforts associated with planning a new well location will be updated on an as-needed basis as determined by the Planning Team. Once source water assessment information is made available, the Planning Team will evaluate the information, particularly the susceptibility analyses, and decide if there are any needed modifications or additions to this Plan or its implementation. Information from capacity development and the City of Challis's water system master plan will also be taken into consideration for drinking water protection planning and implementation purposes, as determined by the Planning Team.

10.0 SECURITY VULNERABILITY SELF-ASSESSMENT GUIDE FOR SMALL DRINKING WATER SYSTEMS

Water systems are critical to every community. Protection of public drinking water systems must be a high priority for local officials and water system owners and operators to ensure an uninterrupted water supply, which is essential for the protection of public health (safe drinking water and sanitation) and safety (fire fighting).

Adequate security measures will help prevent loss of service through terrorist acts, vandalism, or pranks. If a system is prepared, such actions may even be prevented. The appropriate level of security is best determined by the water system at the local level.

A Security Vulnerability Self-Assessment Guide is designed to help small water systems determine possible vulnerable components and identify security measures that should be considered. A "vulnerability assessment" is the identification of weaknesses in water system security, focusing on defined threats that could compromise its ability to provide adequate potable water, and/or water for firefighting. This document is designed particularly for systems that serve populations of 3,300 or less. This document is meant to encourage smaller systems to review their system vulnerabilities, but it may not take the place of a comprehensive review by security experts.

This document is designed for use by water system personnel. Physical facilities pose a high degree of exposure to any security threat. This self-assessment should be conducted on all components of your system (wellhead or surface water intake, treatment plant, storage tank(s), pumps, distribution system, and other important components of your system).

The Assessment will include an emergency contact list for the system's use. This list will help the system identify who needs to be contacted in the event of an emergency or threat and will help the system develop communication and outreach procedures.

The purpose of this document is to start the process of security vulnerability assessment and security enhancements. Security is not an end point, but a goal that can be achieved only through continued efforts to assess and upgrade a system.

This is a sensitive document and as such should be stored separately in a secure place at the water system. A duplicate copy should also be retained at a secure off-site location.
Access to this document should be limited to key water system personnel and local officials as well as the state drinking water primacy agency and others on a need-to-know basis. Therefore, this document will not be included in this report.

11.0 PUBLIC PARTICIPATION

Public participation during the development of this Drinking Water Protection Plan has included the below listed items. Additional public participation will be pursued as part of the implementation process.

- Public meetings;
- Discussion at town council meetings;
- Articles in local newspapers;
- Flyers posted at appropriate locations throughout City (Post office, City Hall, convenience stores, gas stations, etc.);
- Community Workshops.

Citizens can obtain updated information on the City of Challis's Drinking Water Protection Plan, implementation efforts, Source Water Assessments, and drinking water issues at Challis's City Hall, and the Public Works shop.

12.0 REFERENCES

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Idaho Administrative Procedures Act (IDAPA 37.03.09), *Administrative Rules of the Idaho Water Resource Board: Well Construction Standards Rules*, Idaho Department of Water Resources, 1993.

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Idaho Department of Environmental Quality, 2001. City of Challis Source Water Assessment, Part 1: Surface Water Sources.

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APPENDIX A

Source Water Delineations

FIGURE 1. Geographic Location of the City of Challis

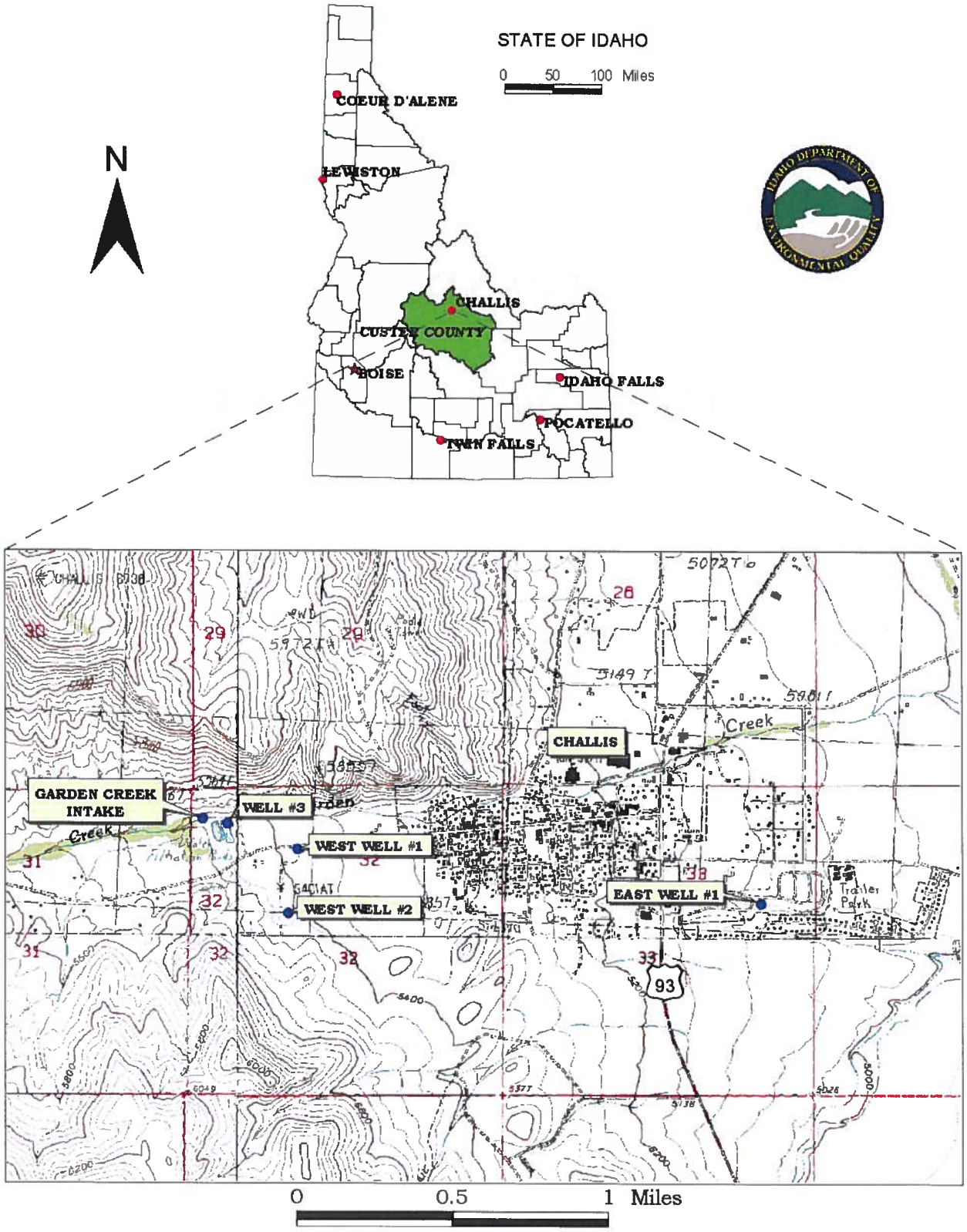

Figure A1. Geographic Location of the City of Challis

Figure 2. City of Challis Delineation Map and Potential Contaminant Source Locations

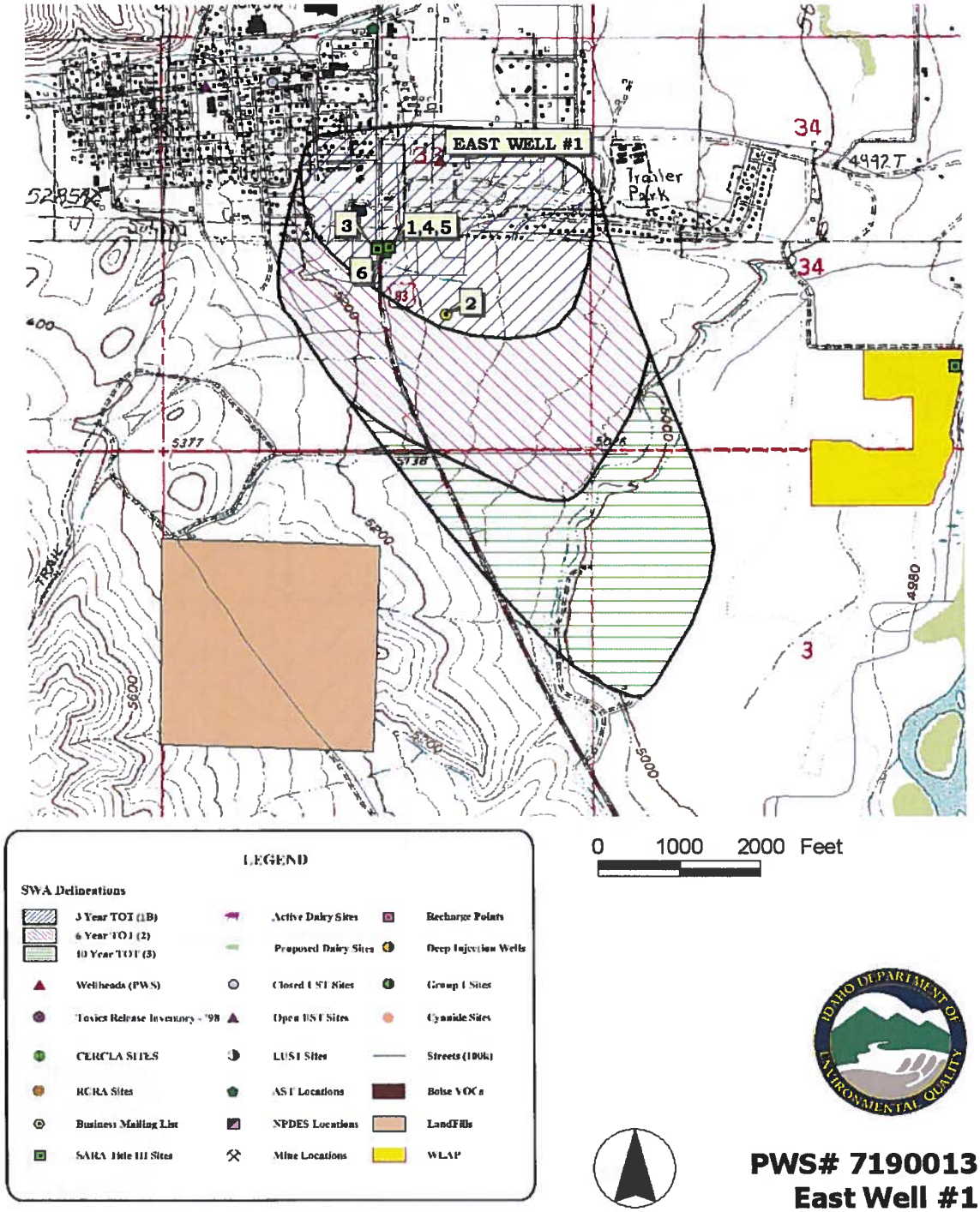

Figure A2. East Well #1 Source Water Delineation

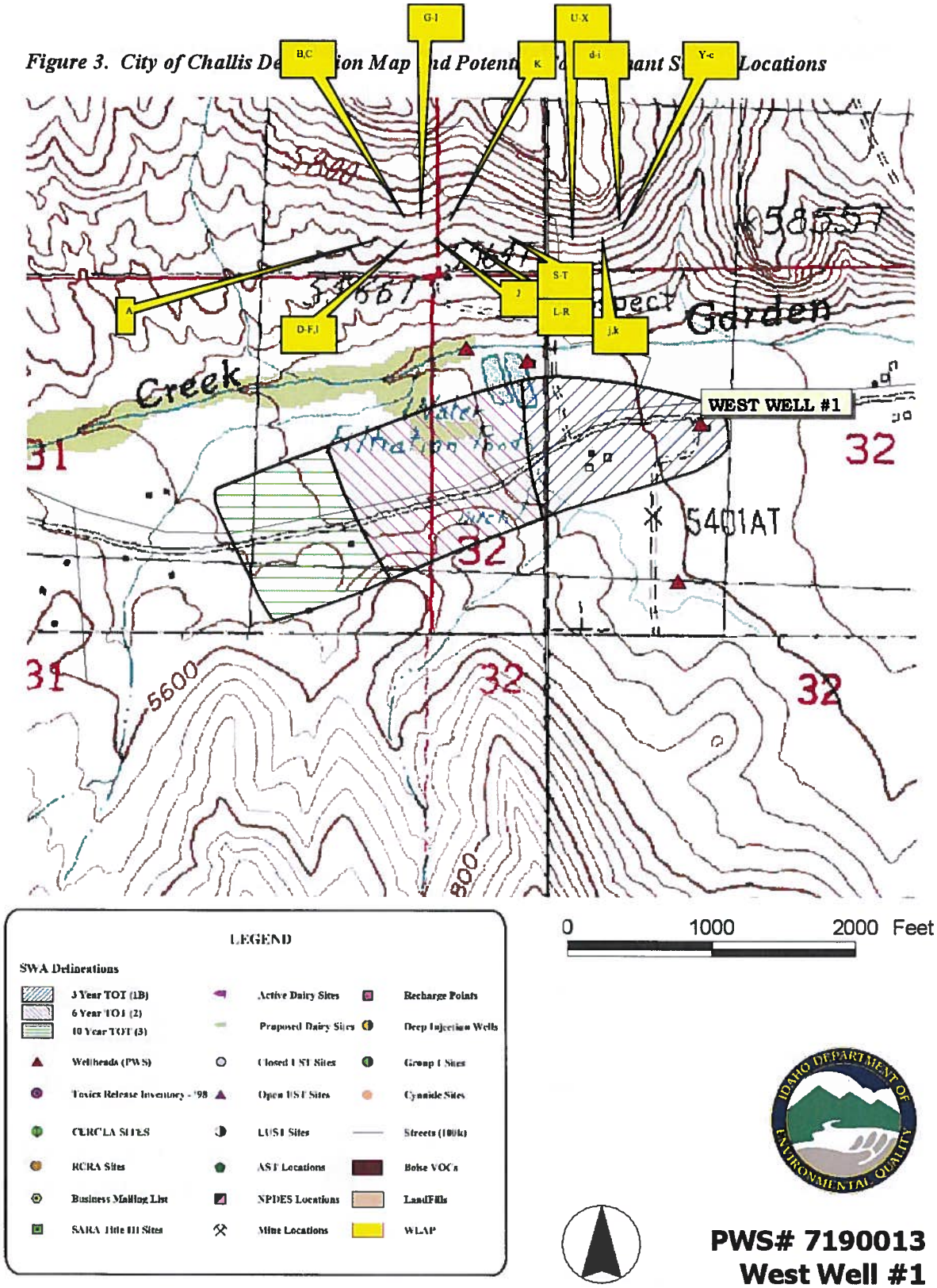

Figure A3. West Well #1 Source Water Delineation

Figure 4. City of Challis Delineation Map and Potential Contaminant Source Locations

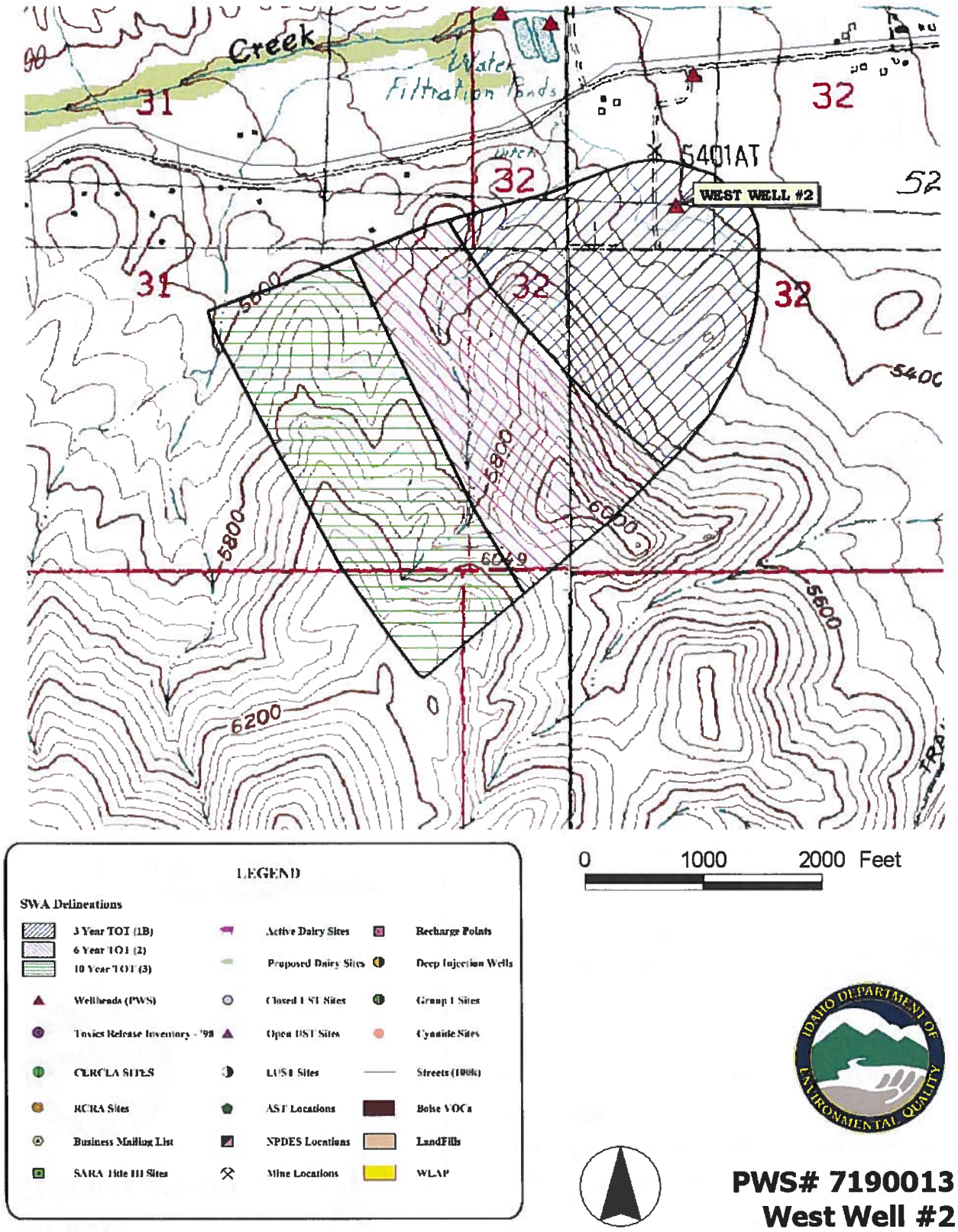

Figure A4. West Well #2 Source Water Delineation

Figure 5. City of Challis Delineation Map and Potential Contaminant Source Locations

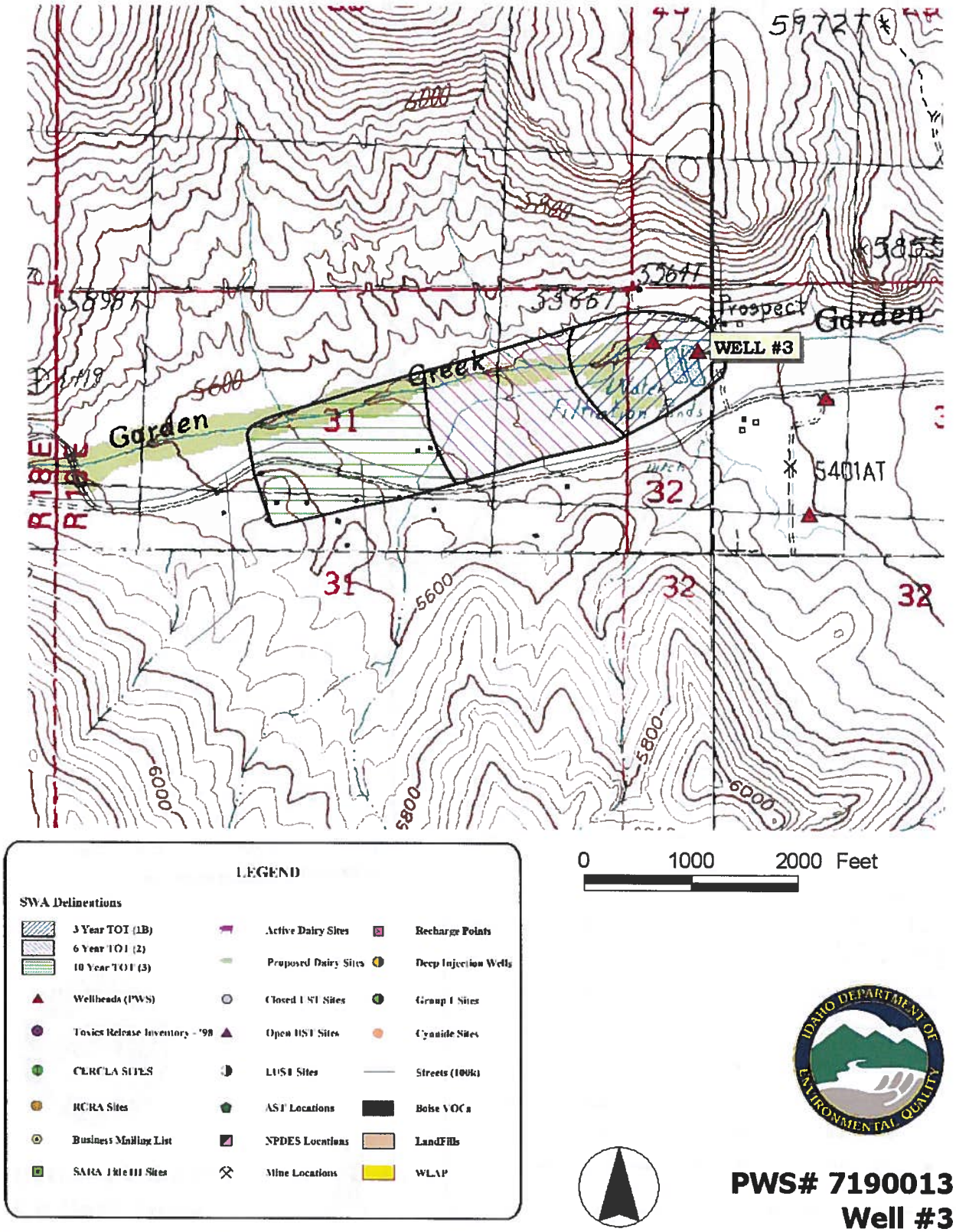

Figure A5. Well #3 Source Water Delineation

FIGURE 1. Geographic Location & Topographic Watershed Delineation for the City of Challis

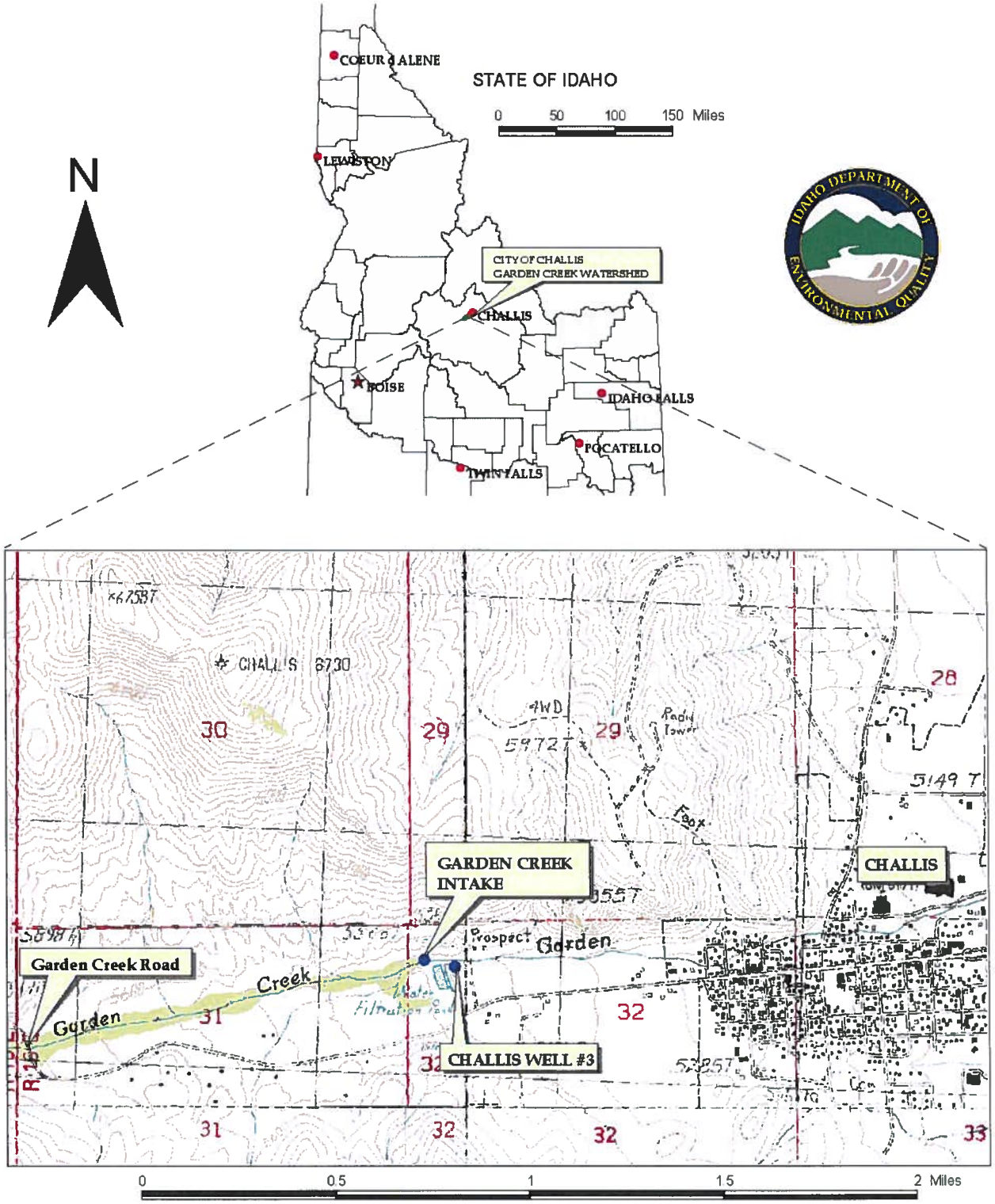

Figure A6. Garden Creek Source Water Delineation

APPENDIX B

Well Documentation

State law requires that report be filed with the Director, Departme (Water Resources within 30 days after the completion or abandonment of t... well.

W. Well #2

. WELL OWNER

CYPRUS MINES CORP.

Address Box 755 CHALLIS, IDAHO 83226

Owner's Permit No. 72-7117

. NATURE OF WORK

☒ New well ☐ Deepened ☐ Replacement
☐ Abandoned (describe method of abandoning) _____

PROPOSED USE

☐ Domestic ☐ Irrigation ☐ Test ☒ Municipal
☐ Industrial ☐ Stock ☐ Waste Disposal or Injection
☐ Other _____ (specify type)

METHOD DRILLED

☒ Rotary ☒ Air ☐ Hydraulic ☐ Reverse rotary
☐ Cable ☐ Dug ☐ Other _____

CONSTRUCTION

Casing schedule: ☒ Steel ☐ Concrete ☐ Other _____

Thickness	Diameter	From	To
.375 inches	12-3/4 inches +	5'2" feet	157'3" feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet
_____ inches	_____ inches	_____ feet	_____ feet

Was casing drive shoe used? ☐ Yes ☒ No
Was a packer or seal used? ☐ Yes ☒ No
Perforated? ☐ Yes ☒ No
How perforated? ☐ Factory ☐ Knife ☐ Torch
Size of perforation _____ inches by _____ inches

Number	From	To
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet
_____ perforations	_____ feet	_____ feet

Well screen installed? ☐ Yes ☒ No
Manufacturer's name _____
Type _____ Model No. _____
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Diameter ____ Slot size ____ Set from _____ feet to _____ feet
Gravel packed? ☐ Yes ☒ No ☐ Size of gravel _____
Placed from _____ feet to _____ feet
Surface seal depth 157'3" Material used in seal: ☒ Cement grout ☐ Puddling clay ☐ Well cuttings
Sealing procedure used: ☐ Slurry pit ☐ Temp. surface casing ☒ Overbore to seal depth
Method of joining casing: ☐ Threaded ☒ Welded ☐ Solvent Weld ☐ Cemented between strata
Describe access port 12" COUPLING WITH PLUG IN 12"x12-3/4" STEEL PLATE WELDED ON TOP

7. WATER LEVEL

Static water level 317 feet below land surface.
Flowing? ☐ Yes ☒ No G.P.M. flow _____
Artesian closed-in pressure _____ p.s.i.
Controlled by: ☐ Valve ☐ Cap ☐ Plug
Temperature COLD °F. Quality GOOD

8. WELL TEST DATA

☒ Pump ☐ Bailer ☐ Air ☐ Other _____

Discharge G.P.M.	Pumping Level	Hours Pumped
510	487.5 FEET	24

9. LITHOLOGIC LOG

Hole Diam.	Depth From	Depth To	Material	Water Yes	Water No
17"	0	3.5	GRAVEL & BROKEN ROCK IN TAN CLAY		X
17"	3.5	6	BROKEN GREY & GREEN VOLCANICS		X
17"	6	15	SOLID GREY VOLCANICS		X
17"	15	15.5	SOFT RED VOLCANICS		X
17"	15.5	96	MEDIUM HARD DARK GREEN VOLCANICS	X	
17"	96	105	GREEN & GREY BROKEN VOLCANICS		X
17"	105	157	DARK GREEN MEDIUM TO SOFT VOLCANICS	X	
12"	157	346	DARK GREEN MEDIUM TO SOFT VOLCANICS	X	
12"	346	407	SOLID BROWN-GREY VOLCANICS	X	
12"	407	490	DARK GREEN VOLCANICS	X	
12"	490	505	SOLID BROWN-GREY VOLCANICS	X	
12"	505	550	MEDIUM TO HARD BLUE-GREEN VOLCANICS	X	
12"	550	605	BROKEN BROWN-GREY VOLCANICS	X	

10. Work started 7-17-81 finished 8-15-81

Figure B1. West Well #2 Documentation

APPENDIX C

Overview of Potential Contaminant Sources
(Ground and Surface Water)

OVERVIEW OF POTENTIAL CONTAMINANT SOURCES
(Ground and Surface Water)

Table C1 provides an overview of potential contaminant sources and the contaminants that may be associated with each source. These sources represent many of the businesses, industries, operations, land uses, and environmental conditions that handle, generate, store, apply, dispose of, or provide a pathway for the contaminants of concern. The sources are separated into four categories:

1) Commercial/Industrial;
2) Agricultural/Rural;
3) Residential/ Municipal, and
4) Miscellaneous;

These sources can apply to either ground water or surface water, and many can apply to both ground and surface water. Where a potential contaminant source generally applies to only ground water or surface water, it is noted within Table C1.

Table C1. Potential Contaminant Sources (Ground and Surface Water)

Source		Potential Contaminants [1,2,3]
Commercial/Industrial		
Automobile	Body Shops/ Repair Shops	Waste oils, gasoline and diesel fuels; solvents, acids, paints, automotive wastes[4], miscellaneous cutting oils.
	Car Washes	Soaps, detergents, waxes, miscellaneous chemicals, hydrocarbons.
	Gas Stations	Petroleum fuels, oil, solvents, miscellaneous wastes.
Boat Services/Repair/Refinishing		Gasoline and diesel fuels, oil, septage from boat waste disposal area, wood preservative and treatment chemicals, paints, waxes, varnishes, automotive wastes[4].
Cement/Concrete Plants		Diesel fuel, solvents, oils, miscellaneous wastes.
Chemical/Petroleum Processing/Storage		Hazardous chemicals, solvents, hydrocarbons, heavy metals.
Dry Cleaners		Solvents (tetrachloroethylene, petroleum solvents), spotting chemicals (trichloroethane, methyl chloroform, ammonia, peroxides, hydrochloric acid, rust removers, amyl acetate).
Electrical/Electronic Manufacturing		Cyanides, metal sludge, caustic (chromic acid), solvents, oils, alkalis, acids, paints and paint sludges, PCBs.
Fleet/Trucking/Bus Terminals		Waste oil, solvents, gasoline and diesel fuel from vehicles and storage tanks, fuel oil, other automotive wastes[4].
Food Processing		Nitrates, salts, phosphorous, miscellaneous food wastes,

Source	Potential Contaminants [1,2,3]
	chlorine, ammonia, ethylene glycol.
Furniture Repair/Manufacturing	Paints, solvents, degreasing and solvent recovery sludges, lacquers, sealants.
Hardware/Lumber/Parts Stores	Hazardous chemical products in inventories, heating oil and fork lift fuel from storage tanks, wood-staining and treating products such as creosote, paints, thinners, lacquers, varnishes.
Home Manufacturing	Solvents, paints, glues and other adhesives, waste insulation, lacquers, tars, sealants, epoxy wastes, miscellaneous chemical wastes.
Junk/Scrap/Salvage Yards	Automotive wastes[4], PCB contaminated wastes, any wastes from businesses[5] and households[6], oils, lead.
Machine Shops	Solvents, metals, miscellaneous organics, sludges, oily metal shavings, lubricant and cutting oils, degreasers (tetrachloroethylene), metal marking fluids, mold-release agents.
Metal Plating/Finishing/Fabricating	Sodium and hydrogen cyanide, metallic salts, hydrochloric acid, sulfuric acid, chromic acid, boric acid, paint wastes, heavy metals, plating wastes, oils, solvents.
Mines/Gravel Pits	Mine spills or tailings that often contain metals, acids, highly corrosive mineralized waters, metal sulfides, metals, acids, minerals sulfides, other hazardous and nonhazardous chemicals, petroleum products and fuels.
Photo Processing/Printing	Biosludges, silver sludges, cyanides, miscellaneous sludges, solvents, inks, dyes, oils, photographic chemicals.
Plastics/Synthetics Producers	Solvents, oils, miscellaneous organic and inorganics (phenols, resins), paint wastes, cyanides, acids, alkalis, wastewater treatment sludges, cellulose esters, surfactant, glycols, phenols, peroxides, etc.
Research/University/Hospital Laboratories	X-ray developers and fixers[7], infectious wastes, radiological wastes, biological wastes, disinfectants, asbestos, beryllium, solvents, infectious materials, drugs, disinfectants, miscellaneous chemicals.
Wood Preserving/Treating	Wood preservatives: creosote, pentachlorophenol, arsenic, heavy metals.
Wood/Pulp/Paper Processing and Mills	Metals, acids, sulfides, other hazardous and nonhazardous chemicals, organic sludges, sodium hydroxide, chlorine, hypochlorite, chlorine dioxide, hydrogen peroxide, methanol, paint sludges, solvents, creosote, coating and gluing wastes.

Source	Potential Contaminants [1,2,3]
Agricultural/Rural	
Livestock Auction Lots/Boarding Stables	Nitrates, phosphorous, bacteria, and viruses, total dissolved solids.
Confined Animal Feeding Operations Slaughter House and Butcher Facilities	Nitrates, phosphorous, chloride, chemical sprays and dips for controlling insect, bacteria and viruses, total dissolved solids.
Farm Machinery Repair	Automotive wastes[4], solvents, fuel.
Crops - Irrigated and Non-irrigated	Pesticides[8], nitrate & phosphorous (from fertilizers), salts, sediment (from runoff).
Wastewater/Sludge/Manure Land Application or Disposal Locations	Nitrates, metals, salts, bacteria and viruses.
Lagoons/Liquid Wastes	Nitrates, livestock sewage wastes, salts, bacteria.
Pesticide/Fertilizer/Petroleum Storage & Transfer Areas	Pesticides[8], nitrate, phosphorous, petroleum residues.
Residential/Municipal	
Airports (Maintenance/Fueling Areas)	Aviation fuels, deicers, diesel fuel, chlorinated solvents, automotive wastes[4], heating oil, building wastes[5].
Camp Grounds/RV Parks, Marinas	Septage, gasoline, diesel fuel from boats, pesticides[8], household hazardous wastes from recreational vehicles (RVs)[6].
Drinking Water Treatment plants	Treatment chemicals.
Golf Courses	Pesticides[8], nitrate, phosphorous, arsenic.
Landfills/Dumps	Organic and inorganic chemical contaminants; waste from households[6] and businesses[5], nitrates, oils, metals, solvents.
Motor Pools	Automotive wastes[4]: solvents, waste oils, fuel storage.
Railroad Yards/Maintenance/Fueling Areas	Diesel fuel; herbicides for rights-of-way[8], creosote from preserving wood ties, solvents, paints, waste oils.
School Maintenance Facilities	Machinery/vehicle serving wastes, gasoline.[4].
Septic Systems (large community systems or 10 single systems on 40 acres)	Bacteria, viruses, nitrates, salts, dissolved solids, improperly disposed of household or business wastes[5,6,9].
Utility Stations/Maintenance Areas	PCBs from transformers and capacitors, oils, solvents, sludges, acid solution, metal plating solutions (chromium, nickel, cadmium).

Source	Potential Contaminants [1,2,3]
Waste Transfer/Recycling Stations	Residential and commercial solid waste residues.
Wastewater Effluent to Surface Waters (primarily surface water concern)	Municipal wastewater, sludge[10], treatment chemicals[11], nitrates, heavy metals, bacteria, nonhazardous wastes.
Miscellaneous	
Above Ground Storage Tanks	Diesel, gasoline, other chemicals.
Construction/Demolition Areas (Plumbing, Heating, and Air Conditioning, Painting, Carpentry, Flooring, Roofing and Sheet Metal etc.)	Solvents, asbestos, paints, glues and other adhesives, wastes insulation, lacquers, tars, sealants, epoxy waste, miscellaneous chemical wastes, explosives, sediment.
Historic Gas Stations	Diesel fuel, gasoline, kerosene.
Historic Waste Dumps/Landfills	Leachate, organic and inorganic chemicals, waste from households[6], and businesses[5], nitrates, oils, heavy metals, solvents.
Injection Wells/Dry Wells/Sumps (primarily ground water concern)	Storm water runoff, used oils, antifreeze, gasoline, solvents, other petroleum products, pesticides[8], and other chemical substances.
Storm Water Drainage to Surface Waters (primarily surface water concern)	Storm water runoff, oils, antifreeze, metals, sediment, and pesticides, and a wide variety of other substances.
Military Installations	Wide variety of hazardous and nonhazardous wastes depending on the nature of the facility, diesel fuels, jet fuels, solvents, paints, waste oils, heavy metals, radioactive wastes, explosives.
Surface Water - Stream/Lakes/Rivers/Recharge Sites	Ground Water: bacteria and viruses, cryptosporidium. Surface Water: nitrates, pesticides, sediment from Ag. return drains.
Transportation Corridors	Herbicides in highway right-of-way[8], road salt (sodium and calcium chloride), road salt anti-corrosives (phosphate and sodium ferrocyanide), automotive wastes[4], nitrate or phosphorous from fertilizer use.
Forest Roads /Logging (primarily surface water concern)	Sediment, fuel spills.
Landslides/Burn Areas (primarily surface water concern)	Sediment.
Underground Storage Tanks	Diesel, gasoline, heating oil, other chemical and petroleum products.

Source	Potential Contaminants [1,2,3]
Unsealed or Abandoned Wells, and Test Holes (primarily ground water concern)	Storm water runoff, solvents, nitrates, septic tanks, hydrocarbons, and a wide variety of other substances.

1. In general, surface or ground water contamination stems from the misuse and improper disposal of liquid and solid wastes; the illegal dumping or abandonment of household, commercial, or industrial chemicals; the accidental spilling of chemicals from trucks, railways, aircraft, handling facilities, and storage tanks; or the improper siting, design, construction, operation, or maintenance of agricultural, residential, municipal, commercial, and industrial drinking water wells and liquid and solid waste disposal facilities. Contaminants also can stem from atmospheric pollutants, such as airborne sulfur and nitrogen compounds, which are created by smoke, flue dust, aerosols, and automobile emissions, fall as acid rain, and percolate through the soil. When the sources listed in these tables are used and managed properly, water contamination is not likely to occur.

2. Contaminants can reach ground water from activities occurring on the land surface, such as industrial waste storage; from sources below the land surface but above the water table, such as septic systems; from structures beneath the water table, such as wells; or from contaminated recharge water.

3. This table lists the most common potential contaminants, but not all-potential contaminants. For example, it is not possible to list all potential contaminants contained in storm water runoff or from military installations.

4. Automobile wastes can include gasoline; antifreeze; automatic transmission fluid; battery acid; engine and radiator flushes; engine and metal degreasers; hydraulic (brake) fluid; and motor oils.

5. Common wastes from public and commercial buildings include automotive wastes; and residues from cleaning products that may contain chemicals such a xylenols, glycol esters, isopropanol, 1, 1, 1, -trichloroethane, sulfonates, chlorinated phenols, and cresol.

6. Households wastes include common household products that can contain a wide variety of toxic or hazardous components.

7. X-ray developers and fixers may contain reclaimable silver, glutaldehyde, hydroquinone, potassium bromide, sodium sulfite, sodium carbonate, thiosulfates, and potassium alum.

8. Pesticides include herbicides, insecticides, rodenticides, and fungicide. EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and quite mobile in the subsurface.

9. Septic tank/cesspool cleaners include synthetic organic chemicals such as 1, 1, 1,-trichloroethane, tetrachloroethylene, carbon tetrachlorine, and methylene chloride.

10. Municipal wastewater treatment sludge can contain organic matter, nitrates; inorganic salts; heavy metals; coliform and noncoliform bacteria; and viruses.

11. Municipal wastewater treatment chemicals include calcium oxide; alum; activated alum; polymers; ion exchange resins; sodium hydroxide; chlorine; ozone; and corrosion inhibitors.

Source: Adapted from EPA (1993).

APPENDIX D

Drinking Water Protection Ordinance Template
(Example)

- Example -
Drinking Water Protection Ordinance

SECTION 1. **Short Title and Purpose.**

A. This ordinance shall be known as the **"Drinking Water Protection Plan"**.

B. It is the purpose of this ordinance to promote the public health, safety, and general welfare and to minimize public and private loses due to contamination of the public water supply, and to formalize ground water protection/pollution abatement and control procedures. Specific goals are to:

1. Protect human life and health;

2. Insure that the public is provided with a sustainable safe potable water supply;

3. Minimize expenditure of public money for pollution remediation projects;

4. Minimize regulations on land use, and

5. Minimize business interruptions.

SECTION 2. **Definitions**. When used in this ordinance, the following words and phrases shall have the meanings given in this section:

A. **Agricultural Runoff Waste Water**. Water diverted for irrigation but not applied to cropland, or runoff of irrigation tail water from the cropland as a result of irrigation.

B. **Aquifer Remediation Related Wells**. These wells shall include those used to prevent, control, or remediate aquifer pollution, including--but not limited to--Superfund sites.

C. **Community Water System**. A public water system which serves at least fifteen (15) service connections used by year-round residents, or regularly serves at least twenty-five (25) year-round residents.

D. **Facility**. Refers to any business or corporation that is built, installed or established to serve a particular purpose.

E. **Hazardous Waste Disposal Facility**. A hazardous waste treatment, storage, or disposal facility which receives hazardous material as described in Part 40 Chapter 260.1 of the Code of Federal Regulations.

F. **Hazardous Waste or Material**. Any waste or material which, because of its quantity, concentration, physical, chemical or infectious characteristics may:

1. Cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness; or

2. Pose a substantial present or potential hazard to human health or to the environment when improperly treated, stored, transported, disposed of or otherwise managed; or

3. Any material or substance designated as a hazardous or toxic substance defined by Title 40

Part 261.3 of the Code of Federal Regulations, or any material or substance designated as a hazardous or toxic substance by the State of Idaho, acting through the DEQ or any successor agency.

G. **Injection**. The sub-surface emplacement of fluids.

H. **Livestock Confinement Operation**. As defined elsewhere in the Code.

I. **Non-Community Water System**. A public water system that is not a community water system.

J. **Public Water System**. A system that provides the public with piped water for human consumption, if such system has at least fifteen (15) service connections or regularly serves an average of at least twenty-five (25) individuals daily at least sixty (60) days out of the year. Such term includes:

1. Any collection, treatment, storage, and distribution facilities under control of the operator of such system, and used primarily in connection with such system; and

2. Any collection or pretreatment storage facilities not under such control that are used primarily in connection with such system.

A public water system is either a "community water system" or a "non-community water system."

K. **Sanitary Landfill**. A solid waste disposal operation where the wastes are spread on land in thin layers, compacted to the smallest practical volume, and covered with cover material once each day of operation in order to safeguard against environmental pollution, nuisances, and health hazards.

L. **Special Drainage Wells.** Used for disposing of water from sources other than direct precipitation. Examples of this well type include: landslide control drainage wells, potable water tank overflow drainage wells, swimming pool drainage wells, and lake level control drainage wells.

M. **Storm Water Runoff**. Water discharged as a result of rain, snow, or other precipitation.

N. **Time of Travel Districts (TOT)**. The time required for ground water to move from a specific point to a well.

O. **Underground Injection Well**. Any excavation or artificial opening into the ground which meets the following three criteria:

1. A bored, drilled or dug hole, or a driven mine shaft, or a driven well point; and

2. It is deeper than its largest straight-line surface dimension; and

3. It is used for or intended to be used for injection.

P. **Drinking Water Protection Overlay District (DWP)**. A land use designation on the Land Use Map, or a zoning designation on a zoning map, that modifies the basic underlying designation in some specific manner. The Drinking Water Protection Overlay District will also appear in the Hazardous Component of the Comprehensive Plan. A map will define specific area districts centering on wells supplying drinking water to a public water system. The map is delineated using one of the following methods:

1. Calculated Fixed Radius;

2. Arbitrary Fixed Radius;

3. Simplified Variable Shapes;

4. Semi-analytical, and Analytical Methods;

5. Hydrogeologic Mapping;

6. Numerical Modeling; and

and following the guidelines established in the Idaho Wellhead Protection Plan.

Q. **Community Wellhead**. The upper terminal of a well including adapters, ports, seals, valves and other attachments.

R. **Drinking Water Protection Overlay District IA**. A minimum fixed radius extending no less than fifty (50) feet radially from the wellhead supplying potable water to the public water supply(s).

S. **Drinking Water Protection Overlay District IB**. A three (3) year time of travel district (TOT) as defined in Section 2.

T. **Drinking Water Protection Overlay District II**. A six (6) year time of travel district (TOT) as defined in Section 2.

U. **Drinking Water Protection Overlay District III**. A ten (10) year time of travel district (TOT) as defined in Section 2.

SECTION 3. **Establishment of Drinking Water Protection Overlay District**. There is hereby established a drinking water protection overlay district identified and described as all the area within the ten (10) year TOT district around public water supplies as shown on the official zoning map. It is further established that these areas be composed of four(4) districts; Drinking Water Protection Overlay District IA, Drinking Water Protection Overlay District IB, Drinking Water Protection Overlay District II, and Drinking Water Protection Overlay District III as they are defined in this Chapter. The Board of Commissioners may record with the County Recorder's Office a metes and bounds description of the Drinking Water Protection Overlay District.

SECTION 4. **Prohibited uses within Zone IA of the Drinking Water Protection Area**. Uses permitted within Zone IA shall be limited to necessary public water supply wellhead equipment including the following, wellhead facility buildings, water storage tanks, disinfection equipment, disinfection chemical storage and approved landscaping. All other uses shall be prohibited.

SECTION 5. **Prohibited uses within Zone IB of the Drinking Water Protection Area**. The following uses or conditions shall be and are hereby prohibited within Zone IB of the Drinking Water Protection Areas:

A. Sanitary landfills;

B. Livestock Confinement Operations;

C. Hazardous waste Disposal Facility;

D. Injection well is a prohibited use ***except for the following***:

1. Closed systems.

E. Existing sewer lines shall not be closer than one hundred (100) feet of a wellhead or of new sanitary system and sewer lines shall not be closer than one hundred fifty (150) feet of a wellhead;

F. Existing septic tanks or drain fields shall not be closer than one hundred (100) feet of a wellhead and new installation of septic tanks or drain fields shall not be closer than two hundred (200) feet away from the wellhead;

G. Junk or salvage yards;

H. Disposal of waste oil, oil filters, tires and all other petroleum products; and

I. All manufacturing or industrial businesses involving the collection, handling, manufacture, use, storage, transfer or disposal of any hazardous solid or liquid material or waste having a potential impact on ground water, and any land use activities posing a hazard or threat to existing ground water quality, except upon issuance of a Special Use Permit. The Special Use Permit process may be instigated by the Zoning Administrator during the application review process.

SECTION 6. **Prohibited Uses within Zone II of the Drinking Water Protection Area**. The following uses or conditions shall be and are prohibited within Zone II of the Drinking Water Protection Area:

A. Sanitary landfills;

B. Hazardous Waste Disposal Facility;

C. Injection well is a prohibited use ***except for the following***:

1. Deep well injection (below 18 feet in depth):

   a. Geothermal Heat;

   b. Heat Pump Return; and

   c. Cooling Water Return.

2. Shallow well injection only (less than 18 feet in depth), including:

   a. Storm Runoff;

   b. Agricultural Runoff Waste Water;

   c. Special Drainage Water;

   d. Aquifer Recharge;

   e. Aquifer Remediation; and

   f. Septic Systems (General).

D. All manufacturing or industrial businesses involving the collection, handling, manufacture, use, storage, transfer or disposal of any hazardous solid or liquid material or waste having potential impact on ground water, and any land use activities posing a hazard or threat to existing ground water quality, except upon issuance of a Special Use Permit. The Special Use Permit process may be instigated by the Zoning Administrator during the application review process.

SECTION 7. **Prohibited Uses within Zone III of the Drinking Water Protection Area**. The following uses or conditions shall be and are prohibited within Zone III of the Drinking Water Protection area:

A. Injection well is a prohibited use ***except for the following***:

1. Deep well injection (below 18 feet in depth):

    a. Geothermal Heat;

    b. Heat Pump Return; and

    c. Cooling Water Return.

2. Shallow well injection only (less than 18 feet in depth):

    a. Storm Runoff;

    b. Agricultural Runoff Waste Water;

    c. Special Drainage Water;

    d. Aquifer Recharge;

    e. Aquifer Remediation; and

    f. Septic Systems (General).

B. All manufacturing or industrial businesses involving the collection, handling, manufacture, use, storage, transfer or disposal of any hazardous solid or liquid material or waste having potential impact on ground water, and any land use activities posing a hazard or threat to existing ground water quality, except upon issuance of a Special Use Permit. The Special Use Permit process may be instigated by the Zoning Administrator during the application review process.

SECTION 8. **Notice of Proposed Action to Operator of Public or Community Water Supply**. Whenever there is a request which requires a Special Use Permit from the Planning and Zoning Commission for land lying within a Drinking Water Protection District, written notice of the hearing shall be given to the entity operating the public or community water supply within that overlay district. The Planning and Zoning Commission may require a granting of easements for monitoring wells if the commission deems it appropriate for protection of the public water supply.

SECTION 9. **Non-Conforming Uses**. Any legal use existing at the time of the adoption of this ordinance and listed as a prohibited use herein, shall become a legal non-conforming use and may not be expanded or improved except as otherwise provided in the zoning ordinance.

SECTION 10. **Enforcement**. It shall be unlawful for any person, corporation, government entity or business to occupy or use the land within the area designated in the Drinking Water Protection Overlay District of Zone IA and IB, II, and III contrary to, or in violation of, any of the provisions of this Chapter.

SECTION 11. **Amendments**. Proposed amendments will require advance notice to all entities operating public or community water supplies that this ordinance effects.

APPENDIX E

Contingency Plan

City of Challis
Public Water System Number 7190013

P.O. Box 587
Challis, Idaho 83226

DRINKING WATER SUPPLY CONTINGENCY PLAN

I. INTRODUCTION

The purpose of contingency planning is to establish, provide and keep updated certain emergency response procedures which may become necessary in the event of a partial or total loss of public water supply service as a result of natural disasters, chemical contamination, mechanical failure, or civil disorders. This Contingency Plan is the procedural guide for responding to such emergencies. This Plan is coordinated with the Idaho Division of Environmental Quality.

The four ground water wells and single surface water intake allows the City of Challis some flexibility in case of contamination of one of the wells, however due to the City's limited capacity to provide drinking water to its residents, the loss of one or more of the City's drinking water sources would create undue hardship to a City that is already struggling with meeting the drinking water demands of its residents.

Public notification of the need for temporary extreme water conservation, or water rationing may be used to help assure that the current drinking water supply can supply the water needs of the community.

II. IDENTIFICATION OF POSSIBLE DISRUPTION THREATS

The principal threat to the City of Challis's public water supply has been identified as a spill, leak, or discharge in the delineated drinking water protection area, as well as electrical power outage and equipment failure. Included are spills from vehicles, spills from mobile liquid holding tanks, leaks from above or underground tanks, leaks from malfunctioning private septic tanks and drain fields, and leaks from waste carrying pipes. A specific threat may be posed by a fuel spill along Highway 93 or along Garden Creek Road that follows the Garden Creek drainage. The state of Idaho is also experiencing its fifth continuous year of significantly lower precipitation; both City and private domestic wells have experienced a decline in the static water table.

III. PUBLIC WATER SUPPLY CHARACTERISTICS

Currently, there does appear to be a physical system limitation that would prevent the City of Challis from providing adequate water supplies should a drinking water well have to be taken off-line. The City is located in an arid part of the state and sees less than 10 inches of precipitation annually. The drinking water system for Challis relies on precipitation at higher elevations to replenish Garden Creek (used as a surface water source) and recharge at least one aquifer from which ground water is obtained. Based upon a relatively recent hydrogeologic analysis of the water supply for the community of Challis, nearly all water in the Challis basin is appropriated; any new upstream water usage within the Garden Creek drainage will likely impact Challis. In the event that one of the City's drinking water wells had to be taken off-line due to contamination or equipment failure, the City of Challis does have the flexibility of requesting its residents to conserve water while its other wells continue to operate. A detailed hydraulic analysis of the entire water system was not conducted, however, specific characteristics include:

Table E1. Water System Specific Characteristics

Storage	4.4 million gallons (sufficient to supply 20 or more days of domestic use without landscape/lawn irrigation)
Distribution Line Sizes	12 inch, 8 inch, 6 inch, 4 inch; gravity flow
Supply Source	West Well #1; West Well #2; Well #3; East Well #1; Garden Creek intake
Treatment	Chlorine gas
People Served	1,073 through 521 meter connections

Table E2. Well Information

Specifications	West Well #1	West Well #2	Well #3	East Well #1	Garden Creek intake
Well Capacity (gpm)	80	500	N/A	500	1,400
Pumping Depth (bgs)	132 feet	487 feet	N/A	243 feet	N/A
Total Depth (bgs)	665 feet	603 feet	800 feet	341 feet	N/A
Production (gpm)	80	500	N/A	500	1,400

IV. PRIORITY OF WATER USERS DURING WATER SUPPLY EMERGENCY

Water supply priorities in the event of an emergency will be for domestic water usage (non-irrigation) and fire control. Water needs can be estimated based on a daily consumption of 300 gallons per household during the summer season and can exceed 500 gallons per household per day (7.8 million gallons per month total system usage) due to lawn/landscape irrigation. During the winter months an average of 390,000 gallons per month are used. In the event of an emergency, lawn/landscape irrigation will not be a priority and water conservation notifications will be announced. Currently, a water restriction during the summer months is in effect due to the City's limited capacity in meeting all of its residents needs.

V. SHORT TERM REPLACEMENT ALTERNATIVES

A. Surface water source and necessary treatment: Snake River; surface water treatment protocol would need to be put into effect.

B. Bottled water and other alternatives:

- **Kearsley Trucking**
  Vaun Kearsley
  P.O. Box 330
  Victor, ID 83455
  (208) 456-3066

- **ARR, LLC (Water Truck)**
  Mike Nelson
  P.O. Box 221
  Carmen, ID 83462
  (208) 756-6755

- **Scoble Water Truck**
  Galen D. Scoble
  502 Granite Street

Salmon, ID 83467
(208) 756-3252

- **Tom Sherman Water Truck**
  Tom Sherman
  114 Elm Street
  Salmon, ID 83467
  (208) 756-4826

- Idaho State Emergency Response Phone 1-800-632-8000

- Custer County Disaster Services (208) 879-2360/FAX (208) 879-5246
  Contact Person: Mr. Jim L. Alexander, Coordinator
  Email: custerdscja@yahoo.com

- Butte County Civil Defense (208) 527-8287/Cell (208) 589-4277/FAX (208) 527-3295
  Contact Person: Mr. Kenneth W. Babcock, Director
  Email: bilcol@atcnet.net

VI. INVENTORY OF AVAILABLE EQUIPMENT AND MATERIALS FOR USE IN AN EMERGENCY

A. City of Challis, City Works Department (208) 879-2244
- Loader
- Backhoe
- Grader
- Pumps

B. City of Challis Fire Department (208) 879-4215
- Fire trucks
- Pumps
- Saws
- Ladders
- Miscellaneous Safety Equipment

C. Lost River Highway District (Custer County)
P.O. Box 33
Mackay, ID 83251
Phone: (208) 588-2824
Commissioners: Victor A. Johnson, Chairman
George A. Gilbert
Earl Wall
- All equipment necessary to maintain roadways, bridges, etc.

VII. NOTIFICATION PROCEDURES - PERSONNEL CONTACT PLAN AND LIST OF TELEPHONE NUMBERS

Table E3. Lead Coordinating Organizations and Contacts for the City of Challis, Custer County, Idaho

Organization	Contact Name/Position	Work Phone	Home Phone
	Jerry Moss	(208) 879-4616	(208) 879-2244

Water System Personnel	*Public Works Supervisor, City of Challis*		
Board Member Incident Coordinator	Marion McDaniel *Mayor Pro Tem, City of Challis*	(208) 879-2386	(208) 879-4706
Police Department	Bill Knox *Chief of Police*	(208) 879-4400	(208) 879-2284
Fire Department	Wayne Butts *Fire Chief*	(208) 879-2332 or 911	(208) 879-4215
Sheriff (Custer County)	Bob Taylor	(208) 879-2232 or 911	(208) 879-4757
Superintendent of Schools	Bruce Bradberry	(208) 879-4231	N/A
Hospital / Area Clinic / Emergency Medical Services	Vicki Armbruster Challis Area Health Center Mountain View	(208) 879-4351 (208) 879-4351	(208) 879-2389 N/A
Local Emergency/Disaster Services	Custer County Disaster Services Mr. Jim L. Alexander *Coordinator* custerdscja@yahoo.com Idaho Emergency Services	(208) 879-2360 FAX 879-5246 1-800-632-8000	(208) 879-2463 N/A
Idaho Transportation Department (ITD)/County Road & Bridge	Jim Sugden ITD	(208) 879-2379	(208) 879-2307
Highway District	Lost River Highway District	(208) 588-2824	N/A
Utility Services	Salmon River Electric Cooperative Matt M???????	(208) 879-2283	(208) 879-2379
Division of Environmental Quality (Regional Office)	Jack Rainey Regional Office, Idaho Falls	(208) 528-2650	N/A
Neighboring Water System	N/A	N/A	N/A

Table E4. Local Incident Assessment Team

Organization	**Contact Name/Position**	**Work Phone**	**Home Phone**
Mayor	Marion McDaniel *Mayor Pro Tem*	(208) 879-23286	(208) 879-4706
Water System Personnel	Jerry Moss *Public Works Supervisor, City of Challis*	(208) 879-4616	(208) 879-2244
Police Department	Bill Knox *Police Chief*	(208) 879-4400	(208) 879-2284
Sheriff (Custer County)	Bob Taylor	(208) 879-2232 or 911	(208) 879-4757

VIII PUBLIC ANNOUNCEMENT PLAN

Public announcements regarding system emergencies and contingency plan implementation will be accomplished via local radio and other media, and via the public address systems on fire trucks for any immediate verbal notification needs, such as water conservation or specific water treatment including but not limited to a boil order. Residents of the City of Challis and users of the City of Challis's drinking water will also be informed by going door-to-door, through local radio and from business postings. The following are local media & radio stations information:

Local Newspapers
Challis Messenger
310 Main Street
Challis, ID 83226
(208) 879-4445

Local Radio Stations
KSRA Salmon
315 Highway 93
Challis, ID 83226
(208) 756-2218

Local TV Media (None available)

APPENDIX F

Idaho Emergency Response Flow Chart

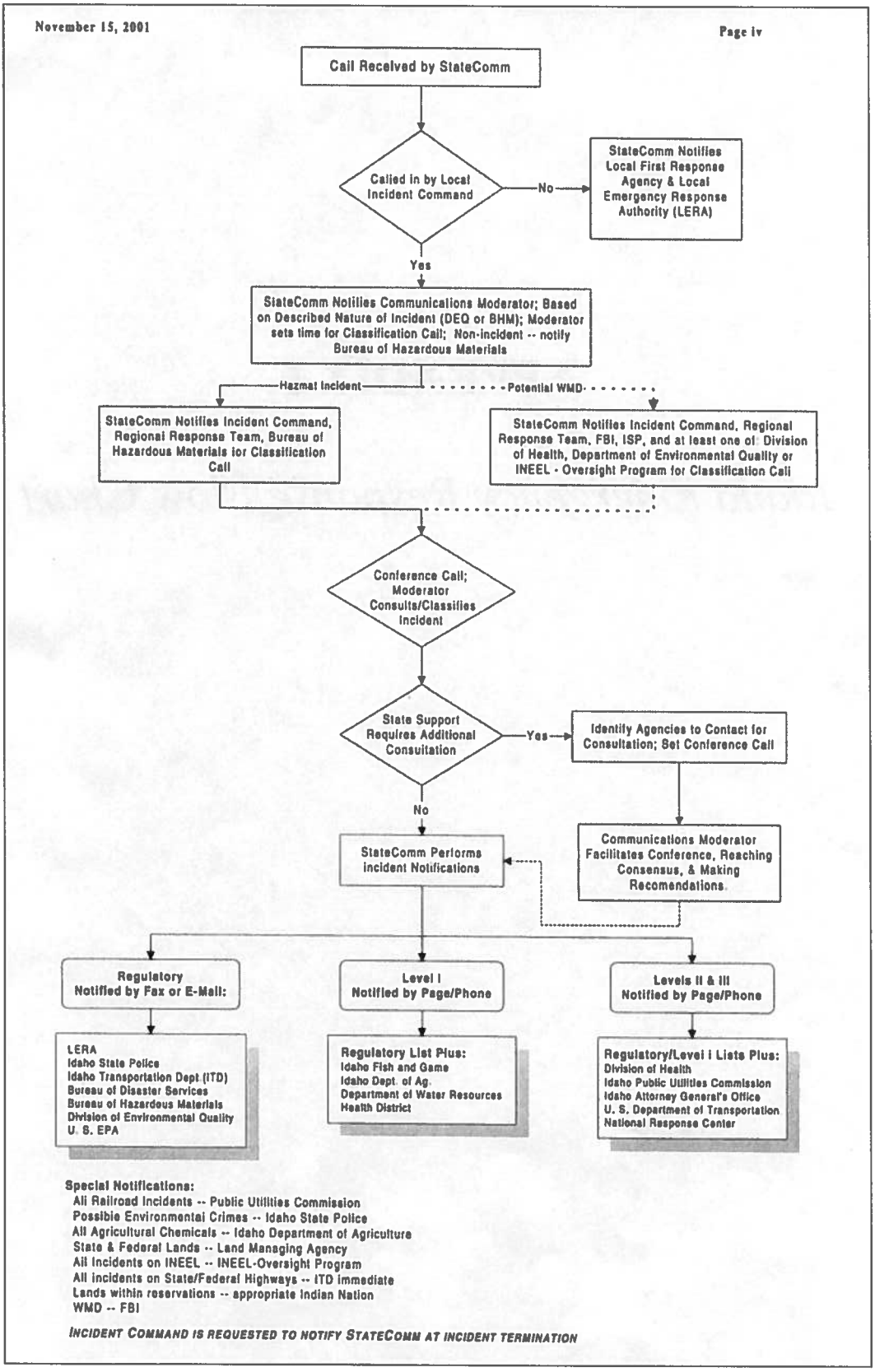

Figure F1. Idaho Emergency Response Flow Chart

APPENDIX G

Drinking Water Protection Plan Certification Checklist for State Certification

Drinking Water Protection Plan Certification Checklist

Public Water System Name: **City of Challis PWS 7190013**

Local Contact: **Jerry Moss**

Date Returned to Water System: _____

Drinking Water Protection Plan **Approved** _____ **Disapproved** _____

Idaho Drinking Water Protection Plan guidance - *Protecting Drinking Water Sources in Idaho, August 2000* Pg. 28 of the document states "If a Plan is found to satisfy all eight elements, then the community will be recognized by DEQ as having a *State Certified* Plan". Additionally, supporting information describing each of the required elements is referenced as well.

Required Elements of Certified Source Water Protection Plan		**Element Addressed**	
Element 1	Description of Planning Team Participant Roles and Duties (Reference Step 1: *Formation of a Community Planning Team*)	**Yes**	**No**
Element 2	Delineation of the Drinking Water Protection Area (Reference Step 2: *Delineation of the Land Area to be Protected*)	**Yes**	**No**
Element 3	An Inventory of Potential Sources of Contamination (Reference Step 3: *Identification of Potential Contaminant Sources*)	**Yes**	**No**
Element 4	Management Tools and Protection Measures that will be Pursued to Manage Potential Sources of Contamination (Reference Step 4: *Development and Implementation of a Management Plan for Drinking Water Protection Area*)	**Yes**	**No**
Element 5	A Contingency Plan (Reference Step 5a: *Development of a Contingency Plan*)	**Yes**	**No**
Element 6	A Protection Strategy for New Wells or Intakes (Reference Step 5b: *Planning for Future Drinking Water Sources*)	**Yes**	**No**
Element 7	A Public Participation and Education component	**Yes**	**No**
Element 8	An Implementation Strategy (what will be done, when it will be done, and by whom)	**Yes**	**No**

If a Plan is found to satisfy all eight elements, then the community will be recognized by DEQ as having a "State Certified Plan". This certification will cover a three year period, after which recertification can be pursued by the community. Recertification will include an evaluation of the community's success in implementing drinking water protection as a measure of the community's strategy (Element 8).

Reviewers	**Agency/Affiliation**
_____	_____
_____	_____
_____	_____
_____	_____

APPENDIX H

Glossary

Glossary

Aquifer – A geologic formation, group of formations, or part of a formation that is saturated and sufficiently permeable to transmit economic quantities of water to wells and springs.

Aquitard - A low-permeability geologic unit that can store ground water and also transmit it slowly from one aquifer to another.

AST (Aboveground Storage Tank) – Sites with aboveground storage tanks.

Best Management Practices (BMPs) – Conservation practices or systems of practices and management measures that (1) reduce water quality degradation caused by nutrients, animal waste, toxics, and sediment, as well as control soil loss; and (2) minimize adverse impacts on surface water, ground water flow, and circulation patterns and on the biological, chemical, and physical characteristics of wetlands.

Capacity – The flow rate that a pump is capable of producing; a water utility's ability to have resources available to meet the water service needs of its customers. In this context, capacity is the combination of plant- and service-related activities necessary to meet the quantity, quality, peak loads, and other service needs of the various customers or classes of customers served by the utility.

Community System – A public water system serving at least 15 service connections used by year-round residents or regularly serving at least 25 year-round residents.

Contaminant – Any physical, chemical, biological, or radiological substance or matter in water.

Contaminant Source Inventory – A record of the activities on a watershed or aquifer recharge area that have a potential to contaminate water.

Contingency Plan – A document that details the intended actions of a water utility under specified adverse conditions.

Dairy – Sites included in the primary contaminant source inventory represent those facilities regulated by Idaho State Department of Agriculture (ISDA) and may range from a few head to several thousand head of milking cows.

Deep Injection Well – A well discharging under pressure to a deep subsurface stratum. Such a well is often used to dispose of liquid waste streams to a suitable confined poor-water-quality aquifer that is generally considered unusable for other purposes; injection wells regulated under the Idaho Department of Water Resources generally for the disposal of storm water runoff or agricultural field drainage.

Enhanced Inventory – Enhanced inventory locations are potential contaminant source sites added by the water system. These can include new sites not captured during the primary contaminant inventory, or corrected locations for sites not properly located during the primary contaminant inventory. Enhanced inventory sites can also include miscellaneous sites added by the Idaho Department of Environmental Quality (DEQ) during the primary contaminant inventory.

Group I Sites – These are sites that show elevated levels of contaminants and are not within the priority one areas.

IDAPA – Idaho Administrative Procedures Act.

Inorganic Priority Area – Priority one areas where greater than 25 percent of the wells/springs show constituents higher than primary standards or other health standards.

Inorganic Contaminant (IOC) – An inorganic substance regulated by the US Environmental Protection Agency in terms of compliance monitoring for drinking water. Contained on the agency's list are contaminants as diverse as asbestos, nitrate (NO_3^-), cyanide, and nickel. This abbreviation came into common use in the US Environmental Protection Agency's Phase V drinking water regulations. An inorganic contaminant is sometimes called an inorganic chemical.

Leachate - The liquid that is derived from the leaching of buried refuse in septic systems, sanitary landfills and dumps by percolating water derived from rain or snowmelt. Leachate contains large numbers of inorganic contaminants, and the total dissolved solids can be very high.

LUST (Leaking Underground Storage Tank) – Potential contaminant source sites associated with leaking underground storage tanks as regulated under RCRA.

Maximum Contaminant Level (MCL) – A value defined under the Safe Drinking Water Act Section 1401 (3) as the maximum permissible level (concentration) of a contaminant in water delivered to any user of a public water system. Maximum contaminant levels are the legally enforced standards in the United States.

Microbes – A microscopic organism, either plant or animal, invisible to the naked eye. Examples are algae, bacteria, fungi, protozoa, and viruses.

Nitrate Priority Area – Area where greater than 25 percent of wells/springs show nitrate values above 5mg/L.

Nonpoint Source – Waste material that enters a water body from overland flow rather than out of a pipe or channel; an unconfined discharge of waste.

Organic Priority Areas – These are any areas where greater than 25 percent of wells/springs show levels greater than 1 percent of the primary standard or other health standards.

Perched Aquifer – A small lens of unconfined ground water separated from an underlying main body of ground water by an impermeable unsaturated zone.

Point Source – A discharge that comes out of the end of a pipe, as opposed to runoff or discharge from a field or similar source, which is called a nonpoint source.

Sanitary Survey – An on-site review of a water utility's water source, facilities, equipment, and operations and maintenance records for the purpose of evaluating the system's adequacy in producing and distributing safe drinking water.

Synthetic Organic Chemical (SOC) – An organic compound that is commercially made; some synthetic organic chemicals are contaminants in drinking water and are regulated by the EPA. The regulated synthetic organic contaminants include volatile organic chemicals, pesticides, herbicides, polychlorinated biphenyls, selected treatment chemicals (e.g. acrylamide), and polynuclear aromatic hydrocarbons.

Time of Travel (TOT) – The determination, usually by modeling, of the time in years for ground water recharge to travel from a certain field point to the wellhead.

Underground Storage Tank (UST) -

Vadose Zone – The unsaturated portion of the soil column between the land surface and the water table. A better term is *unsaturated zone*.

Volatile Organic Compound (VOC) – A class of organic compounds that includes gases and volatile liquids. Many volatile organic chemicals are used as solvents. A number of these compounds are regulated by the US Environmental Protection Agency.

Wastewater Land Application Site – These are areas where the land application of municipal or industrial wastewater is permitted by DEQ.

Wellheads – These are drinking water well locations regulated under the Safe Drinking Water Act. They are not treated as potential contaminant sources.

Zone IA – Sanitary setback zone designed to prevent microbial contamination within a 100-foot radius of the wellhead. This setback zone is established in the Idaho Rules for Drinking Water Supplies (IDAPA 58.01.08.900.01) and requires that: sewer lines, livestock, canals, and streams be 50 feet from the source water/wellhead and that: home septic tanks, seepage pits, disposal fields, and privies are 100 feet away from the source water/wellhead.

Zone IB – Corresponds with the 3-year time of travel for a particle of ground water to reach the wellhead.

Zone II – Corresponds with the 6-year time of travel for a particle of ground water to reach the wellhead.

Zone III – Corresponds with the 10-year time of travel for a particle of ground water to reach the wellhead.

CITY OF CHALLIS
EMERGENCY OPERATION PROTOCOL
OF THE SURFACE WATER TREATMENT PLANT

1. Purpose

In 2012, The City of Challis completed a water system facility plan[1] that projected demands and improvements needed to meet a 20-year planning time frame. The facility plan included a supplement[2] that addressed the operation of the system if any one of the water sources was off-line per IDAPA 58.01.08.501.17 – Ground Water Source Redundancy. In general this code section requires "*Under normal operating conditions, with any source out of service, the remaining source(s) shall be capable of providing either the peak hour demand of the system or a minimum of the maximum day demand plus equalization storage."*

The supplement concluded that the water system could not meet IDAPA 58.01.08.501.17 and described the options available to the City to meet the code. Challis, in consultation with the Idaho Department of Environmental Quality (IDEQ), selected the option of maintaining its surface water treatment plant as an emergency supply for the system. The consultation also:

- Defined the duration of emergency supply to be 72-hours
- Required Challis to provide an emergency operations protocol for the treatment plant for its review and approval
- Determined the protocol would be a "living document" subject to refinements as needed to meet the health and safety requirements of the residents of Challis

The protocol that follows in the sections below discusses how the City will maintain and operate its surface water treatment plant (SWTP) for emergency supply service. There are 3 parts to the protocol – standby operating of the SWTP, start-up procedures and shut down procedures for Clear Well.

2. Description of the Surface Water Source

The surface water source comes from a slow sand filter treatment plant. Garden Creek supplies the treatment plant. The treatment plant includes: diversion structure on Garden Creek, 2 open air filtering ponds (slow sand filters), valves and metering, covered clear well storing disinfected drinking water, and system connection. Elevation of the treatment plant is about 5435 feet. The City uses this source from about March to December. It supplies the Old Town portion of the distribution system. The City has the water right to divert 1.58 CFS (709 GPM) from Garden Creek and the diversion rate is regulated at the control structure on Garden Creek. Peak flow from this source is about 950 GPM. The peak flow from the treatment plant can exceed the diversion rate because diverted water creates a reservoir above the surface of the pond filter media. The reservoir plus the stored treated water in the clear well allows the treatment plant to meet City demands exceeding the diversion rate at Garden Creek.

The treatment plant has valving that directs filtered water from the ponds to either the clear well for disinfection and storage or back to Garden Creek. The clear well of the SWTP has a

[1] CITY OF CHALLIS – CHALLIS WATER SYSTEM FACILITY PLAN FEBRUARY, 2012 – Riedesel Engineering, Inc.
[2] SUPPLEMENTARY INFORMATION CHALLIS WATER SYSTEM FACILITY PLAN, FEBRUARY, 2012 – Riedesel Engineering, Inc.

nominal storage volume of about 30,000 gallons. The City can waste water that is filtered, but un-disinfected, water back to Garden Creek.

3. Standby Operation of the SWTP

Emergency standby operation of the SWTP follows the normal procedures the City has historically followed when it uses treated water from Garden Creek. Standby operation includes the following:

- Overall monitoring of the treatment plant
- Chlorine residual in the clear well
- Bacterial testing in the clear well
- Grab samples from the distribution system

In a standby mode, there may be some changes in the water stored above the filtering media. Instead of delivering filtered and disinfected water to the distribution system, City operators will bypass the clear well and divert filtered water back to Garden Creek. Design flow rate for the diversion is about 50 GPM, which means the production of the plant will be 50 GPM. Summertime operation at this flow rate vs. historic peak rates of 790 GPM may provide conditions for algal blooms on the filter pond surfaces. The City will need to experiment with discharge rates, chlorination, aeration, surface spray, or other mitigating efforts to manage algae if and when the condition arises. The City will notify IDEQ if this condition occurs and negotiate a mitigation measure.

Attached to this protocol is the current monitoring and testing schedule the City is following. The City will follow the same schedule for the same analytes when the SWTP is approved for operating as an emergency source.

4. Start-Up Procedures for the SWTP for Emergency Source Replacement

Like the operating procedure mentioned above, the start-up procedure follows the City's historic measures it uses to bring the SWTP online as a water source for the City. In general the process includes:

- Inspection and cleaning of the clear well
- Diverting filtered water from Garden Creek back to the clear well
- Filling the clear well and starting the chlorination system
- Chlorinating the clear well to reach a minimum free chlorine concentration of about 0.5 mg/L
- Pulling bacterial samples from the clear well
- Once clear well chlorine levels have stabilized at the operating point, closing distribution system inter-connection valves and turning the clear well into the distribution system.
- Routine monitoring of chlorine levels in the distribution system and periodic water quality sampling

City water operators follow a 15 point checklist to connect the SWTP to the distribution system. A copy is attached with this protocol. City staff estimates that in total the start-up procedure will take less than 4 hours to accomplish based on the overall implementation of

the emergency protocol. The SWTP will be providing drinking water to the distribution system in an emergency loss of a drinking water source during a peak day demand in less than 4 hours.

5. Shut-Down Procedures for the SWTP

Shifting the operation of the SWTP from emergency source replacement to standby operation will follow the same procedures the City has used when it places the SWTP into standby mode for the wintertime. In general the process includes:

- Adjusting the control valve to 50 GPM and diverting filtered water from the clear well to Garden Creek
- Allowing the distribution system to consume the contents of the clear well
- Opening the system inter-connection valves
- Valving off the flow from the clear well to the distribution system
- Perform routine maintenance and perform repairs

6. Emergency Response Goals and Summary

The City of Challis can meet the statutory requirements of IDAPA 58.01.08.501.17 – Ground Water Source Redundancy, by keeping the existing surface water treatment plant as an emergency source. The emergency condition arises when (1) groundwater source in either the Garden Creek Aquifer System (West Wells) or the Salmon Aquifer System (East Wells) fails during a peak day demand. The Water System Facility Plan identifies the month of July for the timing of a peak day demand.

The City and IDEQ have determined the duration of an emergency event to be 72 hours. City staff estimates the SWTP would be providing filtered and disinfected water to the distribution system within 4-hours following the emergency operation protocol described above. The procedures for operation, maintenance, monitoring, and testing identified in this protocol will ensure the health and safety of the public during emergency use of the SWTP.

7. Start Up Checklist

7.1. Close the clear well diverter valve located outside the chlorine room on the north side of the clear well building.
7.2. Set the chlorine system actuator to “AUTO”.
7.3. Fill the clear well storage tank, about 30,000 gallons.
7.4. Start the chlorine gas detector system.
7.5. Start the chlorine system injector pump.
7.6. When the injector pump has primed and water is circulating through the pump to the clear well, draw down the clear well storage about 50% by wasting to the clear well drain valve.
7.7. Close the clear well drain valve and open the disinfection system chlorine gas bottles. Test for chlorine gas leaks.
7.8. Install fresh log paper into the chlorine residual data logger.
7.9. Turn on the chlorine residual monitor and chlorine residual data logger.
7.10. Observe chlorine residual level on the monitor and calibrate the monitor by pulling residual grab samples from the clear well and comparing the readings to the grab sample.
7.11. When the monitor readings have stabilized and correlates with the grab samples, open the distribution system isolation valve and supply filtered and disinfected water to the system.
7.12. Notify IDEQ that the surface water treatment plant is operating and delivering drinking water to the system.
7.13. Start data collection for monitoring and testing reports for IDEQ following the monitoring schedule report.
7.14. Test chlorine residuals in the distribution system by taking grab samples at the west and east ends of the system.
7.15. Adjust chlorine gas injection levels at the clear well as needed to maintain minimum residuals at the west and east observation points.

8. IDEQ 2012 Monitoring Analytes and Schedule

Idaho DEQ Public Drinking Water System Monitoring Schedule Report

Print Date: **June 28, 2012**

ID7190013 - CHALLIS CITY OF
Community water system serving 847 people and 524 connections.
Regulated by IDAHO FALLS REGIONAL OFFICE.

The following schedules include monitoring periods between 01/01/2012 and 12/31/2012

Schedules for distribution system(s):

Code	Group/Analyte Name	Monitoring Frequency	Season Begin &	End Date	Satisfied
3100	COLIFORM (TCR)	2 per MN	1/1	12/31	Monthly
ZDBP	DBP - TTHM AND HAA5	1 per YR due between 01/01/2012 and 12/31/2012 taken between the months of July through September.	7/1	9/30	NO

Schedules for E WELL #1 , Tag # E0007349

Code	Group/Analyte Name	Monitoring Frequency	Season Begin &	End Date	Satisfied
ZNO3	NITRATE	1 per YR due between 01/01/2012 and 12/31/2012			NO

Schedules for MANIFOLD - CLEARWELL GC AND WELL 3, Tag # TE0007353M

Code	Group/Analyte Name	Monitoring Frequency	Season Begin &	End Date	Satisfied
ZARS	ARSENIC (1005)	1 per YR due between 01/01/2012 and 12/31/2012			NO
ZNO3	NITRATE	1 per YR due between 01/01/2012 and 12/31/2012			NO

Schedules for TREATMENT PLANT, Tag # 00000010972T

Code	Group/Analyte Name	Monitoring Frequency	Season Begin &	End Date	Satisfied
TOCA	DBP - TOC AND ALK	1 per QT due between 04/01/2012 and 06/30/2012	4/1	9/30	NO
TOCA	DBP - TOC AND ALK	1 per QT due between 07/01/2012 and 09/30/2012	4/1	9/30	*FUTURE

Schedules for W WELL #1 , Tag # E0007351

Code	Group/Analyte Name	Monitoring Frequency	Season Begin &	End Date	Satisfied

Schedules for W WELL #2 , Tag # E0007352

Code	Group/Analyte Name	Monitoring Frequency	Season Begin &	End Date	Satisfied
ZNO3	NITRATE	1 per YR due between 01/01/2012 and 12/31/2012			NO

"*FUTURE" in the "Satisfied" column indicates that the sampling requirement begins sometime in the future. Sampling before the monitoring period begin date will not satisfy the requirement for the monitoring period.

"*See CO" in the "Satisfied" column indicates that the operator needs to contact their Compliance Officer(CO) to verify that samples have been taken and the schedule has been satisfied.

IMPORTANT NOTICE : This monitoring schedule is provided to you as a courtesy and is current as of **June 28, 2012**. This monitoring schedule may be changed or modified as needed. Please revisit the monitoring schedule tool and review the system's monitoring schedule prior to sampling as to ensure compliance with the most current monitoring requirements. Contact your public water system regulating agency if you have any questions.

Page 1 of 2

Date Printed: June 28, 2012

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

900 North Skyline Dr., Suite B • Idaho Falls, Idaho 83402 • (208) 528-2650

C.L. "Butch" Otter, Governor
Curt Fransen, Director

August 23, 2012

Mayor Mark Lupher
City of Challis
PO Box 587
Challis, ID 83226

Re: City of Challis Water System Facility Plan, Custer County, DEQ No. 11-13-19

Dear Mayor Lupher:

We have reviewed the City of Challis Water System Facility Plan along with the supplemental information and the emergency protocol prepared by Donald G. Acheson of Riedesel Engineering. We hereby **approve** the Water System Facility Plan as fulfilling the technical portion of the Facility Plan. If the city wishes to pursue a construction loan from the DEQ's Drinking Water State Revolving Loan Fund (SRF) an environmental information document must be completed and approved by the Department prior to being eligible for funding. Please forward the water system improvement engineering plans and specifications for the water system improvements when available.

If you have any questions regarding this letter or if we can be of further assistance, please call me at (208) 528-2650.

Sincerely,

Carlin Feisthamel, P.E.
Water Quality Engineer

cc: Greg Eager, P.E., Regional Engineering Manager, DEQ-IF
Donald G. Acheson, P.E. Project Engineer, Riedesel Engineering

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SUPPLEMENTARY INFORMATION
CHALLIS WATER SYSTEM FACILITY PLAN
FEBRUARY, 2012

RIEDESEL Engineering

202 Falls Avenue
Twin Falls, ID 83301
208-733-2446

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4.1.4 Recommended Project 1 without Garden Creek Slow Sand Filter – Modifications for West Well Source Failure 9

This supplement responds to a clarification request by the reviewer of the facility plan submitted to the Department of Environmental Quality, Idaho Falls Regional Office. The request for clarification has (3) parts:

1. H2O Map. Information to decipher the hydraulic model extended period simulations depicting the response of the existing and future distribution systems under a peak day load with a fire flow demand. Appendix 1 to this supplement contains this information. The appendix information translates the reports in Appendix F – Sections 1.1 and 2.1 of the facility plan.

2. Loss of Source. Determination of the existing and future distribution system response to peak day demand with (1) of the water sources non-operational meeting the requirements of IDAPA 58.01.08.501.17 – Ground Water Source Redundancy, as follows:

   17. Ground Water Source Redundancy*. New community water systems served by ground water shall have a minimum of two (2) sources if they are intended to serve more than twenty-five (25) connections or equivalent dwelling units (EDUs). Under normal operating conditions, with any source out of service, the remaining source(s) shall be capable of providing either the peak hour demand of the system or a minimum of the maximum day demand plus equalization storage. See Subsection 501.18 for general design and redundancy requirements concerning fire flow capacity.*

3. Loss of Source Duration. IDAPA 58.01.08.501.17 does not specify duration. Based on a phone call to Carlin Fiesthamel, IDEQ-IFRO, the duration of a source outage is the time it takes to get the source back on line. We interpret this to be a non-emergency repair of the source equipment, such as pumping equipment, motor, controls, etc. A conversation with Mr. Corey Rice, Water & Wastewater Superintendant for the City of Challis indicates that he is able to restore pumping equipment in 3 days or less.

