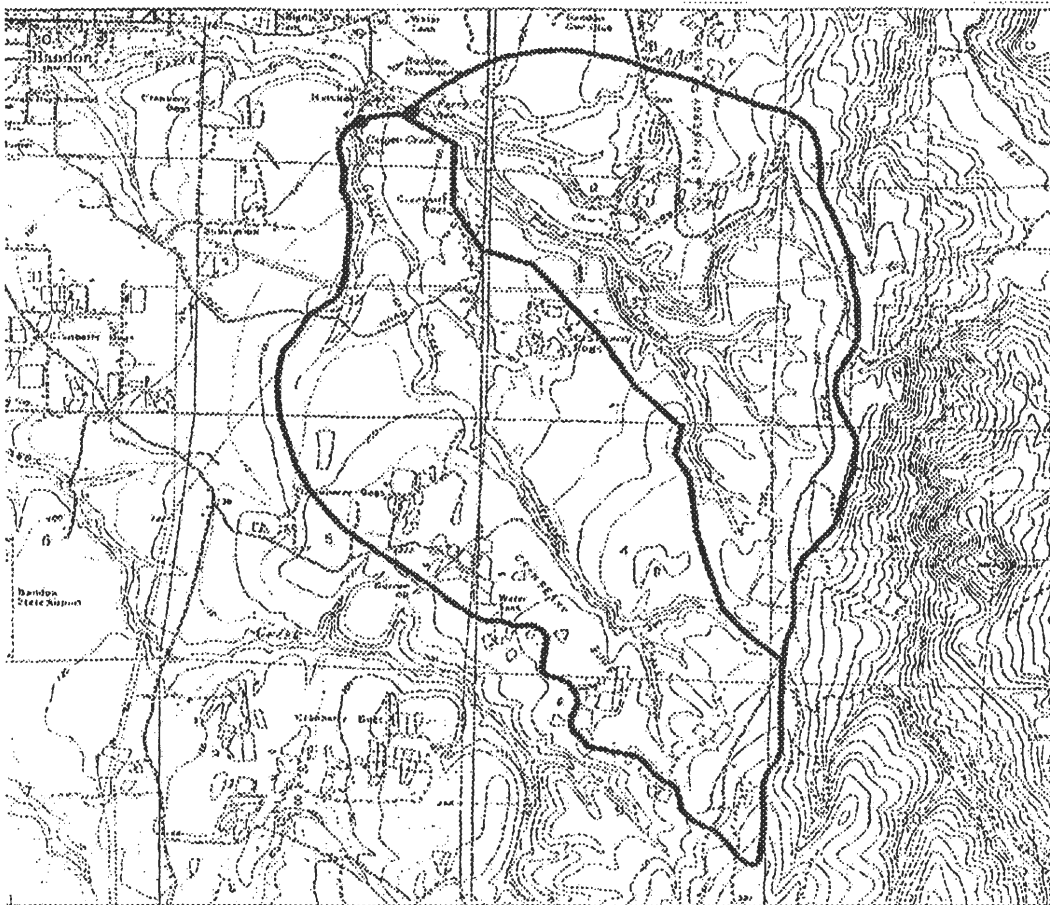


City of Bandon

Source Water Protection Plan



Prepared by:
The Bandon Water Resource Committee
October 15, 2003

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SOURCE WATER PROTECTION PLAN

CITY OF BANDON

OCTOBER 2003

This Plan is prepared in response to the federal Safe Drinking Water Act (SDWA) which requires that each state develop a drinking water protection program that promotes the reduction of contamination of sourcewaters for public water supplies.

The purpose of Bandon's Source Water Protection Plan is to (1) identify ways our community can assist in protecting the area that supplies our drinking water, (2) increase the quantity of water available for Bandon's future needs, (3) continue providing the highest quality of drinking water possible for Bandon's residents.

Bandon's Source Water Assessment Report (hereafter called the Report) was completed by DEQ in May 2000. Bandon was the first city in Oregon to receive a source assessment. The Report is incorporated into this plan as Appendix I and relevant pages, tables and figures are referenced throughout the Plan.

