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August 27, 2008

Oregon Water Resources Department
Attention: Bob Rice
725 Summer Street, NE, Suite A
Salem, OR 97301

RE: City of Bend Water Conservation Grant Application

Dear Mr. Rice:

The City of Bend Water Division is currently undertaking an alternatives analysis study to comprehensively examine Bend's existing and future water sources and supply needs. The study will enable the City to configure the water system infrastructure and water rights to meet growing demand, determine financial impacts and funding sources for preferred alternatives, and identify opportunities to maximize conservation and prudent utilization of limited water resources. This project is identified in our 2008-2009 budget as project #WA0902, **Watershed Sourcewater Improvements.**

As Finance Director for the City of Bend, I certify the funding for this project in the current City of Bend budget for this fiscal year exceeds the match request within the grant application of $328,000.

Sincerely,

Sonia Andrews

GC0004 09

OREGON WATER RESOURCE DEPARTMENT
WATER CONSERVATON, REUSE AND STORAGE GRANT PROGRAM

RECEIVED
AUG 29 2008
WATER RESOURCES DEPT
SALEM, OREGON

Project Name: *City of Bend Long-Term Water Supply Alternatives Analysis Conservation Project*

Type of Grant Requested: ☒ Water Conservation ☐ Reuse ☐ Above Ground Storage
☐ Storage Other Than Above-Ground [Including Aquifer Storage and Recovery (ASR)]

Program Funding Dollars Requested: $ 403,000 Total cost of planning study: $ $806,000
Note: Request may not exceed $500,000

Applicant Name: ***City of Bend***	**Co- Applicant Name:**
Organization: *City of Bend*	Organization:
Address *Water Utility Division, City of Bend, 62975 Boyd Acres Road, Bend, Oregon, 97701*	Address:
Phone *541-317-3003*	Phone:
Fax: *541-317-3046*	Fax:
Email: *amoilanen@ci.bend.or.us*	Email:

Fiscal Officer Name: ***Sonia Andrews***	**Principle Contact:** ***Heidi Lansdowne, PE***
Organization: *City of Bend*	Organization: *City of Bend*
Address: *City of Bend Finance Department, 710 NW Wall, Bend Oregon, 97701*	Address: *City of Bend Water Utility Division, 62975 Boyd Acres Road, Bend, Oregon 97701*
Phone: *541-312-4902*	Phone: *541-388-5538*
Fax: *541-385-6675*	Fax: *541-317-3046*
Email: *sandrews@ci.bend.or.us*	Email: *hlansdowne@ci.bend.or.us*

Certification:

I certify that this application is a true and accurate representation of the proposed work for a project planning study and that I am authorized to sign as the Applicant or Co-Applicant. By the following signature, the Applicant certifies that they are aware of the requirements of an Oregon Water Resources Department grant and are prepared to implement the project if awarded.

Applicant Signature: _____ Date: 8/27/08

Print Name: *Tom Hickmann, PE* Title: *City of Bend Water Utility Manager*

Please give a brief summary of the planning study using no more than 150 words.

This grant would help fund a long-term water supply Alternatives Analysis that will have substantial public benefits, including maximization of water supply, durability, efficiency, and conservation to help prevent depletion of the area's water resources. Key alternatives to be considered include converting Bend's surface water supply to ground water, moving Bend's point of diversion downstream, and others that may leave more water instream to benefit fish and related resources. The study will estimate costs of surface water system upgrades and develop a comparative economic analysis of other water supply alternatives. The evaluation of alternatives will consider efficiency and conservation, resource benefits, hydroelectric power, water rights, water quality and treatment, outside funding, long-term costs and factors such as disruptions to the public and ease of implementation. A preferred alternative will be identified to meet the City's long-term water supply needs while maximizing efficiency and conservation.

Section A. Common Criteria

Instructions: Answer all questions in this section by typing the answer below the question. It is anticipated that completed applications will result in additional pages.

1. Describe how the planning study will be performed. Include:
   a. A description of the planning schedule/timeline, which includes identifying all key tasks. (Section VI provides an opportunity for a "graphical" representation of the schedule.)

      The goal would be to start this planning study between October 1, 2008 and January 1, 2009. The study will be completed by December 31, 2009. Tasks 1 and 2 which relate to the overall management of the project would last through the length of the study. Task 3, Early Action Items, would begin immediately and is expected to be completed within 4 months. Task 4, the Financial Plan, would start on or before February 1, 2009 with the initial findings completed within three months. This plan would be updated during the final evaluation phase of the project, Task 10. Public Involvement, Task 5, would also run throughout the length of the study. Tasks 6, 7, 8, and 9, which are the technical evaluations of the different alternatives of the study will start on or before February 1, 2009 and are expected to be completed within six months. The final alternatives evaluation and selection task would begin on August 1, 2009 and is expect to take two months to complete. Task 11, the Final Report, will be drafted by October 31, 2009 with final approval of the Study completed by December 31, 2009.

   b. When the planning study could begin.

      The planning study is scheduled to begin between October 1, 2008 and January 1, 2009. The actual start date will depend on completion of the final Scope of Work and signing of the contract with consultants. These issues will be influenced by financial considerations such as this grant application.

2. Provide a description of the relevant professional qualifications and/or experience of the person(s) that will play key roles in performing the planning study. If the personnel have not been decided upon, include a description of the professional qualifications and/or experience of the person(s) you anticipate will play key roles in performing the planning study.

   City of Bend Staff:

Tom Hickmann, PE: Manager for the City of Bend Water Utility for the past 4 years with over 12 years of water resource engineering design and project management experience. Tom's experience includes work in the public and private sectors, providing consulting, modeling, design and construction management for public domestic water systems, private irrigation systems, and pipeline design and construction. Tom has extensive experience in analyzing water use, water modeling, water rights, water supply and conservation needs and capacities of hydraulic structures in basins for public agencies and water districts. PE in Oregon and California.

Heidi Lansdowne, PE, CWRE: For the past 7 years Heidi has worked for the City of Bend as an inspector, engineer and project manager on engineering studies and design projects for the Transportation Division, Wastewater Division and Water Division. Heidi has over 25 years engineering project management and construction management experience on multi-million dollar public infrastructure projects including master plan studies, design projects and construction projects

for dams, bridges, water systems, transportation projects, and structures including parking structures and office buildings. OSU graduate specializing in water, wastewater and environmental studies. PE and Certified Water Right Examiner in Oregon; PE in Washington and California.

Patrick Griffiths: Water Resources Coordinator for the past 8 years for the City of Bend. Responsibilities include water supply planning, coordination and implementation of the water conservation programs, water management and conservation planning, water rights, groundwater mitigation and groundwater banking programs within the Deschutes Basin. As the first person hired by the City of Bend to specialize in water conservation and integrated water supply planning, Patrick is dedicated to furthering water conservation and sound water management policies for the City of Bend and the Deschutes Basin. Bachelor's Degree in Graphic Communications, Master of Science in Environmental Policy. Currently serves on advisory board of the Institute for Water and Watersheds at OSU, Bend representative to the AWWA Water Utility Council, on the Deschutes county Mitigation and Enhancement Committee, former board member of the Upper Deschutes Watershed Council, former Oregon Soil and Water Conservation statewide "Conservation Teacher of the Year."

Brown and Caldwell - Project Management, Infrastructure and Hydropower

Bob Willis: Bob is currently serving as the Potable Water Leader for Brown and Caldwell in the Northwest. He serves as the Project Delivery Officer and technical expert or project manager for major management studies, ground water, water treatment, pipeline and pump station projects for water utilities. Bob has served the drinking water profession for 36 years, 28 of which have been in various engineering and management positions with the Water Bureau in Portland, Oregon. His responsibilities involved nearly all aspects of a water utility, including service as Chief Engineer and several years as the supervisor of their capital planning group, design and construction group, and water quality programs.

Edward Olson: Ed has 33 years of experience in the design, operation and maintenance of municipal water systems. As engineer and manager for two large utilities, he has competed numerous facility plans, operational studies and water rates studies. His duties as manager also mandated that he effectively interact with many different public and private organizations and the general public. He also has extensive experience in the design, construction and management of numerous transmission and distribution mains, reservoirs, pump stations, water treatment plants and controls system upgrades and other water related projects.

Jim Doane: Jim has 35 years of engineering experience, the last 28 of which have been focused on drinking water and hydroelectric facilities, while holding various engineering and management positions with the City of Portland, Oregon, Water Bureau. During this time, his primary responsibilities included supervising the planning, design, construction, and operation of the utility. Most recently he supervised the residential and industrial, commercial, and institutional conservation programs, the sustainability program, and the section responsible for hydroelectric power operations. He has been an active member of the American Water Works Association (AWWA) for 27 years.

David Evans and Associates - Water Resources, Groundwater and Public Information

David Prull: Mr. Prull is a professional civil engineer in DEA's Bend office. He has 20 years experience in water resources management, environmental engineering, and construction management. As a project manager, Mr. Prull coordinates engineering services and provides engineering design for a range of water resources projects. Mr. Prull's extensive experience in construction management, including administration and inspection, is an asset during the planning and design of a project as well as a valuable client resource during project construction.

Karen Swirsky: Ms. Swirsky has more than 25 years of experience in land use planning and public involvement. Ms. Swirsky's expertise includes complex code compliance and entitlement projects, ranging from large planned communities and destination resorts to small farm partitions. She regularly works with land use attorneys to resolve difficult land use issues. She has conducted over a hundred public meetings ranging from informal walking tours to formal hearings and conference presentations.

Back and Veach - Water Treatment and Hydropower

Alan Peck: Alan is a senior civil engineer responsible for water systems engineering. His background and experience has been devoted exclusively to water system improvements since 1983. He has developed a broad background in planning and design for water treatment plants, surface and groundwater source development, pumping and storage, conveyance, and distribution networks.

John Blasomgame: Mr. Blasongame's background includes over 20 years of experience in mechanical engineering analysis and design. For 11 years he was the Metropolitan Water District of Southern California (MWD) Lead Mechanical Engineer for the $2 B Diamond Valley Lake Reservoir Project. Included were the pumphouse, forebay, inlet-outlet tower, pressure control facilities, canal and secondary inlet. His experience includes design of many small and large hydroelectric plants, flow control valves, sluice gates and radial gates. Mr. Blasongame also has specialized experience with performance and acceptance testing of hydroelectric turbines, having conducted over 60 unit tests at MWD.

GSI Water Solutions - Water Rights

Adam Sussman: Adam has more than 16 years of experience with water rights and water laws, including the development and implementation of statewide policies and programs. He has an extensive background in water rights issues, including in-depth knowledge of state statutes, administrative rules, and water resources policy. He has experience working with water suppliers, consultants, attorneys, stakeholder groups, and private citizens to resolve complex contested water rights issues.

3. What local, state or federal project permitting requirements/issues do you anticipate in order for the planning study to be conducted?

The City of Bend does not anticipate any permitting requirements in order to conduct the Alternatives Analysis.

4. Are permits/governmental approvals required for the planning study? If yes, indicate whether you have obtained the necessary permits/governmental approval. If you have not obtained the necessary permits/governmental approval, describe the steps you have taken to obtain them.

No such permits/governmental approvals are required in order to conduct the Alternatives Analysis.

5. Describe your goal (which must be based on evaluating the feasibility of developing a water conservation, reuse or storage project) and how this study helps to achieve the goal.

The City of Bend's overall goal, based on the long-term water supply Alternatives Study, is to generate substantial public benefits including maximization of water supply, quantity, efficiency, resource benefits, and conservation to help prevent depletion of the area's water resources. As the community grows over time, it is essential that the City of Bend aggressively pursues the most prudent management of water resources. By integrating efficiency and conservation so thoroughly into its long-term water supply planning efforts, the City will uphold its responsibility to its residents and user groups as well as the natural environment for many years to come.

An important element of the Alternatives Analysis is an evaluation of the complete list of water supply alternatives. For example, converting the City's surface water supply to groundwater or moving the City's surface water point of diversion from its current location at Bridge Creek to a location that could be miles further downstream on Tumalo Creek would mean higher flow for all or a portion of Tumalo Creek. Part of this process will involve modeling to determine if the additional flow would helping to maintain lower water temperatures and thereby have positive impacts on the fisheries resource in that area, which includes key spawning and rearing habitat for redband trout. There may be other significant resource benefits, and other benefits for the City in terms of the efficiency of their diversion and water conveyance systems, if such an option is implemented.

Listed below are some additional goals the City wishes to achieve through this project. They are not listed in order of priority.

* *Define, develop and evaluate alternatives to select the most economical and beneficial water supply alternative. Identify all facility improvements including facility sizing and right of way needs, funding opportunities, permitting requirements, hydroelectric opportunities, potential utility conflicts and water quality issues.*

* *An in-depth economic analysis of each alternative to accurately determine actual costs of development/construction, as well long term life cycle costs.*

* *A risk assessment of the existing surface water supply and alternatives, including regulatory, water rights and environmental risks.*

* *A benefit/cost analysis considering non-economic factors for each alternative. Non-economic factors considered should include as a minimum the value of a dual source supply, environmental impacts, permitting requirements, impacts to water rights, taste and odor complaints due to water quality, ability to implement without interruption to the City water demands or violate regulatory requirements, and any other Deschutes Basin issues that can impact the community from each alternative.*

* *Identify and address feasibility of design, construction, and operational difficulties for each preferred alternative.*

* *Identify and address project reliability, security, and regulatory concerns.*

** Identify any permitting or environmental issues for each alternative. Provide assistance with regulatory agency involvement. Address concerns of local environmental interests with regards to mitigation of temperature and turbidity issues for the Middle Deschutes Basin. Each alternative must address all permitting issues and any potential issues the community may have with each that could affect the ability of the City to implement that alternative.*

** Identify timeline for implementation. Since the City must comply with the federal requirements for additional treatment on its existing surface water supply by 2012 without being subject to an administrative order by the State, the preferred alternative must be able to be designed and constructed prior to 2012.*

** Identify overall long-term benefits to the community for each alternative.*

** Identify and obtain all available non-city funding sources for the project.*

** Implement project controls, processes, and tools that clearly and efficiently track, manage and report progress of the project, providing routine project status reports, cost reports, project schedules, and status of individual project elements.*

** Proactively identify and resolve issues and constraints to expedite the project and minimize schedule delays.*

** Identify and update water efficiency and conservation measures as part of appropriate study elements, and as a separate work task.*

The City is confident that the grant funds requested herein, and the long-term water supply Alternatives Analysis, will directly and substantially assist the City in meeting its stated goals.

6. Describe the technical aspects of the planning study and why your approaches are appropriate for accomplishing the goal of the planning study.

The Scope of Work for the Alternatives Analysis, which is Attachment 1 to this grant application, includes a flow chart which outlines the technical approach that will be used to perform the source water evaluation for the City of Bend. The City will use a Business Case Evaluation (BCE) process to assist it in evaluating the different options it will consider in this study.

The process starts with the determination of the "level of service" workshop to determine the overall goals, community and environmental values, and other tangible and non-tangible issues that will impact the selection. The second step in the process will be to identify as many source water alternatives as possible. An initial screening will be made of these alternatives to remove from consideration any that may have fatal flaws. This process will be followed by a detailed evaluation of each of the elements of the alternatives with the four major focus areas being water resources, water treatment, hydropower, and conservation. A second narrowing process will follow to select 3 - 4 preferred alternatives. These alternatives will be used to update the financial plan, permits and identify impacts and risk issues. As part of the BCE the net present worth, life-cycle cost analysis and cost/benefit analysis will be performed on each alternative followed by a sensitivitiy anaylsis. A third workshop will be held to select the final recommended alternative. A final review will be made of this alternative to revalidate costs, assumptions, risks and impacts. The final report will then be developed and the process and report will be presented to the City Council for approval. A public stakeholder and information program will be conducted throughout the entire process.

7. Describe the level of involvement, interest and/or commitment of different entities associated with the planning study (attach letters of support). Describe how these entities will benefit or be impacted by the planning study.

Please see the Joint Letter of Support for the City of Bend's Long-Term Water Supply Alternatives Analysis and Conservation Grant Application, which is Attachment 2 to this grant application. This letter has been signed by a number of stakeholders in the Deschutes Basin and expresses strong support for the Alternatives Analysis as well as this Conservation Grant application. The City's interest in pursuing this type of long-term water supply and conservation planning will have broad positive effects throughout the Deschutes Basin for many years to come. These benefits will stem from the City's commitment to integrate prudent resource management and conservation practices into its long-term water supply planning.