We used 72 hour duration of a source outage at peak day (3 consecutive peak days of source outage) to simulate the response of the water system. Appendix 2 to this supplement contains simulation data from the hydraulic model supporting the findings.

1 PEAK HOUR DEMAND OR MAXIMUM DAY PLUS EQUALIZATION STORAGE

1.1 Peak Hour Demand – Existing and Future System

We analyzed the peak hour demand for Challis' existing water system to be about 1,950 GPM, occurring at 04:00 hours[1]. For the design year and design year population we project peak hour demand at about 2,700 GPM[2].

1.2 Maximum Day Plus Equalization Storage – Existing and Future System

We analyzed Challis' existing peak day demand to be 1,862,150 gallons per day[3]. For the design year and design year population we project peak day demand at about 2.57MG[4].

2 RECOMMENDED PROJECT 1 SYSTEM RESPONSE TO A WATER SOURCE FAILURE

2.1 Description of Sources and the Distribution System

Recommended Project #1 (RP1) includes changes to the distribution system and the drinking water sources[5]. The Garden Creek Slow Sand Filter (GCSSF) is not an operational part of RP1. The total capacity of all these sources is as follows[6]:

• Required Peak Hour Demand (All as GPM)	<2,700.0>
• Peak output from West Wells	1,100.0
• Peak output from East Wells	1,200.0
• <Deficit>, Overage	<400.0>

Based on output capacities, the water sources for the existing system cannot meet the letter of IDAPA 58.01.08.501.17 for peak hour demand with all sources operational.

The worst case for the system occurs when one of the higher producing East Wells is not in service:

• Required Peak Hour Demand (All as GPM)	<2,700.0>
• Peak output from West Wells	1,100.0
• Peak output from East Wells	600.0

[1] Water System Facility Plan (WSFP), Section 3.3.3.5, page 30
[2] WSFP, Section 4.2, page 41
[3] WSFP, Section, Section 3.3.3.5, Table, page 31.
[4] WSFP, Section 4.2, page 41
[5] WSFP, Section 7.1.1, page 54
[6] WSFP, Section 7.2.1, page 56

- <Deficit>, Overage <1,000.0>

The RP1 cannot meet the statute with (1) non-operational source.

An analysis of peak day plus equalization storage follows:

- Required Peak Day Demand (All as Gallons per Day) <2,570,000.0>
- Total Equalization Storage 400,000.0
- Peak output West Wells 1,584,000.0
- Peak output from East Wells 1,728,000.0
- <Deficit>, Overage 1,142,000.0

The worst case for the system occurs when one of the higher producing East Wells is not in service:

- Required Peak Day Demand (All as Gallons per Day) <2,570,000.0>
- Total Equalization Storage 400,000.0
- Peak output West Wells 1,584,000.0
- Peak output from East Wells 864,000.0
- <Deficit>, Overage 278,000.0

While pump capacity plus storage meets the letter of the code as shown above, the placement of the water sources may not allow the system to operate in accordance with IDAPA 58.01.08.501.17. An example of this is that the East Wells cannot supply the West Reservoir to make up a deficit in the Upper and Mid Cyprus pressure zones during an outage of a West Well source. Challis basically has (2) water systems. The west system can supply the east, but not vice versa.

The purpose of the analysis that continues below is to test the system performance. I performed tests using the same facility plan hydraulic model modified with a 72-hour duration with (3) consecutive peak days.

2.2 Source Failure and Response

There are (2) combinations of single source failure in RP1- failure of one of the wells in the Garden Creek Aquifer system, and failure of one of the wells in the Salmon Aquifer system.

2.2.1 Failure of a West Well

RP1 cannot meet peak day demand without both of the West Wells for 72-hour duration. Under peak day demand with only 500 GPM supplying the West Reservoir, the storage is exhausted after about 4 hours of demand. There is no interconnection between the SAS sources and the West Reservoir to make up this deficit.

2.2.2 Options for Failure of a West Well

There are (3) modifications to RP1 to meet IDAPA 58.01.08.501.17:

1. Increase the storage in West Reservoir from 0.2MG to about 1.5MG to provide enough storage for the 72 hour demand.
2. Do not increase storage but install a booster station near East Reservoir connecting to West Reservoir to make up the deficit in flow from GCAS. The pump station would require about 90 HP to provide about 1,000 GPM peak flow at about 250 feet total pumping head.
3. Incorporate the GCSSF into RP1 as an emergency source to handle this kind of outage.

Note that additional groundwater development in GCAS is not included in the list above. We do not recommend further development other than replacing West Well 1[7].

2.2.3 Failure of an East Well

Even with both West Wells operating, RP1 cannot meet the statute with one source in the SAS not operational for 72 hour duration. The 72 hour demand exhausts the storage of either West or East Reservoir.

2.2.4 Options for Failure an East Well

There are (3) modifications to RP1 to meet IDAPA 58.01.08.501.17:

1. Increase the storage in West Reservoir from 0.2MG to about 0.6MG to provide enough storage for the 72 hour demand.
2. Drill a 3rd source in the SAS to make up the deficit.
3. Incorporate the GCSSF into RP1 as an emergency source to handle this kind of outage.

2.3 Recommendations

The least cost option for Challis is to retain the GCSSF to help the City meet IDAPA 58.01.08.501.17. Operationally, retaining GCSSF requires regular maintenance and sampling of the source to make sure it is available and safe to use when needed. The interval needed for filter cleaning would be increased from once a year to probably once every 2-3 years or longer. Observation and testing will determine the cleaning cycle. Retaining GCSSF is Riedesel's recommendation for meeting the letter and intent of the statute.

If the City determines not to retain GCSSF as an emergency source, we will provide an additional supplement discussing the scope and financial analyses to meet a non-concurrent source failure in either the GCAS or SAS wells. Since there is no way to

[7] WSFP, Section 5.3.1, page 49

predict an East Well or West Well failure, the system must be able to meet either condition. Construction required to meet either condition requires:

- Expansion of West Reservoir storage to 1.5 MG, or
- Booster pump station at East Reservoir and expansion of West Reservoir to 0.6MG, or
- Booster pump station at East Reservoir and addition of a 3rd SAS well.

3 APPENDIX 1

3.1 DECIPHERING INNOVYZE H2O MAP™ EXTENDED PERIOD SIMULATION (FIREFLOW DEMAND)

3.1.1 H2O MAO REPORT EXPLANATION

3.1.2 RP1 EXTENDED PERIOD SIMULATION DATA – FIREFLOW EXAMPLE

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		***HYDRAULIC MODEL***		***SAS GCAS 26JUL11***									
2		***HYDRAULIC MODEL DATA BASE:***		***FIREFLOW DESIGN (ACTIVE FIREFLOW)***									

3 **DECIPHERING THE H2O MAP FIRE FLOW REPORT -** The chart is a portion of the PDF titled "RP1 EXTENDED SIMULATION DATA -FIREFLOW" found in Appendix F, Section 2 - Proposed Water System Hydraulic Analyses. The format of this explanation is a copy of the EXCEL Workbook into which I pasted the H2O Map report. I will be deciphering (3) lines of that report. The (3) lines show examples nodes in the hydraulic model that have fire flow demand (line 6, ID#112 - line 8, ID#118), and a node that only has a peak hour demand (line 7, ID#116).

4 **FIRE FLOW SIMULATION WITH THE HYDRAULIC MODEL -** In the facility plan, I determined the time of day for the peak flow in Challis occurs at 04:00, or 4 AM. All fire flow simulations are run fro a 2-hour duration starting at 04:00. The fire flow demand base on the IFC and Chief Launna Gunderson is 1,500 GPM. The minimum residual pressure at any of the nodes in the system is 20 PSI. The fire flow demand is loaded at the fire hydrants in the existing system and at key representative nodes in the future pipe network. We use key nodes because we don't know where new fire hydrant will ultimately be placed. The hydraulic model adequately represents the response of the distribution system during a fire flow stress without the extra encumbrance of hypothetical hydrants. The fire flow simulation runs concurrently with the peak day demands starting at 04:00. Peak day demands are placed on both nodes representing hydrants and nodes representing common localized demands.

5	ID	Total Demand (gpm)	Critical Node 1 ID	Critical Node 1 Pressure (psi)	Critical Node 1 Head (ft)	Adjusted Fire-Flow (gpm)	Available Flow at Hydrant (gpm)	Critical Node 2 ID	Critical Node 2 Pressure (psi)	Critical Node 2 Head (ft)	Adjusted Available Flow (gpm)	Design Flow (gpm)
6	112.00	1,512.82	110	33.75	5,374.89	2,060.48	2,550.67	110	4.9	5,308.31	2,060.50	2,060.48
7	116.00	1.77	170	40	5,193.31		3,175.67	116	20.1	5,302.39	1.77	1.77
8	118.00	1,505.69	118	35.7	5,294.40	2,090.12	2,088.76	118	20.04	5,258.26	2,089.99	2,089.99

9 **LINE 6 - FIRE FLOW WITH PEAK DAY DEMAND -** Node ID#112 shows a total demand of 1,512.28 GPM. The demand is 1,500 GPM fire flow with 12.28 GPM peak day demand at this node. When node ID#112 is loaded with the demand, the "Critical Node 1" in the model is node ID#110 which is the node in the model that has the lowest pressure for the demand at node ID#112. Pressure at this node is 33.75 PSI and exceeds the 20 PSI minimum. The "Adjusted Fire Flow" is the flow that could be drawn form ID#112 and have node ID#110 still be at 20 PSI. The model shows that ID#112 could be loaded at 2,060.48 GPM. Since I am only interested in the demand node and the Critical Node 1, the rest of the data in the report is interesting but not essential to meet IDAPA. Reviewing the entire report, "RP1 EXTENDED SIMULATION DATA -FIREFLOW", shows that the entire distribution system can meet the 1,500 GPM fire flow demand with peak day load and still have all the Critical Node 1 pressures be at or above 20 PSI.

10 **LINE 7 - PEAK DAY DEMAND -** Node ID#116 shows a total demand of 1.77 GPM. The demand is the peak day demand at this node.

11 **LINE 8 - FIRE FLOW WITH PEAK DAY DEMAND -** Node ID#118 shows a total demand of 1,505.69 GPM. The demand is 1,500 GPM fire flow with 5.69 GPM peak day demand at this node. When node ID#118 is loaded with the demand, the "Critical Node 1" in the model is node ID#118 which is the node in the model that has the lowest pressure for the demand at node ID#118. Pressure at this node is 35.7 PSI and exceeds the 20 PSI minimum. The "Adjusted Fire Flow" is the flow that could be drawn form ID#118 and have node ID#118 still be at 20 PSI. The model shows that ID#118 could be loaded at 2,090.12 GPM. load and still have all the Critical Node 1 pressures be at or above 20 PSI.

CHALLIS WATER SYSTEM FACILITY PLAN – FEBRUARY 2012
Supplement Detailing System Recommended Project Response to Meet IDAPA 58.01.08.501.17 – Groundwater Redundancy

REVIEW #1

1. The City will install a new well in both the Garden Creek Aquifer System (GCAS) and the Salmon Aquifer System (SAS)
2. The **retain** the Garden Creek Slow Sand Filter operational as an emergency source

SYSTEM	PEAK DAY	PEAK HR.	LOSS OF A SOURCE IN GCAS	SYSTEM CHANGES	LOSS OF A SOURCE IN SAS	SYSTEM CHANGES
RP1	2.57MG	2,700 GPM	Total water production – 2,650 GPM: 950 GPM from GCSSF, 500 GPM from remaining West Well, and 1,200 GPM from both SAS wells.	The system meets IDAPA 58.01.08.501.17. No changes.	Total water production – 2,650 GPM: 950 GPM from GCSSF, 1,100 GPM both West Wells, and 600 GPM from remaining SAS wells.	The system meets IDAPA 58.01.08.501.17. No changes.

REVIEW #2

1. The City will install a new well in both the Garden Creek Aquifer System (GCAS) and the Salmon Aquifer System (SAS)
2. The City will **abandon** the Garden Creek Slow Sand Filter

SYSTEM	PEAK DAY	PEAK HR.	LOSS OF A SOURCE IN GCAS	SYSTEM CHANGES	LOSS OF A SOURCE IN SAS	SYSTEM CHANGES
RP1	2.57MG	2,700 GPM	Total water production – 2,650 GPM: 500 GPM from remaining West Well, and 1,200 GPM from both SAS wells.	Groundwater sources alone cannot meet peak hour flow. System must rely on groundwater sources and storage. Upper and Mid Cyprus pressure zones rely on the output of the West Wells. With one source down, the system requires either a larger reservoir or a booster at East Reservoir to supply water from SAS to West Reservoir to make up the deficit. Minimum upgraded reservoir size is about 1.5 MG with total system storage at 1.7MG. Estimated construction cost $1.3M. Minimum booster to supply West Reservoir from East Reservoir is 90 HP. The pumping plant would require (2) pumps, standby electrical supply, building, controls, etc. Estimated construction cost $0.5M. Does not include O&M costs.	Total water production – 2,650 GPM: 1,100 GPM both West Wells, and 600 GPM from remaining SAS wells.	Groundwater sources alone cannot meet peak hour flow. System must rely on groundwater sources and storage. Existing storage (0.4MG) is not sufficient. With one source down, the system requires either a larger reservoir or an additional SAS source. West reservoir needs to be increased to 0.6MG. Total system storage 1.0MG. Estimated construction cost $0.4M. Construction cost for 3rd SAS source is about $0.5M. Does not include O&M costs.

REVIEW #3 – OPTIONS

1. Non-Concurrent Failure – The ability to handle a water source loss in either the Garden Creek Aquifer System (GCAS) or the Salmon Aquifer System (SAS). Since one cannot predict which source may fail, the overall water system needs to perform under either condition.

OPTIONS	DESCRIPTION	COMPONENTS	OPERATION AND MAINTENANCE	ESTIMATED COSTS
1	Retain GCSSF	Existing System. New diversion to allow restoration of Garden Creek and participation of conservation service in drilling a new Garden Creek Well.	1. Routine and periodic testing 2. Routine and periodic filter cleaning 3. Routine and periodic maintenance of disinfection system	No additional cost.
2	Non-Concurrent Failure without GCSSF	Expansion of West Reservoir to 1.5MG	1. Adjust operation to maintain tank turn over (freshness) 2. Routine and periodic maintenance of level controls and other equipment 3. Site security	Estimated $1.3M construction cost
3	Non-Concurrent Failure without GCSSF	Booster duplex 90HP booster station at East Reservoir and increase West Reservoir storage to 0.6MG. Protects against a failure of either a West Well or an East Well.	1. Demand and electrical costs for pumps and HVAC equipment 2. Pump, valve, and control maintenance 3. Routine and periodic maintenance of level controls and other equipment 4. Site security	Estimated $0.4M tank construction + $0.5M booster station construction. Total ~$1.0M.
4	Non-Concurrent Failure without GCSSF	Booster duplex 90HP booster station at East Reservoir and 3rd well in SAS. Protects against a failure of either a West Well or a East Well	1. Demand and electrical costs for pumps and HVAC equipment 2. Pump, valve, and control maintenance 3. Routine and periodic maintenance of level controls and other equipment 5. Site security	Estimated $0.5M booster station construction + $0.5M 3rd East Well. Total ~$1.0M.

Available Report Types

The following report types are available from the Output Report Manager. Choose a report for more information:

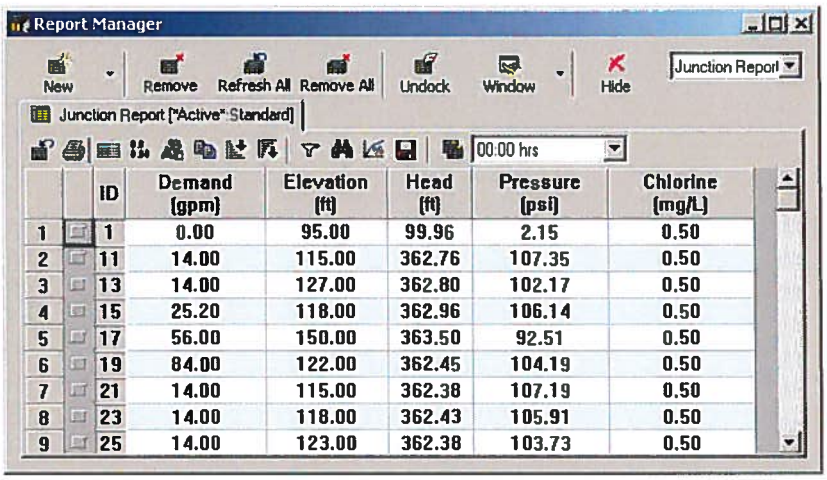
Junction Report	Range Report(s)
Pipe Report	Fireflow Report(s)
Valve Report	Energy Cost
Tank Report	Energy Summary
Pump Report	Demand Cost
Multi-Species	Sustainability

Click on the Report Modification buttons below to learn more about each icon.

Junction Report

Shows standard (hydraulic and water quality) simulation results at any simulation timestep for all junction nodes in tabular format. The node report displays one record for each node in the current H2OMAP project. Junction node report columns include the node identifier, demand, elevation, grade, pressure, and water quality analysis variable.

The following variables are displayed on the Junction Report in the Output Report Manager for all or selected junctions:



	ID	Demand (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	Chlorine (mg/L)
1	1	0.00	95.00	99.96	2.15	0.50
2	11	14.00	115.00	362.76	107.35	0.50
3	13	14.00	127.00	362.80	102.17	0.50
4	15	25.20	118.00	362.96	106.14	0.50
5	17	56.00	150.00	363.50	92.51	0.50
6	19	84.00	122.00	362.45	104.19	0.50
7	21	14.00	115.00	362.38	107.19	0.50
8	23	14.00	118.00	362.43	105.91	0.50
9	25	14.00	123.00	362.38	103.73	0.50

1. **ID** - Junction node identifier.
2. **Demand** - External demand (+ outflow; - inflow) at the current simulation time step, flow units.
3. **Elevation** - Junction node elevation, ft (m).
4. **Grade** - Junction node hydraulic grade at the current simulation time step, ft (m).
5. **Pressure** - Junction node pressure (pressure head for SI units) at the current simulation time step, psi (m).
6. **Water Quality** - Vary depending on the type of water quality analysis performed: constituent concentration for chemical propagation analysis (concentration units), flow weighted average water age for water age analysis (age units), or percentage of water (source contribution) for source tracing analysis (%).

Pipe Report

Shows standard (hydraulic and water quality) simulation results at any simulation timestep for all pipes in tabular format. The pipe report displays one record for each pipe in the current H2OMAP project. Pipe report columns include the pipe identifier, from and to nodes, length, diameter, flow, velocity, headloss, headloss per 1000/feet, and water quality analysis variable. Total forward flow, total backward flow, and total net flow are available for pipes that include flow totalizers.

The following variables are displayed on the Pipe Report in the Output Report Manager for all or selected pipes:

Report Manager

Pipe Report ["Active":Standard]

00:00 hrs

	ID	Diameter (in)	Roughness	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	HL/1000 (ft/kft)	Status	Total Forward	Total Reverse	Total Net	Flow Reversal	Chlorine (mg/L)
1	10	8.00	125.00	37.87	0.24	0.02	0.05	Open				0	0.50
2	100	8.00	125.00	-90.89	0.58	0.16	0.23	Open				0	0.50
3	102	8.00	125.00	76.89	0.49	0.04	0.17	Open				0	0.50
4	104	10.00	115.00	524.95	2.14	0.50	2.34	Open	0.03	0.00	0.03	0	0.50
5	12	8.00	125.00	38.46	0.25	0.01	0.05	Open				0	0.50
6	14	10.00	125.00	24.46	0.10	0.01	0.01	Open				0	0.50
7	16	8.00	125.00	-14.59	0.09	0.00	0.01	Open				0	0.50
8	18	8.00	125.00	145.01	0.93	0.29	0.55	Open				0	0.50

1. **ID** - Pipe identifier.
2. **From Node** - ID of beginning node.
3. **To Node** - ID of ending node.
4. **Length** - Pipe length, ft (m).
5. **Diameter** - Inside pipe diameter, in (mm).
6. **Flow** - Volumetric flow rate at the selected simulation time step, flow units.
7. **Velocity** - Flow velocity at the selected simulation time step, ft/sec (m/sec).
8. **Headloss** - Head lost due to friction across the pipe at the selected time step, ft (m).
9. **HL/1000** - Headloss per 1,000 length units across the pipe (hydraulic slope), ft/1,000 ft (m/1,000m).
10. **Total Forward Flow** - Accumulated flow volume metered in the From-Node to To-Node (forward) direction for the duration of the EPS, MG (ML).
11. **Total Reverse Flow** - Accumulated flow volume metered in the To-Node to From-Node (reverse) direction for the duration of the EPS, MG (ML).
12. **Total Net Flow** - Net flow volume metered for the duration of the EPS, MG (ML).
13. **Flow Reversal** - Total number of times that the direction of flow has changed in the pipe.
14. **Water Quality** - Vary depending on the type of water quality analysis performed: average constituent concentration for chemical propagation analysis (concentration units), flow weighted average water age for water age analysis (age units), or percentage of water (source contribution) for source tracing analysis (%).

(Note: Items 10 to 12 are only available for pipes equipped with flow totalizers during an EPS.)

Valve Report

Shows standard (hydraulic and water quality) simulation results at any simulation timestep for all control valves in tabular format. The valve report displays one record for each valve in the current H2OMAP project. Valve report columns include the valve identifier, from and to nodes, diameter, flow, velocity, headloss, and water quality analysis variable.

The following variables are displayed on the Valve Report in the Output Report Manager for all or selected valves:

Report Manager

Valve Report ["Active":Standard]

00:00 hrs

	ID	From Node	To Node	Diameter (in)	Flow (gpm)	Velocity (ft/s)	Headloss (ft)	Status	Setting	Chlorine (mg/L)
1	300	87	49	8.00	145.60	0.93	196.29	Active	50.00	0.50

1. **ID** - Valve identifier.
2. **From Node** - ID of beginning node.
3. **To Node** - ID of ending node.
4. **Diameter** - Valve diameter, in (mm).
5. **Flow** - Volumetric flow rate at the current simulation time step, flow units.

6. **Velocity** - Flow velocity at the current simulation time step, ft/sec (m/sec).

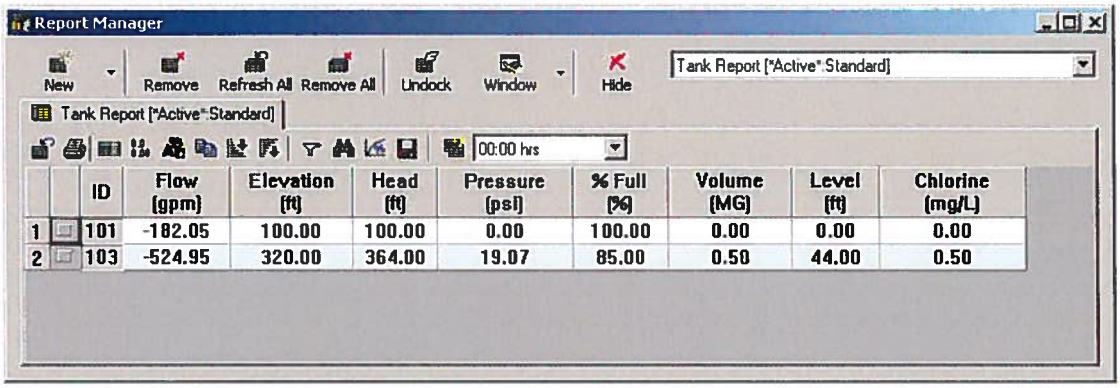
7. **Headloss** - Head lost across the valve at the current simulation time step, ft (m).

8. **Water Quality** - Vary depending on the type of water quality analysis performed: average constituent concentration for chemical propagation analysis (concentration units), flow weighted average water age for water age analysis (age units), or percentage of water (source contribution) for source tracing analysis (%).

Tank Report

Shows standard (hydraulic and water quality) simulation results at any simulation timestep for all storage nodes in tabular format. The node report displays one record for each storage node in the current H2OMAP project. Storage node report columns include the node identifier, demand, elevation, grade, pressure, percent full, and water quality analysis variable.

The following variables are displayed on the Tank Report in the Output Report Manager for all tanks:



	ID	Flow (gpm)	Elevation (ft)	Head (ft)	Pressure (psi)	% Full (%)	Volume (MG)	Level (ft)	Chlorine (mg/L)
1	101	-182.05	100.00	100.00	0.00	100.00	0.00	0.00	0.00
2	103	-524.95	320.00	364.00	19.07	85.00	0.50	44.00	0.50

1. **ID** - Junction node identifier.

2. **Demand** - Volumetric flow rate (+ filling; - draining) at the current simulation time step, flow units.

3. **Elevation** - Node elevation, ft (m).

4. **Head** - Node hydraulic grade at the current simulation time step, ft (m).

5. **Pressure** - Node pressure (pressure head for SI units) at the current simulation time step, psi (m).

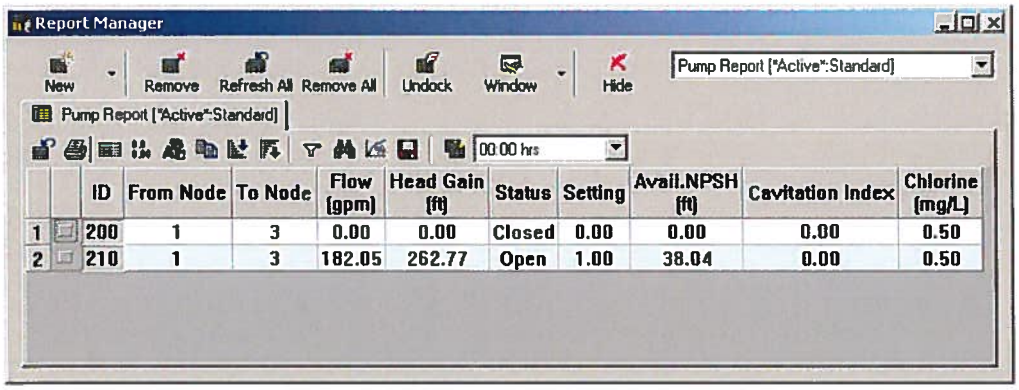
6. **% Full** - Percentage full by water volume at the current simulation time step, %.

7. **Water Quality** - Vary depending on the type of water quality analysis performed: constituent concentration for chemical propagation analysis (concentration units), flow weighted average water age for water age analysis (age units), or percentage of water (source contribution) for source tracing analysis (%).

Pump Report

Shows standard (hydraulic and water quality) simulation results at any simulation timestep for all pumps in tabular format. The pump report displays one record for each pump in the current H2OMAP project. Pump report columns include the pump identifier, from and to nodes, flow, headloss, and water quality analysis variable. Available net positive suction head (NPSH) and cavitation index are available for pumps that include an NPSH curve.

The following variables are displayed on the Pump Report in the Output Report Manager for all or selected pumps:



	ID	From Node	To Node	Flow (gpm)	Head Gain (ft)	Status	Setting	Avail.NPSH (ft)	Cavitation Index	Chlorine (mg/L)
1	200	1	3	0.00	0.00	Closed	0.00	0.00	0.00	0.50
2	210	1	3	182.05	262.77	Open	1.00	38.04	0.00	0.50

1. **ID** - Pump identifier.

2. **From Node** - ID of beginning node.

3. **To Node** - ID of ending node.

4. **Flow** - Volumetric flow rate at the selected simulation time step, flow units.

5. **Headloss** - Head gain imparted by the pump at the selected time step, ft (m).

6. **Available NPSH -** Available Net Positive Suction Head, ft (m).

7. **Cavitation Index** - Ratio of the available NPSH to the required NPSH.

8. **Water Quality** - Vary depending on the type of water quality analysis performed: average constituent concentration for chemical propagation analysis (concentration units), flow weighted average water age for water age analysis (age units), or percentage of water (source contribution) for source tracing analysis (%).

(Note: If the required NPSH curve for a specific pump is not supplied by the user, then H2OMAP will only compute the available NPSH and the cavitation index will not be reported.)

(Note: If the suction piping diameter for a specific pump is not supplied by the user or if the pump is connected directly to a storage node (i.e., upstream node is a storage node), then H2OMAP will not compute the available NPSH.)

Range

The Range Report (for pipes, pumps, valves, junctions, and tanks) displays the maximum, minimum and average values (and the difference between the maximum and minimum values) for the output variables during the entire extended period simulation period. One record is displayed for each component of the selected component type.

Ranges allow the user to see, in a report format, the maximum and minimum values experienced at any element in the system over the EPS. For example, in a junction report, the user is able to get a print out of the maximum and minimum pressures experienced at any of the junction nodes. The range report is important when considering system fatigue.

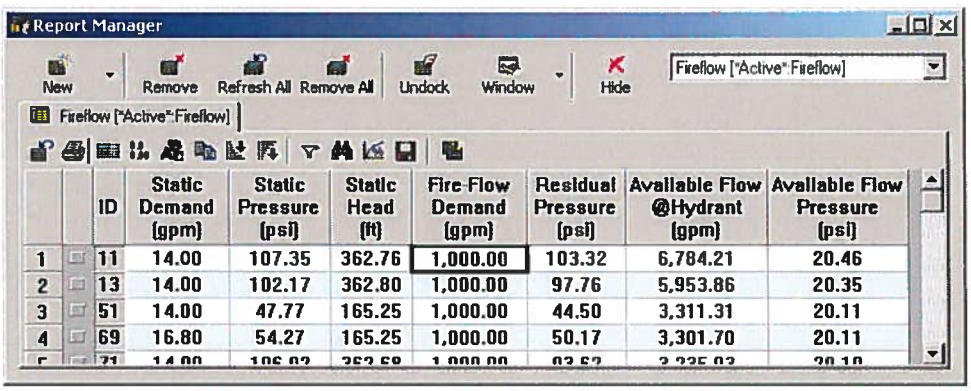
Fireflow

The Fire Flow report is used to display, query, and report fire flow simulation results for all fire flow nodes (active junction nodes assigned a fire flow demand at the time the fire flow simulation was run). Two types of fireflow reports are generated for each fireflow simulation.

The first report is a standard fire flow simulation. This report includes static demand, static pressure, fire flow demand, residual pressure, available flow at the hydrant and pressure at the available flow. The second report is the Fireflow design report. The contents of this report are different, depending whether the Minimum Design Pressure at the bottom of the Fireflow tab of the Run Manager dialog box is checked or not checked. Click here to learn more about the Fireflow Design Report.

Fireflow Report

The following variables are displayed in the Standard Fireflow Report in the Output Report Manager for all junction nodes that have been assigned fire demands. The Fireflow report contains the same information, regardless if the Minimum Design Pressure design flow calculation is checked or not:



	ID	Static Demand (gpm)	Static Pressure (psi)	Static Head (ft)	Fire Flow Demand (gpm)	Residual Pressure (psi)	Available Flow @Hydrant (gpm)	Available Flow Pressure (psi)
1	11	14.00	107.35	362.76	1,000.00	103.32	6,784.21	20.46
2	13	14.00	102.17	362.80	1,000.00	97.76	5,953.86	20.35
3	51	14.00	47.77	165.25	1,000.00	44.50	3,311.31	20.11
4	69	16.80	54.27	165.25	1,000.00	50.17	3,301.70	20.11
5	71	14.00	106.02	362.68	1,000.00	93.62	3,235.02	20.10

1. **ID** - Junction node identifier.

2. **Static Demand** - The nodal demand at the fire flow simulation timestep. This value corresponds to the baseline demand at the specified timestep.

3. **Static Pressure** - The nodal calculated pressure for the static demand at the fire flow simulation timestep.

4. **Fire Flow Demand** - The user specified fire flow demand at the current node when the hydrant is flowing.

5. **Residual Pressure** - The residual pressure at the current junction which includes both the fire flow demand plus the static demand. This pressure value assumes that only the current hydrant (node) is subjected to the assigned fire demand and that no other fire demands are considered in generating this value.

6. **Available Flow @ Hydrant** - The maximum flow that is available while maintaining the user-specified minimum residual pressure at the current node, assuming that only this hydrant (node) is flowing.

7. **Available Flow Pressure** - Residual pressure calculated for the available flow at the current hydrant (node). This value should equal the residual pressure specified by the user.

Fireflow Design Report

The fire flow design report will generate a report that determines the minimum pressures in the critical node searching range and returns a Design Flow to be used as a maximum available fire flow in order to maintain minimum pressures in the distribution system.

Report Manager

New | Remove | Refresh All | Remove All | Undock | Window | Hide | Fireflow Design ["Active"-Fireflow]

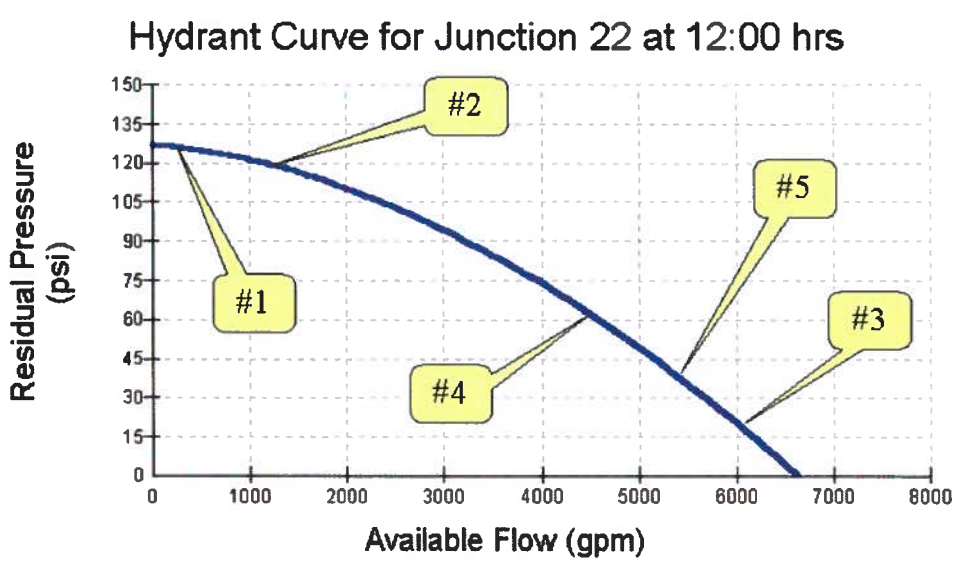
Fireflow Design ["Active"-Fireflow]

	ID	Total Demand (gpm)	Critical Node 1 ID	Critical Node 1 Pressure	Critical Node 1 Head (ft)	Adjusted Fire-Flow (gpm)	Available Flow @Hydrant (gpm)	Critical Node 2 ID	Critical Node 2 Pressure (psi)	Critcal Node 2 Head (ft)	Adjusted Available Flow (gpm)	Design Flow (gpm)
1	11	1,014.00	51	47.77	165.25		6,784.21	11	20.46	162.22	6,804.92	6,804.92
2	13	1,014.00	51	47.77	165.25		5,953.86	13	20.35	173.97	5,968.57	5,968.57
3	51	1,014.00	51	44.50	157.69	3,313.18	3,311.31	51	20.11	101.41	3,313.15	3,313.15
4	69	1,016.80	51	44.74	158.24	3,352.45	3,301.70	69	20.11	86.41	3,303.42	3,303.42
5	71	1,014.00	51	47.77	165.25		3,235.03	71	20.10	164.40	3,266.86	3,266.86
6	73	1,014.00	73	32.83	190.76	1,106.21	1,106.13	73	20.01	161.18	1,106.21	1,106.21
7	75	1,014.00	51	47.77	165.25		3,577.45	75	20.13	166.45	3,580.46	3,580.46

1. **ID** - Junction node identifier.
2. **Total Demand** - The nodal demand at the fire flow simulation timestep. This value corresponds to the baseline demand for the selected timestep plus the assigned fireflow demand.
3. **Critical Node 1 ID** - The junction with the lowest pressure within our Critical Node Searching Range assigned by the user under the fireflow tab of the Run Manager.
4. **Critical Node 1 Pressure** - The pressure of the Critical Node when the Total Demand is flowing from the fire node.
5. **Critical Node 1 Head** - The pressure head of the Critical Node when the Total Demand is flowing from the fire node.
6. **Adjusted Fireflow** - The hydrant flow required to reduce Critical Node 1 to the *Minimum Design Pressure* value assigned under the fireflow tab of the Run Manager. For example, if the minimum design pressure was set at 20 psi, then this is the flow value generated from the fire node to achieve 20 psi at Critical Node 1.
7. **Available Flow @ Hydrant** - The flow required to get the selected fire node to the specified *Residual Pressure.*
8. **Critical Node 2 ID** - The junction with the lowest pressure within the Critical Node Searching Range when the Available Flow at the fire node is applied. In other words, when the available flow is delivered from the selected fire node, this junction has the lowest pressure out of all the values in the Critical Node Searching Range.
9. **Critical Node 2 Pressure** - The pressure of Critical Node 2 when the Available Flow is flowing from selected fire node.
10. **Critical Node 2 Head** - The pressure head of the Critical Node when the Total Demand is flowing from the fire node.
11. **Adjusted Available Flow** - The hydrant flow required to achieve the *Minimum Design Pressure* at Critical Node 2.
12. **Design Flow** - The final adjusted flow at the hydrant to maintain the specified minimum design pressure at ALL locations within the Critical Node Searching Range. This final flow is the least of the two Flow Conditions. Therefore, it is the flow which recognizes the more sensitive of the two Critical Nodes to help make recommendations to reflect actual system capabilities and expectations.

Fireflows Explained

While the contents of a fireflow report may appear confusing, one need only to create a Hydrant Curve of a junction node to fully understand what the reports are telling us. Junction 22 was used to make the hydrant curve below. We will use this graph and the values shown in the tables above to illustrate the results from the fireflow output reports.



1. **Static Demand/Static Pressure** - This point represent the static demand and static pressure (200 gpm, 126.72 psi)
2. **Fire Demand/Fire Pressure** - This point represents the static demand plus fire flow demand and the resulting pressure (1,200 gpm, 120 psi).

3. **Available Flow/Available Pressure** - This point represents the available flow from the hydrant to generate the *Residual Pressure* (6,013 gpm, 20 psi).

4. **Adjusted Fire Flow/Design Pressure at Critical Node 1** - This point represents the maximum allowable flow to exit Junction 22 in order to achieve the *Minimum Design Pressure* at Critical Node 1 (4,494.77 gpm to reach 20 psi at Junction 13).

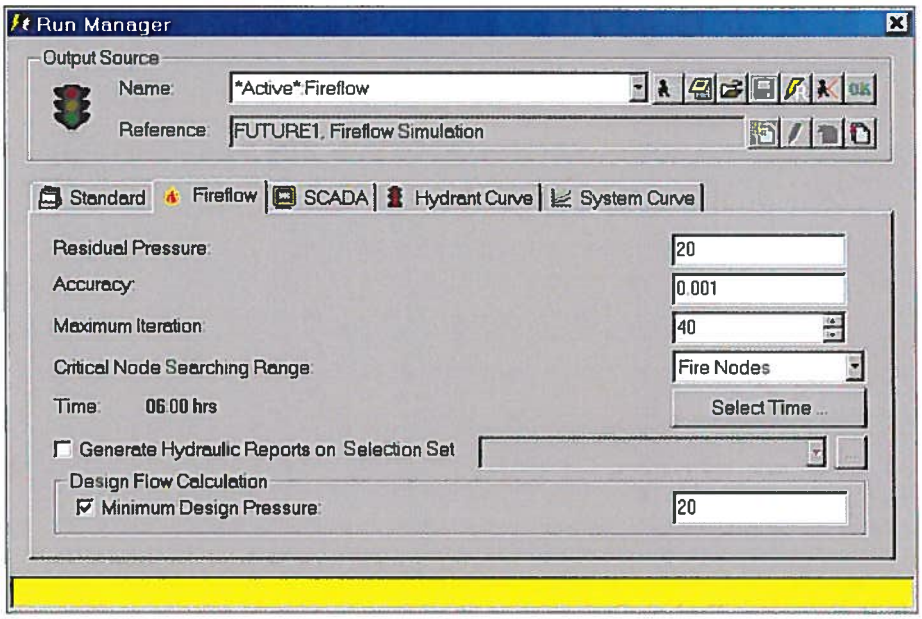
Note: At this juncture in the Fireflow Design Report, the fire node is then allowed to flow at the *Available Flow @ Hydrant* value. When this value is applied, the simulation will now look for the worst case pressure in the Critical Node Searching Range. This worst case node is referred to as Critical Node 2.

5. **Adjusted Available Flow/Design Pressure at Critical Node 2** - This point represents the maximum allowable flow to exit Junction 22 in order to maintain the *Minimum Design Pressure* at Critical Node 2 (5,419.42 gpm to reach 20 psi at Junction 23).

In final, point #4 is ultimately the *Design Flow* as it is the least flow value of all considered residual pressures. This is the value that an engineer would provide to a local fire department by saying this is the maximum (theoretical) flow possible at the subject junction in order to maintain 20 psi at all times in the distribution system.

Hydraulic Reports on Selection Sets

Hydraulic reports for various user specified data elements including pipes, pumps, valves, junctions, tanks and reservoirs may also be generated while conducting a Fire Flow analysis in H2OMAP. This capability is important to review/evaluate system hydraulic performance (e.g., pipe velocities, junction pressures, etc.) under fire flow conditions. In order to generate such reports check the Generate Hydraulic Reports on Selection Set option. Using the Browse button select the elements graphically on your Map that you want to create a hydraulic report for. Click here to learn more about the element selection process.

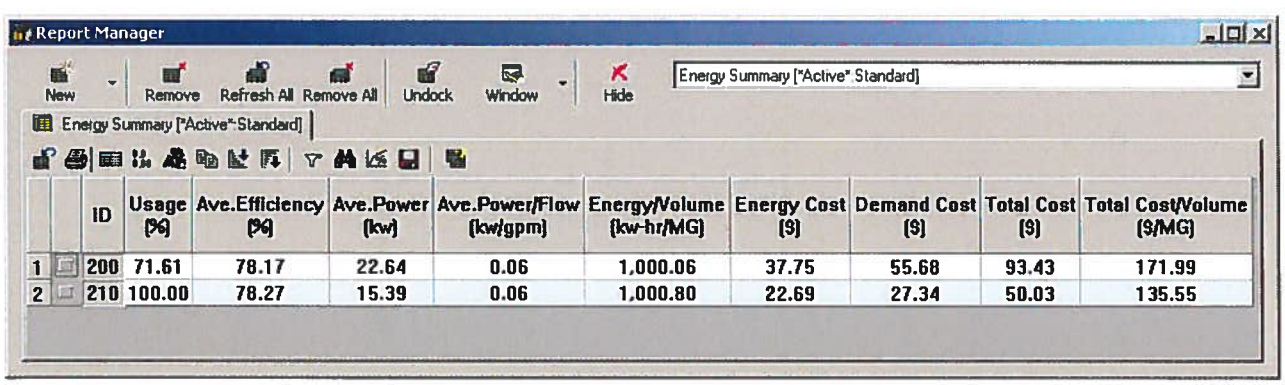


You may select any element type from your map for inclusion in the hydraulic report. These elements should be included in the Selection Set. For each fire flow junction node, H2OMAP will calculate and present hydraulic results for each element included in the Selection Set. The hydraulic results are available from the Output Report Manager.

Energy Summary

Displays summary results of an energy cost analysis for the simulation period. One record for each pump assigned energy data prior to running the energy management simulation will be displayed in the Energy Summary report. Results displayed for each pump include average pump usage (as a percentage of time used over the simulation duration), average efficiency, average power, average power per unit, energy vs. volume ratio, total energy consumption cost, total demand cost, total operating cost, and total cost per unit volume.

The following summary information is displayed on the Energy Summary Report in the Output Report Manager for all pumps assigned energy data:



	ID	Usage (%)	Ave.Efficiency (%)	Ave.Power (kw)	Ave.Power/Flow (kw/gpm)	Energy/Volume (kw-hr/MG)	Energy Cost ($)	Demand Cost ($)	Total Cost ($)	Total Cost/Volume ($/MG)
1	200	71.61	78.17	22.64	0.06	1,000.06	37.75	55.68	93.43	171.99
2	210	100.00	78.27	15.39	0.06	1,000.80	22.69	27.34	50.03	135.55

1. **ID** - Pump identifier.

2. **Percent Pump Usage** - Percentage of time the pump is used (turned on) during the simulation period, percent (%).

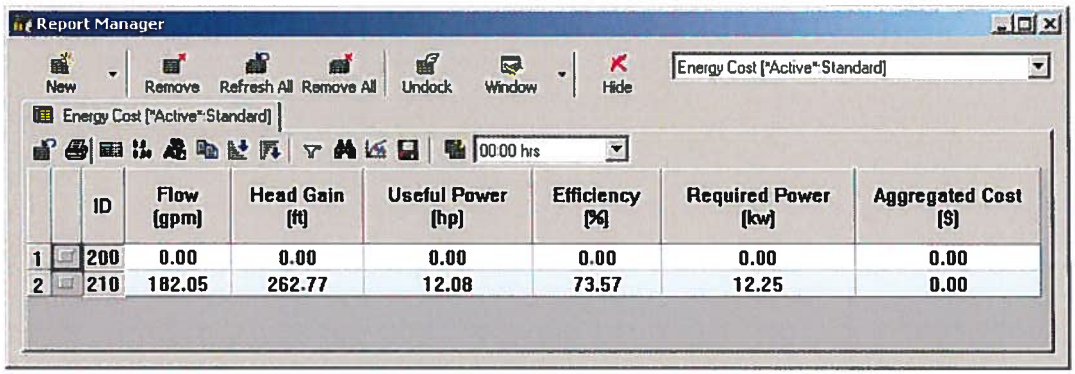
3. **Average Efficiency** - Average active (when pump is on) pump efficiency for the simulation period, percent (%).

4. **Average Power** - Average active (when the pump is on) pump required power for the simulation period, kW.
5. **Average Power/Unit Flow** - Average required power per unit of flow rate pumped for the simulation period, kW/flow unit.
6. **Average Energy/Unit Volume** - Average energy consumed per unit volume of water pumped for the simulation period, kW-hr/MG (or kW-hr/ML).
7. **Energy Cost** - Total cumulative pump energy operating cost reported for the simulation period, $ (or other cost unit).
8. **Demand Cost** - Total demand (charge) cost for the simulation period, $ (or other cost unit).
9. **Total Cost** - Sum of energy and demand cost, $ (or other cost unit).
10. **Total Cost per Unit Volume** - Total pumping cost per unit flow volume pumped for the simulation period, $/MG ($/ML).

Energy Cost

Displays results of an energy cost simulation for any time period. The Energy Cost report displays one record for each pump assigned energy data prior to running the energy management simulation. Results displayed for each pump include pump flow, head, useful power, efficiency, required power, and total operating cost up to each simulation time period.

The following summary information is displayed on the Energy Cost Report in the Output Report Manager for all pumps assigned energy data:

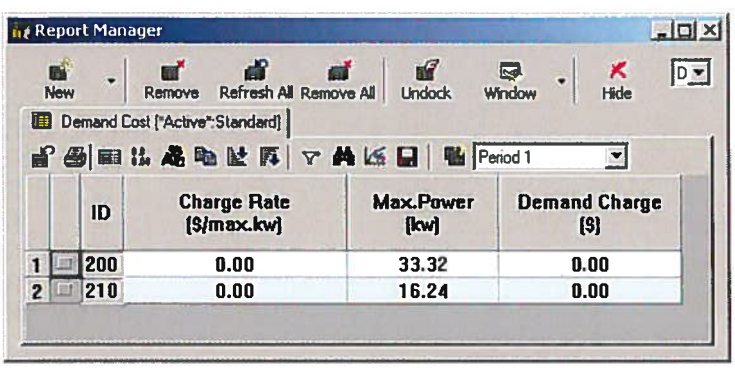


	ID	Flow (gpm)	Head Gain (ft)	Useful Power (hp)	Efficiency (%)	Required Power (kw)	Aggregated Cost ($)
1	200	0.00	0.00	0.00	0.00	0.00	0.00
2	210	182.05	262.77	12.08	73.57	12.25	0.00

1. **ID** - Pump identifier.
2. **Flow** - Pump discharge flow at the current simulation time step, flow units.
3. **Head** - Pump discharge head at the current simulation time step, ft (m).
4. **Useful Power** - Pump calculated useful power at the current simulation time step, hp (kW)
5. **Efficiency** - Pump efficiency at the current simulation time step, percent (%).
6. **Required Power** - Required pump power at the current simulation time step, kW.
7. **Aggregated Cost** - Cumulative pump energy consumption cost reported at the current simulation time step, $ (or other cost unit).

Demand Cost Report

The following variables are displayed on the Demand Cost Report in the Output Report Manager for all pumps assigned energy data and specifically, demand charge patterns:



	ID	Charge Rate ($/max.kw)	Max.Power (kw)	Demand Charge ($)
1	200	0.00	33.32	0.00
2	210	0.00	16.24	0.00

1. **Charge Rate** - The demand charge rate for each billing period based on peak power usage, $ or other cost unit per max. kW.
2. **Maximum Power** - The maximum power used by the pump during each billing period, kW.
3. **Demand Rate** - The demand charge applied for the billing period, $ (or other cost unit).

Multi-Species Reports

Multi-Species water quality model report information will be appended, like any other water quality report, to the element hydraulic data tables.

Report Manager

Junction Report ["Active":Standard]

08:00 hrs

	ID	HCO3 (MOL/L)	H2CO3 (MOL/L)	TOC (MG/L)	CNH3 (MG/L)	CNH2CL (MG/L)
1	10	0.00	0.000	3.00	0.00	2.58
2	101	0.00	0.000	3.00	0.11	2.23
3	103	0.00	0.000	3.00	0.13	2.18
4	105	0.00	0.000	3.00	0.13	2.17
5	107	0.00	0.000	3.00	0.17	2.05
6	109	0.00	0.000	3.00	0.17	2.05
7	111	0.00	0.000	3.00	0.20	1.96
8	113	0.00	0.000	3.00	0.24	1.85
9	115	0.00	0.000	3.00	0.23	1.86
10	117	0.00	0.000	3.00	0.19	2.00
11	119	0.00	0.000	1.61	0.22	1.90

Multi-Species water quality will be reported on the species defined in the Multi-Species Model Dialog Box - Species Tab and the report will vary according to the number and type of species defined. For additional information see the Multi-Species Water Quality Modeling Overview.

Sustainability Reports

Sustainability Reports: A Sustainability analysis is conducted in conjunction with the Standard EPS Analysis. Hence in addition to all the standard report types, Sustainability Analysis provides the following additional report types. See: Sustainability Modeling

Junction Sustainability Report

Junction Sustainability Report ["Active":Standard]

00:00 hrs

	ID	Demand (gpm)	Pressure (psi)	Daily Energy Loss (kw-hr/d)	Daily Carbon Footprint (lb-CO2/d)	Total Carbon Footprint (lb-CO2)	Min.Service Daily Energy Loss (kw-hr/d)	Excess Daily Energy Loss (kw-hr/d)	Water Efficiency (%)
1	1	0.00	2.15	0.00	0.00	0.00	0.00	0.00	0.00
2	11	14.00	107.35	15.68	8.20	0.00	5.84	9.83	37.26
3	13	14.00	102.17	14.92	7.80	0.00	5.84	9.08	39.15
4	15	25.20	106.14	27.90	14.59	0.00	10.51	17.38	37.69
5	17	56.00	92.51	54.03	28.26	0.00	23.36	30.67	43.24
6	19	84.00	104.19	91.28	47.74	0.00	35.05	56.24	38.39
7	21	14.00	107.19	15.65	8.19	0.00	5.84	9.81	37.32
8	23	14.00	105.91	15.47	8.09	0.00	5.84	9.62	37.77
9	25	14.00	103.73	15.15	7.92	0.00	5.84	9.31	38.56
10	27	14.00	105.08	15.34	8.02	0.00	5.84	9.50	38.07

- **ID** - Junction ID
- **Demand** - Junction Demand.
- **Pressure** - Junction Pressure.
- **Daily Energy Loss** - Daily energy loss in kiloWatt-hours per day.
- **Daily Carbon Footprint** - Daily Carbon Footprint in pounds or kilograms of CO_2 per day
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.
- **Minimum Service Daily Energy Loss** - Daily energy loss at minimum daily service pressure requirements in kiloWatt-hours per day.
- **Excess Daily Energy Loss** - Excess daily energy loss above minimum daily service pressure requirements in kiloWatt-hours per day.
- **Water Efficiency** - Percent Water Efficiency

Pipe Sustainability Report

Pipe Sustainability Report ["Active":Standard]

00:00 hrs

	ID	Flow (gpm)	Headloss (ft)	Daily Energy Loss (kw-hr/d)	Daily Carbon Footprint (lb-CO2/d)	Total Carbon Footprint (lb-CO2)
1	10	37.87	0.02	0.00	0.00	0.00
2	100	-90.89	0.16	0.07	0.03	0.00
3	102	76.89	0.04	0.02	0.01	0.00
4	104	524.95	0.50	1.20	0.63	0.00
5	12	38.46	0.01	0.00	0.00	0.00
6	14	24.46	0.01	0.00	0.00	0.00
7	16	-14.59	0.00	0.00	0.00	0.00
8	18	145.01	0.29	0.19	0.10	0.00

- **ID** - Pipe ID
- **Flow** - Pipe Flow.
- **Headloss** - Pipe Headloss.
- **Daily Energy Loss** - Daily rate of energy Loss in kiloWatt-hours per day.
- **Daily Carbon Footprint** - Daily rate of Carbon Footprint in pounds or kilograms of CO_2 per day
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.

Pump Sustainability Report

Pump Sustainability Report [*Active*:Standard]

00:00 hrs

	ID	Flow (gpm)	Head Gain (ft)	Daily Energy Loss (kw-hr/d)	Daily Carbon Footprint (lb-CO2/d)	Total Carbon Footprint (lb-CO2)
1	200	0.00	0.00	0.00	0.00	0.00
2	210	182.05	262.77	216.20	8.65	0.00

- **ID** - Pump ID
- **Flow** - Pump Flow.
- **Head Gain** - Pump Head Gain.
- **Daily Energy Loss** - Daily energy Loss in kiloWatt-hours per day.
- **Daily Carbon Footprint** - Daily Carbon Footprint in pounds or kilograms of CO_2 per day
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.

Valve Sustainability Report

Valve Sustainability Report [*Active*:Standard]

00:00 hrs

	ID	Flow (gpm)	Headloss (ft)	Daily Energy Loss (kw-hr/d)	Daily Carbon Footprint (lb-CO2/d)	Total Carbon Footprint (lb-CO2)
1	300	145.60	196.29	129.16	67.55	0.00

- **ID** - Valve ID
- **Flow** - Valve Flow.
- **Headloss** - Valve Headloss.
- **Daily Energy Loss** - Daily energy Loss in kiloWatt-hours per day.
- **Daily Carbon Footprint** - Daily Carbon Footprint in pounds or kilograms of CO_2 per day
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.

System Sustainability Report

System Sustainability Report [*Active*:Standard]

00:00 hrs

	ID	Daily Energy Loss (kw-hr/d)	Unit Volume Energy Loss (kw-hr/ft3)	Daily Carbon Footprint (lb-CO2/d)	Total Carbon Footprint (lb-CO2)	Unit Volume Carbon Footprint (lb-CO2/ft3)
1	All Junctions	692.69	0.01	362.28	0.00	0.00
2	All Pipes	4.37	0.00	2.29	0.00	0.00
3	All Pumps	216.20	0.01	8.65	0.00	0.00
4	All Valves	129.16	0.00	67.55	0.00	0.00

- **ID** - Element Type
- **Daily Energy Loss** - Daily rate of energy Loss in kiloWatt-hours per day.
- **Unit Volume Energy Loss** - Unit Volume Energy Loss in kiloWatt-hours per unit flow volume.
- **Daily Carbon Footprint** - Daily rate of Carbon Footprint in pounds or kilograms of CO_2 per day
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.
- **Unit Volume Carbon Footprint** - Unit Volume Carbon Footprint in pounds or kilograms of CO_2 per unit.

Junction Sustainability Summary Report

Junction Sustainability Summary Report ["Active":Standard]

	ID	Daily Energy Loss (kw-hr/d)	Unit Volume Energy Loss (kw-hr/ft3)	Total Carbon Footprint (kgCO2)	Daily Carbon Footprint (kgCO2/d)	Unit Volume Carbon Footprint (kgCO2/ft3)
1	1	0.00	0.00	0.00	0.00	0.00
2	11	15.71	0.01	7.88	7.88	0.00
3	13	14.90	0.01	7.48	7.48	0.00
4	15	27.91	0.01	14.01	14.01	0.00
5	17	53.53	0.00	26.86	26.86	0.00
6	19	91.28	0.01	45.81	45.81	0.00
7	21	15.68	0.01	7.87	7.87	0.00
8	23	15.49	0.01	7.77	7.77	0.00

- **ID** - Junction ID
- **Daily Energy Loss** - Daily rate of energy Loss in kiloWatt-hours per day.
- **Unit Volume Energy Loss** - Unit Volume Energy Loss in kiloWatt-hours per unit flow volume.
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.
- **Daily Carbon Footprint** - Daily rate of Carbon Footprint in pounds or kilograms of CO_2 per day
- **Unit Volume Carbon Footprint** - Unit Volume Carbon Footprint in pounds or kilograms of CO_2 per unit flow volume.

Pipe Sustainability Summary Report

Pipe Sustainability Summary Report ["Active":Standard]

	ID	Daily Energy Loss (kw-hr/d)	Unit Volume Energy Loss (kw-hr/ft3)	Total Carbon Footprint (lb-CO2)	Daily Carbon Footprint (lb-CO2/d)	Unit Volume Carbon Footprint	Material Carbon Footprint (lb-CO2)
1	10	0.00	0.00	0.00	0.00	0.00	20,999.00
2	100	0.08	0.00	0.04	0.04	0.00	34,671.12
3	102	0.03	0.00	0.02	0.02	0.00	12,903.00
4	104	0.93	0.00	0.49	0.49	0.00	10,911.25
5	12	0.09	0.00	0.04	0.04	0.00	13,166.12
6	14	0.11	0.00	0.06	0.06	0.00	42,467.60
7	16	0.06	0.00	0.03	0.03	0.00	13,672.13

- **ID** - Pipe ID
- **Daily energy Loss** - Daily rate of energy Loss in kiloWatt-hours per day.
- **Unit Volume Energy Loss** - Unit Volume Energy Loss in kiloWatt-hours per unit flow volume.
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.
- **Daily Carbon Footprint** - Daily rate of Carbon Footprint in pounds or kilograms of CO_2 per day
- **Unit Volume Carbon Footprint** - Unit Volume Carbon Footprint in pounds or kilograms of CO_2 per unit flow volume.
- **Material Carbon Footprint** - Material Carbon Footprint in pounds or kilograms of CO_2.

Pump Sustainability Summary Report

Pump Sustainability Summary Report ["Active":Standard]

	ID	Daily Energy Loss (kw-hr/d)	Unit Volume Energy Loss (kw-hr/ft3)	Total Carbon Footprint (kgCO2)	Daily Carbon Footprint (kgCO2/d)	Unit Volume Carbon Footprint (kgCO2/ft3)
1	200	445.53	0.01	221.81	221.81	0.00
2	210	300.05	0.01	289.34	289.34	0.01

- **ID** - Pump ID
- **Daily Energy Loss** - Daily rate of energy Loss in kiloWatt-hours per day.
- **Unit Volume Energy Loss** - Unit Volume Energy Loss in kiloWatt-hours per unit flow volume.
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.
- **Daily Carbon Footprint** - Daily rate of Carbon Footprint in pounds or kilograms of CO_2 per day
- **Unit Volume Carbon Footprint** - Unit Volume Carbon Footprint in pounds or kilograms of CO_2 per unit flow volume.

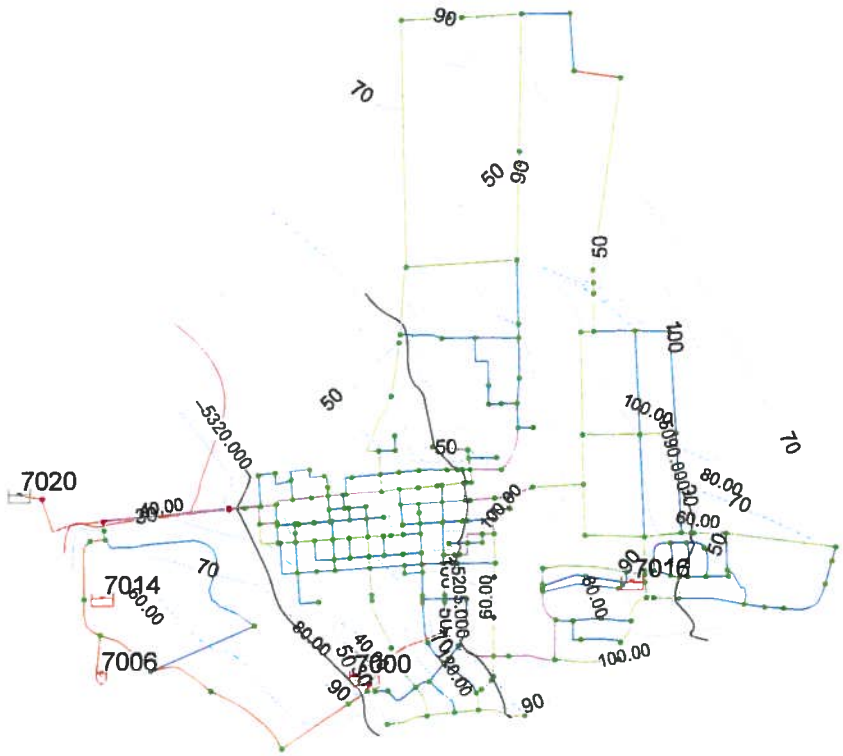
Valve Sustainability Summary Report

Valve Sustainability Summary Report ["Active" Standard]

	ID	Daily Energy Loss (kw-hr/d)	Unit Volume Energy Loss (kw-hr/ft3)	Total Carbon Footprint (kgCO2)	Daily Carbon Footprint (kgCO2/d)	Unit Volume Carbon Footprint (kgCO2/ft3)
1	300	127.38	0.00	63.90	63.90	0.00

- **ID** - Valve ID
- **Daily Energy Loss** - Daily rate of energy Loss in kiloWatt-hours per day.
- **Unit Volume Energy Loss** - Unit Volume Energy Loss in kiloWatt-hours per unit flow volume.
- **Total Carbon Footprint** - Total Carbon Footprint in pounds or kilograms of CO_2.
- **Daily Carbon Footprint** - Daily rate of Carbon Footprint in pounds or kilograms of CO_2 per day
- **Unit Volume Carbon Footprint** - Unit Volume Carbon Footprint in pounds or kilograms of CO_2 per unit flow volume.

RP1 SUPPLEMENTAL 6FEB12 - SYSTEM WITH GCSSF AS EMERGENCY - PERFORMANCE WITHOUT (1) EAST WELL



JUNCTION (VALUE)
- Less than 40
- Greater than 40

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (VALUE)
- Less than 4
- 4~5
- 5~7
- 7~9
- 9~11
- 11~13
- 13
- Greater than 13

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

18 (Demand7) (VALUE)
- 20
- 24
- 28
- 32
- 36
- 40

12 (Elevation) (VALUE)
- 5090
- 5205
- 5320

14 (Min. Pressure at 28:00 hrs) (VALL
- 30
- 50
- 70
- 90
- 100

Prepared By: RIEDESEL ENGINERING, INC.

Date: Wednesday, February 08, 2012

4 APPENDIX 2

4.1 HYDRAULIC MODEL SIMUALTION RESULTS

4.1.1 Matrix of Options

4.1.2 Recommended Project 1 Retaining Garden Creek Slow Sand Filter

4.1.3 Recommended Project 1 without Garden Creek Slow Sand Filter – Modifications for East Well Source Failure

4.1.4 Recommended Project 1 without Garden Creek Slow Sand Filter – Modifications for West Well Source Failure

CHALLIS WATER SYSTEM FACILITY PLAN – FEBRUARY 2012
Supplement Detailing System Recommended Project Response to Meet IDAPA 58.01.08.501.17 – Groundwater Redundancy

REVIEW #1

1. The City will install a new well in both the Garden Creek Aquifer System (GCAS) and the Salmon Aquifer System (SAS)
2. The **retain** the Garden Creek Slow Sand Filter operational as an emergency source

SYSTEM	PEAK DAY	PEAK HR.	LOSS OF A SOURCE IN GCAS	SYSTEM CHANGES	LOSS OF A SOURCE IN SAS	SYSTEM CHANGES
RP1	2.57MG	2,700 GPM	Total water production – 2,650 GPM: 950 GPM from GCSSF, 500 GPM from remaining West Well, and 1,200 GPM from both SAS wells.	The system meets IDAPA 58.01.08.501.17. No changes.	Total water production – 2,650 GPM: 950 GPM from GCSSF, 1,100 GPM both West Wells, and 600 GPM from remaining SAS wells.	The system meets IDAPA 58.01.08.501.17. No changes.

REVIEW #2

1. The City will install a new well in both the Garden Creek Aquifer System (GCAS) and the Salmon Aquifer System (SAS)
2. The City will **abandon** the Garden Creek Slow Sand Filter

SYSTEM	PEAK DAY	PEAK HR.	LOSS OF A SOURCE IN GCAS	SYSTEM CHANGES	LOSS OF A SOURCE IN SAS	SYSTEM CHANGES
RP1	2.57MG	2,700 GPM	Total water production – 2,650 GPM: 500 GPM from remaining West Well, and 1,200 GPM from both SAS wells.	Groundwater sources alone cannot meet peak hour flow. System must rely on groundwater sources and storage. Upper and Mid Cyprus pressure zones rely on the output of the West Wells. With one source down, the system requires either a larger reservoir or a booster at East Reservoir to supply water from SAS to West Reservoir to make up the deficit. Minimum upgraded reservoir size is about 1.5 MG with total system storage at 1.7MG. Estimated construction cost $1.3M. Minimum booster to supply West Reservoir from East Reservoir is 90 HP. The pumping plant would require (2) pumps, standby electrical supply, building, controls, etc. Estimated construction cost $0.5M. Does not include O&M costs.	Total water production – 2,650 GPM: 1,100 GPM both West Wells, and 600 GPM from remaining SAS wells.	Groundwater sources alone cannot meet peak hour flow. System must rely on groundwater sources and storage. Existing storage (0.4MG) is not sufficient. With one source down, the system requires either a larger reservoir or an additional SAS source. West reservoir needs to be increased to 0.6MG. Total system storage 1.0MG. Estimated construction cost $0.4M. Construction cost for 3rd SAS source is about $0.5M. Does not include O&M costs.

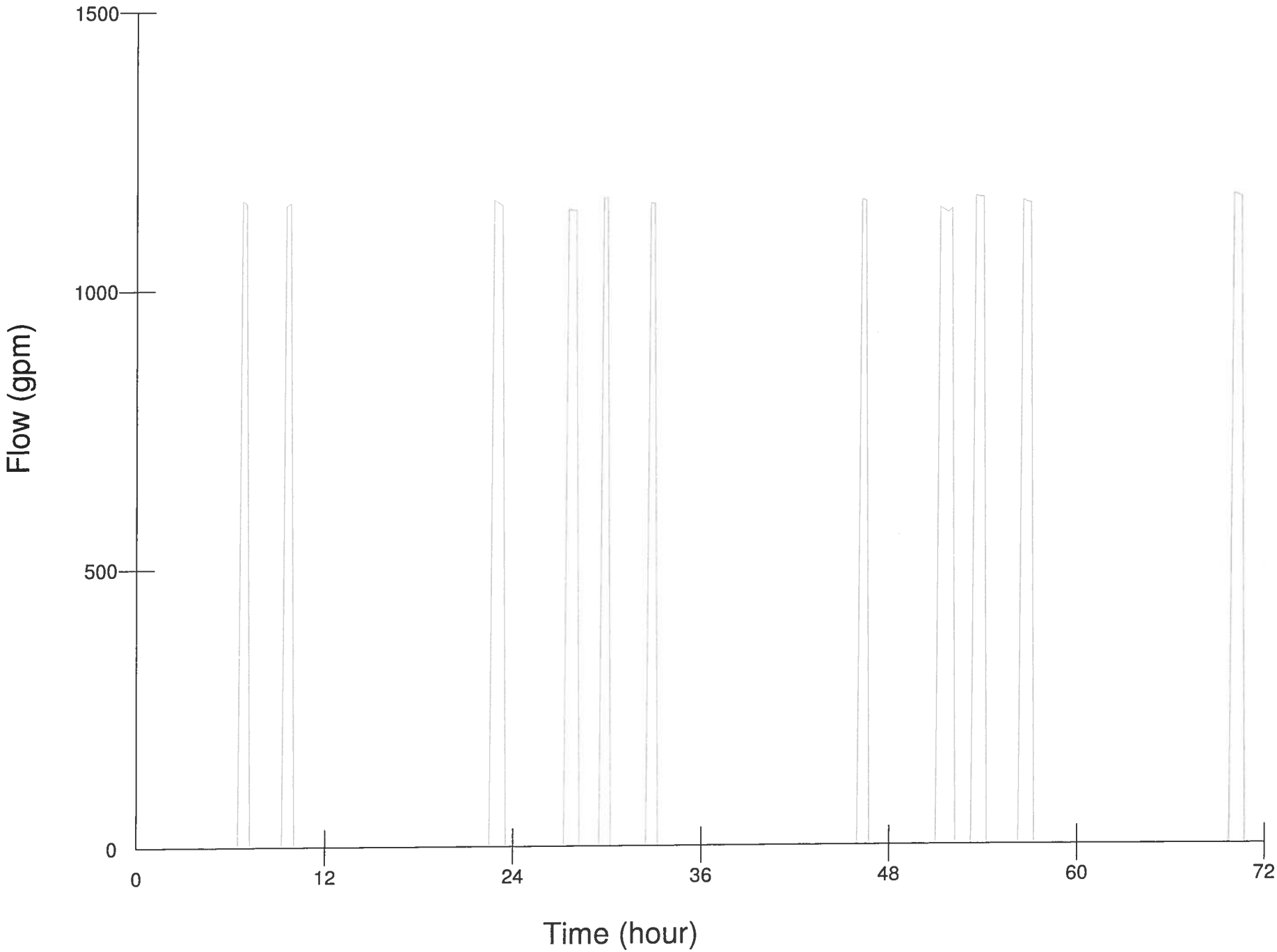
REVIEW #3 – OPTIONS

1. Non-Concurrent Failure – The ability to handle a water source loss in either the Garden Creek Aquifer System (GCAS) or the Salmon Aquifer System (SAS). Since one cannot predict which source may fail, the overall water system needs to perform under either condition.

OPTIONS	DESCRIPTION	COMPONENTS	OPERATION AND MAINTENANCE	ESTIMATED COSTS
1	Retain GCSSF	Existing System. New diversion to allow restoration of Garden Creek and participation of conservation service in drilling a new Garden Creek Well.	1. Routine and periodic testing 2. Routine and periodic filter cleaning 3. Routine and periodic maintenance of disinfection system	No additional cost.
2	Non-Concurrent Failure without GCSSF	Expansion of West Reservoir to 1.5MG	1. Adjust operation to maintain tank turn over (freshness) 2. Routine and periodic maintenance of level controls and other equipment 3. Site security	Estimated $1.3M construction cost
3	Non-Concurrent Failure without GCSSF	Booster duplex 90HP booster station at East Reservoir and increase West Reservoir storage to 0.6MG. Protects against a failure of either a West Well or an East Well.	1. Demand and electrical costs for pumps and HVAC equipment 2. Pump, valve, and control maintenance 3. Routine and periodic maintenance of level controls and other equipment 4. Site security	Estimated $0.4M tank construction + $0.5M booster station construction. Total ~$1.0M.
4	Non-Concurrent Failure without GCSSF	Booster duplex 90HP booster station at East Reservoir and 3rd well in SAS. Protects against a failure of either a West Well or a East Well	1. Demand and electrical costs for pumps and HVAC equipment 2. Pump, valve, and control maintenance 3. Routine and periodic maintenance of level controls and other equipment 5. Site security	Estimated $0.5M booster station construction + $0.5M 3rd East Well. Total ~$1.0M.

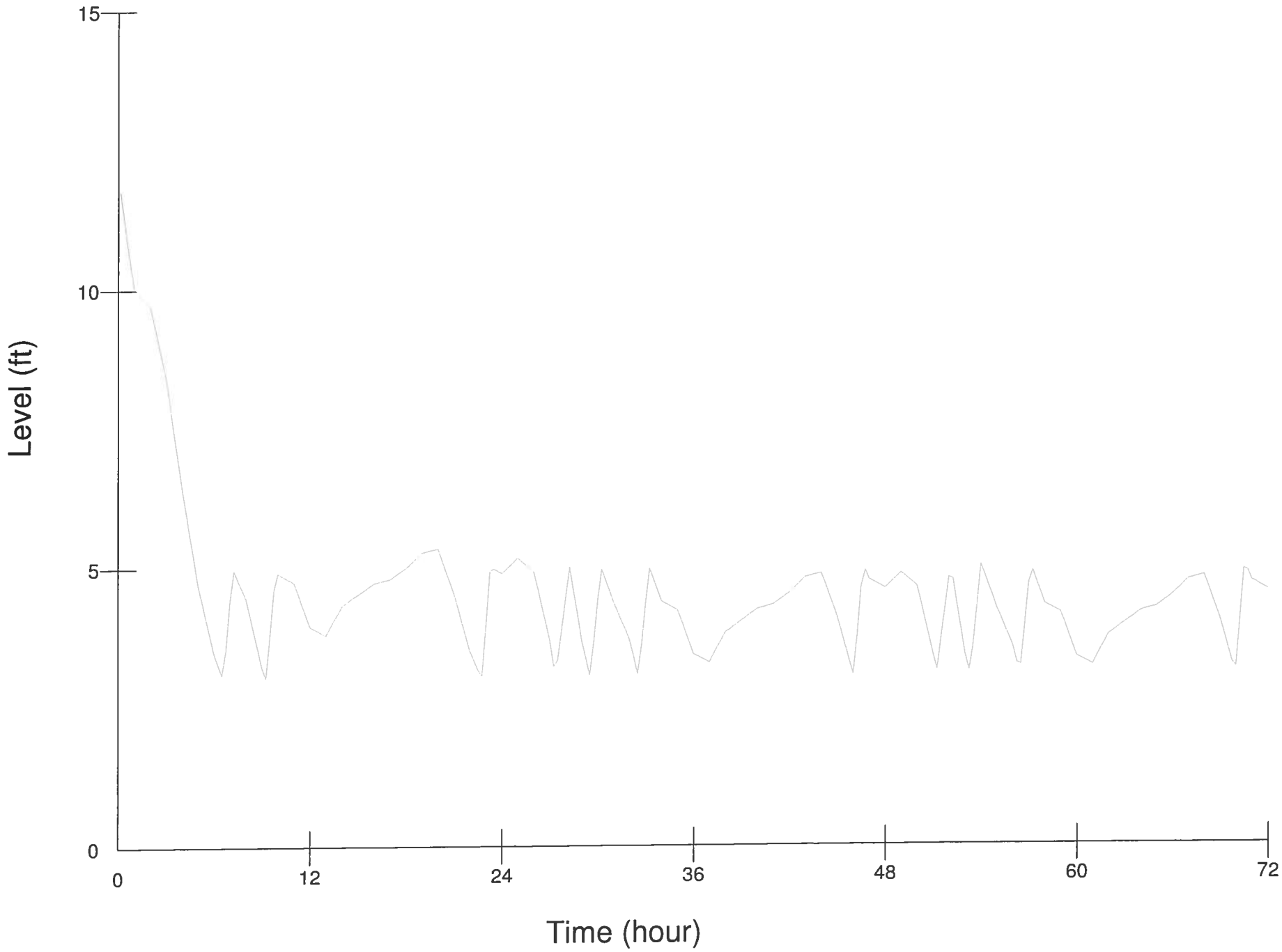
Pipe 723 [RUN10]

EXISTING FILL VALVE AT EAST RESERVOIR. OPERATION WITH LOSS OF 1 EAST WELL.



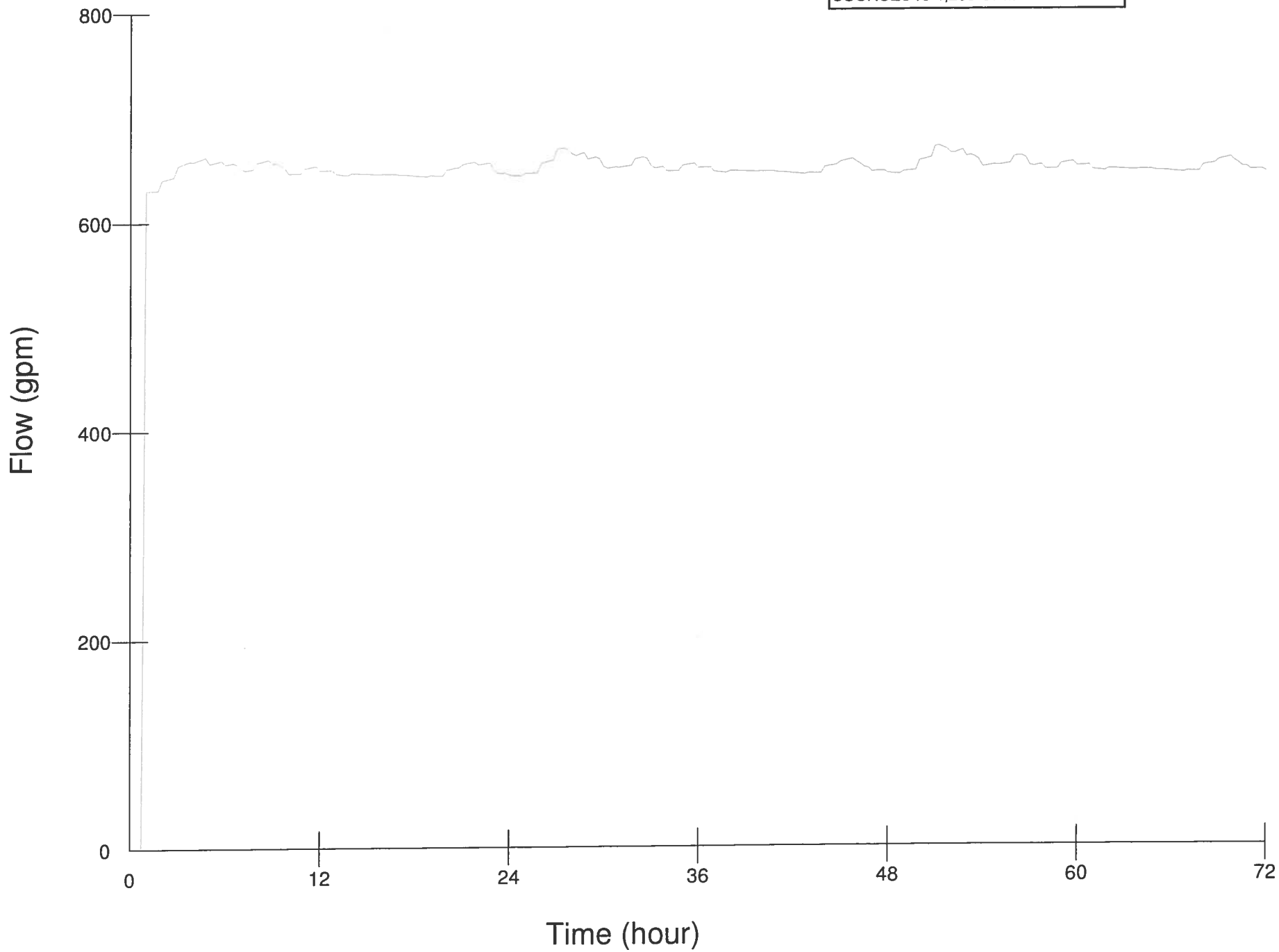
Tank 7000 [RUN10]

EAST RESERVOIR RESPONSE
WITHOUT 1 EAST WELL



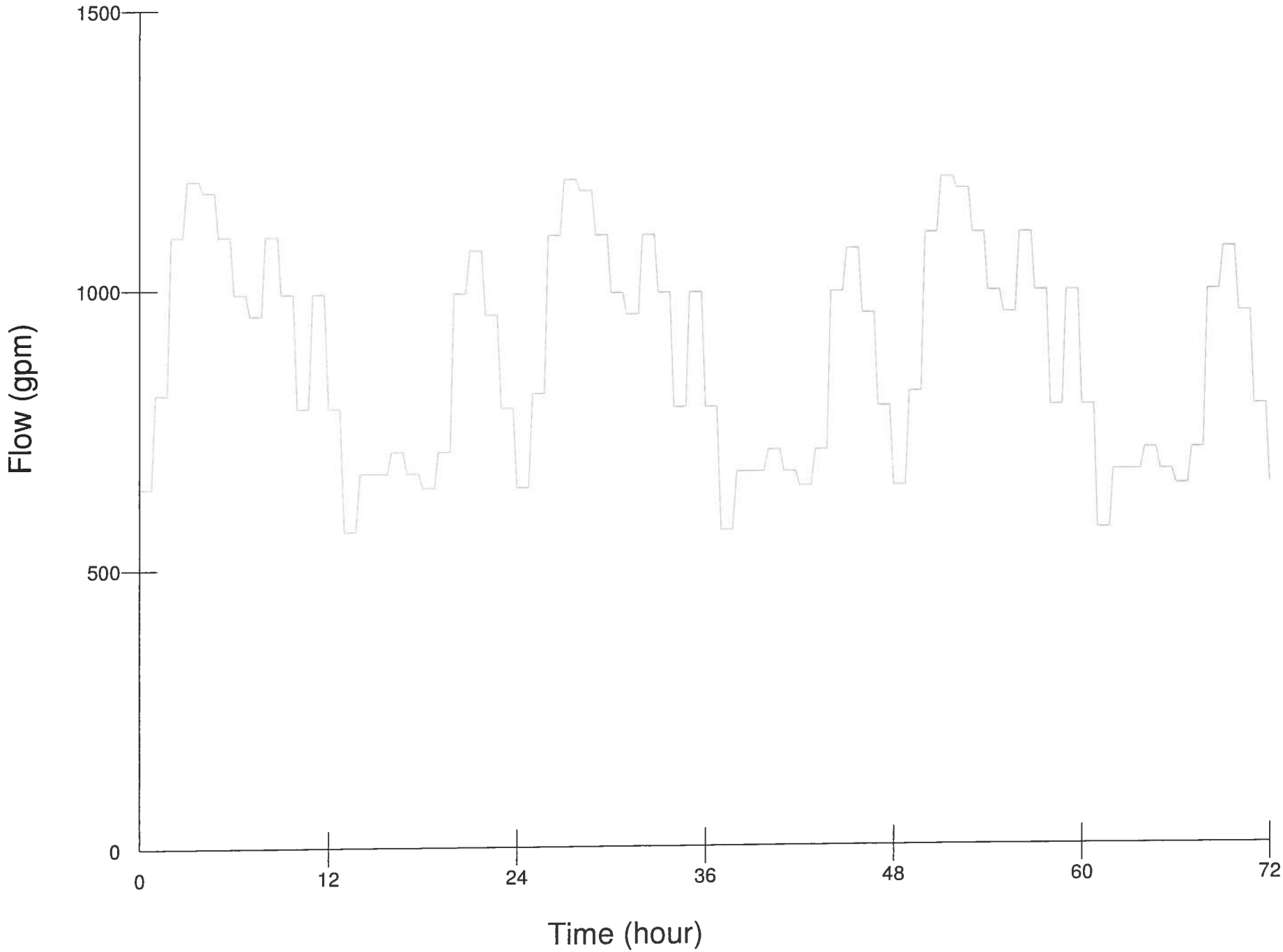
Pump 5003 [RUN10]

EAST WELL COMPLEX WITH 1 SOURCE NOT OPERATION. NOTE - TOTAL PERFORMANCE WITH BOTH SOURCES IS 1,200 GPM



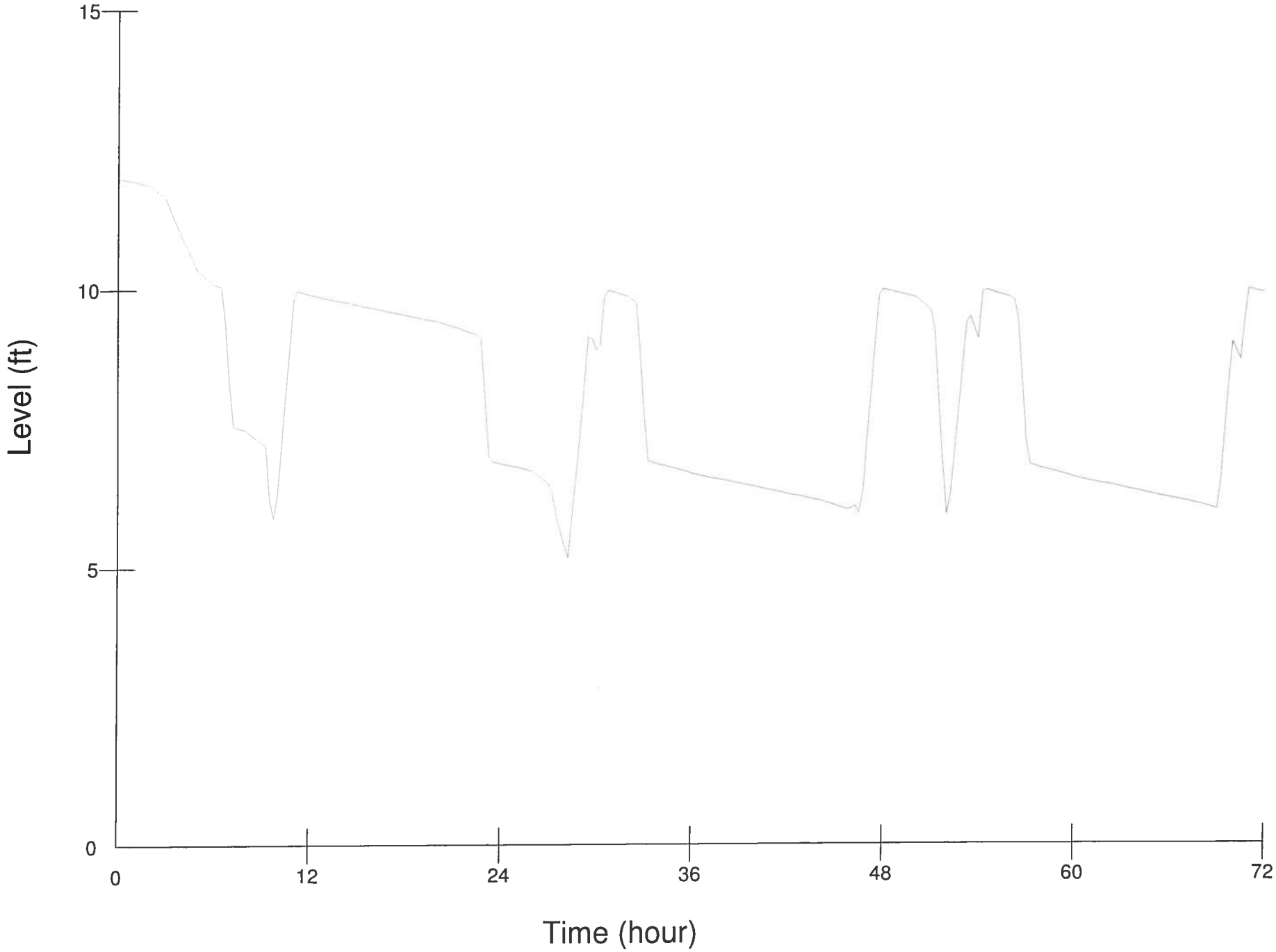
Pipe 173 [RUN10]

GCSSF RESPONSE TO LOSS OF 1 EAST WELL.