Chapter I. Community Profile

The Report (pp 5-6) contains a physiographic description of Bandon, of the watershed boundary, and the climate.

Bandon's water system presently serves 1,802 residential and commercial customers. From 1992 through 2003, water connections increased nearly 31 percent from 1,379 units which consumed 145,881 gallons of water to 1,802 customers which presently consume 161,610 gallons of water. While Bandon has experienced modest growth over the past ten years, water consumption has declined by nearly 7% during that time, but has recently begun to increase and is back to 1995-96 use levels.

The water usage in Bandon over the past 11 years is shown in the following table:

Fiscal Year	1992-93	1993-94	1994-95	1995-96	1996-97	1997-98	1998-99	1999-2000	2000-01	2001-02	2002-03
Population	2425	2455	2610	2760	2790	2800	2875	2940	2833	2880	2985
No of water connections	1379	1386	1397	1412	1442	1467	1519	1632	1667	1693	1802
Volume of water sold in thousands	145881	138681	172810	160669	154928	153418	150415	142316	138279	135969	161619
Gal/Day/Capita	165	155	181	159	152	149	143	133	134	129	139

Gal/Day/Capita in the 80's use averaged 179-180 gal per day

Some of the reduction in use was due to water conservation by residents, some was attributed to the fact that 8% of the city's housing units are occupied for seasonal, recreational or occasional use, another 8% of the residential units are vacant, and the rest is attributed to the closure of a major fish processing plant, and the cheese factory. However, recent increase in population and tourist activity contributes to the current increase in water use.

Bandon, located on the south coast of Oregon, has a population of 2,985. However, city businesses and industries, the post office, school district, and hospital serve a much larger population. Bandon's library, for example, serves in excess of 8,000 households.

Known for its tourism, during much of the year Bandon appears much larger due to the visitors who find the city's beaches and ocean access, its tourist accommodations, and its Old Town Waterfront desirable places to be.

Bandon's population is characterized by mobility. Fifty-six percent of Bandon's population lived in a different house in 1995 with 20% of those persons moving to Bandon from a different state, and 10% moving from a different county within the state.

Twenty-one percent of Bandon's permanent population is under 20 years of age, 43% is between 20 and 59 years, and 36% is over 60 years of age, with the median age being 49. The average family size is 2.7 persons.

Bandon has experienced a notable increase in educational achievement levels. Between 1990 and 2000, educational achievement in the over 25 population increased significantly: 88% compared to 27% had completed high school, and 19% compared to 8% had graduated from college. Bandon High School was one of two Oregon high schools to receive an exceptional rating by the Oregon Department of Education based on recently upgraded educational achievement standards.

The changes in the forest and fishing industries have affected Bandon's overall economy. Fifty-two percent of Bandon's families live below the Federal Poverty level. While that figure is lower than in 1990, the median household income remains too low at \$29,492.

Other positive changes to be noted are: A new community theater opened in September 2000 and was constructed by the Bandon Lions Club with no public funds. Bandon Dunes, a destination resort with golf courses, lodging and restaurants, also opened in 2000, and is receiving national interest and publicity. The resort has approval for a major expansion of 900 acres. Ground was broken for a much-needed public library in 2003, and considerable housing construction and renovation is evident.

The city's Water Resource Committee has received and approved a management plan to guide possible future actions in city-owned forest land in the watershed, which includes steps toward a continued high quality water supply.

Source: U. S. Bureau of the Census, Census 1990 and 2000.

Chapter II. Public Participation in Plan Development

Establishment of Public Participation:

Through Ordinance 1453, the Bandon Mayor and City Council established the Water Resource Committee in January 2001, "to advise the Mayor and City Council and City Manager on water quality, supply and resources, as well as watershed protection"

Representation of Committee:

Since the area that collects the source water for Bandon's water system is outside of the political boundaries of the city and the urban growth boundary, the members of the committee will include representation from urban, rural and agricultural areas within the watershed boundaries; when possible, some members should have backgrounds in the fields of health and/or education.