Section B. Unique Criteria

Instructions: Answer the set of questions below that applies to the type of planning study that this grant will fund.

☒ Water Conservation or ☐ Reuse

1. Water Conservation or Reuse projects that may result from this planning study are requested to be included in the Water Resources Department's "Inventory of Potential Conservation Opportunities". Though you may have already submitted this information earlier in the year through a separate survey, we ask that all applicants complete the information on the form provided at the end of this application. ☒ I have filled out the application or ☐ I have not filled out the application.

2. Describe the water supply need(s) that the project associated with the planning study is intended to meet. Applicant should reference supporting documentation that would be available upon request.

   The water efficiency and conservation measures that will be identified, updated, and recommended in the Alternatives Analysis, and which may be implemented by the City, will directly help to reduce the City's water demand and help to delay the need to develop new sources of water. Since those measures have not yet been identified, the City cannot provide an estimate of the amount of conservation that may be possible. The Alternatives Analysis also focuses substantially on water supply alternatives to meet future demand. In the following discussion, the City has provided a description of its water system, supply, and demand projections which provides context for the water supply needs that the Alternatives Analysis would help address.

   In March, 2007 the City completed a Water System Master Plan Update. This plan included guidelines for future water system improvements for the planning period through the year 2030. Findings included the need for the City to expand supply, storage and pumping capacities to satisfy growing demands of the study period. The Master Plan capital improvement project list included the need to upgrade and modify the existing surface water supply facilities. The preliminary estimate for this project was $50,000,000. Due to the magnitude of this project cost, the City is looking at potential alternatives to the surface water supply that may prove to be more economic over time. This could include conversion to an all ground water system, or new surface water diversion and treatment facilities located closer to the community.

   The City of Bend's current water supply comes from two major sources, a large spring located at the foot of the Cascades west of the City that is diverted into Bridge Creek and several large capacity well fields located throughout the City. The Bridge Creek source was developed in the early 1900s as a gravity operated system and still serves as the primary water source for the City due to its high quality and low cost of operation. The diversion off of Bridge Creek consists of a small diversion dam and intake facility, and two conduits that are approximately 11-miles long to the City's primary water storage and disinfection at the Outback Facility. The City has existing surface water rights that can provide up to 13.6 MGD during peak flow periods and potentially more during the winter months. Much of this system is located on United States Forest Service (USFS) land and is governed by a USFS Special Use Permit. The existing conduit routes are located on easements that run through wooded areas with occasional structures. Some of the conduit easements are on land in private ownership.

Protection and disinfection for the Bridge Creek water supply consists of watershed protection measures designed to exclude contaminants and control human activity, a set of screens and water quality monitoring equipment at the Bridge Creek Intake and gas chlorination and contact time storage at the Outback facility. The system is an approved un-filtered water supply. It is operated nearly continuously throughout the year and is normally only taken off-line when its raw water turbidity exceeds allowable levels. When that occurs, more wells are operated to provide additional water for the system until the turbidity falls to acceptable levels in the Bridge Creek source.

The Outback facility provides storage and a gas chlorination disinfection system. It contains several wells and additional system storage tanks, a hydraulic control structure, general storage buildings, control and telemetry facilities for the water system, and sufficient vacant land to accommodate additional water treatment facilities, storage reservoirs, and wells.

There are three major issues to the City's existing surface water supply which are; fire in the watershed, regulatory requirements, and ageing transmission mains. The watershed currently has a significant amount of standing dead timber (approximately 40% estimate by the USFS). The Lodgepole dominated areas have extensive outbreaks of pine beetle infestation. The water quality of the Bridge Creek source has the potential to be seriously impacted by catastrophic wild fire. Without treatment beyond chlorination it could make the surface water supply potentially unusable for a significant period. In addition to the potential water quality threat from fire, new EPA compliance requirements (Long Term 2 Enhanced Surface Water Treatment Rules) for unfiltered water systems are also requiring additional treatment to the City's surface water supply. The City of Bend is required to have effective treatment for cryptosporidium on line by 2012.

Beyond the water quality issues, many of the surface water facilities are beginning to reach the end of their design life span. The two existing conduits are in poor condition and are difficult to maintain. These conduits are also being threatened by encroachment of buildings and heavy vegetation. The diversion dam and building on Bridge Creek are functional, but do not comply with modern standards for treatment, automation, security, and resistance to seismic damage.

The intake facility is approximately 1,100 feet higher in elevation than the Outback facility. That elevation drop makes power generation an option at the Outback facility. The original design and the existing condition of the transmission mains are believed to be inadequate to supply water to a hydro turbine facility. However, if the replacement of the surface water facilities proves feasible the City would be interested in considering generating power at the Outback facility.

The City of Bend's other sources of water consist of nine well fields. Well depths range from 400 feet to 1,000 feet. The water quality of these wells is very similar to our surface source. The wells are used to meet supply demands during peak summer months and when the surface water source quality is not acceptable due to turbidity from snow melt or heavy precipitation. The City of Bend's typical average winter day demand is approximately 6 million gallons, or 18.4 acre feet, of water per day. The one day summer peak used just over 27 million gallons, or 84 acre feet, of water in late July 2007. Total water use was 4.7 billion gallons, or approximately 14,000 acre feet, during the 2007 calendar year.

The 2007 Water Quality Update includes the following description of Bend's water supply and demand: "The City's surface water supply comes from a protected and isolated watershed, and ground water supply is from the Deschutes regional aquifer which is deep and recharged annually by precipitation that falls in the high Cascades. Annual snowmelt and precipitation supplies the aquifer with an average recharge of 3800 cubic feet per second (cfs) annually, according to a United States Geological Survey groundwater study. This equals about 2.4 billion gallons per day entering the aquifer when averaged over the year. The greatest demand for water occurs during the summer. It is estimated that outdoor water use makes up 58% of Bend's overall water demand. Bend's summer water use increases dramatically due to outdoor watering demands. To continue to meet peak demands while maintaining fire protection supply needs, water must be used more efficiently on lawns and gardens".

The City of Bend has water rights totaling 104.4 cubic feet per second (cfs). Of that, 68.24 cfs are from groundwater and 36.1 cfs are from surface water. The reliable surface and groundwater rights held by the City, when accompanied by required mitigation for Permit G-16177 and G-16178, total 79.96 cfs.

The 2004 Water Management and Conservation Plan Final Report estimated that maximum day demand would increase from 26 MGD in 2003 to 46.5 MGD by 2025 and 55 MGD by the year 2035. Table 5-5, from the 2004 Water Management and Conservation Plan Final Report describes the City of Bend's total system demand to build-out of the urban growth boundary, and is Attachment 3 to this grant application.

The 2007 Water System Master Plan indicates that, based on the City's historical water use, the water service area's total average daily demand has ranged from approximately 8.6 mgd to approximately 11.5 mgd since the year 1998. It appears that the per capita usage of water has decreased in recent years due to ongoing water conservation efforts and to the recent implementation of service meters for all customers. For the year 2005 the total maximum day demand was approximately 26.9 mgd. The maximum day demand is the anticipated demand for the "highest-use" day of the year. Based on historical system demands from 1998 through 2005, and on population projections, the total maximum day demand is estimated to be approximately 71.5 mgd at saturation development. Based on historical water production records the peak hour demand is estimated to be equal to 1.5 times the Maximum Day Demand (MDD). Table ES-1 from the 2007 Water System Master Plan describes population and demand projections in the year 2005 and at "saturation development," and is Attachment 4 to this grant application. At saturation development, the average daily demand is estimated to be 30.7 MGD, the maximum daily demand is 71.5 MGD, and the peak hour demand is 107.3 MGD.

The City of Bend has several documents addressing water supply and demand issues that are available by request. These documents include the 2007 Water Quality Report, City of Bend Water Rights Summary, 2004 Water Conservation and Management Plan Final Report, and the 2007 Water Master Plan Update.

3. Explain how the associated project will mitigate the need to develop new water supplies and/or use water more efficiently. Reference documentation and/or examples of the success of similar or comparable water conservation/reuse projects that would be available upon request.

The Scope of Work for the Alternatives Analysis, which is Attachment 1 to this grant application, includes a description of all major study elements, which focus on water supply alternatives. In addition, key work tasks include an analysis of water efficiency and conservation impacts and measures that can help to make the most economical use of water and help maintain the resource over the long-term. The Scope of Work also includes a separate element for identifying and analyzing water efficiency and conservation opportunities.

It is important to note that the Scope of Work includes an assessment of the feasibility of an Aquifer Storage and Reuse or Recovery (ASR) project, but the City of Bend is not requesting any grant funds for that portion of the Alternatives Analysis.

In addition to identifying the most efficient additional water supply options for the City, the Alternatives Analysis will identify a range of conservation and efficiency measures that, when implemented, would likely help reduce demand and delay the need to develop additional water sources. Since the specific measures have not yet been researched and developed, the City cannot identify an exact quantity of water that could be conserved or used more efficiently at this time. However, several elements of the Alternatives Analysis involve options that may help prevent damage to water system infrastructure and thereby avoid resulting water loss, reduce existing leaks and water loss, result in additional cool water being left in greater portions of Tumalo Creek, and may involve other efficiency and conservation benefits and measures.

Important elements of the Alternatives Analysis include an evaluation of converting the City's surface water source to groundwater or moving the City's surface water point of diversion from its current location at Bridge Creek to a location that could be miles further downstream on Tumalo Creek. If either of these options look feasible and are selected as a preferred option, the City could leave additional cool water in a larger portion of Tumalo Creek. This would likely have positive impacts on water quality by helping to maintain cool water temperatures. This would also have positive impacts on the fisheries resource in that area, which includes key spawning and rearing habitat for redband trout. There may be other significant resource benefits, and other benefits for the City in terms of the efficiency of their diversion and water conveyance systems, if such an option is implemented.

The following elements, as described in the Scope of Work for the Alternatives Analysis, may provide significant efficiency and conservation benefits, or may include measures to enhance the degree of efficiency and conservation:

** Bridge Creek Diversion System Risk Evaluation.*

** Middle Deschutes River Temperature Evaluation.*

** Water Resources Evaluation, which includes an analysis of Surface Water Supply Alternatives, Riverbank Filtration Type Diversion, Relocation of Surface Water Supply Intake, and the Skyliner Road Pipeline Evaluation.*

** Groundwater Supply Alternatives, which includes Aquifer Production and Long-Term Sustainability Evaluation and Probable Well Site Location, Hydraulic Modeling of Connecting*

Alternative Groundwater Wells Sites to Distribution System, Water Rights and Water Strategy Support, Water Resources Evaluation Report.

* *Water Treatment Evaluation.*
* *Hydroelectric Power Evaluation.*
* *Alternatives Evaluations and Selection of Recommended Plan.*
* *Efficiency and Conservation Measures.*
* *Final Report.*

Additional detail on each element of the Alternatives Analysis can be found in the attached Scope of Work.

The City of Bend's Alternatives Analysis will contain evaluations of water supply options that are similar to those found in other municipal Water System Master Plans and Water Management and Conservation Plans, but will also contain many elements that are unique to this project. In general, the types of benefits derived from the water supply and conservation planning that the City of Bend is undertaking are similar to those undertaken by other municipalities with similar water systems and sources.

4. Explain how the project associated with the planning study will meet the water supply need(s), and indicate what percentage of that need will be met. (For example: If your water supply need is 20,000 acre-feet of additional water and the project will supply 10,000 additional acre-feet, 50% of your need will be met).

   The Alternatives Analysis is a comprehensive study aimed at evaluating all of the source water options for the City of Bend. The Alternatives Analysis will focus on the City's Bridge Creek surface supply that normally supplies approximately 11.72 cfs of water to their system. This represents approximately 40% - 50% of the City's summertime demand and 95% of the City's wintertime demand. The study also contains elements that will evaluate the impact of conversion of this surface supply to groundwater, impacts and risks to existing ground water supplies and the role conservation needs to play in meeting future demands.

5. Provide data and information on the associated project and the project's sources of water supply:
   a. The location of the associated project. (Include the basin, county, township, range and section.)

The Alternatives Analysis addresses water supply options as well as efficiency and conservation measures that will likely impact a significant portion of the Deschutes Basin, with project elements both above and below Bend. The entire project is within Deschutes County, in the Deschutes Basin, Oregon. The City of Bend is located in:

T17S, R11E

T17S, R12E

T18S, R11E

T18S, R12E

The City of Bend Surface Water System Map, Water Facilities Map, and Exhibit 2-1 from the 2004 Water Management and Conservation Plan (Water System Map) are included as Attachments 5, 6, and 7 to this grant application, and provide a greater level of detail on the location of various features of the existing water system and facilities.

The springs that are a source of the City's surface water supply are located in T18S, R9E, S10 and S3, and are located on the middle fork of Tumalo Creek approximately 2.4 miles upstream

from the confluence of the north and middle forks of Tumalo Creek. The water is diverted at this location through a 1.2 mile long diversion ditch that leads southeast to Bridge Creek. The diversion ditch meets Bridge Creek approximately 2.9 miles upstream of the confluence of Bridge Creek and Tumalo Creek. The current intake structure for the City of Bend surface water source is located on Bridge Creek approximately 0.2 miles upstream from the confluence of Bridge Creek and Tumalo Creek.

b. The name(s) and river mile(s) of the source water and what they are tributary to, if applicable.

The Attachments described in the response to question 5(a), above, address the location of the City's existing water system and facilities. Surface water is collected approximately 13 miles west of the City at the Bridge Creek Intake Facility located near the confluence of Bridge Creek and Tumalo Creek. Bridge Creek and Tumalo Creek are tributary to the Deschutes River. Flows in Bridge Creek are supplemented by the diversion of natural springs located in the Tumalo Creek drainage basin. Spring flows are collected in a diversion pond and conveyed through two parallel transfer pipes to a canal flowing to Bridge Creek. Raw water is then routed from the Bridge Creek Intake Facility approximately 11.5 miles via two parallel steel transmission pipelines measuring 14 inches and 16 inches in diameter to the Outback Site. Official "river mile" information was not identified for Bridge Creek or Tumalo Creek. In addition to the surface water source, the City currently has 9 groundwater production sites that include 23 wells located throughout the service area and at the Outback site westerly of the City.

c. Environmental flow needs and water quality requirements of supply source water bodies and water bodies downstream of associated and/or affected return flows.

The City of Bend's 2007 Water Quality Report is included with this grant application as Attachment 7 and is incorporated into this response. The Oregon Department of Environmental Quality (ODEQ) is currently developing a total maximum daily load (TMDL) related to temperature pollution in Tumalo Creek, Whychus Creek, and the upper Deschutes River, which is defined by ODEQ as the reach upstream of Lake Billy Chinook. There are instream water rights on Tumalo Creek (30 cfs) and the middle Deschutes River (250 cfs). Tumalo Creek has excellent water quality, especially with its low water temperature. This cool water is a major asset for the important spawning and rearing habitat for redband trout in Tumalo Creek. To the extent that this cool water is allowed to remain instream for a greater distance, major benefits can be realized for fishery and related resources.

ODEQ has produced some resources concerning water quality in the Bend area. Those resources include the "Oregon Water Quality Index Summary Report 1997-2006 (http://www.deq.state.or.us/lab/wqm/docs/OWQISummary06.pdf), "Groundwater Quality Report for the Deschutes Basin, Oregon March 2006" (http://www.deq.state.or.us/lab/techrpts/groundwater/dbgroundwater/dbgwreport.pdf) and "Deschutes River, Whychus Creek, and Tumalo Creek Temperature Modeling (http://www.deq.state.or.us/wq/tmdls/docs/deschutesbasin/DeschutesModeling08May2008.pdf).

d. Reliance on return flows by downstream water right holders.

There are groundwater and surface water rights in the Deschutes Basin both above and below the City of Bend that rely on water that may be affected by actions taken by the City of Bend in response to the Alternatives Analysis. Return flows from the City of Bend include water use from municipal irrigation and, to a limited extent, from the City's wastewater treatment plant which terminates in an evaporation facility. To the extent that the City takes actions that reduce

the amount of water appropriated from any water source, the conserved water would remain in a surface or groundwater body. New appropriations of water by the City would be limited by their water priority date, relative to other existing water rights.