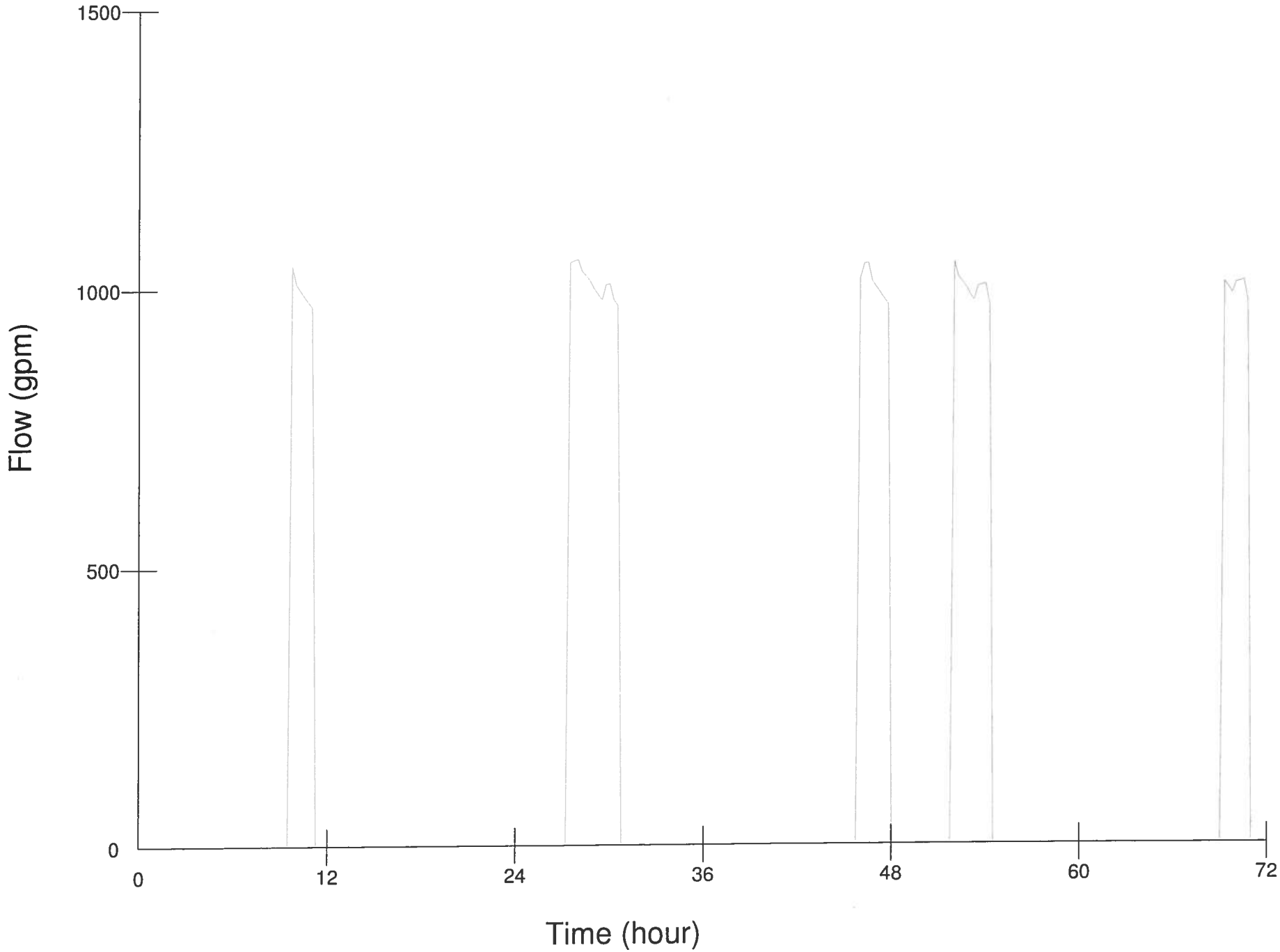
Tank 7006 [RUN10]

WEST RESERVOIR RESPONSE WITH 1 EAST WELL NON-OPERATIONAL

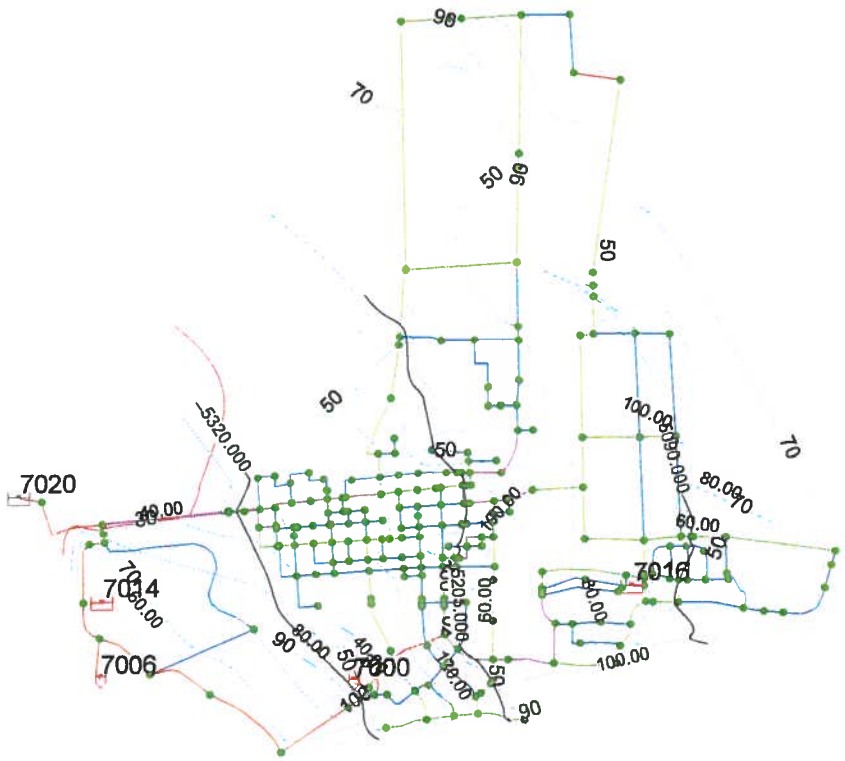


Pump 5001 [RUN10]

WEST WELL COMPLEX RESPONSE WITH 1 EAST WELL NON-OPERATIONAL. NOTE - CAPACITY OF COMPLEX IS 1,100 GPM



RP1 SUPPLEMENTAL 6FEB12 - SYSTEM WITH GCSSF AS EMERGENCY - PERFORMANCE WITHOUT (1) WEST WELL



JUNCTION (VALUE)
- Less than 40
- Greater than 40

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (VALUE)
- Less than 4
- 4~5
- 5~7
- 7~9
- 9~11
- 11~13
- 13
- Greater than 13

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

18 (Demand7) (VALUE)
- 20
- 24
- 28
- 32
- 36
- 40

12 (Elevation) (VALUE)
- 5090
- 5205
- 5320

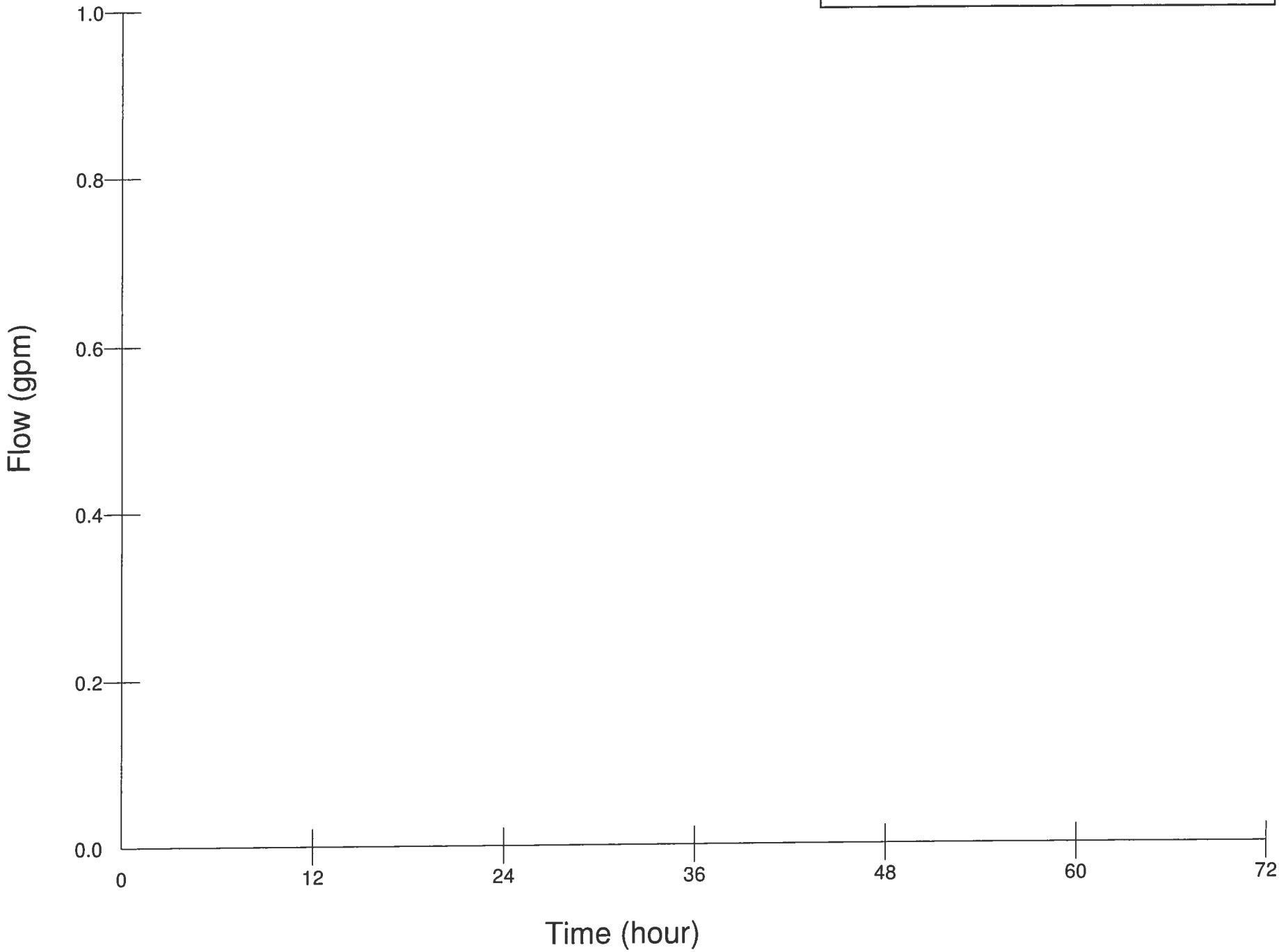
14 (Min. Pressure at 72:00 hrs) (VALL
- 30
- 50
- 70
- 90
- 100

Prepared By: RIEDESEL ENGINERING, INC.

Date: Wednesday, February 08, 2012

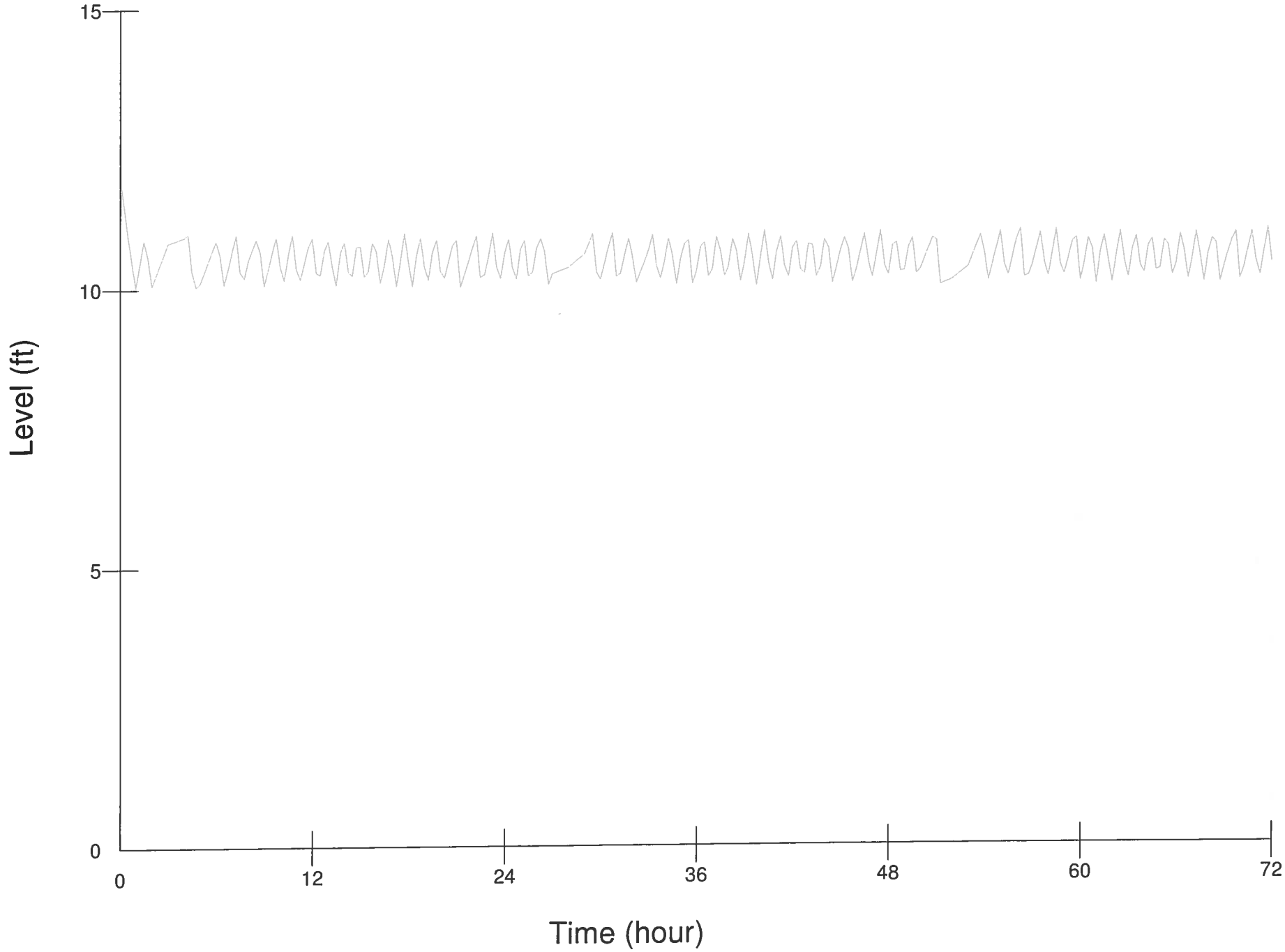
Valve 9009 [RUN10]

OPERATION OF EXISTING PRV THAT SUPPLIES OLD TOWN FROM WEST WELL COMPLEX WITHOUT 1 WEST WELL OPERATIONAL. VALVE IS NOT OPERATING, AND FLOW IS PROVIDED BY GCSSF.



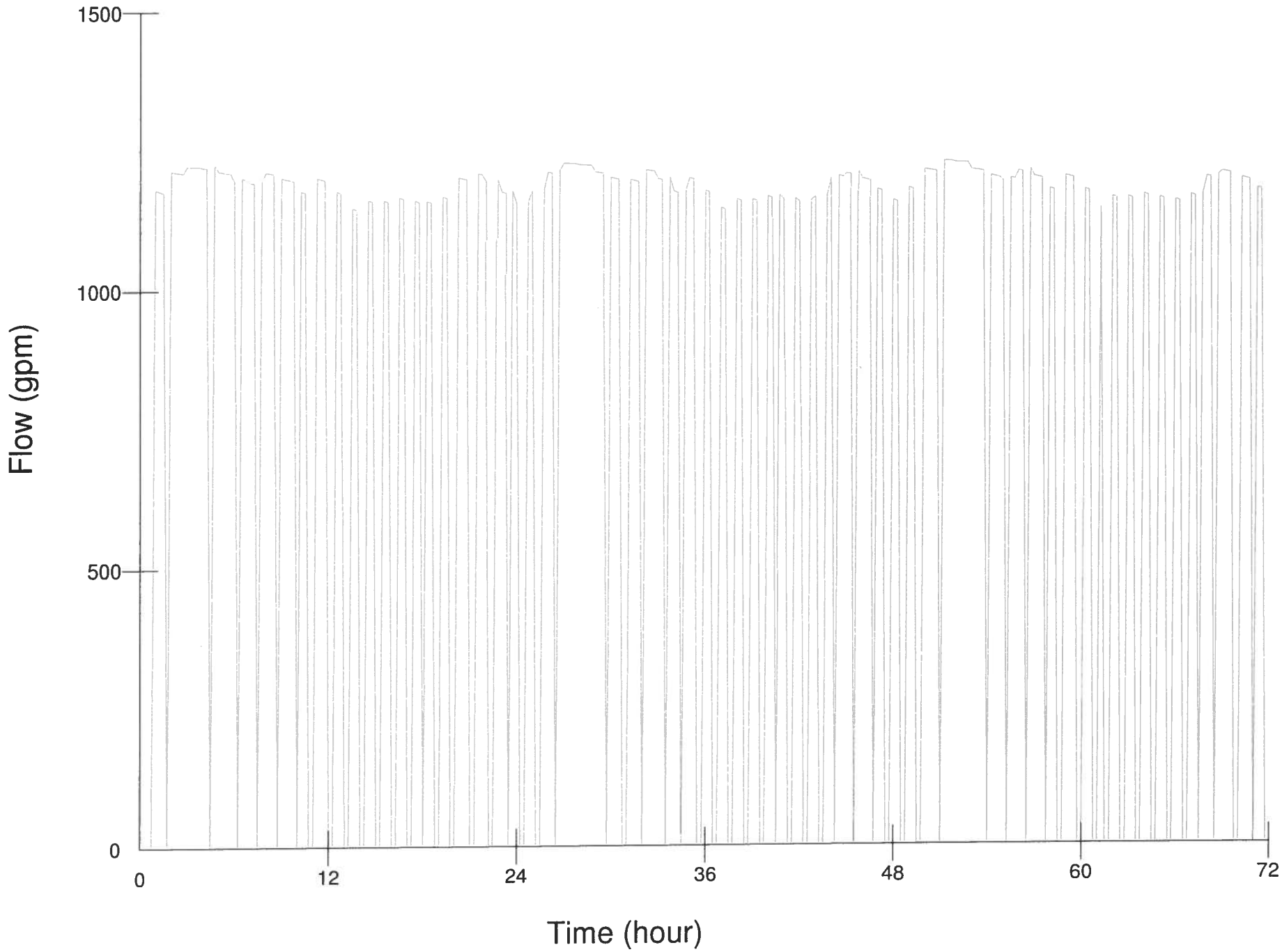
Tank 7000 [RUN10]

OPERATION OF EAST RESERVOIR WITHOUT 1 WEST WELL OPERATIONAL. NOTE MAXIMUM WATER LEVEL IS 12 FEET.



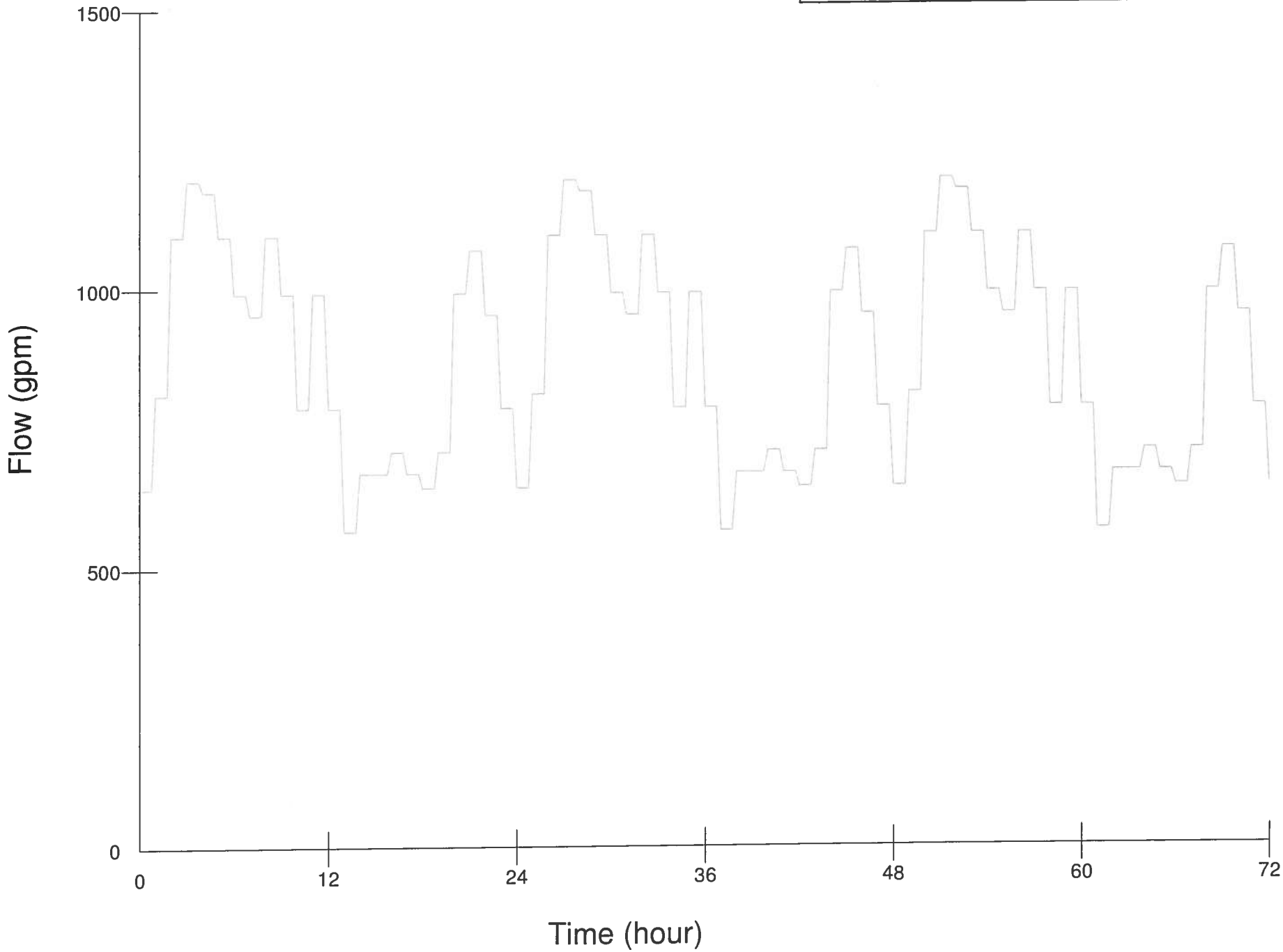
Pump 5003 [RUN10]

OPERATION OF EAST WELLS WITHOUT 1 WEST WELL.
NOTE - EAST WELL COMPLEX PRODUCES 1,200 GPM.



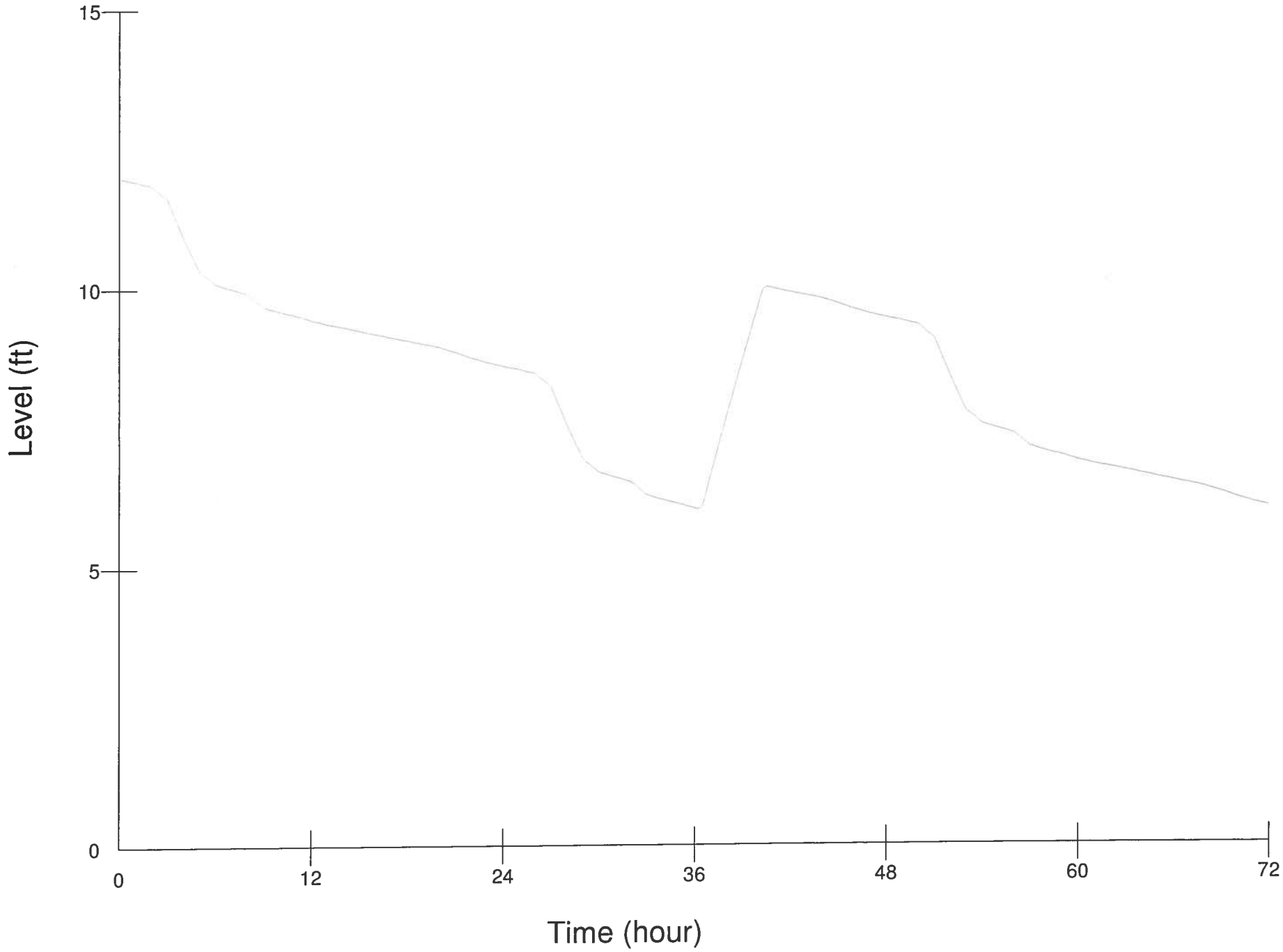
Pipe 173 [RUN10]

OPERATION OF GCSSF WITHOUT 1 WEST WELL OPERATIONAL.



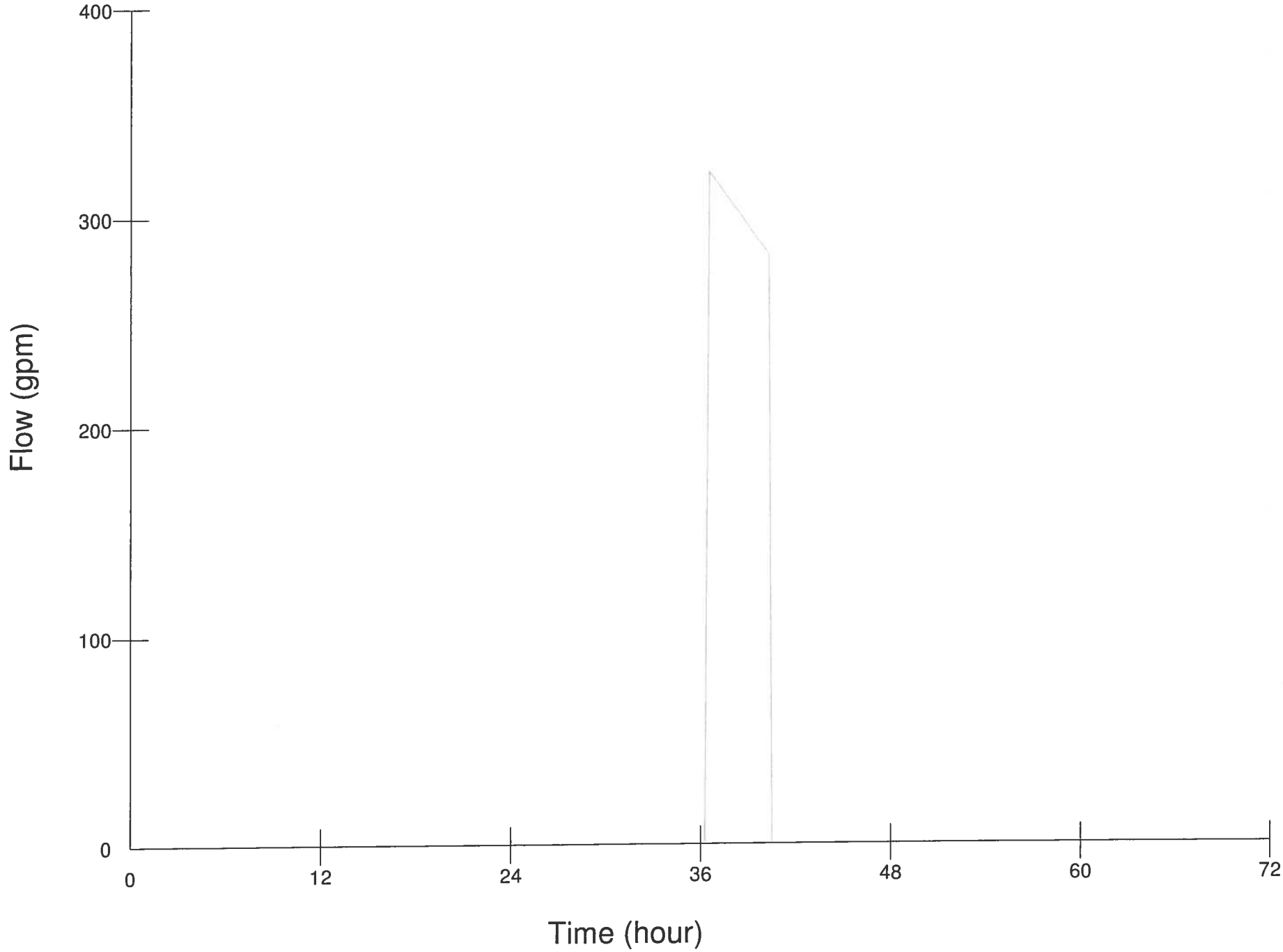
Tank 7006 [RUN10]

OPERATION OF WEST RESERVOIR WITHOUT 1 WEST WELL OPERATIONAL. NOTE - MAXIMUM WATER LEVEL IS 12 FEET.

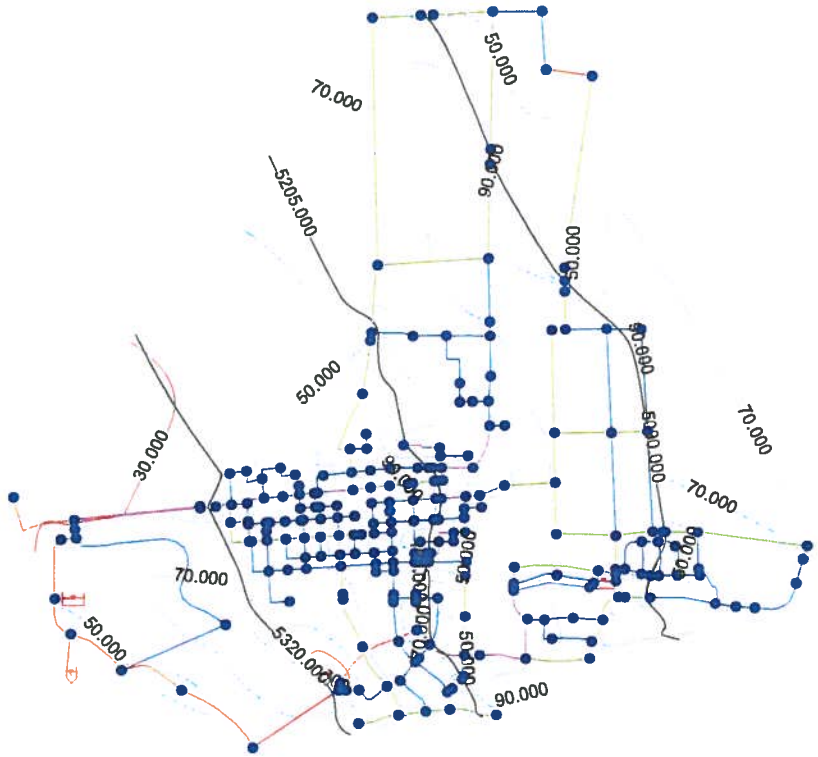


Pump 5001 [RUN10]

OPERATION OF WEST WELL COMPLEX WITHOUT 1 WEST WELL OPERATIONAL. NOTE - TOTAL COMPLEX PRODUCTION IS 1,100 GPM



RP1 SUPPLEMENTAL 6FEB12 - 0.6MG WR - RESPONSE @4800 HRS WITHOUT 1 EAST WELL



JUNCTION (VALUE)
- Less than 40
- Greater than 40

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (VALUE)
- Less than 4
- 4~5
- 5~7
- 7~9
- 9~11
- 11~13
- 13
- Greater than 13

PUMP (MOTYPE)
- Active
- Domain

VALVE (MOTYPE)
- Active
- Domain

12 (Elevation) (VALUE)
- 5090
- 5205
- 5320

18 (Demand7) (VALUE)
- 20
- 24
- 28
- 32
- 36
- 40

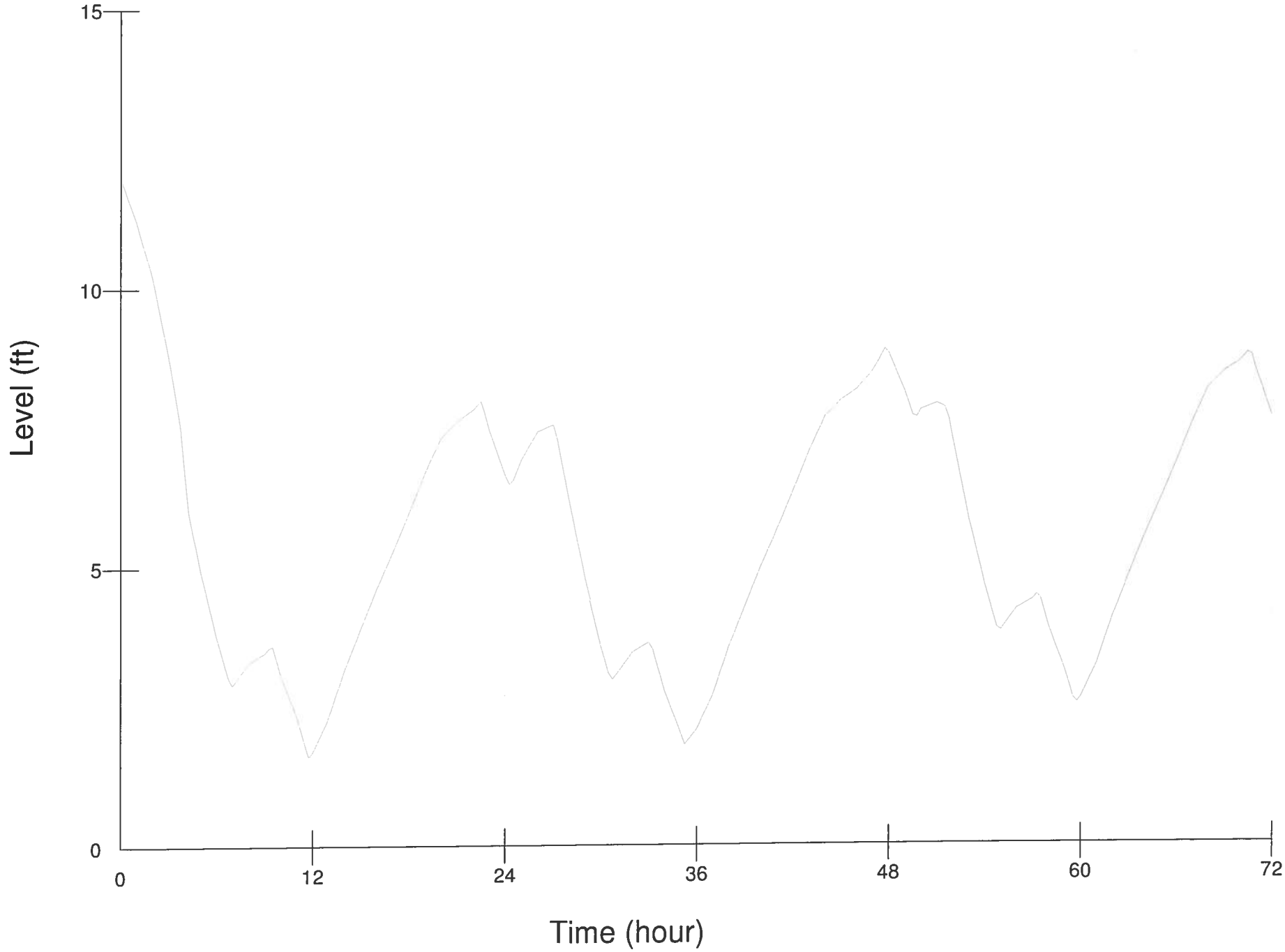
14 (Min. Pressure at 48:00 hrs) (VALL
- 30
- 50
- 70
- 90
- 100

Prepared By: RIEDESEL ENGINEERING, INC.

Date: Monday, February 06, 2012

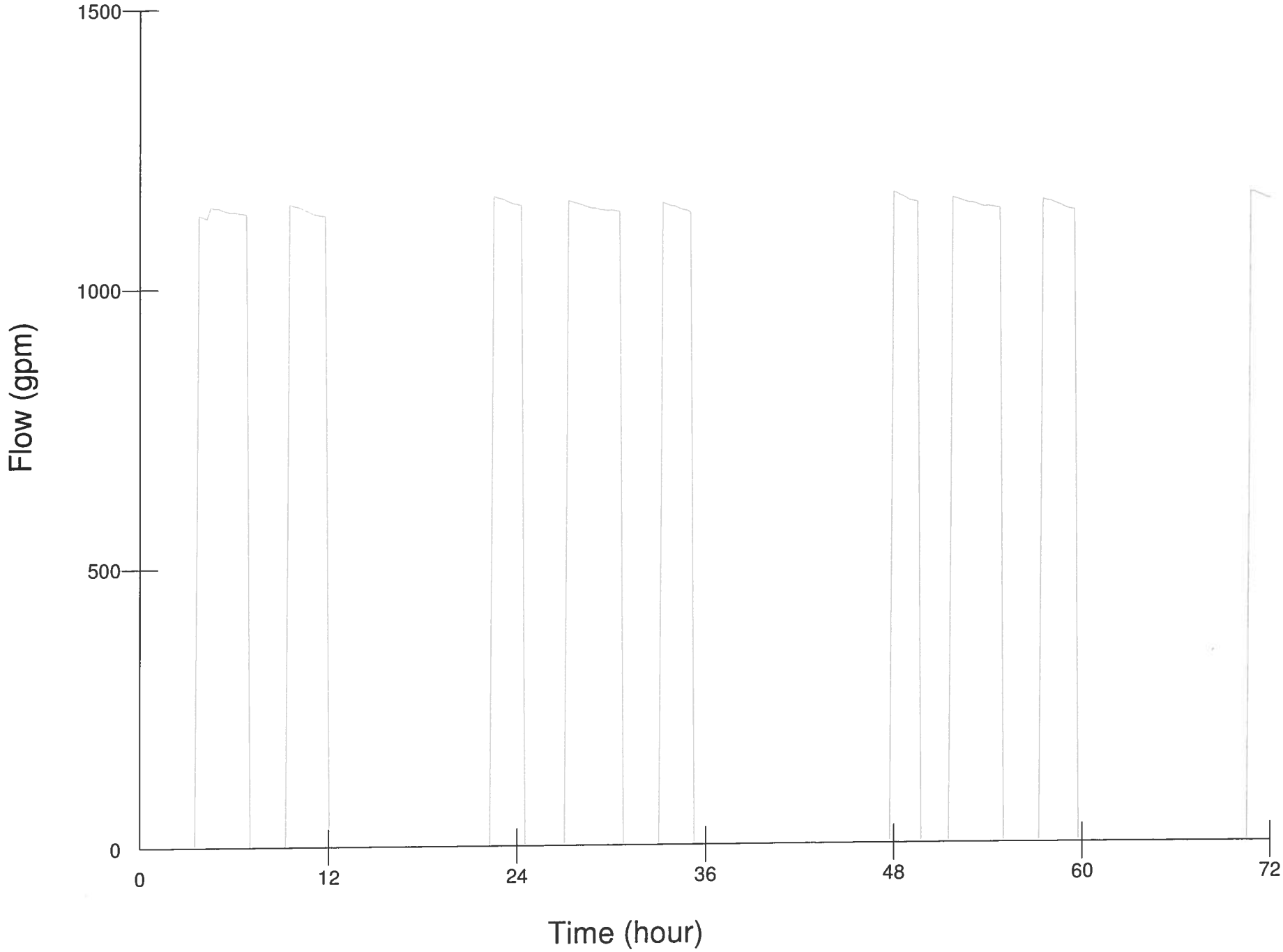
Tank 7006 [RUN10]

RESPONSE OF WEST RESERVOIR, UPGRADED TO 06.MG, WITHOUT GCSSF AND WITHOUT 1 EAST WELL OPERATIONAL.



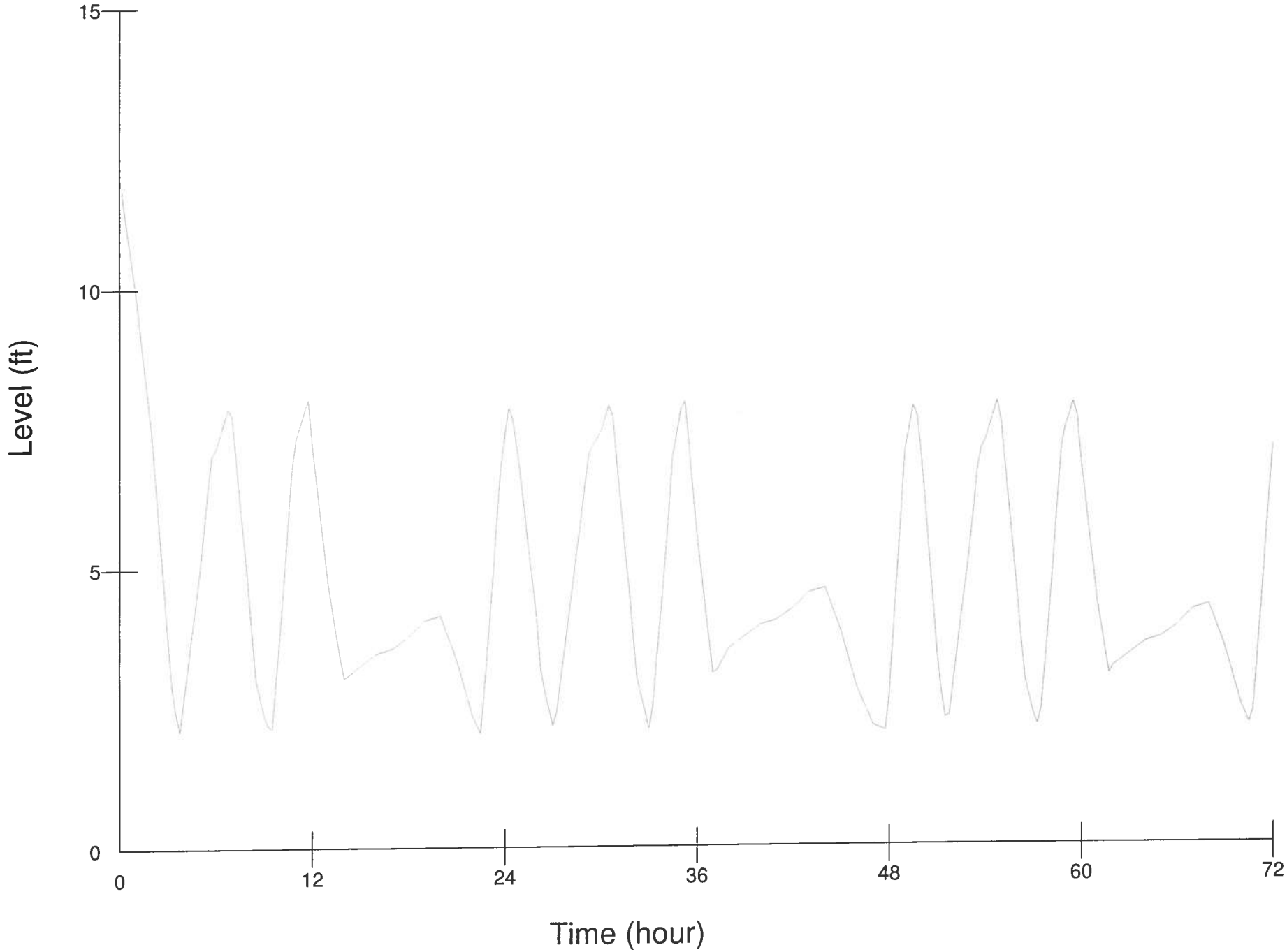
Pipe 723 [RUN10]

EXISTING FILL VALVE AT EAST RESERVOIR. OPERATION WITH WEST RESERVOIR @0.6MG, WITHOUT GCSSF, WITHOUT 1 EAST WELL.



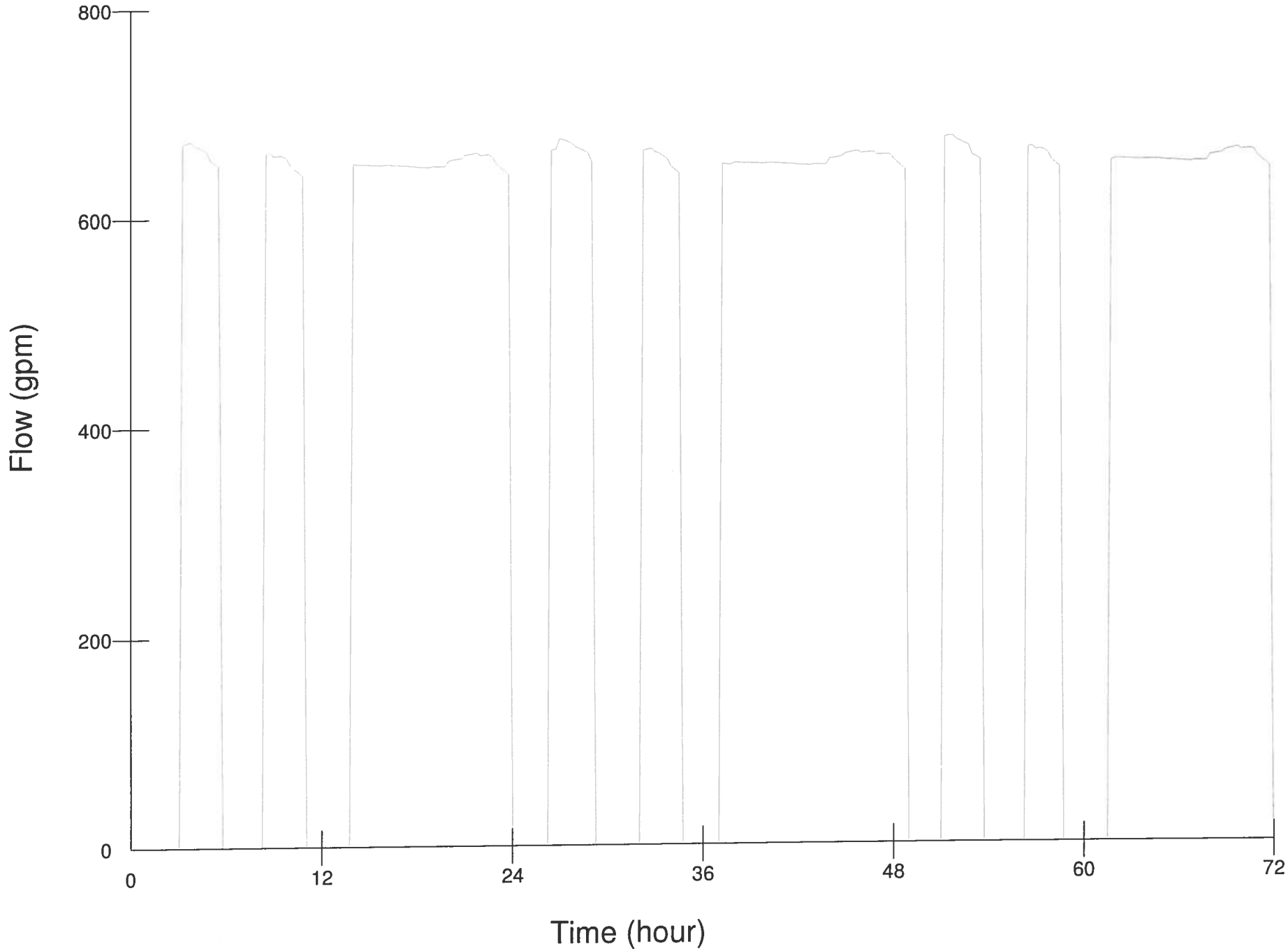
Tank 7000 [RUN10]

EAST RESERVOIR OPERATION WITH WEST RESERVOIR @0.6MG, WITHOUT GCSSF, WITHOUT 1 EAST WELL



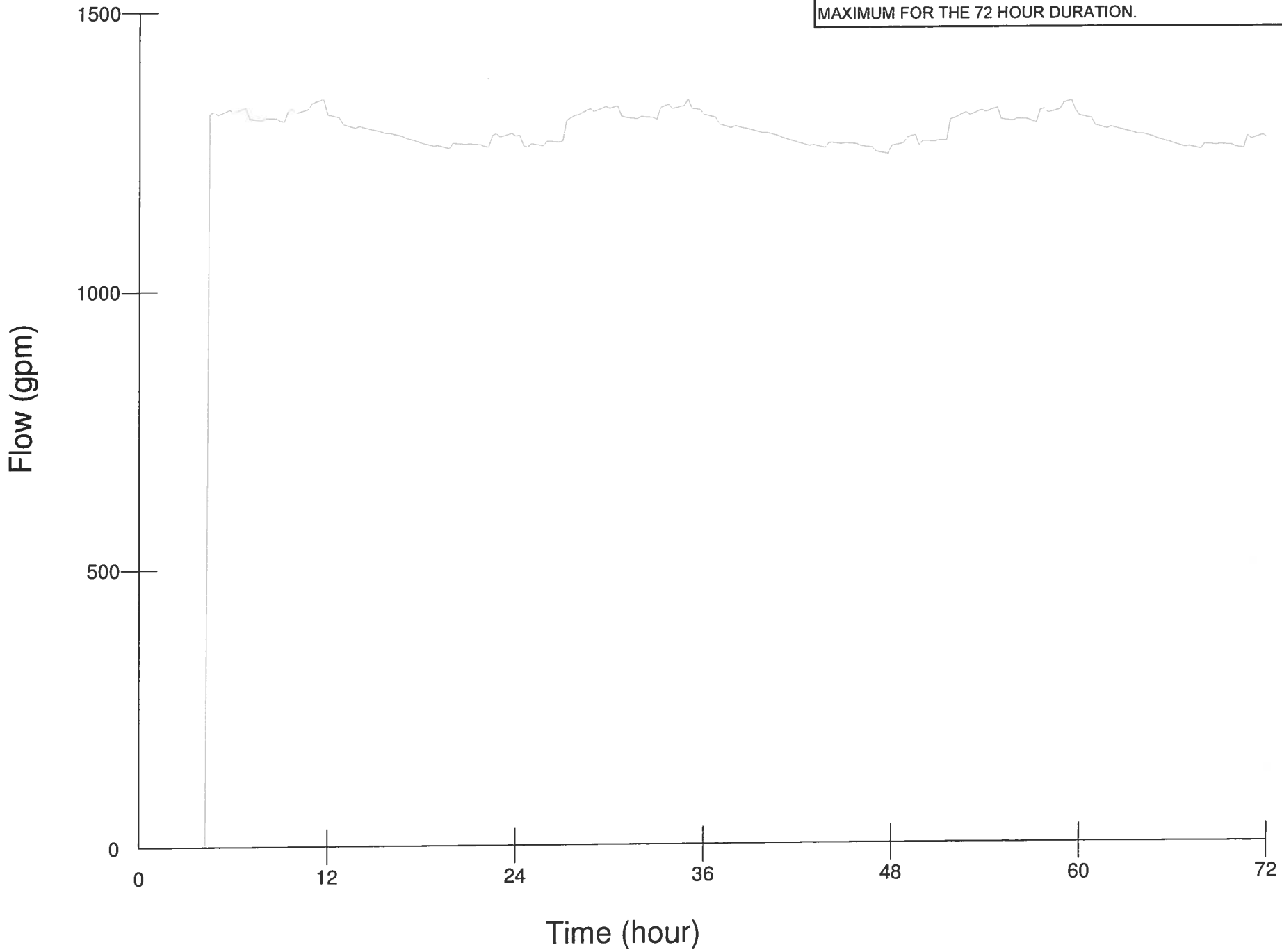
Pump 5003 [RUN10]

RESPONSE OF EAST WELL COMPLEX WITH WEST RESERVOIR @0.6MG, WITHOUT GCSSF, WITHOUT 1 EAST WELL. NOTE EAST WELL COMPLEX CAN PRODUCE 1,200 GPM.

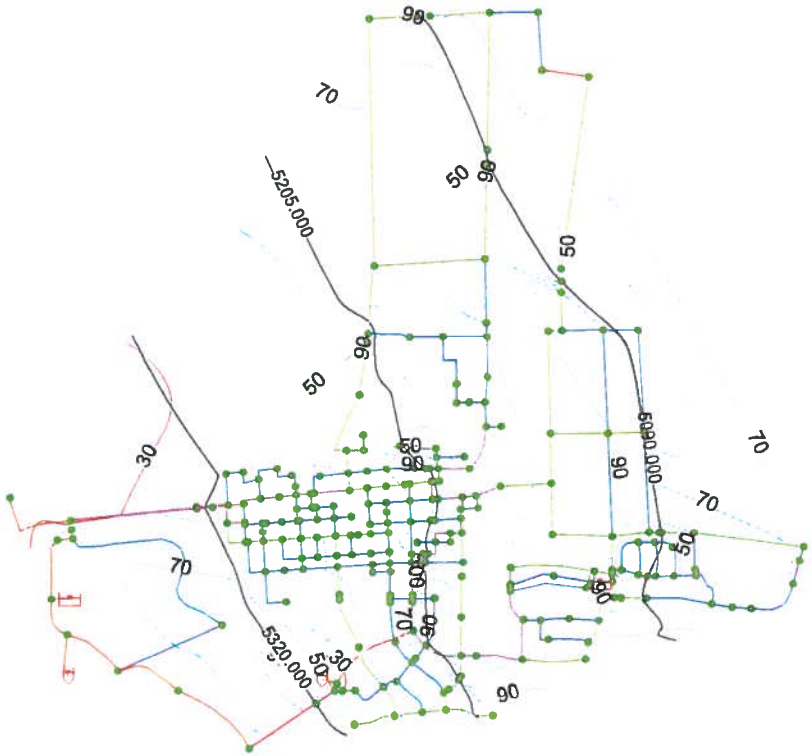


Pump 5001 [RUN10]

WEST WELL COMPLEX RESPONSE WITH WEST RESERVOIR @0.6MG, WITHOUT GCSSF, WITHOUT 1 EAST WELL. NOTE WEST WELL COMPLEX PRODUCTION IS 1,100 GPM. THIS DEMAND STRESSES WEST WELL COMPLEX TO THE MAXIMUM FOR THE 72 HOUR DURATION.



RP1 SUPPLEMENTAL 6FEB12 - ALL RES .2MG - BOOSTER @ ER @4800HRS - WITHOUT 1 WEST WELL-



JUNCTION (VALUE)
- Less than 40
- Greater than 40

TANK (MOTYPE)
- Active Tank
- Domain Tank
- Active Reservoir
- Domain Reservoir

PIPE (VALUE)
- Less than 4
- 4~5
- 5~7
- 7~9
- 9~11
- 11~13
- 13
- Greater than 13

PUMP (MOTYPE)
- Active
- Domain

VALVE (VALUE)
- less than 0.00
- greater than 0.00

18 (Demand7) (VALUE)
- 20
- 24
- 28
- 32
- 36
- 40

12 (Elevation) (VALUE)
- 5090
- 5205
- 5320

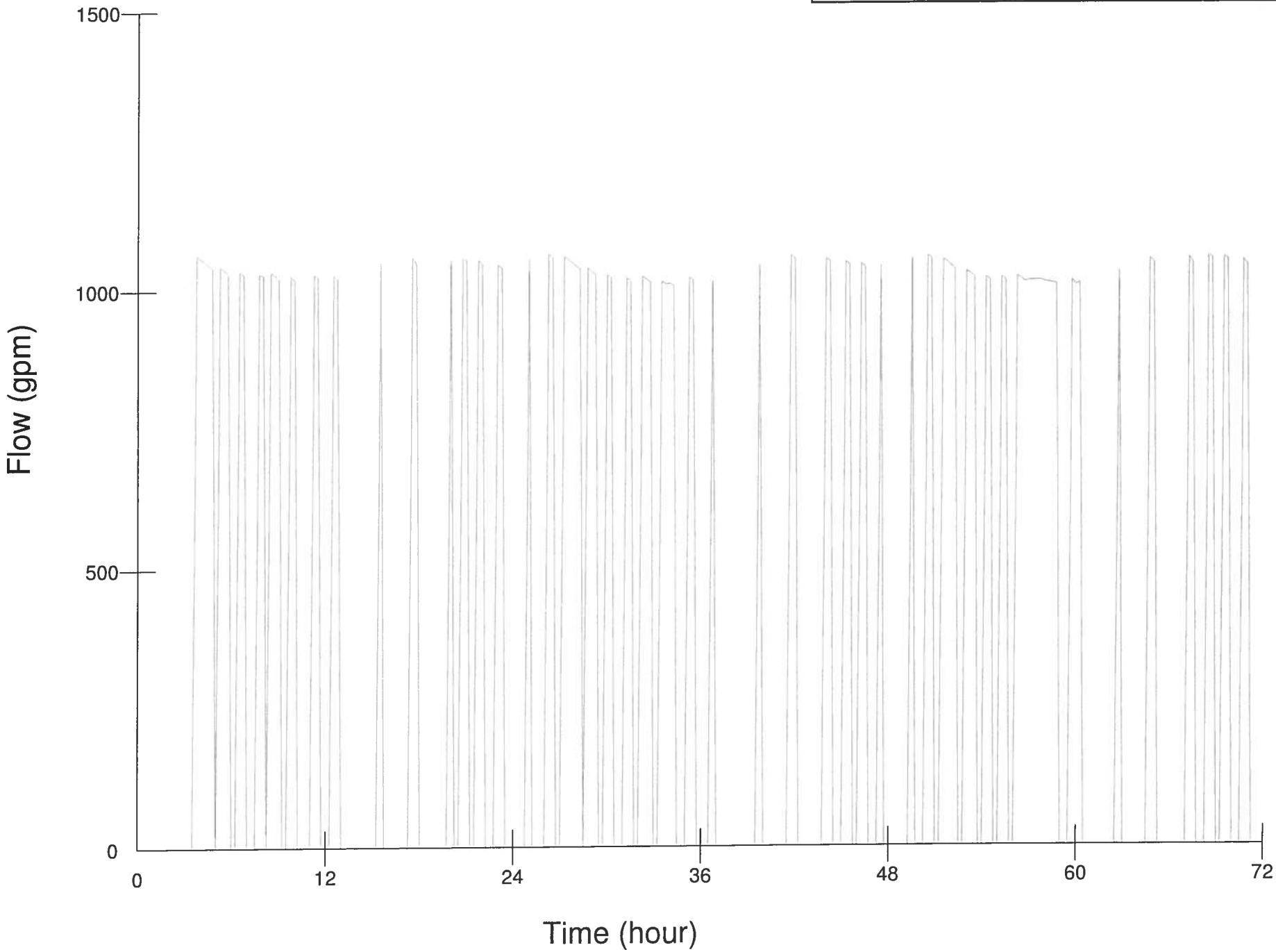
14 (Min. Pressure at 48:00 hrs) (VALL
- 30
- 50
- 70
- 90
- 100

Prepared By: RIEDESEL ENGINEERING, INC.

Date: Monday, February 06, 2012

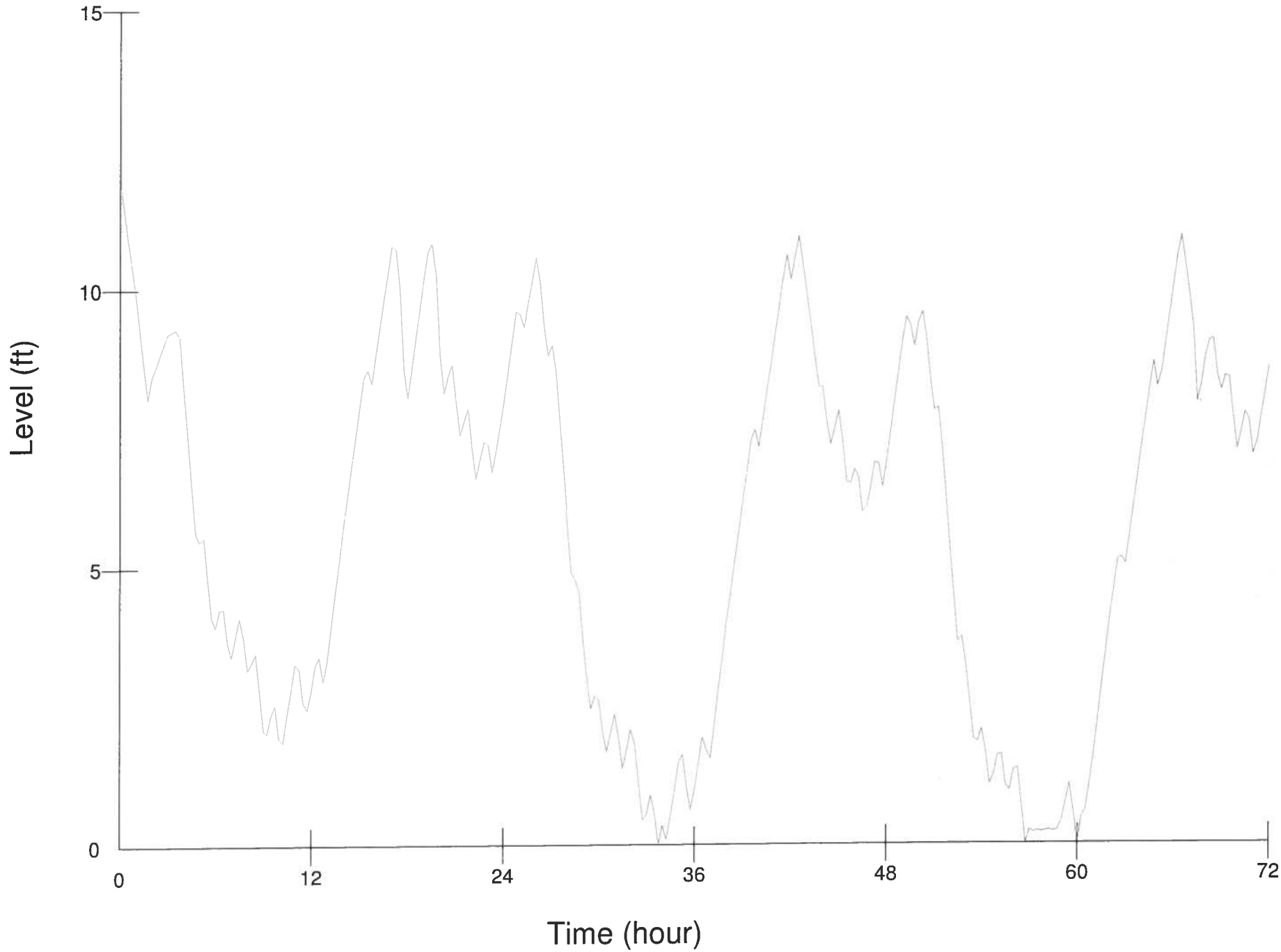
Pump 5007 [RUN10]

BOOSTER PUMP REQUIRED AT EAST RESERVOIR TO MAKE UP DEFICIT IN WEST WELL PRODUCTION TO WEST RESERVOIR. WITHOUT GCSSF, WITHOUT 1 WEST WELL. ALL RESERVOIRS @ 0.2 MG (EXISTING VOLUME).



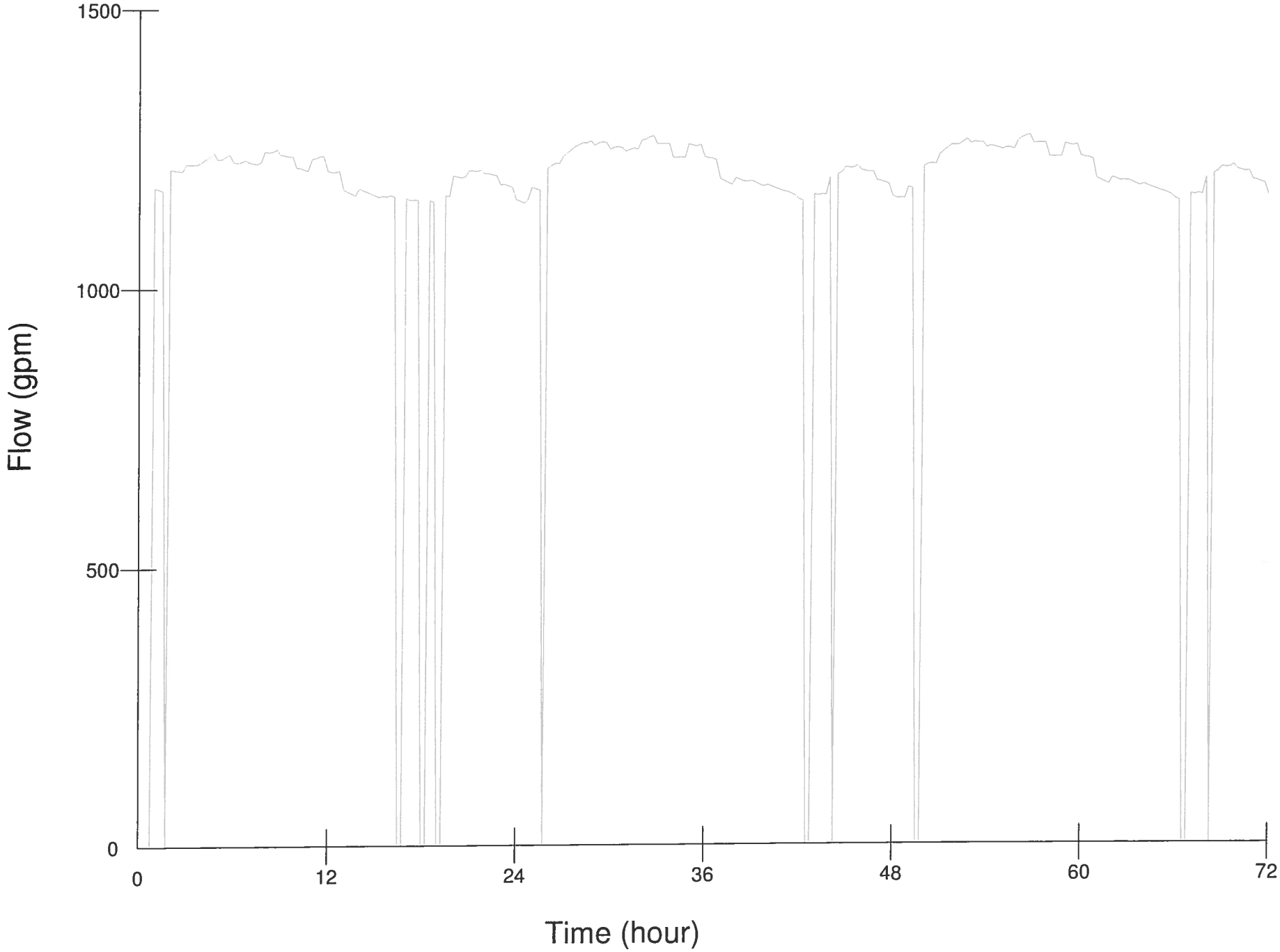
Tank 7000 [RUN10]

EAST RESERVOIR (0.2MG) RESPONSE WITH BOOSTER PUMP DRAFTING, WITHOUT GCSSF, WITHOUT 1 WEST WELL



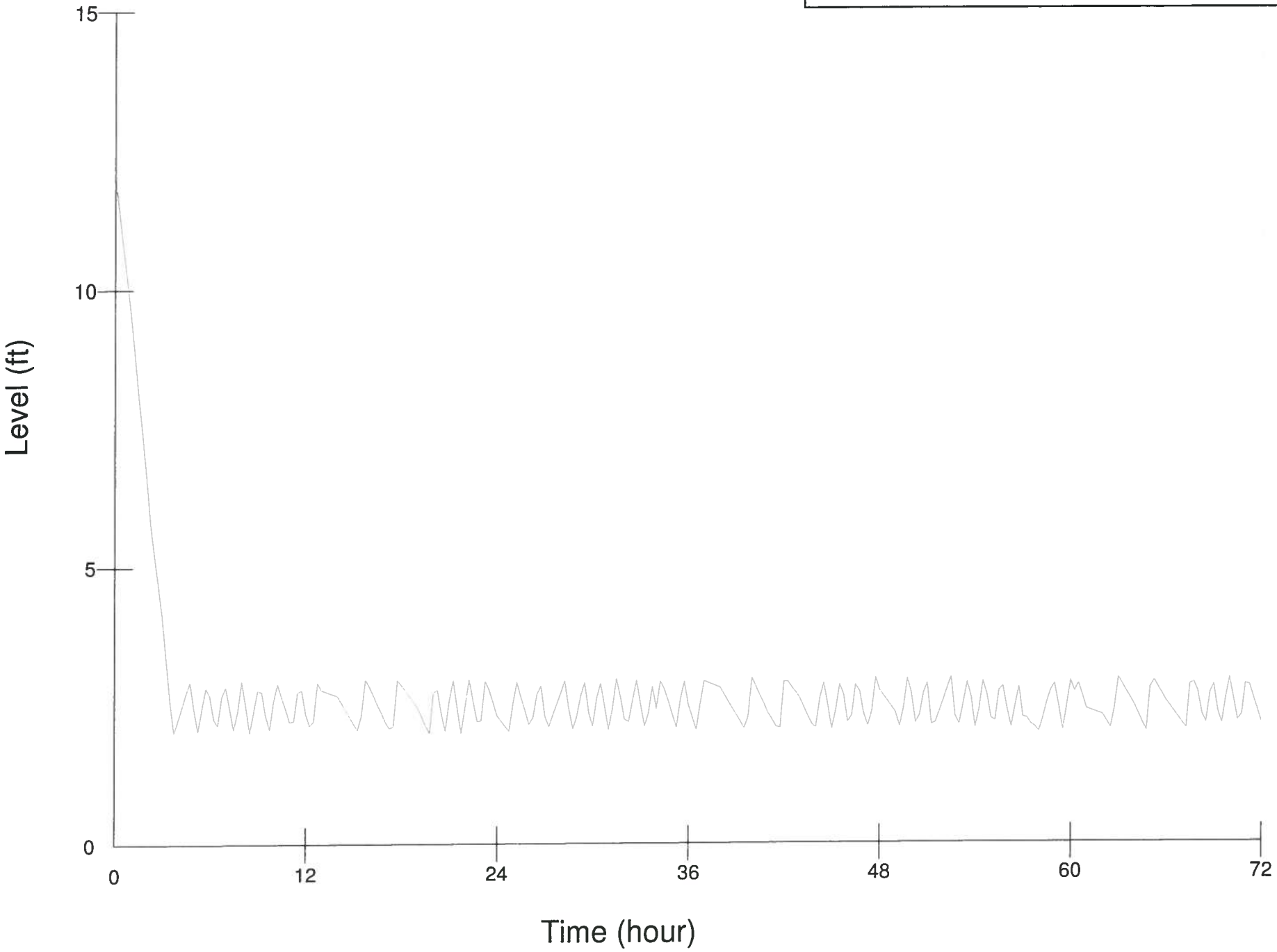
Pump 5003 [RUN10]

EAST WELL COMPLEX RESPONSE WITH ALL RESERVOIRS @0.2MG, WITH BOOSTER PUMP AT EAST RESERVOIR, WITHOUT GCSSF, WITHOUT 1 WEST WELL.



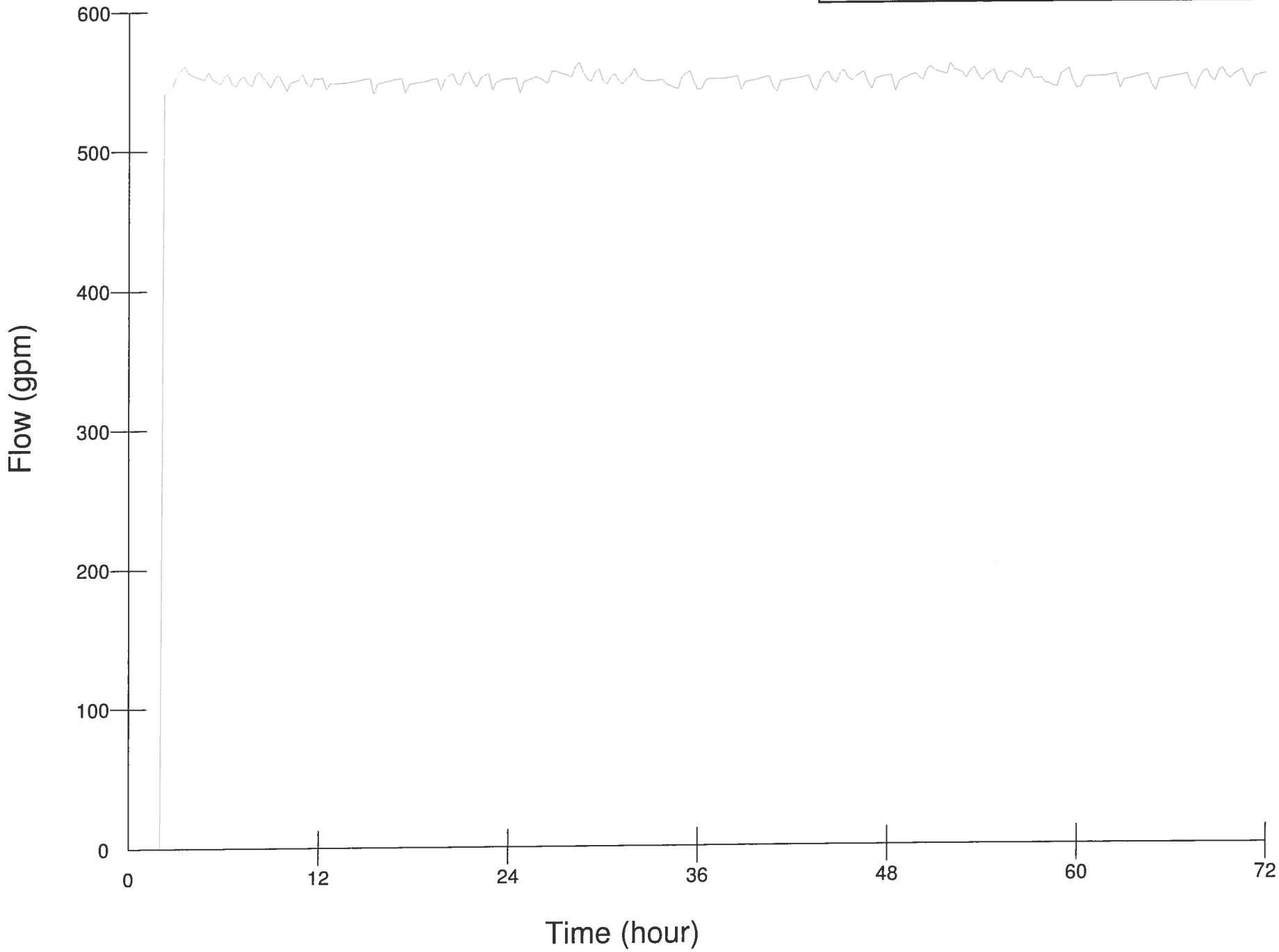
Tank 7006 [RUN10]

WEST RESERVOIR RESPONSE (0.2MG) WITH BOOSTER AT EAST RESERVOIR, WITHOUT GCSSF, WITHOUT 1 WEST WELL.



Pump 5001 [RUN10]

RESPONSE OF WEST WELL COMPLEX WITH 0.2MG RESERVOIRS, BOOSTER PUMP AT EAST RESERVOIR, WITHOUT GCSSF, WITHOUT 1 WEST WELL. NOTE - WEST WELL COMPLEX PRODUCTION IS 1,100 GPM.



1 FACILITY PLAN SUMMARY

The 2011 City of Challis Water System Facility Plan (the Plan) reviews the source water, storage, distribution, metering, and telemetry components of the existing water system. City staff has expressed concerns about the current system which could create water quantity and quality problems within a 20-year planning horizon (year 2030). These concerns include:

- The City's water supply comes from the unprotected Garden Creek Watershed and from two existing ground water wells. The Garden Creek surface water source is susceptible to contamination from the watershed.
- The City may not be able to provide adequate fire flows due to the use of existing old and dead end water mains, and small diameter un-looped lines.
- There are old, improperly spaced hydrants connected to 4" water mains (6" mains provide the minimum supply for fire suppression).
- The City does not have sufficient right to groundwater to expand that source as a replacement to Garden Creek to meet either its current or design year water demand.
- Depending on the water year, the surface water source cannot meet the summertime peak demand without rationing.
- The City does not have a plan to anticipate water demands and provide water services for future growth.
- Any extension of service to supply additional demands or future growth cannot be considered without an approved facility plan[1].
- The residential services and meters installed with the 1980s capital project are aged and need to be replaced.
- Aged pipes not replaced in the 1980s project that are in need of replacement.

As of the report date, the City does not have any water system compliance issues with the Idaho Department of Environmental Quality (IDEQ).

We tested the system components for their ability to meet minimum fire fighting requirements, minimum and maximum statutory working pressures, and the system's ability to meet the estimated water demand of the 20-year planning timeframe. We identified the deficiencies through hydraulic modeling of the distribution system, conversations with City Staff, presentations to the City Council, consultations with State and Federal Agencies, and review of published reports. We summarize our work on the existing water system as follows:

[1] Idaho Administrative Code - IDAPA 58.01.08.502.01

	FACILITY	NEEDED	DISCUSSION
1	Source Water - Water Rights	***Y***	The City currently has groundwater and surface water rights. These rights total 2.79 million gallon per day (MGD). Projected year 2030 demand is 2.57 MGD. Note – Change to 100% groundwater source will require new groundwater right.
2	Source Water - Increased Source Water Production	***Y***	The City does not have enough groundwater capacity from its 2 operating sources to meet year 2030 demands. One of the goals of this plan to for the City to develop enough groundwater right to cease dependence on the Garden Creek Slow Sand Filter.
3	Storage - Increased Water Storage	***N***	The City has a total of 0.4 million gallons (MG) of storage. Modeling of source water production with peak hour flow and fire flow indicate the City has adequate storage.
4	Distribution System – Transmission Improvements	***Y***	The extent of distribution system improvements depends of the specific project chosen by the City. In general, improvements are targeted to eliminate pipeline dead ends, ageing 4-inch and other pipes, conveying water to new developments within the City limits, and conveying water to newly annexed areas.
5	Distribution System – Fire Fighting	***Y***	The City's existing 4-inch lines will not convey the year 2030 demand. The City will need additional hydrants to improve hydrant spacing, and new hydrants along transmission line expansions.
6	Distribution System – Pressure Zones	***Y***	The City needs to improve its pressure zones to meet IDAPA. The City will need (4) formal pressure zones when it switches to all groundwater supply.
7	Distribution System – System Expansion	***Y***	The City desires to extend water service and fire flow capability to the airport and annex the Butts subdivision. Service line extension to the airport will enhance commercial development along the US 93 strip, from the City of Challis to the airport.
8	Metering	***Y***	The City was metered in its 1980s project. The meters are aging, probably are not within AWWA accuracy ranges, and some are not operational. Manual read meters represent a significant labor commitment that can be recovered by AMR equipment. New meters with increased accuracy, ability to read year round could realize increased revenues and/or reduction in consumption.
9	Telemetry	***Y***	The current system uses some basic supervisory control but it not robust. A fully developed telemetry/SCADA system will allow monitoring of key elements with enhanced alarm and notification features. Telemetry/ SCADA can allow remote operator access to assess threats and respond to problems and alarms without physically visiting the site.

The City Council established (11) criteria as requirements for water system improvements and we evaluated (17) preliminary alternatives covering improvements to various aspects of the distribution system, source water development, and metering and telemetry. We revised these alternatives into 18 discrete projects with nine possible combinations of the discrete projects. Based on input from the City Council and feedback from the public participation meeting, Riedesel again revised and condensed the nine project combinations into three specific alternatives, all combination projects addressing source water, distribution, metering, and telemetry. The projects are summarized as follows: all new ground water being developed in the Garden Creek Aquifer System at the west end of Challis; all new ground water being developed in the Salmon Aquifer System on the east side of Challis; a mixture of both east and west locations. The Council selected the

last one of these three as its preferred project which we term Recommended Project #1 (RP1). Estimated construction cost for RP1 is $8,078,877 with and Equivalent Uniform Annual Cost (EUAC) of <$ 442,958>. Of the (3) final alternatives, RP1 has the least EUAC and is therefore the most economically favorable project for the City.

These are the elements of Recommended Project #1 (RP1):

- Source Water. RP1 allows the City to curtail use of the Garden Creek surface water source and source water treatment. 2 new wells - one in the Garden Creek Aquifer system that recovers the lost output of West Well #1 and one in the Salmon Aquifer System – will replace the curtailed Garden Creek water source. The City will abandon the slow sand filter but retain the surface water right. RP1 solves the susceptibility issue of the unprotected Garden Creek watershed by moving all of the City's drinking water sources to groundwater.
- Distribution System. RP1 includes all the modeled pipeline changes and additions needed to meet the year 2030 design population and with total reliance on groundwater. 4 pressure zones will be formally established with new pressure reducing stations and isolation valves. The system will have new, properly spaced hydrants on new pipelines and add hydrants where needed to improve hydrant spacing on the existing pipelines. RP1 solves the pressure zone issues with the existing distribution system, solves the fire hydrant spacing issue, and allows the City to meet the projected drinking water demands of the year 2030 population. The City will be able to meet the requirements of the design fire flow and duration.
- Distribution System Alternatives. RP1 includes new transmission pipeline to provide water and fire fighting service to the Challis Airport. The transmission lines also allow for development in the east and west corridors parallel to US 93, and for the annexation of the Butts Subdivision into the City. RP1 meets the City goals of serving the Airport and providing for future growth.
- Metering. RP1 replaces all the meters in the City with new automated meter read (AMR) equipment. RP1 allows the City to read every meter every month, reduce the staffing requirements to bill for water, increase the accuracy of that billing, take the first steps to recovering the estimated 4% lost water identified by Idaho Rural Water, and provide the data needed to do a water audit.
- Telemetry. RP1 connects the City's key facilities into an integrated network that provides enhanced supervisory control and data acquisition (SCADA). Key facilities include the new and existing groundwater wells, and East and West Reservoirs. Telemetry will provide better security for the drinking water system, and City staff will be able to access the SCADA system remotely to evaluate and respond to alarm conditions. RP1 improves the operation and security of the drinking water system.