Chapter III. Delineation of The Source Water Protection Area

According to the Report surface water delineation includes the entire watershed area upstream of the public water system intake. This area provides the "source" water. This area is described in the Report and is shown on Figure 1 of the Report.

Additional information regarding the watershed is found in Chapter Two of Small Watershed Analysis: the Ferry Creek Example, by Humphrey, 1996.

1. The watershed is crossed by numerous power and gas line rights-of-way.
2. No road passes through the watershed, however there are several county and private roads entering the area. The result is limited access and limited vehicular traffic.
3. Both Ferry and Geiger Creeks are at the bottom of steep wooded ravines making them largely inaccessible.
4. The Windhurst reservoir, a privately owned reservoir, was constructed in 1996 and provides a capacity of up to 425 acre feet of water from a source outside the watershed.

Chapter IV: Sensitive Areas in the Watershed

The list of sensitive areas to be identified within drinking water watersheds was defined by the DEQ advisory committee in 1999. The sensitive areas include both setbacks and other natural factors that increase the risk of contamination of the surface water. The result is an identification of the sensitive areas in the entire watershed. Sensitive areas are those areas where contamination sources or land use activities, if present, pose a greater risk to the water supply. The Report briefly describes four sensitive area characteristics: 1) Sensitive Area Setbacks; 2) High Soil Erosion Potential; 3) High Permeability Soils, and 4) High Runoff Potential (pp7-9).

The sensitive areas within the City of Bandon's source water protection area are shown in Figure 2 of the Report and later in this Plan. These areas include the setbacks from the main stem and all perennial tributaries, and a few small areas of high runoff potential. Good data coverage was available for the Bandon watershed for each of the sensitive areas examined.

The Water Resource Committee has serious reservations about the 1000 foot setback as a sensitive area guideline. A reasonable setback should be influenced by terrain, soil conditions, and the quality of the existing vegetation as well as existing and potential land uses.

Chapter V. Inventory of Potential Contaminant Sources

The inventory of potential contaminant sources was done as part of the Report prepared for the City of Bandon by the Oregon Department of Environmental Quality. The primary intent of this inventory was to identify and locate significant potential sources of any of the contaminants of concern within the source water protection area. The methodology of how this inventory was done is described in the Report (pp9-11).

The results of this inventory are summarized in Tables 1 and 2 and are shown graphically on Figure 3 in the Report (Appendix I)

The inventory lists potential contaminant sources within Bandon's drinking water protection area and provides a preliminary look at the potential sources of contaminants that could, if improperly managed, impact the water quality in the watershed. In examining this inventory, it is important to realize that even very small quantities of certain contaminants can significantly impact water bodies. It is equally important to remember that the sites and areas identified in this section are only potential sources of contamination to the drinking water..

The Water Resource Committee has reexamined this inventory with respect to the potential contaminant sources identified by the state and has reassessed their potential risk with regard to information currently available to the committee. We especially relied on the results of the 2001-2002 study which tested Bandon's reservoirs for the potential presence of 25 different pesticides.

For the purpose of discussing the results of the inventory within the delineated source water protection area, the source areas for both the Ferry Creek and Geiger Creek watersheds have been combined into one watershed. The potential contaminant sources within each sub-watershed are identified by indicating Ferry or Geiger Creeks in Table 2 of the Report. In general, land uses that are closest to the intake and those with the highest risk rating pose the greatest threat to the drinking water supply. The delineated source water protection area is primarily dominated by forest and agricultural land uses with interspersed areas of residential use (Humphrey, 1996). A total of 27 potential contaminant sources were identified in the watershed. In a **hypothetical worst case scenario**, the sources considered to pose moderate to higher risks within the watershed were identified as follows:

Higher
Risk:

Crops — irrigated (bogs)	Ref. # 1,2,7,12,16,1 7, 18,19 Ref. # 13
Transmission Lines	Ref. # 4,5
Utility Stations	Ref. # 15
Transportation corridor	Ref. # 20
Mines/gravel pit	

Moderate
Risk:

Crops - irrigated (bogs)	Ref. # 23,24
Managed forest -clear-cut	Ref. # 9
Transportation corridor	Ref. # 10,25,26,2 7
Housing - high density	Ref. # 14
Other-historic spill	Ref. # 21
Upstream Reservoirs	Ref. # 22

The numbers referenced above identify the sites listed in Table 2 and Figure 3 of the Report.