Match Funding Information

Applicants must demonstrate a minimum dollar-for-dollar match based on the total funding request. The match may include a) secured resources, b) previously expended resources, and/or c) pending resources. For secured funding, you must attach a letter of support from the match funding source that specially mentions the dollar amount shown in the "Amount/Dollar Value" column. For pending resources, documentation showing a request for the matching funds must accompany the application. For resources that have been previously expended, the expenditure must have occurred on or after July 1, 2005. Resources expended prior to July 1, 2005 are not eligible for match purposes.

The Type of matching funds may include:	The Status of matching funds may include:
• The value of in-kind labor, equipment rental and materials essential to the planning study provided by the applicant or partner*.	• Secured funding commitments from other sources.
• Cash is direct expenditures made in support of the planning study by the applicant.	• Associated and documented expenditures for the planning study from non-program sources incurred on or after July 1, 2005.
	• Pending commitments of funding from other sources. In such instances, Department funding will not be released prior to securing a commitment of the funds from other sources. Pending commitments of the funding must be secured within 12 months from the date of the award.

*"Partner" means a non-governmental or governmental person or entity that has committed funding, expertise, materials, labor, or other assistance to a proposed planning study. OAR 690-600-0010.

Match Funding Source (if in-kind, briefly describe the nature of the contribution)	**Type** (✓ **One**)	**Status** (✓ **One**)	**Amount/ Dollar Value**	**Date Match Funds Available** *(Month/Year)*
Labor - In Kind	☐ cash ☒ in kind	☒ secured ☐ expended ☐ pending	*$75,000*	*July 08*
2008-2009 City's Fiscal Year Budget	☒ cash ☐ in kind	☒ secured ☐ expended ☐ pending	*$328,000*	*July 08*
	☐ cash ☐ in kind	☐ secured ☐ expended ☒ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		
	☐ cash ☐ in kind	☐ secured ☐ expended ☐ pending		

Project Planning Study Schedule

Estimated Project Duration: October 1, 2008 to December 31, 2009

Place an "X" in the appropriate column to indicate when each element (key task) of the project will take place.

Project Planning Study Element (Key Tasks)	**2009**				**2010**				**2011 & Beyond**
	1st Qtr	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	**1st Qtr**	**2nd Qtr**	**3rd Qtr**	**4th Qtr**	
Task 1 - Project Management.	X	X	X	X					
Task 2 - Kickoff and Project Meetings	X	X	X	X					
Task 3 - Early Action Items	X	X							
Task 4 - Financial Plan	X	X	X	X					
Task 5 - Public Involvement	X	X	X	X					
Task 6 - Water Resource Evaluation	X	X	X						
Task 7- Water Treatment Evaluaion	X	X							
Task 8 - Hydropower Evaluation	X	X							
Task 9 - Efficiency and Conservation Evaluation		X	X						
Task 10 - Alternatives Evaluation and Selection			X	X					
Task 11 - Final Report			X	X					

VII Project Planning Study Budget

Section A

Please provide an estimated line item budget for the project planning study. An example would include: labor, materials, equipment, contractual services and administrative costs.

Line Items *Note: Administrative costs may not exceed 10% of the total funding requested by the Department.*	**Unit Number** *(e.g. # of hours)*	**Unit Cost** *(e.g. hourly rate)*	**In-Kind Match**	**Cash Match Funds**	**OWRD Grant Funds**	**Total Cost**
Labor - In Kind						
Heidi Lansdowne	*400*	*$124.00*	*$49,600*			*$49,600*
Tom Hickmann	*100*	*$136.00*	*$13,600*			*$13,600*
Patick Griffith	*100*	*$118.00*	*$11,800*			*$11,800*
Contractual Services				*$328,000*	*$403,000*	*$731,000*
Administrative Costs						
Total for Section A			*$75,000*	*$328,000*	*$403,000*	*$806,000*
Percentage for Section A			***9%***	***41%***	***50%***	***100%***

Section B

If Grant amount requested is $50,000 or greater, you <u>MUST</u> complete Section B. Elements (key tasks) in Section B should be the same as the elements (key tasks) in Section VI (Project Planning Study Schedule).

Project Planning Study Element (Key Tasks)	**In-Kind Match**	**Cash Match Funds**	**OWRD Grant Funds**	**Total Cost**
Task 1 - Project Management.	*$15,000*	*$23,000*	*$38,000*	*$76,000*
Task 2 - Kickoff and Meetings	*$5,000*	*$17,500*	*$22,500*	*$45,000*
Task 3 - Early Action Task	*$5,000*	*$37,500*	*$42,500*	*$85,000*
Task 4 - Financial Plan	*$5,000*	*$22,500*	*$27,500*	*$55,000*
Task 5 - Public Involvement	*$10,000*	*$42,500*	*$52,500*	*$105,000*
Task 6 - Water Resources Evaluation	*$5,000*	*$70,500*	*$75,500*	*$151,000*
Task 7 - Water Treatment Evaluation	*$5,000*	*$36,500*	*$41,500*	*$83,000*
Task 8 - Hydropower Evaluation	*$5,000*	*$36,500*	*$41,500*	*$83,000*
Task 9 - Efficiency and Conservation Evaluation	*$5,000*	*$13,000*	*$18,000*	*$36,000*
Task 10 - Alternatives Evaluation and Selection	*$10,000*	*$25,000*	*$35,000*	*$70,000*
Task 11 - Final Report	*$5,000*	*$3,500*	*$8,500*	*$17,000*
Total for Section B	*$75,000*	*$328,000*	*$403,000*	*$806,000*

Totals in Section B must match the totals in Section A

Request to be added to the Oregon Water Resources Department's

Inventory of Potential Conservation Opportunities

The purpose of this inventory is to catalogue potential conservation projects that water users themselves have identified but not yet pursued because of financial, institutional, or other barriers. For the purpose of this application, water storage other than above-ground are included as conservation opportunities and are most likely capital conservation projects.

As a water provider or user, you know your water demands and water conservation opportunities better than anyone. We would appreciate your assistance with this important data collection effort by completing this survey. Your participation will help provide the building blocks we need to begin to identify and achieve potential future water supplies. Please answer the questions as completely as possible, to the best of your ability. We appreciate your help with this important effort.

This inventory of already-identified, potential conservation projects includes both capital and programmatic projects. Capital projects are defined as one-time, large investments resulting in water savings. Examples include reclaimed water plants, reservoir covering, transmission line upgrades reducing leaks, or industrial engineering modifications to re-use process water. Programmatic projects are defined as ongoing investments resulting in water savings. Examples include facilitating upgrades to more efficient water using devices (e.g., distributing free showerheads, toilet rebates) and distribution system leak detection programs. The conservation inventory is primarily intended to include "planned" projects rather than projects that are currently being implemented. However, currently active programmatic projects may be listed if they will continue or expand in future years. The inventory of projects submitted will be compiled by county or basin.

Examples are provided below.

	Example **Capital Conservation Project**	**Example** **Programmatic Conservation Project**
Project Description Provide brief sentence	Line 3 miles of unlined ditch.	Toilet rebate program for residential customers
Estimated Future Savings Provide brief sentence, including information regarding savings seasonality.	20 acre feet of water per year	If we spend our full budget each year, we estimate 50,000 gallons of water save per year
Seasonality Indicate what part of the year savings are generated (e.g. year-round; summer only; etc.).	Peak (irrigation) season savings.	Savings should occur throughout the year.
Estimated Future Costs Provide brief sentence.	$500,000 total project costs.	$40,000 a year.
Implementation Schedule Provide brief sentence.	Not set. Have conducted cost and savings estimate, but still seeking funding.	We started the program in 2005 and plan to implement until 2015.
Project Funded? Designate either "yes", "no", or provide brief sentence if necessary	No. Pursuing grant funding.	Yes. IN our CIP through the next 5 years.

To add a project to the inventory of potential conservation opportunities, please provide the following information for each conservation project.

This is a ☒ Capital Conservation Project ☒ Programmatic Conservation Project	
Project #/Name	**City of Bend Long-Term Water Supply Alternatives Analysis Conservation Project**
Project Description	The City of Bend has requested a $403,000 Water Conservation Grant to conduct a long-term water supply Alternatives Analysis that will have substantial public benefits, including maximization of water supply, durability, efficiency, and conservation to help prevent depletion of the area's limited water resources. The study will include an alternatives analysis that will estimate the costs of surface water system upgrades and develop a comparative economic analysis of other potential water supply alternatives. The alternatives will consider conservation measures, hydroelectric power potential, water rights, water quality and treatment, outside funding opportunities, long-term operation and maintenance costs and non-economic factors such as potential disruptions to the public and ease of implementation. The goal is to arrive at a preferred alternative which will meet the City's long-term water supply needs in a manner calculated to maximize efficiency and conservation.
Estimated Future Savings	Estimated future savings will be assessed and estimated in the upcoming Alternatives Analysis, but are not known at this time. The City of Bend anticipates that efficiency and conservation measures can be a very significant element of the City's wise long-term water supply planning and implementation efforts.
Seasonality	The City anticipates that the efficiency and conservation opportunities that will be identified in the Alternatives Analysis will have benefits throughout the year, but especially during the dry summer months. During high water use periods, the benefits of efficiency and conservation measures can have a greater impact.
Estimated Future Costs	The Alternatives Analysis will include a number of economic feasibility studies to determine the initial and ongoing costs and benefits of different elements that may be selected as part of a Preferred Alternative for the City of Bend. Since the Alternatives Analysis has not yet been conducted, the City cannot yet determine the estimated future costs, although they will almost certainly be quite substantial.
Implementation Schedule	The Alternatives Analysis will commence on October 1, 2008. It is anticipated that the Alternative Analysis will be concluded by December 31, 2009.
What are the barriers to implementation, e.g. funding?	Funding, Permitting
This is a ☐ Capital Conservation Project ☐ Programmatic Conservation Project	
Project #/Name	
Project Description	
Estimated Future Savings	
Seasonality	
Estimated Future Costs	
Implementation Schedule	
What are the barriers to implementation, e.g. funding?	

- Include this form with your application -

ATTACHMENT 1 – SCOPE OF WORK

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT

CITY OF BEND WATER SUPPLY ALTERNATIVES PROJECT
SCOPE OF WORK

PHASE 1 – ALTERNATIVES DEVELOPMENT AND EVALUATION

This Scope of Work (SOW) presents the tasks included in completing Phase 1 of the City of Bend's (City) long-term water supply alternatives study. Each task includes the specific work details, assumptions, and deliverables that will be followed to develop and evaluate the selected alternatives.

The study will include an alternatives analysis that will estimate the costs of any required existing surface water system upgrades and develop a comparative economic analysis of other potential water supply alternatives including enhanced efficiency of water use and expanded water conservation measures. The alternatives will consider hydroelectric (hydro) power potential, water rights, water quality and treatment, outside funding opportunities, long-term operation and maintenance (O&M) costs and non-economic factors such as potential disruptions to the public and ease of implementation. The overall goal is to arrive at a preferred alternative which will meet the City's long-term water supply needs. Figure 1, presents the project flow chart.

The SOW is based on a level of detail consistent with an alternative evaluation and selection process. More in-depth evaluation and precise cost estimates are reserved for a later phase of the project after the basic alternatives direction has been selected. Therefore, the evaluation of project alternatives will be taken to a level to:

- Identify fatal or near-fatal flaws that will prevent selection
- Prepare cost and revenue estimates to the reconnaissance level as defined by the American Society of Professional Estimators, which provide a +50% and -30% accuracy
- Identify risks sufficient to comparatively rank alternatives by estimated impacts of failure of the item at risk
- Select the most favorable long term water supply source for Bend

Task 1. Project Management

Background and Purpose: Initiate the project and establish a foundation for execution and overall management for it's duration.

The Consultant's Project Manager (PM) will be responsible for coordinating the Consultant Team and controlling project resources and budget. The PM will make decisions related to the project on behalf of the Consultant Team in a timely manner. The PM will prepare and update project schedules, monitor project performance related to schedule, control expenses/budget, and provide quality control. The PM will also provide regular reports as outlined below to the City's PM.

Activities:

1.1 Develop Project Management Plan (PMP)

The PMP will describe in detail the framework, tools, and project team that the Consultant Team will be utilizing to manage the project. The Project Management Plan will include Consultant Team contact information, scope and schedule, quality assurance/quality control (QA/QC) procedures, and document control procedures. The cost for review and quality control of deliverables is contained within the cost of each deliverable. However, an overall coordination of quality control of the project and the periodic checking

of the internal quality control process is essential to maintain the quality on this project and has been budgeted separately. QA/QC framework for the project will be provided in the QA/QC Plan.

1.2 Monthly Reports and Accounting

A monthly progress report will be provided by the Consultant Team. The Consultant Team will be invoicing the City by deliverable, on a deliverable schedule agreed to by the City and the Consultant Team. Monthly progress reports will coincide with deliverable packages where applicable to maximize efficiency. The progress report will document meetings, amendments, project decisions concerning cost or schedule, and upcoming schedule. These summary reports are a project management tool to track major decisions and indicate where changes or amendments occurred.

Task 1 will include the development of a project guide, day-to-day management and coordination with City Staff and subconsultants, and project closeout.

1.3 Project Schedule

The project schedule will be updated monthly and provided as part of the monthly reports. It will be updated to reflect schedule changes, new or different critical path items and any other item which will impact the implementation of the project. The Consultant Team will maintain the schedule in MS Project®.

1.4 Internal Project Website

A project website will be maintained by David Evans and Associates. It will reflect the status of the different task and subtask, new critical path items, upcoming meetings, changes to project schedule, and any other item needed to allow the parties of the agreement to track the project. The site will be for the use of and the Project Team members, with controlled access to documents.

Deliverables:

- Draft PMP
- Internal website
- Project schedule
- QA/QC Plan

Task 2. Project Kickoff Workshop and Weekly Meetings

Background: Establish project meeting schedules and purpose. Meetings will include Project Kickoff Workshop and Weekly Project Meetings. They will be attended by the PM, appropriate team members, and City staff for the purposes of project management and team coordination.

Activities:

2.1 Project Kickoff Workshop

Conduct a Project Kickoff Workshop to present the draft PMP, reach consensus with City staff on project vision, goals, and expectations, and steps to achieve them; establish critical success factors for the project; clarify roles and responsibilities, communication channels, and QA/QC procedures. A brief discussion of the project schedule and work breakdown structure shall be provided in the Kickoff Workshop. All milestone dates, including those for meetings and workshops, will be identified at the Kickoff Workshop. The meeting will include establishing lines of communication and discussing a data request list provided by the Consultant prior to the meeting. The protocol for project management communication will be discussed between the two PMs outside the start-up meeting.

2.2 Weekly Project Meetings

Conduct weekly project meetings to coordinate the many concurrent tasks. Weekly meetings will be brief discussions with the exception of once a month when a more in-depth meeting will be held to review the Monthly Progress Report.

Deliverables:

- Kickoff Workshop summary
- Weekly meeting summaries
- Monthly progress reports
- Final PMP
- Revised project schedule

Task 3. Early Action Tasks

Background and Purpose: Begin tasks that address the needs of the current system or provide data essential for other tasks. Task 3 will begin as soon as notice-to-proceed is given.

Activities:

3.1 Bridge Creek Diversion System Risk Evaluation

The Consultant Team will perform a review of the existing pipelines (conduits) that are part of the Bridge Creek diversion system. Additionally, the Consultant Team will do an initial, preliminary review of risks associated with other components of the surface water system such as the diversion dam, intake, and intake facility structure. Individual components of the system will be investigated further in Task 6.2.1. The goal of this task is to identify factors that pose a risk to the existing pipelines and other facilities, and make recommendations of actions that would help to minimize the risk of any pipeline failure or other failures related to system vulnerabilities during the completion of this project or may identify a fatal flaw that should be considered in the alternatives analysis in Task 3.7. The Consultant Team will consider such external factors as seismicity and watershed fire when evaluating risks to the system. Specific elements of the task are listed below.

3.1.1 Pipeline Condition Review

The Consultant Team will conduct a site inspection along the entire pipeline route to identify conditions that may pose a risk to the pipeline.

3.1.2 Review and Evaluation of Existing Facilities

The Consultant Team will review existing information for the diversion dam, intake, and intake facility structure.