Recommended Project #1(RP1) is a plan for the development of the City of Challis from now to the 2030 design year. RP1 addresses health and safety issues, operation and maintenance improvements, and expansion of the water system to serve the airport and growth of the community. RP1 needs strategic implementation for prudent implementation. "Prudent implementation" has these elements in order of priority:

1. Address health and safety concerns
2. Focus on items that will reduce the operation and maintenance (O&M) costs of the system
3. Expand the water system to serve the airport and other areas of interest to the City as the need and demand for service occur

The table below shows the components of RP1 and rates them for the (3) priorities. All the components except for metering impact all 3 priorities. The category designations:– SW – Source Water; DS – Distribution System; T – Telemetry; M – Metering match the designations of the project charts in Appendix D.

CATEGORY	*DESCRIPTION/ RP1 SOLUTION*	*HEALTH & SAFETY*	*MINIMIZE O&M*	*SYSTEM EXPANSION*
SW HEALTH & SAFETY Garden Creek Surface Water Source	Vulnerability & Variability of the Garden Creek Water Shed. Replace surface water supply with new groundwater source and recover the capacity of West Well 1.	✓		
SW O&M	Recovers O&M costs to operate and maintain the slow sand filter.		✓	
SW EXPANSION	Meet future demands with new well in Salmon Aquifer System.			✓
DS HEALTH & SAFETY Fire Fighting	Dead end lines, hydrants on 4-inch lines, sub-standard hydrant spacing. Add pipe loops to tie–in dead ends; replace 4-inch lines; add new hydrants to add capability to existing system. Add interties to incorporate groundwater sources to Old Town system (surface water source replaced with groundwater).	✓		
DS O&M	Replacing old 4-inch pipes reduces leaks.		✓	
DS EXPANSION	New pipes and pipe loops top meet system expansion to the airport and future growth			✓
DS HEALTH & SAFETY Pressure Zones	Over-pressurized areas of Old Town and Cyprus System. Create (4) new pressure zones incorporating the change to groundwater for the entire system.	✓		
DS EXPANSION	Pressure Zone 4 includes the existing system and will cover the full expansion of the system.			✓
T HEALTH & SAFETY System	Existing system has minimal supervisory control and data acquisition (SCADA) capability and no intrusion alarms for key water system elements. Add new telemetry.	✓		

CATEGORY	DESCRIPTION/ RP1 SOLUTION	HEALTH & SAFETY	MINIMIZE O&M	SYSTEM EXPANSION
Telemetry				
T O&M	New telemetry allows remote operator access to the key elements of the system instead of requiring a site visit. Key elements include well houses and pump stations, storage reservoirs, and pressure reducing stations.		✓	
T EXPANSION	Telemetry allows for addition of new key elements to the system, such as a new well in the Salmon Aquifer system.			✓
M O&M	Re-meter the City with new "automated read" (AMR) water meters. City can read every meter every month throughout the year and have the data for a complete water audit. All the meters can be read in less than (1) day.		✓	

We suggest the following ranking of the first priority items:

1. Replace the surface water source with a new groundwater source in the Garden Creek aquifer system.
2. Construction distribution system improvements to tie the Old Town system into the new groundwater system, eliminate 4-inch pipes and the fire hydrants that tie to them, install new and properly spaced fire hydrants, and tie-in dead end lines. Add pressure reducing stations and isolation valves to create (4) pressure zones which eliminates service areas that are over-pressurized.
3. Install a telemetry system to improve supervisory control and data acquisition to protect the water system.

Appendix D has a chart that shows the EUAC analysis for the first priority items.

The first priority items automatically fulfill the operation and maintenance (O&M) criteria of the second priority when they are implemented. Metering is the only stand alone second priority item. Even though metering is not a health and safety priority, our analysis indicates the construction cost may be significantly (if not completely) offset by the labor saving to read the meters and process the water bills. The City may also realize some lost revenues due to inaccuracies with the old existing meters. We recommend replacing the meters as soon as possible.

2 INTRODUCTION

2.1 Purpose and Need for Project

The City of Challis is a municipal corporation located in Custer County, Idaho. The most recent water system facility plan and resulting improvement project performed for the City dates from 1981 and is approximately 30 years old[2]. City staff has expressed concerns about the current system which could create water quantity and quality problems within a 20-year planning horizon (year 2030). These concerns include:

- The City's water supply comes from the unprotected Garden Creek Watershed and from two existing ground water wells. The Garden Creek surface water source is susceptible to contamination from the watershed.
- The City may not be able to provide adequate fire flows due to the use of existing old and dead end water mains, and small diameter un-looped lines.
- There are old, improperly spaced hydrants connected to 4" water mains (6" mains provide the minimum supply for fire suppression).
- The City does not have sufficient right to groundwater to expand that source as a replacement to Garden Creek to meet either its current or design year water demand.
- Depending on the water year, the surface water source cannot meet the summertime peak demand without rationing,
- The City does not have a plan to anticipate water demands and provide water services for future growth.
- Any extension of service to supply additional demands or future growth cannot be considered without an approved facility plan[3].
- The residential services and meters installed with the 1980s capital project are aged and need to be replaced.
- Aged pipes not replaced in the 1980s project that are in need of replacement.

There are 5 main areas of focus to this facility plan:

1. Drinking water sources
2. Potable storage
3. Distribution system
4. Metering
5. Telemetry

It is the purpose of this facility plan to review and analyze staff concerns within these five components and then to test the component's ability to meet the regulatory, consumption,

[2] "Challis, Idaho Water System Improvements – Master Plan and Preliminary Engineering Report" – CH2M Hill, April 1981
[3] Idaho Administrative Code - IDAPA 58.01.08.502.01

and operational demands of the 2030 design year. The plan will then propose community-based solutions to projected deficiencies with capital projects.

2.2 Organization of Report

The structure of the report follows the format of The Idaho Department of Environmental Quality (IDEQ) Form 5-A, December 2010 edition and includes a Table of Contents and appendices. The order of the report is as follows: Facility Plan Summary, Introduction, Existing Conditions, Future Conditions, Development and Initial Screening of Alternatives, Final Screening of Principal Alternatives and Facility Plan Adoption, Selected Alternative Description and Implementation Agreements, Engineer's Recommendations, and Appendices.

Physically, the report has two parts – the main report document and the Appendices. The parts are in 2 books. When studying the report, the reader has the option of viewing a referenced item side-by-side with the report section that references it.

2.3 Acceptance by Owner of Project Responsibility

The City of Challis' project responsibility is divided into two parts – responsibility for the funding of the facility plan which identifies potential capital projects, and responsibility for the funding and administration of an actual capital construction project. The facility plan is currently funded by the City of Challis. The City tried to secure a planning grant from USDA-Rural Development but the population median income exceed the maximum grant approval criteria of Rural Development. The City has recently applied for a planning grant through IDEQ. The City has funds dedicated to the facility plan and has selected its consultant through a proper Qualification Based Selection process meeting the requirements of Idaho Statute 67-2320.

Should the City decide to pursue a capital project to repair or improve its water system infrastructure, Challis will be seeking grants and loans to help finance the project. At the present, Challis' options for project funding include: IDEQ SRF loan and USDA-Rural Development grant and loan. A preliminary Income Survey performed to see if the City could qualify for Idaho Department of Commerce Community Development Block Grant (CDBG) indicates the City will not qualify for CDBG funds. The City will be using a certified grant administrator to apply for SRF/USDA-RD funds and aid with selection of the bond counsel and bond election.

Challis has successful project experience, organization, and facilities to carry out a new construction project. Application for project funding will further demonstrate the financial capability to secure the needed grants and loans. The following table gives an overview of project history:

Project Dates Start/End	Funding Agency	Project Description	Capital Cost	Consultant
12/2005	FAA	#569 Challis General Engineering	$350,000	Riedesel Engineering, Inc.
8/05 to 4/08		#712 Challis Airport – Land Acquisition	$29,455	Riedesel Engineering, Inc.
6/05 to 12/07		#805 Challis Water Funding	$67,5000	Riedesel Engineering, Inc.
1/09 to 10/09	FAA	#1051 Challis Airport – AIP	$679,000	Riedesel Engineering, Inc.
11/09 to 12/09	Fed/Local Agencies	#1546 Challis Bike Path	$1,333,000	Riedesel Engineering, Inc
3/10 to 7/10	FAA	#1569 Challis Airport	$83,6500	Riedesel Engineering, Inc

3 EXISTING CONDITIONS

3.1 Project Planning Area

The Planning Area Map is located in Appendix A, Figure 1. The area within the border encompasses about 2,048 acres or 3.2 square miles. About 60% percent of the planning area is within the existing City limits. Any capital improvement project identified by this report and accepted by the City will occur within this study boundary. The boundary is also the footprint of the environmental document that is a separate part of this facility plan. Progressive Engineering Group, Inc. (PEGI), is a sub-consultant to Riedesel Engineering and provides the Environmental Information Document included in Appendix H.

3.2 Existing Environmental Conditions

Riedesel Engineering and Progressive Engineering Group established a list containing 35 target individuals and agencies that might want to comment on the facility plan boundaries. The list is in Appendix E. The information from these contacts is primarily used in the environmental document prepared by Progressive Engineering. Not all persons or agencies contacted by mail responded. The responses we received, both mail and emails are also located in Appendix E. The following maps that are referenced in this section are located in Appendix D – Maps & Charts:

- Study Area Map
- USGS Topographic Map
- Wild & Scenic River Designations
- U.S. Fish & Wildlife Service National Wetlands Inventory
- DEQ/IDWR Sole Source Aquifer Designation location map
- Custer County Land Ownership
- Public Lands Interpretive Association map of parks and campgrounds
- Idaho Air Quality Planning Areas
- Mine Locations
- FEMA Flood Plain Panel
- City of Challis Zoning Map

3.2.1 Physiography, Topography, Geology, and Soils

The City of Challis is located within north central Custer County, in central Idaho. The City is situated on the alluvial fan created by Garden Creek, within Round Valley, with the mountainous Sawtooth Recreational District to the south, the Challis National Forest to the West and the Salmon National Forest to the North. The northerly flowing Salmon River bounds the area on the east. Elevation ranges from about 5,100‘ to 5,400‘ above mean sea level. Central Challis is located at Latitude 44(degrees) 30‘ 17.76" N and Longitude 114(degrees) 13‘ 55.44"W. The topography within Challis is generally level to gently sloping toward the east, although steep slopes bound the valley to the north, west and south. The gently to moderately sloping Salmon River and its associated floodplain lies to the east.

The Challis basin may have formed at least 50 million years ago (MYA), by a combination of faulting and erosion before and during Eocene age (51 to 40 MYA) volcanic eruptions. As lava, ash-flows and ash erupted and settled, faulting (earth movement), landslides and stream erosion produced the topography and unconsolidated sediments overlying the rock formations. One prehistoric slide temporarily blocked Garden Creek, forming a small lake which deposited the alluvial clay rich soils of lower Garden Creek. The Challis Basin is still considered subject to earthquakes and earth vibrations and is included within the Central Idaho Seismic Zone.
The prehistoric earthquake history is not well known except for parts of the Lost River fault, which ruptured in 1983. Therefore it is virtually impossible to predict with any accuracy where a rupture or fault scarp might occur. Seismic design for water pipelines is not required to meet current AWWA standards. However, critical function pipelines and / or critical function connections could be subject to more rigorous design criteria as far as available information and budget allow. Critical function pipelines or connections are defined by consideration of: the facilities they serve; importance to the community for fire fighting, health, and post-earthquake emergency response and recovery; potential for secondary disasters (erosion, inundation, life safety) resulting from pipe damage or failure; difficulty in making repairs; effects on community socio-economics; and a pipe's ability to disrupt emergency response or evacuation if damaged. The soils within the project area, listed in the table below are too steep, rocky and / or dry to present an expected liquefaction risk.

Table of Soils within the Challis Basin and Area of Impact

Map Symbol	Map Unit Name	Farmland Classification
10	Bayhorse-Dawtonia association, 15 to 40 % slopes	Not prime farmland
31	31 Calcids-Rubble land-Rock outcrop complex, 50 to 80 percent slopes	Not prime farmland
48	Dawtonia very gravelly loam, 4 to 8 percent slopes	Not prime farmland
49	Dawtonia-Dawtonia, cold complex, 5 to 25 percent slopes	Not prime farmland

Map Symbol	Map Unit Name	Farmland Classification
51	Dawtonia-Frailton complex, 20 to 50 percent slopes	Not prime farmland
53	Dawtonia-Rock outcrop complex, 20 to 50 percent slopes	Not prime farmland
55	Dawtonia-Dacont association, 20 to 50 percent slopes	Not prime farmland
146	Nurkey-Dawtonia association, 20 to 55 percent slopes	Not prime farmland
232	Whiteknob-Zer complex, 2 to 6 percent slopes	Not prime farmland
241	Yearian very stony loam, 1 to 4 percent slopes	Not prime farmland
256	Zer gravelly loam, warm, 2 to 15 percent slopes	Not prime farmland

Source: Natural Resources Conservation Service
Soil Survey Area: Challis, Idaho
Survey Area Data: Version 4, February 14, 2011

None of the soils listed above that fall within the proposed project area are listed as Prime, Unique or Farmland of Statewide Importance.

3.2.2 Surface and Groundwater Hydrology

The City of Challis relies on surface water derived from the Garden Creek watershed. Surface water from Garden Creek supplies the slow sand filter on the west side of town. The Garden Creek Watershed also supplies the groundwater source used by the City's West Well #2. The City's East Well is supplied by the Salmon Aquifer system. The document that best describes the geology and hydrogeology of these sources is "Hydrogeologic Analysis of the Water Supply for Challis, Custer County, Idaho", Otto, Wylie & Martin, Idaho Geologic Survey, 2005. A copy of the document is in Appendix B.

3.2.3 Fauna, Flora & Natural Communities

The following table lists Special Status Species likely to occur near the City of Challis. The information does not designate these species as occurring within the study area of the facility plan.

Special Status Species Known or Likely to Occur near Challis

Species	Type	Vegetation Type / Habitat	Soil Characteristics
Lemhi Milkvetch (Astragalus aquilonius)	2	Most abundant on gentle slopes near Challis, but also on steep erosive slopes and in washes; generally south facing, dry	Challis volcanic weathering; limestone gravelly slopes and shallow sandy loams

Species	Type	Vegetation Type / Habitat	Soil Characteristics
Welsh's buckwheat (Eriogonum capistratum var. welshii)	2	Alluvial fans of Big Lost River Range	Calcareous gravels
Alkali primrose (Primula alcalina)	2	Spring-fed calcareous headwaters system	Highly alkaline clay
Challis Milkvetch (Astragalus amblytropis)	3	Steep erosive slopes, little vegetated, south facing, dry	Challis volcanic weatherings including rhyolitic and andesitic weatherings
Meadow Milkvetch (Astragalus diversifolius)	3	Alkaline wet meadows	Soils often alkaline with obvious whitish deposits
Blue gramma (Bouteloua gracilis)	3	Unknown	Unknown
Chatterbox orchid (Epipactis gigantean)	3	Springside, thermal springs	Limestone weatherings
Marsh felwort (Lomatogonium rotatum)	3	Spring-fed calcareous headwaters system	Highly alkaline clay
Challis crazyweed (Oxytropis besseyi var. salmonensis)	3	Steep (30%) to more gentle slopes, generally south facing, or in washes. Usually dry, sparsely vegetated, open communities	Sandy to gravelly erosive substrates derived from Challis volcanics
Wavy leaf thelypody (Thelypodium repandum)	3	Steep erosive slopes, little vegetated, south facing dry	Challis volcanic weatherings, including rhyolitic and adesitic weatherings
Pale sedge (Carex livida)	4	Unknown	Unknown
White eatonella (Eatonelela nivia)	4	Mid-elevation desert	Sand to gravelly thin soil, often on basalt
Hoary willow (Salix candida)	4	Spring-fed calcerous headwater wetland systems	High alkaline clay
Rush aster (Aster juncuformis, Symphyotrichum boreale)	4	Unknown	Unknown

Rare and Endemic Species

Common Name	Scientific Name	Distribution
D = Disjunct | P = Peripheral | L = Limited | CI = Central Idaho | CE = Challis Endemic * Species known only from the Challis area		
Salmon River rabbitbrush	*Chrysothamnus parryi salmonesis*	CE
Salmon River Cryptantha*	*Cryptantha salmonesis*	CE

Wildlife living in the area includes elk, pronghorn, mule deer, sage grouse as well as many rodents, birds of prey and songbirds. The Herd Management Area (HMA) also provides critical winter range habitat for big game species, as well as a full complement of large predators with mountain lions, bears, and wolves.

3.2.4 Housing, Industrial and Commercial Development

The City of Challis is zoned and a copy of the zoning map is in Appendix D. The City completed a rate study with assistance from Idaho Rural Water Association (IRWA). The rate study identified and differentiated the water meters into residential and commercial equipment. The rate study and list of meters is in Appendix C.

3.2.5 Cultural Resources

The City of Challis lies at the boundary of three distinct cultural areas: the Plains, the Great Basin and the Columbia Plateau. The area contains 495 known, recorded cultural resource sites which represent a variety of types and chronological time periods. Together these sites document an almost continuous human occupation of the area from at least 11,000 years ago to the present. Historic sites in this area include historic mining districts, stage and freight road remnants, homesteads, cabins and dumps. The City of Challis has two National Historic Districts, the Old Challis Historic District and the Challis Brewery Historic District. Historic places in Challis are listed in the Table below.

National Register of Historic Places listings in Challis County, Idaho

Landmark name	Date listed	Location	City
Bayhorse	March 15, 1976	South of Challis off U.S. Route 93 44°23′52″N 114°18′42″W44.39778°N 114.31167°W	Challis
Board-and-Batten Commercial Building	December 3, 1980	Main Ave. 44°30′19″N 114°14′9″W44.50528°N 114.23583°W	Challis
Building at 247 Pleasant Avenue	December 3, 1980	247 Pleasant Ave. 44°30′13″N 114°14′10″W44.50361°N 114.23611°W	Challis

Landmark name	Date listed	Location	City
Buster Meat Market	December 3, 1980	Main Ave. 44°30′19″N 114°14′10″W44.50528°N 114.23611°W	Challis
Bux's Place	December 3, 1980	321 Main Ave. 44°30′17″N 114°14′6″W44.50472°N 114.235°W	Challis
Challis Archeological Spring District	February 12, 1981	Address Restricted	Challis
Challis Bison Jump Site	September 5, 1975	Address Restricted	Challis
Challis Brewery Historic District	February 5, 1980	Challis Creek Rd. 44°30′28″N 114°13′38″W44.50778°N 114.22722°W	Challis
Challis Cold Storage	December 3, 1980	Main Ave. 44°30′19″N 114°14′7″W44.50528°N 114.23528°W	Challis
Challis High School	December 3, 1980	Main Ave. 44°30′17″N 114°13′52″W44.50472°N 114.23111°W	Challis
Bill Chivers House	December 3, 1980	3rd St. 44°30′21″N 114°14′7″W44.50583°N 114.23528°W	Challis
Thomas Chivers Cellar	December 3, 1980	Challis Creek Rd. 44°30′27″N 114°13′34″W44.5075°N 114.22611°W	Challis
Thomas Chivers House	December 3, 1980	Challis Creek Rd. 44°30′27″N 114°13′52″W44.5075°N 114.23111°W	Challis
Custer County Jail	December 3, 1980	Main Ave. 44°30′18″N 114°13′49″W44.505°N 114.23028°W	Challis
False-Front Commercial Building	December 3, 1980	Main Ave. 44°30′17″N 114°14′9″W44.50472°N 114.23583°W	Challis
Emmett Hosford House	December 3, 1980	3rd St. 44°30′22″N 114°14′7″W44.50611°N	Challis

Landmark name	Date listed	Location	City
I.O.O.F. Hall	December 3, 1980	Main Ave. 44°30′17″N 114°13′59″W44.50472°N 114.23306°W	Challis
McKendrick House	December 3, 1980	4th St. 44°30′12″N 114°14′3″W44.50333°N 114.23417°W	Challis
Old Challis Historic District	December 3, 1980	Bounded by Valley and Pleasant Aves., 2nd and 3rd Sts. 44°30′13″N 114°14′10″W44.50361°N 114.23611°W	Challis
Bill Peck House	December 3, 1980	16 Main Ave. 44°30′18″N 114°14′17″W44.505°N 114.23806°W	Challis
Penwell House	December 3, 1980	North Ave. 44°30′23″N 114°13′50″W44.50639°N 114.23056°W	Challis
Donaldson Rowles House	December 3, 1980	North Ave. 44°30′22″N 114°13′23″W44.50611°N 114.22306°W	Challis
Henry Smith House	December 3, 1980	5th St. 44°30′13″N 114°13′59″W44.50361°N 114.23306°W	Challis
Stone and Log Building	December 3, 1980	Pleasant Ave. 44°30′16″N 114°14′6″W44.50444°N 114.235°W	Challis
Stone Building	December 3, 1980	3rd St. 44°30′20″N 114°14′7″W44.50556°N 114.23528°W	Challis
Twin Peaks Sports	December 3, 1980	Main Ave. 44°30′20″N 114°13′59″W44.50556°N 114.23306°W	Challis
Clyde Wilkinson House	December 3, 1980	9th St. 44°30′25″N 114°13′46″W44.50694°N 114.22944°W	Challis

Construction of capital improvements identified by this facility plan will occur in the streets and other rights-of-way and will not impact cultural or historic resources.

3.2.6 Utility Use

The City of Challis provides drinking water and sanitary sewer to its residents. Other utilities that serve the community are:

- Solid Waste – Blue Mountain Refuse
- Propane - Salmon River Propane
- Telephone – Custer Telephone

Recommended Project #1 (RP1) derived from this facility plan will increase the City's electrical consumption. RP1 includes (2) new groundwater wells and pumping plants to add capacity the (2) existing groundwater sources. The City's electrical consumption for groundwater pumping will double when the wells are online and meeting the planning year demand.

3.2.7 Flood Plains & Wetlands

The 100-year floodplains for both the Salmon River and Garden Creek are shown in Appendix D Maps & Charts. The National Flood Insurance Program (FNIP) has established the 100-year flood as the basis for determining minimal land use measures for construction of new facilities or substantial improvements to existing development in flood hazard areas. Executive Order 11900 and EPA Flood Insurance Requirements (PRM-71) further define requirements for flood proofing of water and wastewater facilities in accordance with the NFIP. These requirements have been addressed as part of the proposed project.

Historical Frequency Flash Floods

Place	Date	Event	Magnitude / Reported Damage
Challis	9/18/1940	Flash Flood	Washed out section of Highway 93
Challis	7/26/1941	Flash Flood	Washed out irrigation ditches, outbuildings
Challis	8/20/1941	Flash Flood	Highways & irrigation ditches washed out
Challis	7/17/2007	3:45 PM	Over 1" of rain in one hour

Historical Frequency River or Stream Flooding

Place	Date	Event	Details
Challis	1/6/1938	Flood	Salmon River floods / Water covers highway 27 below Challis
Challis	1/31/1940	Flood	Ice jam caused flooding / Water washed out Highway 27
Challis/ Mackay	3/31/1943	Flood	Rapid snow melt caused flooding / State Hwy 27 closed, other roads washed out including main street in Challis
Challis	1/15/1974	Flood	Salmon River floods / 2 bridges and 8 basements flooded

A map of the National Wetlands Inventory, for the Challis area with locations where the proposed project may intersect wetlands can be found in Appendix D. No wetlands have been designated within the project area. No wetlands will be affected by any capital improvement project identified by this facility plan.

3.2.8 Wild/Scenic Rivers

The Salmon River located past the east border of the study area is a designated "Wild/Scenic River" and the only such designated waterway near the study area.

- Designated Reach: July 23, 1980. The segment of the main stem from the mouth of the North Fork of the Salmon River downstream to Long Tom Bar.
- Classification/Mileage: Wild — 79.0 miles; Recreational — 46.0 miles; Total — 125.0 miles.

3.2.9 Public Health and Water Quality Considerations

The City has both treated surface water and groundwater sources for drinking water. As of the latest sanitary survey, there are no compliance issues with the water system. The water system meets current standards for protection of the health and safety of the public. The City does have increasing concerns about its surface water supply since the Garden Creek watershed that provides the water is unprotected. Idaho Rural Water Association (IRWA) completed a Drinking Water Protection Plan for the City in 2003 that details vulnerability concerns with this source. A copy of the protection plan is located in Appendix B. The facility plan addresses how the City can overcome the vulnerability issue with Garden Creek by installing (2) more groundwater sources.

3.2.10 Important Farmlands

The following table lists soil groups within the study area. None of the soils listed in the table are listed as Prime, Unique or Farmland of Statewide Importance.

Table of Soils within the Challis Basin and Area of Impact

Map Symbol	Map Unit Name	Farmland Classification
10	Bayhorse-Dawtonia association, 15 to 40 % slopes	Not prime farmland
31	31 Calcids-Rubble land-Rock outcrop complex, 50 to 80 percent slopes	Not prime farmland
48	Dawtonia very gravelly loam, 4 to 8 percent slopes	Not prime farmland
49	Dawtonia-Dawtonia, cold complex, 5 to 25 percent slopes	Not prime farmland
51	Dawtonia-Frailton complex, 20 to 50 percent slopes	Not prime farmland
53	Dawtonia-Rock outcrop complex, 20 to 50 percent slopes	Not prime farmland
55	Dawtonia-Dacont association, 20 to 50 percent slopes	Not prime farmland
146	Nurkey-Dawtonia association, 20 to 55 percent slopes	Not prime farmland
232	Whiteknob-Zer complex, 2 to 6 percent slopes	Not prime farmland
241	Yearian very stony loam, 1 to 4 percent slopes	Not prime farmland
256	Zer gravelly loam, warm, 2 to 15 percent slopes	Not prime farmland

Source: Natural Resources Conservation Service
Soil Survey Area: Challis, Idaho
Survey Area Data: Version 4, February 14, 2011

3.2.11 Proximity to Sole Source Aquifer

There are no sole source aquifers located in the planning area of this facility plan.

3.2.12 Land Use and Development

Of the 3,152,384 land acres in Custer County, the Federal government owns 93%. The USFS owns 2,123,710 acres and the BLM owns 813,965. The State of Idaho owns 1.7% of the County‘s acres including 52,626 Endowment land acres, 1,253 Fish and Game acres and 22 Park and Recreation acres. Cities and the County own less than 1% of the land. Private land is 5% of the total at 158,503 acres.

The Custer County All Hazards Mitigation Plan (AHMP) contains maps that show the distribution of land ownership in Custer County. Most of the Forest Service land is located in the south and west areas of the County. A copy of the AHMP is located in Appendix B. The Bureau of Land Management has most of its land in the Pahsimeroi, Little Lost River,

the Salmon, and Big Lost River Valleys. State of Idaho Lands is scattered throughout BLM land. Private land is concentrated around the major roads and near or within cities.

DESCRIPTION OF LAND OWNERSHIP	ACRES OF LAND OWNED
U.S. Forest Service	2,123,710
Bureau of Land Management	813,965
State Endowment	52,626
Idaho Fish & Game	1,253
Custer County	2,300
Municipal	5
Total Private	158,503
Total Federal Land	2,937,675
Total State Land	53,879
Total Land	3,152,384

3.2.13 Formally Classified Lands

The Salmon/Challis National Forest and the Frank Church River of No Return Wilderness lie to the west, northwest of Challis. The Salmon River flows northerly to the east of Challis. Classified lands include the Sawtooth National Recreation Area, Redfish Lake, the Yankee Fork Gold Dredge, the historic ghost town of Custer lie to the south southwest of Challis. None of these lie within one mile of the project planning area, although the Bureau of Land Management Buffalo Jump Interpretive Center is 1.75 miles to the south, southeast of Challis.

There are no national or state parks, or campgrounds within the planning area. There are no national, state, or private animal refuges within the planning area. The Challis Municipal Golf Course is within the service area and does provide camping / recreational vehicle camping, but no recommended improvements identified by this plan impact the Challis Municipal Golf Course.

3.2.14 Climate – Precipitation, Temperature and Prevailing Winds

The average rainfall for the Challis area is 7.38 inches in a year. Average snowfall is 17.1 inches. The average high temperature is 58 (degrees Fahrenheit) and the average low temperature is 30. The month of July is typically the warmest and the driest month, averaging 85 degrees Fahrenheit. January is typically the coldest month and June is generally the wettest month.

TABLE
Average High Temp

Dec., Jan., Feb.	Mar, Apr, May.	June, July, Aug.	Sept, Oct, Nov.
33.3F	57.7F	81.5F	59.6F

TABLE
Average Low Temp

Dec, Jan, Feb.	Mar, Apr, May.	June, July, Aug.	Sept, Oct, Nov.
11.6F	31.4F	47.7F	30.7F

3.2.15 Air Quality & Noise

Custer County is not located in an Idaho air quality "Nonattainment Area" planning area. Construction of capital improvements as a result of this facility plan may impact air quality and create noise. Both noise and air impacts can be mitigated through application of the Idaho Standards for Public Works Construction (ISPWC) which typically specifies dust control measures and timing of construction.

3.2.16 Energy Production and Consumption

Electrical service is provided to the community by an REA utility, Snake River Electric Cooperative. The facility plan does not include any elements for electrical production.

3.2.17 Socioeconomic Profile of the Community

The population of Challis has fallen from a high of 1,073 in 1990 to 956 in 2006, an 11% decline. The population is 94.9% white, 3.9% Hispanic, 0.7% American Indian and 0.6% report two or more races. The population is 50.5% female and the median age is 41.8 years.

The most common industries in Challis are mining, quarrying, educational services, construction, accommodation and food services, agriculture, forestry, fishing and hunting, public administration, food and beverage stores. The major employers in Custer County are the Challis & Mackay Joint School District #181 & #182, Custer County, Idaho & U.S. Government (BLM, F&G, Ag), Lamb's Foodtown, The Village Inn, Thompson Creek Mining Company and Village Square

- Retail trade (33%)
- Accommodation and food services (15%)
- Public administration (9%)
- Mining, quarrying, and oil and gas extraction (8%)
- Professional, scientific, and technical services (8%)
- Finance and insurance (6%)
- Agriculture, forestry, fishing and hunting (5%)

TABLE
Service Area Employers

ITEM NO.	NAME	PRODUCT OR SERVICE	EMPLOYEES
1	Tri Pro Lumber Company	Wood Products	75
2	Challis Motel	Motel	8
3	Brant Cedar	Wood Products	6
4	JR Industries	Machine Shop	4
5	Custer Concrete	Concrete Mix	3

3.2.17.1 Assessed Property Valuations

Market values for the Tax Code Areas within the City of Challis Water District were provided by Custer County. Valuations for residents within the taxing district are listed as follows:

TAX YEAR	ASSESSED VALUATION
2000	$12,802,264
2001	$12,812,654
2002	$12,132,218
2003	$12,521,859
2004	$12,666,740
2005	$13,849,974
2006	$17,157,,118
2007	$21,235,390
2008	$20,709,337

3.2.17.2 Outstanding Bonded Indebtedness

The City of Challis has no outstanding indebtedness.

3.2.17.3 Surplus and Reserve Funds

The City of Challis records indicate the following surplus and reserve funds:

DESCRIPTION	AMOUNT IN FUND
Checking Account	$921.59
Money Market Account	$28,029.48
Savings Account	$640.47

City records indicate the following surplus and reserve funds:

DESCRIPTION	AMOUNT IN FUND
General Fund	$4,000.00

3.2.18 Maps, Site Plans, Graphics, Etc.

Please see the facility plan appendices for this information.

3.3 Existing Sources, Distribution System & Treatment

The map of the existing water system with labels for the elements described below is shown in Figure 2 in the Appendix A. Table 1 Appendix A lists the pipe diameters, lengths and hydrants in the existing system. The data source for Table 1 is the City's map, "Water Main System of Challis, Idaho". A full sized copy of this map is in Appendix D.

3.3.1 Water Sources

The City has surface and groundwater sources for drinking water. The surface water source comes from a slow sand filter treatment plant. Garden Creek supplies the treatment plant. Elevation of the treatment plant is about 5435 feet. The City uses this source from about March to December. It supplies the Old Town portion of the distribution system. The City has the water right to divert 1.58 CFS from Garden Creek and the diversion rate is regulated at the control structure on Garden Creek. Peak flow from this source is about 950 GPM. The peak flow from the treatment plant can exceed the diversion rate because diverted water creates a reservoir above the surface of the filter media. The reservoir plus the stored treated water in the clear well allows the treatment plant to meet City demands exceeding the diversion rate at Garden Creek.

The City has (4) groundwater wells of which only 2 are currently in service. The (2) wells in service are West Well #2 (WW2) and East Well (EW). Neither well supply is currently disinfected. Challis has 2.73 CFS in water right for its west and east wells. WW2 is located on the west end of town in the Garden Creek drainage at a surface elevation of about 5420 feet. WW2 derives its water from fractured basalts that this report terms "Garden Creek Aquifer System". More information about the hydrogeology of Challis' water supply can be found in "Hydrogeologic Analysis of the Water Supply for Challis, Custer County, Idaho", Bruce Otto, et. al., Idaho Geologic Survey, 2005, located in Appendix D.

WW2 ties to the West Reservoir which controls its operation. WW2 primarily supplies the upper Cyprus pressure zone during March through December when the Garden Creek source is operational. When Garden Creek is not operational, West Well 2 supplies the Old Town Distribution system though a pressure reducing valve (PRV) at Garden Creek Road. A gate valve isolates the PRV and the connection to Old Town until staff wants to

divert flow to Old Town. WW2 is also connected to East Reservoir. The City uses the East Reservoir connection to supplement and blend WW2 water with the harder (calcium carbonate hardness) water developed form EW. Water quality data for West and East wells is located in Appendix B. Flow rate from WW2 is about 400-500 GPM. A copy of the well log for WW2 is located in Appendix B.

East Well is an alluvial well completed in what this report terms “Salmon Aquifer System”. EW is located about 1 mile east of US Highway 93 in the Middle Cyprus distribution system and ties to the East Reservoir which controls its operation. Surface elevation for this source is about 5,100 feet. East Well is highly productive and supplies about 600 GPM to the system. East Well primarily serves the Middle and Lower Cyprus distribution system. Flow rate from East Well is about 600 GPM and its well log is located in Appendix B.

3.3.2 Pumping Facilities and Appurtenances

The Garden Creek surface water treatment system supplies the Old Town distribution system by gravity. The disinfection equipment uses a booster pump to create velocity for the chlorine gas injection. Flow from the treatment system is metered and has a recording chart. More details about this system are on file with IDEQ-IFRO and the latest Sanitary Survey concerning the treatment plant can be found in Appendix G.

West Well 1 (not currently operational), West Well 2, and East Well all have lineshaft turbine pumps to deliver water from the well to the distribution system, as follows[4]:

- East Well – 75 HP, 3 PH, 1770 RPM driver with FLOWAY 10-inch 9-stage pump. Metered.
- West Well 1 (not operational) – 50 HP, 3 PH, 1170 RPM driver with FLOWAY 10-inch 16-stage pump. Not metered.
- West Well 2 – 125 HP, 3 PH, 1770 RPM driver with Aurora Vertiline 10-inch, 16 stage pump. Metered with chart recorder.

None of the wells have standby power generation. All wells are metered but only West Well 2 has a recording chart. More details about the City wells and equipment is on file with IDEQ-IFRO and the latest Sanitary Survey concerning them can be found in Appendix G.

3.3.3 Storage and Distribution System

This section describes the City’s existing storage facilities and provides an analysis of the storage capability to meet peak hour demand with the City’s current source water production.

[4] Data supplied by Corey Rice, City of Challis Water/Wastewater Superintendant

3.3.3.1 Water Storage and Its Distribution System.

The City has two storage and distribution systems – Old Town and Cyprus. The Old Town system is the original distribution system and uses the impoundments and Clearwell at the slow sand filter treatment plant for storage. The impoundments total several million gallons in storage, and the Clearwell has about 30,000 gallons in storage. The Old Town system and the Cyprus system can be interconnected through isolation valves at Seventh, Tenth, Eleventh Streets, and at the pressure reducing station at Garden Creek Road.

The Cyprus distribution system is newer, completed in the 1980's as part of expansion project by Cyprus Mines, Ltd. Cyprus mines paid for the engineering and installation of the Cyprus distribution system which includes (2) 200,000 gallon concrete reservoirs. Both reservoirs are about 12 feet in depth. The City has named the storages West Reservoir and East Reservoir.

West Reservoir is located west of the City on a small hill top. Reservoir elevation is about 5,550 feet and supplies the upper pressure zone. West Reservoir is a back up supply to the East reservoir through a float valve located at that storage. West Reservoir supplies the Upper Cyprus and a small portion of the Mid-Cyprus pressure zones. East Reservoir is south of town and about 0.75 miles east of West Reservoir. Structure elevation is about 5,320 feet, and East Reservoir supplies the Mid Cyprus and Lower Cyprus pressure zones. See Figure 2 Appendix A for the location of these facilities

There are 2 normal operating modes for the distribution system: nominally March to December and January through February. During the March/December period, the City uses the Garden Creek surface water system, and it supplies the demands for Old Town distribution system. West Well 2, East Well, and the 2 reservoirs supply the Cyprus system. This period is the maximum consumption demand of City. The January/February period is the low demand time of the City. The City does not operate the Garden Creek source during this period. Drinking water is mainly provided by West Well 2. The City cycles East Well on occasion during low demand.

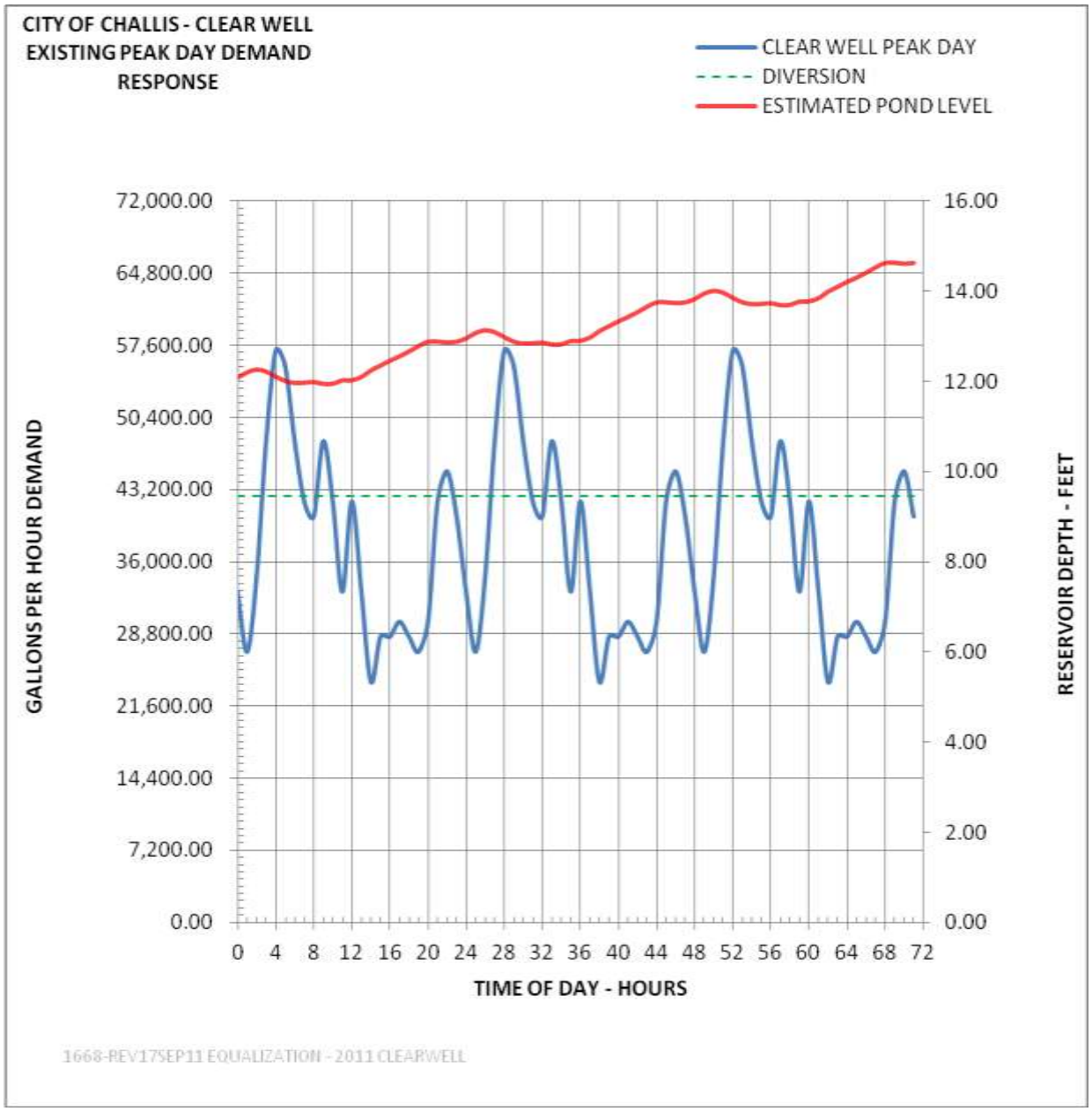
3.3.3.2 Analysis of Storage Response – Garden Creek Surface Water System

There are two factors that govern the response of the Garden Creek Surface Water System to consumptive demands from Old Town – maximum water right diversion rate to the slow sand filters and the design output of the slow sand filters. The diversion water right is 1.58 CFS[5], or an average of about 709 GPM. This right is yearlong, 24 hours per day, and has some restrictions. See documents on the City's water rights in Appendix B.

The maximum output rate of the filters is governed by the hydraulic surface loading of the filters. Typically slow sand filters are loaded between 0.015 to 0.15 gallons per minute per square foot of filter area[6]. The City is not able to produce record information about the construction of the slow sand filter beds. CH2MHill in its April 1981 Master Pan and

[5] IDAHO DEPARTMENT OF WATER RESOURCES Water Right Report 72-47. See Appendix B
[6] "Slow Sand Filtration", Tech Brief Fourteen, National Drinking Water Clearinghouse Fact Sheet, June 2000

Preliminary Engineering Report states the maximum production of the filters is 1.56 MGD or an average flow of about 1,083 GPM. The peak hour/peak day demand of the Old Town System is about 950 GPM (57,000 GPH) (See Section C.1 Water Sources). The Garden Creek system has sufficient capacity to meet peak hour demand without any lowering of the water surface elevation over the filters. The graph below assumes the water depth is 12 feet:



3.3.3.3 Analysis of Storage Response – East & West Reservoirs.

The West Reservoir directly supplies the upper and a small portion of the mid Cyprus pressure zone around Summit Circle and Blue Mountain Road. West Reservoir also connects to the East Reservoir as a backup supply. Flow to the East Reservoir from West Reservoir is governed by a float valve. The proportioning of usage between West 2 and East Well to meet the total Cyprus system demand is an operational procedure managed by City staff. The East Reservoir directly supplies the lower Cyprus pressure zone and the remainder of the Mid Cyprus zone.

Table 2 in Appendix A shows how the water system connections and system Equivalent Dwelling Units(EDUs) are distributed in the Upper, Mid, and Lower Cyprus zones as well as the Old Town system. 1 EDU = 1 residential water connection based on a 5/8 x 3/4 inch meter service. Other meter sizes have different EDU values. See Appendix C for City Water Rates and Meter Sizes. A summary of Table 2 values follows below:

- Total system from Challis Rate Study - 789 Connections, 984 EDUs
- Hydraulic Model Lower Cyprus East Reservoir (LCER) – 136 residential connections, 7 commercial EDUs, total 143 EDUs
- Hydraulic Model Mid Cyprus East Reservoir (MCER) – 163 residential connections, 40 commercial EDUs, total 203 EDUs
- Hydraulic Model Old Town System (OTS) – 329 residential connections, 162 commercial EDUs, total 491 EDUs.
- Hydraulic Model Upper Cyprus West Reservoir (UCWR) – 126 residential connections, 28 commercial EDUs, total 157 EDUs.

We analyzed the performance of the City's East and West reservoirs to see if the aggregate 0.4 MG storage would be sufficient to meet the existing peak day/peak hour demand. Tables 3, 4 & 5 and their respective graphs in Appendix A show the results. The City has sufficient storage with its existing well sources to meet the peak day/peak hour demand.

3.3.3.4 Treatment facilities

The City's only water treatment facility is the Garden Creek slow sand filter and disinfection system. None of the well supplies are currently disinfected.

3.3.3.5 Current Peak Hour Water Demands – Summer & Winter – The Diurnal Curve – How It Was Generated and What It Means.

Riedesel typically uses a diurnal curve to model present and future demands and hydraulic response of the distribution system to those demands. When we have data available we generate specific curves for the system showing peak hour- peak day consumption, and low hour -low day consumption. The diurnal curve is an essential tool

in digital hydraulic modeling of the system. The curve it tells us the critical hour to use for simulating a fire flow demand on the system.

As mentioned above only 2 of Challis' 3 currently operating sources have recording charts – Garden Creek slow sand filter (GCSSF) and West Well 2. The following summarizes the creation of the peak flow and low flow diurnal curves for Challis:

- GCSSF connects directly to the Old Town distribution system. Its flow chart represents the time delineated demand of Old Town during peak day. We searched City records for a chart showing peak demand and chose the chart for July 22, 2006.
- WW2 connects to West Reservoir and is either "On or Off". The recording chart does not directly depict a time delineated consumption pattern for this source. The chart shows the reservoir demand for water based on the level controls in the tank. We searched City records for a chart showing a peak day usage and chose the chart for July 26, 2006.
- The City manually collects flow data for East Well by observing the instantaneous flow when the operator periodically records the meter readings to calculate pumpage. The City's observations are more or less monthly. We searched City observations for a record showing peak demand and chose the record for July 26, 2006.

The year 2006 had the highest water demand in the 2005-2009 record of the City. Demand record for 2005-2009 is shown in Figure 4 Appendix A.

We created a composite diurnal curve for the City using the peak day data from all 3 sources. We assumed GCSSF chart to be representative of the entire system, Old Town and Cyprus for low flow and peak flow. We used to flow data from WW2 and East Well to scale up the GCSSF data, that is, we summed the peak day flows and then used the hourly variability of the GCSSF chart to determine the peak hour flow for a specific hour for the composite diurnal curve. For example:

- The peak day flow for the Garden Creek Slow Sand Filter is 907,500 gallons
- The flow from the chart at hour 04:00 is 950 GPM
- The GCSSF peak hour scaler for 04:00 is 950/907,500 or 0.00105 (rounded) GPM/GPD
- The product of total composite flow multiplied by the scaler is the composite peak hour flow for 04:00 – 0.00105 (rounded) GPM/GPD X 1,862,150 GPD = 1,949.36 GPM

We assumed the GCSSF chart to be representative of the system during the wintertime low flows when the filter is not operational. We used the records from WW2 and East Well to scale down the GCSSF data in the same manner described above. Copies of the data are located in Appendix B. The following tables summarize the City's peak hour-peak and low flow diurnal curve for the year 2010. The graph of the composite curve, showing peak day and low day is shown in Figure 3, Appendix A.

CITY OF CHALLIS - PEAK DAY SUMMARY

SOURCE	PEAK HOUR	PEAK HOUR GPM	GPD FROM SOURCE	% OF COMPOSITE	COMPOSITE GPD
GCSSF	4:00 AM	950	907,500	48.7%	1,862,150
WW2	N/A – SUPPLIES WEST RESERVOIR. "ON OR OFF".	*410 *PEAK FLOW FROM CHART	448,950	24.1%	1,862,150
EAST WELL	N/A – SUPPLIES EAST RESERVOIR. "ON OR OFF".	*507 *OBSERVED AT TIME OF DATA GATHERING	505,700	27.2%	1,862,150
TOTALS			1,862,150	100%	

CITY OF CHALLIS - LOW DAY SUMMARY

SOURCE	PEAK HOUR	PEAK HOUR GPM	GPD FROM SOURCE	% OF COMPOSITE	COMPOSITE GPD
GCSSF	N/A	N/A	0	0	279,100
WW2	N/A – SUPPLIES WEST RESERVOIR. "ON OR OFF".		215,100	77%	279,100
EAST WELL	N/A – SUPPLIES EAST RESERVOIR. "ON OR OFF".		64,000	23%	279,100
TOTALS			279,100	100%	

Some observations:

a.) Composite Curve. The peak day/peak hour diurnal curve is a composite based on both operational experience from City staff and peak flow data we collected. Other combinations of flow data from the 3 sources collected on different dates could produce other conclusions about peak and peak hour flows.

b.) Irrigation and Potable Consumption. The peak day flow composite represents source water input into the water system. It includes potable consumption, irrigation, potential leaks, etc., for both residential and commercial connections.

c.) Composite vs. Actual Diurnal Curve. There are several ways this composite curve differs from what a typical municipal curve looks like. First, the curve is more quad-urnal than diurnal, in that is it has 4 distinct peak hour flows instead of 2. Second, the peak hour, 04:00 is about 3-4 hours earlier than typical[7] . The same skew applies to the 4th peak occurring at about 22:00 hours. Third, neither the peak hour flow nor the low flow ever reaches or approaches 0 GPM flow during the 24-hour period. One would expect such a drop in demand in a metered distribution system with minimum leakage and minimal unaccounted water[8]. The lowest value for the low flow day is about 123 GPM at 14:00 hours.

[7] Residential End Uses of Water, Figure ES.4, page xxxi & Figure 5.21, page 125. William B. DeOreo et.al, AWWA Research Foundation and American Water Works Association, 1999.
[8] Ibid.

The lowest value for the peak day is about 821 GPM at 14:00 hours. The lowest value from the GCSSF curve from which these flow values are based is 400 GPM at 14:00 hours. Typically, the difference between the ideal approaching zero demand and the low flow shown on a diurnal curve is caused by a combination of leaks, other lost water, irrigation, and data accuracy. The City of Challis sits atop a highly permeable alluvial fan which affects the ability of the City to detect a leak because it does not surface, and creates a high irrigation demand to maintain landscaping. Challis has vigorously pursued system leaks, and the historical decline in water use in the period from 2005 to 2009 reflects this effort. See Figure 4 Appendix A. Both the City and Idaho Rural Water consider lost water and leaks to be no more than about 4% of the total daily flow[9]. We estimate the low flow from the GCSSF chart to be representative of actual summertime peak day irrigation demand. Based on the data available, the curve is our representation of time delineated flows in the system at peak day demand.

The main purpose of creating a time delineated flow for the City is to determine the timing of the peak hour and the flow probably occurring at that time. We time the occurrence of a fire flow demand in the digital hydraulic model at that peak hour to simulate the worst-case stress on the system when responding to a fire. Determining how Challis meets the regulatory requirements of fighting a fire is one of the goals of this facility plan. The composite curve provides the critical hour and the system flow at that time.

We estimated Challis 2010 population at 906 persons, and the composite peak hour demand totals about 2,055 gallons/capita/per day (GPCD). There are about 984 existing EDUs. Demand per EDU is 1,892 gallons per day. The peak hour demand includes potable consumption, commercial use, and irrigation. Figure 4 shows a plot of yearly water use from 2005 to 2009 for each of the 3 sources based on City records[10]. Figure 5 plots total water use with population and average GPCD consumption for the same period. Average percapita consumption for this period is 644 gallons per day, with a high use in 2005 of 713 GPCD and a low use in 2009 of 581 GPCD. Typical water system peaking factors that estimate peak hour flow from average flow range from about 2 to 4. Using "10 States"[11] formula to estimate a peaking factor yields an average factor of 3.84 based on the population for the period of 2005-2009. The product of the 2005 average percapita demand multiplied by the peaking factor yields a peak flow of 2,738 GPCD. Using the factor and the low flow from year 2009, the peak flow is 2,231 GPCD.

3.3.3.6 Cross Connection Control

The City of Challis has a cross connection ordinance. A copy is included in Appendix B.

3.3.3.7 Most Recent Sanitary Survey

[9] Conversation with Bill Hayes, Idaho Rural Water Circuit Rider and author of the 2011 Water Rate Study for Challis, and Corey Rice, City of Challis Water/Wastewater Superintendant

[10] Note – 2009 is a projection.

[11] "Recommended Standards for Wastewater Facilities" – 2004 Edition, page 10-6, Figure 1. Note – the chart source is not specific to wastewater estimation.

The most recent Sanitary Survey of the City, performed by IDEQ-IFRO is dated August 5, 2009. The survey did not identify any significant deficiencies or any deficiencies in general. Comments include:

- ***Groundwater Source*** - *"The pump distribution line for West Well #1 & #2 and East Well #1 do not provide the necessary valves and appurtenances to allow the well to be pumped to waste at the design capacity of the well via an approved air gap at a location prior to the first service connection, as required by IDAPA 58.01.08.511.02."*
- ***Groundwater Source – "****The pump distribution line for West Well #1 does not provide an instantaneous and totalizing flow meter equipped with nonvolatile memory pursuant to IDAPA 58.01.08.511.04. The Department has deemed a flow meter to be unnecessary for West Well #1 at this time. The requirement of a flow meter will be reevaluated every time an ESS is conducted.* ***(No Action Required)".***
- ***Distribution – "****There are fire hydrants provided that are connected to water mains smaller than six (6) inches in diameter, which is not in accordance with IDAPA 58.01.08.542.06."*
- ***Pumping – "****There is no auxiliary power on-site for West Well #1 & #2 and East Well #1 as required by IDAPA 58.01.08.501.07. According to the operator, the power outages experienced by the system are of minimal frequency and duration that auxiliary power will not be required. The need for auxiliary power on-site will be reevaluated every time an ESS is conducted.* ***(No action required at this time)".***

The alternatives presented later in this report address fire hydrants and standby generation plants at the proposed new wells. The Sanitary Survey is included in Appendix G.

3.4 Drinking Water Quality

The City of Challis is in compliance with all drinking water quality rules. Copies of test reports can be found in Appendix B. There are some quality concerns in developing additional ground water supplies in the Salmon Aquifer System (SAS). The groundwater from these wells is harder than groundwater from the Garden Creek Aquifer System (GCAS). Recent test reports for hardness and related analytes are also in Appendix B. The following table summarizes the most recent tests:

WELL	SOURCE	HARDNESS MG/L	TDS MG/L	pH
WEST WELL 1	GCAS	70.7	213	7.61
WEST WELL 2	GCAS	65.9	213	7.77
EAST WELL	SAS	108	246	7.58
CHALLIS AIRPORT	SAS	112	226	7.35
BUTTS SUBDIVISION	SAS	92.7	220	7.23

The City of Challis blends groundwater from East Well with West Well 2 water in the East Reservoir to mitigate the hardness for its customers.

3.5 Hydraulic Analysis of Existing Conditions

Riedesel created a hydraulic model of the City's distribution system, water sources, and storage tanks using Innovyze® (formerly MWH Soft®) H2OMAP Water 9.6 (H2OMAP), Update #4. Hydraulic data used in the existing system model are located in Appendix F. The model is un-calibrated and is suitable for facility planning. If and when the City proceeds to a design phase, the model should be calibrated to confirm the design. The model simulates the performance the drinking water system at peak day demand and demonstrates the pressure effects under peak day demand for fire flow. The model is based on the following data:

- Water Main System of Challis, Idaho - Mountain River Engineering, September, 1995. The map shows the location of pipes in the system and their respective diameters and age; location of pressure reducing valves; location of fire hydrants; key isolation valves; and operational notes. Riedesel created a *.TIFF of this map, overlaid upon a Google Earth Pro ©2010 image, and scaled it to match the Google Earth image. The scaled image provided the pipe lengths used for model. We made a *.DXF of the map pipe network and imported this *.DXF into the H2OMAP program giving the model the correct spatial representation of the system. Please see Table 1 Appendix A for a summary of the existing pipelines in the distribution system.
- Composite Diurnal Curve. The composite diurnal curve created for this facility is discussed in detail in a previous section. The curve informs the hydraulic model about the time delineated demands in the system, that is the total peak hour demand for the peak day and how that total is distributed by hour for the peak day. Please see Figure 3 Appendix A for the composite existing system diurnal curve.
- Nodes and Node Demand Loading. Model nodes are pipeline junctions, hydrant locations, or other specific points of interest in a pipeline run. The model uses these nodes to represent how the total peak day demand is distributed over the City. In the case of fire flow simulations, we loaded the existing fire hydrant locations with the design fire requirements. City staff provided guidance where a cluster of water services might be represented by a demand node in the model. We loaded these demand nodes with their pro rata share of the total peak day flow based on the number of connections represented by the node. The existing system model has 195 demand nodes, 86 of which represent fire hydrants.
- Node Elevations. We used Google Earth Pro ©2010 (GEP) to determine node elevations for the model. The GEP image dates from June, 2009.
- Hazen Williams Friction Factor. We used a Hazen's factor (C) of 120 for all existing pipes in the system, and C of 130 for all new pipes.

3.5.1 Existing System Peak Hour Simulations

The model includes the operation of the Garden Creek Slow Sand Filter, West Well 2, East Well, the two 0.2MG storage reservoirs, and 2 existing pressure reducing valve stations. A copy of the modeling output of the existing system model is shown in Table 4 Appendix A. The modeling simulations predict the following:

- The existing distribution system can meet the existing peak hour demand and stay within the guidelines of IDAPA 58.01.552.01.b.ii, even with extensive quantities of old 4-inch mains. For the most part the distribution system is effectively looped.
- There are some areas where the static and dynamic pressures exceed the requirements of IDAPA 58.01.552.01.b.iii.
- East and West Reservoirs have sufficient volume coupled with the performance of East and West Well 2 to meet equalization requirements for peak day/peak hour demand.

A complete set of data for the model's existing system peak day demand can be found in Appendix F.

3.5.2 Existing System Fire Flow Demand at Peak Hour Simulations

The official empowered to determine the design fire criteria for the City is Launna Gunderson, Chief, North Custer Rural Fire District. Chief Gunderson selected the minimum required fire flow and duration - 1,500 GPM for 2-hour duration[12]. The design fire requires either equalization storage of 180,000 gallons or source(s) that can provide peak day flow and 1,500 GPM. Challis' (3) water sources do not have peak hour and fire flow capacity. The City's 2 reservoirs impound 400,000 gallons and have sufficient fire storage. Fire storage is 180,000 gallons.

Chief Gunderson expressed concerns about Challis' existing distribution system that limits the District's ability to fight a fire. Those concerns are:

1. There are many pipelines that were not replaced in the most recent water project (circa 1980). These are primarily the 4-inch lines in the Old Town distribution system.
2. There are fire hydrants connected to 4-inch lines.
3. Some of the hydrants (Pacific States) are not operational and some will not close again if opened.
4. Hydrant spacing is greater than current standards. Current standards[13] are summarized as follows:

[12] 2009 International Fire Code, Copyright © 2009 by International Code Council, Inc., Appendix A, Table B105.1
[13] 2009 International Fire Code, Copyright © 2009 by International Code Council, Inc., Appendix B, Table C105.1

- Minimum number of hydrants - 1
- Average spacing between hydrants – 500 feet
- Maximum distance from any point on street or road frontage to a hydrant – 250 feet

The existing system composite diurnal curve shows the peak hour of the peak day to be 04:00 hours. The H2OMAP performs a comprehensive fire flow analysis at the determined peak day-peak hour using the data from the existing system model and the assigned fire demand nodes. A copy of the output report is in Appendix F. A copy of the existing system operating at peak day-peak hour demand with fire flow demand is shown in Figure 6 Appendix A. The modeling simulations predict the following:

- The existing distribution system cannot meet the existing peak hour demand with the design fire criteria and stay within the guidelines of IDAPA 58.01.552.01.b. i. Figure 6 Appendix A shows that intensely looped old 4-inch mains can meet the design fire requirements. It is the peripheral nodes that fail the demand.
- With the exception of 2 dead end nodes, the maximum compliant fire flow the existing system can provide is 500 GPM. Please see Figure 7 Appendix A.

A complete set of data for the model's existing system peak day demand with fire flow can be found in Appendix F.

3.6 Violations and Compliance Issues

The City is not operating under any violation or compliance issues. A copy of the latest sanitary survey is included in Appendix G.

3.7 User Charges and Operations Budget

Challis has changed its schedule for water and sewer rates. The new schedule takes place in October, 2011. A copy of new fiscal year budget, rates, and rate ordinance are in Appendix C.

3.8 Pressure Zone and Problems

The Idaho Administrative Procedures Act (IDAPA) establishes rules for public drinking water systems in IDAPA 58.01.08. Section 552.01.b addresses minimum and maximum distribution system pressures. In general, these pressures are:

- Minimum of 20 PSI during peak hour demand including fire flow demand (58.01.08.552.01.b.i)
- Minimum of 40 PSI during peak hour demand excluding fire flow (58.01.08.552.01.b.v)
- Ordinary maximum static pressure of 80 PSI (58.01.08.552.01.b.vi)
- Controlling pressures above 100 PSI with pressure reducing devices (58.01.08.552.01.b.vi)

Low system pressure can cause back-siphonage of materials into the drinking water system that are harmful to the health and safety of the public. High system pressures increases overall water consumption, increases leaks and the amount of water loss from leaks in the system, increases wear on valves and fittings, and increases the stress of pressure transients on pipelines and appurtenances.

The distribution system of the City of Challis has 4 pressure areas – Old Town, Upper Cyprus, Middle Cyprus and Lower Cyprus. Figure 8 Appendix A shows the existing pressure areas, pressure contours during peak day peak hour flow, and the location of specific junctions that are discussed below.

The clear well at the Garden Creek Slow Sand Filter sets the maximum hydraulic grade line for the Old Town System at about 5,425 feet elevation. The lowest model node (J580 - Safe Haven) in this system is about 5,142 feet elevation. Static head at this node is about 283 feet, or about 123 PSI. The City does not have any pressure reducing valves in the Old Town distribution system and it is effectively one pressure zone. Hydraulic modeling indicates the Old Town System meets the 40 PSI minimum pressure during peak hour demand. The Old Town distribution system does not meet the IDAPA rules for maximum unregulated system static pressure.

The hydraulic gradeline for the Upper Cyprus System (UCS) is set by the West Reservoir. Elevation at the West Reservoir is about 5,550 feet. Isolation valves separate UCS from the middle and lower systems and from the Old Town System. UCS is (1) pressure zone. The elevation of the lowest node in the UCS is about 5,193 feet (J314 – BLM). Static head at this node is about 357 feet, or about 155 PSI. Hydraulic modeling indicates the UCS meets the 40 PSI minimum pressure during peak hour demand. UCS distribution system does not meet the IDAPA rules for maximum unregulated system static pressure.

The hydraulic gradeline for the Middle Cyprus System (MCS) is set by the East Reservoir. Elevation at the East Reservoir is about 5,320 feet. Isolation and pressure reducing valves separate MCS from the upper and lower systems. Isolation valves also separate the MCS from the Old Town System. MCS is (1) pressure zone. The elevation of the lowest node in the MCS is about 5,100 feet (J182 – Valley RV). Static head at this node is about 220 feet, or about 95 PSI. Hydraulic modeling indicates the MCS meets the 40 PSI minimum pressure during peak hour demand. MCS distribution system meets the IDAPA rules for maximum unregulated system static pressure.

The hydraulic gradeline for the Lower Cyprus System (LCS) is set by pressure reducing valves on Apex Lane and in the vicinity of Bayhorse and Ramshorn. We estimate the elevation of these valves to be about 5,100 feet. The downstream setting of these valves is about 50 PSI. The hydraulic gradeline at these settings is about 5,216 feet. LCS is (1) pressure zone. The elevation of the lowest node in the LCS is about 5,026 feet (J150 FH39). Estimated static head at this node is about 190 feet, or about 82 PSI. Hydraulic modeling indicates the LCS meets the 40 PSI minimum pressure during peak hour demand. LCS meets the IDAPA rules for maximum unregulated system static pressure.

The alternatives developed in this facility plan address the over-pressure issue with the Old Town and Upper Cyprus distribution systems.

3.9 Defects and Deficiencies

The most recent Sanitary Survey of the City, performed by IDEQ-IFRO is dated August 5, 2009. The survey did not identify any significant deficiencies or any deficiencies in general. See Section 3.3.3.6.

Based on our hydraulic modeling of the existing system we add over-pressuring in the Upper and Old Town distribution systems as a defect. In our modeling of Future Conditions we create 4 pressure zones for the entire distribution system.

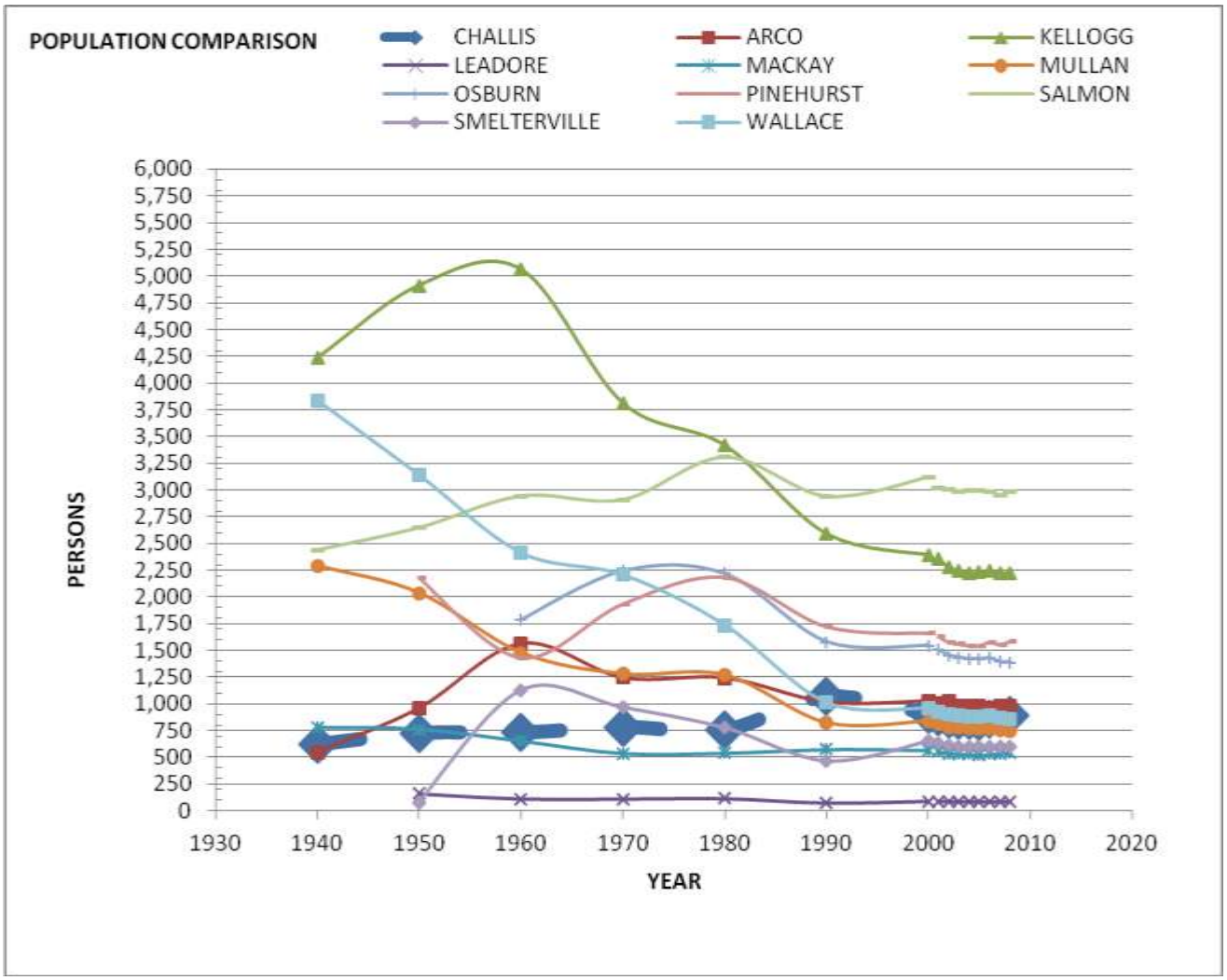
3.10 Other - None

4 FUTURE CONDITIONS

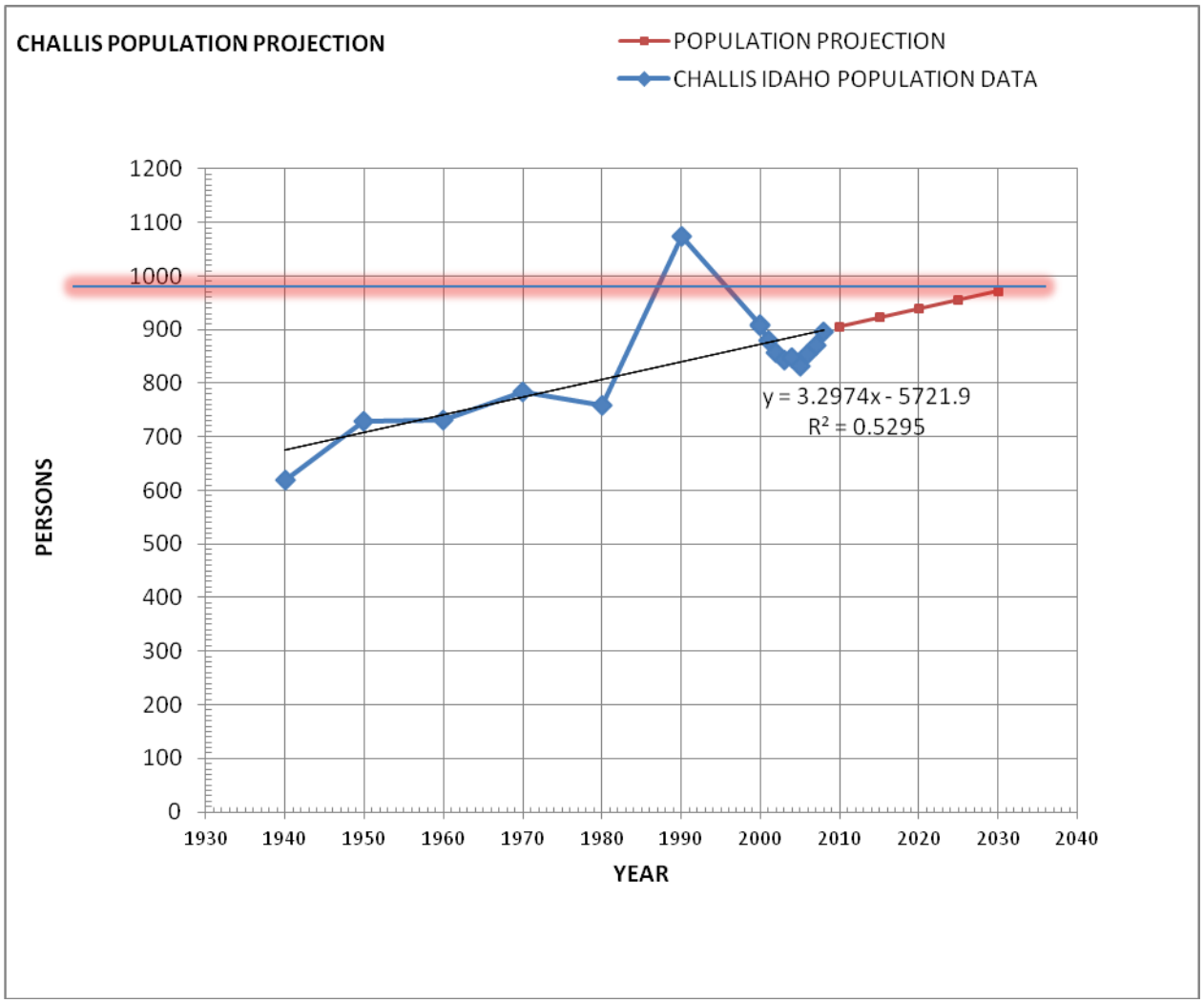
4.1 Future Growth and 20-year planning horizon

We used 2 methods to estimate a 20-year population for the City of Challis (Year 2030) – a statistical curve fitting procedure using population data from the Idaho Department of Commerce (IDC) and historical data coupled with an estimate of the City's service requirements within its City limits.

Statistical Curve Fitting. The economy and population of Challis is based on resource extraction and like many other Cities in Idaho and especially Northern Idaho, Challis' population follows a "boom/bust" cycle. The figure below compares the populations of Challis with 10 other communities. Most of these communities experienced population gains in the decade starting from 1970 to 1980. Challis' peak population occurred about 1990.



The graph below shows the same data but for Challis only. The population rises from 1980 and peaks at 1990 and then declines to year 2000. The latest data from IDC is for the year 2008 and the points beyond that year are extrapolations based on a linear curve fit to IDC data. The 2008 population is 896 persons. The year 2000 population is 907 persons. Projected 2010 population is 906 persons.



The population projection for year 2030 is 972 persons. Our initial hydraulic modeling for future conditions was based on 972 persons for the year 2030. Table 5 Appendix A shows population data.

Historical – Service Obligation. The statistical projection has shortcomings. First it doesn't accommodate well the nature of a resource based economy and the potential municipal service obligations it creates. The 1990 population peak demonstrates this. Second, it doesn't account for the City's service obligation to serve platted existing residential and commercial lots within the current City limits. When these lots develop (or re-develop) the City must provide water service. At the present time, this service obligation is an implicit demand on Challis' source water supplies and distribution system.

We consulted with City staff to better understand this implicit obligation, and determined the best representation would be a design population of 1,250 persons. 1,250 persons was the peak population for the City when the Cyprus Mines project was in full development. The Cyprus Mines project constructed the road, water and sewer system

infrastructure for the City to meet the demand. In conjunction with City staff and Council, we accepted 1,250 persons to be 2030 year design horizon and subsequently hydraulically remodeled the City for this projection. All of the initial and final alternatives discussed in this report are based on a design population of 1,250 persons.

4.2 Forecast of Demand

In Section II.C.5 we discussed the creation of the composite diurnal curve and the existing peak hour and flow day demand. We use the same composite diurnal curve to project 2030 year demands with a population of 1,250 persons. We scaled the 2030 year demand using a peak day percapita consumption of 2,056 gallons. Since the City has been metered since the 1980s, we do not expect any reduction in the percapita demand based solely on the presence of meters. The City may experience some percapita reduction if it chooses re-meter the system with "automated read" (AMR) type equipment. AMR equipment will allow the City to read (instead of estimating flows) meters every month through the year. Better accounting of water use and increased water rates could create reductions in consumption. The City is instituting a new rate schedule. The rate schedule will escalate if the City decides to pursue a capital project.

There are some assumptions in doing this projection:

1. The peak hour demands shown by the existing composite diurnal curve will be representative of the design year 2030. For instance - discussions with staff and Bill Hayes[14] indicate the 04:00 and 22:00 hour peaks are representative of the shift changes at the mine. The patterns could change with expansion/contraction of this industry, or with the development of new industries in the City.
2. The proportion of residential/commercial/irrigation components of the City's potable consumption remains consistent with current usage. Expansion of the commercial sector in respect to residential demand changes overall per lot demand, and the estimated percapita demand.
3. The population projection is predicative of the design year. Population projections were discussed in the previous section.
4. There are no significant water conservation programs to diminish peak hour demand.

Figure 3 Appendix A shows the composite diurnal curve showing existing year and year 2030 peak hour demands.

In Section II.C.5 we estimated existing peak hour flow at about 1,950 gallons per minute (GPM) and peak day at 1.86 million gallons (MG). For the design year 2030, projected peak hour flow is about 2,700 GPM and peak day is about 2.57 MG.

[14] Conversation with Bill Hayes, Idaho Rural Water Circuit Rider and author of the 2011 Water Rate Study for Challis, and Corey Rice, City of Challis Water/Wastewater Superintendant

4.3 Needed Drinking Water Facilities for 20-year horizon

This section identifies general improvements needed for the City to meet a design population of 1,250 persons by the year 2030. At the outset, we categorized the areas in which these improvements were to occur. The categories are: Distribution System, Source Water; Storage, Metering, and Telemetry.

	FACILITY	NEEDED	DISCUSSION
1	Source Water - Water Rights	*Y*	The City currently has groundwater and surface water rights. These rights total 2.79 million gallon per day (MGD). Projected year 2030 demand is 2.57 MGD. Note – Change to 100% groundwater source will require new groundwater right.
2	Source Water - Increased Source Water Production	*Y*	The City does not have enough groundwater capacity from its 2 operating sources to meet year 2030 demands. One of the goals of this plan to for the City to develop enough groundwater right to cease dependence on the Garden Creek Slow Sand Filter.
3	Storage - Increased Water Storage	*N*	The City has a total of 0.4 million gallons (MG) of storage. Modeling of source water production with peak hour flow and fire flow indicate the City has adequate storage.
4	Distribution System – Transmission Improvements	*Y*	The extent of distribution system improvements depends of the specific project chosen by the City. In general, improvements are targeted to eliminate pipeline dead ends, ageing 4-inch and other pipes, conveying water to new developments within the City limits, and conveying water to newly annexed areas.
5	Distribution System – Fire Fighting	*Y*	The City's existing 4-inch lines will not convey the year 2030 demand. The City will need additional hydrants to improve hydrant spacing, and new hydrants along transmission line expansions.
6	Distribution System – Pressure Zones	*Y*	The City needs to improve its pressure zones to meet IDAPA. The City will need (4) formal pressure zones when it switches to all groundwater supply.
7	Distribution System – System Expansion	*Y*	The City desires to extend water service and fire flow capability to the airport and annex the Butts subdivision. Service line extension to the airport will enhance commercial development along the US 93 strip, from the City of Challis to the airport.
8	Metering	*Y*	The City was metered in its 1980s project. The meters are aging, probably are not within AWWA accuracy ranges, and some are not operational. Manual read meters represent a significant labor commitment that can be recovered by AMR equipment. New meters with increased accuracy, ability to read year round could realize increased revenues and/or reduction in consumption.
9	Telemetry	*Y*	The currently uses some basic supervisory control but it not robust. A fully developed telemetry/SCADA system will allow monitoring of key elements with enhanced alarm and notification features. Telemetry/ SCADA can allow remote operator access to assess threats and respond to problems and alarms without physically visiting the site.

The improvements vary according to the planning alternative the City chooses to pursue. Specific improvements, their respective design lives, project costs, and Equivalent Uniform Annual Cost (EUAC) determinations are presented in detail in Section VI – Selected Alternative Description and Implementation Arrangements.

4.4 Future Conditions without Proposed Improvements

The City Council determined that the design population for the facility plan would be 1,250 persons for the design year 2030. The Council also created 11 criteria or goals it would use to evaluate a potential capital improvement project. This section evaluates those criteria if the City does not proceed to implement improvements. Note: the City does not need to proceed with a capital project because of a compliance issue with the State of Idaho. The 11 criteria and their evaluation are as follows:

1. Provide for City Fire Protection
   - The City cannot meet the design fire flow and pressure requirements without making improvements to the existing distribution system.
   - The City cannot expand its distribution system and have it meet the design fire flow and pressure requirements without making improvements to the existing distribution system and designing the expansion to meet fire flow requirements.
   - Inability to provide the minimum design fire requirements could limit the economic attractiveness of the community for either business start-ups or business relocation
   - Inability to provide the minimum design fire requirements increases fire insurance rates.
   - Criteria #1 is not attainable without a capital improvement project and the City could be liable for its inability to meet the minimum design fire requirements
2. Provide for Airport Fire Protection
   - The existing well and pump system at the airport cannot meet the design fire requirements.
   - Inability to provide the minimum design fire requirements could limit the economic attractiveness of the community for either business start-ups or business relocation
   - Inability to provide the minimum design fire requirements increases fire insurance rates.
   - Criteria #2 is not attainable without a capital improvement project.
3. Meet Development and Growth Needs
   - To meet future development and growth needs the City must expand its distribution system and increase its volume of drinking water. Future development includes both “in-fill” projects within the City limits, and expansion to future areas of annexation.
   - In a sense, City service expansion is a regionalization strategy that would incorporate and improve substandard water and sewer systems with corresponding improvements to the Round Valley environment.
   - Criteria #3 is not attainable without a capital improvement project.
4. Recovers Labor from the Slow Sand Filter

- Continuing dependence on the Garden Creek surface water source and treatment will create increased labor and staff expense because of inflationary factors and increased treatment level mandates.
- Criteria #4 is not attainable without a capital improvement project.

5. Maintain or Improve Source Water Quality & Safety
   - The surface water supply for the slow sand filter comes from an unprotected watershed. The City does not have the financial means to litigate violators in the watershed in order to protect its influent water quality. Recent testing has revealed increased levels of E.coli bacteria in Garden Creek upstream of the treatment plant. We assume there is also an increase in nitrates in the water source as well. Continued use of this surface water supply without improved treatment providing multiple barriers to contaminants jeopardizes health and safety of the Old Town users of the source.
   - Development of groundwater sources is an attractive alternative to enhanced surface water treatment.
   - The safety of the Garden Creek system cannot be improved nor can new groundwater sources be developed without a capital project.
   - Criteria #5 is not attainable without a capital improvement project.
6. Controls or Minimizes Future Costs
   - System improvements re-establish the life cycle of aged infrastructure. It replaces and minimizes, at least initially, repairs. Repairs escalate over time as equipment degrades. Capital improvements are required to have new operation and maintenance manuals that detail ways to keep equipment functioning properly. New equipment and proper maintenance controls and minimizes future costs.
   - Time value of money calculations generally favors “doing it now” versus “doing it later” strategies.
   - Incorporating technology, such as AMR meters and telemetry, adds complexity but minimizes operational costs.
   - Criteria #6 is not attainable without a capital improvement project.
7. Is the Water Source or Treatment Reliable for Quality
   - Concerns about continuing reliance on the surface water source for the City has been discussed above and is relevant here as well.
   - Criteria #7 cannot be addressed without a capital improvement project.
8. Is the Water Source Reliable for Amount
   - The City has sufficient water right to meet the drinking water demands of the design year if the City does not undertake an improvement project.
   - The yearly production of the groundwater and surface water sources themselves can vary and have done so historically.
   - The City needs to recapture the lost production of West Well 1 to meet the design year demand.
   - Criteria #7 cannot be addressed without a capital improvement project.
9. Provides Minimum Pipe Sizes for Fire Protection
   - The City has old 4-inch pipes and hydrants tied to them. Criteria #9 cannot be met without a capital improvement project

10. Maintains or Improves the Reliability of the System Components
    - System improvements re-establish the life cycle of aged infrastructure. It replaces and minimizes, at least initially, repairs. Repairs escalate over time as equipment degrades. Capital improvements are required to have new operation and maintenance manuals that detail ways to keep equipment functioning properly. New equipment and proper maintenance controls and minimizes future costs.
    - Time value of money calculations generally favors “doing it now” versus “doing it later” strategies.
    - Incorporating technology, such as AMR meters and telemetry, adds complexity but minimizes operational costs.
    - Criteria #10 is not attainable without a capital improvement project.
11. Provides for Redundancy and Emergency Isolation of the System
    - The City’s water supply uses surface water and wells tapping 2 different aquifer systems. The City’s sources are redundant.
    - The supply to the Old Town pressure zone can be back fed by the Cyprus system. The Old Town pressure zone supply is redundant.
    - The Upper Cyprus pressure zone is not redundant. There is insufficient head to supply West Reservoir from the Garden Creek Slow Sand Filter. The East Well pump does not have sufficient head to supply West Reservoir, even if the distribution system had the necessary valving to make the connection.
    - The Middle and Lower Cyprus pressure zones can be supplied from the Old Town and Upper Cyprus zones. The Middle and Lower zones have redundant sources.
    - All of the zones can be isolated with existing valving, but isolating the Middle Cyprus zone requires modification to East Well controls to allow East Well to continue supply the Lower Cyprus zone.
    - Criteria #11 is not fully attainable without a capital improvement project.

4.5 Land Use Plans for Existing & Future Drinking Water Facilities

The City’s existing water facilities include: Old Town and Cyprus distribution systems, Garden Creek Slow Sand Filter and Clearwell; West Well 1&2, West Reservoir, East Reservoir, and East Well. The City owns the land for the GCSSF, West and East Reservoirs, both West Wells, and the site for East Well. The distribution systems are located in the public roadways or within dedicated easements and/or rights-of-way.

Where possible, future source water facilities such as new wells will be sited on existing City property. Expansion of the distribution system into unincorporated areas will require new easements when public roadways and rights-of-way are not available for pipelines. We anticipate that the City will have to cross US 93 in at least 2 locations for new transmission lines. Idaho Transportation Department (ITD) will probably require directional boring under the highway for utility extensions

4.6 Hydraulic Analysis of Future Conditions

In Section IV.B we forecasted the demand for the design year based on a population of 1,250 persons and Figure 3 Appendix A shows a diurnal curve estimating the peak day/peak hour consumption. Hydraulic modeling uses this diurnal curve along with the placement of demands within the distribution system to predict the response of the system to the peak day/peak hour demand and the peak day/peak hour demand with a design fire demand. The future hydraulic model is based on the level of service the City wishes to provide and the area it wishes to serve. We worked with the City through a variety of different levels of service and service areas until Council selected an alternative. The selection process and the selected alternatives are discussed in the following sections. The future hydraulic model for the selected alternative is located in Appendix F.