The potential contaminant sources which were identified by Oregon DEQ are irrigated crops (cranberry bogs), the transportation corridors (heavy use roads, potential herbicide use areas and stream crossings), and public utility facilities (transmission lines and substations). Each of these potential sources of contamination pose a higher to moderate relative risk to the drinking water supply in a **worst case scenario**. Other identified potential sources with relatively high or moderate risk within the source water protection area included a recent clear-cut and replanted forested area, a high density housing area using septic systems, a barrow pit, a historic spill, small farms, and a planned cranberry bog reservoir. Additional detail for each of these sites is provided in Table 2. The two potential contaminant sources with lower relative risk levels are associated with rural residential areas using septic systems.

The Bandon Water Resource Committee reviewed the recommendations from DEQ and proposed the following be viewed as alternative language based on our intimate knowledge of the watershed and the data obtained during the Water Sampling Project of 2001-2002:

Relying upon local observation and the results of the Water Sampling Project, we believe that the sources identified as higher risk should be considered moderate risk.

- The cranberry bogs should be treated as an area wide potential contaminant source rather than discrete point sources (as they are in Table 2 of the Report) as management practices are similar throughout the area. When bogs are properly managed and utilize the best management practices established by the Cranberry Growers Association, they pose only a low-to-moderate risk to the watershed as confirmed by our Water Sampling Project.
- The site referred to in Reference 09 as a recent clear cut has now been replanted, the trees are taking hold, and the erosion potential is significantly reduced from the conditions reported in the DEQ survey.

- The site referred to in Reference 20 as a mine barrow pit is actually a site where some sand was removed for use in a cranberry bog and it poses no risk to the watershed.
- The site referred to in Reference 22 is now a functional reservoir and risk should be reevaluated.
- The Water Resources Committee will regularly monitor the effect of potential erosion into Geiger and Ferry Creeks caused by any increased traffic on roads in the watershed as Bandon continues to grow, and residences and businesses are developed in the Bandon Watershed area.

Chapter VI: Susceptibility Analysis

Susceptibility can be defined as the potential for contamination in the source water protection area to reach the intake on the surface water body being used for a public drinking water system. Whether or not a particular source becomes contaminated, depends on three major factors: 1) the occurrence of a facility or land use that releases contamination, 2) the location of the release, and 3) the hydrologic and/or soil characteristics in the watershed that allow the transport of the contaminants to the surface water body. The methodology used to gather the information for this analysis is described on page 13 of the Report.

The results of the potential contamination source inventory are combined with the locations of the sensitive areas to determine the most susceptible areas within Bandon's source water protection area. The total number of sources within the sensitive area is summarized as follows:

	Total Within Drinking Water Protection Area	Total Within Sensitive Areas	Higher or Moderate Risks Within Sensitive Areas
Potential Contamination Sources Identified	27	18	16

Overlaying the locations of the moderate to high risk sources with the sensitive areas provides an indication of the areas that are highly susceptible to contamination. The susceptibility analysis results are shown in the Report, Figure 3. The most vulnerable areas to contamination are identified when the moderate-to-higher risk sources fall within the sensitive areas. In the Bandon watershed, these areas include the distribution of the 16 identified sources within the areas of high runoff potential, or within the 1000-foot setback from the streams. In general, potential contaminant sources within the sensitive areas in the lower watershed pose greater risk than those in the higher areas of the watershed. The susceptibility analysis provides the water system with information on where the greatest risk occurs and where to focus resources for protection.

Analysis of Figure 3 indicates that 10 of 27 sights identified are outside or at the very edge of the sensitive area in the 1000-foot setback. Four more are well away from the intake since they are in the upper part of the watershed. The question of high and moderate risk is discussed in Chapter 5. Considering all these factors, the susceptibility of the Bandon water supply to contamination is low.