3.1.3 Prioritize Conditions Based on Risk and Cost to Mitigate the Risk

Upon completion of the inspection and cataloguing of potential risks to the pipelines and other facilities as described in Item 3.1.2, the Consultant Team will assign a risk factor to weight each of the items identified.

3.1.4 Develop a Mitigation Plan for Pipelines and Surface Water System Components

Prepare a techical memorandum (TM) documenting the findings of the survey and studies, identifying and prioritizing the risks assessed in Item 3.1.2, and developing a plan to mitigate this risk (TM 1).

3.2 Chlorine Contact Time (CT) Hydraulic Impact Evaluation

The Consultant Team will review the hydraulic capacity impact of the current chlorine contact system at the Outback facility. The brief study will confirm or, if necessary, improve the hydraulic computer model of the Outback piping and tank system. The program will be used to identify improvements to the system. Recommendations will be made on interim improvements to regain lost system capacity. Results of this evaluation will be presented in TM 2.

3.3 Middle Deschutes River Temperature Evaluation

Currently, the Oregon Department of Environmental Quality (DEQ) is developing a total maximum daily load regulation related to temperature pollution in Tumalo Creek, Whychus Creek, and the upper Deschutes River, which is defined by DEQ as the reach upstream of Lake Billy Chinook.

The Consultant Team will evaluate the effects of increased flows on water temperature in the Middle Deschutes River. The study will consider the possible future increases in flow in the Middle Deschutes River that could occur by transferring existing surface water rights to groundwater rights. For this study, the Middle Deschutes River is defined as the reach beginning at the North Canal Dam and ending at Round Butte Dam. Specific elements of this task are listed below.

3.3.1 Collect and Review Data

The Consultant Team will review the May 2008, DEQ report titled *Deschutes River, Whychus Creek, and Tumalo Creek Temperature Modeling* that details the application of the Heat Source[1] temperature model for the Deschutes River between Wickiup Reservoir and Lake Billy Chinook.

The Consultant Team will contact DEQ directly to retrieve the calibrated Heat Source model files developed in the DEQ temperature modeling. The Consultant Team will review the modeling files and conduct preliminary model simulations to reproduce the calibrated baseline results published in the DEQ study. Questions will be directed to DEQ unless another contact is specified by DEQ.

After reviewing the Heat Source model, The Consultant Team will work with City staff to develop three flow alternatives to be modeled. The City has proposed simulating the addition of 30, 150, and 250 cubic feet per second. The Consultant Team will discuss specific details regarding the flow alternatives with the City. For example, location and temperature of flow additions will be agreed upon before modeling commences.

3.3.2 Temperature Modeling and Data Analysis

The Consultant Team will simulate temperatures in the Middle Deschutes River using the Heat Source model. The simulations will examine the flow alternatives developed previously. The Consultant Team will calculate the moving 7-day average of the daily maximum temperatures for

[1] Heat Source is a computer model used by DEQ to simulate stream thermodynamics and hydrology. It was developed in 1996 as a Masters Thesis at Oregon State University in the Departments of Bioresource Engineering and Civil Engineering. DEQ currently maintains the Heat Source methodology and computer programming.

each of the flow alternatives. The results will be graphed and evaluated with respect to the study objectives.

TM 3 will be prepared summarizing results of the alternatives analysis.

3.4 Project Revenue Options and Funding Source Application Preparation

This task includes a review of available non-City funding sources for the project, ranking those sources by probability of success, and developing a cost and schedule to complete any necessary application or other preparatory process. TM 4 will be prepared summarizing the findings.

This task also includes an estimated level of effort by the Consultant Team to assist the City in efforts to obtain Business Energy Tax Credits during this phase of the project. In addition, the Consultant Team will prepare grant applications for up to three funding sources, such as the Energy Trust of Oregon, State Revolving Loan Fund, Oregon renewable energy funds, Federal Emergency Management Agency and Homeland Security grants, etc.

3.5 Business Case Evaluation (BCE) Initiation Workshop

The initial workshop will provide an overview of the BCE process, identify level of service (LOS) parameters, and frame the problem to be solved. The BCE process will be reviewed to facilitate a common understanding of the overall process.

Current LOS parameters adopted by the City will be reviewed and service level objectives and current status will be identified. Additional LOS parameters may be considered to ensure that the full range of community and environmental values are defined for the subsequent screening analysis. Examples of new LOS could be climate change, specific carbon footprint reductions, energy generation, and advanced water and energy conservation measures, etc.

The problem to be addressed, including identification of root causes, will be reviewed, linked to LOS gaps, and a draft problem statement will be prepared (TM5).

3.6 Alternative Identification Work Session and Initial Fatal Flaw Screening

The BCE Team will begin the process of defining alternative approaches to addressing water supply alternatives. Through a facilitated brainstorming approach, a full range of alternatives will be developed. Alternative creation will include objectives to increase water and energy use efficiency and water conservation improvement. The BCE Team will conduct a fatal flaws analysis. Fatal flaws will be defined based on an alternative's inability to achieve any one of the key LOS objectives. For the remaining potentially viable alternatives, the BCE Team will examine the drivers and objectives, cost and benefits, life-cycle cost items, and customer service risk impacts, as well as environmental and community risks. The Consultant Team will then analyze how best to estimate the actual life-cycle costs and how to value benefits. To facilitate collaboration on the results, City staff will have assignments to engage in the cost and benefit estimation process as well as to assess customer service impacts and risk levels for each specific alternative. TM6 will be prepared summarizing the alternative identification.

Due to the complexity of the alternatives and the need for additional technical data and information, additional follow-up workshops will be held in each of the three alternatives tasks 6, 7, and 8. The goal of these workshops will be to refine/narrow the alternatives further before detailed analysis is completed.

3.7 Preliminary Permit Requirement Assessment

The Consultant Team will conduct a preliminary permit requirement assessment on the different alternatives developed in the workshop outlined in Subtask 3.6. The assessment shall identify the different permits

needed to develop selected alternatives, their potential impacts on project schedules, approximate cost, and overall impacts on project. TM 7, summarizing the results of the assessment, will be provided. As alternatives outlined in Tasks 6, 7, and 8 progress, the Consultant Team will focus permit assessment efforts toward alternatives that have the highest likelihood of being selected for further evaluation.

Deliverables:

- Agendas and meeting minutes
- TM 1. Pipeline Risk Assessment (draft and final)
- TM 2. CT Hydraulic Impact Evaluation (draft and final)
- TM 3. Middle Deschutes Temperature Evaluation (draft and final)
- TM 4. Project Revenue Options Evaluation and Schedule (draft and final)
- TM 5. Level of Service Determination (draft and final)
- TM 6. Alternatives Evaluation Identification and Screening (draft and final)
- TM 7. Preliminary Permit Requirement Assessment (draft and final)

Task 4. Preliminary Funding/Financial Planning

Background and Purpose: Evaluate financial alternatives for the project, including determining the impacts, if any, on the City's ratepayers and on other stakeholders associated with the project. The Consultant Team will accomplish this by developing an enterprise financial plan modeling the City's utility operations as they currently exist, and adding the project impacts, including the financing impacts through a series of scenario analyses that the City can compare side by side on the final three project alternatives. The purpose of this task is not to prepare a new financial plan for the utility, but to show the impact of this project on the existing projections.

Activities:

4.1 Data Collection and Model Development

The Consultant Team will provide the City with a request for information that will include a request to review existing studies that led up to the project, master plans, annual reports, billing records, and historical customer demand information.

4.2 Develop Revenue Projections

The Consultant Team will determine revenue projections for the City's water utility sales, as well as energy sales and/or other sources of income that may be gained from the project, as identified in Task 3.4. Revenue projections can be changed depending on the scenario examined.

4.3 Develop O&M Projections

The model will contain a projection of the existing O&M expenses for the water utility operations and the projected increase in O&M costs that may occur as a result of the project. O&M projections can be changed depending on the scenario examined.

4.4 Develop Capital Improvements Plan (CIP) Table

The capital improvements schedule is one of the key cost drivers. The CIP will include all planned water utility projects as well as the planned expenditures for this project. The CIP table may be changed depending on the scenario examined.

4.5 Develop Table of Outstanding and Projected Debt Service

The Consultant Team will develop a table of the City's existing water utility debt service (principal and interest) along with the bond covenant requirements for the outstanding debt. Depending on the scenario examined, we will add projected debt service for future bonds.

4.6 Develop Projection of Other Water System Requirements

Other requirements can include contractual commitments, grants, miscellaneous revenues (not earned from rates or impact fees), legal requirements, pending lawsuits or court orders, or any other requirement that defies definition as a rate revenue, O&M expenditure, capital project cost, or debt commitment.

4.7 Prepare Cash Flow Projection

The financial planning model is a cash-based model that includes a projected statement of cash flows. Based on the starting cash on hand, we will be adding all of the already determined and projected sources (revenues and income) and uses (O&M, capital spending, debt service) to determine net cash impacts on a year-by-year basis. The cash flow projections will include provisions for maintaining minimum required balances and reserves. The cash flow projection and the calculation of rate requirements are based on the inputs from all of the above determining factors.

4.8 Evaluate Alternatives and TM Preparation

Alternative evaluation will be ongoing once the model has been constructed. The scope will include evaluation of up to three alternatives, which will be developed in coordination with the Consultant Team. This task will include preparation of TM 8, the Preliminary Funding and Financial Plan.

Deliverable:

- TM 8. Preliminary Funding and Financial Plan (draft and final)

Task 5. Public and Stakeholder Involvement

Background and Purpose: To develop and lead a process to educate and update the public and stakeholders on the status of the project.

Activities:

5.1 Project Team Meetings

This task consists of conducting project team meetings on a monthly basis for the period of 1 year. A written summary of each meeting will be posted on the Project's internal website, SharePoint®, as defined in Subtask 5.6. One person from The Consultant Team will attend each meeting to facilitate and record notes.

5.2 Develop Public Involvement Strategy and Define Success Measures

The first monthly project team meeting will be conducted as a half-day workshop to accomplish the following tasks:

- Define and achieve consensus on the problem that Public Involvement will address
- Define the root causes related to the problem

- Define the success measures that will be tracked to identify the progress/success as the public involvement plan is being implemented. This will provide a basis for mid-course corrections, if required.
- Identify the barriers to success (new elections, powerful special interests, etc.)
- Develop the tactics to overcome the barriers and deliver on the success measure. The SOW for public involvement herein may need to be adjusted based on the outcome of the strategy session.

TM 9 will be prepared summarizing this task.

5.3 Stakeholder Process

- This task consists of interviewing major project stakeholders and compiling the results of the interviews in a summary report. Stakeholders are defined as groups or individuals with specific interests in one or more aspects of the project, and could include irrigation districts, environmental groups, neighborhood associations, agencies, and individuals.

5.4 Ongoing Public Program Management

This task involves ongoing Public Program Management via the use of phone calls, internet, interviews, etc., and includes the following activities for the purposes of keeping the public informed, as well as obtaining information and input from the public for purposes of this alternatives analysis.

5.5 Public Meetings

- *Public Meeting No. 1: Alternatives Work Session:*

  Public Meeting No. 1 will be formatted as an informational meeting to provide background and process information. This meeting will be held after the majority of stakeholder interviews are complete.

- *Public Meeting No. 2: Presentation of Recommended Alternative*

  Public Meeting No. 2 will be formatted as an open house and informational meeting, with the recommended alternative presented graphically and in a formal presentation. This meeting will occur when the Consultant Team and City feel that Tasks 3, 6, 7, 8, and 9 have reached the point where the information gathered and alternatives identified and analyzed can be shared with the public. Opportunities for public input will be provided.

5.6 Website Publication and Maintenance

- Consultant Team will post the public website prior to the first public meeting.
- Consultant Team will maintain the website with fresh materials and dates as needed.
- At this time, no surveys are planned; however, a method for recording public comments and questions will be part of the website.

5.7 Council Presentation/Hearing

- The Consultant Team will provide one mid-project presentation (may not be necessary if a Council member is on the Project Team) and one final hearing.

- The Consultant Team will coordinate the hearing presentation, and present technical information.

5.8 Focus Groups

A maximum of three focus group meetings will be convened as necessary to collect information so the Consultant Team can estimate fiscal value to subjective issues for the purposes of applying the BCE process. Focus groups are comprised of randomly selected residents of Bend who are asked to spend 4 to 6 hours completing this exercise.

Deliverables:

- Project Team meeting summaries (posted to website)
- TM 9. Public Involvement Strategy (draft and final)
- Stakeholder interview summary (posted to website)
- Public Meeting No. 1 summary (posted to website)
- Public Meeting No. 2 summary (posted to website)
- Focus group meeting reports

Task 6. Water Resources Evaluation

Background and Purpose: The City has two basic water sources available, surface water and groundwater. This task will evaluate alternatives available to the City and the impact of the alternatives on water use efficiency and conservation. The objective is to determine which option and/or configuration provides the best overall benefit to the community.

This task will consider items including, but not limited to, cost, permitting, schedule, implementability, public impacts, sustainability characteristics, and long-term water supply needs when evaluating and comparing alternatives. Preliminary results from Tasks 3 and 4 will be incorporated. The subtasks listed below will evaluate the basic alternatives and their respective options. These subtasks may change based upon the results of the work session conducted as part of this task or Subtask 3.5.

Activities:

6.1 Water Resources Alternative Identification Work Session

A work session will be held to define, narrow, and refine the water resource alternatives developed in Task 3.6. This is to ensure that time and resources are spent on a refined list of the best alternatives.

6.2 Surface Water Supply Alternatives

This section contains several surface water alternatives to be considered.

6.2.1 Bridge Creek Intake Evaluation

This task will build upon the study performed as part of Subtask 3.1 to determine the viability and/or capacity of continued use of the Bridge Creek system considering the existing system's vulnerability and the extent of potential upgrades

6.2.2 Riverbank Filtration (RBF) Type Diversion Assessment

Perform a preliminary feasibility assessment to evaluate the potential for developing an RBF/type diversion in the Tumalo Creek watershed just downstream from the current diversion.

6.2.3 Relocation of Surface Water Supply Intake Evaluation

This task will consider the findings of Subtask 6.2.1 and investigate potential alternative intake locations for the City such as in the Deschutes River or in Tumalo Creek. The following activities will be performed in this subtask:

- *Identification of Probable Diversion Options*–The Consultant Team will identify probable diversion, intake, and screening options
- *Facilities and Site Concept Development*–The Consultant Team will develop concept level plans for intake alternative sites.
- *Cost Benefit Analysis*–The Consultant Team will develop probable CIP costs and probable O&M costs to an accuracy of +50 to -30 percent. Results of the cost determinations will be used during the preparation of the Financial Plan described in Task 4.
- *Risk Elements*–The Consultant Team will consider the following risk elements: public acceptance, property procurement, and water right procurement as well as long-and short-term water quality and aesthetics such as taste and odor. The potential effects of climate change on alternative intake locations will be considered during this evaluation. The results of this study will be included in TMs 10 and 13.

6.2.4 Skyliner Road Pipeline Evaluation

Prepare an evaluation of the Skyliner Road pipeline that includes an evaluation of the future pipeline route from the Bridge Creek system intake to the Outback facility. This task will include a conceptual look at the proposed pipeline corridor and a brief investigation of possible geotechnical, right-of-way, and permit-related issues that would potentially impact the cost and schedule of the relocation of the two existing conduits.

- Two +50 to -30 percent cost estimates for the pipeline will be prepared as sized with and without a hydro power component.

The results of this study will be included in TMs 10 and 13.

6.2.5 Preparation of TM 10 – Surface Water Source Evaluation

This task will summarize the findings of Subtasks 6.2.1 through 6.2.4 into TM 10, and the information will ultimately be incorporated in TM 13–Water Resources Evaluation Report.

6.3 Groundwater Supply Alternatives

6.3.1 Aquifer Production and Long-Term Sustainability Evaluation and Probable Well Site Evaluation

- *Verify Well and Aquifer Capacities and Trends*–Review available data to evaluate the pumping capacity of the aquifer given hydrogeologic and regulatory constraints and spatial variability in yield across the City, assess trends in groundwater levels, and evaluate potential relationships with precipitation and river flow variability.