5 DEVELOPMENT AND INITIAL SCREENING OF ALTERNATIVES

5.1 Description of Compliance Issues, Problems & Deficiencies

5.1.1 DEFINITIONS

This section will use the following definitions:

Compliance Issue – A possible or current decree or order to the water system by agency or agencies with jurisdiction to correct an identified condition affecting the health and safety of the public.

Problem – A condition of the water system that does not immediately affect the health and safety of the public. An example of a problem could be a missing hydrant port cover or a line valve that is difficult to operate. A problem may or may not be an item identified by a sanitary survey.

Deficiency – A deficiency is a problem that detracts from the optimal operation or management of the water system but does not concern the health and safety of the public.

IDAPA 58.01.08.003.113 Significant Deficiency. As identified during a sanitary survey, any defect in a system's design, operation, maintenance, or administration, as well as any failure or malfunction of any system component, that the Department or its agent determines to cause, or have potential to cause, risk to health or safety, or that could affect the reliable delivery of safe drinking water.

5.1.2 GENERAL

The last water facility planning study for the City of Challis, Idaho was completed in 1981. Since then the City has been able to meet minimum water quality standards without compliance issues. The latest sanitary survey of the system was performed in 2009 and

the text of the document is located in Appendix G. The survey found no significant deficiencies and no deficiencies.

5.2 Description of Problems/Deficiencies

The City and the facility plan have identified the following needs to respond to future problems and the issues identified in the sanitary survey. These needs are the driving force for capital projects identified in later sections:

	FACILITY	NEEDED	DISCUSSION
1	Source Water - Water Rights	***Y***	The City currently has groundwater and surface water rights. These rights total 2.79 million gallon per day (MGD). Projected year 2030 demand is 2.57 MGD. Note – Change to 100% groundwater source will require new groundwater right.
2	Source Water - Increased Source Water Production	***Y***	The City does not have enough groundwater capacity from its 2 operating sources to meet year 2030 demands. One of the goals of this plan to for the City to develop enough groundwater right to cease dependence on the Garden Creek Slow Sand Filter.
3	Storage - Increased Water Storage	***N***	The City has a total of 0.4 million gallons (MG) of storage. Modeling of source water production with peak hour flow and fire flow indicate the City has adequate storage.
4	Distribution System – Transmission Improvements	***Y***	The extent of distribution system improvements depends of the specific project chosen by the City. In general, improvements are targeted to eliminate pipeline dead ends, ageing 4-inch and other pipes, conveying water to new developments within the City limits, and conveying water to newly annexed areas.
5	Distribution System – Fire Fighting	***Y***	The City's existing 4-inch lines will not convey the year 2030 demand. The City will need additional hydrants to improve hydrant spacing, and new hydrants along transmission line expansions.
6	Distribution System – Pressure Zones	***Y***	The City needs to improve its pressure zones to meet IDAPA. The City will need (4) formal pressure zones when it switches to all groundwater supply.
7	Distribution System – System Expansion	***Y***	The City desires to extend water service and fore flow capability to the airport and annex the Butts subdivision. Service line extension to the airport will enhance commercial development along the US 93 strip, from the City of Challis to the airport.
8	Metering	***Y***	The City was metered in its 1980s project. The meters are aging, probably are not within AWWA accuracy ranges, and some are not operational. Manual read meters represent a significant labor commitment that can be recovered by AMR equipment. New meters with increased accuracy, ability to read year round could realize increased revenues and/or reduction in consumption.
9	Telemetry	***Y***	The currently uses some basic supervisory control but it not robust. A fully developed telemetry/SCADA system will allow monitoring of key elements with enhanced alarm and notification features. Telemetry/SCADA can allow remote operator access to assess threats and respond to problems and alarms without physically visiting the site.

5.3 Development of Alternatives – Source, Distribution, Storage, Metering, Telemetry

This section covers the first preliminary set of project alternatives for the City. Refinements of the preliminary set are the bases of the final alternatives and the project selected by the City. The alternatives cover five main areas of City concerns – the water distribution system, the drinking water sources, the system water storage, system wide metering, and control telemetry. The alternatives were generated to respond to these general criteria:

- Does the alternative address the problems?
- Does the alternative address the deficiencies?
- Does the alternative address significant deficiencies?
- Does the alternative address compliance issues?
- Does the alternative address the needs?

The City's water system currently has no significant deficiencies and no compliance issues. Problems, including sanitary survey issues, have been identified in Future Conditions, Section D. The (9) system needs have been identified in the previous section.

Appendix D contains charts identifying each alternative and shows: standard alternatives to the upgrade or construction; no-action benefits and dis-benefits; environmental concerns from Form 5-4 Section B.2; and the whether there are impacts to the environmental concerns. In total the charts display 17 preliminary alternatives – nine for Source Water, five for the Distribution System, and three for Metering and Telemetry.

DEQ's Outline and Checklist for Engineering Report/Facility Plan Form 5-A requires a discussion of "optimum operation of existing facilities".

5.3.1 Optimum Operation – Sources

Water Right. Challis has enough aggregate water right to meet the projected demand for the year 2030. The City will utilize 92% of that aggregate right to meet the peak day/peak hour flow for the year 2030. See "How Much Water do We Need" chart in Appendix D. One of the main goals of the facility plan is to test the ability of the City to replace the Garden Creek Surface Water System with new groundwater source(s). The City will need to develop new groundwater right to ensure that it has optimal source water available for the design year 2030. See the summary report from Barker, Rosholt & Simpson, LLP in Appendix E.

Groundwater Sources. There are competing priorities for the optimum location of new groundwater sources. There are two sources available – The Garden Creek Aquifer System (GCAS) (West Wells 1&2 utilize this aquifer) and the Salmon Aquifer System

(SAS) (East Well utilizes this source). The alluvial Salmon Aquifer system east of town is the more extensive and prolific. New well(s) will require less drilling depth, and new well will have higher specific capacity (GPM per foot of draw down). The SAS also has poorer water quality due to mineral hardness and will require extensive distribution pipeline changes if SAS is used as the sole groundwater source.

GCAS is an optimal location for new groundwater sources because it is higher in elevation than SAS, will not require signification distribution pipeline changes to incorporate into the system, and has much lower mineral hardness than SAS. GCAS is a less extensive source that Idaho Water Resources Research Institute (IWRRI) indicates is fully exploited[15]. Other than the recovery of the capacity of West Well #1, we feel it inadvisable to attempt to develop the full replacement capacity of surface water supply in the GCAS. The optimal solution which we derived by hydraulic modeling, is a single new well in the GCAS and a single new well in the SAS.

Pumping. Both groundwater sources, East Well and West Well pump to the City's storage tanks. Pump operation is based on water level in the tanks. The pumps are either "on or off" as a result. The future groundwater sources will operate in the same manner. Optimal operation includes proper design of new pumps to ensure wire-to-water efficiency and management of the level controls in the storage tanks to minimize short-cycling of the pumps. Large 3-phase pump motors should have no more than 4 starts per hour. The City currently operates the level controls to minimize short-cycling.

5.3.2 Optimum Operation – Storage

Hydraulic modeling of the existing and future water systems indicate the City has sufficient storage to meet peak day/peak hour demand with a fire demand at peak day/peak hour. Optimal operation of the City's storage includes adjustment of winter-time water levels to ensure turnover for water quality. Turnover will be especially important if the City is required to start disinfection of the groundwater sources.

5.3.3 Optimum Operation – Distribution System

Issues for optimal operation of the distribution system include: elimination of dead end lines and pipeline networking, elimination of small diameter pipes to improve hydraulic efficiency for fire flows, adequate number and spacing of fire hydrants, and establishing pressure zones throughout the system. The final selected alternative rectifies all these issues.

5.3.4 Optimum Operation – Metering

The City of Challis is currently metered, but the meters date from the 1980s. Issues for optimal operation system wide metering include: change out of non-operating or inaccurate meters, and reading the meters during the winter months rather than

[15] "Hydrogeologic Analysis of the Water Supply for Challis, Custer County, Idaho", Otto, Wylie & Martin, Idaho Geologic Survey, 2005, page 13, paragraph Recharge for West Wells.

estimating consumption. Replacement of all the meters with new equipment using automated read features will rectify these issues. Further, new equipment will identify and reduce City-side service leaks, recover lost water revenues, and encourage conservation.

5.3.5 Optimum Operation – Telemetry

The City of Challis currently has minimal telemetry/supervisory control and data acquisition (SCADA) capability, and relies on visual inspections and site visits to monitor operation of its pumps and water storage elements. A more robust SCADA system will reduce staff time, improve overall monitoring of key elements, enhance reporting and response of alarm conditions, and improve the security of the system. The final selected alternative rectifies the telemetry issue.

DEQ's Outline and Checklist for Engineering Report/Facility Plan Form 5-A requires a discussion of "regionalization".

5.3.6 Regionalization

The City of Challis is the only municipality within a twenty-mile radius of the City. The nearest municipal water system is operated by the City of Salmon, ID. The City of Salmon is about 60 miles, by road, from Challis. There are no regionalization opportunities within an economic proximity to the City of Challis. Challis is considering annexation of the Butts subdivision. Butts subdivision has a separate water and sewage system. Annexation of the subdivision will eliminate a poor to failing water and wastewater system, bring those systems into compliance, and ensure proper operation of the facilities. The annexation if pursued is a regionalization effort.

5.4 Environmental Impacts

See charts in Appendix D.

5.5 Service to Isolated Areas

Future service line extensions discussed in the preliminary alternatives will serve future annexation areas. Service includes metering, pressure zones, and design fire fighting capabilities.

5.6 Development of New Sources

New groundwater sources will have to be developed to replace the City's dependence on its Garden Creek surface water source.

5.7 New Treatment Facilities

No new treatment facilities are required for the 1,250 population for the 2030 design year.

5.8 Storage Requirements

No new water storage is required for the 1,250 population for the 2030 design year.

5.9 Pumping Requirements

New groundwater sources will require new pumping plants with standby generation capability.

5.10 Pressure Maintenance

The water system needs (4) defined pressure zones throughout the system. See Figure 12 Appendix A.

5.11 Separate Irrigation Facilities

We have reviewed the option of supplying separate irrigation facilities. A separate irrigation system will not remedy the problems/defects identified by this plan. It is not an economic alternative for the City. See the project list in Appendix D.

5.12 Staged Distribution

Future expansion of the distribution system can be phased or staged.

5.13 System Classification and Licensure

The water system for the City of Challis is a public water system, PWS# 7190013. Current operator levels needed are Class 1 Treatment and Distribution System. Using DEQ's classification worksheets, the future system will still require only Class 1 Treatment and Distribution. See Figure 14, Appendix A.

5.14 Other

None.

6 FINAL SCREENING OF PRINCIPAL ALTERNATIVES AND FACILITY PLAN ADOPTION

6.1 Evaluation of Costs

This facility plan presents an evaluation of costs both on the preliminary and final alternatives. The final alternative cost evaluations use and equivalent uniform annual cost (EUAC) method which is a derivative of Present Work Analysis. EUAC presents an annualized cost based on capital cost of improvements and its financing, the replacement frequency or life of the improvements, the impact of the improvements on operation and maintenance, and current electrical costs based on the rate structure of the local utility.

Like a Present Worth Analysis, the project with the lowest EUAC is the economically preferred project.

The EUAC analysis uses the loan term, 40 years, to differentiate between a long-lived asset and a short lived asset. An asset with a replacement life of less than 40 years is a short lived asset. The EUAC uses a 6% interest rate even though rates from DEQ and Rural Development are significantly less. 6% allows some latitude for inflation over the life of the projection. Copies of the EUAC worksheets for each of the principal alternatives are in Appendix D.

6.2 Evaluation of Environmental Impacts – NEPA, IDAPA 58.01.20

The environmental report by Progressive Engineering Group, Inc. follows the guidelines of IDAPA 58.01.2 and Idaho Department of Commerce Community Development Block Grant. The environmental report is located in Appendix H.

6.3 Consideration of Impacts to Water Supply Systems

The facility plan follows the recommendations of the IWRRI report, "Hydrogeologic Analysis of the Water Supply for Challis, Custer County, Idaho", 2005. Based on this document we recommend the City not attempt to replace the total right from the Garden Creek surface water source in the Garden Creek Aquifer System.

6.4 Consideration of EPA Reliability Criteria

We base the reliability of the proposed groundwater sources on the IWRRI cited above.

6.5 Comparison of Alternatives

The principal alternatives will have no environmental effects other than dust and noise during construction. Construction will require an Storm Water Pollution and Prevention Plans to mitigate run-off from construction.

6.6 Public Input Evaluation per 40CFR Part 25 and State of Idaho 40 CFR part 25 Describes Criteria for Public Participation.

We followed the guidelines in this manner:

- 40CFS part 25.4.c – Public Notification. The City of Challis provided public notification of each City Council Meeting in which elements of the facility plan were presented according to Idaho Statute. Council Meeting presentations occurred on these dates: 4/12/11, 5/10/11, 6/7/11, and 8/9/11. Notification of the formal public participation hearing, held on 7/21/11, was published in "The Challis Messenger".
- 40CFS part 25.5 – Public Hearings. A public hearing was held on 7/21/11. A copy of the notice and list of attendees are included in Appendix E. The hearing included post boards and presentations by Don Acheson, P.E. of

Riedesel Engineering, Inc, and Michelle Bly, P.C.E.D. of Progressive Engineering Group, Inc. Attendees were encouraged to ask questions and each were given (4) colored dots to use for expressing their alternative preference. The dots were: green – my favorite; blue – my second choice; yellow – my third choice; and red – no thank you. At the end of the presentation, attendees were request to express their alternative preference by placing a colored dot on the poster board explaining that alternative.

- 40CFS part 25.8 – Responsiveness Summary. The summary is in Appendix E.

6.7 Description of Cost Effectiveness per 40 CFR 35.2030(B.)(3.)

This section applies to wastewater treatment works and not a water system facility plan. The facility plan does address elements of the this section, namely: the high per capita water consumption and conservation measures that can be incentivized by water rates and re-metering with new AMR type equipment; the EUAC analysis; environmental impacts; water supply implications; a concise and appropriate facility planning level project description of the selected alternative.

7 SELECTED ALTERNATIVE DESCRIPTION AND IMPLEMENTATION ARRANGEMENTS

In all, Riedesel Engineering initially presented the City of Challis with 17 preliminary alternatives covering improvements to various aspects of the distribution system, source water development, and metering and telemetry. The alternatives were in response to the City's concerns about the vulnerability of the surface water source for drinking water, the desire to develop new groundwater sources to supplant the surface water supply, the ability to provide fire flow protection, and meet the future drinking water needs of the community. Please see the charts in Appendix D. Riedesel later revised these alternatives into 18 discrete projects with nine possible combinations of the discrete projects. The revision was based on the City's 11 criteria for future improvements to the system. We used the revision as the basis for discussion during the Public Hearing on July 21, 2011. Based on input from the City Council and feedback from the public participation meeting, Riedesel revised and condensed the nine project combinations into three specific alternatives, all combination projects addressing source water, distribution, metering, and telemetry. The three projects differ in the location of new groundwater sources and the extent of pipeline and other changes needed to tie the new sources into the water system. The projects are summarized as follows: all new ground water being developed in the Garden Creek Aquifer System at the west end of Challis; all new ground water being developed in the Salmon Aquifer System on the east side of Challis; a mixture of both east and west locations.

Riedesel presented the three projects at the regular City Council meeting on August 9, 2011 with a specific recommendation to select the option with new groundwater sources east and west of town, Recommended Project #1. The rationale for this recommendation:

1. The hydrogeologic study[16] indicated the Garden Creek Aquifer may be fully allocated. The City should not try to get the full replacement of the surface water source from this aquifer. Replacing the failed West Well #1 from this source will supply about half of the surface water supply and be within the capability of the aquifer.
2. While the Salmon aquifer system is abundant and wells using this alluvial source are highly productive, the water has high mineral hardness. The City typically blends East Well with the less-hard West Well 2 water to mitigate consumer complaints about hardness. Further, developing all the replacement water from the Salmon system would require an 8,000 foot, 12-inch transmission pipeline to connect the source to the West Reservoir. The 12-inch connection is the least onerous distribution system modification needed to make this option workable.
3. Project #1, a new well in both the Garden Creek and Salmon aquifer systems, provides the best water quality, minimizes pipeline changes, and has the least equivalent uniform annual cost.

At the meeting the council voted to proceed with Recommended Project #1. Recommended Project #1 is the overall water system masterplan for the City of Challis as it grows to its projected 2030 design year population. In Section 8 we provide recommendations for a strategic approach to implementing Recommended Project #1.

7.1 Justification and Description of Selective Alternative – Recommended Project #1

7.1.1 Description of Selected Project

These are the elements of Recommended Project #1 (RP1):

- Source Water. RP1 allows the City to curtail use of the Garden Creek surface water source and source water treatment. 2 new wells - one in the Garden Creek Aquifer system that recovers the lost output of West Well #1 and one in the Salmon Aquifer System – will replace the curtailed Garden Creek water source. The City will abandon the slow sand filter but retain the surface water right. RP1 solves the susceptibility issue of the unprotected Garden Creek watershed by moving all of the City's drinking water sources to groundwater.
- Distribution System. RP1 includes all the modeled pipeline changes and additions needed to meet the year 2030 design population and with the total reliance on groundwater. 4 pressure zones will be formally established with new pressure reducing stations and isolation valves. The system will have new, properly spaced hydrants on new pipelines and add hydrants where needed to improve hydrant spacing on the existing pipelines. RP1 solves the pressure zone issues with the existing distribution system, solves the fire hydrant spacing issue, and allows the City to meet the projected drinking water demands of the year 2030 population. The City will be able to meet the requirements of the design fire flow and duration.

[16] See note #14.

- Distribution System Alternatives. RP1 includes new transmission pipeline to provide water and fire fighting service to the Challis Airport. The transmission lines also allow for development and new water services in the east and west corridors parallel to US 93, and for the annexation of the Butts Subdivision into the City. RP1 meets the City goals of serving the Airport and providing for future growth.
- Metering. RP1 replaces all the meters in the City with new automated meter read (AMR) equipment. RP1 allows the City to read every meter every month, reduce the staffing requirements to bill for water, increase the accuracy of that billing, take the first steps to recovering the estimated 4% lost water identified by Idaho Rural Water, and provide the data needed to do a water audit.
- Telemetry. RP1 connects the City's key facilities into an integrated network that provides enhanced supervisory control and data acquisition (SCADA). Key facilities include the new and existing groundwater wells, and East and West Reservoirs. Telemetry will provide better security for the drinking water system, and City staff will be able to access the SCADA system remotely to evaluate and respond to alarm conditions. RP1 improves the operation and security of the drinking water system.

A map of the RP1 system is included in Appendix A, Figure 12.

7.1.2 Justification of Selected Project

Recommended Project #1 is justified on these merits:

1. There are only three alternatives that comprehensively meet the City's 11 criteria. RP1 is one of the three alternatives.
2. Of the three alternatives, RP1 has the least Equivalent Uniform Annual Cost and is therefore the best economic choice for the City.
3. RP1 addresses and corrects the system deficiencies.
4. RP1 does not require the construction of new water storage facilities.
5. RP1 minimizes the land needed for developing new well sources by using existing City property.
6. RP1 removes the environmental uncertainty of reliance on surface water used as a drinking water source that is derived from an unprotected watershed.
7. The public health and safety aspects of curtailing surface water as a potable source more than compensates for the additional electrical energy needed for the new well pumps.
8. RP1 is affordable by the community.

7.2 Preliminary design of selected alternative

DEQ Checklist Form 5A requires the discussion of seven items in this section: Major Features, Unit Processes and Sizes; A Schematic Diagram for Treatment; Distribution Length and Sizes; Proposed Design Criteria; Design and Construction Completion Schedule; Maps. Recommended Project #1 does not have any treatment elements, so Unit Processes and Treatment Schematics will not be addressed. See Appendix B for an

estimated Construction and Completion Schedule. The presentation that follows discusses the remaining five elements as the elements pertain to Source Water, Distribution, Metering, and Telemetry.

7.2.1 Source Water

- Major Features
  - New alluvial aquifer well in the vicinity of East Well tapping the Salmon Aquifer System, finished 12-inch diameter with stainless steel screen and approximately 350 feet in depth. Estimated minimum water production – 600 GPM.
  - New hard rock well in the vicinity of the slow sand filter in the Garden Creek System, finished 12-inch open hole and approximately 600 feet in depth. Recovers the lost production of West Well #1, about 600 GPM.
  - Both wells will use new vertical lineshaft turbine pumps in pump houses, dedicated well lots, and meet IDAPA 58.01.08.511 & 512.
  - Standby generation equipment for the 2 new well sources.
  - Dedicated metering, instantaneous pumping level assessment, and system connection telemetry
- Distribution Length and Sizes. Depends on final chosen location for drilling. New system connections will probably be new 6-inch piping with appurtenances.
- Proposed Design Criteria
  - IDAPA 58.01.510, 511, 512, 541
  - IDAPA 37.03.09 Well Construction Standards
  - Salmon Aquifer System Alluvial Well – pumps to East Reservoir, 600 GPM @ 450 feet TDH @ 75% efficiency – 90 BHP.
  - Garden Creek Aquifer System – pumps to West Reservoir, 600 GPM @ 688 feet TDH @ 75 % efficiency – 139 BHP.
  - Consider variable frequency drive instead of pump control valves

7.2.2 Distribution System

- Major Features
  - Looped transmission pipelines to the Challis Airport, east and west of US93.
  - Network “backbone” to connect Butts Subdivision when that project is annexed.
  - Elimination of pipeline dead ends
  - (2) US93 bores for Airport loop and supply to eastside transmission extension
  - Replacement of all old 4-inch Old Town system pipes
  - Addition of fire hydrants in the Old Town system to improve spacing.
  - New fire hydrants with new transmission lines.
  - Ability to convey design year demand flows with fire flow to all areas of the City.
  - New pressure zones that extend throughout the system

- Distribution Length and Sizes

  The table shows the lengths and sizes of new, upgraded, and unchanged pipes in the distribution system. All existing 4-inch pipes in the system are replaced.

DIAMETER	TOTAL LENGTH (FEET)	NEW (FEET)	UPGRADE (FEET)	EXISTING NO CHANGE (FEET)
6-INCH	69,126	12,397	15,914	40,815
8-INCH	48,313	26,748	5,756	15,809
10-INCH	17,727	0	836	16,891
12-INCH	12,964	510	0	12,454
TOTALS	148,130	39,655	22,506	85,969

- Proposed Design Criteria
  - IDAPA 58.01.08.501, 542, &548
  - Idaho Standards for Public Works Construction, most recent edition
  - ASTM/AWWA Standards such as C651, C654
  - Conforming construction standards from the City of Challis
  - System network design to provide fire flow for the design year 2030, during peak day/peak hour demand, with no location in the system dropping below 20 PSI.
  - Minimum design year peak day/peak hour pressure – 40 PSI
  - Maximum design year peak day/peak hour pressure – 90 PSI

7.2.3 Metering

- Major Features
  - Replace all residential meters with new 5/8 x 3/4 inch, automated read meters. Reuse existing meter setters & meter boxes.
  - Replace all commercial meters larger than 5/8 x 3/4 inch with automated read meters.
  - Equip the City with a vehicle mounted receiver and laptop computer to read the meters in “drive-by” mode.
  - Equip the City with software to process metering downs to work with either the City’s existing billing, or provide new software billing.
- Distribution Length and Sizes – N/A
- Proposed Design Criteria
  - Idaho Standards for Public Works Construction, most recent edition
  - AWWA/ASTM C700-713
  - Manufacturer’s recommendations

7.2.4 Telemetry

- Major Features
  - Provides enhanced supervisory control and data acquisition (SCADA) for key system elements like wells, East & West reservoir, and key metering points in the City.
  - Provides better security for the drinking water system
  - City staff will be able to access the SCADA system remotely to evaluate and respond to alarm conditions
- Distribution Length and Sizes – N/A
- Proposed Design Criteria

- Proprietary and public domain design criteria
- AWWA/ASTM G200 & G430

7.3 Justification – Most Cost Effective of Meeting Applicable Public Health Requirements.

Documentation provided in this report demonstrates that Recommended Project #1 is the most cost effective and environmentally sound alternative for the City. We base this conclusion on the following:

- The City's water system is not out of compliance with applicable codes and statutes.
- Recommended Project #1 rectifies all the deficiencies identified by this facility plan.
- Construction of Recommended Project #1will take place within the study area of the attached environmental document. The environmental document demonstrates that there will be no significant impact when constructing the improvements.
- We performed an equivalent uniform annual cost (EUAC) analysis that shows Recommended Project #1 is the least costly and most economically feasible for the City.

7.4 Total estimated project cost

The total estimated project cost to implement all the changes identified in Recommended Project #1 is $8,078,877.

7.5 Certification of Financial Capability

The City will fulfill the certification requirement as part of the funding process for the capital project it chooses to implement. We have identified Recommended Project #1(RP#1) as the plan for the City to meet the water system demands for the design year 2030. It is not prudent for the City to proceed with this total project. Please see Section 8 – Engineer's Recommendations for a listing of priorities we feel the City should follow as it implements elements of RP#1.

7.6 Availability of Most Suitable Land for the Selected Project

RP#1 utilizes existing City property along with existing rights-of-way in existing roadways.

7.7 Environmental Information Document

See Appendix H.

7.8 Other Implementation Elements

1. Intermunicipal Agreements. None required for RP#1.

2. Financial Arrangements. The City will seek funding for RP#1 from multiple sources including IDEQ's SRF program, USDA-Rural Development grant & loan. The City will bond for improvements.
3. Operation and Maintenance Requirements. RP#1 will require training for the operation of the automated meter reading system and billing procedures. We have estimated these costs in the EUAC analyses. City staff will also need training to operate, manage, and perform basic repairs and troubleshooting for the telemetry system. We have estimated these costs in the EUAC analyses.
4. Project Schedule. The City of Challis is not under a compliance order from DEQ and there is no compliance schedule that must be adhered to. We have provided an estimated project schedule in Appendix B.

7.9 Operator Certification.

The City's current operator certification is adequate for RP#1. See Figure 14, Appendix A.

8 ENGINEER'S RECOMMENDATIONS

8.1 IMPROVEMENT PRIORITIES – A STRATEGIC APPROACH

Recommended Project #1(RP1) is a plan for the development of the City of Challis from now to the 2030 design year. RP1 addresses heath and safety issues, operation and maintenance improvements, and expansion of the water system to serve the airport and growth of the community. RP1 needs strategic implementation for prudent implementation. "Prudent implementation" has these elements in order of priority:

1. Address health and safety concerns
2. Focus on items that will reduce the operation and maintenance (O&M) costs of the system
3. Expand the water system to serve the airport and other areas of interest to the City as the need and demand for service occur

The table below shows the components of RP1 and rates them for the (3) priorities. All the components except for metering impact all 3 priorities. The category designations:– SW – Source Water; DS – Distribution System; T – Telemetry; M – Metering match the designations of the project charts in Appendix D.

CATEGORY	DESCRIPTION/ RP1 SOLUTION	HEALTH & SAFETY	MINIMIZE O&M	SYSTEM EXPANSION
SW HEALTH & SAFETY Garden Creek Surface Water Source	Vulnerability & Variability of the Garden Creek Water Shed. Replace surface water supply with new groundwater source and recover the capacity of West Well 1.	✓		
SW O&M	Recovers O&M costs to operate and maintain the slow sand filter.		✓	
SW EXPANSION	Meet future demands with new well in Salmon Aquifer System.			✓
DS HEALTH & SAFETY Fire Fighting	Dead end lines, hydrants on 4-inch lines, sub-standard hydrant spacing. Add pipe loops to tie–in dead ends; replace 4-inch lines; add new hydrants to add capability to existing system. Add interties to incorporate groundwater sources to Old Town system (surface water source replaced with groundwater).	✓		
DS O&M	Replacing old 4-inch pipes reduces leaks.		✓	
DS EXPANSION	New pipes and pipe loops top meet system expansion to the airport and future growth			✓
DS HEALTH & SAFETY Pressure Zones	Over-pressurized areas of Old Town and Cyprus System. Create (4) new pressure zones incorporating the change to groundwater for the entire system.	✓		
DS O&M	New pressure zones keep maximum pressure to IDAPA standards. Lower pressures reduce system leaks and water loss.		✓	
DS EXPANSION	Pressure Zone 4 includes both the existing system and will cover the full expansion of the system.			✓
T HEALTH & SAFETY System Telemetry	Existing system has minimal supervisory control and data acquisition (SCADA) capability and no intrusion alarms for key water system elements. Add new telemetry.	✓		
T O&M	New telemetry allows remote operator access to the key elements of the system instead of requiring a site visit. Key elements include well houses and pump stations, storage reservoirs, and pressure reducing stations.		✓	
T EXPANSION	Telemetry allows for addition on new key elements to the system, such as a new well in the Salmon Aquifer system.			✓
M O&M	Re-meter the City with new "automated read" (AMR) water meters. City can read every meter every month throughout the year and have the data for a complete water audit. All the meters can be read in less than (1) day.		✓	

We suggest the following ranking of the first priority items:

1. Replace the surface water source with a new groundwater source in the Garden Creek aquifer system.
2. Construction distribution system improvements to tie the Old Town system into the new groundwater system, eliminate 4-inch pipes and the fire hydrants that tie to them, install new and properly spaced fire hydrants, and tie-in dead end lines. Add pressure reducing stations and isolation valves to create (4) pressure zones which eliminates service areas that are over-pressurized.
3. Install a telemetry system to improve supervisory control and data acquisition to protect the water system.

The first priority items automatically fulfill the operation and maintenance (O&M) criteria of the second priority when they are implemented. Metering is the only stand alone second priority item. Even though metering is not a health and safety priority, our analysis indicates the construction cost may be significantly (if not completely) offset by the labor saving to read the meters and process the water bills. The City may also realize some lost revenues due to inaccuracies with the old existing meters. We recommend replacing the meters as soon as possible.

9 APPENDICES

A. Figures & Tables

B. Relevant Engineering Information – Reference Documents – Water Quality Test Results

C. User Charge Ordinance and Latest Maintenance Budget

D. Maps & Charts

E. Mailing List – Correspondence – Public Participation Information – Water Rights

F. Hydraulic Analyses of Existing & Proposed Water System Improvements

G. DEQ Sanitary Survey

H. Environmental Information Document

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APPENDIX B
ENVIRONMENTAL

National Wetlands Inventory……...B-2

Wild & Scenic River Watersheds……B-3

Project Area Phots……..B-4

NRCS Web Soil Survey Farmland Classification……...B-6

Idaho Air Quality Planning Areas……B-9

FEMA Federal Insurance Rate Map…….B-10

U.S. Fish & Wildlife Service Special List…….B-13

DEQ Threatened/Endangered Species Memo…….B-20

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U.S. Fish and Wildlife Service

National Wetlands Inventory

Oct 10, 2013

Wetlands

- Freshwater Emergent
- Freshwater Forested/Shrub
- Estuarine and Marine Deepwater
- Estuarine and Marine
- Freshwater Pond
- Lake
- Riverine
- Other

Riparian

- Herbaceous
- Forested/Shrub

Riparian Status

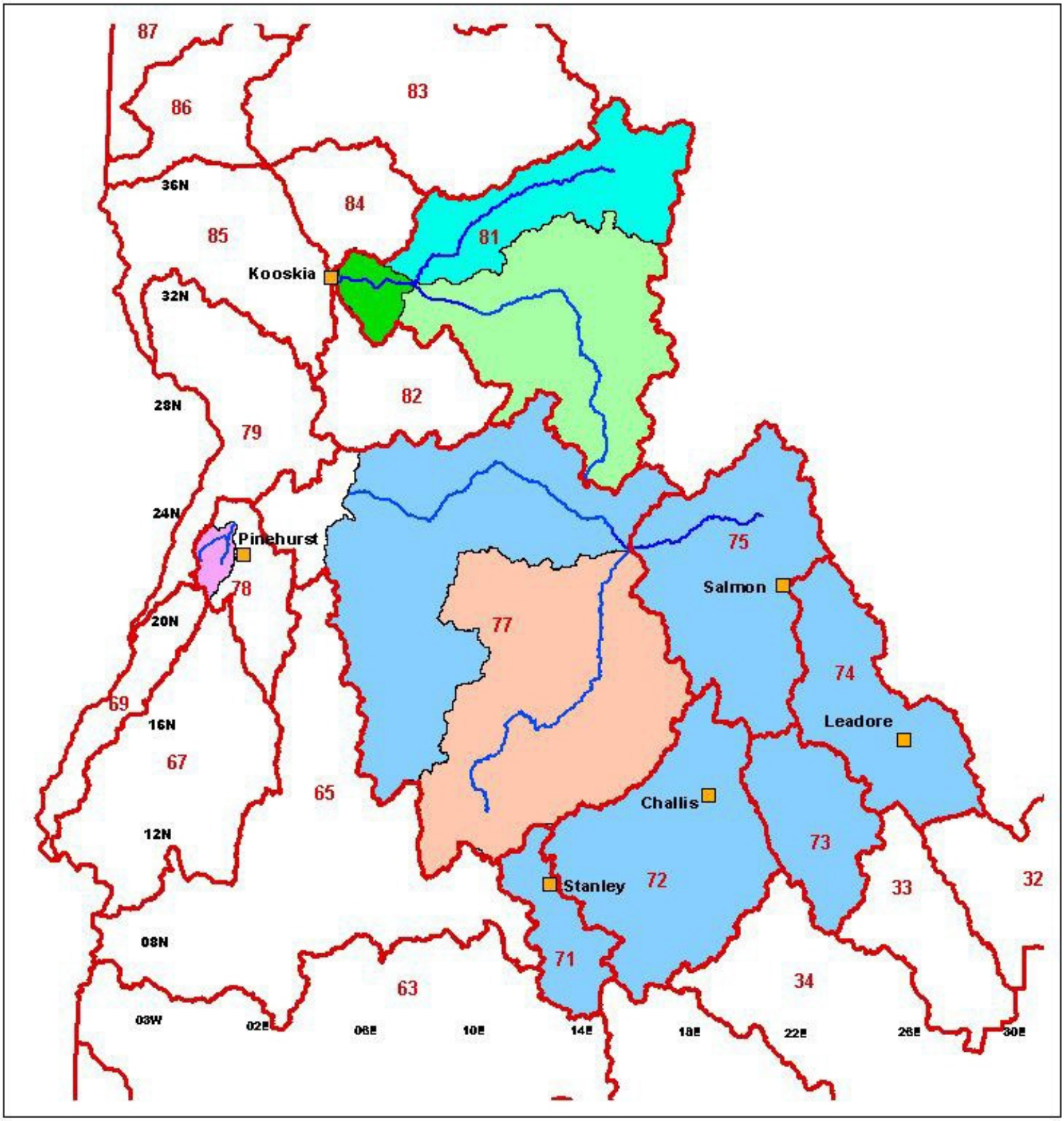
- Digital Data

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

User Remarks:

In town area showed "no data" when map was first retrieved.

Wild & Scenic River Watersheds



Cities
Administrative Basins
Federal Wild Rivers

Wild and Scenic Watersheds
- Lochsa River
- Mid Fk Clearwater River
- Mid Fk Salmon River
- Rapid River
- Salmon River excluding Middle Fork
- Selway River

50 0 50 Miles

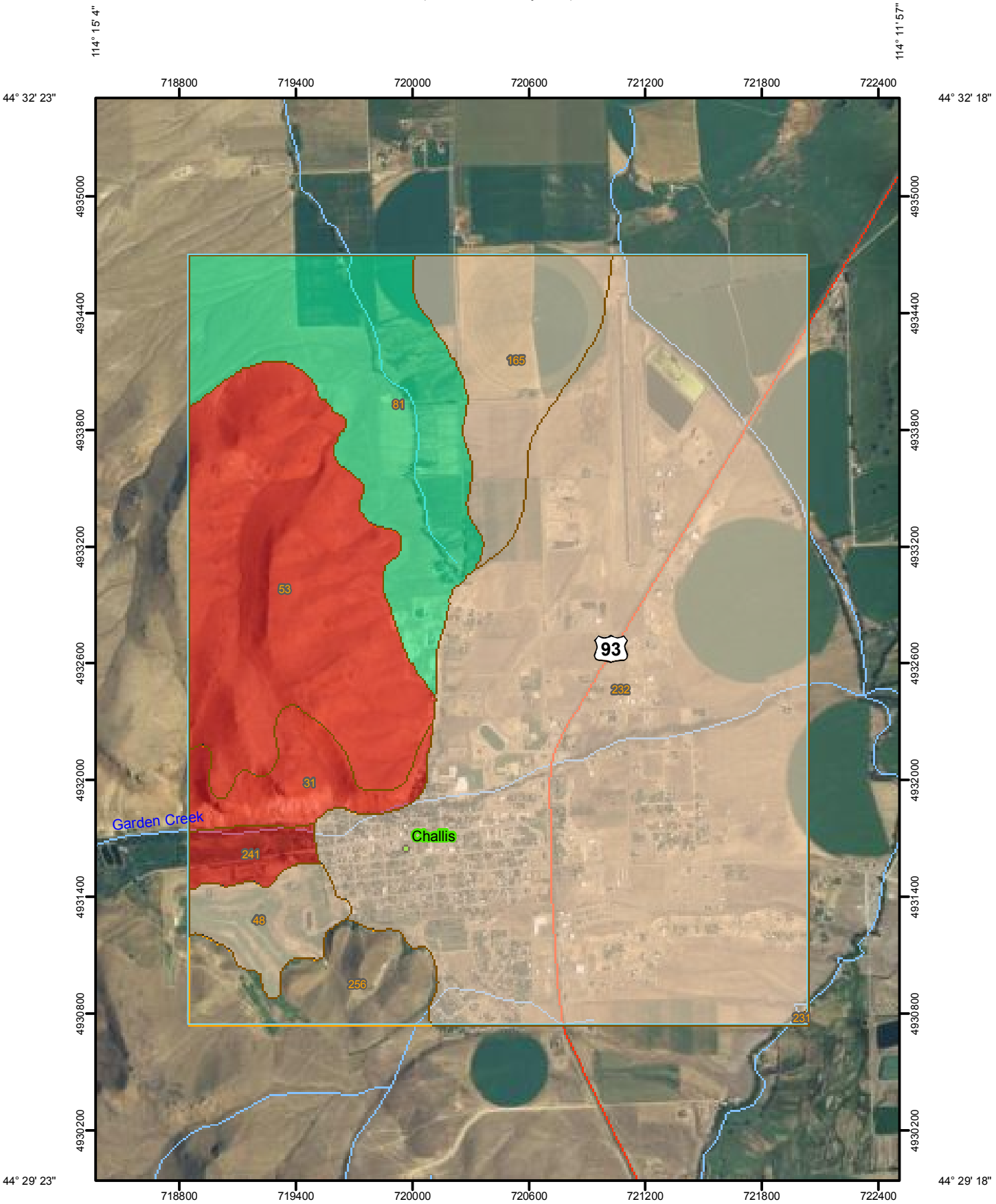
N

Entrenched Garden Creek bed.

Narrow corridor of trees with sparse understory.

Home along Garden Creek.

Farmland Classification—Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties
(Challils Water System)



Map Scale: 1:26,500 if printed on A size (8.5" x 11") sheet.

N

Meters: 0 250 500 1,000 1,500

Feet: 0 1,000 2,000 4,000 6,000

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

- Soil Map Units

Soil Ratings

- Not prime farmland
- All areas are prime farmland
- Prime farmland if drained
- Prime farmland if protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated
- Prime farmland if drained and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if irrigated and drained
- Prime farmland if irrigated and either protected from flooding or not frequently flooded during the growing season
- Prime farmland if subsoiled, completely removing the root inhibiting soil layer
- Prime farmland if irrigated and the product of I (soil erodibility) x C (climate factor) does not exceed 60
- Prime farmland if irrigated and reclaimed of excess salts and sodium
- Farmland of statewide importance
- Farmland of local importance
- Farmland of unique importance
- Not rated or not available

Political Features

- Cities

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads

MAP INFORMATION

Map Scale: 1:26,500 if printed on A size (8.5" × 11") sheet.

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for accurate map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: UTM Zone 11N NAD83

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties
Survey Area Data: Version 13, Aug 21, 2012

Date(s) aerial images were photographed: 8/12/2004; 6/23/2004

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Farmland Classification

Farmland Classification— Summary by Map Unit — Custer-Lemhi Area, Idaho, Parts of Blaine, Custer, and Lemhi Counties (ID752)				
Map unit symbol	**Map unit name**	**Rating**	**Acres in AOI**	**Percent of AOI**
31	Calcids-Rubble land-Rock outcrop complex, 50 to 80 percent slopes	Not prime farmland	92.8	3.0%
48	Dawtonia very gravelly loam, 4 to 8 percent slopes	Prime farmland if irrigated	79.2	2.5%
53	Dawtonia-Rock outcrop complex, 20 to 50 percent slopes	Not prime farmland	484.8	15.6%
81	Germer-Dawtonia complex, 2 to 10 percent slopes	Prime farmland if irrigated and reclaimed of excess salts and sodium	371.9	11.9%
165	Pedoli-Dawtonia complex, 1 to 4 percent slopes	Prime farmland if irrigated	205.8	6.6%
231	Whiteknob-Leadore complex, 2 to 8 percent slopes	Prime farmland if irrigated	0.8	0.0%
232	Whiteknob-Zer complex, 2 to 6 percent slopes	Prime farmland if irrigated	1,711.3	55.0%
241	Yearian very cobbly loam, 1 to 4 percent slopes, very stony	Not prime farmland	43.1	1.4%
256	Zer gravelly loam, warm, 2 to 15 percent slopes	Farmland of statewide importance, if irrigated	123.3	4.0%
Totals for Area of Interest			**3,112.9**	**100.0%**

Description

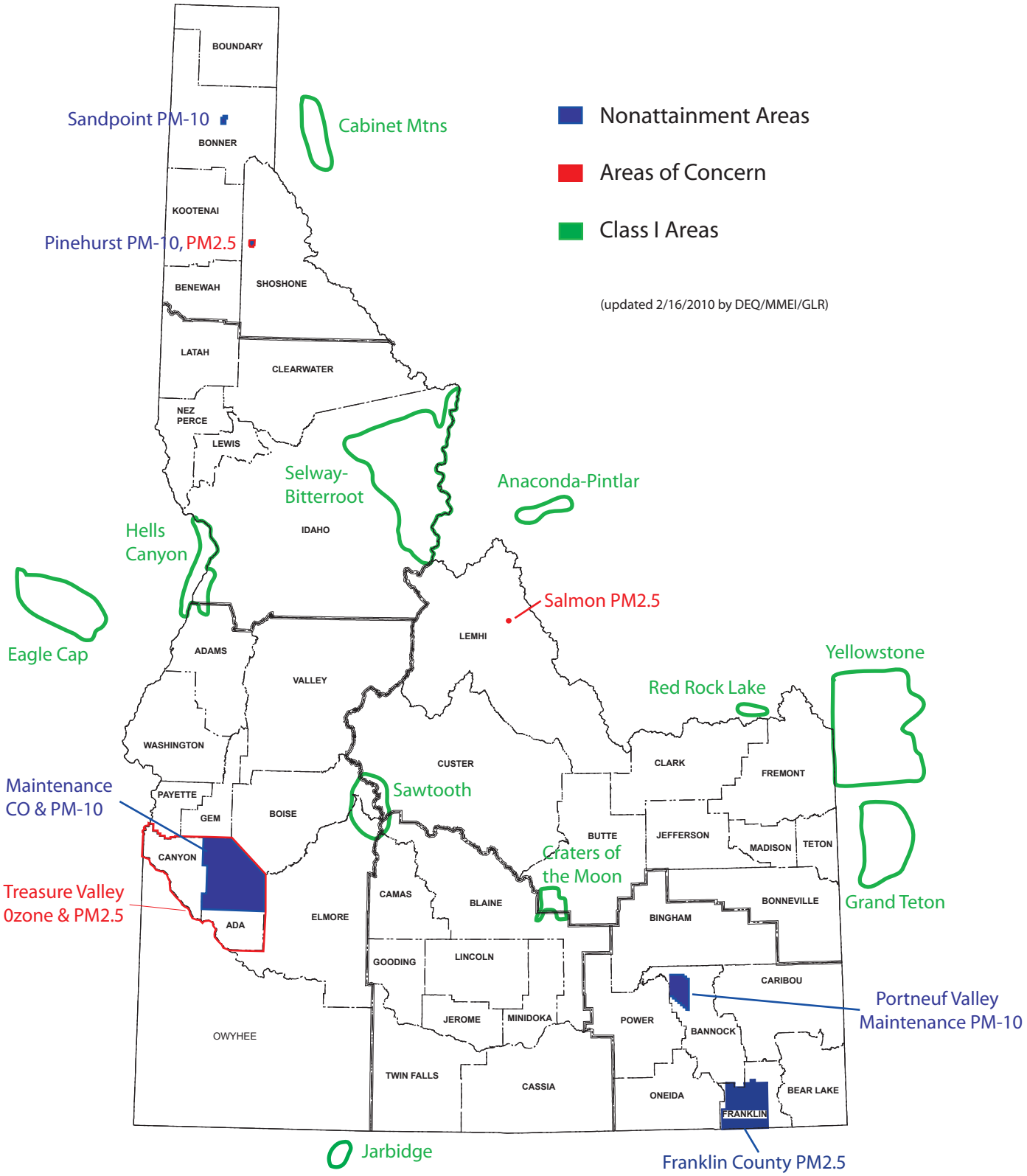
Farmland classification identifies map units as prime farmland, farmland of statewide importance, farmland of local importance, or unique farmland. It identifies the location and extent of the soils that are best suited to food, feed, fiber, forage, and oilseed crops. NRCS policy and procedures on prime and unique farmlands are published in the "Federal Register," Vol. 43, No. 21, January 31, 1978.

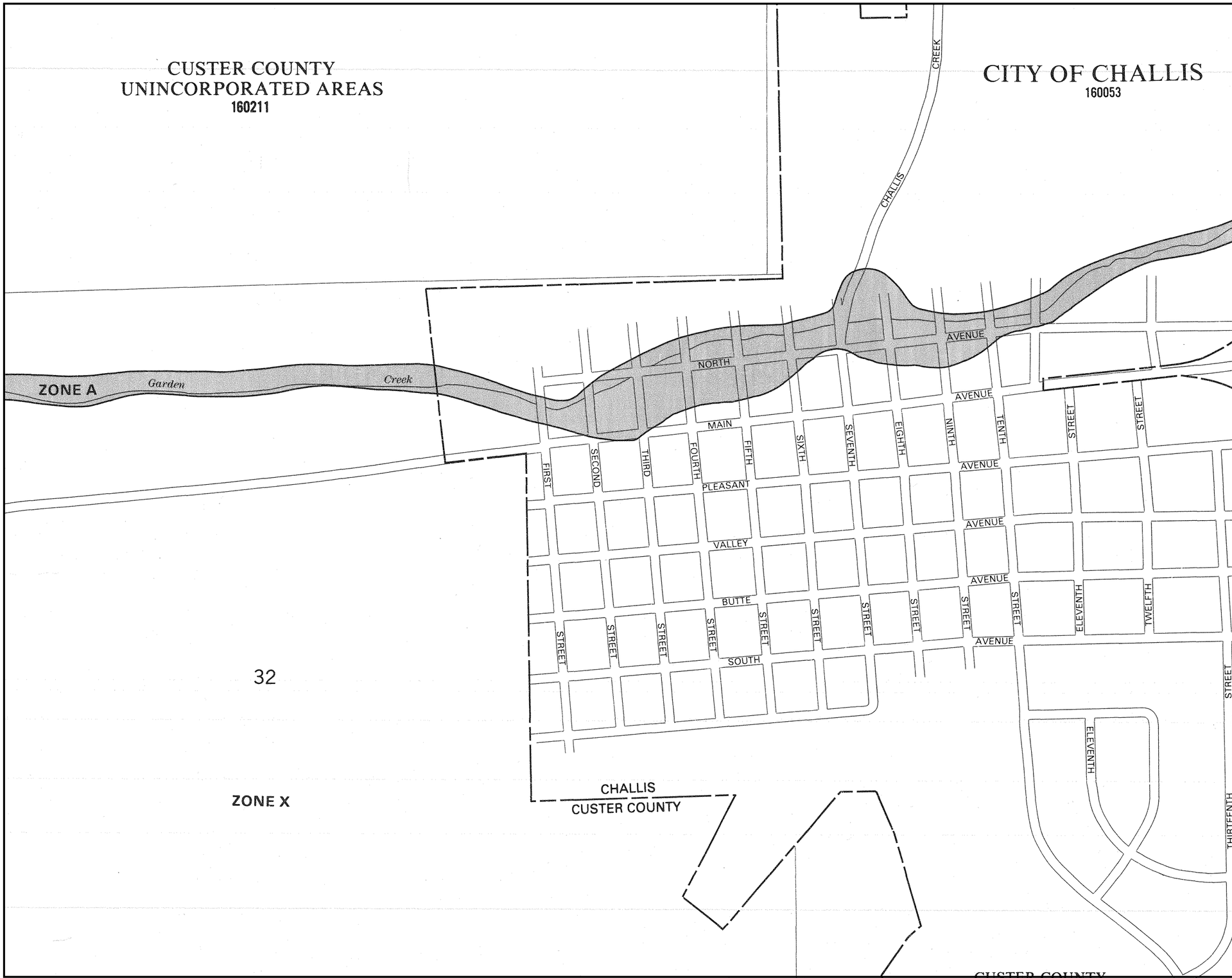
Rating Options

Aggregation Method: No Aggregation Necessary

Tie-break Rule: Lower

Idaho Air Quality Planning Areas





APPROXIMATE SCALE IN FEET

500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

CUSTER COUNTY,
IDAHO AND
INCORPORATED AREAS

PANEL 381 OF 1325

PANEL LOCATION

CONTAINS:

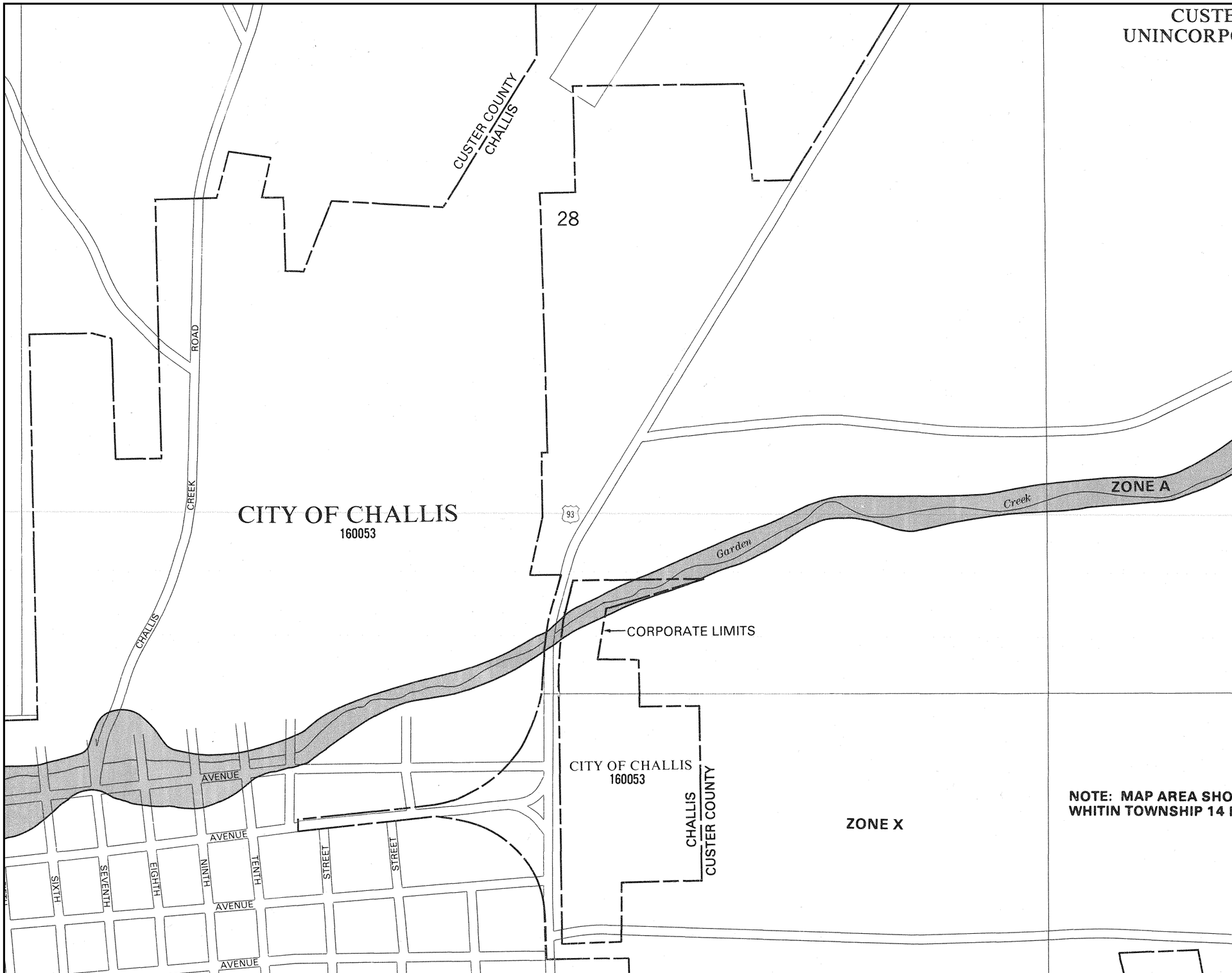
COMMUNITY	NUMBER	PANEL	SUFFIX
CHALLIS, CITY OF	160053	0381	C
UNINCORPORATED AREAS	160211	0381	C

MAP NUMBER
16037C0381 C

EFFECTIVE DATE:
MARCH 4, 1988

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE IN FEET

500 0 500

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

- **ZONE A** — No base flood elevations determined.
- **ZONE AE** — Base flood elevations determined.
- **ZONE AH** — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
- **ZONE AO** — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- **ZONE A99** — To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
- **ZONE V** — Coastal flood with velocity hazard (wave action); no base flood elevations determined.
- **ZONE VE** — Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

- **ZONE X** — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

- **ZONE X** — Areas determined to be outside 500-year flood plain.
- **ZONE D** — Areas in which flood hazards are undetermined.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet*

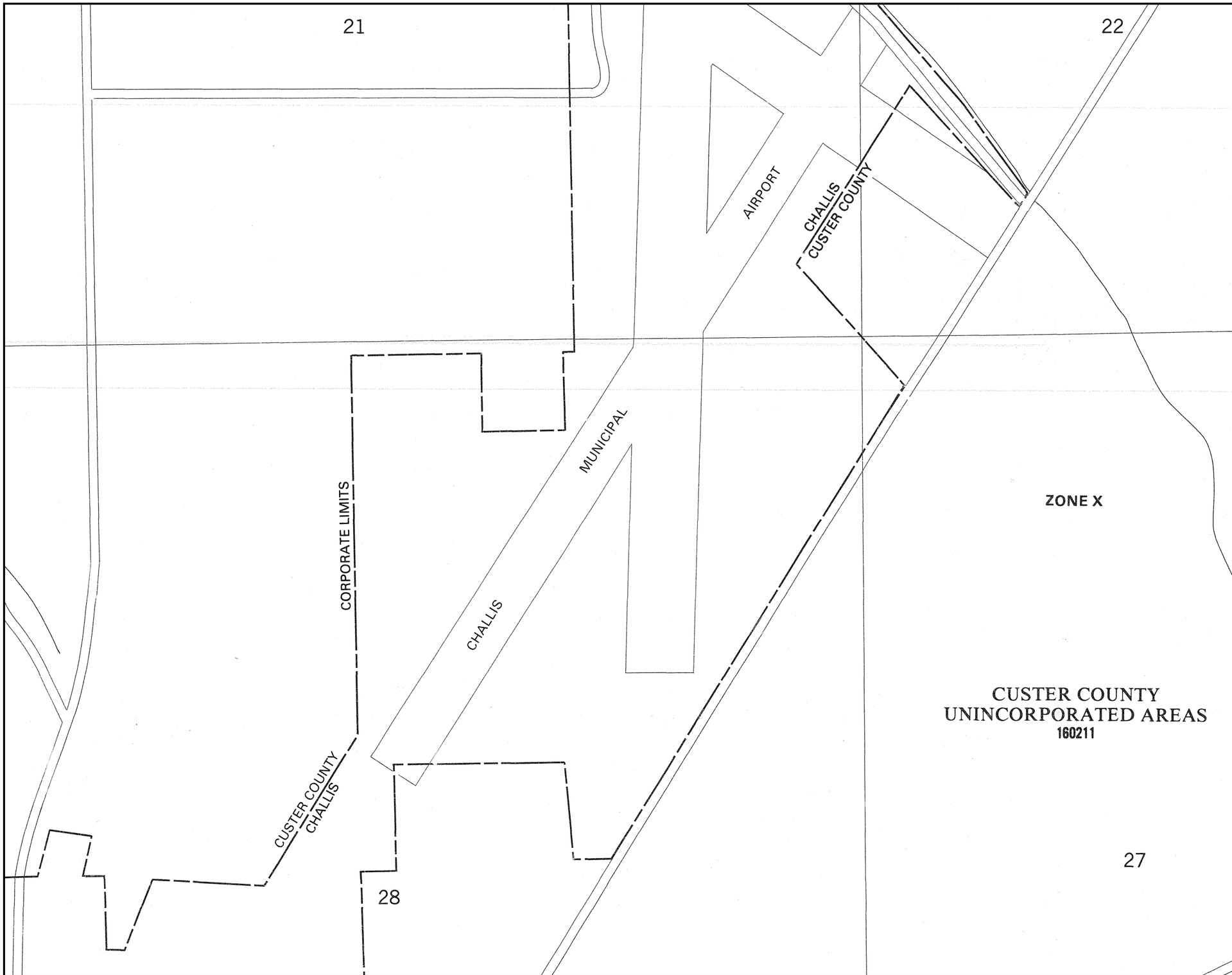
D — D — Cross Section Line

(EL 987) — Base Flood Elevation in Feet Where Uniform Within Zone*

RM7 X — Elevation Reference Mark

*Referenced to the National Geodetic Vertical Datum of 1929

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov



APPROXIMATE SCALE IN FEET

500 0 500

*Referenced to the National Geodetic Vertical Datum of 1929

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

Coastal base flood elevations apply only landward of the shoreline.

Elevation reference marks are described in the Flood Insurance Study Report.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of the map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Index Map

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
MARCH 4, 1988

EFFECTIVE DATE (S) OF REVISION (S) TO THIS PANEL:

CUSTER COUNTY
UNINCORPORATED AREAS
160211

Refer to Flood Insurance Rate Map Effective date shown below to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Idaho Fish and Wildlife Office
1387 SOUTH VINNELL WAY, SUITE 368
BOISE, ID 83709
PHONE: (208)378-5243 FAX: (208)378-5262
URL: www.fws.gov/idaho/

Consultation Tracking Number: 01EIFW00-2014-SLI-0117 January 24, 2014
Project Name: Challis Drinking Water System

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project.

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, and proposed species, designated critical habitat, and candidate species that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having

similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (http://www.fws.gov/windenergy/) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm; http://www.towerkill.com; and http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html.

Please note, the module for identifying proposed and designated critial habitat by your defined project area is currently incomplete. At this time, we ask that you use the following County by County list to aid you in determining whether your project may affect proposed or designated critical habitat in your action area.

Canada Lynx (*Lynx canadensis*)
Designated Critical Habitat: (designated February 24, 2009) Boundary County.

Federal Register Notice:
http://www.gpo.gov/fdsys/pkg/FR-2009-02-25/pdf/E9-3512.pdf#page=1
Printable Maps:
http://www.fws.gov/mountain-prairie/species/mammals/lynx/criticalhabitat_files/20081222_fedre

GIS Data: http://criticalhabitat.fws.gov/docs/crithab/zip/lunx_ch.zip
KML for Google Earth: (None Currently Available)

Selkirk Mountains Woodland Caribou (*Rangifer tarandus Caribou*)
Proposed Critical Habitat: (proposed Noveber 30, 2011) Bonner and Boundary Counties.

Federal Register Notice: http://www.fws.gov/idaho/home/2011-30451FINALR.pdf
Printable Maps: http://www.fws.gov/idaho/home/Map1_sub1_150.pdf
GIS Data: (None Currently Available)
KML for Google Earth: (None Currently Available)

Bull Trout (*Salvelinus confluentus*)
Designated Critical Habitat: (designated September 30, 2010) Adams, Benewah, Blaine, Boise, Bonner, Boundary, Butte, Camas, Clearwater, Custer, Elmore, Gem, Idaho, Kootenai, Lemhi, Lewis, Nez Perce, Owyhee, Shoshone, Valley, and Washington Counties.

Federal Register Notice:
http://www.gpo.gov/fdsys/pkg/FR-2010-10-18/pdf/2010-25028.pdf#page=2
Printable Maps: http://www.fws.gov/pacific/bulltrout/CH2010_Maps.cfm#CHMaps
GIS Data: http://criticalhabitat.fws.gov/docs/crithab/zip/bulltrout.zip
KML for Google Earth:
http://www.fws.gov/pacific/bulltrout/finalcrithab/BT_FCH_2010_KML.zip

Kootenai River White Sturgeon (*Acipenser transmontanus*)
Designated Critical Habitat: (designated July 9, 2008) Boundary County.

Federal Register Notice:
http://www.gpo.gov/fdsys/pkg/FR-2008-07-09/pdf/E8-15134.pdf#page=1
Printable Maps: (None Currently Available)
GIS Data: http://criticalhabitat.fws.gov/docs/crithab/zip/fch_73fr39506_acit_2009.zip
KML for Google Earth: (None Currently Available)

Slickspot Peppergrass (*Lepidium papilliferum*)
Proposed Critical Habitat: Ada, Canyon, Elmore, Gem, Owyhee, and Payette Counties.

Federal Register Notice: http://www.gpo.gov/fdsys/pkg/FR-2011-10-26/pdf/2011-27727.pdf
Printable Maps: http://www.fws.gov/idaho/Lepidium.html
GIS Data: (None Currently Available)
KML for Google Earth: (None Currently Available)

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment

United States Department of Interior
Fish and Wildlife Service

Project name: Challis Drinking Water System

Official Species List

Provided by:

Idaho Fish and Wildlife Office
1387 SOUTH VINNELL WAY, SUITE 368
BOISE, ID 83709
(208) 378-5243
http://www.fws.gov/idaho/

Consultation Tracking Number: 01EIFW00-2014-SLI-0117
Project Type: Water Supply / Delivery
Project Description: Replacing existing 4 inch pipe in Old Town Challis with 6 inch pipe and running 6 inch pipe north of Garden creek to the airport for fire flow. There will be no work in Garden Creek or the riparian area. All pipe installation will take place in existing roadways, alleyways and roadside ditches. The project requested a species list from FWS in November 2011. We are requesting an updated list at this time. There has been no consultation to date.

Endangered Species Act Species List

There are a total of 9 threatened, endangered, or candidate species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed on the **Has Critical Habitat** lines may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Banbury Springs limpet *(Lanx sp.)*

Population: Entire

Listing Status: Endangered

Bliss Rapids snail *(Taylorconcha serpenticola)*

Population: Entire

Listing Status: Threatened

Bull Trout *(Salvelinus confluentus)*

Population: U.S.A., conterminous, lower 48 states

Listing Status: Threatened

Has Critical Habitat: Final designated

Canada Lynx *(Lynx canadensis)*

Population: (Contiguous U.S. DPS)

Listing Status: Threatened

Has Critical Habitat: Final designated

Greater sage-grouse *(Centrocercus urophasianus)*

Population: entire

Listing Status: Candidate

North American wolverine *(Gulo gulo luscus)*

Listing Status: Proposed Threatened

Snake River Physa snail *(Physa natricina)*

Population: Entire

Listing Status: Endangered

Whitebark pine *(Pinus albicaulis)*

Listing Status: Candidate

Yellow-Billed Cuckoo *(Coccyzus americanus)*

Population: Western U.S. DPS

Listing Status: Proposed Threatened

Critical habitats that lie within your project area

The following critical habitats lie fully or partially within your project area.

Species	Critical Habitat Type
Bull Trout *(Salvelinus confluentus)* Population: U.S.A., conterminous, lower 48 states	Final designated

MEMO

TO: SANDY WILLIAMS, NORTH WIND RESOURCE CONSULTING
DON ACHESON, RIEDESEL ENGINEERING
FROM: MIKE MAY, DEQ GRANT AND LOAN PROGRAM
SUBJECT: CITY OF CHALLIS DRINKING WATER IMPROVEMENTS
THREATENED/ENDANGERED SPECIES AND ESSENTIAL FISH HABITAT
DATE: OCTOBER 10, 2014

The proposed project to be financed by the Idaho Drinking Water State Revolving Fund (SRF) includes:

- Replacement of approximately 13,000 linear feet of water main and installation of 52 new fire hydrants and 2 pressure-reducing valves in existing roadways in the "Old Town" section of Challis;
- Installation of approximately 6,000 linear feet of new 8-inch water main, approximately 1,950 linear feet of new 6-inch water main, 32 new fire hydrants and associated fittings within existing roadways to extend service to the airport;
- Replacement of 760 water meters and ancillary equipment; and
- Installation of a Supervisory Control and Data Acquisition (SCADA) telemetry system for monitoring and control of the water system.

A related water project being constructed by the Custer Soil and Water Conservation District (CSWCD), designed by the U.S. Bureau of Reclamation (USBR) and funded by the Bonneville Power Administration (BPA) includes:

- Installation of 2 drinking water wells for the City of Challis;
- Removal of the city's existing diversion dam and intake on Garden Creek near its slow sand filter (SSF) water treatment system;
- Removal of the existing diversion structure approximately 100 feet upstream that currently supplies an irrigation ditch that runs immediately west of the SSF; and
- Construction of a new headworks about 350 feet upstream of the city's existing diversion dam that would supply water to both the irrigation ditch and the SSF while simultaneously allowing fish passage upstream.

The CSWCD project features are not shown explicitly on the SRF project maps, but the SSF and clear well are identified on the maps. The existing diversion dam for the SSF is located immediately north of the SSF, and the irrigation canal can be seen immediately to the west of the SSF. The CSWCD project has currently completed the environmental review and design phases, and will shortly progress to construction.

The environmental effects of the two projects are largely independent of each other, and this memo considers primarily the SRF project. However, the National Environmental Policy Act requires assessment of the reasonably foreseeable potential direct, indirect, short term and cumulative environmental effects. A known contemporaneous project such as CSWCD's is clearly foreseeable, and would contribute to the cumulative effects from the drinking water system of the City of Challis. The CSWCD and its partners conducted their own environmental assessment and agency consultation. This memo presents only the conclusions of their assessments for threatened, endangered and candidate species and essential fish habitat. Relevant documents are included as attachments.

The project site is located in the Dry Intermontane Sagebrush Valleys ecoregion, an alluvial valley in the rain shadow of the Salmon River Mountains of central Idaho with sagebrush steppe native vegetation.[1] Garden Creek runs east out of the mountains through the city and discharges to Hannah Slough about a half mile east of the project area. This canal then discharges to the main fork of the Salmon River. The January average snow depth at the Challis weather station is 2 inches, with less snow cover in December and February, based on data from 1895 to 1996.[2]

The U.S. Fish and Wildlife Service (USF&WS) revised its threatened and endangered species list[3] during the history of this project. The revisions referenced in this memo and attached were issued on October 23, 2013 and August 14, 2014 and were downloaded July 28, 2014 and September 15, 2014, respectively. The list was refined and species were assessed using telephone conversations and email correspondence with the USF&WS Eastern Idaho Field Office, as well as publically available documents.

The following species are listed as threatened within Custer County:

1. **Canada Lynx** (*Lynx canadensis*) – The Canada Lynx reside in boreal forest landscapes and provide one or more of the following beneficial habitat elements including snowshoe hares for prey, abundant, large, woody debris piles that are used as dens, and winter snow conditions that are generally deep and fluffy for extended periods of time.4 The proposed project is located in a suburban sagebrush environment not typical of boreal forests and having shallow winter snow depths. The proposed project will have NO EFFECT on the Canada Lynx.

2. **Bull Trout** (*Salvelinus confluentus*) – There is no bull trout critical habitat within the boundaries of the project area.5 There is a Garden Creek within the Unit 27 listing in the Federal Register, but the coordinates indicate this is a tributary of Panther Creek, about 700 feet above its discharge to the Salmon River, about 112 river miles downstream of Challis.6,7 Irrigation diversions cause Garden Creek within the project area to often run dry in the summer, but good flows and fish habitat are present in the upper reaches.8 One aspect of the proposed CSWCD project will end routine diversions from Garden Creek for drinking water, which would leave additional flows for aquatic species such as bull trout, except during periods when one of the wells is out of service.

   The Salmon River in the vicinity of Challis is bull trout critical habitat. Construction Best Management Practices will be used to prevent construction sediment from reaching the Salmon River via Garden Creek or other unnamed channels. The proposed project will have NO EFFECT on Bull Trout.

The following have been listed as Candidate Species within Custer County:

1. **Whitebark Pine** (*Pinus albicaulis*) – The Whitebark pine is a 5 needle conifer species. The species occurs from approximately 2,950 feet at its northern limit in British Columbia up to 12,000 feet in the Sierra Nevada. The Whitebark Pine is typically found at or slightly lower than

alpine timberline in the upper montane zone. In the U.S. it is primarily found on public lands.9 The proposed project is located in a suburban sagebrush valley environment unsuited to Whitebark Pine, although the map below shows that the species may be present on surrounding ridges. The project will have NO EFFECT on whitebark pine.

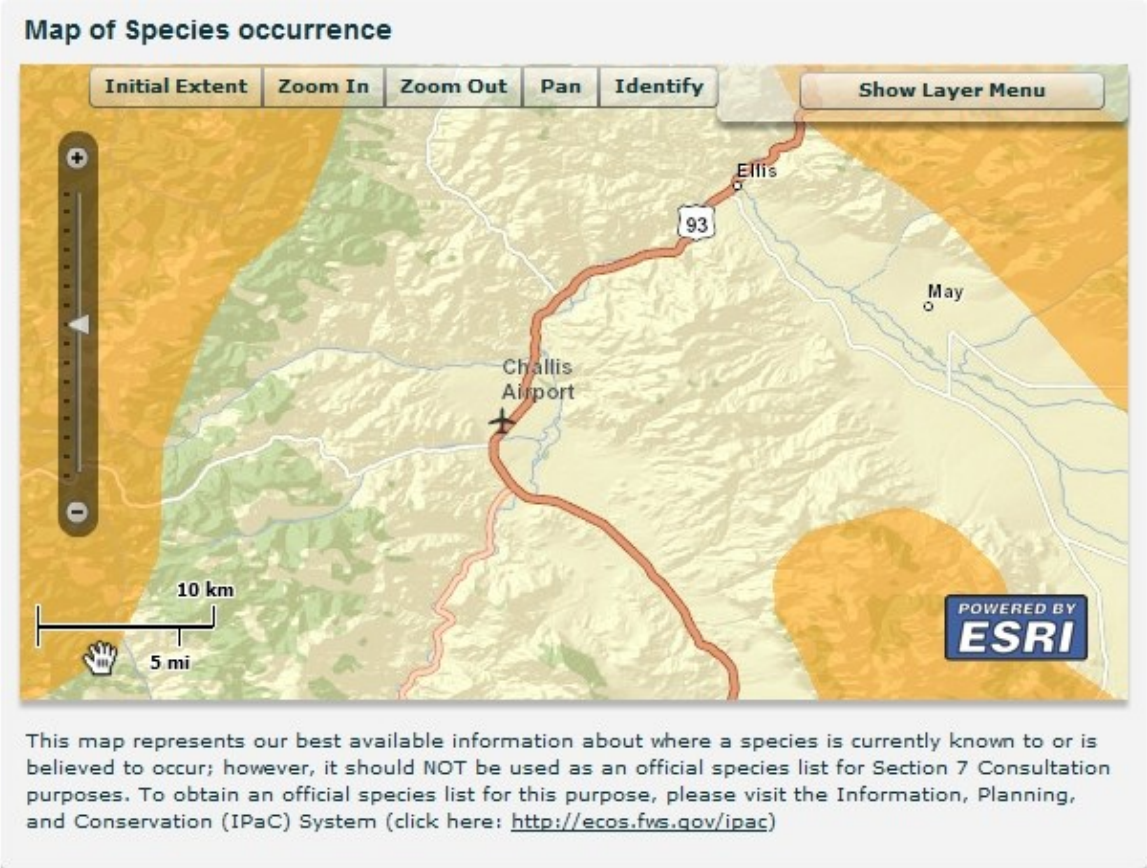


Figure 1. Whitebark Pine species occurrence map (USFWS)

2. **Greater Sage-Grouse** (*Centrocercus urophasianus*) – Grouse reside in Sagebrush Steppe environments, and prefer slightly elevated features surrounded by flat terrain, but not lower portions of hillsides beneath areas that could contain raptors or other predators. The Challis area is surrounded by generally intact sagebrush that could provide suitable habitat at some point during the year, as is evident by the USF&WS species occurrence map below[10], and on the priority areas map below, which shows that Priority Area Y is located just north of town.[11] However, examining the species occurrence map on a closer scale shows that it cannot be correct in all details, because most of the developed area within the City of Challis is shown as Greater Sage-Grouse habitat.

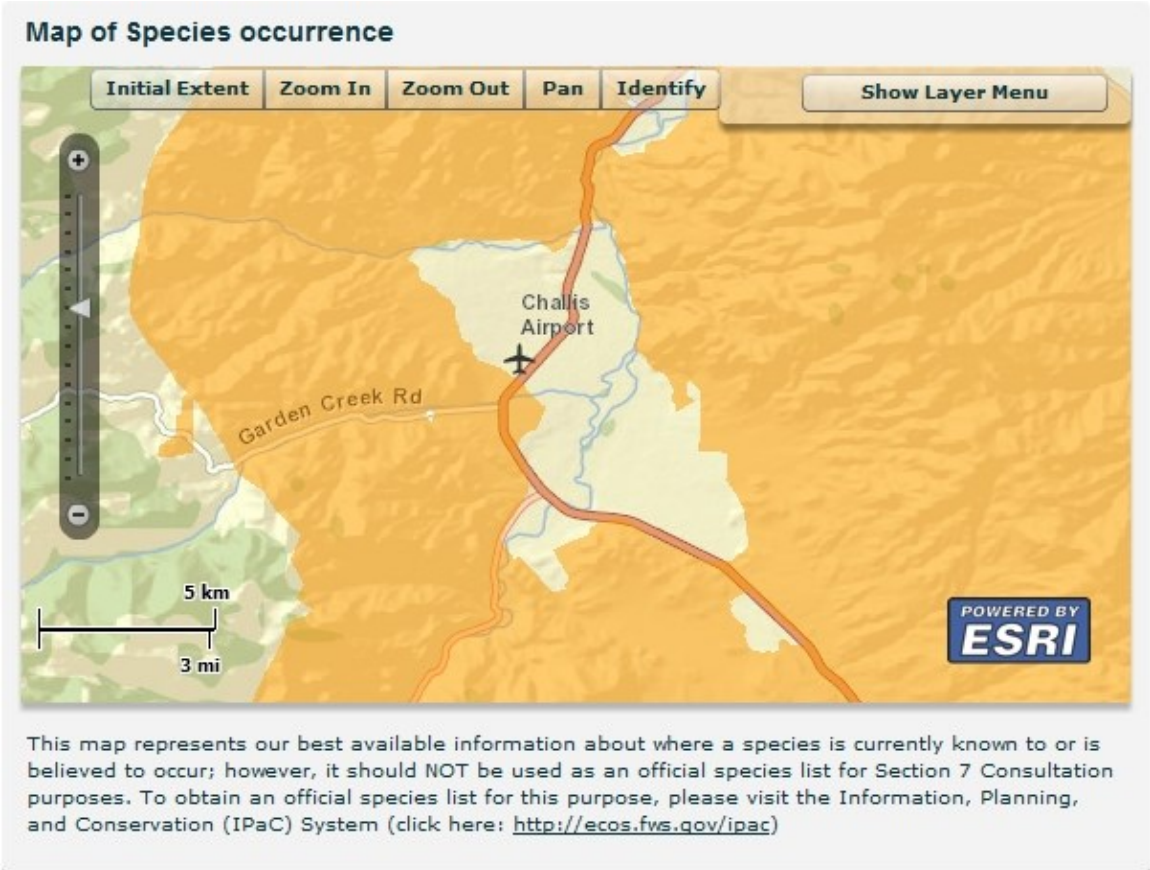


Figure 2. Greater Sage-grouse species occurrence map (USF&WS). See text.

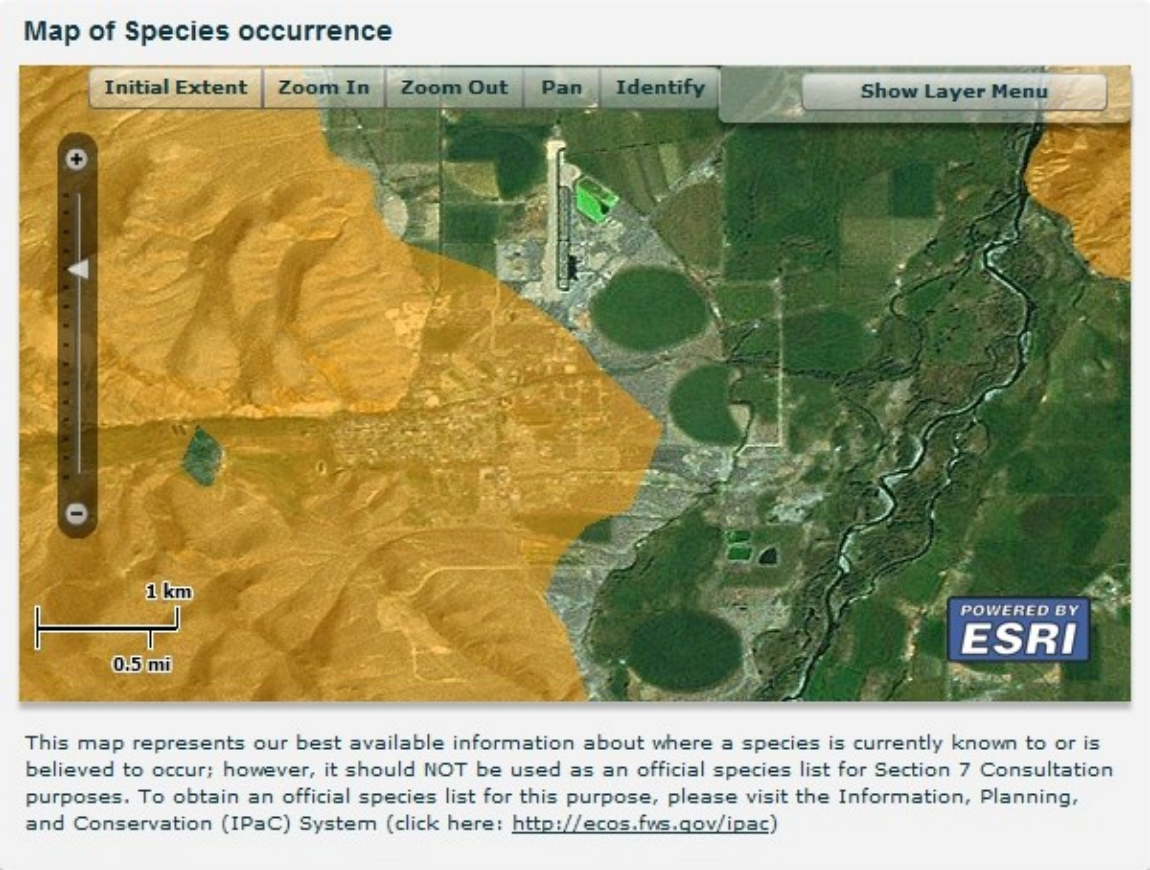


Figure 3. Greater sage-grouse species occurrence map (larger scale, USF&WS). See text.

The preferred Best Management Practice is avoidance: if construction activity must occur during lekking season, work should be postponed until after 10:30 a.m. All project work is proposed to be limited to existing city streets, roads and rights of way, including U.S. Highway 93. This makes it extremely unlikely that leks are present near the project area, since paved roads and primary and secondary routes are believed to cause adverse effects on leks at a distance of 1.6 miles.[12] The proposed project will have NO EFFECT on the Greater Sage Grouse.

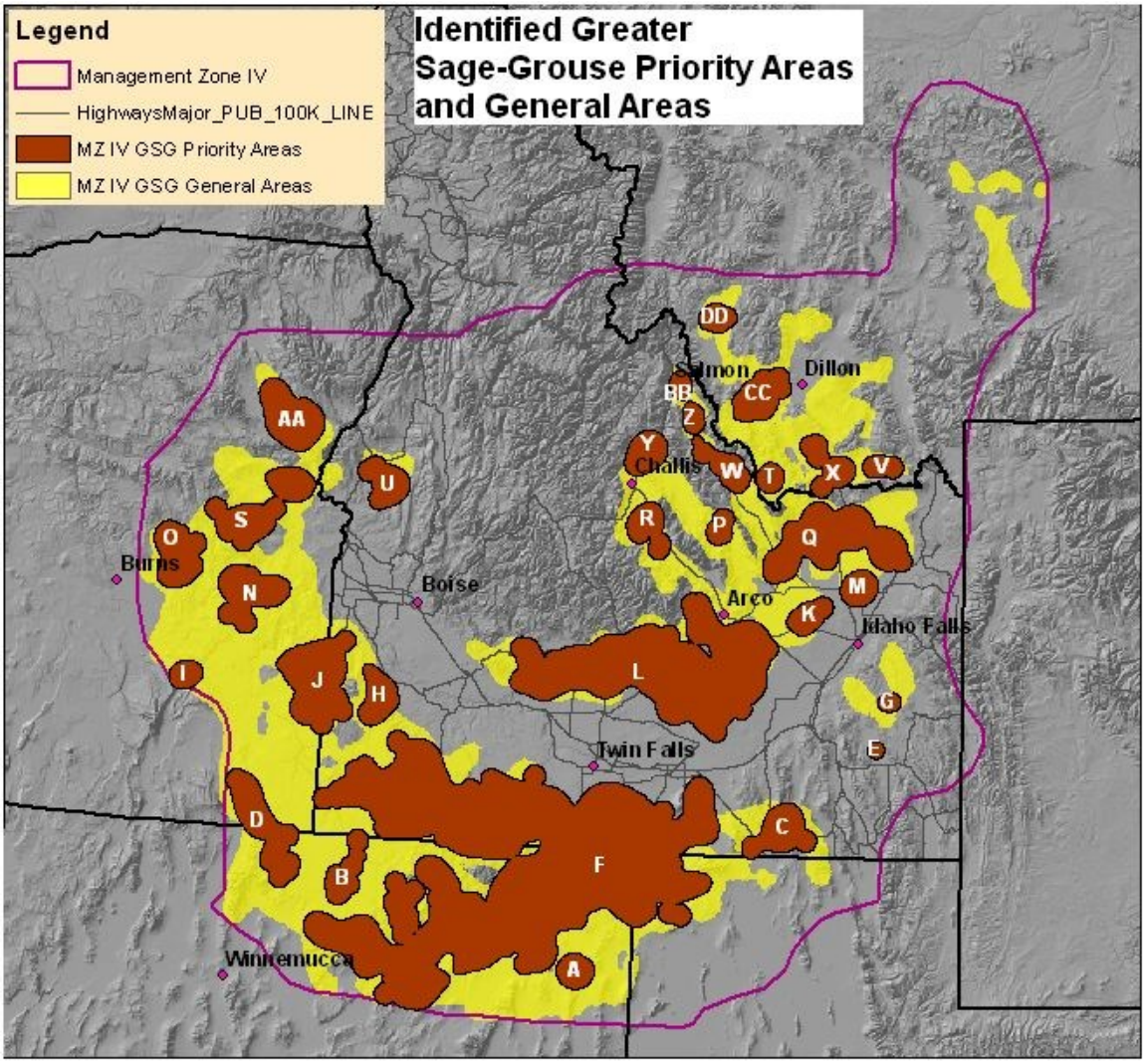


Figure 4. Greater Sage-Grouse Priority Areas and General Areas (BLM 2011)[13]

The following species are listed as a Proposed Threatened Species within Custer County:

1. **North American Wolverine** (*Gulo gulo luscus*) - The North American Wolverine is a proposed species which is not expected to be found in the proposed project planning area. The proposed project is located in suburban and arid foothills environments. Wolverine distribution is restricted to high elevation areas of deep, persistent and reliable spring snow cover (April 15 to May 14) is the best overall predictor of wolverine occurrence in the contiguous U.S.[14] Wolverines are known to travel long distances, so any individuals that may be encountered are almost certain to be travelling between other suitable habitats. January is the snowiest month in for Challis is deepest in January, with an average snow depth of 2 inches over 101 years of data.[2] This is insufficient snow depth at the project site for wolverine dens, therefore the proposed project will have NO EFFECT on the wolverine species.[15]

2. **Yellow-Billed Cuckoo** (*Coccyzus americanus*) –Western cuckoos breed in large blocks of riparian habitats, particularly woodlands with cottonwoods and willows. Dense understory foliage is believed to be important for nesting sites. They are generally local and uncommon in scattered

drainages of the arid and semiarid portions of western Colorado, western Wyoming, Idaho, Nevada and Utah. USFWS reported in 2011 that the Yellow-Billed cuckoo was considered a rare and local summer resident in Idaho, with only four records of the species in northern and central Idaho over the last century. The majority of sightings have been in the Snake River corridor in southeast Idaho. On the other hand, the same paragraph states that the species has been observed numerous times in the southwestern part of the state in the past 25 years. They concluded that the information at that time was inadequate to judge trends in population or distribution.[16]

The Yellow-billed Cuckoo is "known or believed to be present" in the near vicinity of the project area, according to the USF&WS map below.[17] The most likely habitat in the project area would be along the riparian corridor of Garden Creek. However, recent photographs of this corridor show that the trees do not extend far from the creek bank, do not exhibit the dense understory best suited for nesting, and are adjacent to developed areas, such as single family housing, schools and city streets. After reviewing the photographs (one of which is shown below), Nisa Marks of the USF&WS Eastern Idaho Field Office indicated that this was not suitable habitat. This is consistent with the 2014 proposed critical habitat designation,[18] which indicated that floodplains at least 325 feet wide with dense canopy closure greater than 200 acres in extent are generally required to support more than a single breeding pair. The critical habitat proposal includes all known nesting areas greater than 200 acres, based on breeding records between 1998 and 2012, and no such areas were identified in Custer County. The proposed project will have NO EFFECT on the Yellow-billed cuckoo.