Chapter VII - Reducing Risks from Potential Sources of Contamination

This chapter is divided into the four primary land use categories in Bandon's source water protection area: **residential, agricultural, industrial/commercial, and municipal and other community-based uses**. Within each category, potential sources of contamination are first identified and then addressed by formulating goals and related management strategies. Goals are broad vision statements describing desired conditions or future activities. They provide direction for the development of management strategies. The management strategies for each goal more specifically describe a course of action. Each goal and related cluster of management strategies includes a background discussion and rationale for the goals and management strategies identified for each land use category.

The implementation of management strategies is key to the ultimate success of the Plan. Upon the adoption of the Plan by the City Council, the standing Water Resource Committee will monitor and follow up on implementation activities at least twice each year.

A :Residential Uses

People who reside in the source water protection area need to know that the water, both in the streams and in the ground, is a valuable and vulnerable resource. They also need to know that they can help protect this resource. Many people are unaware that some common activities, such as housecleaning or gardening, frequently involve toxic chemicals that could have serious impacts on water quality if overused or disposed of improperly. Very small amounts of certain contaminants can pollute an entire community's water supply, as can the cumulative effect of numerous less toxic sources. To help prevent contamination, community members need to be educated about how their actions affect water quality. Education can lead to understanding, and understanding can lead to behavioral changes that help reduce the risk of contamination. Furthermore, education about the value and vulnerability of the city's source water has the potential of providing far-reaching benefits as people bring this awareness to their current and future jobs in business, industry, and agriculture. Following is an overview of residential land uses within the source water protection area and management strategies that address issues related to residential land use. The residential land uses in this source water protection area are identified on Figure 3 and Table 2 (from the Report) as sites 6, 8 and 14.

Goals and Strategies for Reducing Risks

The primary goals for the residential community are aimed at raising awareness of pollution prevention.

Goal 1 (Residential):

Increase awareness among community members about 1) the vulnerability of surface water, 2) residence-based sources of contamination, and 3) ways to reduce the potential for contamination.

Background Discussion:

Threats to water quality from residential land users primarily arise from the use, storage, and disposal of hazardous materials. Hazardous substances associated with residential use can come from household wastes, mechanical repair and maintenance products, lawn and garden care products, swimming pool maintenance chemicals, and storm water runoff which carries pollutants such as petroleum, pesticides, fertilizers, etc. Improper storage and disposal of these types of products are a threat to both surface and groundwater in the watershed.

The density of septic systems can also have an impact on water quality. Septic systems may contribute to nitrate levels even though drain fields allow effluent to percolate into and through the soil. Therefore housing development that is greater than 1 or 2 units per acre and that rely on septic systems can pose a moderate to high risk to water quality because of the potential for elevated nitrate, microbiological, and toxic contaminants. New septic systems require a permit from the DEQ which administers the permit process for systems within Coos County. At the present time, higher density housing using septic systems is not a problem in our watershed but future development within the watershed should be closely monitored.

Home heating oil tanks are another potential threat to groundwater. Preventing tank spills and leaks is important because fuel oil can move rapidly through surface layers and into groundwater. Residential tanks are generally not regulated and it is therefore difficult to know how many there are in existence. Contamination can stem from leaks, repeated small spills as a result of over-filling, as well as improperly abandoned tanks.

Strategies for Achieving Goal 1(Residential):

1. Distribute educational information available through the Oregon Health Department, Department of Environmental Quality, Oregon Department of Agriculture, and the Oregon State University Extension Service to all households in the source water protection area through civic groups and mailed flyers.
2. Obtain DEQ's notebook entitled "Teacher's Guide to Drinking Water Protection" by calling 503-229-5413 and distribute this notebook to local teachers along with full information on Bandon's Source Water Protection Plan.

Goal 2 (Residential):

Promote the proper disposal of household hazardous waste.

Background Discussion:

Proper disposal of household hazardous waste is key to reducing risks of contamination to the drinking water.