- *Evaluate Sustainable Pumping Capacity of Aquifer under Future Pumping Scenarios, and Mitigation Requirements*–Review available historical well production and water level data provided by the City to identify current trends in the aquifer.
- *Identify and Manage Impacts to Other Local Groundwater Users*–Identify potential impacts to other groundwater users, such as irrigation districts and private water companies, from increased pumping to meet the City's future needs.
- *Assess Water Quality Issues*–Review available groundwater quality data provided by the City and assess if future well locations and additional groundwater supply will change the aesthetic characteristics of the supply.
- *Evaluate Well Siting Issues*–Evaluate potential mitigation program zone-of-impact issues, land ownership, infrastructure limitations, or other issues that must be considered that add cost to the project scenarios.
- *Identify Future Regional Basin-wide Issues*–Develop and evaluate the likely future political, regulatory and cultural issues within the basin that are likely to impact Bend's long-term water groundwater production capacity.

6.3.2 Hydraulic Modeling of Connecting Alternative Groundwater Well Sites to Distribution System

The Consultant Team will use the existing hydraulic model to evaluate the effect scenarios containing groundwater alternatives have on the existing distribution system. This will provide planning level information to develop piping improvement costs for these alternatives.

6.3.3 Concept Development Plan

Prepare a concept development plan for facilities associated with alternatives that will be included as part of TM 11. Issues investigated under this task shall include access, site preparation, well construction, well head facilities, power sources, water transmission, water storage and re-pumping.

6.3.4 Cost/Benefit Analysis

Conduct a cost/benefit analysis of groundwater alternatives and related water resources alternatives identified and studied as part of Task 6. Cost analysis shall include identification of probable capital improvement costs, probable O&M costs and risk elements.

Benefit analysis shall consider such items as public acceptance of groundwater in lieu of surface water, property procurement, water rights procurement, long-term water quality and climate changes.

The cost/benefit analysis will be included as part of Subtask 6.3.5, TM 11.

6.3.5 TM 11. Groundwater Source Evaluation

Following the cost benefit analysis, a report will be developed documenting the alternatives investigated and ranking the alternatives. The Consultant Team will prepare a TM 11 comparing the groundwater source alternatives. This information will ultimately be incorporated in TM 13–Water Resources Evaluation Report.

6.4 Groundwater with Aquifer Storage and Recovery (ASR) Evaluation

Conduct a preliminary ASR feasibility evaluation to assess both the traditional use of an ASR system as a means to store excess winter water, as well as assess the potential of using it as a mitigation tool by timing discharges of injected water to benefit surface water flows. The key issue to understand in this evaluation is the fate of the water after it is injected. The movement and discharge of the ASR-injected water to the

surface water system and the timing of this will play a major part in the potential recoverable percentages allowed by the Oregon Water Resources Department (OWRD), and/or as potential use for mitigation.

The preliminary ASR feasibility evaluation will use existing published and unpublished information from the City, OWRD, the USGS, and other readily-available sources to refine, as necessary, a conceptual hydrogeologic model in the area, and to develop alternative ASR operational scenarios. The USGS Deschutes Basin groundwater model will be used to evaluate the fate of injected water by assessing the effect of injection on groundwater flow velocities, groundwater levels and discharge to surface water in the system. Based on evaluation of the ASR scenarios, estimates of recovery efficiencies and potential enhancements to surface water flow will be developed, which in turn will be used to identify alternatives for using ASR to increase available ground water capacity during peak demand periods either through direct recovery of injected water, or to mitigate for additional groundwater pumping.

In addition, the evaluation will identify key uncertainties that would need to be addressed through additional data collection to verify ASR feasibility, and outline costs to test and implement an ASR feasibility study. The ASR evaluation (TM 12) will include the following scope elements:

- Preliminary ASR Feasibility Evaluation
- ASR Modeling
- Scope and cost to conduct a more detailed ASR feasibility study.

6.5 Water Rights and Water Strategy Support

Integrate water rights information into preliminary alternatives development, including water rights for hydro power generation. GSI will work closely with the remainder of the Consultant Team during the initial up-front alternatives evaluation to be sure the team members understand the opportunities, impediments, regulatory requirements, and basin-wide context of the City's current water rights, potential additional water rights and water right transfers and how those fit into alternatives being considered.

6.6 Water Resources Evaluation Report

TM 13, will be developed documenting the alternatives investigated and summarizing the findings of the Subtasks 6.1 through 6.5. TM 13 will incorporate information as needed from Tasks 3, 4, 7, and 8 to adequately describe the alternatives evaluated.

Deliverables:

- Water Resources Work Session Summary
- TM 10. Surface Water Source Evaluation (draft and final)
- TM 11. Groundwater Source Evaluation (draft and final)
- TM 12. ASR Evaluation (draft and final)
- TM 13. Water Resources Evaluation Report (draft and final)

Task 7. Water Treatment Evaluation

Background and Purpose: To evaluate treatment needs for the existing surface water supply, as well as other supply alternatives investigated as part of this project. This task will explore possible locations for a water treatment facility, and examine potential water treatment technologies. It includes coordination with the Consultant Team to ensure that treatment requirements and those are integrated with alternatives that are investigated as part of Task 6. As part of this task, the Consultant Team will:

- Review the modeling and verify proper hydraulic profile needed for hydro generation and a water treatment plant.
- Review membrane filtration options and ultraviolet (UV) disinfection options to meet the EPA *Long-Term 2 Enhanced Surface Water Treatment Rules* (LT2) requirements for the Springs/Bridge Creek water supply.
- The following technologies will be investigated (assuming a capacity to treat 13.5 million gallons per day [mgd]):
  - UV disinfection
  - Membrane filtration (submerged and pressure)
- Identify ancillary equipment including chemical feed systems
- Identify any impacts of water treatment on water use efficiency and conservation.

Activities:

7.1 Treatment Criteria and Project Treatment Needs Review Workshop

A workshop with the City and Consultant Team will be conducted to discuss and confirm project needs. A overview of treatment technology will be presented.

7.2 Evaluate Treatment Alternatives

This subtask includes evaluation of treatment alternatives as they apply to regulatory requirements, results of data gathering and review, and the results of Subtask 7.1. It will include coordination with other Consultant Team members to ensure the proper integration of treatment studies with other alternatives being evaluated. This subtask will also refine treatment alternatives and needs in preparation for the Water Treatment Evaluation Work Session as described in Subtask 7.4.

7.3 Evaluate Water Treatment Plant Locations

The Consultant Team will review the considerations that could apply to meeting the LT2 requirements for other possible water supply locations–on the river centrally located in Bend, or on one of the irrigation canals.

7.4 Water Treatment Evaluation Work Session

Once the evaluations of potential water treatment alternatives have been completed, a work session will be conducted to select a path forward. In the workshop, the City and Consultant Team will assess the relative merits of pursuing one of the alternate treatment sites.

7.5 Water Treatment Evaluation and Recommendation

Following the work session, a TM 14 will be developed documenting the alternatives investigated, comparing the merits of each alternative, and recommending a preferred alternative. Evaluation shall include all

necessary components for reliable 13.5 mgd treatment capacity with redundancy of elements, and shall include a planning level, net present worth analysis that includes capital cost and O&M costs.

Deliverables:

- Water treatment evaluation workshop summaries (two workshops total)
- TM 14. Water Treatment Evaluation (draft and final versions)

Task 8. Hydroelectric Power Evaluation

Background and Purpose: To investigate whether hydropower generation is a feasible option—specifically whether hydro power can be integrated into the City's existing distribution system as well as the feasibility of hydro as a component of different water supply alternatives that are investigated as part of this project. The analysis will include a review of the impacts of the hydropower options on the water system's water use efficiency and established and future conservation programs.

The Consultant Team will review the costs, technology, and feasibility of hydropower generation from the Springs/Bridge Creek water supply, at as many as four smaller locations throughout the distribution system, and from the use of ASR injection wells.

Activities:

8.1 Evaluate Outback Location and Smaller Sites

- Following the Kickoff Meeting, select members of the Consultant Team will visit each of the potential hydropower facility locations.

8.1.1 Facility Requirements

- The Consultant Team will identify and size the hydropower equipment and required structures for each site. A minimum of two generation alternatives and associated facilities will be identified for the Outback site, and one concept for up to three smaller hydro sites and an ASR well.
- The Consultant Team will contact manufacturers of small hydro turbine/generators to obtain equipment sizing and budgetary cost estimates. Facility layout sketches (one sketch for each alternative) will be prepared in enough detail to represent the recommended improvements and to prepare construction cost estimates.

8.1.2 Power Distribution

Potential sources of power sales agreements will be identified and the interconnection fees and/or other requirements associated with these agreements identified for each generation alternative. These fees will be rolled into the opinion of probable construction costs.

8.2 Distributions System and ASR Injection Well Micro-hydro Evaluation

Locations for micro–hydropower generation development will be investigated within the water distribution system and at ASR injection wells. There currently appears to be at least three sites that have potential to cost-effectively produce power within the distribution system. Issues to be investigated include infrastructure requirements, proximity to power lines, cost/benefit analysis, and non-cost factors such as impacts to neighborhoods such as noise and aesthetics. In addition, the Consultant Team will investigate whether new or replacement water distribution mains can be wrapped into these hydro projects in order to obtain favorable non-City funding.

8.3 Hydropower Evaluation Work Session

Once all the evaluations of potential hydropower alternatives have been completed, a work session will be conducted to select a path forward and arrive at a shortlist of alternatives that will warrant further investigation and evaluation.

8.4 Hydropower Regulatory Evaluation and Utility Coordination

The Consultant Team will identify federal, state, and local building and land-use permitting requirements as may be required for implementing each of the generation alternatives identified. In addition, applicable Federal Energy Regulatory Commission (FERC) licensing requirements will be identified for each generation alternative. The Consultant Team will coordinate with local utilities to understand potential constraints surrounding integration of hydro alternatives with existing infrastructure and local utility regulations.

8.5 Hydropower Evaluation and Recommendation Report

Following the hydropower evaluation and work session, TM 15 will be prepared documenting the alternatives investigated and recommending preferred alternatives. TM 15 will identify the hydropower generation capacity at each site by analyzing the present and future capacity. Projected water flows for each site including winter average, annual average, and peak season average flow rates by year for the next 30 years will be reviewed. It is assumed that the City can provide available pressure at each of the sites for hydropower. From this flow and available head data, the Consultant Team will analyze the projected available power from each site under seasonal operating conditions. Projected flow and head duration curves will be prepared for each site to select the optimum turbine selections that will provide the greatest generation.

The purpose of this subtask will be to determine a seasonal and yearly estimate of energy production in megawatt hours (MWH) for each site.

8.6 Cost and Schedule

The Consultant Team will prepare an opinion of probable construction costs in 2009 dollars for each of the generation alternatives identified. Other project costs in the economic evaluation will include engineering design, permitting, interconnection fees, and yearly O&M costs.

A design and construction schedule will also be prepared identifying the time needed for design, permitting, and construction of each alternative.

TM 16 summarizing the economic evaluation will be prepared. The economic feasibility of a hydro facility at each site will be evaluated and preliminary recommendations identified.

Deliverables:

- TM 15. Hydro Power Option Evaluation (draft and final)
- TM 16. Economic Evaluation Summary (draft and final)

Task 9. Efficiency and Conservation Evaluation

Background and Purpose: To update existing water conservation measures employed by the City, identify and describe new efficiency and conservation measures developed in the alternatives analysis, and quantify and/or rank the measures.

Activities:

9.1 Evaluate the Existing Conservation Measures

The Consultant Team will review the existing water conservation program of the City and develop a listing of potential enhancements, including an estimation of benefit.

9.2 Evaluate the Water Use Efficiency Impact of Identified Water Supply Alternatives

The Consultant Team will compile and evaluate the benefit obtained from water use efficiency generated by the alternatives developed in Tasks 6, 7, and 8.

9.3 Conservation Workshop and Recommendations

Once a listing has been compiled of potential improvements to the existing City conservation measures and the conservation impacts of the considered supply alternatives, a work session will be conducted with the relevant consultant and project team members to develop recommendations for improvements in the City's conservation measures and then generate a conservation/water use efficiency impact/rating for use in the BCE of the water supply alternatives in Task 10. The results of the workshop will be summarized in TM 17.

Deliverables:

- Evaluation of existing conservation measures
- Water use efficiency options for alternatives
- TM 17. Conservation Improvement Recommendations and Alternative Efficiency Impacts (draft and final)

Task 10. Alternatives Evaluations and Selection of Recommended Plan

Background and Purpose: Summarize the findings of the Water Supply Alternatives and Perform BCE. This process will be done in a workshop format with all stakeholders present. The criteria developed in Task 3 will be used to help narrow the field of alternatives to three or four. The second part of this task will involve conducting an in-depth evaluation of the preferred alternatives. This evaluation will involve updating the alternatives specific permit requirements, understanding their potential impact on the financial plan and subjecting them to the Consultant Team's formal BCE process.

Activities:

10.1 Final Screening and Selection of Preferred Alternatives

The alternatives developed in Tasks 6, 7, and 8 will be reviewed against the LOS requirements and other evaluation criteria. The top three alternatives will be selected for more detailed analysis.

10.2 Update Financial Plan and Permit Requirements on Preferred Alternatives (including capital, O&M etc.) and Identify Impacts and Risk

The economic impact of each one of the preferred alternatives will be incorporated into the financial plan developed in Task 4. The results will be presented in an overall spreadsheet for evaluation.

- This subtask also involves updating the preliminary permit requirement assessment on the different alternatives developed in Subtask 3.7. The assessment shall identify the various permits needed to develop each alternative, their potential impacts on project schedules, approximate cost, and overall impacts on the project.

10.3 Analyze Life-Cycle Costs Using Net Present Value

Following development of the utility direct costs of capital and ongoing O&M and refurbishment/replacement costs, the Consultant Team will utilize the results of the LOS Work Session performed as part of Subtask 3.5 to provide guidance and support for the City staff as they develop benefits, ownership costs, risk assessments, and customer service impacts of various water system improvements.

The Consultant Team will also prepare the life-cycle cost analysis template for review by the City and relevant stakeholders. The Consultant Team, the City and relevant stakeholders will review the interim cost and benefit work on the alternatives.

10.4 Complete a Sensitivity Analysis of the Cost Assumptions

The financial impact of various assumptions will be tested using a sensitivity analysis. For example, a range of probabilities will be assigned to some of the risk factors to understand how influential the impact of the failure might be in the alternative rankings. Further, a cost range can be assigned to some of the potentially controversial environmental and community impacts. The output of these efforts will be reviewed for purposes of identifying the alternative's life cycle cost range.

10.5 Final Recommended Plan Selection Work Session

After the net present value model has been completed including the sensitivity analysis that has been conducted on the key assumptions and cost ranges for the key environmental and community impacts and risks, the output will be reviewed in a work session for purposes of identifying the option with the overall lowest life-cycle cost of ownership.

The work session will be held with all stakeholders to determine a long term water supply alternative for this project. The work session will involve summarizing the entire process, confirming the assumptions and technical data used to develop the preferred alternatives, reviewing their impacts on the financial plan, reviewing the BCE of each alternatives and insuring that each alternative meets the level of service determination developed in Subtask 3.5.

10.6 Final Recommendation and Implementation Plan Report

The Consultant Team will prepare a draft report describing the work and including the descriptive, qualitative, and quantitative materials developed. The report will include detailed life-cycle cost analyses for each alternative evaluated as well as the initial recommendations as to the preferred alternatives. TM 18 will be distributed to the City and relevant stakeholders for review. The BCE methodology will be documented and a flow chart of the decision-making process will be included in the report. Input received will be incorporated into a final report.

Deliverable:

TM 18. Recommendation and Implementation Plan (draft and final)

Task 11. Final Report

Background and Purpose: Prepare a final report containing the findings and recommendations of the study.

Activities:

11.1 Compile Final Report

A final report will be compiled from the TMs and reports produced for the study. An executive summary will be prepared. The report will be provided to the City for review. After incorporating review comments, a final version will be prepared.

11.2 Print and Distribute Final Report

Ten (10) printed copies of the final report and four (4) CDs of the complete report will be provided to the City.