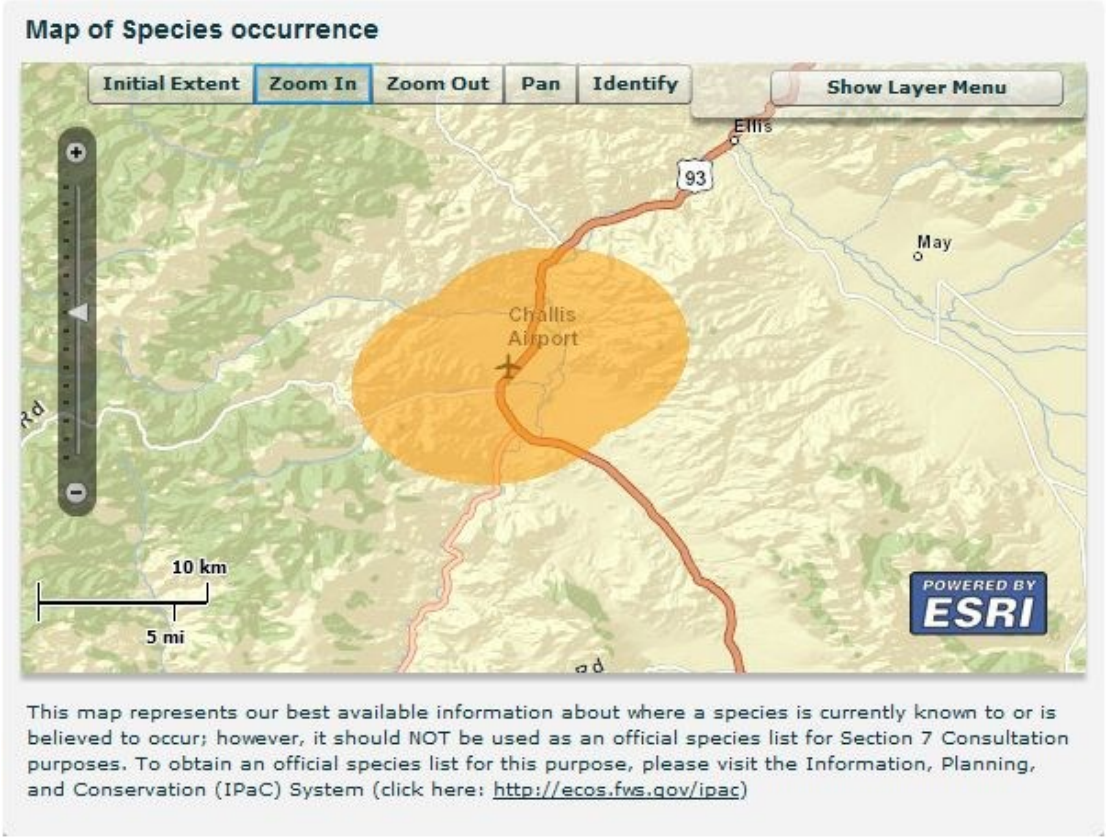


Figure 5. Yellow-Billed Cuckoo species occurrence map (USF&WS). See text.

Figure 6. Narrow corridor of trees with sparse understory in project area are unsuitable Yellow-Billed Cuckoo habitat.

Essential Fish Habitat

The project area is located within the Upper Salmon Subbasin (Hydrologic Unit Code 17060201), which contains Essential Fish Habitat (EFH) for **Chinook Salmon** (*Oncorhynchus tshawytscha*) but not **Coho Salmon** (*Oncorhynchus kisutch*) as identified in the attached EFH map. "All those water bodies occupied or historically accessible" in the identified hydrologic units are considered EFH, according to 50 CFR 660.412. Since there are no barriers to salmon migration downstream of Challis, both the Salmon River and Garden Creek are designated EFH (70FR52630). Because the SRF project will not include work in Garden Creek or associated riparian areas and best management practices will be used to control stormwater, the SRF project will have "NO EFFECT" on EFH

As previously stated, CSWCD and its partners conducted their own assessment and agency consultation for their project. They determined that their project "May Effect but is Not Likely to Adversely Affect" (NLAA) Chinook salmon, steelhead trout or bull trout or their critical habitat.[19] USF&WS concurred that the project was unlikely to adversely affect bull trout, and would probably provide long-term nbeneficial effects.[20] NMFS concurred with the NLAA determination, and determined that the project would not adversely affect EFH.[21]

Figure 7. Critical habitat in the project area (USF&WS Critical Habitat Mapper 3.0)[22]

MLM

Attachments: Idaho Species List, downloaded July 28 and September 15, 2014
Critical Habitat for Bull Trout Map (Unit 27)
Emails between DEQ and USF&WS, 2013-2014
DEQ, Chinook Salmon Essential Fish Habitat in Idaho (map)
Biological Assessment, Garden Creek Rehabilitation Project, Draft Final, April 2014
BPA Biological Assessment transmittal letter to NMFS, May 19, 2014
BPA Biological Assessment transmittal letter to USW&WS, May 19, 2014
NMFS concurrence letter and EFH response, June 23, 2014
USF&WS concurrence letter, June 20, 2014

References

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[1] McGrath, *et al.*, 2002, *Ecoregions of Idaho*, EPA Western Ecology Division, Corvallis, Oregon, www.epa.gov/wed/pages/ecoregions/id_eco.htm.

[2] Western Regional Climate Center, *Challis, Idaho (101663) Monthly Climate Summary, 1/1/1895 to 6/30/1996*, www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?id1663

[3] January 23, 2013, USF&WS, *Idaho Species List*, www.fws.gov/idaho/species/IdahoSpeciesList.pdf, last downloaded July 28, 2014.

[4] USF&WS Species Profile: Canada Lynx (*Lynx canadensis*), ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A073

[5] *Federal Register*, Vol. 75, Page 63898, October 28, 2010.

[6] U.S. Geological Survey, 7.5 minute *Bighorn Creek* quadrangle, 1997.

[7] U.S. Geological Survey, 7.5 minute *Challis* quadrangle, 1997.

[8] *Completion Report, Garden Creek and Gini Canal Crossing Project*, Upper Salmon Subbasin, Salmon, Idaho, July 2007, www.usbr.gov/pn/programs/fcrps/thp/srao/uppersalmon/completion/ginicanal/gini-garden.pdf.

[9] USF&WS Species Profile: Whitebark pine, ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=R00E

[10] USF&WS Species Profile: Greater sage-grouse (Centrocercus urophasianus), ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06W

[11] Makela & Major, 2012, *Idaho Sage-grouse Priority Areas White Paper*, www.blm.gov/pgdata/etc/medialib/blm/id/wildlife/sensitive_species/sg_scoping_meeting.Par.67149.File.dat/Idaho_Sage-grouse_Priority_Areas_White_Paper_September_27_2011_FINAL_508.pdf

[12] *Draft Idaho and Southwestern Montana Sub-Region Greater Sage-Grouse LUPA/EIS, Vol. II* §4.2.1

[13] BLM, 2011, *Idaho Sage-grouse Priority Areas White Paper, September 27, 2011 FINAL*, www.blm.gov/pgdata/etc/medialib/blm/id/wildlife/sensitive_species/sg_scoping_meeting.Par.67149.File.dat/Idaho_Sage-grouse_Priority_Areas_White_Paper_September_27_2011_FINAL_508.pdf

[14] USF&WS Species Profile: North American wolverine (Gulo gulo luscus), ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=A0FA

[15] USF&WS withdrew its proposal to list the North American wolverine as threatened with the contiguous United States; Federal Register, Vol. 79, Page 47521, August 13, 2014.

[16] USFWS 2011, *Species Assessment and Listing Priority Assignment Form*, ecos.fws.gov/tess_public/candidateReport!streamPublishedPdfForYear.action?candidateId=22&year=2011, obtained from Reference 13.

[17] USF&WS Species Profile: Yellow-Billed Cuckoo (Coccyzus americanus), ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06R#candidate.

[18] *Federal Register*, Vol. 79, Page 48547, August 15, 2014.

[19] Michael J. Donahoo, *Biological Assessment: Garden Creek Rehabilitation Project*, April 2014.

[20] David Kampwerth of USF&WS, concurrence letter to Michelle Guay of BPA, June 20, 2014.

[21] William W. Stelle of NMFS, concurrence letter to Michelle Guay of BPA, June 23, 2014.

[22] USF&WS Critical Habitat Mapper 3.0, ecos.fws.gov/crithab/flex/crithabMapper.jsp, accessed March 27, 2014.

This information is for general reference only. Please visit http://ecos.fws.gov/ipac/ to obtain an official list for purposes of Endangered Species Act section 7 consultation. Revised 08/14/2014. **Downloaded September 15, 2014**

U.S. Fish and Wildlife Service • Idaho Fish and Wildlife Office

LISTED, CANDIDATE, AND PROPOSED SPECIES & DESIGNATED AND PROPOSED CRITICAL HABITAT IN IDAHO

	Herps	Birds		Mammals					Fish		Mollusks				Plants							
Common Name	Columbia Spotted Frog (Great Basin Population)	Greater Sage-Grouse	Yellow-Billed Cuckoo	Canada Lynx	Grizzly Bear	Northern Idaho Ground Squirrel	Selkirk Mountains Woodland Caribou	Southern Idaho Ground Squirrel	Bull Trout	Kootenai River White Sturgeon	Banbury Springs Lanx	Bliss Rapids Snail	Bruneau Hot Springsnail	Snake River Physa	Goose Creek Milkvetch	MacFarlane's Four-O'Clock	Packard's Milkvetch	Slickspot Peppergrass	Spalding's Catchfly	Ute Ladies'-Tresses	Water Howellia	Whitebark Pine
Scientific Name	*Rana luteiventris*	*Centrocercus urophasianus*	*Coccyzus americanus*	*Lynx canadensis*	*Ursus arctos horribilis*	*Spermophilus brunneus brunneus*	*Rangifer tarandus caribou*	*Spermophilus brunneus endemicus*	*Salvelinus confluentus*	*Acipenser transmontanus*	*Lanx* sp.	*Taylorconcha serpenticola*	*Pyrgulopsis bruneauensis*	*Haitia (Physa) natricina*	*Astragalus anserinus*	*Mirabilis macfarlanei*	*Astragalus cusickii var. parkardiae*	*Lepidium papilliferum*	*Silene spaldingii*	*Spiranthes diluvialis*	*Howellia aquatilis*	*Pinus albicaulis*
Ada		C	P						T					E				P-PCH				
Adams		C		T		T		C	T-DCH													C
Bannock		C	P-PCH																			
Bear Lake		C		T																		
Benewah				T					T-DCH										T		T	
Bingham		C	P-PCH																	T		
Blaine		C	P-PCH	T					T-DCH													C
Boise			P	T					T-DCH													C
Bonner				T	T		E		T-DCH													C
Bonneville		C	P-PCH	T	T															T		C
Boundary				T-DCH	T		E-DCH		T-DCH	E-DCH												C
Butte		C		T					T-DCH													C
Camas		C	P	T					T-DCH													C
Canyon														E				P-PCH				
Caribou		C		T																		
Cassia		C	P											E	C							
Clark		C	P	T	T																	C
Clearwater				T					T-DCH													C
Custer		C	P	T					T-DCH													C
Elmore		C	P	T					T-DCH			T		E				P-PCH				C
Franklin		C		T																		
Fremont		C	P	T	T															T		C
Gem		C						C	T-DCH									P-PCH				C

Table Key: C = Candidate Species P= Proposed Species T=Threatened Species E=Endangered Species PCH= Proposed Critical Habitat DCH=Designated Critical Habitat

United States Department of the Interior

Fish and Wildlife Service

Idaho Fish And Wildlife Office
1387 S. Vinnell Way, Room 368, Boise
Idaho 83709
Telephone (208) 378-5243
http://www.fws.gov/idaho

U.S. Fish and Wildlife Service - Idaho Fish and Wildlife Office
Endangered, Threatened, Proposed, and Candidate Species
With Associated Proposed and Critical Habitats in Idaho

July 28, 2014

This Letter and Species List

The U.S. Fish and Wildlife Service (Service) is providing this letter in response to your inquiry regarding federally listed, proposed, and candidate species, and proposed and designated critical habitats that may occur in Idaho. Use the attached Species List to ensure compliance with Sections 7 and 9 of the Endangered Species Act (Act). As a federal agent or designated non-federal representative, use this list in conjunction with best available information to assess whether a proposed action may affect these species or their habitats. If you determine a proposed action may affect a species or their habitats, contact the Service to initiate informal or formal consultation. This list is only valid for a period of 90 days. An updated list can be obtained from the Initial Project Scoping application accessed via the site: www.ecos.fws.gov/ipac/

Candidate Species Conservation

Though Candidate species have no protection under the Act, they are included in the Species List for early planning consideration. Candidate species could be proposed or listed during the project planning period. The Service advises project proponents to evaluate potential effects to Candidate species that may occur in the project area. Should the species be listed, this may expedite Section 7 consultation under the Act.

Effects Beyond Idaho

If the anticipated effects of an action extend beyond the range of Idaho, please contact the appropriate Service Contact for lists of species and habitats occurring in those adjacent states.

U.S. Fish and Wildlife Service Contacts

Idaho - Idaho Fish and Wildlife Office, Bob Kibler, bob_kibler@fws.gov, (208) 378-5255
Montana - Montana Ecological Services Field Office, (406) 449-5225
Nevada - Nevada Fish and Wildlife Office, (775) 861-6300
Oregon - LaGrande Field Office, (541) 962-8584
Utah - Utah Ecological Service Field Office, (801) 975-3330
Washington - Eastern Washington Field Office, (509) 891-6839
Wyoming - Wyoming Ecological Services Field Office, (307) 772-2374

NOAA Fisheries Species

Listed or proposed species that are under National Marine Fisheries Service's (NOAA Fisheries) jurisdiction do NOT appear on the Service's Species Lists. In Idaho, please contact NOAA Fisheries at (208) 378-5696 or visit NOAA Fisheries' webpage at http://www.westcoast.fisheries.noaa.gov/#movedprotected_species/species_lsit/species_lists.html for consultation information.

Additional Information

To obtain additional information about the Act, please visit one of the Service's internet sites at http://www.fws.gov/endangered/laws-policies/index.html; http://www.fws.gov/idaho/agencies.htm; or speak with a Service Contact.

This species list was revised by the USFWS on 10/23/2013, and is valid for 90 days after 10/13/2014.

U.S. Fish and Wildlife Service • Idaho Fish and Wildlife Office

CANDIDATE, PROPOSED AND LISTED SPECIES & PROPOSED AND DESIGNATED CRITICAL HABITAT IN IDAHO

	Herps	Birds		Mammals						Fish		Mollusks				Plants							
Common Name	**Columbia Spotted Frog (Great Basin Population)**	**Greater Sage-Grouse**	**Yellow-Billed Cuckoo**	**Canada Lynx**	**Grizzly Bear**	**Northern Idaho Ground Squirrel**	**Selkirk Mountains Woodland Caribou**	**Southern Idaho Ground Squirrel**	**North American Wolverine**	**Bull Trout**	**Kootenai River White Sturgeon**	**Banbury Springs Lanx**	**Bliss Rapids Snail**	**Bruneau Hot Springsnail**	**Snake River Physa**	**Goose Creek Milkvetch**	**MacFarlane's Four-O'Clock**	**Packard's Milkvetch**	**Slickspot Peppergrass**	**Spalding's Catchfly**	**Ute Ladies'-Tresses**	**Water Howellia**	**Whitebark Pine**
Scientific Name	*Rana luteiventris*	*Centrocercus urophasianus*	*Coccyzus americanus*	*Lynx canadensis*	*Ursus arctos horribilis*	*Spermophilus brunneus brunneus*	*Rangifer tarandus caribou*	*Spermophilus brunneus endemicus*	*Gulo gulo luscus*	*Salvelinus confluentus*	*Acipenser transmontanus*	*Lanx* sp.	*Taylorconcha serpenticola*	*Pyrgulopsis bruneauensis*	*Haitia (Physa) natricina*	*Astragalus anserinus*	*Mirabilis macfarlanei*	*Astragalus cusickii var. parkardiae*	*Lepidium papilliferum*	*Silene spaldingii*	*Spiranthes diluvialis*	*Howellia aquatilis*	*Pinus albicaulis*
Ada		C	P							T					E				P-PCH				
Adams		C		T		T		C	P	T-DCH													C
Bannock		C	P						P														
Bear Lake		C		T					P														
Benewah				T					P	T-DCH										T		T	
Bingham		C	P						P												T		
Blaine		C	P	T					P	T-DCH													C
Boise			P	T					P	T-DCH													C
Bonner				T	T		E		P	T-DCH													C
Bonneville		C	P	T	T				P												T		C
Boundary				T-DCH	T		E-DCH		P	T-DCH	E-DCH												C
Butte		C		T					P	T-DCH													C
Camas		C	P	T					P	T-DCH													C
Canyon															E				P-PCH				
Caribou		C		T					P														
Cassia		C	P												E	C							
Clark		C	P	T	T				P														C
Clearwater				T					P	T-DCH													C
Custer		C	P	T					P	T-DCH													C
Elmore		C	P	T					P	T-DCH			T		E				P-PCH				C
Franklin		C		T					P														
Fremont		C	P	T	T				P												T		C
Gem		C						C	P	T-DCH									P-PCH				C

Table Key: C = Candidate Species P= Proposed Species T=Threatened Species E=Endangered Species PCH= Proposed Critical Habitat DCH=Designated Critical Habitat

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CANDIDATE, PROPOSED AND LISTED SPECIES & PROPOSED AND DESIGNATED CRITICAL HABITAT IN IDAHO

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Gooding		C										E	T		E								
Idaho				T					P	T-DCH							T			T			C
Jefferson		C	P	T					P												T		
Jerome		C											T		E								
Kootenai			P	T					P	T-DCH										T		T	
Latah				T					P											T		T	
Lemhi		C	P	T					P	T-DCH													C
Lewis										T-DCH										T			
Lincoln		C	P																				
Madison		C	P	T					P												T		
Minidoka		C	P												E								
Nez Perce				T						T-DCH										T			
Oneida		C																					
Owyhee	C	C	P							T-DCH				E	E				P-PCH				
Payette		C						C		T					E			C	P-PCH				
Power		C	P																				
Shoshone				T					P	T-DCH										T		T	C
Teton				T	T				P														C
Twin Falls	C	C											T		E								
Valley				T		T			P	T-DCH													C
Washington		C				T		C	P	T-DCH					E								C

Table Key: C = Candidate Species P= Proposed Species T=Threatened Species E=Endangered Species PCH= Proposed Critical Habitat DCH=Designated Critical Habitat

From: Marks, Nisa <nisa_marks@fws.gov>
Sent: Wednesday, April 23, 2014 14:15
To: Mike May
Cc: cswcd; David Kampwerth
Subject: Re: follow-up consultation on T&E species issues and Challis drinking water improvements

Mike -

OK, thanks for letting me know about the CSWCD project.

Thank you for informing us of your no effect determination for bull trout. We have not identified any other issues that indicate that further consultation under section 7 of the Endangered Species Act would be needed for this project.

Feel free to be in touch with any further questions.

Nisa Marks, Biologist
US Fish and Wildlife Service
Eastern Idaho Field Office
4425 Burley Dr., Suite A
Chubbuck, ID 83202
208-237-6975 x121

On Wed, Apr 23, 2014 at 1:26 PM, <Michael.May@deq.idaho.gov> wrote:
Thanks, Nisa.

The CSWCD project is being run separately, and I expect that they will be consulting you about the specifics of that project. I brought it up because of the cumulative effects issue with NEPA, and the court cases that say reasonably foreseeable related projects should not be ignored.

Regarding the bull trout, the SRF project (the one described by the maps) does not involve any work within Garden Creek or in its riparian zone. I expect it to have no effect on bull trout, as long as we follow standard construction BMPs that prevent sediments from being transported into Garden Creek or the Salmon River. Do we need a more formal determination than that?

From: Marks, Nisa [mailto:nisa_marks@fws.gov]
Sent: Wednesday, April 23, 2014 11:14
To: Mike May
Cc: cswcd@custertel.net; David Kampwerth
Subject: Re: follow-up consultation on T&E species issues and Challis drinking water improvements

Hi Mike,

Thanks for being in contact. To answer your questions:

1) We appreciate being notified of your no effect determination for wolverine, and do not see any issues that would indicate further consultation under the Act would be needed for this species.

2) I would not consider the area in the photo suitable yellow-billed cuckoo habitat.
3) I have no additional thoughts about sage grouse, beyond what we previously discussed.
4) Is the CSWCD project being done as part of the same proposed project as the drinking water project, or separately? (if the same project, I would need more information about that component before being comfortable about an effects determination.)
5) Migratory bull trout likely would use the area, in low densities. Do you need additional information? Have you reached an effects determination for bull trout for the project?

Hope that helps; let me know if I can be of additional assistance.

Nisa Marks, Biologist
US Fish and Wildlife Service
Eastern Idaho Field Office
4425 Burley Dr., Suite A
Chubbuck, ID 83202
208-237-6975 x121

On Tue, Apr 22, 2014 at 3:43 PM, <Michael.May@deq.idaho.gov> wrote:

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------< Attachments >------

USFW Consultation - Challis DW - 29 Nov 2011

Trees along Garden Creek (EID excerpt) - Challis DW - 28 Jan 2014

Revised project map Sheet 1 from EID - Challis DW - 16 Dec 2013

Garden Creek and Old Town expanded scale map - Challis DWL - 21 April 2014
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Hi Nisa, I want to follow up on our consultation from last year regarding the City of Challis drinking water project. First, to refresh your memory, I am pasting in my notes from our May 21, 2013 telephone conversation.

May 21, 2013 10:30

- I clarified the operation of the SSF and indicated that I thought the intake was also being left in place. Flows were being replaced in near term and intermediate term with wells, so habitat would presumably be improved by greater flows. City is retaining water right. Some stream crossings, don't know if they are on bridges, or how replacements would be done.

- Nisa fine w/ determination for lynx, sage grouse, Whitebark pine

- Is there dense riparian cottonwood/willow zone for breeding? Season would be mid-March to August 1, but only if habitat present. Otherwise, might be present during migration only, not a concern.

- For bull trout, clarify in-stream activity, withdrawals or anything creating noise, such as pumps. She will check on specifics of bull trout in Garden Creek

Now, some clarifications that should be relevant to bull trout, yellow-billed cuckoo and North American wolverine:

· My telephone conversation notes didn't indicate anything about the North American wolverine. Please confirm whether there any concerns there. I assume the very thin snow cover is dispositive for this species.

· The scope has changed somewhat, and I am attaching an updated project map (two 11"x17" sheets).

· For this project, there is no work planned on stream crossings, and the drinking water intake in Garden Creek will remain in place. Challis will be retaining the water right, but plans to use Garden Creek only as a redundant source (when one of its wells is out of service), so most of the time the water now being withdrawn will be allowed to flow in Garden Creek.

· However, a related project to be conducted by the Custer Soil and Water Conservation District (CSWCD) and funded by Bonneville Power will be removing the existing intake, which blocks fish passage, and installing a new intake upstream that does not block fish passage. They will also be drilling two new wells. The contact for that project is Karma Bragg of CSWCD, who is being copied on this email. She will be consulting with you in detail, but it appears that the long term effects should be positive as far as bull trout are concerned.

· The engineers have supplied some photographs of the trees along Garden Creek within the project area, which I have provided in an attached PDF. The trees appear to lie in a narrow riparian corridor, and are often in close proximity to single-family homes. Is this likely yellow-billed cuckoo habitat that we should be concerned about?

I checked the current Idaho Species List <www.fws.gov/idaho/species/IdahoSpeciesList.pdf>, which was last updated on October 23, 2013. The same six species are identified as on the February 6, 2013 list that was current when we last spoke, although the Yellow-billed cuckoo status was changed from Proposed to Candidate. Also, the draft BLM Greater sage-grouse land use plan amendment went through public comment. Have these or any other recent developments changed your view about whether the Greater sage-grouse would be impacted by the project?

Thanks for your assistance with this project.

Mike May
Sr. Water Quality Analyst
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706
(208) 373-0406
Michael.May@deq.idaho.gov

From: Mike May
Sent: Friday, May 17, 2013 15:19
To: Nisa Marks (USF&WS)
Subject: T&E species issues and Challis drinking water improvements

Hi Nisa, sorry we missed each other playing telephone tag today. I wanted to follow up on a few items.

There had been contact between the engineer and your office back in November of 2011, at which time salmon, steelhead and bull trout were the only species identified. For reference, I am attaching a copy of the correspondence. By the way, since I am preparing an Essential Fish Habitat Determination for submittal to NMFS, I will be interested in any insights you have on salmonids, although I didn't ask about them previously.

Also, I have obtained somewhat better maps, which may or may not be helpful to you. The first two maps in the attached set are the same as I sent on Wednesday, so the current attachment contains four maps:

· Locator map. I'm sure you know where Challis is, but it includes a more visible project boundary than the next map;

· Project Map (aerial photo); unfortunately the color of the project boundary doesn't contrast well;

· Existing system map; shows where the existing features are, particularly the intake on Garden Creek; note that the boundary on this map is only a portion of the project area; and

· Project features, divorced from underlying land features; more legible than the previous version, with more project features visible.

Hopefully we can touch bases on Monday morning. Thanks again.

Mike May
Sr. Water Quality Analyst
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706
(208) 373-0406
Michael.May@deq.idaho.gov

From: Mike May
Sent: Wednesday, May 15, 2013 14:24
To: 'Marks, Nisa'
Subject: RE: T&E species issues and Challis drinking water improvements

Thanks, that will be excellent. Here's the map that I neglected to attach. Actually, it's a set of three maps in one PDF:

· Locator map. I'm sure you know where Challis is, but it includes a more legible project boundary than the next map;

· Project Map (aerial photo); unfortunately the color of the project boundary doesn't contrast well; and

· Project features, divorced from underlying land features; probably not useful for your purposes, but illustrative of the project scope.

From: Marks, Nisa [mailto:nisa_marks@fws.gov]
Sent: Wednesday, May 15, 2013 13:39
To: Mike May
Cc: DAcheson@riedeseleng.com; dstark@northwindgrp.com; MaryAnna Peavey; Ester Ceja
Subject: Re: T&E species issues and Challis drinking water improvements

Thank you for the email; I will take a look and be in touch in the next couple of days.

Best,

Nisa Marks, Biologist
US Fish and Wildlife Service
Eastern Idaho Field Office
4425 Burley Dr., Suite A

Chubbuck, ID 83202
208-237-6232 x121

On Wed, May 15, 2013 at 1:30 PM, <Michael.May@deq.idaho.gov> wrote:
I am writing to enquire about potential effects on threatened and endangered species of a proposed drinking water improvements project in the City of Challis, potentially funded by the Idaho Drinking Water State Revolving Fund or other federally-derived funds.

The project site is shown on the attached map, and consists mostly of previously developed land and adjacent lands within the valley floor and adjoining arid foothills.

The proposed project for the City of Challis Drinking Water Improvements includes construction of two new wells and appurtenances; mothballing an existing surface water intake and treatment plant on Garden Creek; replacement of existing distribution mains and construction of new extensions; installation of valves, hydrants, pressure-reducing valves and replacement of meters.

The current Idaho species list indicates several threatened, endangered, candidate and proposed species in Custer County. Based on our initial review, we believe the effects on threatened and endangered species will be as follows:

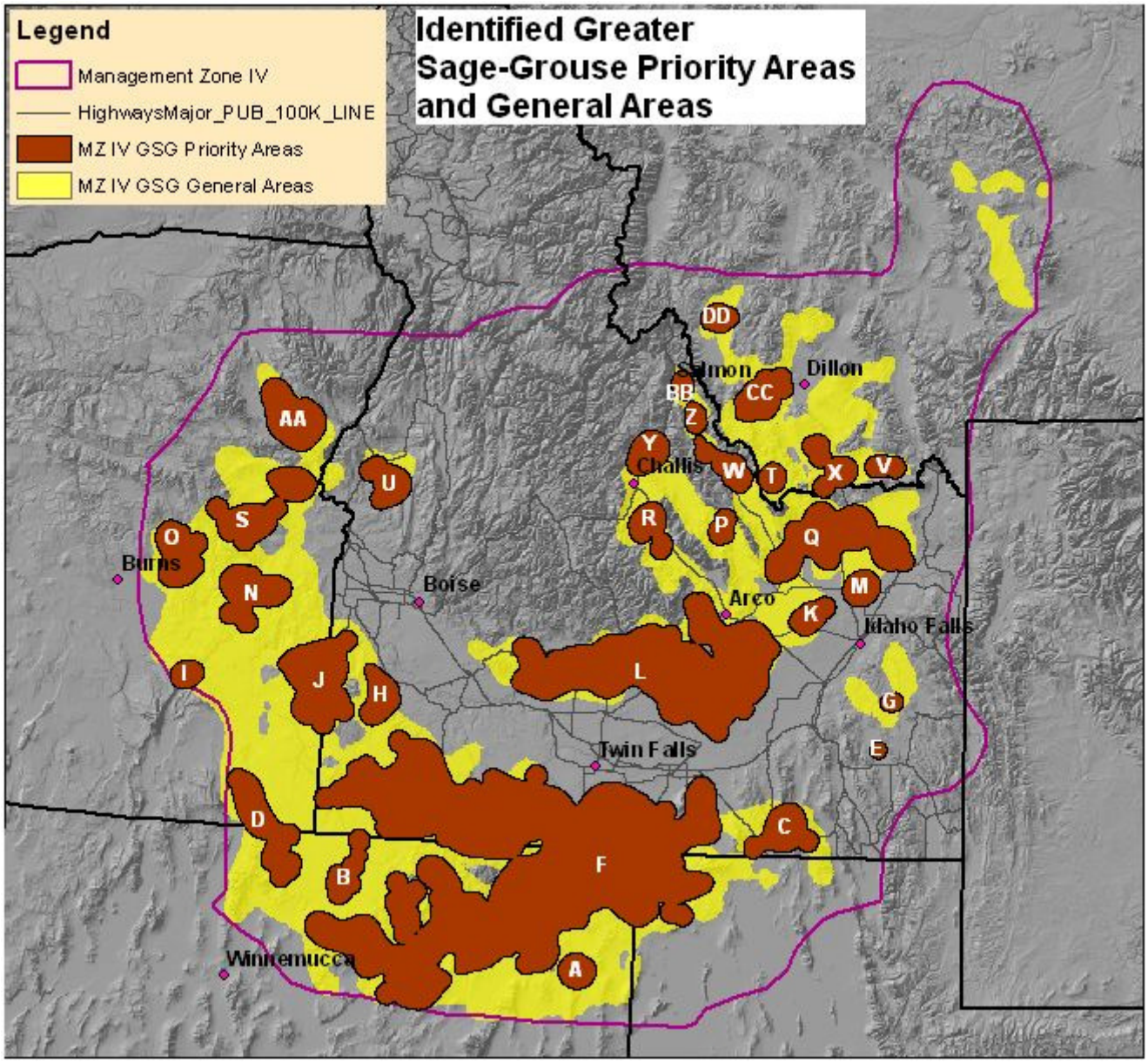
· **Canada Lynx** (*Lynx canadensis*). Because the Canada Lynx resides in arboreal forests which have deep fluffy snow cover for extended periods, and the project site is in suburban developed land and adjacent arid treeless foothills with typical winter snow cover of 2 inches or less, we expect that there will be no impact from the project.

· **Bull Trout** (S*alvelinus confluentus*). The Salmon River near Challis is identified in 75FR63898 (2010) as critical habitat for bull trout in Unit 27 (Salmon River). Although there is a Garden Creek listed in the water body table for Unit 27, the coordinates indicate that it is not the Garden Creek that flows through Challis. Reduced withdrawal from Garden Creek has the potential to improve habitat, but since the city is retaining its water right, the improvements may not be permanent. We expect that there is a limited potential for negative short-term impacts during construction, and request agency advice regarding appropriate mitigation measures.

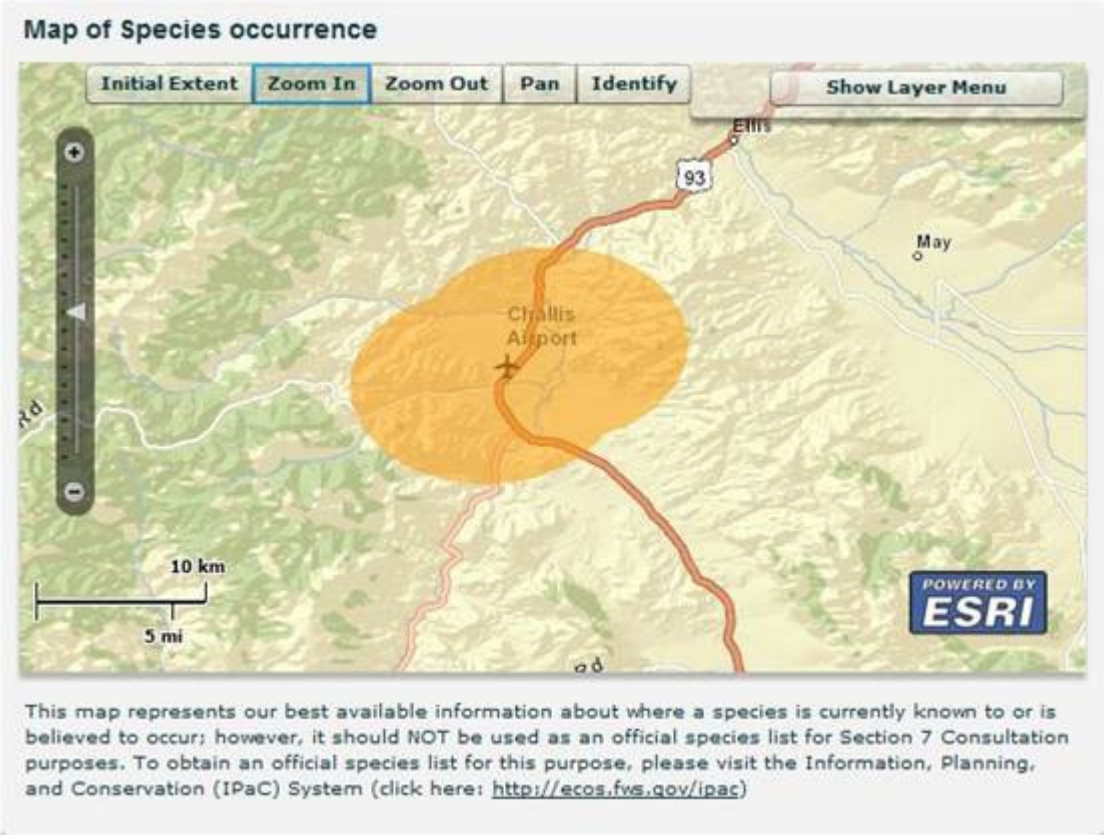
· **Whitebark Pine** (*Pinus albicaulis*). Because the Whitebark Pine is typically found near the alpine timber line, and the project site is in suburban developed land and adjacent arid treeless foothills, we expect that there will be no impact from the project.

Greater Sage Grouse (*Centrocercus urophasianus*). Grouse reside in sagebrush steppe environments and prefer slightly elevated features surrounded by flat terrain, but not lower portions of hillsides beneath areas that could contain raptors or other predators. The Challis area has been identified as having generally intact sagebrush the could provide suitable habitat at some point during the year, and Priority Area Y is located just north of town, as can be seen in the figure below <www.blm.gov/pgdata/etc/medialib/blm/id/wildlife/sensitive_species/sg_scoping_meeting.Par.67149.File.dat/Idaho_Sage-grouse_Priority_Areas_White_Paper_September_27_2011_FINAL_508.pdf>. However, nearly the entire project site is within ¼ mile of existing residential, commercial or industrial buildings, and all of it is within

one mile of such buildings. We believe that the existing human activity within the project area makes it unsuitable for sage grouse habitat, and therefore the project will have no impact on Greater Sage Grouse.



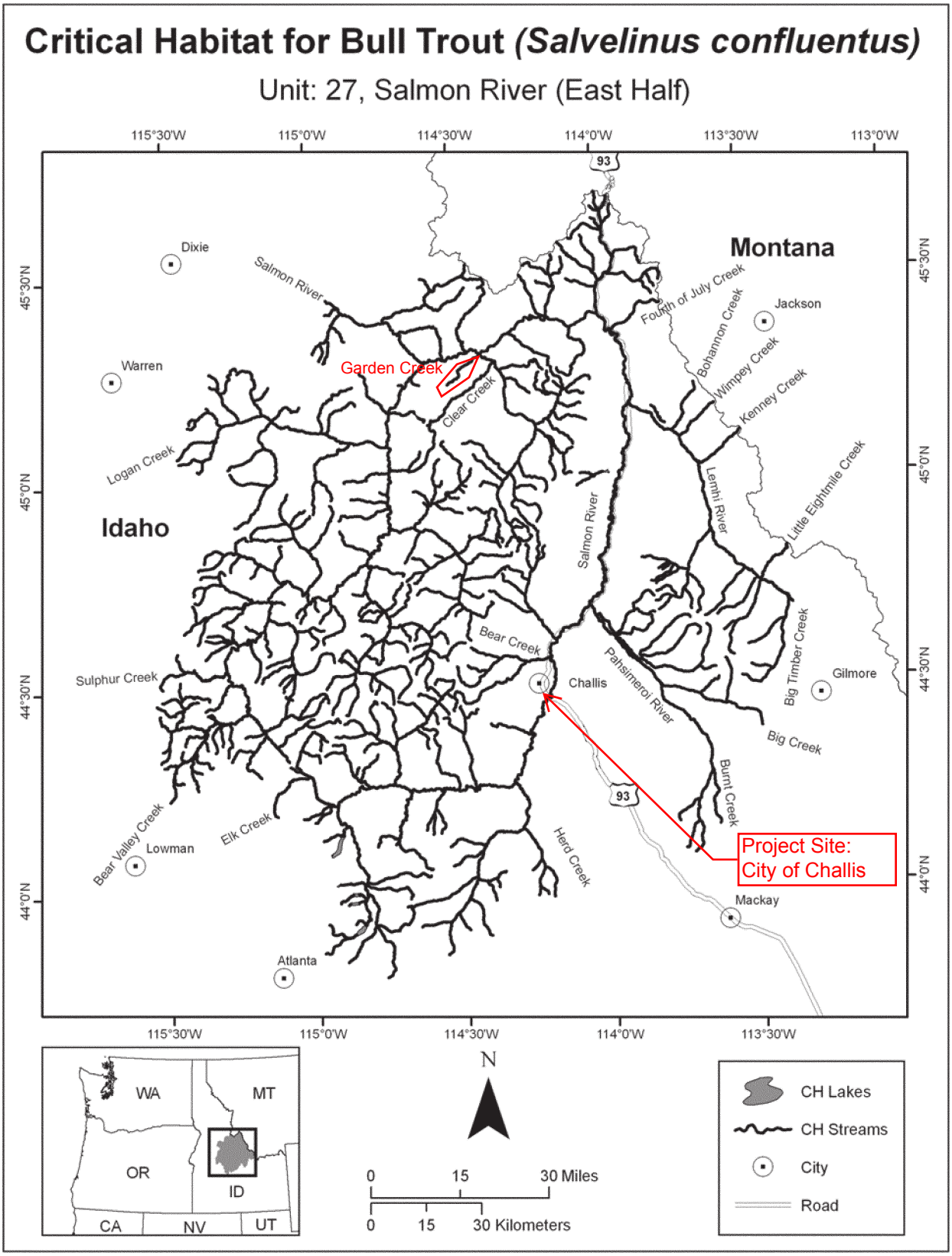
· **Yellow-Billed Cuckoo** (*Coccyzus americanus*). The species profile <ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=B06R> contains a map purporting to show that this candidate species is known or believed to inhabit Challis and the project area. However, the 2011 *Species Assessment and Listing Priority Assignment Form* <ecos.fws.gov/docs/candidate/assessments/2012/r8/B06R_V01.pdf> states that the species was considered a rare and local summer resident in Idaho, with only four records of Yellow-Billed Cuckoo in northern and central Idaho over the last century. The only riparian areas within the proposed project planning area are Garden Creek within the city and an irrigation canal that adjoins the city on the southeast. Please clarify whether this is a species of concern for this project. If so, please advise regarding mitigation measures.



· **North American Wolverine** (*Gulo gulo luscus*). Because wolverine distribution is restricted to high elevation areas of deep, persistent winter snow, and the project site is in suburban developed land and adjacent arid treeless foothills with typical winter snow cover of 2 inches or less, we expect that there will be no impact from the project.

Thank you for your attention to this matter. If I can provide any additional information, please contact me by email or telephone.

Mike May
Sr. Water Quality Analyst
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706
(208) 373-0406
Michael.May@deq.idaho.gov



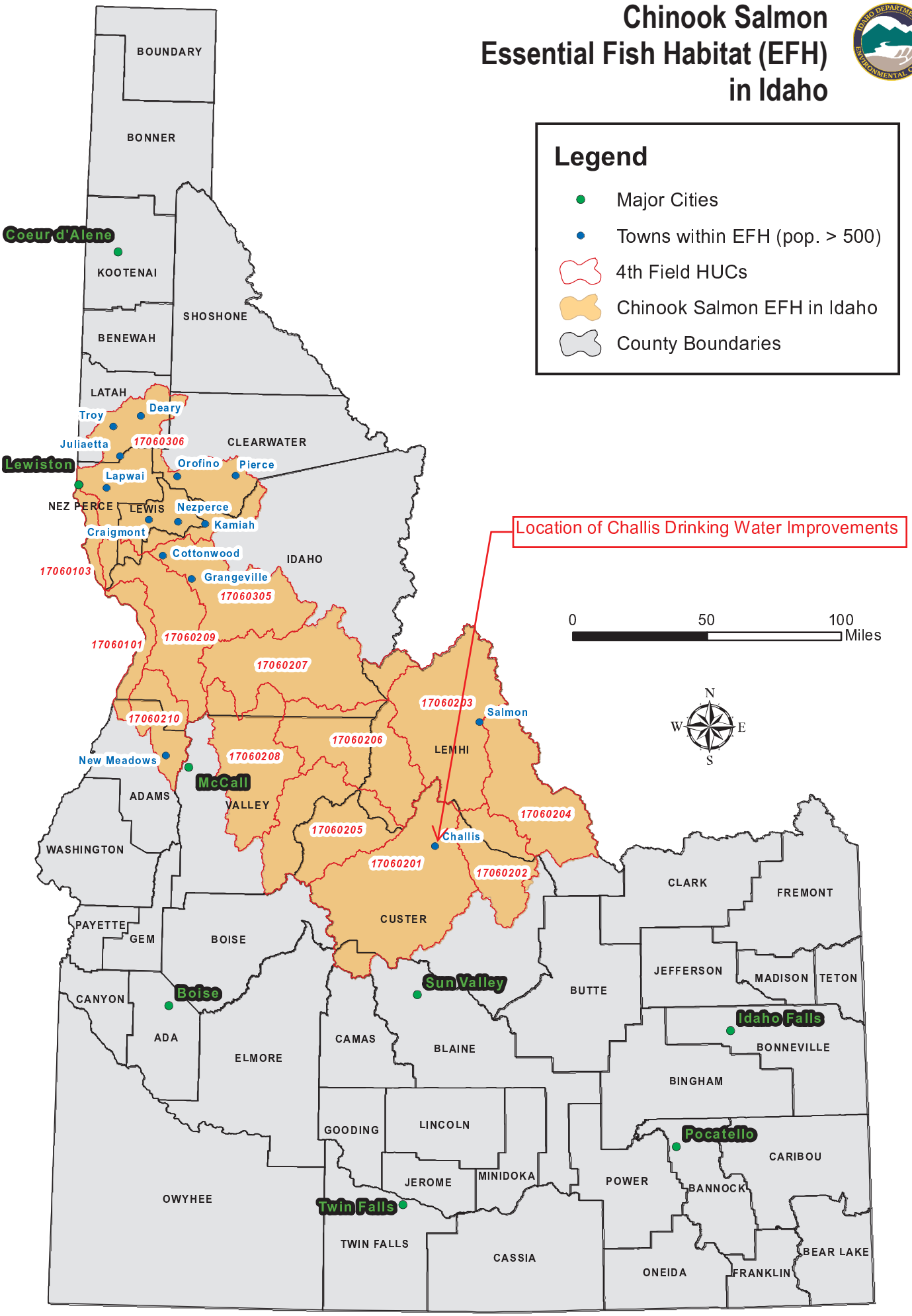
BILLING CODE 4310–55–C

(36) Unit 27: Salmon River – West Half

(i) The entire Salmon River unit consists of 7,376.5 km (4,583.5 mi) of streams and 1,683.8 ha (4,160.6 ac) of lakes and reservoirs. The unit is located in central Idaho.

(ii) See paragraph (e)(35)(ii) of this entry for a complete list of individual waterbodies in this unit.

Chinook Salmon Essential Fish Habitat (EFH) in Idaho



UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
West Coast Region
7600 Sand Point Way N.E.
Seattle, Washington 98115

June 23, 2014

Refer to NMFS No: WCR-2014-1027

Ms. Michelle Guay
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208

Lt. Col. Andrew D. Kelly
U.S. Army Corps of Engineers
Walla Walla District
201 North Third Avenue
Walla Walla, Washington 98362-1836

Re: Endangered Species Act Section 7(a)(2) Concurrence Letter and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Response for the Garden Creek Rehabilitation Project, Garden Creek, - 170602011602, Custer County, Idaho

Dear Mrs. Guay and Lt. Col. Kelly:

On May 12, 2014, NOAA's National Marine Fisheries Service (NMFS) received your request for a written concurrence that the Bonneville Power Administration (BPA) Garden Creek Rehabilitation Project is not likely to adversely affect (NLAA) species listed as threatened or endangered or critical habitats designated under the Endangered Species Act (ESA). This response to your request was prepared by NMFS pursuant to section 7(a)(2) of the ESA, implementing regulations at 50 CFR 402, and agency guidance for preparation of letters of concurrence.

A U.S. Army Corps of Engineers (COE) 404 Clean Water Act (CWA) permit may also be required to complete these actions. Therefore, the issuance of the COE permit, a separate Federal action, has also been considered in this concurrence letter.

NMFS also reviewed the proposed action for potential effects on essential fish habitat (EFH) designated under the Magnuson-Stevens Fishery Conservation and Management Act (MSA), including conservation measures and any determination you made regarding the potential effects of the action. This review was pursuant to section 305(b) of the MSA, implementing regulations at 50 CFR 600.920, and agency guidance for use of the ESA consultation process to complete

EFH consultation. In this case, NMFS concluded the action would not adversely affect EFH. Thus, consultation under the MSA is not required for this action.

This letter underwent pre-dissemination review using standards for utility, integrity, and objectivity in compliance with applicable guidelines issued under the Data Quality Act (section 515 of the Treasury and General Government Appropriations Act for Fiscal Year 2001, Public Law 106-554). The concurrence letter will be available through NMFS' Public Consultation Tracking System [https://pcts.nmfs.noaa.gov]. A complete record of this consultation is on file at the Snake Basin Office, Boise, Idaho.

Proposed Action and Action Area

The BPA, in conjunction with the Pacific Coastal Salmon Recovery Fund, proposes to fund Garden Creek Rehabilitation Project. There are two diversions on Garden Creek which are fish passage barriers. The City of Challis Garden Creek municipal diversion structure (municipal diversion) is a steel slide gate structure with no fish passage facilities. There is a 4½ foot drop across the structure. This structure is a complete barrier for upstream fish migration at all flows. Approximately 100 feet upstream of the municipal diversion there is a private unscreened headgate and irrigation ditch that receives water from an instream push-up dam formed from stream substrate and sandbags. This diversion is also considered a fish migration barrier.

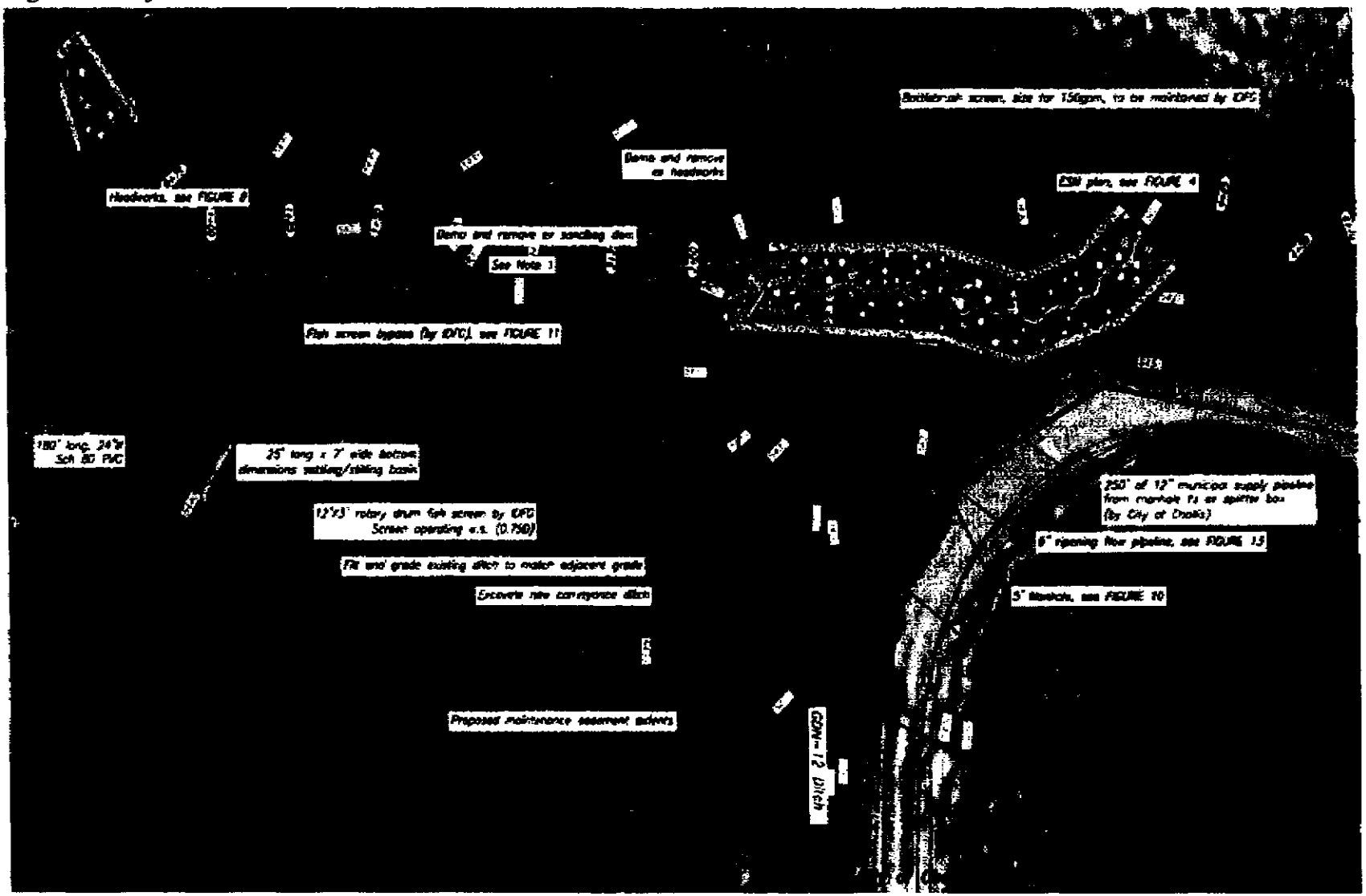
The objective of Garden Creek Rehabilitation project (Figure 1) is twofold: (1) Remove the existing municipal diversion and the private irrigation instream pushup and sandbag diversion structure to permit fish passage under all but no flow conditions; and (2) consolidate and upgrade the municipal and private irrigation points of diversion (POD) to a single POD and install a NOAA Fisheries compliant fish screen. These actions will provide fish access to an additional 1.2 miles of Garden Creek habitat.

The municipal and private irrigators have combined water rights of 10.03 cubic feet per second (cfs) for diversion. The City of Challis has a senior water right of about 3.2 cfs from Garden Creek. The city is developing a groundwater source for their primary water supply and will replace the existing dam and headgate with a structure that will permit fish passage and act as an emergency backup water supply for the city. Approximately 0.08 cfs of water will be required to maintain the function of existing slow sand filter drinking water ponds; the remaining approximately 3.12 cfs will remain in Garden Creek until or if needed in an emergency. The municipal water diversion and the unscreened private irrigation POD are fish migration barriers. Approximately 100 feet upstream of the municipal diversion there is a private unscreened headgate and irrigation ditch that receives water from an instream push-up dam formed from stream substrate and sandbags. This diversion is also a fish migration barrier.

The private irrigation and the municipal PODs will be consolidated into a single upstream private POD (referred to as the "consolidated POD"). The consolidated POD will be located approximately 275 feet upstream of the private sandbag diversion, and 375 feet upstream from the municipal POD. The existing private and municipal POD's will be closed. The streambed

will be contoured at the consolidated POD, and from the existing private POD to the municipal POD, to match existing stream features and elevations.

Figure 1. Project Site and Plan Overview



All proposed work will occur during the recommended instream work window of July 1 to August 15. No Federally listed fish have been documented at either of the existing diversion structures. Based on this scenario, the stream flow will be diverted into an 18 to 24-inch flexible pipe with cofferdam structures placed from the bank to maintain water flow, if present, through the work areas. Placing and removing a cofferdam to divert the water into the pipe will be the only inwater work associated with this project. All other construction work will be in the dry and will be completed in 3 weeks. Placing and removing a cofferdam to divert the water into the pipe will be the only in water work associated with this project. All other construction work will be in the dry and will be completed in 3 weeks.

The work will consist of two segments. The first segment will be to divert the stream flow through the work site with an 18 to 24-inch pipe. The sandbag irrigation diversion will be removed and the boards in the existing municipal check dam will be removed to allow the remaining water to slowly exit the work area. This will allow any fish in the work area to move downstream to safer habitat. Once this area is dry, the headgate and check dam will be removed.

The second segment will consist of contouring the streambed to grade with a stable constructed streambed surface comprised of native and, if needed, imported substrate. Streambank restoration will consist of laying back or filling the streambank slopes at a 1.5H:1V ratio before placing willow stakes and brush bundles on the streambank, and installing the headgate structure.

The Construction Plan lists an overall construction sequence to be implemented after the water is diverted into the bypass pipe. The sequence is summarized here:

1. Remove boulders and other materials from the streambed and sort to be reused.

2. Excavate the streambed to grade for engineered streambed materials and pools and install the stable constructed streambed surface comprised of native and, if needed, imported substrate.

3. Construct pools and place roughness boulders, beginning downstream and moving upstream.

4. Once the roughness boulders are in place and compacted by the excavator bucket, fines will be added and washed into interstitial spaces to seal the streambed and reduce percolation losses and stream bed movement. This step will be completed with recycled water salvaged from the pool areas as designed in the Construction Plan.

5. Lay back or fill slopes using excavated material at 1.5H:1V ratio.

6. Complete all work, including streambank revegetation, within each swing of the excavator before moving to the next section.

7. The excavator will move upstream and the construction steps will be repeated until the project is completed.

8. The final step will be to slowly turn water from the pipe into the upper end of the work area

and remove the cofferdam. This sequence will greatly reduce silt mobilization and downstream transport.

Riparian disturbance and bank disturbance will be kept to a minimum at the project site. Any large willows that need to be removed will be salvaged with intact root mass and replanted on site to speed site recovery. All disturbed streambanks will be replanted with willow stakes, brush bundles, and other native herbaceous plants. Disturbed pasture or cultivated grass lands will be planted with an approved pasture and grass seed mixture.

Silt that may be generated due to work in the stream channel when placing and removing the cofferdams will be contained using straw waddles or with a bonded fiber matrix at the lower end of the channel. When Garden Creek is turned back into the main channel, silt is expected to settle out within 160 yards downstream due to stream gradient and low flow volume.

The following measures will be implemented to minimize sediment introductions to waters within the action area:

1. Silt fence or equivalent measures such as bonded fiber matrix will be deployed where overland sediment delivery may occur during typical rain events for the area.

2. Proposed instream work will occur in the dry.

3. The dewatered work area will be pre-wet prior to cofferdam removal; cofferdam installation and removal will occur slowly to minimize turbidity input and ensure fish are not stranded during the process.

All possible steps will be taken to minimize the possibility of machine lubricants entering the streambed (i.e., equipment will be leak free prior to arrival on site and inspected daily). Contractors will be required to have a spill containment kit onsite of appropriate size for the equipment used in the excavation. Construction equipment and materials staging, including refueling areas, will occur well away from the stream course (>150 feet).

All fish that may be electroshocked will be non-anadromous fish because they do not currently occur in and are blocked from entering into the project area. Fish will first be encouraged to passively leave the dewatered area by slowly installing the cofferdam to incrementally diminish flows in the mainstream and divert the water through the work area via an 18 to 24-inch bypass pipe. Any fish stranded in pools will be electrofished and netted and transported in aerated buckets to a point below the work area and released back into live water. All settings and methodologies will be within the guidelines for electrofishing waters containing salmonids listed under the ESA.

The action area includes the project area, upstream of the existing Municipal Water Diversion 100 yards, and downstream of the same structure 160 yards.

Action Agency's Effects Determination

The BPA and COE determined the proposed action would be NLAA Snake River spring/summer Chinook salmon, Snake River Basin steelhead, and their designated critical habitats. See Table 1 for species specific Federal Register notices and ESA-listing status.

Table 1. Federal Register notices for final rules that list threatened and endangered species, designated critical habitat, or apply protective regulations to listed species considered in this consultation (Listing status: 'T' means listed as threatened under the ESA; 'E' means listed as endangered).

Species	Listing Status	Critical Habitat	Protective Regulations
Chinook salmon (*Oncorhynchus tshawytscha*)			
Snake River spring/summer run	T 6/28/05; 70 FR 37160	12/28/93; 58 FR 68543 10/25/99; 64 FR 57399	6/28/05; 70 FR 37160
Steelhead (*O. mykiss*)			
Snake River Basin	T 1/05/06; 71 FR 834	9/02/05; 70 FR 52630	6/28/05; 70 FR 37160

Consultation History

The BPA provided NMFS with a Biological Assessment on May 12, 2014, and consultation was initiated at that time.

Effects of the Action

Under the ESA, "effects of the action" means the direct and indirect effects of an action on the listed species or critical habitat, together with the effects of other activities that are interrelated or interdependent with that action (50 CFR 402.02). The applicable standard to find that a proposed action is NLAA listed species or critical habitat is that all of the effects of the action are expected to be discountable, insignificant, or completely beneficial. Beneficial effects are contemporaneous positive effects without any adverse effects to the species or critical habitat. Insignificant effects relate to the size of the impact and should never reach the scale where take occurs. Discountable effects are those extremely unlikely to occur.

Species Determination

The potential effects of this restoration project to juvenile Snake River Basin steelhead and juvenile Snake River spring/summer Chinook salmon are anticipated to be of short duration, low magnitude, and short downstream extent. Due to the passage barriers, fish will not be present in the project area. It is possible that the stream will be dry when work takes place. If not, the diversion of water through the project area will be accomplished in a slow fashion so as to allow any fish that are present downstream of the lower passage barrier to move to safety. The flow bypass pipe will be placed immediately downstream of the lower passage barrier so the flow

depletion will be limited to a very small area. The risk of adverse effects to listed salmonids from the dewatering portion of the project is therefore discountable.

The second phase of the project will consist of contouring the streambed to a natural form and reshaping the streambanks. This will involve disturbing the existing substrate with the resulting likelihood of resuspending some of the streambed's fine sediment when the channel is re-watered. Some sediment from the streambank work may be introduced into the stream channel. Straw waddles or a bonded fiber matrix will be used at the lower end of the channel to help contain suspended sediment. Additionally, the newly constructed channel will be pre-wetted to help settle sediment before the channel is re-watered. Re-watering will be conducted slowly so as to further minimize the suspension of sediment. Any turbidity produced will be low intensity, a one-time occurrence, and will be of short duration. For these reasons, the turbidity produced by the project will likely only cause insignificant effects.

Suspended sediment produced by the proposed action has the potential to settle into the substrate downstream and potentially reduce substrate suitability for spawning and forage production. However, the small amount of sediment which will be suspended is insignificant and, for this reason, any sediment which would settle out and become embedded will also be insignificant.

Riparian vegetation in the project area will also be altered by the proposed action. Alterations of riparian vegetation may increase stream temperatures. However, any large willow that are removed during project implementation will be salvaged with their rootballs intact to use in revegetation work. All disturbed streambanks will be revegetated with willow stakes, brush bundles, and other native herbaceous plants. The project will seek to minimize bank and riparian vegetation disturbance. For these reasons, effects to riparian vegetation will be insignificant.

Use of heavy machinery adjacent to action area streams presents opportunities to produce a fuel/oil spill capable of chemically contaminating Garden Creek. As referenced above, no ESA-listed fish are present in the project area. All work with heavy machinery will be conducted in the dry and no in-channel work in moving water is proposed. Contractors will be required to have a spill containment kit on site of appropriate size for the equipment used in the excavation. Construction equipment and materials staging, including refueling areas, will occur well away from the stream course (>150 feet). For these reasons, the likelihood of chemical contamination is discountable.

Critical Habitat Determination

The proposed action has the potential to affect the following essential physical and biological features (Chinook salmon) or primary constituent elements (PCEs) (steelhead) of designated critical habitat (hereinafter collectively referred to as PCEs): (1) Water quality (i.e., temperature, turbidity, and chemical contamination); (2) substrate/spawning gravel; and (3) forage (Table 2). Any modification of these PCEs may affect freshwater spawning, rearing or migration in the action area. Proper function of these PCEs is necessary to support successful adult and juvenile migration, adult holding, spawning, and the growth and development of juvenile fish. No other PCEs would be affected.

Table 2. Types of sites and essential physical and biological features designated as PCEs, and the species life stage each PCE supports.

Site	Essential Physical and Biological Features/PCEs	ESA-listed Species Life Stage
Snake River Basin Steelhead[a]		
Freshwater spawning	Water quality, water quantity, and substrate	Spawning, incubation, and larval development
Freshwater rearing	Water quantity & floodplain connectivity to form and maintain physical habitat conditions	Juvenile growth and mobility
	Water quality and forage[b]	Juvenile development
	Natural cover[c]	Juvenile mobility and survival
Freshwater migration	Free of artificial obstructions, water quality and quantity, and natural cover[c]	Juvenile and adult mobility and survival
Snake River Fall and Spring/summer Chinook Salmon		
Spawning and Juvenile Rearing	Spawning gravel, water quality and quantity, cover/shelter, food, riparian vegetation, and space	Juvenile and adult
Migration	Substrate, water quality and quantity, water temperature, water velocity, cover/shelter, food[d], riparian vegetation, space, safe passage	Juvenile and adult

a. Additional PCEs pertaining to estuarine, nearshore, and offshore marine areas have also been described for Snake River Basin steelhead. These PCEs will not be affected by the proposed action and have therefore not been described in this letter of concurrence.
b. Forage includes aquatic invertebrate and fish species that support growth and maturation.
c. Natural cover includes shade, large wood, log jams, beaver dams, aquatic vegetation, large rocks and boulders, side channels, and undercut banks.
d. Food applies to juvenile migration only.

The action's potential to affect the water quality PCE (i.e., water temperature, turbidity, and chemical contamination) were described in the effects to species section. Although minor shade reductions may occur in the project area, the affected area is too small to result in measurable water temperature increases. Water temperatures may be cooled over time as the current streamside is revegetated and begins shading Garden Creek. As described above, the proposed Best Management Practices are expected to render the likelihood of chemical contamination discountable. Therefore, the action's effects on this PCE will be insignificant (water temperature) and discountable (chemical contamination).

The action's effects on substrate/spawning gravel and forage will be insignificant for the reasons referenced above. Because the amount of sediment that will be suspended by the action will be insignificant, the amount deposited and embedded will also be insignificant. Similarly, because the amount of sediment expected to be deposited is insignificant, it is very unlikely to affect macroinvertebrates and the forage PCE.

Conclusion

Based on this analysis, NMFS concurs with the BPA and the COE that the proposed action is NLAA the subject listed species and designated critical habitats.

Reinitiation of Consultation

Reinitiation of consultation is required and shall be requested by the BPA and/or the COE where discretionary Federal involvement or control over the action has been retained or is authorized by law, and if: (1) New information reveals effects of the action that may affect listed species or critical habitat in a manner or to an extent not previously considered; (2) the identified action is subsequently modified in a manner that causes an effect to the listed species or critical habitat that was not considered in this concurrence letter; or, (3) if a new species is listed or critical habitat designated that may be affected by the identified action (50 CFR 402.16). This concludes this ESA consultation.

Please direct questions regarding this letter to Nikki Leonard, Boise Idaho Office, 208-378-5708.

Sincerely,

for

William W. Stelle, Jr.
Regional Administrator

cc: R. Holder
C. Colter

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Eastern Idaho Field Office
4425 Burley Dr., Suite A
Chubbuck, Idaho 83202
Telephone (208) 237-6975
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Michelle Guay
Environmental Protection Specialist-KEC-4
Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

JUN 20 2014

Subject: Garden Creek Rehabilitation Project — Custer County, Idaho—Concurrence
In Reply Refer To: 01EIFW00-2014-I-0511

Dear Ms. Guay:

This letter transmits the U.S. Fish and Wildlife Service's (Service) concurrence on the effects to species listed under the Endangered Species Act (Act) of 1973, as amended, for the proposed Garden Creek Rehabilitation Project – BPA Project #2007-268-00, contract 63589, work element H (Project) near Challis, Idaho. In a letter dated May 19, 2014, and received May 22, 2014, the Bonneville Power Administration (BPA) requested concurrence on the determination, as documented in the Biological Assessment (Assessment), that the Project may affect, but is not likely to adversely affect the Columbia River bull trout (*Salvelinus confluentus*).

The proposed Project entails the following components.

- Close and remove two points-of-diversion (POD) which are barriers to upstream fish migration in Garden Creek. One is a private irrigation diversion and the other is a municipal water diversion.
- Consolidate the two PODs into one diversion which is passable by fish.
- Screen the new diversion compliant with National Oceanic and Atmospheric Administration - Fisheries criteria to prevent fish entrainment.
- Construct the new POD approximately 275 feet upstream of the private diversion and 375 feet upstream from the municipal diversion.
- Place rocks around the headgate to pool water at the opening of the structure of the new POD.
- Dewater the project area. If flow is present during construction, the project area would be dewatered slowly by placing cofferdams to direct stream flow into an 18-24 inch flexible pipe, bypassing the project area, and emptying back into Garden Creek below the area of activity.
- Contour the streambed at the new POD and between the private POD and the municipal POD (approximately 198 feet) to match existing stream features and slope upstream and downstream of those areas.
- Restore a more natural configuration of the streambank on both sides of Garden Creek along approximately 198 feet by laying back and filling material to reach a 1.5 foot horizontal to 1 foot vertical ratio.

- Further restore streambanks and disturbed riparian habitat using willow stakes, brush bundles, and other native herbaceous plants.

  A more detailed description of the proposed action is contained in the Biological Assessment (Donahoo 2014, pp. 4-10).

Service concurrence that the Project is not likely to adversely affect the Columbia River bull trout is based on the following rationales.

- There is a low likelihood of bull trout being present during project implementation. Bull trout are known to be present in the upper reaches of Garden Creek on US Forest Service managed lands and one bull trout was found in 2002 in Hannah Slough, a tributary to the lower end of Garden Creek near the Salmon River. It is highly likely the bull trout population in Garden Creek contained a migratory component (using the Salmon River for foraging, migrating, and overwintering habitat and the upper reaches of Garden Creek for spawning) prior to establishment of barriers to upstream fish migration. Currently, bull trout cannot migrate past the project area due to physical barriers and/or low or no water. Due of the lack of recent (within the last 70-plus years) connectivity, apparent lack of suitable spawning habitat due to temperature and flow, lack of flow, and timing of implementation when water temperature should be the highest of the year, the potential for bull trout to be present in the action area during construction is negligible.
- Instream work would be completed between July 1 and August 15 which is outside of the bull trout spawning period for tributaries of the main Salmon River between the Pahsimeroi River and Valley Creek (USBWP 2005, p. 18).
- All work would be conducted in the dry except for placement of the cofferdams.
- The project area generally has little or no flow during the construction period in a normal year due to irrigation use.
- Turbidity is expected to be negligible due to low or no flow at the time of cofferdam placement and no flow in the project area during other instream work. Best management practices, including slow and careful dewatering of the project area prior to instream activity and slowly allowing flows (if any) to re-water the stream post-construction should minimize turbidity.
- The new diversion would provide access to an additional 1.2 miles of habitat in Garden Creek for upstream migrating fish of all life stages.

If successful, the long-term effects of this project are considered beneficial to bull trout. Conditions for bull trout foraging, migrating and overwintering in lower Garden Creek would be improved and the amount of habitat increased. This project furthers the progress already made to eventually result in the bull trout population in upper Garden Creek becoming connected to the Salmon River.

We appreciate the cooperative conservation efforts of all parties involved to improve aquatic ecosystems in the Challis area. This project is the third in a series which will have provided fish access to 6.45 miles of previously inaccessible habitat in Garden Creek from the Salmon River.

This concludes informal consultation on the proposed Garden Creek Rehabilitation Project under section 7 of the Act. If the proposal addressed in this letter is modified, environmental conditions change, or additional information becomes available regarding potential effects on listed species, you should verify with the Service that your conclusions are still valid. Thank you for your continued interest in the conservation of threatened and endangered species. Please contact Nisa Marks (208) 237-6975, ext. 121, if you have questions concerning this letter.

Sincerely,

David Kampwerth
for Supervisor, Eastern Idaho Field Office

cc: Custer Soil and Water Conservation District, Challis (K. Bragg)
NOAA, Salmon (C. Fealko)
USACE, Idaho Falls (J. Joyner)

References Cited

Donahoo, M. 2014. Biological Assessment: Garden Creek Rehabilitation Project. Prepared for Custer Soil and Water Conservation District, Challis, Idaho. 35 pp.

Upper Salmon Basin Watershed Project (USBWP). 2005. Upper Salmon River Recommended Instream Work Windows and Fish Periodicity for river reaches and tributaries above the Middle Fork Salmon River including the Middle Fork Salmon River drainage. Prepared by the Upper Salmon Basin Watershed Project Technical Team, June 2004, revised November 30, 2005. 29 pp.

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

Official File

ENVIRONMENT, FISH AND WILDLIFE

May 19, 2014

In reply refer to: KEC-4

David Mabe
Snake Basin Office Director
National Marine Fisheries Service
10095 W Emerald St.
Boise, ID 83701

RE: Biological Assessment, Garden Creek Rehabilitation project
BPA project # 2007-268-00, contract 63589, work element H

Dear Mr. Mabe:

In complying with its responsibilities under the Endangered Species Act of 1973, as amended, Bonneville Power Administration (BPA) is submitting the enclosed biological assessment for the Garden Creek Rehabilitation Project. This project is sponsored by the Custer Soil and Water Conservation District and funded by BPA. The Biological Assessment was prepared by Michael J. Donahoo, a contractor for the Custer Soil and Water Conservation District.

It is BPA's opinion that the proposed actions covered in this BA may affect, but are **not likely to adversely affect** Snake River spring/summer Chinook salmon, Snake River Basin steelhead, or their critical habitat.

We are requesting your review of the BA and concurrence with the effect determination. If you have any questions or require additional information, please contact me at 503.230.3459 or mxguay@bpa.gov. Alternatively, you may contact the project sponsor, Karma Bragg of the Custer Soil and Water Conservation District, at 208.879.4428 or cswcd@custertel.net.

Sincerely,

Michelle Guay

Michelle Guay
Environmental Protection Specialist

Enclosure:
Biological Assessment

ecc: (w/enclosure)
Chad Fealko, NMFS, Chad.Fealko@noaa.gov
Karma Bragg, Custer Soil and Water Conservation District, cswcd@custertel.net

Department of Energy

Bonneville Power Administration
P.O. Box 3621
Portland, Oregon 97208-3621

ENVIRONMENT, FISH AND WILDLIFE

May 19, 2014

In reply refer to: KEC-4

David Kampwerth
US Fish and Wildlife Service
Eastern Idaho Field Office
4425 Burley Dr., Suite A
Chubbuck, ID 83202

RE: Biological Assessment, Garden Creek Rehabilitation project
BPA project # 2007-268-00, contract 63589, work element H

Dear Mr. Kampwerth:

In complying with its responsibilities under the Endangered Species Act of 1973, as amended, Bonneville Power Administration (BPA) is submitting the enclosed biological assessment for the Garden Creek Rehabilitation Project. This project is sponsored by the Custer Soil and Water Conservation District and funded by BPA. The Biological Assessment was prepared by Michael J. Donahoo, a contractor for the Custer Soil and Water Conservation District.

It is BPA's opinion that the proposed actions covered in this BA may affect, but are **not likely to adversely affect** federally listed bull trout.

We are requesting your review of the BA and concurrence with the effect determination. If you have any questions or require additional information, please contact me at 503.230.3459 or mxguay@bpa.gov. Alternatively, you may contact the project sponsor, Karma Bragg of the Custer Soil and Water Conservation District, at 208.879.4428 or cswcd@custertel.net.

Sincerely,

Michelle Guay

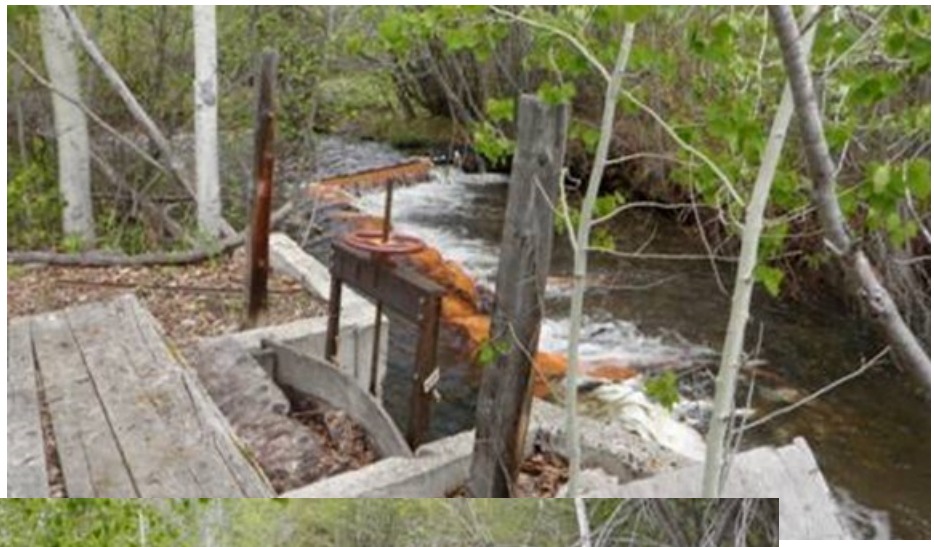
Michelle Guay
Environmental Protection Specialist-KEC-4

Enclosure:
Biological Assessment

ecc: (w/enclosure)
Nisa Marks, USFWS, nisa_marks@fws.gov
Karma Bragg, Custer Soil and Water Conservation District, cswcd@custertel.net

Biological Assessment
Garden Creek Rehabilitation Project

April 2014



Prepared For the

Custer Soil and Water Conservation District

Challis, Idaho

Prepared by: Michael J. Donahoo

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1.0 Introduction

The Bonneville Power Association (BPA) funds projects similar to the Garden Creek Rehabilitation Project throughout the Pacific Northwest to meet commitments for the NOAA Fisheries 2008 Federal Columbia River Power System (FCRPS) Biological Opinion (BiOp) (NMFS 2008). The BPA projects implemented throughout the region have made important contributions to improve the status of Endangered Species Act-listed species, prevent extinctions, and protect currently healthy populations.

The Pacific Coastal Salmon Recovery Fund (PCSRF) was established by Congress in Fiscal Year 2000 to protect, restore, and conserve Pacific salmon and steelhead populations and their habitats. Under the PCSRF, NOAA Fisheries manages a program to provide funding to states and tribes of the Pacific Coast region - Washington, Oregon, California, Nevada, Idaho and Alaska – for these types of projects.

The Endangered Species Act (ESA) of 1973, as amended, directs all Federal agencies or any project that has a Federal nexus, to implement measures to protect all federally listed species and their listed habitat found in the project area and not jeopardize their continued existence. The ESA also requires agencies or projects with a Federal nexus to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) on actions that may affect federally listed species or their listed habitat. The U.S. Army Corps of Engineers is party to the consultation for the Garden Creek Rehabilitation Project by virtue of their responsibility to consider permitting actions under the Clean Water Act.

This project has been developed with the input of numerous county, state and federal agencies including: Custer Soil and Water Conservation District (CSWCD), Natural Resources Conservation Service (NRCS), Idaho Department of Fish and Game (IDFG), Idaho Department of Water Resources (IDWR), NMFS, USFWS and the U.S. Bureau of Reclamation. Funding is being provided from the BPA and PCSRF. The city of Challis is a major participant in the project planning process. This Biological Assessment (BA) was prepared by Michael J. Donahoo Consulting under contract to CSWCD which is also funded in part by the BPA.

2.0 Project Location and Action Area

The ‘action area’ means all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02).

Garden Creek flows east out of the U.S. Forest Service (Forest Service) managed lands in the Salmon River Mountains on to private land, past the Garden Creek Rehabilitation project site, through the city of Challis, and under the Gini Canal project site. It is then joined by the highly productive spawning and rearing waters of the Hannah Slough before entering into the Salmon River (Figure 1). The total stream length is 14.9 miles from the headwaters to the confluence.

The project site is 4.9 miles upstream from the Garden Creek/Salmon River confluence in the 50,000 acre City of Challis Garden Creek Watershed, Custer County, Idaho (Figure 1) (USGS hydrologic unit code 170602011602). The Watershed has no perennial tributaries (IDEQ 2003).

The Action Area for the project is defined as 100 yards above the existing Municipal Water Diversion structure (Figure 2) to 160 yards downstream of the same structure.

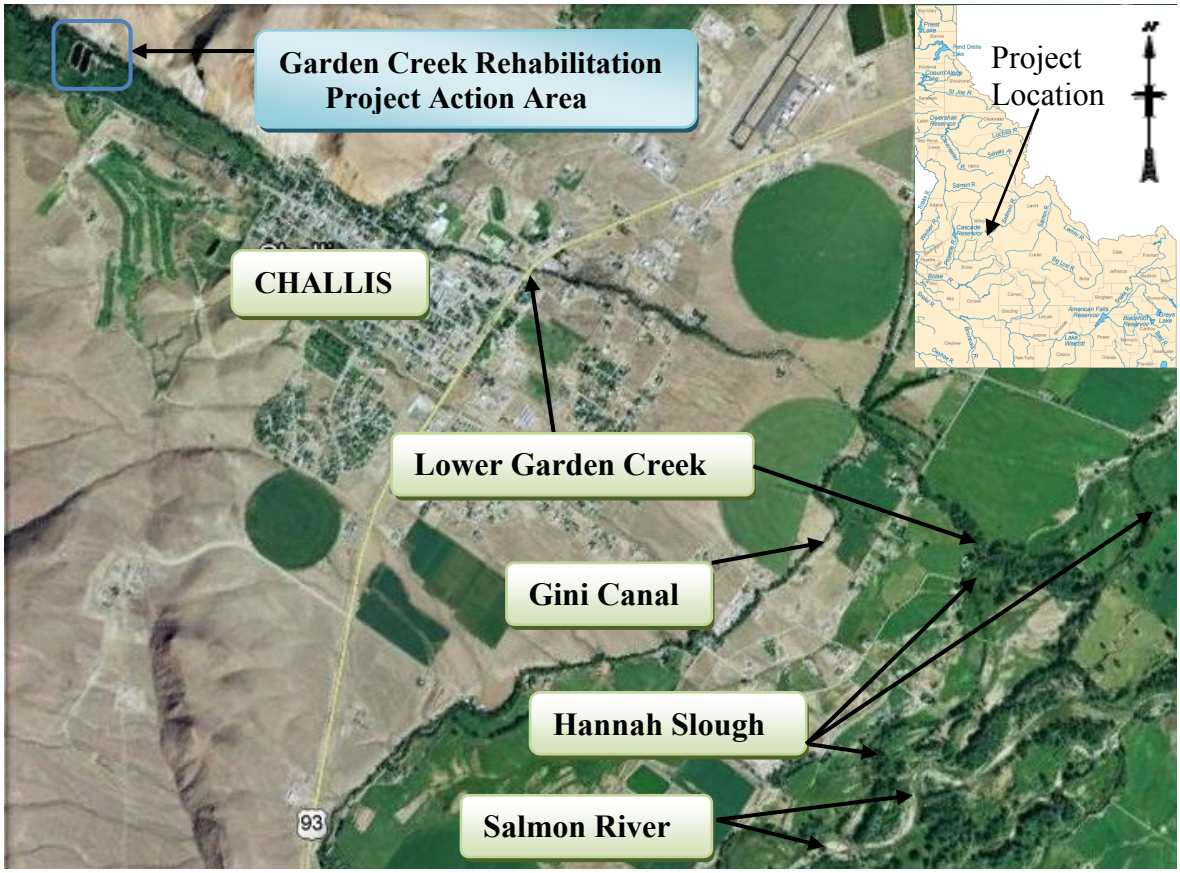

Figure 1. Project Location

Figure 2. Action Area and Project Site – Garden Creek Rehabilitation Project

3.0 Need for Action and Objective

Irrigation practices and some municipal water diversions, both past and to some degree present, have reduced or completely cut off federally listed salmonid populations from accessing many Salmon River tributaries, including Garden Creek. The fragmentation of salmonid migration between the Salmon River and its tributaries has been identified as a limiting factor affecting salmonid production in the Salmon River watershed (USDI, USFS 2001).

Approximately 4.5 miles, including the headwaters, of Garden Creek are on Forest Service managed lands. This section of Garden Creek has also been identified as containing suitable bull trout spawning and rearing habitat (Gamett 2011). The remaining approximately 10.4 miles of Garden Creek, from the Forest Service boundary to the confluence with the Salmon River, is on private land.

The Garden Creek Road crosses Garden Creek one mile upstream of the action area and project site. The County road culvert is a probable seasonal migration barrier for juvenile fish due to the position of the culvert in relation to the stream bed. The culvert is mentioned here for information purposes only and is not part of the BA discussion.

Garden Creek was reconnected with the Salmon River after completion of the Gini Canal project in 2004 (NW 2004). This provided access to an additional three miles of previously inaccessible habitat. When the Garden Creek 3rd Street Bridge project (City of Challis 2009) was completed, fish could access Garden Creek from the confluence of the Salmon River to the project site; a total distance of 5.25 miles.

The City of Challis Garden Creek municipal diversion structure (municipal diversion) is a steel slide gate structure with no fish passage facilities (Figure 3 and Appendix D). There is a 4 ½ foot drop across the structure. This structure is a complete barrier for upstream fish migration at all flows.

Approximately 100 feet upstream of the municipal diversion (Figure 3) there is a private unscreened headgate and irrigation ditch that receives water from an instream push-up dam formed from stream substrate and sandbags (Figure 4). This diversion is also considered a fish migration barrier.

The objective of Garden Creek Rehabilitation project (Figure 5) is twofold: 1) Remove the existing municipal diversion and the private irrigation instream pushup and sandbag diversion structure to permit fish passage under all but no flow conditions; and 2) Consolidate and upgrade the municipal and private irrigation points of diversion (POD) to a single POD and install a NOAA Fisheries compliant fish screen. These actions will provide fish access to an additional 1.2 miles of Garden Creek habitat.

This project is supported through the BPA State of Idaho MOA process as a high priority for inclusion. Both IDFG and NOAA Fisheries recovery plans have highlighted the importance of carrying out habitat actions to assist recovery of key anadromous populations through providing access to historic spawning and rearing habitat.