Strategies for achieving Goal 2 (Residential)

1. Promote the existing hazardous waste round-up events.
2. Pursue options for establishing a regular periodic hazardous waste collection day in the city. Get information from DEQ on the private businesses that can collect hazardous waste for municipalities. Apply for a DEQ Solid Waste Grant to pursue this strategy.

Goal 3 (Residential):

Promote the proper use and application of pesticides in residential settings.

Background Discussion

Smaller property owners, who may not have a license or training in pesticide application, can benefit from factual information about how to safely handle, store, and apply chemicals to reduce the risk to source water.

Strategies for achieving Goal 3 (Residential):

1. Distribute materials from OSU Extension regarding safe chemical use including:
 - keeping chemicals away from groundwater wells and sumps,
 - following instructions provided on product labels,
 - managing small spills, and
 - using non-toxic alternatives to traditionally used chemicals.
2. Ask OSU Extension Service to prepare a fact sheet specific to Bandon on pesticides, storage, and application.

B: Commercial / Industrial Uses

Commercial and industrial facilities are highly regulated through laws such as the Toxic Substances Control Act (TSCA) and the Resource Conservation and Recovery Act (RCRA). Despite this level of regulation, commercial and industrial facilities can still pose a risk to water quality. The majority of the regulations applicable to commercial and industrial facilities concern how to respond to contamination events, rather than how to prevent contamination events.

The goal for this portion of the Plan is to encourage contamination prevention.

The inventory of potential contaminant sources identified a relatively low level of risk from commercial and industrial activities in the watershed. In fact, the Report identifies only one potential contaminant source in the commercial area. This is the "gravel pit" which was determined by the committee not to be a potential contaminant source.

Goals and Strategies for Reducing Risks

In Bandon, the urban growth boundary does not extend into the watershed and the county predicts that growth will be in other directions - away from the watershed. Therefore the risks that need to be addressed from commercial/industrial sources are minimal. At the present time there are no sources of commercial/industrial contaminants in the Bandon watershed; therefore further work on this section will be postponed until such concerns become relevant.

C: Municipal Uses (County and Private Roads, Transmission Lines and Storm Drains)

For the City of Bandon watershed, this category concerns the power lines and power substations of BPA and PP&L that traverse the source water protection area. Lines are regularly maintained by these agencies and traditionally have been sprayed with pesticides. Several county and private roads also enter the watershed and are of some concern with regard to both erosion and pesticide spraying. These are issues will require the cooperation and interaction between the City and other entities. The potential risk to water quality arises primarily from the storage, application and disposal of hazardous materials used in conjunction with the maintenance of power lines and roads.

Erosion from intense storms may affect the storage ponds which hold Bandon's municipal water. Management practices can be used to divert runoff away from areas exposed to pollutants. On an area-wide basis, Best Management Practices (BMPs) can be used to direct polluted runoff to natural or other types of treatment. Encouraging businesses and homeowners to apply source reduction practices as much as practicable is a priority because these practices reduce the amount of pollution generated at the site and prevent contaminants from entering storm water. Treating contaminated storm water to remove pollutants before the runoff leaves the individual site is the next option. This may transfer the pollution problem from one place or medium to another because treatment will not be completely effective. Source reduction methods are also desirable because they are often less expensive than treatment methods.

Goals and Strategies for Reducing Risks

Goal 1 (Municipal):

Reduce potential for erosion damage in the watershed.

Background Discussion Pertaining to Goal 1 (Municipal)

Storm water runoff can cause damage to the watershed by causing erosion that could effect our source water streams. Storms can cause county or private roads in the watershed to slide toward the stream. A yearly visual inspection of the roads to check for erosion will be part of the committee's work.

Strategies for Achieving Goal 1 (Municipal):

1. Arrange for the Water Resource Committee to do a windshield inspection of the roads in the watershed after the winter storms have passed and make recommendations for necessary maintenance.
2. Meet with county officials or private parties when problems are found with roads.

Goal 2 (Municipal):

Monitor all pesticide spraying in the watershed.

Strategies for Achieving Goal 2 (Municipal):

1. Inquire of all agencies with easements in the watershed when they intend to spray and what chemicals they will be using.
2. Ask that they notify the City of Bandon whenever spraying will be done
3. Test the city source water at least every three years for the specific chemicals used in these pesticide applications at a reasonable time after the application.