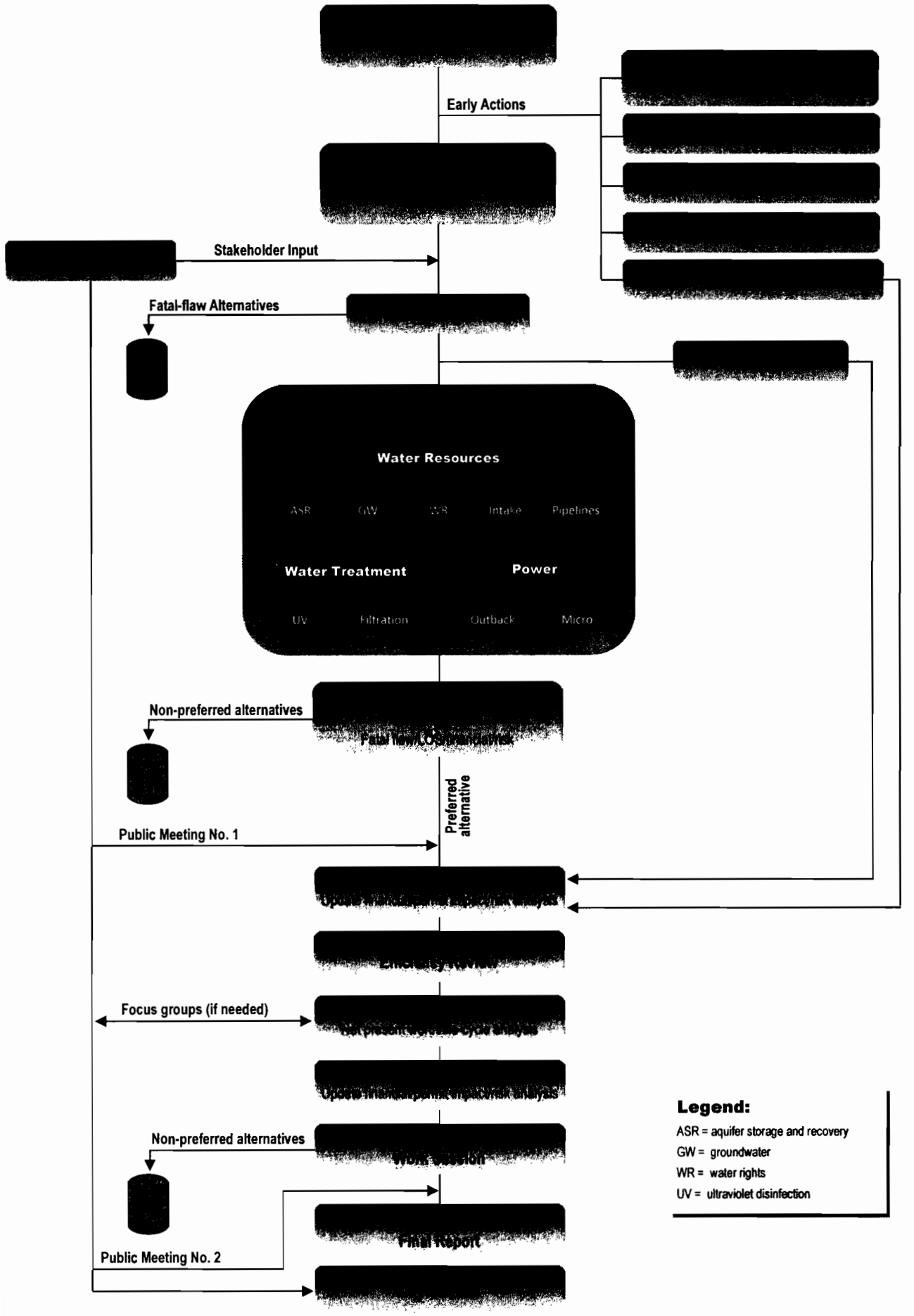


Figure 1. Project Flow Chart

ATTACHMENT 2 – JOINT LETTER OF SUPPORT

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT

JOINT LETTER OF SUPPORT FOR THE CITY OF BEND'S LONG-TERM WATER SUPPLY ALTERNATIVES ANALYSIS AND CONSERVATION GRANT APPLICATION

We, the undersigned, wish to jointly express our strong support for the City of Bend's long-term water supply Alternatives Analysis as well as the City's application to the Oregon Water Resources Department for a Water Conservation Grant to help fund that important project. We are all stakeholders in the Deschutes Basin and are deeply committed to the wise long-term management of the area's water resources.

The Alternatives Analysis will comprehensively examine Bend's existing and future water sources and supply needs, analyze options to best configure its water system infrastructure and water rights to meet growing demand, determine financial impacts and funding sources for preferred alternatives, and identify opportunities to maximize conservation and prudent utilization of limited water resources.

The Alternatives Analysis will consider hydroelectric power potential, water rights, water quality and treatment, outside funding opportunities, long-term operation and maintenance costs and non-economic factors such as potential disruptions to the public and ease of implementation. The overall goal is to arrive at a preferred alternative which will meet the City's long-term water supply needs in the most efficient manner.

The City of Bend's application for a Water Conservation Grant to help fund the Alternatives Analysis is highly appropriate, in light of the definition of "conservation," which includes:

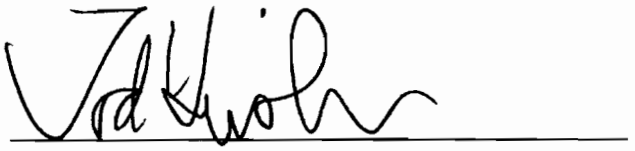
- the planned management of a natural resource to prevent exploitation, destruction, or neglect;
- official supervision of rivers and other natural resources in order to preserve and protect them through prudent management; and
- the careful utilization of a natural resource in order to prevent depletion.

We all know that resource users must be wise resource stewards in order to sustain both the user and the resource over time. Water is a critical resource in the Deschutes Basin, and it is incumbent on the City of Bend, as a primary user of those water resources, to thoroughly examine options for meeting growing demand in the most efficient and conservation-minded manner over the long-term. This is the essence of the conservation project that the City of Bend is undertaking.

Each individual and entity that has signed this letter reserves the right to participate fully in the study process and may or may not support specific conclusions reached at the conclusion of these studies. Nonetheless, we strongly believe that the City of Bend must undertake this type of comprehensive water planning analysis.

As the community grows, it is essential that the City of Bend aggressively pursues the most prudent management of its water resources. By integrating efficiency and conservation so thoroughly into its water supply planning efforts, the City will uphold its responsibility to its residents and user groups as well as the natural environment for many years to come. We are confident that the grant funds requested by the City, and the long-term water supply Alternatives Analysis, will directly and substantially assist the City in meeting these important goals.

SIGNATURE PAGE FOR THE
JOINT LETTER OF SUPPORT FOR THE CITY OF BEND'S
LONG-TERM WATER SUPPLY ALTERNATIVES ANALYSIS
AND CONSERVATION GRANT APPLICATION



Signature

Tod Heister

Print Name of Person Signing

Deschutes River Conservancy

Print Name of Organization or Entity, if Applicable

8/22/08

Date

SIGNATURE PAGE FOR THE
JOINT LETTER OF SUPPORT FOR THE CITY OF BEND'S
LONG-TERM WATER SUPPLY ALTERNATIVES ANALYSIS
AND CONSERVATION GRANT APPLICATION

Signature

Ryan Houston

Print Name of Person Signing

Upper Deschutes Watershed Council

Print Name of Organization or Entity, if Applicable

8/20/08

Date

SIGNATURE PAGE FOR THE
JOINT LETTER OF SUPPORT FOR THE CITY OF BEND'S
LONG-TERM WATER SUPPLY ALTERNATIVES ANALYSIS
AND CONSERVATION GRANT APPLICATION

Signature

STEVEN C JOHNSON

Print Name of Person Signing

CENTRAL OREGON IRRIGATION DISTRICT

Print Name of Organization or Entity, if Applicable

26 August. 2008

Date

**SIGNATURE PAGE FOR THE
JOINT LETTER OF SUPPORT FOR THE CITY OF BEND'S
LONG-TERM WATER SUPPLY ALTERNATIVES ANALYSIS
AND CONSERVATION GRANT APPLICATION**

Elmer G McDaniels

Signature

ELMER G McDANIELS

Print Name of Person Signing

TUMALO IRRIGATION DISTRICT

Print Name of Organization or Entity, if Applicable

8-27-08

Date

ATTACHMENT 3 – PROJECTED DEMAND

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT

Table 5-5
City of Bend
Total System Demand to Build-Out of the UGB (MGD)

Metered Residential (1)	5.71	6.27	6.37	6.48	7.99	8.46	8.97	9.35	10.19	11.09	10.79	12.06	13.47
Commercial	3.98	4.37	4.44	4.51	5.56	5.89	6.25	6.51	7.09	7.72	7.52	8.40	9.38
Schools	0.24	0.27	0.27	0.28	0.34	0.36	0.38	0.40	0.43	0.47	0.46	0.51	0.57
Mtr. Demand Sub-Total	9.93	10.91	11.08	11.26	13.89	14.72	15.60	16.26	17.71	19.29	18.77	20.97	23.42
Non-revenue water (2)	0.97	1.30	1.32	1.34	1.66	1.75	1.86	1.94	2.11	2.30	2.24	2.50	2.79
Conservation Savings (3)		(0.30)	(0.35)	(0.41)	(0.80)	(0.94)	(1.08)	(0.96)	(1.13)	(1.30)	(1.14)	(1.34)	(1.54)
Demand Buffer (10%) (5)		2.69	2.72	2.76	3.33	3.51	3.70	3.89	4.22	4.59	4.49	5.00	5.57

(1) Includes metered and unmetered Residential demand.
(2) In 2003, non-revenue water was 9.8% of metered demand (see Table 5-4) and in future years it was calculated at 11.9% of metered demand.
(3) Conservation savings for 2003 not calculated. For the method used to calculate future savings, see Section 3, Water Conservation Element.
(4) The sum of demand in 2003 does not equate to actual ADD or MDD figures because unmetered Residential demand was not incorporated into Residential demands.
(5) A demand buffer represents 10% of maximum day demand. A demand buffer was not a component of total system demand in 2003.
(6) A peaking factor of 2.26 was used to forecast MDD in 2005 to 2035. The peaking factor was not applied to the demand buffer, though the demand buffer is a component of MDD.

ATTACHMENT 4 – POPULATION PROJECTIONS AND DEMAND SUMMARY

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT

development. Based on historical water production records the peak hour demand is estimated to be equal to 1.5 times the Maximum Day Demand (MDD) (See Table ES-1).

Table ES-1
Population Projections and Water Demand Summary

Year	Water Service Area Population	Water Demand (mgd)		
		Average Day Demand (ADD)	Maximum Day Demand (MDD)	Peak Hour Demand [5]
2005	52,941	11.3 [1]	26.9 [2]	40.4
Saturation Development[6]	103,000	30.7 [3] [6]	71.5 [4] [6]	107.3[6]

Notes:
(1) Existing Average Day Demand based on 2005 water use records.
(2) Existing Maximum Day Demand based on 2005 water use records.
(3) Average Day Demand equals the Population multiplied by the estimated average daily per capita usage for the service area (250 gpcd).
(4) Maximum Day Demand equals the Population multiplied by the estimated maximum daily per capita usage for the service area (590 gpcd).
(5) Peak Hour Demand equals 1.5 times the Maximum Day Demand
(6) Includes Juniper Ridge ADD, MDD and Peak Hour Demand of 4.75, 10.67 and 16.0 mgd, respectively.

Planning and Analysis Criteria

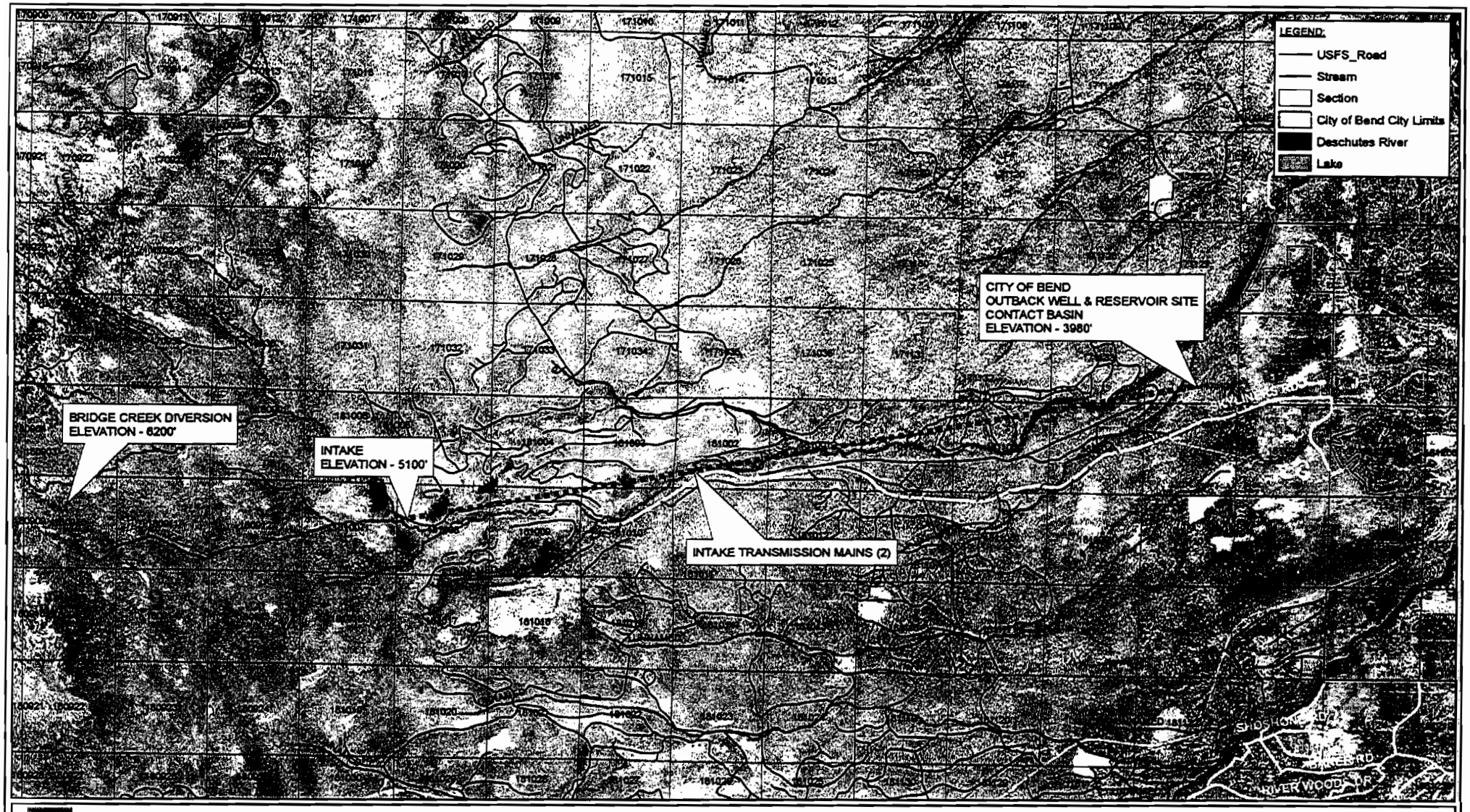
Criteria for the analysis of the City of Bend water system are summarized as follows:

- The City's supply, treatment and transmission systems should be capable of providing estimated maximum day demands through the end of the 25-year planning period.
- Water storage capacity should provide for operational, fire, and emergency storage capabilities.
- Water storage capacity should be provided to each pressure zone where practical.
- Pressure zones should be established so that the maximum service pressures do not exceed 120 pounds per square inch (psi).
- The distribution system should be capable of delivering the maximum day demand while maintaining a minimum service pressure at the highest point in the service zone of 40 psi.
- Distribution main lines should be looped and should not be less than 8 inches in diameter unless there are no fire hydrants and/or is no potential for future extension of the main line.
- Pump stations that pump to a reservoir should be sized to supply the maximum day demand to the areas served.