Figure 3. Existing Municipal Water Diversion Structure on Garden Creek

Figure 4. Existing Private Irrigation Headgate and Diversion on Garden Creek

4.0 Proposed Action

The municipal and private irrigators have a combined 10.03 cubic feet per second (cfs) diversion water rights. The City of Challis has a senior water right of about 3.2 cfs from Garden Creek. The city is developing a groundwater source for their primary water supply and will replace the existing dam and headgate with a structure that will permit fish passage and act as an emergency backup water supply for the city. Approximately 0.08 cfs of water will be required to maintain the function of existing slow sand filter drinking water ponds; the remaining approximately 3.12 cfs, will remain in Garden Creek until or if needed in an emergency. The municipal water diversion (Figure 3 and Appendix D) and the unscreened private irrigation POD are fish migration barriers (Figure 4 and Appendix D).

The private irrigation and the municipal PODs will be consolidated into a single upstream private POD (referred to as the "consolidated POD"). The consolidated POD is approximately 275 feet upstream of the private sandbag diversion and 375 feet upstream from the municipal POD. The existing private and municipal POD's will be closed. The streambed will be contoured at the consolidated POD and from the existing private POD to the municipal POD to match existing stream features and elevations (Figures 5, 6 and Appendix A).

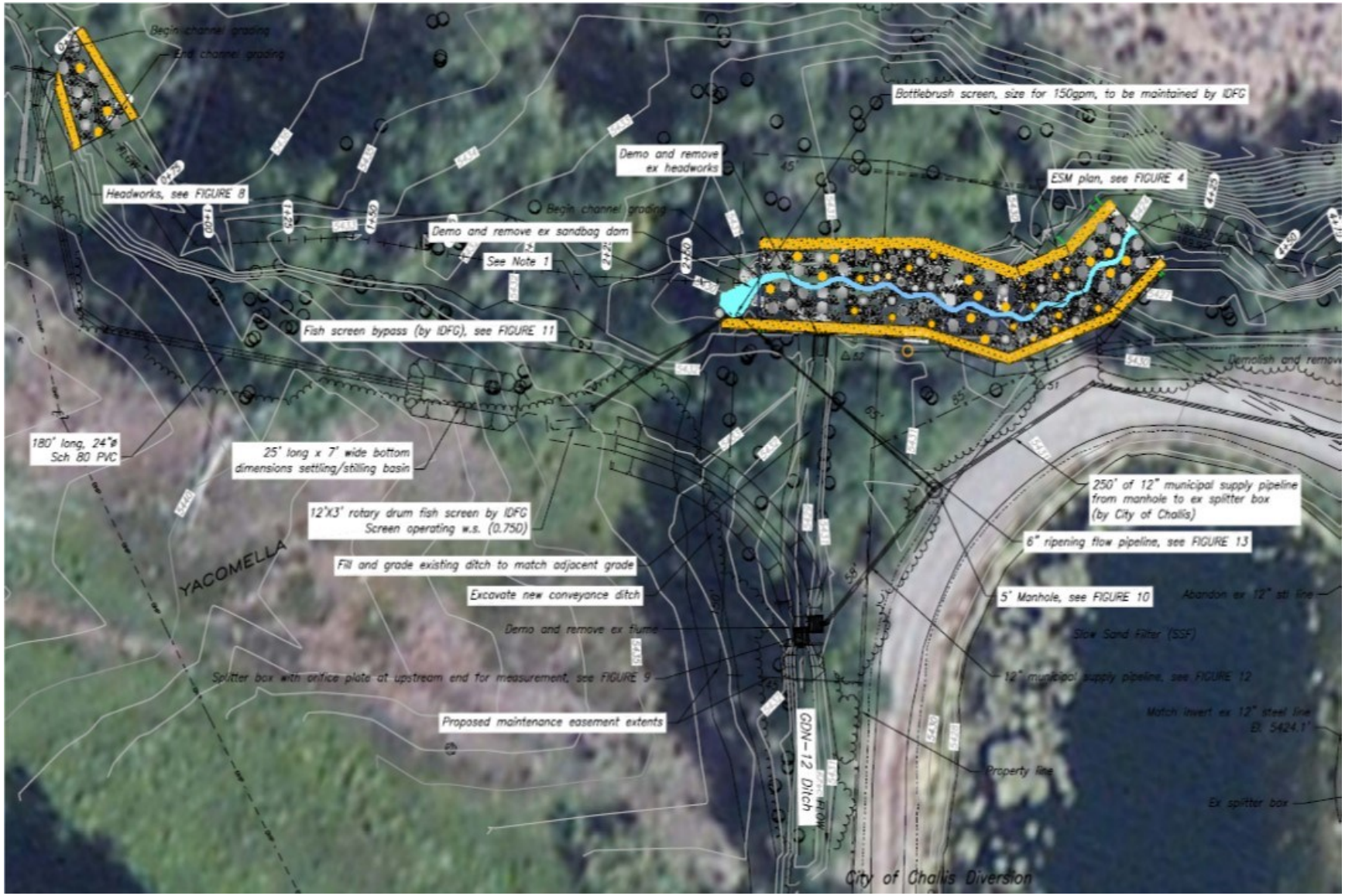

Figure 5. Project site and plan overview

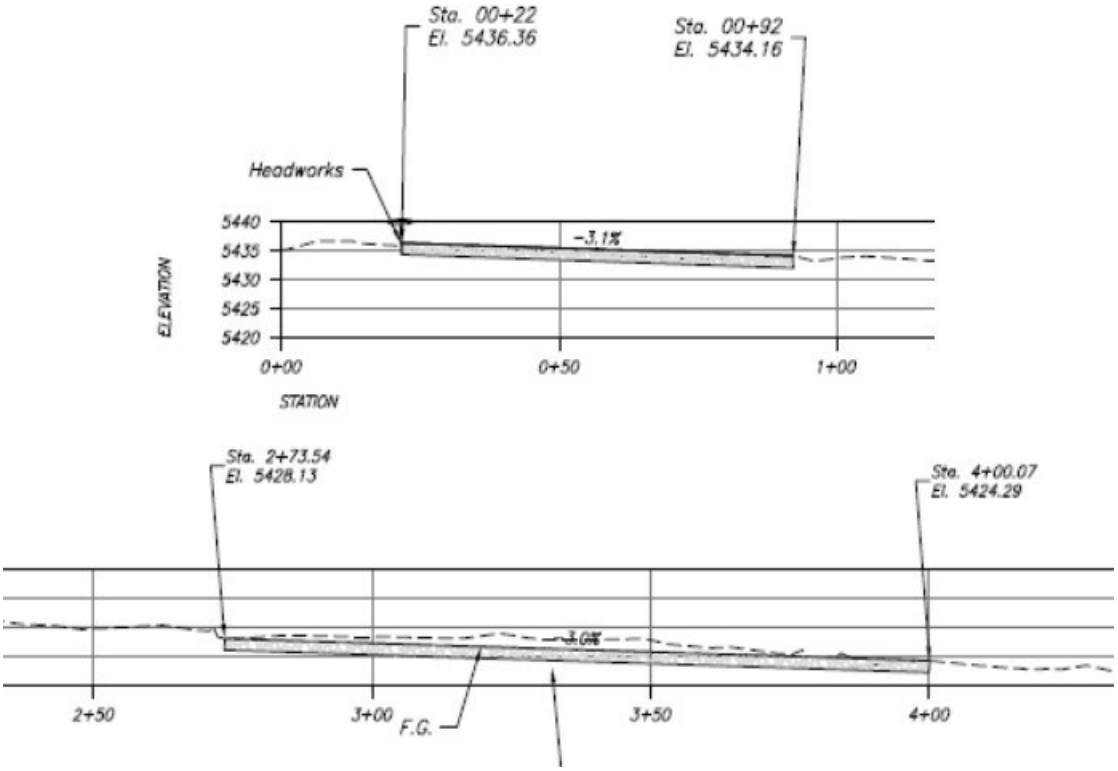

Figure 6. Elevations and streambed gradients for the headworks and the municipal diversion.

The diversion structures and fish screen will be constructed on private land as shown in Appendix A. The new headworks structure will be installed at the consolidated POD site and about 180 feet of 24 inch diameter schedule 80 PVC pipe will connect the consolidated POD to a 25 foot settling pond. IDFG will install a 24 inch NOAA compliant fish screen downstream of the settling pond and the fish screen will connect to a splitter box via a newly excavated ditch. The fish screen bypass will discharge back into the creek just downstream of a placed boulder. The ripening line POD for the municipal ponds will be placed just downstream of the fish screen discharge to take advantage of a constructed pool and boulder protection (Figure 7).

Channel work will include removing the existing sandbag dam and the municipal check dam and fish barrier structure. A combined total of about 198 feet of the streambed will be recontoured with native and, if needed, imported substrate. The result will be a stable constructed streambed that matches the up and downstream gradients (Figure 6). The instream diversion will consist of rocks placed to pool water at the opening of the headgate structure. Willow cuttings and brush bundles will be incorporated into the stream banks as outlined in Appendix A.

All work will be done in the dry. Each of the proposed construction actions are shown in Appendix A.

4.1 Proposed Conservation Measures

The following conservation actions apply to the described project site and are designed to minimize disturbance to ESA-listed species and designated critical habitat within the action area.

Construction Timing and Techniques

All proposed work would occur during the instream work window of July 1 to August 15 as recommended in the *Upper Salmon River Recommended Instream Work Windows and Fish Periodicity* charts on page 21, as revised November 5, 2005 (USBWP 2004). There is currently no fish passage in this section of the Garden Creek because of the two diversion structures and low to no water flow due to irrigation use during the proposed work window time. No federally listed fish have been documented at either of the existing diversion structures. Based on this scenario, the stream flow will be diverted into an 18 to 24 inch flexible pipe with cofferdam structures placed from the bank to maintain water flow, if present, through the work areas.

Placing and removing a cofferdam to divert the water into the pipe will be the only in water work associated with this project. All other construction work will be in the dry and will be completed in 3 weeks (See Figure 6 in Appendix A).

The work will consist of two segments. The first segment will be to divert the stream flow through the work site with an 18 to 24 inch pipe. The sandbag irrigation diversion will be removed and the boards in the existing municipal check dam will be removed to allow the remaining water to slowly exit the work area. This will allow any fish in the work area to move downstream to safer habitat. Once this area is dry, the headgate and check dam will be removed.

The second segment will consist of contouring the streambed to grade with a stable constructed streambed surface comprised of native and, if needed, imported substrate (Figures 7 and 8). Stream bank restoration will consist of laying back or filling the stream bank slopes at a 1.5H:1V ratio before placing willow stakes and brush bundles on the stream bank, and installing the headgate structure.

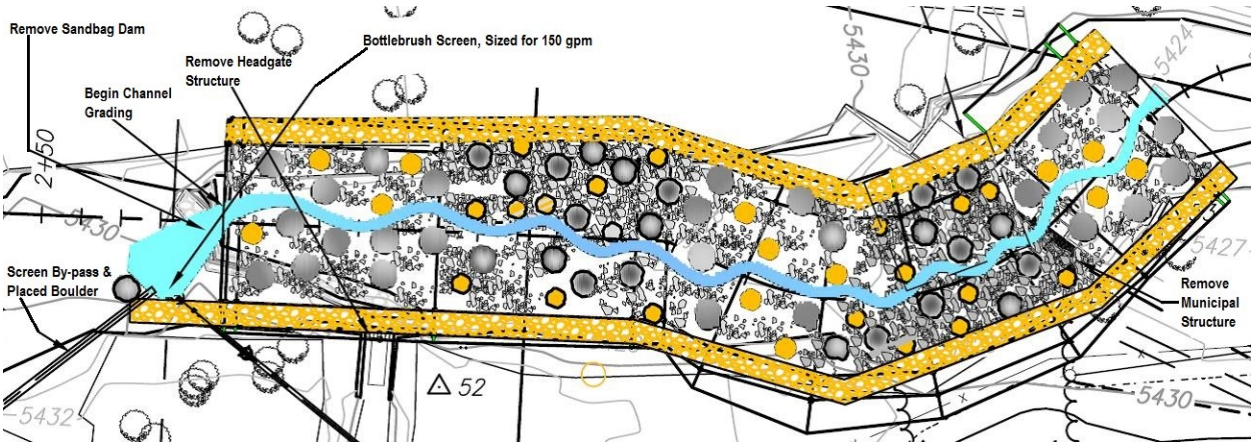

Figure 7. Garden Creek rehabilitation site for existing headgate and municipal structure**.**

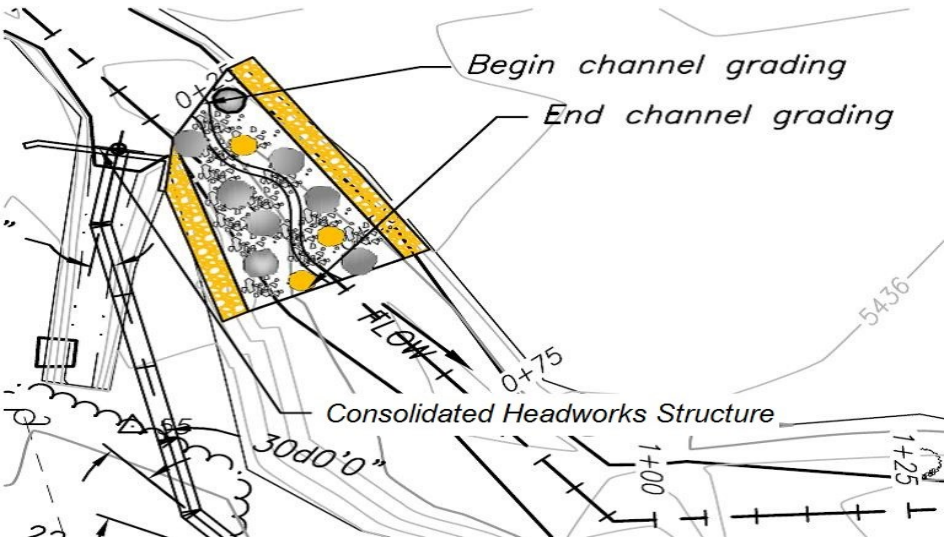

Figure 8. Consolidated headworks, pipeline and channel rehabilitation site and plan.

The Construction Plan (Figure 6 of Appendix A) lists an overall construction sequence to be implemented after the water is diverted into the by-pass pipe. The sequence is summarized here.

1. Remove boulders and other materials from the streambed and sort to be reused.
2. Excavate the streambed to grade for engineered streambed materials and pools and install the stable constructed streambed surface comprised of native and, if needed, imported substrate.
3. Construct pools and place roughness boulders, beginning downstream and moving upstream.
4. Once the roughness boulders are in place and compacted by the excavator bucket, fines will be added and washed into interstitial spaces to seal the streambed and reduce percolation losses and stream bed movement. This step will be completed with recycled water salvaged from the pool areas as designed in the Construction Plan.
5. Lay back or fill slopes using excavated material at 1.5H:1V ratio.
6. Complete all work, including stream bank revegetation, within each swing of the excavator before moving to the next section.
7. The excavator will move upstream and the construction steps will be repeated until the project is completed.
8. The final step will be to slowly turn water from the pipe into the upper end of the work area and remove the cofferdam. This sequence will greatly reduce silt mobilization and downstream transport.

Revegetation

Riparian disturbance and bank disturbance will be kept to a minimum at the project site. Any large willows that need to be removed will be salvaged with intact root mass and replanted on site to speed site recovery as listed in Figure 5 of Appendix A. All disturbed stream banks will be replanted with willow stakes, brush bundles and other native herbaceous plants. Disturbed pasture or cultivated grass lands will be planted with an approved pasture and grass seed mixture. The project will help decrease stream water temperatures, and improve riparian habitat quality and stream bank stability.

Sediment Control

Silt that may be generated due to work in the stream channel when placing and removing the cofferdams will be contained using straw waddles or with a bonded fiber matrix at the lower end of the channel. When Garden Creek is turned back into the main channel, silt is expected to settle out within 160 yards downstream due to stream gradient and low flow volume.

The following measures will be implemented to minimize sediment introductions to waters within the action area:

1. Silt fence or equivalent measures such as bonded fiber matrix will be deployed where overland sediment delivery may occur during typical rain events for the area.
2. Proposed instream work will occur in the dry.
3. The dewatered work area will be pre-wet prior to cofferdam removal; cofferdam installation and removal will occur slowly, to minimize turbidity input and ensure fish are not stranded during the process.

The *Catalog of Stormwater Best Management Practices* (BMP), Idaho Department of Environmental Quality, for Idaho Cities and Counties will be cited for construction direction. Construction spill prevention and control will be in accordance with BMP 8: Spill prevention and control. All possible steps will be taken to minimize the possibility of machine lubricants entering the streambed (i.e., equipment will be leak free prior to arrival on site and inspected daily). Contractors will be required to have a spill containment kit on site of appropriate size for the equipment used in the excavation. Construction equipment and materials staging, including refueling areas, will occur well away from the stream course (>150 feet).

Electrofishing/Fish Salvage

Fish will be encouraged to passively leave the dewatered area by slowly installing the cofferdam to incrementally diminish flows in the mainstream and divert the water through the work area via an 18 to 24 inch by-pass pipe. Any fish stranded in pools will be electrofished and netted and transported in aerated buckets to a point below the work area and released back into live water. Electrofishing will be conducted with a Smith-Root backpack LR-24 battery powered electrofisher. All settings and methodologies will be within the guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act (NMFS 2000).

5.0 Listed Species and Critical Habitat

The Endangered Species Act (ESA) of 1973 directs that any project with a Federal nexus implement measures to protect all federally listed species found in the project area. NOAA Fisheries and USFWS identify five aquatic and four terrestrial species that occur and/or contain critical habitat within Custer County, Idaho. These threatened or endangered species under the ESA of 1973, as amended, were listed on the USFWS Species List Update for Custer County, Idaho (Appendix B) and the NOAA Fisheries anadromous species for the Snake River (Appendix B).

Suitable habitat for the proposed yellow-billed cuckoo and wolverine and the candidate greater sage-grouse does not occur in the proposed project area. Proposed species are those for which listing rules have been published in the Federal Register, but formal listing still awaits administrative action. Candidate species have no statutory protection under ESA and are mentioned here and listed in Appendix B for information purposes only and to indicate the

project will not cause the species or habitat to trend toward listing under ESA regulations.

The action area consists of agricultural land and dry scrublands. Suitable habitat for Canada lynx consists of mature forest. Therefore, there is no suitable habitat for lynx in the action area. The grey wolf is known to travel through the mountains and foothills around the action area and could use the area occasionally as a travel corridor. Wolf denning sites are normally found in generally secluded areas with a degree of isolation for protection. The action area is surrounded by agricultural and grazing land that is not suitable denning habitat. No dens have been identified in proximity to the action area (IDFG and Nez Perce Tribe 2012). There are no known gray wolves in the project area.

The current species lists issued by the USFWS (last updated May 7, 2014) and by NOAA Fisheries (last updated May 7, 2014) identifies four ESA listed fish species as occurring on or adjacent to the Project Site. These are:

- Snake River Sockeye Salmon (Endangered) (FR 56 58619)
- Snake River Spring/Summer Chinook Salmon (Threatened) (FR 57 14653)
- Snake River Steelhead (Threatened) (FR 62 43937)
- Bull Trout (Threatened) (FR 63 31647)

The scope of this BA, including species descriptions and analysis of effects, will be limited to the four federally listed fish species listed above and designated critical habitat in the Garden Creek corridor which includes the action area and project site.

The species description, status, distribution and discussion of critical habitat in the Garden Creek watershed in this BA are compiled from several existing biological assessments, primarily the *Biological Assessment for the Garden Creek 3rd St Bridge Project* (City of Challis 2009), *Biological Assessment for the Gini Canal – Garden Creek Structure Replacement* (NW 2004) and the *Aquatic Species Biological Assessment for Livestock Grazing on the Garden Creek Allotment* (Gamett 2011).

6.0 Biological Information

Snake River Sockeye Salmon

Status and Distribution within the Action Area and Project Site

The Snake River sockeye salmon was listed as endangered on November 20, 1991 (56 FR 58619) and critical habitat was designated December 28, 1993 (58 FR 68543) effective January 27, 1994.

The mainstem Salmon River is a migratory corridor for Snake River sockeye salmon that spawn in lakes near Stanley, Idaho. Sockeye do not enter the Garden Creek watershed during any part of their life cycle. The action area and project site is about 4.9 miles upstream from the Garden Creek confluence with the Salmon River. Due to the distance from the action area and the project site to the confluence with the Salmon River, and based on the fact that fish surveys in Garden Creek and Hannah Slough have not found any sockeye salmon, it is determined that the proposed project will have "**No Effect"** on sockeye salmon or designated critical habitat and the species will not be considered further.

Snake River Spring/Summer Chinook Salmon

Status and Distribution within the Action Area and Project Site

The Snake River spring/summer and fall Chinook salmon were federally listed as threatened April 22, 1992 (57 FR 14653). Critical habitat for the species was designated on December 28, 1993 (58 FR 68543) and covered the entire Snake River and its tributaries, including the Salmon River and its major tributaries which includes Garden Creek.

Fish surveys above and below the project site have not found any individuals or populations of Chinook salmon in the project reach of Garden Creek (Bartel, et.al. 2009; Gamett, 2011; IDFG, unpublished data reviewed in 2012).

No Chinook salmon have been found in the upper reaches of the Garden Creek watershed on Forest Service managed lands (Bartel, et. al. 2009; Gamett 2011). One Chinook salmon was found during the 2010 survey of Garden Creek near Challis High School, about 1.4 miles downstream of the project site. Several Chinook salmon have been observed in Hannah Slough, approximately 3.5 miles downstream of the project site, during annual surveys from 2000 through 2011 (IDFG, unpublished data reviewed in 2012).

Snake River Steelhead

Status and Distribution within the Action Area and Project Site

The Snake River Basin steelhead was listed as threatened under the Endangered Species Act on August 18, 1997 (62 FR43937) and reaffirmed on January 5, 2006 (71 FR 834). Critical habitat for the species was designated on September 2, 2005 (70 FR 52630) and includes Garden Creek.

Rainbow trout have been found in Buster Lake, a high mountain lake located in the head of Garden Creek, as well as the inlet to Buster Lake (Brimmer et al. 2006; Bartel et al. 2009). The U.S. Forest Service fish biologist believes these fish are from the rainbow trout that were stocked in the lake in 2001 and they do not consider them to be steelhead (Gamett 2011).

A fish survey conducted by IDFG personnel in 2008 near Challis High School documented numerous rainbow trout, but no steelhead. The survey did capture two westslope cutthroat trout. In 2009 cutthroat trout were also observed in Hannah Slough.

Surveys have documented steelhead in Hannah Slough, approximately 3.5 miles downstream from the project site, during annual surveys from 2000 through 2011 (IDFG, unpublished data reviewed in 2012).

Bull Trout

Status and Distribution within the Action Area and Project Site

All bull trout populations in the Salmon River Subbasin were listed as Threatened under the ESA in 1998 and are defined as one recovery unit of the Columbia River distinct population segment. General life history and status information can be found in the Final Rule of the Federal Register (FR 63 31647) and in the State of Idaho Bull Trout Conservation Plan (Batt1996). Bull trout display wide, yet patchy distribution throughout their range. Within the entire Columbia Basin, the Central Idaho Mountains (more than half of which falls within the Salmon Subbasin) support the most secure populations of bull trout.

Bull trout are found in the Salmon River and Garden Creek is a tributary to the Salmon River. A single bull trout was found in 2002 in Hannah Slough, a tributary to the lower end of Garden Creek and a major salmonid spawning and rearing area adjacent to the Salmon River (IDFG, unpublished data reviewed in 2012). Bull trout are also found in the upper reaches of Garden Creek on Forest Service managed lands (Bartel et al. 2009; Gamett 2011). Bull trout have not been found in the section of Garden Creek between the Forest Service managed land and Hannah Slough, including the action area and project site. This is likely due to dewatering of the stream channel at certain times of the year and migration barriers such as at the project site (City of Challis 2009).

Critical Habitat

On October 18, 2010, the final rule on designation of critical habitat for bull trout was published in the Federal Register (75 FR 63898). Garden Creek in the Garden Creek Watershed was not included in the critical habitat designation; therefore, no critical habitat for the federally listed bull trout is considered in this BA.

7.0 Endangered Species Recovery Goals

The USFWS recommend several actions to aid in the recovery of bull trout. Though the needs of bull trout and salmon are somewhat different, they share much of the same habitat. Bull Trout Interim Conservation Guidance, a December 9, 1998 USFWS publication outlined recommended actions for bull trout including improving and restoring habitat, providing connectivity between tributaries, and reducing stream water temperatures. This project will adhere to and compliment these biological objectives.

NOAA Fisheries issued final biological opinions in May of 2008 for the Federal Columbia River Power System (FCRPS) and the Upper Snake projects. NOAA Fisheries finds that, with the actions in the FCRPS Reasonable and Prudent Alternative, salmon and steelhead are on a trend to recovery. The Alternative includes offsite mitigation in the form of habitat implementation projects that improve or restore freshwater habitat for anadromous fish. This project is a direct approach to implement actions that improve habitat and support recovery of the Chinook salmon and steelhead in the Salmon River Watershed.

The Screening and Habitat Improvement Prioritization for the Upper Salmon Subbasin (SHIPUSS) is intended to address fish conservation needs on or adjacent to irrigated agricultural and livestock ranching lands. SHIPUSS is a prioritized list of streams within watersheds to guide fish screening and habitat improvement efforts on privately owned lands throughout the Upper Salmon River Basin (USRB). SHIPUSS was developed by the Upper Salmon Basin Watershed Project (USBWP) Technical Team (Tech Team), which is comprised of numerous professional technical experts and fisheries biologists from regional, state, Federal, and tribal agencies, and other biologists familiar with fisheries populations in the USRB. SHIPUSS was developed to assist the Tech Team and USBWP Advisory Board in prioritizing the funding of conservation efforts across the USRB, and is intended to be used by these groups in conjunction with existing project-level prioritization methods. This project is compatible with the intent of SHIPUSS.

8.0 Environmental Baseline Conditions

Regulations implementing the ESA (50 CFR 402.02) define the environmental baseline "*as the past and present impacts of all Federal, State or private actions and other human activities in the project area*".

In the Garden Creek watershed, the past and present activities that may affect federally listed species considered in this assessment include those activities associated with irrigated agriculture, prescribed burning, and habitat restoration and development projects. In many watersheds, including Garden Creek, land management and development activities have:

1) reduced connectivity (i.e., the flow of energy, organisms, and materials) among streams, riparian areas, floodplains and uplands;
2) elevated fine sediment yields, degrading spawning and rearing habitat;
3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools;
4) reduced the vegetative canopy that minimizes solar heating of streams;
5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations;
6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and
7) altered floodplain function, water tables and base flows.

Under State of Idaho Water Law, early settlers in the Garden Creek watershed were granted water rights to virtually all existing spring and stream surface water sources in the valley. Many of these water rights were granted in the late 1800's to early 1900's and are still recognized as valid uses under existing state water law. Because of the current irrigation practices, the upper reaches of Garden Creek are no longer accessible to the federally listed salmonid populations which once spawned and reared there.

Interruption or blockage of salmonid migration between the Salmon River and its tributary spawning area in upper Garden Creek has been identified as a limiting factor affecting salmonid migration and production in the Garden Creek watershed (City of Challis 2009).

9.0 Analysis of the Potential Effect

Habitat fragmentation and degradation are believed to limit salmonid production and migration due to severe instream flow reductions and highly altered channel morphology from the upper Challis City limits to the confluence with Hannah Slough. Each of these factors may act cumulatively or independently to adversely affect Chinook salmon, steelhead, and bull trout populations.

Water Quality

Due to past practices of removing water from the system upstream of the project site, water quality ranges from nonexistent to poor during the summer irrigation season. A privately owned river crossing at the lower end of the action area can contribute sediment to the system if private vehicles use the site. However, the bridge (also private) next to the river crossing is the preferred method used to cross the stream. The stream crossing is used only in emergencies. Within the City limits the streambanks are stable but highly channeled with riprap. Above the City of

Challis, the Beneficial Use Reconnaissance Program scores are above the full support thresholds and fisheries data show full support of the salmonid spawning beneficial use (IDEQ 2003).

Vegetation

Stream bank cover and stability average 87.5% and 96 % respectively within the action area (IDEQ 2003). Access to the existing private and municipal diversion structures will be from City of Challis owned land on an existing access in an effort to reduce disturbance to the vegetation around the project site. The consolidated diversion and fish screen site will be accessed through private property.

The contractor will remove and stockpile all willow clumps and replant them to aid site recovery. The rock pile and staging areas will be on existing areas that are devoid of vegetation and currently used as a parking area. Willow cuttings and debris bundles will be established along the stream banks in areas disturbed by construction. Debris bundles will include tree branches, stems, live willow stakes and general brush to form a compacted 8 to 10 inch bundle (Figure 5 in Appendix A). Disturbance of existing vegetation will be kept to a minimum.

Fish

Primary negative effects to all fish species will be downstream impacts of turbidity/sediment pulses at the beginning and end of construction, and potential mortality and stress due to electrofishing and salvage in the dewatered reach. Sediment release will be controlled by slowly reducing the flows out of and into the stream channel at the start and completion of the project. Fish salvage will be conducted during dewatering of the construction area and the installation and removal of the cofferdam. Any fish that may be in the construction area will be encouraged to passively leave dewatered areas by slowly installing the cofferdam to incrementally diminish the flow. IDFG personnel will electrofish all fish stranded in isolated pools, place them in aerated buckets and transport them to an area below the project to be released. Electrofishing will be conducted with a Smith-Root backpack LR-24 battery powered electrofisher. All settings and methodologies will be within the guidelines for electrofishing waters containing salmonids listed under the Endangered Species Act (NMFS 2000).

No Chinook salmon or steelhead have been found upstream or within 3 miles downstream of the project site. Bull trout have been documented in Garden Creek on Forest Service land about 10 miles above the project site and on private land more than 3 miles downstream of the project site.

Mitigation Measures to Reduce Adverse Effects of the Proposed Action

This project will be conducted in accordance with Idaho Department of Environmental Quality (IDEQ) best management practices: The BMPs for Idaho Cities and Counties will be cited for construction direction. The BMPs will be incorporated into all contractual documents and specifications for installations. Mitigation measures used to minimize adverse effects to listed species, designated and proposed critical habitat include the following:

1. A cofferdam will be installed to dewater the river reach during construction. The cofferdam will be installed slowly and incrementally to decrease the amount of turbidity as the water is diverted into the 18 to 24 inch by-pass pipe. Slow installation of the cofferdam will encourage any fish to leave the area on their own.
2. Staging of construction equipment and materials will occur at least 100 feet away from Garden Creek.

3. Fuel storage and refueling, if needed, will occur no closer than 150 feet from the Garden Creek. The existing roads and paths will be used to access the project area and utilized as a staging/refueling area for equipment and vehicles. They will be operated using best management practices (use of catch-basins and/or sediment berms) and will be equipped with an appropriate spill containment system. Absorbent pads to soak up leaks and a fuel spill response kit of appropriate size for the equipment used will be readily available throughout the construction period.
4. Heavy equipment will be washed to remove oil/grease before delivery to the job site.
5. All equipment will be inspected before use to remove vegetation and dirt clods that may contain noxious weeds and seeds.
6. Machinery will be inspected daily for fuel or lubricant leaks.
7. Machinery will be operated from the top of the stream bank on adjacent upland and developed areas at each site to the maximum extent practicable. Equipment will not be driven or operated in flowing water.
8. Sediment barriers and erosion controls such as fences, weed-free straw matting/bales or fiber wattles will be used as necessary in all work areas sloping toward the water channel to intercept any surface flow that might transport sediment to the stream channel.
9. Excavated material, if any, will be covered and stockpiled away from the stream channel or flanked with sediment fencing or fiber wattles to minimize opportunity for fine sediment to be transported into the stream.
10. Where construction would otherwise destroy existing riparian vegetation, project managers will direct machinery to remove existing willows prior to disturbance, stockpile them so they can be replanted in disturbed areas to aid site recovery.
11. All operators of construction equipment and/or construction personnel are required to immediately cease operation if a sick, injured, or dead specimen of a threatened or endangered species is found in association with project activities. Take care in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death.
12. Cease any instream work, such as installing or removing cofferdams, during any heavy precipitation events in order to limit the potential for adverse sedimentation from erosion.
13. Slowly dewater the work area at the beginning of the project and then wet the dewatered site to minimize the suspension of disturbed sediments and avoid excessive downstream turbidity at the completion of the project.
14. Turbidity monitoring will be conducted at the project site to the following standards:
    a. A standard, regularly calibrated turbidity meter, measuring NTUs, will be used.
    b. A background sample will be taken at a relatively undisturbed area approximately 100 feet upstream from the project site, prior to the expected turbidity pulses to establish background turbidity levels.
    c. A sample will also be taken every 30 minutes at a spot approximately 500 feet downstream from the point of discharge or the most appropriate downstream site during sediment pulses for comparison to the background measurement.
    d. The monitoring results will be compared to the background measurements at 30 minute intervals. Turbidity levels that exceed 50 NTUs over background levels for two consecutive readings (60 minutes) shall result in cessation of work until turbidity levels subside.
    e. All readings and times will be recorded for later report preparation.

15. A post-project report, providing the information discussed above and confirming the successful application of all conservation measures described in this BA will be submitted within four (4) weeks of project completion.

10.0 Conclusion

CHINOOK SALMON and SNAKE RIVER STEELHEAD

This project **May Affect but is Not Likely to Adversely Affect (NLAA)** federally listed Chinook salmon and steelhead trout. The rationale for this determination is based on the following biological information specific to the action area and project site:

1. No Chinook salmon or steelhead have been found on Forest Service land 10 miles upstream of the project site. Chinook salmon and steelhead have been found in the Hannah Slough 3.5 miles downstream of the project site. One Chinook salmon was found 1.4 miles downstream of the project site in 2010.
2. The cofferdam placement will be the only in-water work at the point of construction, but the placement will be done during the low water period between July 7 and August 15. All remaining construction work will be in the dry.
3. There is no fish passage currently at the project site, so water, if present, will be directed through the site in an 18 to 24 inch pipe. However, if needed, IDFG will relocate any fish found in the area when the construction site is dewatered. No federally listed fish are expected to be in the area due to low or no water in the action area.
4. Completion of the project will remove two existing fish passage barriers and replace them with a new, single POD and recontoured streambed that will permit fish passage.
5. The two unscreened diversions will be consolidated into one diversion and a NOAA Fisheries compliant fish screen and by-pass pipe will be installed; 3.12 additional cfs of water will remain in the stream. This will provide access/passage for all species of fish to the upper reaches of Garden Creek during low water times. This is a beneficial effect for Chinook salmon and steelhead.

Critical Habitat

Critical habitat for Chinook salmon (58 FR 68543) and Snake River Steelhead (70 FR 52630) was designated in this reach of the Salmon River and its tributaries in October 1993 and September of 2003, respectively. No Chinook salmon or steelhead have been found within 3 miles of the project site. This project will remove a migration corridor barrier and improve water levels through and downstream of the project site. Therefore the project **May Affect but is Not Likely to Adversely Affect (NLAA)** listed critical habitat for Chinook salmon and steelhead. The project will be beneficial to the species and listed critical habitat.

BULL TROUT

This project **May Affect but is Not Likely to Adversely Affect (NLAA)** listed bull trout. The rationale for this determination is based on the following biological information specific to the action area:

1. Bull trout are only found 10 miles above and more than 3 miles downstream of the project site in Garden Creek.

2. The cofferdam placement will be the only in-water work at the point of construction, but the placement will be done during the low water period between July 7 and August 15. All remaining construction work will be in the dry.
3. There is no fish passage currently at the project site, so water, if present, will be directed around the site in an 18 to 24 inch pipe. If needed, IDFG will relocate any fish found in the area when the construction site is dewatered. No federally listed fish are expected to be in the area due to low or no water in the action area.
4. Completion of the project will remove two existing fish passage barriers and replace them with a new, single POD and recontoured streambed that will permit fish passage.
5. The two unscreened diversions will be consolidated into one diversion and a NOAA Fisheries compliant fish screen and by-pass will be installed. The project will leave 3.12 cfs of water in the stream and open migratory access to and from the upper reaches of Garden Creek. This is considered a beneficial effect for bull trout. It will also benefit all other fish and the aquatic habitat of Garden Creek.

Critical Habitat

On October 18, 2010, the USFWS published a Federal Register notice: *Endangered and threatened wildlife and plants; Revised designation of critical habitat for bull trout in the coterminous United States* that includes the Garden Creek (75 FR 63898). Garden Creek, a tributary to the Salmon River, was not included in the critical habitat designation; therefore, no critical habitat for the federally listed bull trout is in the action area and the project will **Not Affect (NA)** bull trout critical habitat.

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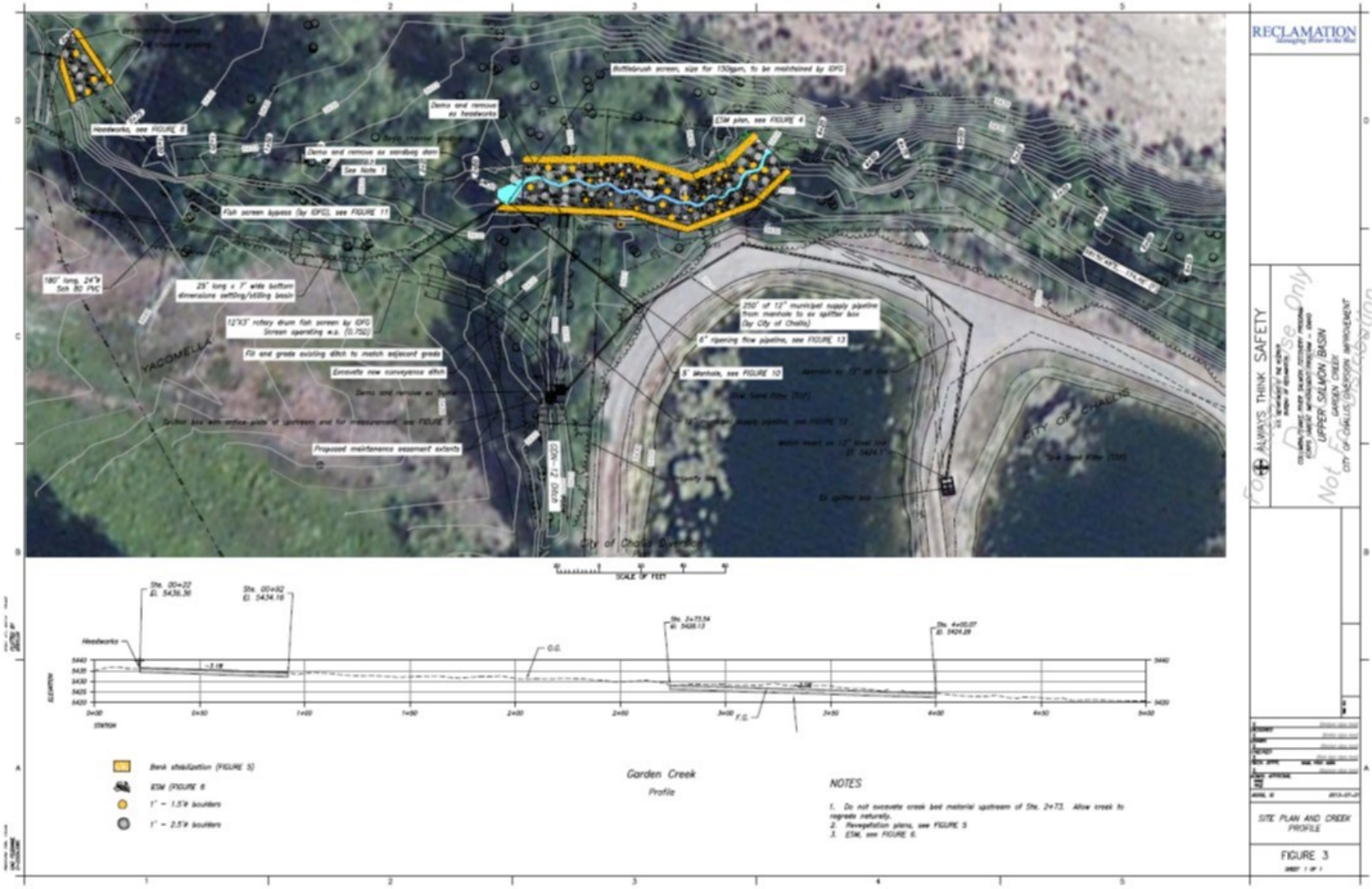
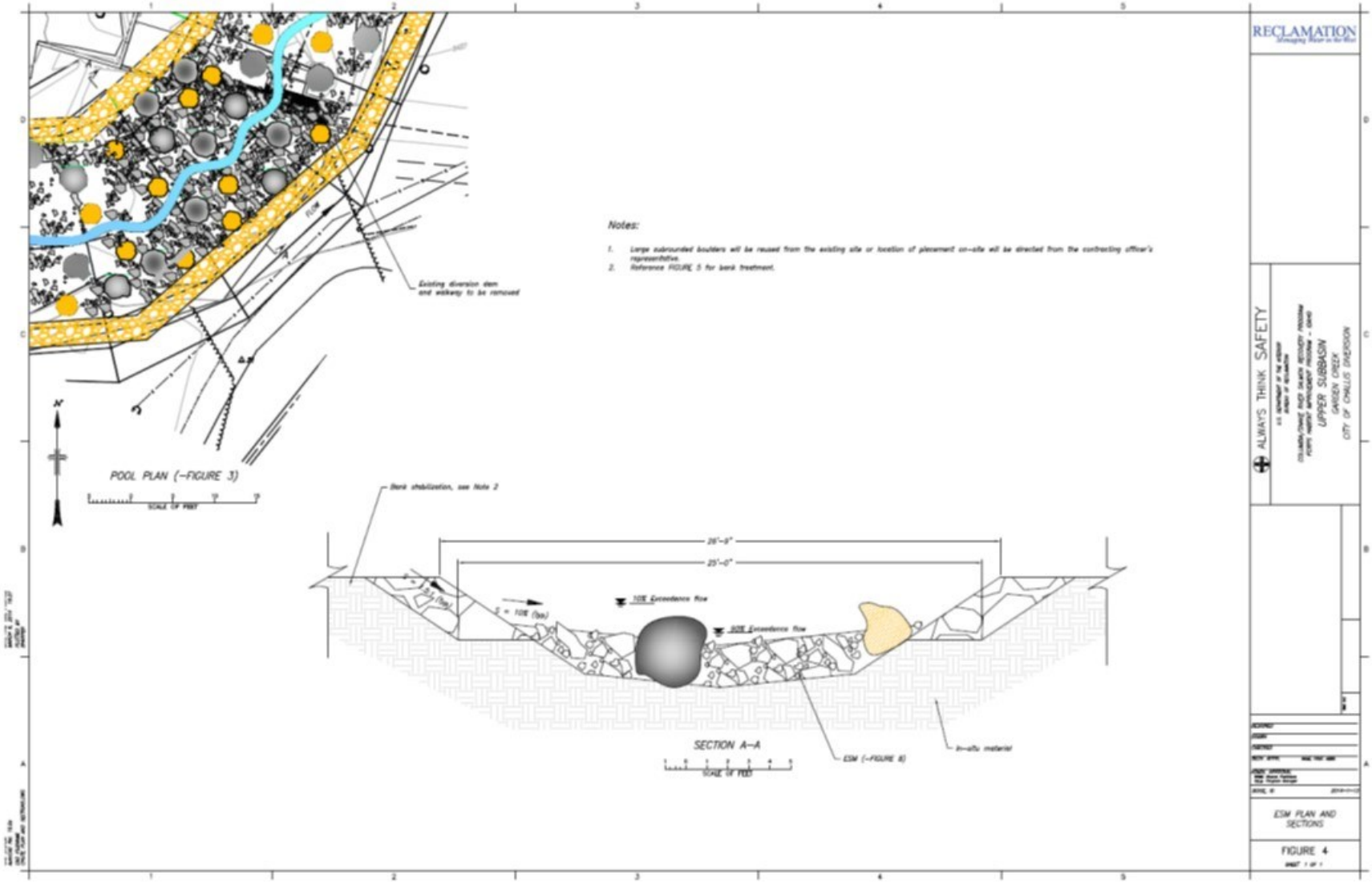
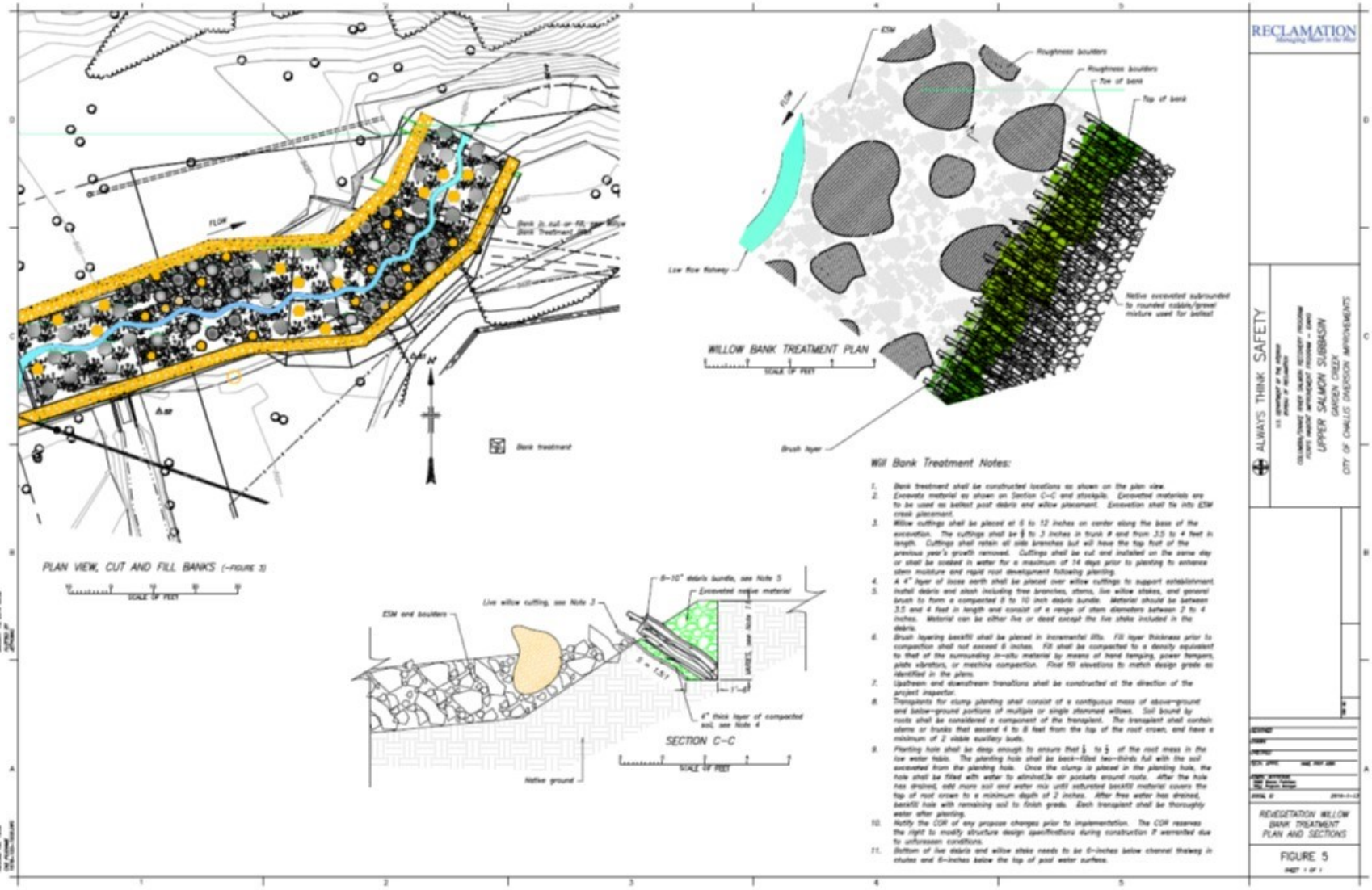
Appendix A. Diagrams of City of Challis Diversion and Headgate Structure




RECLAMATION
Managing Water in the West
Notes:
1. Large subrounded boulders will be reused from the existing site or location of placement on-site will be directed from the contracting officer's representative.
2. Reference FIGURE 5 for bank treatment.
Existing diversion dam and walkway to be removed
FLOW
POOL PLAN (~FIGURE 3)
SCALE OF FEET
Bank stabilization, see Note 2
26'-0"
25'-0"
10% Exceedance flow
50% Exceedance flow
SECTION A-A
SCALE OF FEET
ESM (~FIGURE 6)
In-situ material
ALWAYS THINK SAFETY
UPPER SUBBASIN
GARDEN CREEK
CITY OF CHALLIS DIVERSION
ESM PLAN AND SECTIONS
FIGURE 4


PLAN VIEW, CUT AND FILL BANKS (~FIGURE 3)
SCALE OF FEET
FLOW
Bank treatment
WILLOW BANK TREATMENT PLAN
SCALE OF FEET
ESW
Roughness boulders
Roughness boulders
Toe of bank
Top of bank
Low flow flowway
Native excavated subrounded to rounded cobble/gravel mixture used for ballast
Brush layer
SECTION C-C
SCALE OF FEET
ESW and boulders
Live willow cutting, see Note 3
8-10" debris bundle, see Note 5
Excavated native material
4" thick layer of compacted soil, see Note 4
Native ground
Will Bank Treatment Notes:
1. Bank treatment shall be constructed locations as shown on the plan view.
2. Excavate material as shown on Section C-C and stockpile. Excavated materials are to be used as ballast post debris and willow placement. Excavation shall tie into ESW creek placement.
3. Willow cuttings shall be placed at 6 to 12 inches on center along the base of the excavation. The cuttings shall be ½ to 3 inches in trunk ø and from 3.5 to 4 feet in length. Cuttings shall retain all side branches but will have the top foot of the previous year's growth removed. Cuttings shall be cut and installed on the same day or shall be soaked in water for a maximum of 14 days prior to planting to enhance stem moisture and rapid root development following planting.
4. A 4" layer of loose earth shall be placed over willow cuttings to support establishment.
5. Install debris and slash including tree branches, stems, live willow stakes, and general brush to form a compacted 8 to 10 inch debris bundle. Material should be between 3.5 and 4 feet in length and consist of a range of stem diameters between 2 to 4 inches. Material can be either live or dead except the live stake included in the debris.
6. Brush layering backfill shall be placed in incremental lifts. Fill layer thickness prior to compaction shall not exceed 6 inches. Fill shall be compacted to a density equivalent to that of the surrounding in-situ material by means of hand tamping, power tampers, plate vibrators, or machine compaction. Final fill elevations to match design grade as identified in the plans.
7. Upstream and downstream transitions shall be constructed at the direction of the project inspector.
8. Transplants for clump planting shall consist of a contiguous mass of above-ground and below-ground portions of multiple or single stemmed willows. Soil bound by roots shall be considered a component of the transplant. The transplant shall contain stems or trunks that extend 4 to 8 feet from the top of the root crown, and have a minimum of 2 viable auxiliary buds.
9. Planting hole shall be deep enough to ensure that ¼ to ½ of the root mass in the low water table. The planting hole shall be back-filled two-thirds full with the soil excavated from the planting hole. Once the clump is placed in the planting hole, the hole shall be filled with water to eliminate air pockets around roots. After the hole has drained, add more soil and water mix until saturated backfill material covers the top of root crown to a minimum depth of 2 inches. After free water has drained, backfill hole with remaining soil to finish grade. Each transplant shall be thoroughly water after planting.
10. Notify the COR of any propose changes prior to implementation. The COR reserves the right to modify structure design specifications during construction if warranted due to unforeseen conditions.
11. Bottom of live debris and willow stake needs to be 6-inches below channel thalweg in chutes and 6-inches below the top of pool water surface.
RECLAMATION
ALWAYS THINK SAFETY
UPPER SALMON SUBBASIN
GARDEN CREEK
CITY OF CHALLIS DIVERSION IMPROVEMENTS
REVEGETATION WILLOW BANK TREATMENT PLAN AND SECTIONS
FIGURE 5

ENGINEERED STREAMBED MATERIAL (ESM)		
Gradation	% of Mix	Size
*D100	16%	2 feet
*D84	34%	1.6 feet
D50	34%	1.2 feet
D16	8%	2.25 inch
D8	8%	0.75 inch

*Roughness and grade control boulders are considered D100–D84 of ESM.

FINES (USCS SILTY SAND)		
Gradation	% of Mix	US Sieve Size
D100	15% retained	No. 4
D85	55% retained	No. 200
D30	30% passing	No. 200

ESTIMATED CONTRACTOR FURNISHED QUANTITIES		
Material	Quantity	Units
Grade Control and Roughness Boulders	80	EA
ESM D84 minus	190	CY
Fines	25	CY
Grout	12	CY
Off Haul Unusable Material*	80	CY

*Disposal to be directed by contracting officer.

ESTIMATED CONTRACTOR SORTED* QUANTITIES		
Material	Quantity	Units
Grade Control and Roughness Boulders (Existing Weirs)	150	EA
Existing Streambed Material	50	CY

*Sorted material from existing weirs and streambed to be reused.

RIPRAP GRADATION (FT)	
2	100%
1.50	80%
1.25	60
0.85	40
0.50	20
0.30	10

ESM NOTES

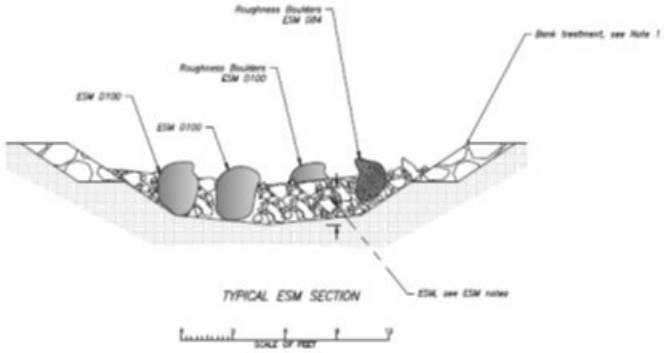
1. Obtain ESM material in three separate ranges of size, D100–D84, D84–No. 4 Sieve, and fines. Store in separate piles onsite.
2. Following shall references angularity of particle size class in ESM:
   - 0 – 6-inch material: rounded to subrounded
   - 6-inch to 2-foot material: angular
   - 2-foot and above: rounded to subrounded
3. Use a 2" trash pump for sluicing/washing D16 minus material into voids. Nozzle may be required. Minimize turbidity by reusing water used for sluicing/washing.

CONSTRUCTION SEQUENCING

1. Remove boulders of existing creek bed and sort material for reuse.
2. Excavate to bottom grade of ESM and pools. Sort material for reuse under direction of COR. Haul off excess material.
3. Finished grading to proceed from downstream to upstream moving stepwise a distance within swing radius of excavator constructing channel/banks then moving to next section.
4. Build pool structures and place roughness boulders within swing radius of excavator under direction of engineer.
5. Begin placing D84 minus of ESM around grade control structures and roughness boulders. Use max. 1' lifts and bucket compact with excavator.
6. Add fines and wash/sluice material liberally and continuously into voids reusing water from sump to minimize turbidity until all voids are filled and water sheets over placed material.
7. Utilize constructed pool as authorized by COR as sump for dewatering and sluicing/washing ESM material into voids.
8. Repeat steps 6–7 until grade of roughened channel is reached.
9. Lay back or fill slopes using excavated material at 1.5H:1V under direction of engineer.
10. Wash fines into voids to completely seal banks.
11. Move upstream repeating steps 5–10 until roughened channel is complete.

GENERAL NOTES

1. Reference FIGURE 5 for bank treatment.



TYPICAL ESM SECTION

RECLAMATION

ALWAYS THINK SAFETY

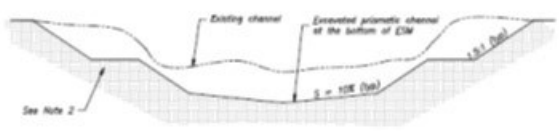
UPPER SALMON SUBBASIN

CITY OF CHALLIS BYPASS IMPROVEMENT

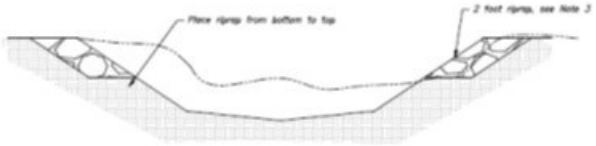
ENGINEERED STREAMBED MATERIAL DETAILS AND NOTES

FIGURE 6

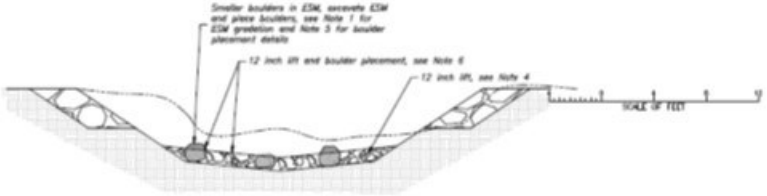
For Use Only
Not For Distribution



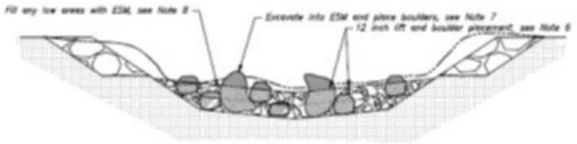
CHANNEL PREPARATION – STEP 1



RIPRAP LAYER – STEP 2



BASE LIFT INSTALLATION – STEP 3



TOP LIFT INSTALLATION – FINAL STEP

NOTES

1. Contractor to stockpile ESM per design specifications, see drawing FIGURE 8. Materials are to be graded, mixed, and stockpiled at the material pit and hauled to the immediate project area for placement.

2. Treat existing channel bed by removing organics, creating a prismatic working surface, and compacting that surface with a CAT345 or larger excavator.

3. Construct banklines (see FIGURE 6 and 7) 2 feet thick, with 1.5:1 side slopes. There will be areas of the banks that are designed to utilize a mix of riprap and soil wrap or excavated material and willow bundles, see drawings 6 and 7 to determine where the differing bank stabilization techniques will be used.

4. Import ESM, compact matrix material in 12 inch lifts using CAT345 or larger excavator, track on ESM sufficiently to compact material. Pressure wash fines into ESM using a trash pump and 2 inch fire hose with nozzle until water runs on surface.

5. Excavate pockets into ESM and set boulders to embedment per detail; pressure wash fines into matrix surrounding boulders and compact with excavator bucket.

6. Repeat matrix construction and boulder placement in 12 inch lifts to the design channel thalweg bed elevation.

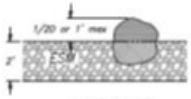
7. Boulders sized and spaced as shown on FIGURE 4 are to be added to the top matrix lift to create diverse flow paths and habitat. Each boulder is to be embedded per detail.

8. Excavate and shape low flow fishway as authorized by CDR and as shown on FIGURE 4 during and before boulder placement.

9. Hand compact ESM around each boulder with vibratory compactor (or similar).

10. Top dress completed engineered fill with ESM per C.O./Engineer.

D_{100} BOULDER



D_{84} BOULDER

DESIGN INTENT

The intent of the engineered fill is to provide a stable constructed surface comprised of native and imported substrate. The ESM is used to increase the river channel bed elevation and is typically constructed to form riffle, run, and glide habitat units. The ESM composition includes three primary substrate classifications including gravels and cobbles, boulders, and fines. Boulders provide the scour resistance, influence low flow stream flow patterns and hydraulics, and create habitat while the gravels and cobbles fill majority of the pore space around the boulders. Fines are pressure washed into the matrix material to seal the streambed to reduce percolation losses and bed material movement, the ESM is constructed in 12 inch lifts. Boulders protrude from the ESM surface to promote diverse flow paths, provide energy dissipation, and create aquatic habitat.

PRISMATIC CHANNEL, CLEANED OF DEBRIS AND COMPACTED

PLACING ESM IN 12 INCH LIFTS (TYP)

PRESSURE WASHING FINES INTO ESM (TYP OF EACH LIFT)

ESM AFTER ALL LIFTS ARE PLACED TO FINISHED GRADE WITH TOP DRESSING

ESM AFTER ALL LIFTS ARE PLACED TO FINISHED GRADE

RECLAMATION
Managing Water in the West

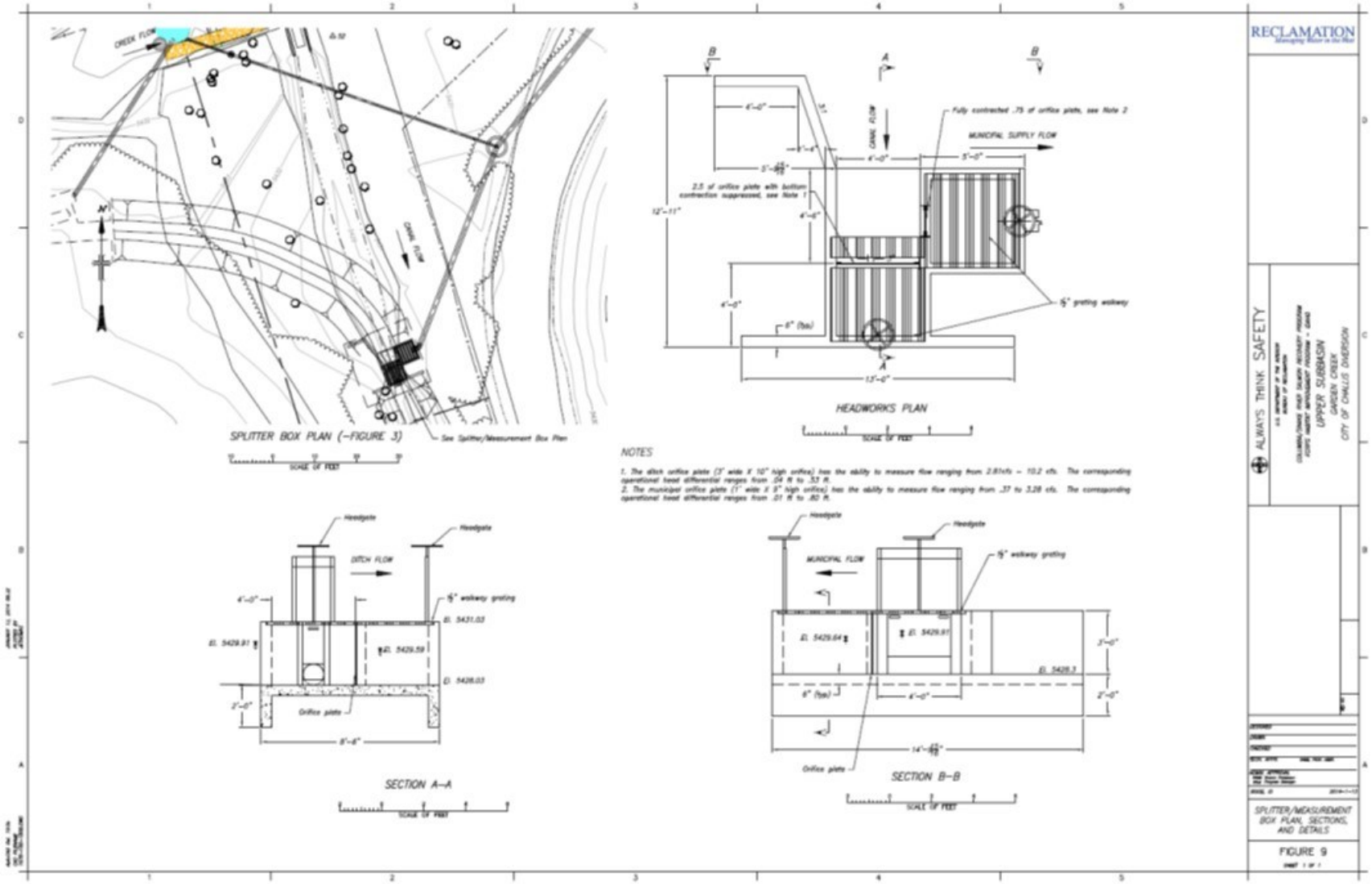
ALWAYS THINK SAFETY

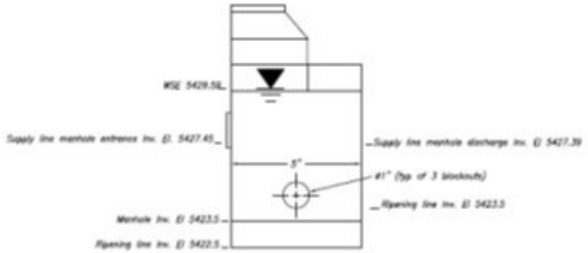
UPPER SALMON SUBBASIN
SANDY CREEK
CITY OF CHALLIS (DIVERSION IMPROVEMENT)

ESM PLACING PROCEDURE, PLAN AND SECTION

FIGURE 7

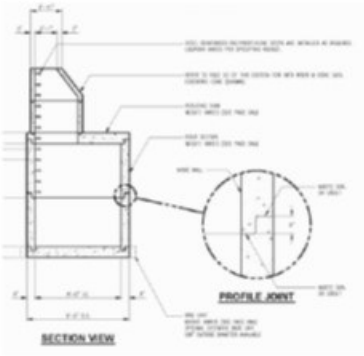
For Internal Use Only
Not For Distribution


RECLAMATION
SPLITTER BOX PLAN (–FIGURE 3)
See Splitter/Measurement Box Plan
HEADWORKS PLAN
Fully contracted .75 of orifice plate, see Note 2
MUNICIPAL SUPPLY FLOW
CANAL FLOW
2.5 of orifice plate with bottom contraction suppressed, see Note 1
½" grating walkway
NOTES
1. The ditch orifice plate (3" wide X 10" high orifice) has the ability to measure flow ranging from 2.81cfs – 10.2 cfs. The corresponding operational head differential ranges from .04 ft to .33 ft.
2. The municipal orifice plate (1" wide X 9" high orifice) has the ability to measure flow ranging from .37 to 3.28 cfs. The corresponding operational head differential ranges from .01 ft to .80 ft.
Headgate
DITCH FLOW
Orifice plate
SECTION A–A
MUNICIPAL FLOW
SECTION B–B
ALWAYS THINK SAFETY
UPPER SUBBASIN
GARDEN CREEK
CITY OF CHALLIS DIVERSION
SPLITTER/MEASUREMENT BOX PLAN, SECTIONS, AND DETAILS
FIGURE 9



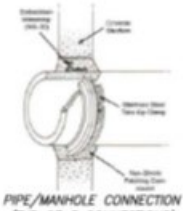
MANHOLE ELEVATION (~FIGURE 3)

SCALE OF FEET



MANHOLE DETAILS

N.T.S.

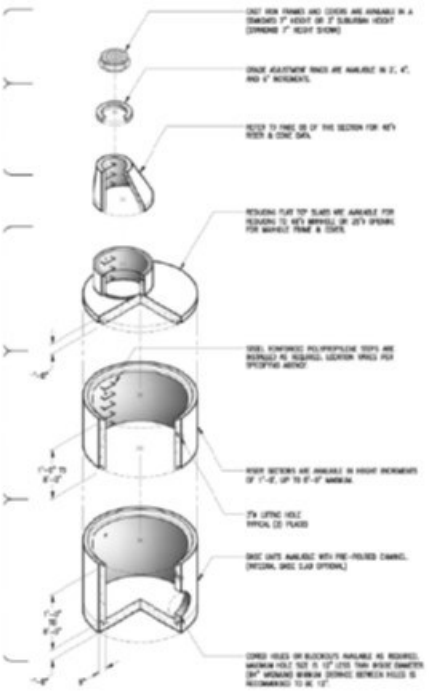


PIPE/MANHOLE CONNECTION
(TYP OF 3 CONNECTIONS)

N.T.S.

NOTES

1. Sections shown are referenced from Oldcastle Precast manholes.
2. Manhole shall be equal to Oldcastle Precast manholes or as approved by COR.



MANHOLE SECTION OPTIONS

N.T.S.

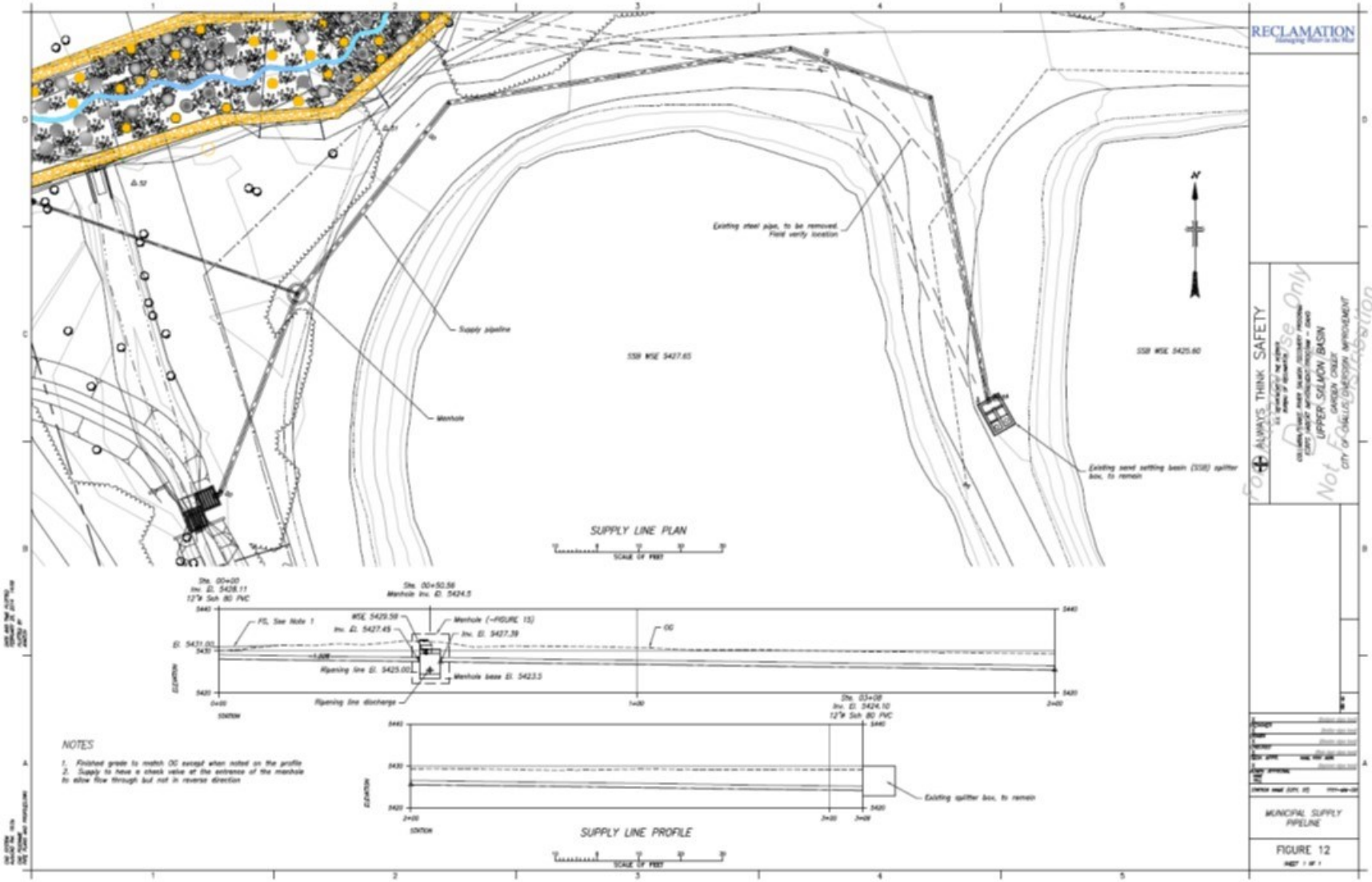
RECLAMATION

ALWAYS THINK SAFETY

UPPER SALMON BASIN

MANHOLE PLAN, SECTIONS, AND DETAILS

FIGURE 10


RECLAMATION
Managing Water in the West
Existing steel pipe, to be removed. Field verify location
Supply pipeline
Manhole
SSB WSE 5427.65
SSB WSE 5425.60
Existing sand settling basin (SSB) splitter box, to remain
SUPPLY LINE PLAN
SCALE OF FEET
Sta. 00+00
Inv. El. 5428.11
12"ø Sch 80 PVC
Sta. 00+50.56
Manhole Inv. El. 5424.5
FG, See Note 1
WSE 5429.59
Manhole (~FIGURE 15)
Inv. El. 5427.45
Inv. El. 5427.39
OG
El. 5431.00
Ripening line El. 5425.00
Manhole base El. 5423.5
Ripening line discharge
ELEVATION
STATION
Sta. 03+08
Inv. El. 5424.10
12"ø Sch 80 PVC
Existing splitter box, to remain
SUPPLY LINE PROFILE
NOTES
1. Finished grade to match OG except when noted on the profile
2. Supply to have a check valve at the entrance of the manhole to allow flow through but not in reverse direction
ALWAYS THINK SAFETY
UPPER SALMON BASIN
GARDEN CREEK
CITY OF DILLON, OREGON IMPROVEMENT
MUNICIPAL SUPPLY PIPELINE
FIGURE 12
For Reference Only
Not for Construction

Appendix B. Federally Listed Species

The U.S. Fish and Wildlife Service county species list and the National Oceanographic and Atmospheric Administration Fisheries Service (collectively referenced as the Services) list are for informational purposes only. The Services biologists have used the best scientific and biological information available to formulate these lists. The lists are updated regularly. Section 7 of the Act requires Federal agencies to assure that their actions are not likely to jeopardize the continued existence of endangered or threatened species. Federal funding, permitting, or land management decisions are considered to be Federal actions subject to Section 7. If the proposed action may affect a listed species, consultation with the Services is required. Formal consultation must be initiated for any project that is likely to adversely affect a threatened or endangered species. If a proposed species is likely to be jeopardized by a Federal action, regulations require a conference between the Federal agency and the Service (www.fws.gov/idaho/species/IdahoSpeciesList.pdf ; www.nmfs.noaa.gov/pr/species/esa/fish.htm 76 FR 66370).

Custer County, Idaho Species List

CANDIDATE SPECIES	FEDERAL STATUS	CRITICAL HABITAT	COMMENTS
Yellow-billed cuckoo *(Coccyzus americanus)*	PT	None	FWS Jurisdiction
Greater Sage-Grouse (*Centrocercus urophasiunus*)	C	None	FWS Jurisdiction
Wolverine *(Gulo gulo luscus)*	PT	None	FWS Jurisdiction (Petition was found "warranted but precluded")
LISTED SPECIES			
Canada lynx *(Lynx canadensis)*	LT	Not in designated LAU	FWS Jurisdiction
Gray Wolf (*Canis lupus*)	XN	None	FWS Jurisdiction
Bull trout *(Salvelinus confluentus)*	LT	Designated	FWS Jurisdiction
Snake River Steelhead trout *(Oncorhynchus mykiss)*	LT	Designated	NOAA Fisheries jurisdiction
Snake River Spring/summer Chinook salmon *(O. tshawytscha)*	LT	Designated	NOAA Fisheries jurisdiction
Snake River Sockeye salmon *(O. nerka)*	LE	Designated	NOAA Fisheries jurisdiction

LT = Listed Threatened; LE = Listed Endangered; PT = Proposed Threatened; C = Candidate; XN = Experimental Nonessential

Endangered and Threatened Marine and Anadramous Fish
List of Fish Species under NMFS' Jurisdiction

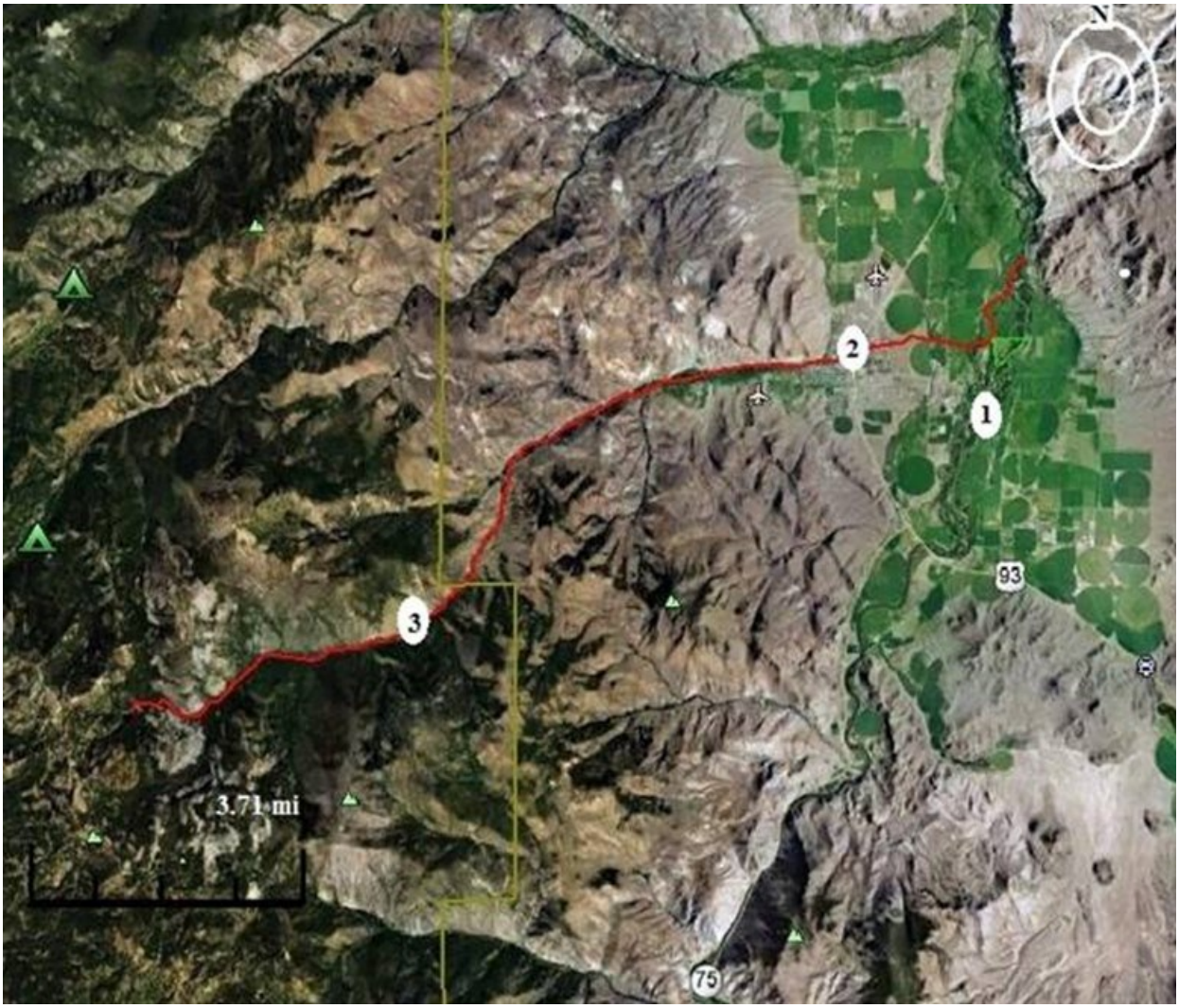
Species	Year Listed*	Status	Critical Habitat	Recovery Plan
Chinook Salmon (*Oncorhynchus tshawytscha*)				
Snake River fall-run	1992	T	**final**	**in process**
Snake River spring/ summer-run	1992	T	**final**	**in process**
Sockeye Salmon (*Oncorhynchus nerka*)				
Snake River	1991	E	**final**	**in process**
Steelhead Trout *(Oncorhynchus mykiss)*				
Snake River Basin	1997	T	**final**	**in process**

(E = Endangered; T = Threatened *)

***** All Pacific salmonid listings were revisited in 2005 and 2006. Only the salmonids whose status changed as a result of the review will show the revised date; for all others, only the original listing date is shown.

Updated May 7, 2014

Appendix C. Fish Survey Sites (IDFG, unpublished data reviewed in 2012; Gamett 2011; Bartel, et al. 2009)



Fish survey sites: 1-Hannah Slough; 2- Challis High School; 3- US Forest Service managed land.

Appendix D. Project Site Photographs

Lower end of the Action Area, 160 yards downstream of the municipal diversion.

Garden Creek channel downstream of the project area. Looking upstream near the lower end of the Action Area.

Downstream view of the City of Challis Municipal Water Supply diversion on Challis Creek. Note the structure drop is 4 ½ feet across the entire structure with no fish passage.

Looking upstream from the Municipal Water supply diversion to the private irrigation diversion.

Looking downstream from the existing private irrigation headgate.

Looking upstream from the private irrigation diversion.

Approximate location, on private land, of new headgate installation site looking upstream.

Looking downstream from approximate location, on private land, of new headgate structure.

APPENDIX C
Agency Correspondence

U.S. EPA, Region 10; December 23, 2011 ..... C-2

Idaho Department of Lands; December 20, 2011 ..... C-3

Idaho Department of Water Resources; December 19, 2011 ..... C-4

Idaho Department of Environmental Quality; December 16, 2011 ..... C-5

National Oceanic & Atmospheric Administration; December 12, 2011 ..... C-7

National Oceanic & Atmospheric Administration; December 9, 2011 ..... C-8

Eastern Idaho Public Health District; December 9, 2011 ..... C-9

Idaho State Historical Society; December 7, 2011 ..... C-10

State of Idaho Department of Environmental Quality; December 6, 2011 ..... C-11

State of Idaho Department of Agriculture; December 2, 2011 ..... C-12

U.S. Fish & Wildlife Service; November 29, 2011 ..... C-13

State of Idaho Department of Water Resources; November 28, 2011 ..... C-16

U.S. Army Corp of Engineers; March 17, 2011 ..... C-17

Idaho State Historical Society; February 7, 2011 ..... C-18

State of Idaho Department of Water Resources; January 31, 2011 ..... C-19

U.S. Army Corps of Engineers; April 5, 2012 ..... C-20

Terry Kristof

From: "Cyndi Grate" <Grafe.Cyndi@epamail.epa.gov>
Date: Friday, December 23, 2011 1:24 PM
To: <tkristof@clearwire.net>
Subject: City of Challis Water System Improvement Project - Preparation of EID

Hi Terry,

Thank you for the opportunity to review the Challis project After checking with my colleagues, the R10 Idaho Operations Office does not have any comments regarding the proposed project.

Best regards,
Cyndi

==========

Cyndi Grafe
EPA Region 10 - Idaho Operations Office
Boise, Idaho
208/378-5771
grafe.cyndi@epa.gov

EASTERN **IDAHO**
SUPERVISORY AREA *3563*
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COMMISSIONERS C. *L. "Butch"* Otter,
Governor *Ben Ysursa, Secretary of State*
Lawrence G. Wasden, Attorney General
Donna M. Jones, State Controller Tom
Luna, Sup't of Public Instruction

December 20, 2011

Terry Kristof
Progressive Engineering Group
1208 Idaho Street
Lewiston, ID 83501

RE: City of Challis Water System Improvement Project

Dear Mr. Kristof:

The Idaho Department of Lands has no comments regarding this project.

Sincerely,

,Patrick Brown
Area Manager

From: "McGown, Mary" <Mary.McGown@idwr.idaho.gov>
Date: **Monday, December 19, 2011 10:35 AM**
To: **<tkristof@cleanNire.net>**
Cc: <challiscity@custertel.net>
Attach: Challis Water System Impvt Project Photol 12-19-11.pdf; Challis Water System Impvt Project Photo 2
12-19-11.pdf
Subject: City of Challis Water System Improvement Project

Mr. Kristof,

I have reviewed the information you sent about the City of Challis water system improvement project and have a few comments. Some of the system components will be constructed in the mapped flood hazard area of Garden Creek as it flows through the city. I have attached two aerial photos of the mapped flood hazard through the project area. The images were taken from the Idaho Flood Hazard Maps posted on the Idaho Department of Water Resources Floodplain Management webpage. A floodplain development permit will be required from the City of Challis for the work that occurs in the flood hazard area. A floodplain development permit is a **minimum requirement of** the National Flood Insurance Program. The city clerk of Challis is the floodplain administrator.

"Development" is broadly defined in the regulations as, "... *any man-made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations or storage of equipment or materials. (44 CFR* 59) Please check the city's flood damage prevention ordinance to see if there are specific requirements.

The federal minimum regulations are general for water system improvements.

> *(The community must] Require within flood-prone areas new and replacement water supply systems to be designed to minimize or eliminate infiltration of flood waters into the systems: 44 CFR 60.3(a)(5)*

In most instances, these criteria can be met through careful system design. Manholes should be raised above the Base Flood Elevation (BFE) or equipped with seals to prevent leakage. Pumping stations should have electrical panels elevated above the BFE. In Challis no BFE has been identified. The Garden Creek flood hazard area is an approximate Z zone.

Please let me know if you have other questions.