D. Agricultural Uses

Farmers in the Bandon watershed have been working the land for years. Guarding the health of the land and water is important for the continued success of the farming operation because quality land and water are what the farming community depends upon for its success. Through voluntary and mandated efforts, farmers are applying best land and water management practices because they too rely on groundwater for their drinking water.

This section of the management plan reminds agricultural land users to apply measures that protect not only the streams but also the groundwater in the watershed. Agricultural land users include large-scale farming operators, several smaller scale growers and rural residential landscaping and gardening. The agricultural members of the committee have identified priority risk issues related to agriculture and rural land use. These **potential** threats are listed below in order from high to lower priority:

1. Chemical, fertilizer and pesticide handling, mixing and application. Fertilizer and pesticide mixing and spills;
2. Equipment repair facilities (risks associated with cleaning solvents and used substances);
3. Fuel storage; leaking and potential spills of underground and above-ground fuel storage, and
4. Organic farming nitrate and waste disposal, and small-scale livestock operations.

Our goal is to integrate these areas of concern through management strategies designed to reduce the risks associated with farming operations and rural land use. The agricultural land uses in the Bandon Source Water Protection Area include cranberry bogs, and some organic gardening.

Goals and Strategies for Reducing Risks

Goal 1 (Agricultural):

Inform farm operators and homeowners about proper chemical handling, storage, and application.

Background Discussion Pertaining to Goal 1 (Agricultural)

Working with the land provides the farmer's livelihood. In most cases, best management practices that protect source water are being applied because they prevent problems and make good business sense. Fertilizer and pesticide applications are typical farming practices used to assist farmers get the best yields. Pesticides include herbicides, insecticides, rodenticides, fungicides, and avicides. The EPA has registered approximately 50,000 different pesticide products for use in the United States. Many are highly toxic and mobile in the subsurface. Larger scale pesticide applicators, farmers and professional applicators, have to be licensed and undergo periodic training to help ensure the safe application and storage of chemicals. Applicators, who are not licensed, will benefit from educational reminders about the risks of chemical use to potential groundwater contamination. Practices that minimize leaching are preferred by growers because they reduce the amount of chemicals used, thus reducing costs and increasing profit margins. Leaching refers to the movement of a substance (fertilizer, pesticides, etc.) down through the soil. Water, either through rain or irrigation, is the primary force driving the movement of these substances through the soil. The extent of leaching varies with different substances, but in general is affected by many factors. Some of these factors are the amount and timing of substance

application, and the amount and timing of water applied after application. Best management practices, such as the use of cover crops or integrated pest management techniques can also reduce leaching.

Providing information to assist farmers determine appropriate applications of chemicals and which irrigation practices minimize leaching is a key management strategy.

Chemical storage and handling near wells concerns both growers and rural residential property owners. Well houses may appear to be the perfect, convenient place for storage of chemicals if the property owner is unaware of the potential risks associated with such storage. Property owners need to be informed and reminded that chemicals should not be stored or mixed near wells. Removing chemicals from this location will reduce the risk associated with potential spills of concentrated substances. Chemicals that are no longer being used should also be disposed of properly. Currently, chemical containers (emptied and rinsed) can be disposed of twice a year at an event sponsored by the Oregon Agriculture Chemical Association.

The Environmental Quality Incentives Program (EQIP) was recently established under the 1996 Farm Bill. The program is designed to provide technical, financial and educational assistance to farmers to address significant natural resource concerns and objectives in priority areas such as watersheds. With the delineation of the Bandon source water protection area, Bandon has identified a priority area of concern for potential EQIP funding.