ATTACHMENT 5 – SURFACE WATER SYSTEM

CITY OF BEND'S APPLICATION FOR A

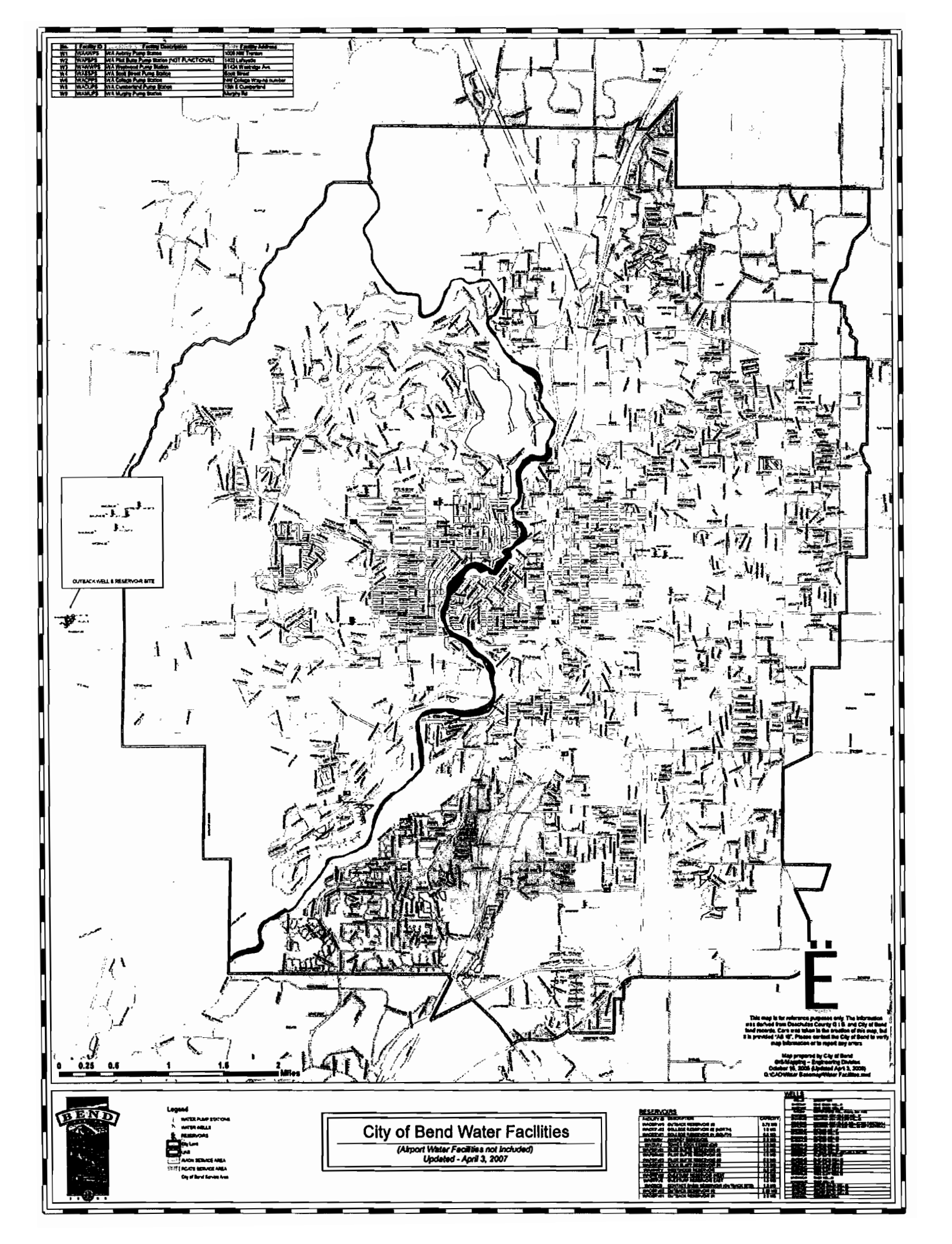
SB 1069 WATER CONSERVATION GRANT


LEGEND:
USFS_Road
Stream
Section
City of Bend City Limits
Deschutes River
Lake
CITY OF BEND
OUTBACK WELL & RESERVOIR SITE
CONTACT BASIN
ELEVATION - 3980'
BRIDGE CREEK DIVERSION
ELEVATION - 6200'
INTAKE
ELEVATION - 5100'
INTAKE TRANSMISSION MAINS (2)
SHOSHONE
RIVER WOODS DR
BEND
CITY OF BEND
SURFACE WATER SYSTEM
April 3, 2008
Miles
0
0.5
1
2
3
4

ATTACHMENT 6 – WATER FACILITIES

CITY OF BEND'S APPLICATION FOR A

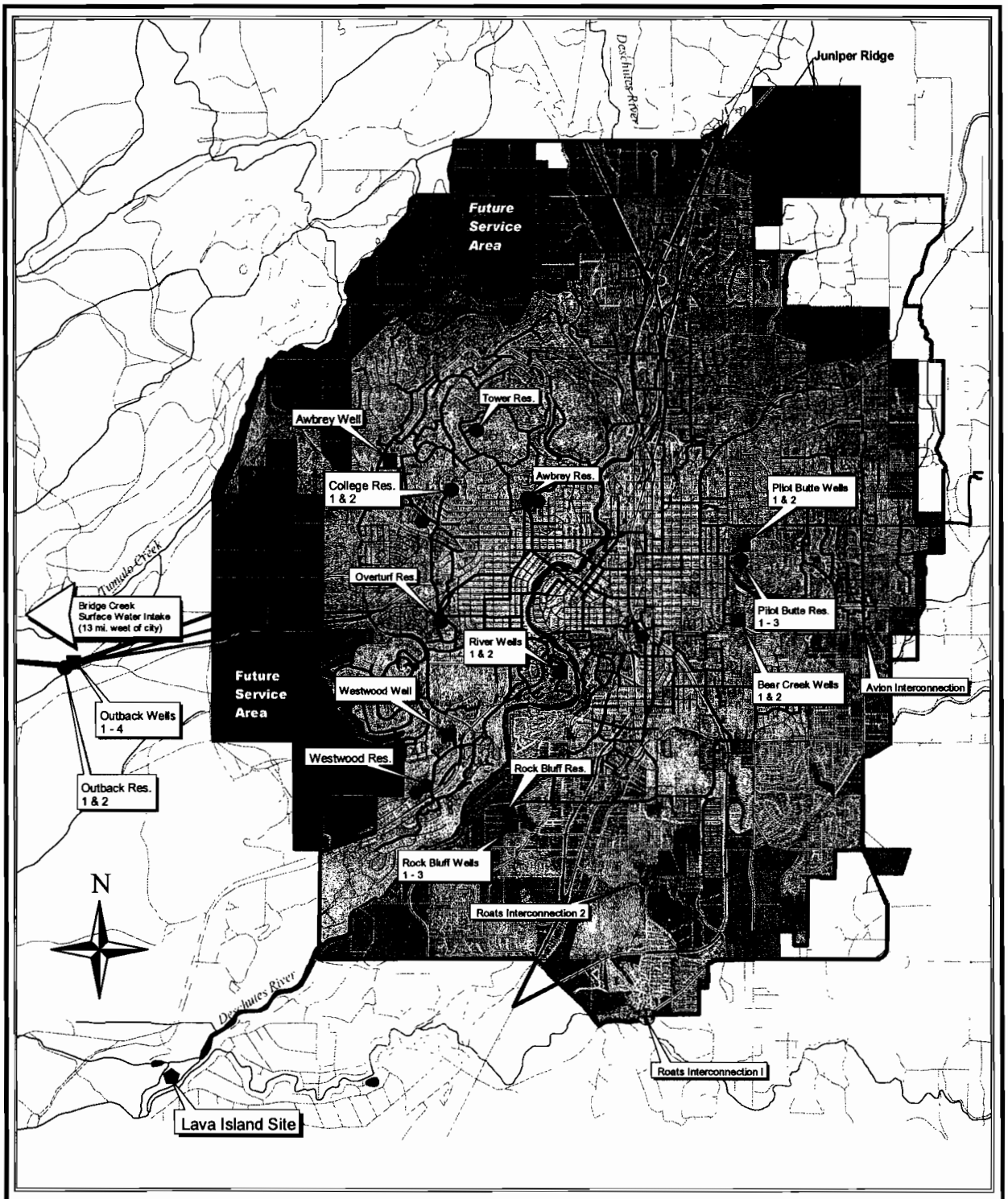
SB 1069 WATER CONSERVATION GRANT


OUTBACK WELL & RESERVOIR SITE
0 0.25 0.5 1 1.5 2 Miles
This map is for reference purposes only. The information was derived from Deschutes County GIS and City of Bend land records. Care was taken in the creation of this map, but it is provided "AS IS". Please contact the City of Bend to verify map information or to report any errors.
Map prepared by City of Bend
GIS Mapping - Engineering Division
October 16, 2006 (Updated April 3, 2007)
G:\CAD\Misc Basemap\Water Facilities.mxd
BEND
Legend
WATER PUMP STATIONS
WATER WELLS
RESERVOIRS
City Limit
UGB
PRESSURE ZONE SERVICE AREA
City of Bend Service Area
City Water Facilities
(Airport Water Facilities not included)
Updated - April 3, 2007
RESERVOIRS
WELLS

ATTACHMENT 7 – WATER SYSTEM MAP

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT



Legend

- Avion or Roats Interconnections
- Lava Island Site
- Existing Well
- Reservoir
- Pump Station
- Bridge Creek Surface Water Intake (off map)
- City Limits
- Urban Reserve Area
- Major Water Lines
- Minor Water Lines
- Rivers
- Roads
- Urban Growth Boundary
- Bend Service Area
- Future Bend Service Area
- Roats Water System
- Avion Water Company
- Old Juniper Utility Company (Bend Service Area)

0.5 0 0.5 1 Miles

EXHIBIT 2-1
City of Bend
Water System Map

Div. 86-140 [8]

March 2004

ees Economic and Engineering Services, Inc.
Bellevue Mount Vernon Olympia Portland Tri-Cities

03/12/2004 5:03:14 PM M:\ArcView\Bend\Bend.apr

ATTACHMENT 8 – 2007 CONSUMER CONFIDENCE REPORT

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT

City of Bend
2007
Consumer Confidence Report

Letter From Staff

The slowdown in growth during the past year has provided both challenges and opportunities for the City of Bend Water Division. The slowdown has allowed us the opportunity to review our priorities and needs, as well as assess our existing programs. In addition, the slowdown has allowed us to get back to the basics for doing preventative maintenance and re-establishing programs that have not been active in many years. Some of these programs include system flushing, valve maintenance, hydrant maintenance, safe drinking water through backflow maintenance and enforcement, and water conservation programs.

In addition to looking at our maintenance and regulatory requirements, we also looked at industry standard benchmarks for staffing and maintenance. In both key benchmarks we are significantly behind industry standards. Most significant was that we are at approximately half the industry standard for staffing, and do more work that is classified as "urgent response" compared to work that is "planned maintenance". We expect to improve both of these through technology and utilization of other utility staff and resources.

Our Water Master Plan (WMP) was completed in 2007 and identified $180 million in water infrastructure needs over the next twenty-five years. The WMP not only identified new infrastructure needs to meet new growth demands, but also identified the needs for upgrading and replacing existing infrastructure that is reaching the end of its normal life cycle.

The most significant infrastructure improvements will be with our unfiltered surface water supply coming from Bridge Creek. There are three major issues facing our surface water supply that is currently estimated at $50 million to rectify and will need to be paid for in the next five years. The surface water infrastructure that supplies the City with 50% of our water supply on an annual basis is 80 years old and showing signs of stress. In addition to the age and indications of potential failure, the watershed itself is in threat of a stand replacement fire. In the event of a fire or transmission main failure, our ability to take surface water would be suspended indefinitely. Lastly, regulatory actions by the Environmental Protection Agency are requiring that we install a treatment facility by 2012. The treatment will remove the potential threat of cryptosporidium entering the system, which currently can not be removed by chlorine. The treatment will also allow us to continue to take surface water even if a fire occurs since the treatment would remove the sediments. During this next year we will be studying all alternatives for our surface water supply and will be bringing those to the community for their input on the next hundred years of water supply for the City of Bend.

All of the factors mentioned here are driving the need for additional revenue. The City assembled a staff advisory committee made up of community members to review these needs and look at new ways of recovering the needed revenue. This process will take several months and we have begun our public outreach to inform the community of what the potential impacts could be to their water bill. Feedback received will be taken back to the Bend City Council. Look for announcements regarding when these public outreach meetings will occur.

The City of Bend is required and pleased to provide this annual Consumer Confidence Report (also known as a Water Quality Report). The purpose of the report is to inform our customers of the location of our water sources, programs implemented to maintain the quality of the water, and the analysis used to ensure that the water delivered to you is safe, reliable, and of the highest quality.

We consider it a privilege to serve you and we invite you to read this report and share your comments. If you have any questions or concerns, please call us at 317-3000.

Thank you,

Tom Hickmann P. E. - Water Utility Manager

Water Sources

The City of Bend is fortunate to be located in the Deschutes Basin, one of the most stable and productive watersheds in North America. Our water sources include both surface water and ground water. The City's surface water supply comes from a protected and isolated watershed, and our ground water supply is from the Deschutes regional aquifer which is deep and recharged annually by precipitation that falls in the high Cascades. Annual snowmelt and precipitation supplies the aquifer with an average recharge of 3800 cubic feet per second (cfs) annually, according to a United States Geological Survey groundwater study. This equals about 2.4 billion gallons per day entering the aquifer when averaged over the year.

Bend's surface water is diverted from Bridge Creek, a small stream south of Tumalo Creek about 11 miles west of Bend. It has served as Bend's source of drinking water since 1926 and can provide 13.6 million gallons, or 41.4 acre feet, of water per day. The Bridge Creek watershed is spring-fed and consists of 3,200 acres of actual drainage area. Most of the watershed is pristine, old growth forest and is owned entirely by the United States Forest Service.

To protect the water you drink, access to the watershed is restricted to a trails only access which requires a permit. No motorized vehicles, no camping, no fires, no bicycles, no domestic animals, including dogs, are allowed.

The City of Bend's other sources of water consist of nine (9) well fields. Well depths range from 400 feet to 1,000 feet. The water quality of these wells is very similar to our surface source. The wells are used to meet supply demands during peak summer months and when the surface water source quality is not acceptable due to turbidity from snow melt or heavy precipitation.

The City of Bend's typical average winter day demand is approximately 6 million gallons, or 18.4 acre feet, of water per day. Our one day summer peak used just over 27 million gallons, or 84 acre feet, of water in late July 2007. Total water use was 4.7 billion gallons, or approximately 14,000 acre feet, during the 2007 calendar year. Even with our adequate supply, efficient use of water is the best long term strategy for protecting the Deschutes Basin water resources.

Water Supply System

The City of Bend's water supply infrastructure consists of approximately 450 miles of pipe, 15,000 valves, 15 storage reservoirs, 23 individual wells, 4 pump stations and 23,700 service connections. These facilities are inspected, maintained and operated by approximately 30 professionally trained and state certified staff to ensure a reliable supply of high quality drinking water. Water samples are collected on a regular basis throughout the distribution system to verify all water quality parameters are being met or exceeded. This ensures that fresh water is always available to your tap.

What We Do Day After Day, Year After Year

The City of Bend delivers water that is a clean, quality product. All the information contained in this report has been collected and reported in accordance with the rules and regulations of the Environmental Protection Agency (EPA) and the Oregon Department of Human Services Drinking Water Program. Each day, City employees work around-the-clock to ensure that the water provided meets or exceeds these standards and expectations.

"City employees work arou
the water provided meets or
expectations for safety,

This report contains information concerning the following water systems operated by the City of Bend:

1. **City of Bend - Water System Identification (WSID) #4100100**
2. **Bend Municipal Airport – WSID #4194978**

Samples are collected monthly from these two water systems and are tested for coliform bacteria (an indicator of contamination) and chlorine residuals (level of disinfectant). Bridge Creek water is tested every working day during the year to monitor and track potential pathogens in the disinfection process. Inorganics and organics are tested every three years. These are either naturally occurring or human made and can enter into your water system through improper disposal of chemical solutions or unprotected cross connections. Lead and copper samples are collected once every three years from customers' taps that are most likely to contain those substances based upon when the home was built. The monitoring and reporting of these results are sent to the Oregon Department of Human Services Drinking Water Program.

ınd-the-clock to ensure that
exceeds these standards and
reliability and quality."

Safe Drinking Water

To ensure that tap water is safe to drink, the EPA sets water quality standards and establishes testing methods and monitoring requirements for water utilities. The EPA sets maximum levels for water contaminants and requires utilities to give public notice whenever a violation occurs. Currently, there are more than 120 water quality standards for potential contaminants in drinking water supplies in Oregon.