Mary G. McGown, Ph.D., CFM
State Floodplain Coordinator
Idaho Department of Water Resources
322 E. Front Street
P.O. Box 83720 Boise, ID 83720-0098
(208) 287-4928

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

900 North Skyline Drive, Suite B • Idaho Falls, Idaho 83402 • (208) 528-2650

C.L. "Butch' Otter, Governor
Toni Hardesty, Director

December 16, 2011

Terry Kristof
Progressive Engineering Group, Inc.
1208 Idaho Street
Lewiston, Idaho 83501

Re: City of Challis Water System Improvement Project-Request for Comments for Preparation of an Environmental Information Document

Dear Terry,

We have reviewed your letter requesting comments concerning the City of Challis Water System Improvements. Since the improvements would be a material modification of the water system, the following items will need to be addressed in order to meet DEQ approval:

Plans and Specifications:

0 The City of Challis is currently a regulated public water system. All public water systems must submit for approval a complete set **of plans** and specifications for modifications to the water system prior to construction. The plans and specifications must be prepared and certified by a professional engineer licensed to practice in the state of Idaho. The plans and specifications must include; facility plans; engineering reports; and the demonstration of Technical, Financial, and Managerial Capacity as identified in **IDAPA 58.01.08.500-504**

Minimum Well Standards:

0 All wells used as a domestic water supply sources must meet all of the minimum standard well requirements for public drinking water systems identified in **IDAPA 58.01.08.510**

Well Site Approval:

The DEQ shall be consulted prior to design and construction regarding a proposed well location as it relates to required separation between existing and potential sources of contamination and groundwater development.

New Source Monitoring:

0 The DEQ requires that all newly developed sources for public water systems monitor the source to determine that the water falls below all the regulated maximum contaminant levels (MCLs) before delivering water to the public.

All of these items will need to be addressed before the DEQ will grant project approval. If you have any questions feel free to contact me at 208-528-2650 or e-mail me at Carlin.Feisthamel@deq.idaho.gov

Sincerely,

r

Carli Feisthamel, P.E.
Water Quality Engineer
Idaho Falls Regional Office

Cc: Greg Eager, DEQ-IF
Kellye Eager, EIPI-ID

Terry Kristof

From: "David Mabe" <david.mabe@noaa.gov>
Date: Monday, December 12, 2011 2:57 PM
To: "Terry Kristof" <tkristof@clearwire.net>
Subject: Re: City of Challis, Idaho, water project

Thank you for the clarification Terry. I do not think it makes a difference with respect the responses included in the letter. If you have any questions please give me call.
Thanks.

On Mon, Dec 12, 2011 at 12:56 PM, Terry Kristof < > wrote:

Hello Mr. Mabe,
Thank you for your prompt response to our scoping letter regarding the City of Challis, Idaho water system improvements. There is one misunderstanding that I would like to correct. Your letter assumes that the City of Challis is planning to "abandon" their water right to Garden Creek. While the City is happy to let the water to NRCS, and would leave the diversion so that fish can pass, the City does not plan to abandon their water right at this point. I do not know if that difference in legal ownership of the water right would make a difference in your thought process, or not. Please advise.
Thank you,
Terry Kristof
Progressive Engineering Grout'

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE

10095 West Emerald Street
Boise, Idaho 83704

December 9, 2011

Terry Kristof
Progressive Engineering Group, Inc.
1208 Idaho Street
Lewiston, Idaho 83501

RE: City of Challis Water System Improvement Project

Dear Mr. Kristof:

This letter responds to your November 21, 2011, letter requesting the National Marine Fisheries Service (NMFS) provide information on potential environmental issues regarding the subject action. Your letter indicates that the proposed water system upgrades may be funded by a grant from the U.S. Department of Agriculture Rural Development (USDA RD). Your letter also indicates that the Federal funds would be used to drill two new wells, closing out the existing slow sand filter system in the process, and moving the City of Challis' drinking water source from surface water to groundwater. The City would retain their existing surface water right, potentially letting the water to the National Resources Conservation Service (NRCS) to augment current streamflows in Garden Creek.

If the proposed action is Federally-funded, consultation with NMFS under section 7(a)(2) of the ESA is required. We urge you to work with your contact at the USDA RD to ensure their funding does not jeopardize ESA-listed species, or result in destruction or adverse modification of critical habitats.

Garden Creek is a tributary to the Salmon River, and is occupied by Endangered Species Act (ESA) protected Snake River spring/summer Chinook salmon and Snake River Basin steelhead. Garden Creek is also designated critical habitat for both species and Magnuson-Stevens Act Essential Fish Habitat for Snake River spring/summer Chinook salmon. The critical habitat designation for spring/summer Chinook salmon also includes approximately 300 feet on either side of the ordinary high water mark.

Based upon the information provided, NMFS is supportive of the City of Challis abandoning its surface water right as proposed. NMFS also encourages the City to ensure that the existing point of diversion be left in a manner that allows for year-round, upstream and downstream fish passage of migrating and rearing salmonids and that the City work with both the NRCS and the Idaho Department of Water Resources to secure delivery of the City's abandoned surface water rirt downstream to the Salmon River.

ENVIRONMENTAL HEALTH DIVISION

EASTERN IDAHO
Public Health
DIS TR IC T

1250 Hollipark Drive Idaho
Falls, Idaho 83401
208.523.5382 fax
208.528.0857
www.idaho.qov/phd7

Promoting the Health of People & Their Environment

December 9, 2011

Terry Kristof
Progressive Engineering Group, Inc.
1208 Idaho Street
Lewiston, ID 83501

RE: ENVIRONMENTAL REVIEW RESPONSE

Dear Mr. Kristof:

This letter is in regards to your November 21, 2011, Environmental Information Document for the City of Challis. Our response is declared below.

We would like to emphasis that disposal of any construction debris generated from the project should be at an approved solid waste facility. The company that is removing the old pipes will have to determine if the pipes are composed of any regulated hazardous materials (asbestos, lead, etc.) The company should also contact the landfill where they intend to dispose of the pipes. The landfill might require demolition permits or documentation verifying absence of any regulated hazardous waste. It is up to the generator of the waste to provide all needed documentation.

Also from our food program responsibilities, this construction may impact the food establishments in Challis with one or multiple water outages. If this is the case, we recommend that with any water outages involving food establishments the City, schedule with and receive approval from, the Health Department in Salmon, Idaho. The phone number for our Lemhi County office is (208) 756-2122.

Thank you for the opportunity to respond. Please call if you have questions. The number is (208) 523-5382.

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e aag
Env ronmental Health Director

CC: .Steve Adams, E1PHD- Custer/Lemhi Counties
Glenullugunin, EIPHD- Custer/Lemhi Counties

ry.idaho.gov

State Historical SOCIETY

CI. "Butch' Otter
Governor of Idaho

Janet Gallimore
Executive Director

Administration
2205 Old Penitentiary Road Boise, Idaho 83712-8250 Office: (208) 334-2882 Fax (208) 334-2774

Membership and Fund Development
2205 Old Penitentiary Road Boise, Idaho 83712-8250 Office: (208) 514-2310 Fax (208) 334-2774

Historical Museum and Education Programs 610 North Julia Davis Drive Boise. Idaho 83702-7695 Office: (208) 334-2120 Fax (208) 334-4059

State Historic Preservation Office and Historic Sites Archeological Survey of Idaho
210 Main Street
Boise, Idaho 83702-7264
Office: (206) 334-3661
Fax (208) 334-2775

Statewide Sites:
- Franklin Historic Site
- Pierce Courthouse
- Rock Creek Station and
- Sticker Homesite

Old Penitentiary
2445 Old Penitentiary Road Boise, Idaho 83712-8254 Office (208) 334-2844 Fax (208) 334-3225

Idaho State Archives 2205 Old Penitentiary Road

North Idaho Office
112 West 4th Street. Suite #7 Moscow, Idaho 83843
Office: (208) 882-1540
- (208) 882-1763

December 7, 2011

Terry Kristof
Progressive Engineering Group, Inc.
1208 Idaho St.
Lewiston, Idaho 83501

RE: City of Challis Water System Improvement Project

Thank you for requesting our views on the proposed improvements to the City of Challis' water system. From the information we received, it appears that improvements with the potential to affect archaeological properties include new distribution lines and two new wells.

Our records show that the project is located in an area where archaeological sites may exist, and few archaeological surveys have been conducted in the past. We are therefore recommending an archaeological survey of all project components requiring new ground disturbance. That is, lines being installed directly into paved or crowned and ditched roads will not need to be surveyed. The survey should be conducted when ground visibility is good, and a report should be sent to our office for review. Depending upon the results, we may recommend avoiding sensitive areas, archaeological testing or monitoring, or proceeding with the project as planned.

A list of archaeological consultants can be found on Preservation Idaho's website (svww.preservationidaho.ora) under Resources.

We appreciate your cooperation. If you have any questions, please feel free to contact me at 208-334-3847, ext. 107.

Sincerely,

Susan Pengilly

Susan Pengilly
Deputy SHPO

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STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

900 North Skyline Drive, Suite B • Idaho Falls, ID 83402 • (208) 528-2650

C. L. "Butch" Otter, Governor
Toni Hardesty, Director

December 6, 2011

Terry Kristof
Progressive Engineering Group
1208 Idaho Street
Lewiston, ID 83501

Dear Mr. Kristof,

The Idaho Department of Environmental Quality (DEQ) has reviewed the information submitted regarding the City of Challis's plan to make improvements to their existing drinking water system with respects to *Air Quality* impacts in the region. DEQ appreciates your efforts to apprise our agency of the planned project activity.

Please be advised that the control of fugitive dust at all phases of the project is required under Idaho law. Additionally, construction debris and other wastes are strictly prohibited from open burning and need to be properly disposed of in a certified landfill. Idaho law also requires that odor be controlled during the improvement process and after final completion of the project. These are aspects that typically present minor to significant problems within the region and are closely monitored and strictly enforced.

If you have further questions concerning this or other matters in our region, please call me at (208) 528-2650.

Respectfully,

Ed Jolly
Air Quality Analyst
Idaho Falls Regional Office

c: Rensay Owen — Idaho Falls Regional Air Quality Manager
Source File

STATE OF IDAHO

C. L "BUTCH" OTTER
GOVERNOR
CELIA R. GOULD
DIRECTOR

December 2, 2011

Terry Kristof
Progressive Engineering Group, Inc
1208 Idaho Street
Lewiston, ID 83501

Dear Mr. Kristof:

Thank you for inquiring with the Idaho State Department of Agriculture (ISDA) with regards to your work with the Challis Water System Improvement Project. The public works project being proposed will be an important project for the citizens of that area.

We have reviewed the planning documents provided to us. Your documents appear to be professional and informative. At this time we do not have comments or questions related to this project.

Thank you for contacting our agency. Feel free to contact us in the future (main number - 208-332-8500, my number - 208-332-8597).

Sincerely,

Gary Bahr

Water Quality Programs

PC: Water Program File

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Eastern Idaho Field Office 4425 Burley Dr., Suite A Chubbuck, Idaho 83202 Telephone (208) 237-6975

http://www.fws.gov/idahoes/

NOV 29 2011

Terry Kristof
Progressive Engineering Group,
Inc. 1208 Idaho Street
Lewiston, Idaho 83501

Subject: Proposed City of Challis Water System Improvement Project in Custer County, Idaho 2012_TA0046

Dear Mr. Kristof:

The Fish and Wildlife Service (Service) is providing you with a list of endangered, threatened, proposed, and/or candidate species, and designated critical habitat which may occur in the area of the proposed water system improvement project in Challis, Custer County, Idaho. You requested this list in a letter dated November 21, 2011 and received in our office November 28, 2011.

Non-Federal Lands and Section 7

Section 7 of Endangered Species Act of 1973, as amended (Act) requires Federal agencies to assure that their actions do not jeopardize any listed species and provides a process for exemption of take for Federal agencies. Although your project is located on non-Federal lands, if there is a Federal action (funding, permitting, or direct action) associated with your project, the Federal agency is required to consult with the Service if the action may affect a listed species. Section 7 regulations also allow for applicants to be involved in the consultation process. For instance, a Federal agency may designate you or another non-Federal entity to represent them in an informal consultation.

The enclosed list fulfills the requirements for a species list under section 7(c) of the Act. If the project decision has not been made within 180 days of this letter, regulations require that you request an updated list. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at: http://www.fws.gov/endangereci/consultations/s7hndbk/s7hndbk.htm. Section 7 consultation information specific to Idaho listed species can also be found on the Snake River Fish and Wildlife Office website at http://www.fws.gov/idaho/agenices.htm.

Voluntary Agreements for Species Conservation on Private Lands

The Act includes provisions for the conservation of listed species on both Federal and non-Federal lands. A private landowner may wish to enter into an agreement with the Service under section 10 of the Act for activities that benefit listed, proposed, and candidate species. Voluntary agreements such as Safe Harbor Agreements or Candidate Conservation Agreements contribute

to the conservation of listed, proposed, or candidate species while allowing for management activities on non-Federal lands. In addition, Section 9 of the Act prohibits the "taking" of any listed species without an exemption (issued by the Service) for that take'. For private landowners, that exemption is developed through the permit process of Section 10 (through a Habitat Conservation Plan) of the Act. More information on the various mechanisms for take exemption available to private landowners under the Act can be found at http://www.fws.gov/idaho/Landowners.htm.

Also, please be aware that the Fish and Wildlife Service appointed David Kampwerth as supervisor of the Eastern Idaho Ecological Services Field Office in Chubbuck, Idaho replacing Damien Miller. In the future, please address all correspondence to Mr. Kampwerth.

If you have any questions about your responsibilities under the Act, or require further information, please contact Ty Matthews of the Eastern Idaho Field Office at (208) 237-6975 x115. Thank you for your continued interest in endangered species conservation.

Sincerely,

/ David Kampwerth,
Field Supervisor

Enclosure

I Take of threatened or endangered animal species is defined as; harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering.

PROGRESSIVE ENGINEERING GROUP,
INC. CUSTER COUNTY, IDAHO
SPECIES LIST 2011

LISTED SPECIES	COMMENTS
Sockeye salmon *(Oncorhynchus nerka)*	LE - NOAA Fisheries jurisdiction
Spring/summer chinook salmon *(Oncorhynchus tshawytsha)*	LT - NOAA Fisheries jurisdiction
Steelhead *(Oncorhynchus mykiss)*	LT - NOAA Fisheries jurisdiction
Bull trout *(Salvelinus confluentus)*	LT

PROPOSED SPECIES/CRITICAL HABITAT	
Steelhead *(Oncorhynchus mykiss)*	CH — NOAA Fisheries jurisdiction

CANDIDATE SPECIES'

LE - Listed Endangered
LT - Listed Threatened
XN - Experimental/Non-essential population
PT - Proposed Threatened
C - Candidate

Candidate species have no protection under the Act, but are included for your early planning consideration. Candidate species could be proposed or listed during the project planning period, and would then be covered under Section 7 of the Act. The Service advises an evaluation of potential effects on candidate species that may occur in the project area.

State of Idaho
DEPARTMENT OF WATER RESOURCES

Southern Region, 1341 Fillmore Street, Suite 200 • Twin Falls, Idaho 83301-3380
Phone; (208) 736-3033 • Fax: (208) 736-3037 • *Web Site:* www.idwr.idaho.gov

C. L. "BUTCH" OTTER
Governor
GARY SPACKMAN
Interim Director

November 28, 2011

Progressive Engineering Group Inc.
Terry Kristof
1208 Idaho Street
Lewiston, ID 83501

RE: City of Challis Water System Improvement Project

Dear Ms. Kristof:

You recently contacted our office regarding the proposed "Water System Improvement Project" for the City of Challis, located in Custer County. Upon review, our office would like to make the following comments for your consideration.

The City of Challis currently has three water rights recorded with Municipal use. Water rights 72-7117 and 72-7167 are ground water rights while 72-47 is surface water from Garden Creek. The groundwater rights show that there are four points of diversion with a combined diversion limit of 3.11 cfs. The diversion from Garden Creek has a diversion limit of 1.58 cfs.

The proposed changes will add two points of diversion which may require a transfer be filed to update current water rights to include the additional points of diversion. If the proposal increases the Cities diversion rate; a new water right will need to be filed with the Department. Any changes made to the current system that impact any of the natural water ways in the area may also require a stream channel alteration permit.

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It should also be noted that the drilling of the new well must comply with the drilling permit requirements of §42-235, IDAHO CODE, and are subject to the Department's well construction standards (IDAPA 37, Title, 03, Chapter 09).

In summary, it appears that there are options available for development of water for the City of Challis. If you have any questions, or if you need any further assistance, feel free to contact our office at your convenience.

Sincerely,

Nathan Erickson
Sr. Water Resource Agent

Don Acheson

From: Brochu, Robert A NWW [Robert.A.Brochu@usace.army.mil]
Sent: Thursday, March 17, 2011 3:45 PM
To: Don Acheson
Subject: Challis Water System Planning Study

Donald:

In response to you January 18, 2011 letter to us I offer some comments.

1. It will be beneficial to map the extent of wetlands and waters (waters of the U.S.) to help you possibly design around and avoid impacts to waters of the U.S. This is normally done by persons experienced in wetland mapping and there are many such private consultants in eastern and southern Idaho.
Section 404 of the Clean Water Act provides that discharges of dredged and fill material into waters of the U.S. requires a permit from the Corps of Engineers.

2. If you cannot avoid waters of the U.S. then you should design to minimize impacts.

3. Impacts and issues to consider: The streams in this reach are likely habitat for fish protected by the Endangered Species Act (ESA) and even temporary impacts to waterways should be avoided if possible. Withdrawals of surface water or subsurface waters that reduce stream flows could impact fish and fish habitat.

4. If a Section 404 permit is required for work in waters or wetlands then we will need to coordinate or consult with either or both the US Fish and Wildlife Service and the National Marine Fisheries Service regarding impacts to ESA listed fish.

Rob Brochu
Regulatory Project Manager
Walla Walla District, U.S. Army Corps of Engineers 900 North Skyline Drive, Suite A Idaho Falls, Idaho 83402
208-522-1645
fax 208-522-2994
robert.a.brochu@usace.army.mil

www.history.idaho.gov

Idaho State Historical Society

C.L. "Butch" Otter
Governor of Idaho

Janet Gallimore
Executive Director

Administration
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2682
Fax: (208) 334-2774

Membership and Fund Development
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 514-2520
Fax: (208) 334-2774

Historical Museum and Education Programs
610 North Julia Davis Drive
Boise, Idaho 83702-7695
Office: (208) 334-2120
Fax: (208) 334-4059

State Historic Preservation Office and Idaho Site Archeological Survey of Idaho
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3861
Fax: (208) 334-2775

Statewide Sites
- Franklin Historic Site
- Pierce Courthouse
- Rock Creek Station and
- Stricker Homestead

Old Penitentiary
2445 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2844
Fax: (208) 334-3225

Idaho State Archives
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2620
Fax: (208) 334-2626

North Idaho Office
112 West 6th Street, Suite #7
Moscow, Idaho 83843
Office: (208) 882-1540
Fax: (208) 882-1563

Historical Society is an
Equal Opportunity Employer.

February 7, 2011

RECEIVED
BY:

Donald G. Acheson
Riedesel Engineering
202 Falls Avenue
Twin Falls, Id 83301

RE: Water System Improvements, City of Challis, Idaho

Dear Mr. Acheson:

Thank you for requesting our views on the water system improvements planned for the City of Challis. We understand the proposed sewer system improvements are still in the preliminary planning stages. Our office will not need to review the portions of the proposed project which do not include ground disturbing activities, such as general maintenance, testing, flushing, etc.

Also, for use in your planning, you can consider that our office typically does not recommend an archaeological survey for projects involving the replacement of water lines, provided the work will occur within the existing line, immediately adjacent to the existing line or within existing roadways. We would also not likely recommend a survey for work to existing facilities or within the boundaries of an existing water facility. However, we would need to review the proposed improvements to make a final determination.

When the project moves forward and specific project locations and activities have been determined, please submit the following information to our office for those areas which will involve placement of new line, construction of new facilities, or any other activities occurring outside of existing lines or facilities. For each of these areas, we will need:

1. Description of project and construction and ground disturbing activities that will occur.
2. Map showing the location of the project area.
3. Photos of the project area.
4. Description of the current condition of the ground (i.e. previous farmland, adjacent to gravel road, etc.).

State of Idaho
DEPARTMENT OF WATER RESOURCES
Southern Region, 1341 Fillmore Street, Suite 200 • Twin Falls, Idaho 83301-3380
Phone: (208) 736-3033 • Fax: (208) 736-3037 • Web Site: www.idwr.idaho.gov

C. L. "BUTCH" OTTER
Governor

GARY SPACKMAN
Interim Director

January 31, 2011

DONALD G ACHESON, P.E.
RIEDESEL ENGINEERING
202 FALLS AVENUE
TWIN FALLS, ID 83301

RECEIVED
BY: LK

RE: City of Challis – Water System Facility Planning Study

Dear Mr. Acheson,

I am in receipt of your letter requesting comments for the general engineering criteria regarding the project for the City of Challis. These comments are from the perspective of a state agency with regulatory responsibility:

I found seven water rights for the City of Challis: 72-47, 72-110B, 72-111B, 72-123, 72-7117, 72-7167, and 72-7412, copies of which I have enclosed. The first four have the source of Garden Creek and the last three have ground water pumped from wells as their source. These rights cover the municipal, storage, aesthetic, irrigation, domestic and fire protection uses of the city. The map you submitted with your request outlining the place of use for the City of Challis does not match the shapes we have on file for their water rights. The City should contact the Department to officially update the place of use shapes for their rights.

Challis falls under the jurisdiction of Water District 170, which is overseen by a water master, and also within the Wild and Scenic Agreement designated area. This area is currently available for new appropriations within the guidelines established by that agreement. New applications received by the Department can be processed as long as a stipulated block of water is available, with comments solicited from the Idaho Department of Fish & Fame (IDFG) and the Idaho Department of Environment Quality (IDEQ). Water rights can also be purchased and transferred to the City through our transfer process. (Reference Idaho Code 42-222).

Garden Creek flows through the city of Challis and supplies some of their water. Before any work is done or equipment operated below the mean high water mark in Garden Creek, or any other perennial stream, applications for State of Idaho Stream Channel Alteration Permits, subject to review, must be filed with and approved by our department. Permits may also be required under section 404 of the "Clean Water Act", administered by the US Army Corps of Engineers, for fill in a wetland or an intermittent stream.

There may be concerns for any required new waste management systems or the potential use of Injection Wells. Injection wells are used as a means to dispose of or store fluids in the subsurface. In Idaho, excess storm water, agricultural runoff water, and facility heating/cooling water are the most common fluids disposed of with injection wells of various designs; including standard case well, drain fields, and infiltration trenches. Injection of waste from septic systems is not authorized.

The Department regulates the construction, operation, and abandonment of injection wells. Injection wells are categorized into two types: 1) deep injection wells greater than 18 feet deep, and 2) shallow wells less than 18 feet deep. Both types of injection wells are regulated under Idaho Code Title 42 Chapter 39 and IDAPA 37.03.03.

It should also be noted that the construction of any new wells, greater than 18 feet deep must also comply with the drilling permit requirements of Idaho Code Title 42 Chapter 235, and are subject to the Department's well construction standards (IDAPA 37.03.09). This would include construction of injection wells or construction of production wells for diversion of potable water used for commercial or irrigation uses.

Feel free to contact me at the office if I can be of further assistance.

Sincerely,

Jeanie Robertson
Sr. Water Resource Agent

2

DEPARTMENT OF THE ARMY
WALLA WALLA DISTRICT, CORPS OF ENGINEERS
IDAHO FALLS REGULATORY OFFICE
900 NORTH SKYLINE DRIVE, SUITE A
IDAHO FALLS, IDAHO 83402-1718

REPLY TO ATTENTION OF

April 5, 2012

Regulatory Division

SUBJECT: NWW-2011-00617-I02

Terry Kristof
Progressive Engineering Group, Inc.
1208 Idaho Street
Lewiston, ID 83501

Mr. Kristof:

This is in response to your 21 November 2011 letter and 23 March 2012 email requesting our comments on your City of Challis proposed water system improvement project. Section 404 of the Clean Water Act (33 U.S.C. 1344) requires a Department of the Army permit be obtained for the discharge of dredged or fill material into waters of the United States. This includes most perennial and intermittent rivers and streams, natural and man-made lakes and ponds, and wetlands, as well as irrigation and drainage canals and ditches that are tributaries to other waters. Activities regulated under Section 404 include excavation and mechanized landclearing activities which result in the discharge of dredged material and destroy or degrade waters of the United States.

Based on the information provided, it appears the proposed project will not involve work in areas subject to our jurisdiction and a Department of the Army permit will not be required. It is our understanding that your proposed project will **NOT** involve crossing Garden Creek or any other waterway or wetland.

A Department of the Army permit **MAY** be required for your proposed project if you decide to cross a waterway If so, you will need to complete and submit a permit application for processing and evaluation. You can access our joint applications for permit online at http://www.nww.usace.army.mil/html/offices/op/rf/joint_app.asp

If you have any questions concerning these regulatory matters, please contact Timm Kennedy at 208-522-1645 or timm.a.kennedy@usace.army.mil

Sincerely,

James M. Joyner

James M. Joyner
Regulatory Project Manager

Printed on Recycled Paper

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APPENDIX D
Public Participation

Affidavit of Publishing-Newspaper Article..... D-2

Public Participation Meeting Sign In Sheet D-3

Consultant Letter Answering Questions D-4

City Council Minutes of Approval Meeting D-8

State Historic Preservation Office Consultation D-11

Shoshone-Bannock & Shoshone-Paiute Tribal Consultation D-29

AFFIDAVIT OF PUBLICATION

State of Idaho, County of Custer, ss:

I, Susan Callahan, representing the Challis Messenger, a weekly newspaper, published at Challis, Idaho, do solemnly swear that the notice hereto attached and made a part hereof, was published in the regular and entire issue of the Challis Messenger for 2 consecutive weeks, commencing with the issue dated 2/27 2014 and ending with the issue dated 3/6 2014.

Susan Callahan

STATE OF IDAHO)
)
COUNTY OF CUSTER)

On this 10th day of Mar. in the year of 2014, before me, a Notary Public, personally appeared Susan Callahan, known or identified to me to be the person whose name subscribed to the within instrument, and being by me first duly sworn, declared that the statements therein are true, and acknowledged to me that he executed the same.

Rina Sue Tappan
Notary Public for Idaho
Residing at Challis, ID
My commission expires: 12-8-14

RINA SUE TAPPAN NOTARY PUBLIC STATE OF IDAHO

CITY OF CHALLIS NOTICE OF PUBLIC COMMENT PERIOD

The City Council of the City of Challis, Custer County, Idaho will be accepting comments from the public regarding "Drinking Water Improvements" and the drinking water alternatives in the facility plan and the analysis in the Environmental Information Document (EID). The EID contains findings and potential environmental impacts associated with the upcoming water improvements project. Hard copies of the FPS and draft EID are available for review at the City of Challis; City Clerk's Office located at 721 E. Main Street Challis, ID 83226

A public meeting is scheduled for March 13, 2014 at 5:00 p.m. to 7:00 p.m. at Challis City Hall. Comments will be accepted at the meeting or in writing at Challis City Hall, 721 E. Main Street, P. O. Box 587, Challis, Idaho, 83226. City Hall is open 8 a.m. to 5 p.m. weekdays, telephone 208-879-2386, fax 208-879-5288, and email cityclerk@custertel.net

The intent of the public meeting is to discuss the different drinking water alternatives identified in the facility plan.

The proposed project alternative based on the findings in the facility plan include improvements for the distribution system include replacement of existing 4-inch waterlines in the "Old Town" system including replacement of approximately 50 fire hydrants, installation of a new waterline to service the Airport and bring the system into compliance with current state requirements. The existing pipe system cannot meet the required fire demand without causing a low pressure event. A low pressure event can introduce hazardous materials into the drinking water system. There are serious health concerns with low pressure events. New water meters and telemetry systems will be installed as a way to monitor current water consumption as well as increased security for the drinking water system.

The facilities are accessible to persons with disabilities. Special accommodations or alternative formats for non-English speaking persons will be available upon request with a minimum of five (5) days notice to the city clerk prior to the meeting.

The public comment period will commence on Thursday February 27, 2014 at 5:00 p.m. and will run for twenty-eight (28) days. The comment period will conclude on March 27, 2014 at 5:00 p.m. Please refer comments to Kellie Wahlstrom at the above address or email comments to cityclerk@custertel.net

Published: February 27 and March 6, 2014

CHALLIS WATER SYSTEM IMPROVEMENTS EID

Public Meeting
March 13, 2014

PLEASE SIGN IN

Name	Address	Phone
Mark Lupher	P.O. Box 336 Challis Id	833-5787
MARTY GERGEN	202 FALLS AVE TF	733-2446
MIKE BARRETT	PO Box 1104 CHALLIS	879-2797
Kellie Walstrom	PO Box 587 Challis, ID	879-4557
Todd Adams / Challis	Messenger	879-4445

MARCH 13

QUESTIONS —

— 4.4 SCHEDULE WAS FOR 2015
DOES THAT MAKE A DIFF FOR
EID

— TABLE 2 RATES WHERE DID
THE NUMBERS COME FROM
→ O&M 23K TABLE A.2

— 3.1 MAY HAVE THIS STUFF. WILL
IT BE TESTED

A-85 3.2.6 UTILITY BILL WILL DOUBLE
WILL ONLY DOUBLE FOR 6-7 MONTHS
OTHER 5-6 WILL BE SAME

5.9 WHY NOT IN WELL DESIGN
STAND BY GENER. THEY WILL

RIEDESEL Engineering

RESPONSE TO PUBLIC MEETING QUESTIONS ON
THE REVISED ENVIRONMENTAL INFORMATION DOCUMENT
FOR CITY OF CHALLIS PROPOSED WATER SYSTEM IMPROVEMENTS

1. What is an "EDU"?

   "EDU" is an abbreviation for "Equivalent Dwelling Unit". The Idaho Administrative Procedures Act – Idaho Rules for Public Drinking Water Systems (IDAPA 58.01.08.003) defines "Equivalent Dwelling Unit" as follows:

   42. Equivalent Dwelling Unit (EDU). *A unit of measure that standardizes all land use types (housing, retail, office, etc.) to the level of demand created by a single-family detached housing unit within a water system. The demand for one (1) equivalent dwelling unit is equivalent to the amount of water provided to the average single-family detached housing unit within a water system. For example, a business designed to use three (3) times as much water as an average single-family detached housing unit would have a demand of three (3) equivalent dwelling units.*

2. Please clarify the Environmental information Document (EID), Section 4.4 Schedule of Construction.

   The Schedule of Construction provided in the EID is a required element of the EID. The schedule is a reasonable timeline based on a number of variables. Actual project timelines are established by the owner/engineer agreement for design and construction of the project.

3. In Appendix A-2, where do the projections for monthly O&M costs come from?

   The rate study and O&M projections were provided by the City's consultant, Rick Miller of the Development Company. Mr. Miller used information provided him by the City of Challis for the projection.

202 Falls Avenue
Twin Falls, ID 83301
208/733-2446
Fax 208/734-2748

850 E. Franklin, Suite 403
Meridian, ID 83642
208/898-9165
Fax 208/734-2748

77 Southway, Suite C
Lewiston, ID 83501
208/743-3818
Fax 208/743-3819

1845 Terminal Drive, Suite 150
Richland, WA 99352
509/946-3559
Fax 509/946-3554

riedesel@riedeseleng.com

www.riedeseleng.com

4. Do "hydrothermally altered rocks" discussed in Section 3.1, page 4, mean that the City's water system is contaminated or could be contaminated?

   The City regularly and routinely monitors for possible contaminants, chemical and microbial, in the drinking water as part of its operational oversight of the drinking water system. Challis' drinking water quality is in compliance with the Idaho Department of Environmental Quality's (IDEQ) administration of the Safe Drinking Water Act (SDWA).
   Water testing for inorganic (IOC), volatile organic (VOC), and synthetic organic (SOC) chemicals is part of the process to determine the acceptability of a new water source for drinking water. Along with chemical testing, the water source is also tested for the presence of microbial pathogens that could affect the health and safety of the public. New sources developed by the City will meet health and safety requirements for a public drinking water system.

5. EID Appendix A, page 85, shows the facility plan section 3.2.6 Utility Use. The section states that additions of new groundwater sources will double electrical consumption. Please clarify.

   New groundwater sources will replace the water provided by the surface water slow sand treatment plant. The treatment plant is located west of the City and adjacent to Garden Creek. The City uses this system from about March through December[1] and the only electrical use associated with it is the booster pump for the disinfection system.

   New groundwater sources will be pumped and the horsepower loads will be new demands. A quick estimate for electrical consumption is "double" the existing usage for West Well 2 and East Well. Actual consumption will depend on many factors including: water use, recovering water loss in the system, climate, user rates, and the actual horsepower of the pumping plants installed.

6. EID Appendix A, page 119 shows the facility plan section 5.9 Pumping Requirements. Why do the new pumping plants require standby generation capability?

   Prudent design of pumping plants supplying a critical need to a community, like safe drinking water and water supply for fire flow, dictates reasonable design to keep the facility operational during disruptions or disasters. The City's existing Wet Well 2 and East Well do not have standby generation on site, nor does the City have

[1] EID Appendix A, Page A-91, Facility Plan Section 3.3.1

portable generation capability to run these wells during a power outage. IDAPA 58.01.08.501.07 specifically addresses requirements for reliability and emergency operation for new or substantially improved water systems.

During a sustained power outage, the City would be solely reliant on the water storage in its 2 reservoirs (400,000 gallons if completely full) to meet average day demand plus fire flow. A 2-hour fire flow demand would consume 45% of the storage (if the tanks are 100% full at the time of the fire) without considering the rest of the potable demand on the tanks. The average day consumption is based on 644 gallons per capita per day. If the population is 910 persons, the usage is over 580,000 gallons. We conclude, aside from prudent design considerations to protect the health and safety of the public, the City cannot meet the requirements of 58.01.08.501.07 without standby electrical generation for its well sources.

PROFESSIONAL ENGINEER
REGISTERED
8102
19 MAR 2014
STATE OF IDAHO
DONALD G. ACHESON

RECORD OF PROCEEDINGS
CITY OF CHALLIS
May 13, 2014

REGULAR MEETING

COUNCIL PRESENT: Mayor Mark Lupher, Councilman Ike Funkhouser, Councilman Chuck Felton, Councilman Jerry Haslam, Councilman Michael Barrett

EMPLOYEES PRESENT: Kellie Wahlstrom, City Clerk/Treasurer, Corey Rice, Superintendent of Public Works

VISITORS: Dolores Ivie, Jack Ivie, Levi Maydole/Animal-Code Enforcement Officer, Grace Barry, Whit Barry, Sharlene Miller, Todd Adams/Challis Messenger, Tom Pettit, Casey Pettit, Ken Dizes, Doug Leaton, Aletia Straub Workman, Chad Workman, Jack O. Hardy, Brett Plummer/Airport Manager, Erin Alford, Tristan Maydole, Betty Horn, Dale Parkinson

Mayor Mark Lupher called the May 13, 2014 regular meeting to order at 7:00 p.m.
Pledge of Allegiance was led by the Mayor.

AMENDMENTS TO AGENDA Councilman Chuck Felton would like to discuss water rates at the end of the meeting.

CONSENT AGENDA

Regular meeting minutes of the Council, April 8, 2014.
Special meeting minutes of the Council, April 8, 2014
Special meeting minutes of the Council, April 23, 2014
Special meeting minutes of the Council, May 7, 2014

MOTION by Ike Funkhouser, **SECONDED** by Chuck Felton approval of the minutes as written.

MOTION PASSED-ALL IN FAVOR

Review and approve expenditures April 9, 2014 through May 13, 2014.

MOTION by Michael Barrett, **SECONDED** by Chuck Felton approval of the expenditures as presented.

MOTION PASSED-ALL IN FAVOR

REPORTS

A. Custer County Law Enforcement Report – Sheriff Lumpkin
Sheriff Lumpkin wasn't present. Custer County Law Enforcement monthly report is on file at City Hall.

B. Maintenance Report - Corey Rice
Corey Rice was present. Maintenance Report is on file at City Hall.

C. Ordinance Enforcement Officer Report - Levi Maydole
Levi Maydole was present. Animal/Ordinance Enforcement monthly report is on file at City Hall.

D. Challis Airport Manager – Brett Plummer
Brett Plummer was present. No report was submitted.
Brett is concerned with having to purchase liability insurance for himself it he is a contract employee with the City. If he has to pay his own insurance, then the City "can take this job".

. E. Challis Fire Marshal Report – Launna Gunderson
Launna Gunderson wasn't present. Fire Marshal monthly report is on file at City Hall.

F. Challis Golf Commission – Hether Lambson
The City was told someone would be in attendance for this evening's meeting, but no one was. Meeting minutes from April 16, 2014 were submitted and are on file at City Hall. However minutes from their April 29, 2014 meeting were not.

G. Library Report – Shanna Pederson
Shanna Pederson was not in attendance and no report was submitted.

PETITIONS, APPLICATIONS, APPEALS & COMMUNICATIONS

A. Street Lights – Dolores Ivie & Ken Dizes

Dolores Ivie read the light proposal she was presenting to the Council. The light committee consists of herself, Betty Horn, Ike Funkhouser and Ken Dizes. They have worked on this proposal for the past year. No decisions or motions were made by the Council.

B. Property on Hwy – Elaine Hardy

Jack Hardy read a proposal for a resolution and agreement between himself and his wife and the City. Although there were disagreements between Mr. Hardy and his wife during the meeting regarding a corner piece of land, he read his proposal to the City Council for review (see attached).

MOTION by Chuck Felton, **SECONDED** by Ike Funkhouser directing the City Clerk to forward the proposal to the City attorney for review. **MOTION PASSED-ALL IN FAVOR**

C. N.C.H.D. Proposed Permanent Override Levy – Sharlene Miller

Sharlene Miller presented information on the North Custer Hospital District's proposed permanent override levy, to be voted on at the May 20, 2014 election (see attached).

D. Zone Permit – Derris Anderson

No action was taken regarding Derris Anderson's Zone Permit for the addition on the back of the Village Restaurant. Levi Maydole told the Council that he measured from the center of Valley and it appears that Derris is in compliance of the set-backs. However, Darr Moon with Moon & Associates submitted, to the Council, a survey that shows that Mr. Anderson encroaches over 7' past his lot lines. This has been an ongoing saga.

E. Zone Permit – John VanAlfen

MOTION by Ike Funkhouse, **SECONDED** by Chuck Felton to approve Zone Permit application for John VanAlfen.

MOTION PASSED

F. Pioneer Plaza Water Leak – Robert & Donna DeGrado

MOTION by Chuck Felton, **SECONDED** by Jerry Haslam giving the DeGrado's until September 2014 to fix their water leak. **MOTION PASSED-ALL IN FAVOR**

G. Laptop Computer Pricing

City Clerk, Kellie Wahlstrom, submitted pricing on a laptop computer for the Council to use during meetings to project meeting documentation on the new Epson projector. Kellie would like to continue doing a little more research and resubmit at a future meeting.

H. Thompson Creek Mine Expansion & Land Exchange Proposals

MOTION by Ike Funkhouser, **SECONDED** by Jerry Haslam to draw up a letter and have all of the Council and Mayor sign the letter, from the City, supporting Thompson Creek Mine. **MOTION PASSED-ALL IN FAVOR**

I. Settlement Offer CV-2013-120 Challis v Consent of the Governed Caucus

The settlement offer to the Consent of the Governed Caucus was submitted, to the Council, for their information.

J. DEQ – Alternative 4 Distribution System Improvements

City Clerk, Kellie Wahlstrom, read the following: "Alternative 4 would consist of upgrading the Old Town piping system from 4" to 6" mains, installing valves, hydrants, PRV's, extending 6" mains, hydrants, pressure reducing stations, fire line extension to the airport, fire loop at the airport, new water meters, update SCADA system, and any road repairs associated with the construction of the mentioned improvements."

MOTION by Michael Barrett, **SECONDED** by Jerry Haslam to moving forward with Alternative #4 as read.

MOTION PASSED-ALL IN FAVOR

K. Water Rates Discussion – Councilman Chuck Felton

Chuck Felton feels the Council needs to start increasing the water rates immediately. He would like to see an increase of $11.70 on top of the current $13.45 base rate. He feels giving a break on the usage rate would be beneficial to the fixed income residents. Councilman Felton would like to change the gallons of usage to start

at 5,000. Councilman Jerry Haslam feels there needs to be more answers brought to the table so that when rates are increased the council has factual data to back it up. The Council agreed that a Special Meeting needs to be called. In the meantime, the Council would like to ask that the following information be gathered by Colleen Engle, Utility Billing Clerk:

How many users have base rates as well as usage.
How many users just pay base rates.
How many users are delinquent.
How many residents have walked away from their homes and utility bills.
How many have empty lots that have never paid their base rates.

The Council would also like Colleen Engle, Utility Billing Clerk, to attend all future council meetings with a report. They would also like that she work on getting bills brought up to current dates versus the bills reflecting a month behind.

The Council directed the City Clerk to gather information on the Council's schedules and hold a special meeting to discuss the findings.

ORDINANCES AND RESOLUTIONS

EXECUTIVE SESSION

OLD BUSINESS

NEW BUSINESS

Meeting adjourned 10:07 p.m.

After the Mayor adjourned the meeting, Doug Leaton, asked to speak with the Council regarding his ordinance violation bill. He feels that it shouldn't have taken the City 19 hours to clean up his property. He also feels that $35.00/hour is too high. Doug Leaton's sister, Afton Leaton, paid the bill several weeks ago. Since Mr. Leaton and his sister are not on speaking terms, he was unaware that his sister had paid the bill. However, the City Clerk spoke to him a couple months ago on the phone and had informed him.

Mayor adjourned the meeting, again, at 10:16 p.m.

_____
Mayor, Mark Lupher

_____
City Clerk, Kellie Wahlstrom

Councilman Haslam asked that the City Clerk let the record show that he remembered to take his hat (belongings) with him as he usually leaves something behind.

Minutes/minutesMAY132014.rtf

www.history.idaho.gov

Idaho State Historical Society

C.L. "Butch" Otter
Governor of Idaho

Janet Gallimore
Executive Director

Administration
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2682
Fax: (208) 334-2774

Membership and Fund Development
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 514-2310
Fax: (208) 334-2774

Historical Museum and Education Programs
610 North Julia Davis Drive
Boise, Idaho 83702-7695
Office: (208) 334-2120
Fax: (208) 334-4059

State Historic Preservation Office and Historic Sites
Archeological Survey of Idaho
210 Main Street
Boise, Idaho 83702-7264
Office: (208) 334-3861
Fax: (208) 334-2775

Statewide Sites:
• Franklin Historic Site
• Pierce Courthouse
• Rock Creek Station and
• Stricker Homesite

Old Penitentiary
2445 Old Penitentiary Road
Boise, Idaho 83712-8254
Office: (208) 334-2844
Fax: (208) 334-3225

Idaho State Archives
2205 Old Penitentiary Road
Boise, Idaho 83712-8250
Office: (208) 334-2620
Fax: (208) 334-2626

North Idaho Office
112 West 4th Street, Suite #7
Moscow, Idaho 83843
Office: (208) 882-1540
Fax: (208) 882-1763

May 2, 2014

Mr. Michael May
Senior Water Quality Analyst
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706

RE: Challis Water System Project (Idaho SHPO REV 2012-97)

Dear Mr. May,

We have received your letter and informational materials regarding the proposed improvements to the Challis Water System. In additional thank you for supplying supplemental materials which helped us further understand the scope of the undertaking. We do not feel a field inventory is warranted to evaluate the effects of this undertaking as any potential new ground disturbance will be located in road rights of ways which have experienced varying levels of disturbance. As we have already expressed to you, we do have a few concerns regarding the potential installation of buried pipelines in previously undisturbed areas and ground disturbing activity near the Challis Brewery Historic District (located along the western side of 300 – 500 blocks of Challis Creek Road).

We recommend that the undertaking will have <u>no adverse effect</u> on historic properties if the following conditions are met:

1) If any cultural materials besides isolated historic artifacts (>50 years) are discovered during the course of excavation construction should cease in the immediate area and our office should be contacted. Cultural material includes any prehistoric artifacts or features; historic features such as middens or building foundations; or any human remains.

2) Ground disturbance near the Challis Brewery Historic District should be confined to underneath Challis Creek Road or in the eastern side of the road. If project design requires excavation on the western side of Challis Creek Road our office should be consulted.

We appreciate your consulting with our office. If you have any questions feel free to contact me at 208-334-3847 x107 or ethan.morton@ishs.idaho.gov.

Sincerely,

Ethan Morton, Idaho State Historic Preservation Office

Historical Society is an Equal Opportunity Employer.

From: Ethan Morton <Ethan.Morton@ishs.idaho.gov>
Sent: Friday, May 02, 2014 10:21
To: Mike May
Subject: RE: SHPO consultation request - Challis drinking water improvements (Idaho SHPO REV 2012-97)
Attachments: 2012-97_Challis Water System Project.pdf; Challis_Brewery_Historic_District_80001303.pdf

Mike,
Our official recommendation is attached (no adverse effect with conditions).
I have also attached the National Register Nomination Form for the brewery to aid in avoiding it. I believe it has lost some integrity since its recording in the 1970s.

Thank You,

Ethan Morton
Idaho State Historic Preservation Office
210 Main Street
Boise, Idaho 83702
208-334-3861 x107
ethan.morton@ishs.idaho.gov

"The head of any federal agency having direct or indirect jurisdiction over a proposed federal or federally assisted undertaking in any state and the head of any federal department or independent agency having authority to license any undertaking shall, prior to the approval of the expenditure of any federal funds on the undertaking or prior to the issuance of any license, as the case may be, take into account the effect of the undertaking on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register." Section 106 of the National Historic Preservation Act of 1966 ammended through 1992 (16 U.S.C. 470f)

"Undertaking means a project, activity, or program funded in whole or in part under the direct or indirect jurisdiction of a Federal agency, including those carried out by or on behalf of a Federal agency; those carried out with Federal financial assistance; and those requiring a Federal permit, license or approval". (36 CFR 800(y))

From: Michael.May@deq.idaho.gov [mailto:Michael.May@deq.idaho.gov]
Sent: Thursday, April 24, 2014 9:37 AM
To: Ethan Morton
Subject: SHPO consultation request - Challis drinking water improvements

Ethan,

This letter is to follow up on our conversation from this morning about the City of Challis Drinking Water Improvements. The attached December 7, 2011 letter from Suzi Pengilly indicated that SHPO would require additional archaeological surveys only for water lines requiring new ground disturbance, not for those "installed directly into paved or crowned and ditched roads." The project scope has changed in the interim, and the proposed SRF-financed project consists of improvements to the distribution system entirely within existing paved roadways, as shown on the attached project map (two 11"x17" sheets):

- Replacement of approximately 13,000 linear feet of water main and installation of 52 new fire hydrants and 2 pressure-reducing valves in existing paved roadways in the "Old Town" section of Challis;
- Installation of approximately 6,000 linear feet of new 8-inch water main , approximately 1,950 linear feet of new 6-inch water main, 32 new fire hydrants and associated fittings within existing paved roadways to extend service to the airport;
- Replacement of 760 water meters and ancillary equipment; and
- Installation of a Supervisory Control and Data Acquisition (SCADA) telemetry system for monitoring and control of the water system.

Please indicate whether you have any concerns about historic properties in light of the current project scope. I will consult with the Shoshone-Bannock and Shoshone-Paiute Tribes after receiving your response. Thank you.

Mike May
Sr. Water Quality Analyst
Idaho Department of Environmental Quality
1410 North Hilton
Boise, Idaho 83706
(208) 373-0406
Michael.May@deq.idaho.gov

Form No. 10-300 REV. (9/77)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

FOR NPS USE ONLY
RECEIVED DEC 11 1979
DATE ENTERED FEB 5 1980

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
Challis Brewery Historic District

AND/OR COMMON
Klug Brewery

LOCATION

STREET & NUMBER
Challis Creek Road
__NOT FOR PUBLICATION

CITY, TOWN
Challis
__ VICINITY OF
CONGRESSIONAL DISTRICT
Second

STATE
Idaho
CODE
016
COUNTY
Custer
CODE
037

CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
X DISTRICT	__PUBLIC	X OCCUPIED	__AGRICULTURE	__MUSEUM
__BUILDING(S)	__PRIVATE	__UNOCCUPIED	__COMMERCIAL	__PARK
__STRUCTURE	X BOTH	__WORK IN PROGRESS	__EDUCATIONAL	X PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	X YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	X BEING CONSIDERED	__YES: UNRESTRICTED	__INDUSTRIAL	__TRANSPORTATION
		__NO	__MILITARY	__OTHER:

OWNER OF PROPERTY

NAME
Multiple; see continuation sheet

STREET & NUMBER

CITY, TOWN
__ VICINITY OF
STATE

LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.
Custer County Courthouse

STREET & NUMBER

CITY, TOWN
Challis
STATE
Idaho

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
Idaho State Historic Sites Inventory

DATE
1972
__FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS
Idaho State Historical Society

CITY, TOWN
Boise
STATE
Idaho

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
__EXCELLENT	__DETERIORATED	__UNALTERED	X ORIGINAL SITE
__GOOD	__RUINS	X ALTERED	__MOVED DATE_____
X FAIR	__UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The 1879 Challis Brewery historic district is made up of a cut-stone and rubble brewery building, two rubble-stone houses held together with mud mortar and mud plaster, a stone-walled outbuilding with wooden roof and facade, and the stone foundation of a fifth structure no longer extant. Brewery Spring is nearby--source of the water used in the original brewery operation. It flows at a good rate into a catch basin.

The one-story brewery building is the largest of the structures, and is in good condition. It is 37' 6" long x 28' wide, constructed of local stone. The east-facing entry wall is made of hand-cut smooth-finished stone, laid in random-coursed ashlar. The other three walls are of uncoursed rubble.

The front door is centered under the gable, and is flanked by double-hung 6 x 6 sash windows, one on each side. The three openings are spanned by stone lintels, each set under a shallow segmental arch in stone which relieves the weight of the wall above. The space between these arches and the lintels is slight, and is filled with mortar. A clearly discernible keystone is visible in the arches above the left-hand window and the door, but the same function on the right hand window is carried out with two stones. The projecting square-cut stone window sills are monolithic. There are two additional windows in north and south walls.

The roof is gabled, running east and west. It is covered with sheet metal but was originally shingled.

Interior wood work is largely intact, and is handsomely proportioned. Wainscoting of pine lumber is divided into panels trimmed with delicate moldings. This has been painted an ivory color which enhances interior lighting from the six windows. Upper walls are papered.

Archaeology may reveal three stone tanks used in brewing, remembered by old time residents but no longer visible.

The two rubble structures to the south, originally dwellings for the brewers and their families, were literally held together with mud. Repeated plastering with mud, whitewashed on the outside, has built up an additional thickness of 4 to 6 inches on the rough stone beneath. This is severely weathered, but is intact enough for accurate restoration. The Don Ferguson rock-adobe "B" is the larger of the two. It has one small off-center six pane window in the east wall and a door on the north wall. The Henry Reynolds rock-adobe "A" has a centered door in the east wall flanked by one six-pane window on the left hand side. A window in the door supplies all additional light. Rubble retaining walls at the back of these two dwellings connect them and control erosion from the hillside to the rear. Several small wooden sheds of recent date complete the complex.

The low pitched roofs on these two dwellings are framed in lodgepole pine logs, running parallel to the ridgepole, and covered with planks. Earth for insulation was placed on top of the planks. Adobe "B" has a tin roof on top of original earth and plants. All of these structures are in fair condition and restorable, if work can be started within the next year or two.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	X ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN
__1700-1799	__ART	__ENGINEERING	__MUSIC	__THEATER
X 1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	__TRANSPORTATION
__1900-	__COMMUNICATIONS	X INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		__INVENTION		

SPECIFIC DATES 1879 BUILDER/ARCHITECT Unknown

STATEMENT OF SIGNIFICANCE

There has been no brewery operating in Idaho for 20 years. Even these most recently used brewery structures have been demolished. The Challis brewery is of especial interest, since it is one of only two known breweries in the state to have survived, and is older by 25 years than the second.

The brewery building itself is a fine example of frontier stone commercial architecture. The craftsmanship on the random ashlar facade is especially noteworthy. The front half of the building is well finished on the inside since it doubled as saloon as well as brew house.

The brewers' dwelling houses adjacent to the main structure are also of great interest, due to their method of construction. The rubble stone walls of these buildings were mortared together by mud and heavily plastered with it inside and out. Although mud was often used for mortar in early Idaho, the mud plastering was rare--due no doubt to a mountain climate which deteriorated it rapidly. It was a geographical eccentricity which made mud plaster more permanent in Challis, Idaho, than elsewhere. In the rain shadow of the Salmon River mountains, Challis gets less snow and milder temperatures than other mountain areas nearby. This, and the fact that the two dwellings have been almost continuously occupied since 1879 accounts for their preservation. Fresh mud has been added, along with an occasional coat of paint to keep the buildings intact and habitable.

Three Germans, Fred Albiez, Ferdinand Klug, and George Fuchs teamed up in 1879 to start a brewery in Challis--a townsite laid out just that year in a region of promising mineral discoveries. By 1886 the establishment of other breweries at Custer and Bayhorse, farther up the Salmon river, made the Challis operation unprofitable. In 1887 the brewery building was used for at least one winter as a school. It has had varied uses since, including residential.

A small historic district, encompassing all of the structures associated with the brewery and the spring which supplied the water, will enable the preservation and restoration of a unique example of early industry. The brewery itself is the property of the North Custer Historical Society. The other structures are in process of being acquired.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Summary of history of Challis brewery, compiled by Roberta H. Green, on file at Idaho Historical Society, Boise, Idaho.
Idaho Statesman, Boise, Idaho, 30 April 1979, p. 6B

UTM NOT VERIFIED

10 GEOGRAPHICAL DATA

ACREAGE NOT VERIFIED

ACREAGE OF NOMINATED PROPERTY approximately 10 acres.

QUADRANGLE NAME Challis QUADRANGLE SCALE 15.

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	11	720125	4931875
B	11	720750	4931750
C	11	720000	4931750
D	11	720750	4931875
E			
F			
G			
H			

VERBAL BOUNDARY DESCRIPTION

The boundary of the Challis Brewery Historic District is described in item 7 and shown as the dotted line on the attached sketch map entitled "Challis Brewery Historic District, Challis, Idaho." The eastern boundary of the district

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE
Arthur A. Hart, Architectural Historian and Idaho State Historical Society Director

ORGANIZATION
Idaho State Historical Society

DATE

STREET & NUMBER
610 North Julia Davis Drive

TELEPHONE
384-2120

CITY OR TOWN
Boise

STATE
Idaho

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE X LOCAL ___

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE Merle Wells

TITLE Idaho State Historian, SHPO

DATE 4 Dec 79

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

Sally G. Oldham DATE 2/5/80
KEEPER OF THE NATIONAL REGISTER

ATTEST: W. Ray Luce DATE 2-4-80
for CHIEF OF REGISTRATION

DEC 11 1979

Item 4. Continuation.

Challis Brewery Historic District
Owners List:

Lloyd Reed
Challis, ID 83226

Don Ferguson
Box 52
Silverton, ID 83867

Leslie Corrigan
543 Hancock
Hayward, CA 94544

M. P. Shull
Route 1, Box 51
Mead, WA 99021

Henry Reynolds
Box 711
Challis, ID 83226

Francis Doffing
P. O. Box 18407
Las Vegas, Nevada 89114

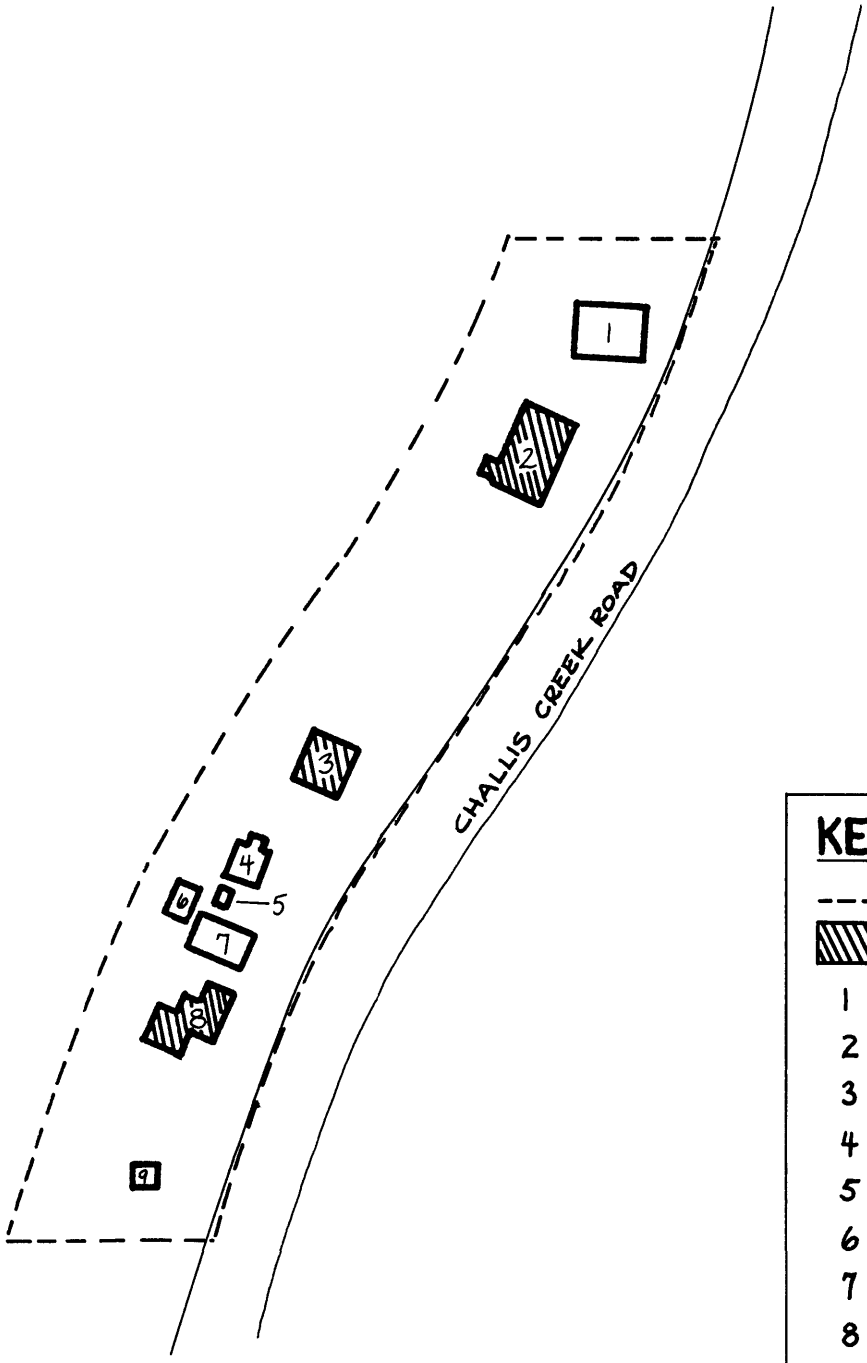
J. Yacomella
Challis, ID 83226

The most southerly site in the district is Brewery Spring itself. The remains of a small springhouse sit over it. Although the roof is lost, the walls of saddle-notched poles remain. The greater height of the northern wall and the pitch of the rafter-poles show that the springhouse was a shed-roofed. Water flows steadily from a wooden pipe, formed from narrow staves bound by an iron strap, which emerges from the eastern base of the structure.

The district is immediately to the west of Challis Creek Road, within the northern corporate limits of Challis. The boundaries recognize the "strip" arrangement of the historically, architecturally, and historic-archaeologically significant sites, and allow a clearance of at least 25' to the north, south and west of the major sites.

Three small houses have been built inside the historic brewery complex in the 20th century (map #'s 2, 3, and 8). The Ferguson and Reed houses are frame bungalows. The Reynolds house is a log cabin of the 1920s, built of lodgepole pine. All must be regarded as intrusive, but could be moved if the property is acquired by the local historical society.

boundary of the district follows the western edge of the road. It commences at a point due east of a point 25' south of the southernmost site (Brewery Spring, map #9). It continues northeasterly to a point due east of a point 25' north of the northernmost site (Challis Brewery, map #1). The western boundary of the district is described by a line which is at every point 100' due west of the eastern boundary. The northern and southern boundaries run laterally, due west from the northern and southern extremities of the eastern boundary to the corresponding extremities of the western.



N

KEY:

- ---- DISTRICT BOUNDARY
- NONCONFORMING INTRUSIONS
- 1 BREWERY
- 2 LLOYD REED RESIDENCE
- 3 HENRY REYNOLDS RESIDENCE
- 4 REYNOLDS' ROCK ADOBE "A"
- 5 STONE FOUNDATION
- 6 STONE OUTBUILDING
- 7 FERGUSON ROCK ADOBE "B"
- 8 DON FERGUSON RESIDENCE
- 9 BREWERY SPRING

CHALLIS BREWERY HISTORIC DISTRICT

CHALLIS, IDAHO
SCALE: 1" = 100' 1979

DEC 11 1979

Challis, Idaho
Brewery

Challis Brewery Historic District
(Site 1, Brewery)
Challis Creek Road, Challis, Custer
County, Idaho

Photograph by North Custer Historical
Society
1979

FEB 5 1980

Negative in private collection

View from southeast

Photograph #~~1~~ 22 of 4

DEC 11 1979

Challis Brewery Historic District
(site 4, Reynold's Adobe)
Challis Creek Road, Challis, Custer
County, Idaho

Photograph by North Custer Historical
Society , 1979

FEB 5 1980

Negative in private collection

View from southeast

DEC 11 1979

Photograph #2 of 4

Challis Brewery Historic District
(site 7, Ferguson Adobe)
Challis Creek Road, Challis, Custer County, Idaho

Photograph by North Custer Historical Society

Negative in private collection

FEB 5 1980

View from east

DEC 11 1979

Photograph #3 of 4

Challis Brewery Historic District
(site #9, springhouse)
Challis Creek Road, Challis, Custer County, Idaho

Photograph by Patricia Wright
September 1979

FEB 5 1980

Negative on file at Idaho State Historical Society, Boise, Idaho

View from southeast

DEC 11 1979

Photograph #4 of 28 4

The SHOSHONE-BANNOCK TRIBES

PHONE: (208) 236-1086
FAX: (208) 478-3707
EMAIL: csmith@sbtribes.com
lbill@sbtribes.com
romartinez@sbtribes.com

CULTURAL RESOURCES
HERITAGE TRIBAL OFFICE (HETO)
P.O. BOX 306
FORT HALL, IDAHO 83203

May 22, 2014

Michael May
Sr. Water Quality Analyst
STATE OF IDAHO/DEQ
1410 North Hilton
Boise, ID 83706
Michael.May@deq.idaho.gov

RE: Proposed City of Challis Drinking Water Improvements Project

Dear Mr. May:

The Shoshone-Bannock Tribes (Tribes) Heritage Tribal Office (HeTO) appreciates the opportunity to comment on the proposed City of Challis Drinking Water Improvements Project.

The above named proposed project located in the City of Challis, Custer County, Idaho is within inherent ancestral lands of the Shoshone and Bannock people, and continues to hold important cultural properties, traditional hunting, fishing and gathering activities still practiced today by members of the Shoshone-Bannock Tribes.

According to the information provided, the proposed project will consist of improvements to the distribution system. This would include the installation of the following: new water mains, new fire hydrants, pressure reducing valves, Supervisory Control and Data Acquisition and the replacement of water meters and ancillary equipment. The Tribes' HeTO concurs with the recommendation of Ethan Morton of Idaho SHPO that the undertaking will have no adverse effect on historic properties if conditions one and two in his letter dated May 2, 2014 are met.

However, a letter dated December 7, 2011, from Susan Pengilly (Deputy SHPO), states "**Our records show that the project is located in an area where archaeological sites may exist, and few archaeological surveys have been conducted in the past**. This statement only strengthens the need for careful considerations to be applied during the ground disturbing construction period in the project direct APE. The construction of the proposed project will consist of ground disturbing activities; the Tribes' HeTO appreciates the following inadvertent clause incorporated into the Stop Work Order Plan.

In the event of an inadvertent discovery (cultural resources and/or human remains) the Tribes' HeTO requests a Stop Work Order of construction activities and immediate notification to the Tribes' HeTO. Construction shall cease until proper treatment of cultural resources and/or human remains is achieved. Please note the correct contact information.

The purpose of this letter is to provide technical input and not intended as formal government-to-government consultation. Should there be any questions or concerns please feel free to contact me at phone: **(208) 236-1084**/ e-mail: romartinez@sbtribes.com; or Carolyn Smith (Cultural Resource Coordinator) at: **(208) 236-1086**/ email: csmith@sbtribes.com

Sincerely,

Romelia Martinez

Romelia Martinez
Cultural Resource Technician II
Shoshone-Bannock Tribes

CC: FILE- Proposed City of Challis Drinking Water Improvements Project/DEQ-ID

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton • Boise, ID 83706 • (208) 373-0502
www.deq.idaho.gov

C. L. "Butch" Otter, Governor
Curt Fransen, Director

May 8, 2014

Certified Mail No.: 7012 3050 0001 2126 3186

Carolyn Boyer Smith
Cultural Resources Program
Shoshone-Bannock Tribe
P.O. Box 306
Fort Hall, Idaho 83203

Re: Request for Tribal Consultation on Cultural Issues for the City of Challis Drinking Water Improvements

Dear Ms. Smith:

The City of Challis has prepared a facility planning document to identify and make necessary improvements to its drinking water system that are necessary and environmentally sound. It is anticipated that construction of these improvements will be financed by a federally funded State Revolving Fund loan, requiring compliance with the Idaho Department of Environmental Quality's State Environmental Review Process (SERP), which mirrors the National Environmental Policy Act. The purpose of this letter is to request your review and response regarding any cultural impact concerns that the Tribe may identify for this proposed project.

The proposed SRF-financed project consists of improvements to the distribution system. Most of the work will be done entirely within existing paved roadways, but some of the new water mains north of Garden Creek will be constructed within unpaved roadways. The project details are shown on the attached project map (two 11"x17" sheets):

- Replacement of approximately 13,000 linear feet of water main and installation of 52 new fire hydrants and 2 pressure-reducing valves in existing paved roadways in the "Old Town" section of Challis;
- Installation of approximately 6,000 linear feet of new 8-inch water main , approximately 1,950 linear feet of new 6-inch water main, 32 new fire hydrants and associated fittings within existing paved roadways to extend service to the airport;
- Replacement of 760 water meters and ancilliary equipment; and
- Installation of a Supervisory Co
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As a component of the SERP-required cu
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(USBR) and funded by Bonneville Power

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- Construction of a new headwork
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the maps. The existing diversion dam for

SENDER: COMPLETE THIS SECTION

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Carolyn Boyer Smith
Cultural Resources Program
Shoshone-Bannock Tribe
P.O. Box 306
Fort Hall, Idaho 83203

COMPLETE THIS SECTION ON DELIVERY

A. Signature
x Chandler
☐ Agent
☐ Addressee

B. Received by (Printed Name) Linda Chandler
C. Date of Delivery 5/12/14

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (Extra Fee) ☐ Yes

2. Article Number
(Transfer from service label) 7012 3050 0001 2126 3186

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

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C. L. "Butch" Otter, Governor
Curt Fransen, Director

May 8, 2014

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Shoshone-Bannock Tribe
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Dear Ms. Smith:

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The proposed SRF-financed project consists of improvements to the distribution system. Most of the work will be done entirely within existing paved roadways, but some of the new water mains north of Garden Creek will be constructed within unpaved roadways. The project details are shown on the attached project map (two 11"x17" sheets):

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- Replacement of 760 water meters and ancilliary equipment; and
- Installation of a Supervisory Control and Data Acquisition (SCADA) telemetry system for monitoring and control of the water system.

As a component of the SERP-required cumulative effects analysis, we draw your attention to the related water project being constructed by the Custer Soil and Water Conservation District (CSWCD), designed by the U.S. Bureau of Reclamation (USBR) and funded by Bonneville Power. This project consists of:

- Installation of two drinking water wells for the City of Challis;
- Removal of the city's existing diversion dam and intake on Garden Creek near its slow sand filter (SSF) water treatment system;
- Removal of the diversion structure approximately 100 feet upstream that currently supplies an irrigation ditch that runs immediately west of the SSF; and
- Construction of a new headworks about 350 feet upstream of the city's diversion dam that would supply water to both the irrigation ditch and the SSF while simultaneously allowing fish passage upstream.

The CSWCD project's features are not shown explicitly on the SRF project maps, but the SSF and clear well are identified on the maps. The existing diversion dam for the SSF is located immediately north of the SSF, and the irrigation canal can be

seen immediately adjacent to the west of the SSF. The CSWCD project is currently in the design phase, and consultation will be conducted separately. More information can be obtained from Karma Bragg of CSWCD at (208) 879-4428. Ms Bragg provided some of the archaeological surveys described below.

Previous consultation requests and cultural resource investigations known to us that may have a bearing on the SRF project include consultation requests with the State Historical Preservation Officer (SHPO) and archaeological surveys related to the CSWCD project and airport expansion. Copies of these are enclosed for your reference. SHPO has indicated that the project would have no adverse effects on historic properties if ground disturbance near the Challis Brewery Historic District is confined to underneath or on the east side of (unpaved) Challis Creek Road, and if excavation is stopped and they are consulted in the event of inadvertent discovery. We plan to use as a project condition our standard inadvertent discovery language, which reads:

> Cultural Resources: If archeological artifacts (such as beads, arrow heads, pottery, fabric, grave goods, glass, metal fragments or other human made objects that appear to predate 1960) or human remains (such as bones, bone fragments or teeth) are inadvertently discovered during construction, ground disturbing activities shall cease and the State Historical Preservation Officer (SHPO), the Shoshone-Bannock Tribe and the Shoshone-Paiute Tribe shall be notified. They can be reached by telephone at (208) 334-3847, (208) 478-3707 and (208) 759-3100, respectively. Mitigation measures will be implemented as directed by SHPO and the Tribes, and work will not resume at the discovery site without their consent.

Please respond within 30 days, if possible, with any concerns or mitigation measures you have on the potential cultural impacts from this project. Please contact me at Michael.May@deq.idaho.gov or (208) 737-0406 if you have any questions. Thank you.

Sincerely,

Michael May
Sr. Water Quality Analyst

MLM/djs

Enclosed:

- Project Map for SRF project (two 11"x17" sheets)
- SHPO letter indicating no historical properties would be affected by airport improvements, October 30, 2007
- SHPO letter regarding archaeological survey requirements for water mains, December 7, 2011
- USBR consultation request for Garden Creek diversion, February 22, 2013
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- SHPO determination of no adverse effects, with conditions near Challis Brewery Historic District and with inadvertent discovery protocol, May 2, 2014
- Challis Brewery Historic District – National Register of Historic Places nomination form, approved Feb. 5, 1980

c: Sandy Williams, North Wind Resource Consulting (swilliams@northwindgrp.com)
Karma Bragg, Custer Soil and Water Conservation District (cswcd@custertel.net)

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 North Hilton • Boise, ID 83706 • (208) 373-0502
www.deq.idaho.gov

C. L. "Butch" Otter, Governor
Curt Fransen, Director

May 8, 2014

Certified Mail No.: 7012 3050 0001 2126 3193

Ted Howard, Director
Cultural Resources Program
Shoshone-Paiute Tribe
P.O. Box 219
Owyhee, Nevada 89832

Re: Request for Tribal Consultation on Cultural Issues for the City of Challis Drinking Water Improvements

Dear Mr. Howard:

The City of Challis has prepared a facility planning document to identify and make necessary improvements to its drinking water system that are necessary and environmentally sound. It is anticipated that construction of these improvements will be financed by a federally funded State Revolving Fund loan, requiring compliance with the Idaho Department of Environmental Quality's State Environmental Review Process (SERP), which mirrors the National Environmental Policy Act. The purpose of this letter is to request your review and response regarding any cultural impact concerns that the Tribe may identify for this proposed project.

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the maps. The existing diversion dam for

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- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Ted Howard, Director
Cultural Resources Program
Shoshone-Paiute Tribe
P.O. Box 219
Owyhee, Nevada 89832

COMPLETE THIS SECTION ON DELIVERY

A. Signature
X
☐ Agent
☐ Addressee

B. Received by (*Printed Name*) C. Date of Delivery

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☑ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? (*Extra Fee*) ☐ Yes

2. Article Number (*Transfer from service label*) 7012 3050 0001 2126 3193

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Michael May
Sr. Water Quality Analyst

MLM/djs

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c: Sandy Williams, North Wind Resource Consulting (swilliams@northwindgrp.com)
Karma Bragg, Custer Soil and Water Conservation District (cswcd@custertel.net)

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APPENDIX E
Engineering

City of Challis Plan – Layout E-1

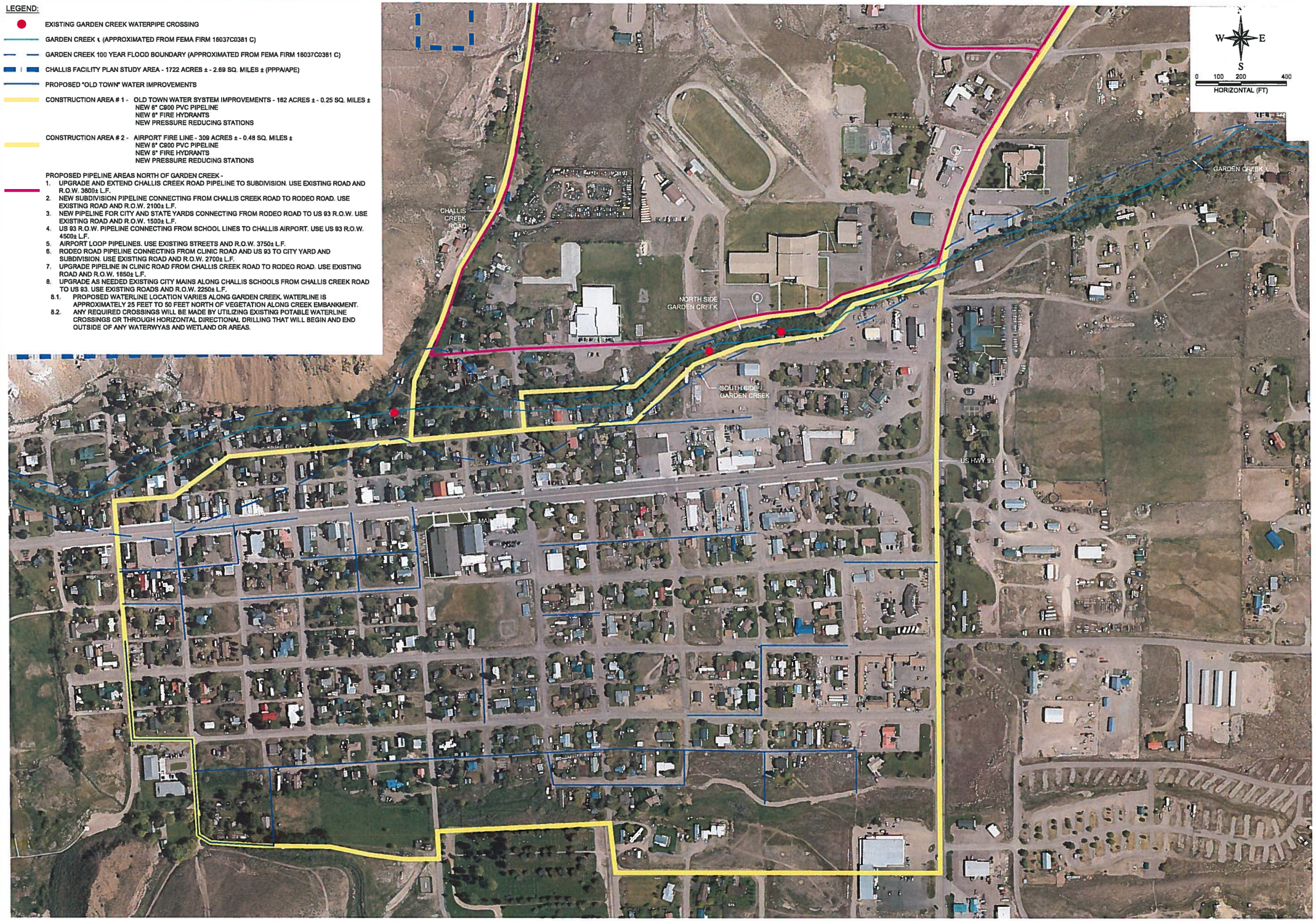
City of Challis Map E-2

LEGEND:

- EXISTING GARDEN CREEK WATERPIPE CROSSING
- GARDEN CREEK ℄ (APPROXIMATED FROM FEMA FIRM 16037C0381 C)
- GARDEN CREEK 100 YEAR FLOOD BOUNDARY (APPROXIMATED FROM FEMA FIRM 16037C0381 C)
- CHALLIS FACILITY PLAN STUDY AREA - 1722 ACRES ± - 2.69 SQ. MILES ± (PPPA/APE)
- PROPOSED "OLD TOWN" WATER IMPROVEMENTS
- CONSTRUCTION AREA # 1 - OLD TOWN WATER SYSTEM IMPROVEMENTS - 162 ACRES ± - 0.25 SQ. MILES ±
  NEW 6" C900 PVC PIPELINE
  NEW 6" FIRE HYDRANTS
  NEW PRESSURE REDUCING STATIONS
- CONSTRUCTION AREA # 2 - AIRPORT FIRE LINE - 309 ACRES ± - 0.48 SQ. MILES ±
  NEW 6" C900 PVC PIPELINE
  NEW 6" FIRE HYDRANTS
  NEW PRESSURE REDUCING STATIONS

PROPOSED PIPELINE AREAS NORTH OF GARDEN CREEK -

1. UPGRADE AND EXTEND CHALLIS CREEK ROAD PIPELINE TO SUBDIVISION. USE EXISTING ROAD AND R.O.W. 3600± L.F.
2. NEW SUBDIVISION PIPELINE CONNECTING FROM CHALLIS CREEK ROAD TO RODEO ROAD. USE EXISTING ROAD AND R.O.W. 2100± L.F.
3. NEW PIPELINE FOR CITY AND STATE YARDS CONNECTING FROM RODEO ROAD TO US 93 R.O.W. USE EXISTING ROAD AND R.O.W. 1500± L.F.
4. US 93 R.O.W. PIPELINE CONNECTING FROM SCHOOL LINES TO CHALLIS AIRPORT. USE US 93 R.O.W. 4500± L.F.
5. AIRPORT LOOP PIPELINES. USE EXISTING STREETS AND R.O.W. 3750± L.F.
6. RODEO ROAD PIPELINE CONNECTING FROM CLINIC ROAD AND US 93 TO CITY YARD AND SUBDIVISION. USE EXISTING ROAD AND R.O.W. 2700± L.F.
7. UPGRADE PIPELINE IN CLINIC ROAD FROM CHALLIS CREEK ROAD TO RODEO ROAD. USE EXISTING ROAD AND R.O.W. 1850± L.F.
8. UPGRADE AS NEEDED EXISTING CITY MAINS ALONG CHALLIS SCHOOLS FROM CHALLIS CREEK ROAD TO US 93. USE EXISTING ROADS AND R.O.W. 2250± L.F.
   - 8.1. PROPOSED WATERLINE LOCATION VARIES ALONG GARDEN CREEK. WATERLINE IS APPROXIMATELY 25 FEET TO 50 FEET NORTH OF VEGETATION ALONG CREEK EMBANKMENT.
   - 8.2. ANY REQUIRED CROSSINGS WILL BE MADE BY UTILIZING EXISTING POTABLE WATERLINE CROSSINGS OR THROUGH HORIZONTAL DIRECTIONAL DRILLING THAT WILL BEGIN AND END OUTSIDE OF ANY WATERWYAS AND WETLAND OR AREAS.



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REVISIONS

NO	DATE	BY	DESCRIPTION
1			
2			
3			
4			
5			
6			

CITY OF CHALLIS
2011 SYSTEM FACILTY PLAN 2014
GARDEN CREEK LAYOUT

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED	CLB
DESIGN CHECKED	DGA
DETAILED	CLB
DRAWING CHECKED	DGA
FILE NAME	1970-GARDEN CREEK LAYOUT.dwg
DRAWING DATE	5/23/14
DRAWING SCALE	AS SHOWN
SHEET 1 OF 1	

PLOT DATE: 5/23/2014
Z:\1970-CITY OF CHALLIS GENERAL SERVICES\1970\CADD\DRAWINGS\EID\1970-GARDEN CREEK LAYOUT.DWG

LEGEND:

- EXISITING GARDEN CREEK WATERPIPE CROSSING
- FUTURE PRESSURE REDUCING STATION
- CHALLIS FACILITY PLAN STUDY AREA - 1722 ACRES ± - 2.69 SQ. MILES ± (PPPA/APE)
- CONSTRUCTION AREA # 1 - OLD TOWN WATER SYSTEM IMPROVEMENTS - 162 ACRES ± - 0.25 SQ. MILES ±
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  NEW 6" FIRE HYDRANTS
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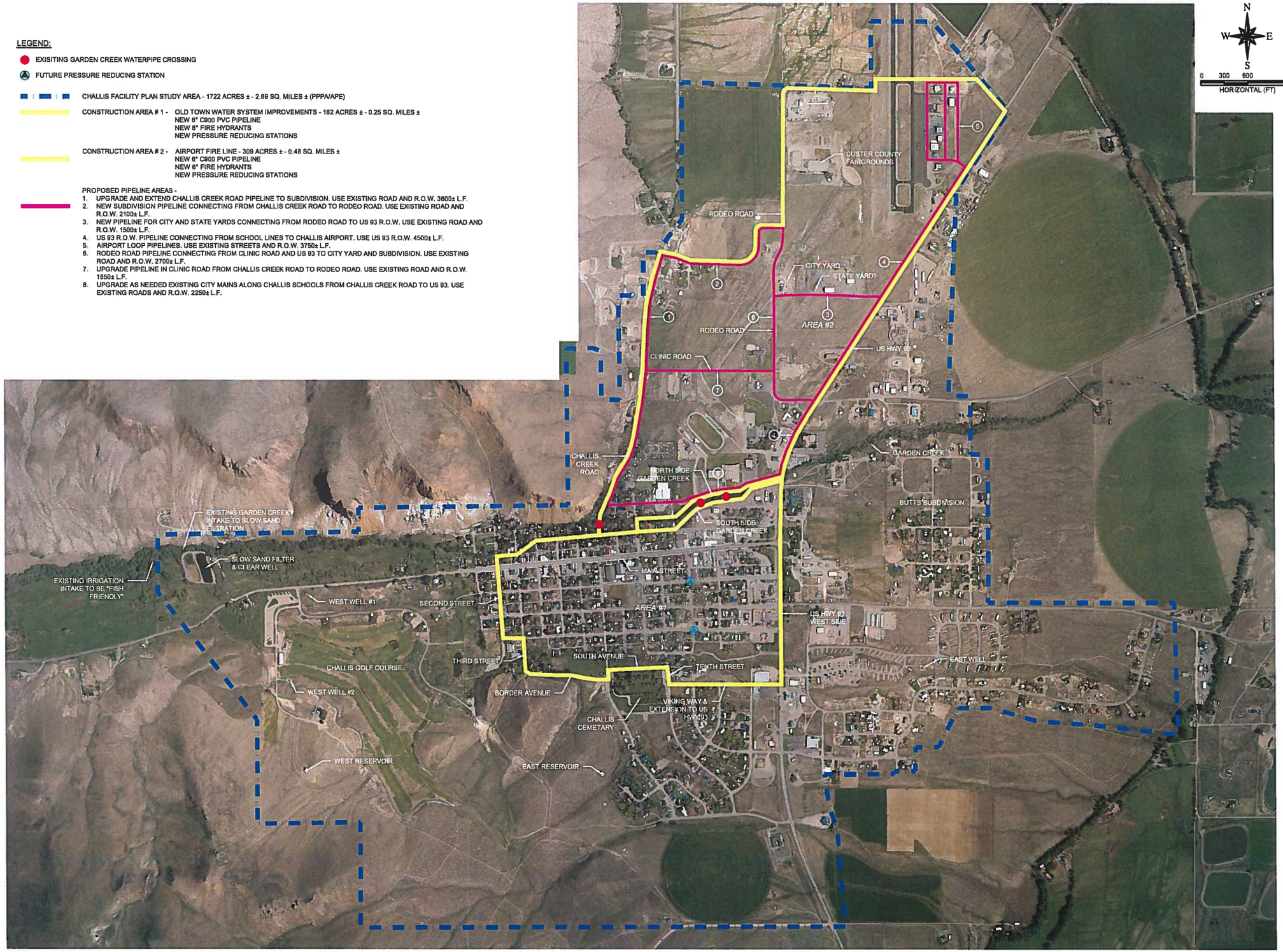
5. AIRPORT LOOP PIPELINES. USE EXISTING STREETS AND R.O.W. 3750± L.F.
6. RODEO ROAD PIPELINE CONNECTING FROM CLINIC ROAD AND US 93 TO CITY YARD AND SUBDIVISION. USE EXISTING ROAD AND R.O.W. 2700± L.F.
7. UPGRADE PIPELINE IN CLINIC ROAD FROM CHALLIS CREEK ROAD TO RODEO ROAD. USE EXISTING ROAD AND R.O.W. 1650± L.F.
8. UPGRADE AS NEEDED EXISTING CITY MAINS ALONG CHALLIS SCHOOLS FROM CHALLIS CREEK ROAD TO US 93. USE EXISTING ROADS AND R.O.W. 2250± L.F.



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REVISIONS

NO	DATE	BY	DESCRIPTION

CITY OF CHALLIS
2011 SYSTEM FACILTY PLAN
2014

PROJECT MAP

PRELIMINARY NOT FOR CONSTRUCTION

DESIGNED	VAS
DESIGN CHECKED	DGA
DETAILED	VAS
DRAWING CHECKED	DGA
FILE NAME	1668-CITY OF CHALLIS PLAN.dwg
DRAWING DATE	5/23/14
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