The EPA prescribes regulations that limit the amount of certain contaminants in water provided by public water systems. This is to ensure that tap water is safe to drink. The Food and Drug Administration (FDA) regulations establish limits for contaminants in bottled water.

Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that the water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

Hydrant Flushing And Water Quality

Annually, water crews will be active in hydrant flushing and distribution valve maintenance. Hydrant flushing is an important part of long term water quality management. During hydrant flushing, water pressures and volumes are recorded to help calibrate the water system's hydraulic computer model. You may notice reduced pressures and discolored water for short periods of time. The overall effect of hydrant flushing results in better water quality and better system control.

Water Quality Monitoring Results

The City of Bend routinely monitors for contaminants in your drinking water according to Federal and State laws. The data in the following tables are from January 1, 2007 to December 31, 2007, unless otherwise noted. Although Bend's water supplies are tested for all regulated and many unregulated contaminants, only contaminants that have been detected in the water are included in this report. Through our monitoring and testing, some contaminants have been detected. The results, however, meet or surpass all State and Federal drinking water standards.

City of Bend Results of Monitoring for Turbidity, Bacteria, Radionuclides, Inorganics and Organics

Variable	Minimum Amount Detected	Maximum Amount Detected	Maximum Contaminant Level (MCL)	Maximum Contaminant Level Goal (MCLG)	Source Of Contaminant
Microbiological Contaminants - PWSID04100100					
Turbidity	.01 NTU	3.06 NTU	5 NTU	N/A	Erosion
Total Coliform	0	0	5% Positive	0	Found throughout the Environment
Radioactive Contaminants - PWSID04100100					
Combined Radium (pCi/L)	0 pCi/L (2003)	1.03 pCi/L (2003)	5 pCi/L	0 pCi/L	Volcanic Mountain Range
Uranium (ppb)	0 ppb (2003)	0.21 ppb (2003)	30 ppb	0 ppb	Volcanic Mountain Range
Inorganic Contaminants - PWSID04100100					
Arsenic (ppb)	0 ppb	2.5 ppb (2004)	10 ppb	0 ppb	Erosion of natural deposits
Barium (ppb)	0 ppb (2006)	2.4 ppb (2004)	2000 ppb	2000 ppb	Erosion of natural deposits
Chromium (ppb)	0 ppb (2006)	1.8 ppb (2003)	100 ppb	100 ppb	Discharge from steel and pulp mills; Erosion of natural deposits
Fluoride (ppm)	0 ppm (2006)	0.14 ppm (2006)	4.00 ppm	4.00 ppm	Erosion of natural deposits
Lead (ppb)	0 ppb (2006)	5 ppb (2002)	15 ppb	0 ppb	Corrosion of household plumbing systems; Erosion of natural deposits
Nickel (ppb)	0 ppb (2006)	1.21 ppb (2003)	100 ppb	N/A	Erosion of natural deposits
Nitrate	0 ppm	0.84 ppm (2005)	10.0 ppm	10.0 ppm	Erosion of natural deposits; Runoff from fertilizer use

Monitoring and reporting of compliance data violations

Our water system failed to sample enough routine coliforms in September and November 2007. We are required to sample 60 routine coliform samples per month; however, due to an oversight, we took 59 samples during each of those months. We have recently implemented a new monitoring and scheduling system which should prevent this type of monitoring oversight in the future.

Definitions

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the Maximum Contaminant Level Goals as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLGs): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Variance and Exemptions: State or EPA permission not to meet an MCL or a treatment technique under certain conditions.

Part per million (ppm); part per billion (ppb): These units describe the levels of detected contaminants. One part per million is equal to one minute in two years, or the distance of one foot (12 inches) which is relative to the distance from Downtown Bend to the Pacific Ocean. One part per billion is equal to one minute in 2,000 years or one foot from the earth to the moon.

Haloacetic Acids (HAAs) and Total Trihalomethanes (TTHMs): Disinfection byproducts that results from a chemical reaction between chlorine and naturally occurring organic or inorganic matter in the water. The disinfection process is carefully controlled to remain effective while keeping disinfection byproduct levels low.

Turbidity and Nephelometric Turbidity Units (NTUs): Bridge Creek is an unfiltered surface water source. Rules for public water systems have strict standards for unfiltered supplies. Turbidity is a measure of the cloudiness of the water and is measured in Nephelometric Turbidity Units (NTU). Precipitation and snow melt are the greatest contributors of turbidity and make disinfection more difficult.

CONTAMINANTS

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs and wells. As water travels over the surface of the land or through the ground it dissolves naturally-occurring minerals, and in some cases radioactive materials, and can pick up substances resulting from the presence of animals or human activity.

Contaminants that may be present in source water include:

- Microbial contaminants, such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.
- Pesticides and herbicides, which may come from a variety of sources such as agriculture, stormwater runoff and residential uses.
- Inorganic contaminants, such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial or domestic wastewater discharges, or farming.
- Organic chemical contaminants, including synthetic and volatile organics, which are byproducts of industrial processes and can also come from gas stations, urban stormwater runoff and septic systems.
- Radioactive contaminants which can be naturally occurring.

Fluoride

Fluoride is a naturally occurring trace element in groundwater and at low levels helps prevent dental cavities. However, the City of Bend does not add fluoride to the water. The United States Public Health Service and the Centers for Disease Control consider the fluoride levels in Bend's water sources to be lower than optimal for helping to prevent decay. You may want to consult your dentist about fluoride treatments to help prevent tooth decay, especially for young children.

Bend Municipal Airport Results of Monitoring for Contaminants

Variable	Minimum Amount Detected	Maximum Amount Detected	Maximum Contaminant Level (MCL)	Maximum Contaminant Level Goal (MCLG)	Source Of Contaminant
Microbiological Contaminants - PWSID#4194978					
Total Coliform	0	0	5% Positive	0	Found throughout the Environment
Inorganic Contaminants - PWSID#4100100					
Arsenic (ppb)	0 ppb	2.5 ppb (2004)	10 ppb	0 ppb	Erosion of natural deposits
Barium (ppb)	2.1 ppb (2004)	3.2 ppb (2004)	2000 ppb	2000 ppb	Erosion of natural deposits
Chromium (ppb)	0 ppb (2004)	1.1 ppb (2004)	100 ppb	100 ppb	Discharge from steel and pulp mills; Erosion of natural deposits
Lead (ppb)	0.93 ppb (2004)	1.04 ppb (2004)	15 ppb	0 ppb	Corrosion of household plumbing systems; Erosion of natural deposits
Nitrate	0 ppm	0.84 ppm (2005)	10.0 ppm	10.0 ppm	Erosion of natural deposits; Runoff from fertilizer use

Nitrates

Nitrates are found at extremely low levels in both surface and groundwater sources and the amounts vary between well locations and surface water. The data in this report represents the high and low amounts detected in our source water. Groundwater and surface water may be mixed in reservoirs and distribution mains before reaching individual homes throughout the distribution system. High levels of nitrates exceeding the Maximum Contaminant Level can contribute to health problems.

Radiological

Radiological detections are measured in Picocuries, which are defined as 2.2 nuclear transformations per second. The source of radiological detections is natural processes in the active volcanic Cascade Mountain Range west of the community.

City of Bend Results of Monitoring By-Products of Water Chlorination

Variable	Maximum Amount Detected	Minimum Amount Detected	MCL	In compliance with EPA
Disinfection By-Products detected in the system - WSIS #4100100				
HALOACETIC ACIDS (HAA5)	27.6 ppb	*ND	60 ppb	Yes
TOTAL TRIHALOMETHANES (TTHM))	22.3 ppb	ND	80 ppb	Yes
Disinfection By-Products detected at the Airport - WSIS #4194978 (Sampled last in 2004 & 2005)				
HALOACETIC ACIDS (HAA5)	ND	ND	60 ppb	Yes
TOTAL TRIHALOMETHANES (TTHM)	2.70 ppb	1.61ppb	80 ppb	Yes

***ND = Not Detected at the Minimum Reporting Level**

Contact Information

At the City of Bend, we value our customers and work hard to ensure your satisfaction. If you have questions or comments about this report or other issues, please call us:

Public Works Customer Service 541 317-3000
Water Conservation Hotline 541-317-3002
Bend WaterWise Program – www.waterwisetips.org

Lead and Copper

The City of Bend continues monitoring tap water samples from a sample group of 30 homes. This group sampling takes place every three years and was last completed in 2006. These are homes where the plumbing may contribute to elevated levels of lead and copper, based on when the house was built. Lead is not usually detected in our water sources. These metals can, however, enter the drinking water supply through corrosion within the water distribution system or in household plumbing systems. Samples are collected at customers' homes after the water has been standing in their plumbing 6-18 hours.

Results of Lead and Copper Sampling at Residential Water

Water System	Variable	90% Percentile Values	Number of sites Exceeding The Action Level	Action Level (AL*)	Source of Contamination
City of Bend PWSID#4100100	Copper	158 ppb	0	1300 ppb	Corrosion of household plumbing systems
	Lead	0	0	15 ppb	Corrosion of household plumbing systems
Bend Municipal Airport PWSID#4194978	Copper	0	0	1300 ppb	Corrosion of household plumbing systems
	Lead	0	0	15 ppb	Corrosion of household plumbing systems

*AL = Regulatory Action Level. The concentration that, if exceeded, triggers treatment or other requirements that a water system must follow

Important Health Information

Some individuals may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons, such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and some infants can be particularly at risk from infection. These individuals should seek advice about drinking water from their healthcare providers. EPA/Centers for Disease Control (CDC) guidelines on appropriate means to lessen the risk of infections by Crypto-sporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791) or by visiting their web site at www.epa.gov/ow.

Pipe failure due to age.

Water Conservation

The greatest demand for water occurs during the summer. It is estimated that outdoor water use makes up 58% of Bend's overall water demand. Bend's summer water use increases dramatically due to outdoor watering demands. To continue to meet peak demands while maintaining fire protection supply needs, we must use water more efficiently on our lawns and gardens. By reducing water consumption at home and at work, we can help delay or prevent spending limited resources on costly new water supply and storage facilities, as well as remain good stewards of the resources we manage.

WaterWise: water isn't all you save

The City of Bend is proud to sponsor the WaterWise Program. This award winning program brings you ongoing water conservation tips, education programs and a network of experts to help you learn how to use water more efficiently.

WaterWise landscaping is beautiful landscaping.

Water Meter Program

Full metering of the community has proven to be very valuable to the conservation and measurement of the water resources in Bend. Approximately 559 new water service connections were made to the water system in 2007 and each of these services were fully metered and fitted with Automated Meter Reading (AMR) devices that allow for remote meter reading and an efficient monthly billing process. In the coming years all of the water meters in the City are slated to be upgraded to the AMR configuration.

Part of our meter program is the systematic replacement of water meters as they age. Meters are replaced every 12 to 15 years to ensure accuracy in the measurement. This replacement plan also allows backflow devices to be installed with the new meter along with the AMR system upgrade. These backflow devices protect and isolate the water distribution system from contaminants that may enter the water distribution system from a water customer's plumbing system. These devices, known as "premise-isolation assemblies", are tested and inspected annually and are owned by the City of Bend. If your meter is 12 years old or older, and your meter is not equipped with a premise-isolation backflow device you will likely see a water crew replacing both your meter box and meter in the coming years. This is part of our annual operations and maintenance of the distribution system.

Most Frequently Asked Questions:

What can I do about chlorine odors? The odor is just chlorine doing its job. The simplest way to get rid of the odor is to pour a container of water and let it sit in the refrigerator. Overnight, the chlorine will have dissipated and the odor will be gone.

What is the City of Bend doing to secure future drinking water supplies? The City of Bend continues to work with its Deschutes Basin Partners, within the Deschutes Water Alliance. We obtain our State required groundwater mitigation from the Deschutes Water Alliance (DWA) Water Bank, in partnership with other cities, irrigation districts and environmental groups. This water is allocated annually by committee. By using the DWA Water Bank, our aquifer and surface water remains protected from new groundwater pumping on an annual basis.

What about security? Security has become even more important for our water system since the events of 9/11. We are very fortunate to have a dual water source system, both surface and groundwater. Well sites are fenced, locked, monitored and equipped with alarms, and the surface water intake structure has water quality telemetry, closed circuit television (CCTV), intrusion alarms and is monitored by on-site personnel. Reservoirs and pump stations are equipped with telemetry units and will send alarms when set operational parameters are exceeded. Each site is routinely visited and is monitored 24 hours a day, seven days a week.

Is our water hard or soft? The City of Bend water sources are considered to be "soft water". "Hard water" is caused by higher than ordinary levels of dissolved minerals, such as magnesium and calcium, often enhanced by carbon dioxide. Hard water typically leaves a sticky scum when it reacts with soaps and the soap does not make "suds". Typical levels of City water sources have a hardness of about .99 - 1.46 grains of hardness per gallon.

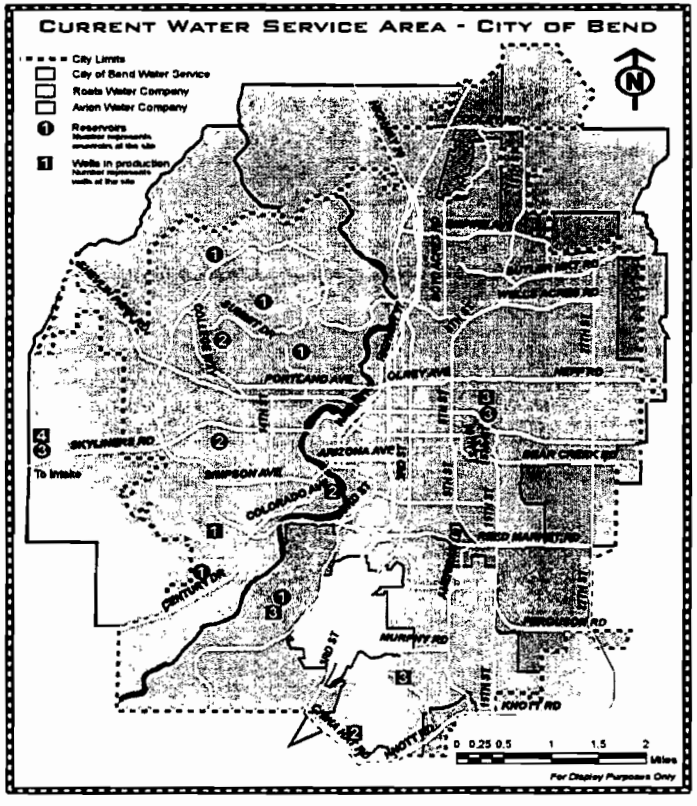
Is bottled water safer than tap water? The safety of bottled water depends on its source and the treatment it has undergone. Bottled water is considered a food product, so it is regulated by the Food and Drug Administration. The Environmental Protection Agency regulates water utilities. The FDA has been tightening regulations, and now bottled water generally must meet the EPA's Purity and Safety Requirements for Public Drinking Water. Using bottled water is a personal preference. However, if you are using bottled water for health reasons, we suggest that you thoroughly research the product that you are selecting to assure that it offers the level of protection that you are seeking.

Do I need to use a home water treatment device? As our water quality report shows, your water supply is carefully managed and your tap water meets or exceeds all of the standards established by the EPA for safe drinking water. Therefore, a home water treatment device is not necessary to make your water safe to drink. If you wish to use a treatment device, be sure to select a unit approved by the National Sanitation Foundation International (NSF), an independent, non-profit organization that evaluates these units. Also, be sure to properly maintain the device to avoid water quality problems.

This report was prepared by City of Bend Staff and cost $.41 per copy (preparation, design, printing and mailing). We will be happy to answer any questions about the City of Bend's water quality or this report. For more information, please contact (541) 317-3000.

This report contains important information about your community's water quality. Have it translated, or speak with a friend who understands it well. Este informe contiene information muy importante. Traduscalo o hable con un amigo quien lo entienda bien.

The City of Bend is committed to providing materials that are accessible to persons with disabilities. To request this report in an alternate format, please call 541-693-2141 or Relay TTY 1-800-735-2900



CITY OF BEND
Public Works Department
575 NE 15th Street
Bend OR 97701

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PERMIT NO. 473

ECRWSS
POSTAL CUSTOMER

ATTACHMENT 9 – FISCAL LETTER OF SUPPORT

CITY OF BEND'S APPLICATION FOR A

SB 1069 WATER CONSERVATION GRANT