Strategies for Achieving Goal 1 (Agricultural):

1. Produce a fact sheet that provides information regarding safe chemical use, including:
 - keeping chemicals away from wells and sumps,
 - following instructions provided on products labels and do not overuse
 - encouraging backflow devices,
 - managing small spills,
 - using non-toxic alternatives to traditionally used chemicals,
 - encouraging voluntary assessment using the extension service Farm-a-Syst
 - Request OSU Extension assistance with fact sheet formation and distribution.
2. Provide information at growers' meetings and pesticide applicator short courses about chemical use and its association with water contamination risks. Information can be provided through written material and/or speaker presentations and should include information presented in Strategy 1 above as well as:
 - application and irrigation practices that reduce chemical use for specific crops in the Bandon watershed.
 - best management practices that reduce the amount of chemical leaching (cover cropping, soil analysis, etc.).
 - Request OSU Extension Service to prepare a fact sheet specific to Bandon growers on safe chemical mixing, storage, and application.

3. Sponsor a hazardous materials round-up that will allow the collection of surplus agriculture chemicals.

Research the possibility of coordinating activities with the local solid waste disposal program or company.

Contact DEQ's hazardous waste technical assistance program to initiate a round-up process and event where educational materials will also be available.

Apply for a DEQ solid waste grant to develop a hazardous materials collection/recycling program.

4. Every 5 years conduct a Farm-A-Syst program. Establish a well education program which informs about proper well construction, maintenance, and abandonment.

Chapter VIII - Policies and Recommendations for the Source Water Protection Area

1. The completed Source Water Protection Plan shall be proposed for adoption to the City Council, updated as needed, and implemented through voluntary participation of watershed users.
2. A major focus of the Source Water Protection Plan is public education to assure an adequate and qualitative water supply for Bandon residents.
3. The Water Resource Committee shall set its goals and plans annually in keeping with the needs of the City, the status of the watershed and the municipal water facilities.
4. The Water Resource Committee shall evaluate possible water supply sources and recommend action to the City Council which assures an adequate 20-year water supply at the most reasonable cost.
5. The Water Resource Committee shall assist in updating plans which relate to the Committee's original charge by the Council: "to advise on water quality, supply and resources as well as watershed protection."
6. The Water Resource Committee shall recommend measures to the City Manager and Council which it believes will protect and enhance water quality, and may recommend adoption of policies where needed.
7. The Water Resource Committee shall provide an annual report to the Council.

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APPENDIX - I

SOURCE WATER ASSESSMENT REPORT

2002-2003

17,118,055 Proposed Budget

1. Water and Sewer rates have been declining for past several years while costs have increased, budget asks for 10% increase in water rates; **The last sewer rate increase was in 1996 (six years prior) and last water rate increase was in 1991 (eleven years prior).**

Further, Matt wrote:

“ Those increases will impact the City’s water and sewer utility customers. In accordance with the court rulings in the Stadelman vs. City of Bandon, water and sewer rate suit, the sewer rate increases are required by the City’s Wastewater Plant construction loan agreements with the Department of Environmental Quality and can therefore be implemented by the City Council. The water rate increases, however, would be subject to the City Charter requirements for approval by the voters. The budget anticipates that the water rate vote would be placed on ballot for the September 17, 2002 election. It is recommended that the ballot measure either grant full authority to the City Council to adjust rates, or allow a limited increase (i.e. 5%) per year. To keep the impacts on our utility customers as low as possible, it is also recommended that water, sewer and electric rates be included in the ballot measure, to allow small preemptive increases each year instead of large increases every several years.”

He then moved to property taxes and a comparison of the rates that were frozen by the state in

Myrtle Point	7.99
Coos Bay	6.36
Powers	7.39
North Bend	6.18
Coquille	6.10
Bandon	.46

He then closed with:

“ Unlike cities which typically depend on property taxes as an important revenue base, the City of Bandon continues to essentially function as a utility company, operating water sewer and electric systems. Revenues from the sale of those services are deposited into the enterprise funds, and used to operate and maintain the respective utility systems. Taxes and reimbursements from those utilities also serve as the primary revenue base for providing other essential municipal services, including police protection, fire protection, administration, accounting, planning, street and drainage maintenance, and parks and maintenance and parks and recreation.

“Although the City has been able to successfully keep its expenditures in line with relatively constant revenues, some changes on the revenue side of the equation will be necessary in the near future, if the City is going to be able to continue providing quality services. These increases will be needed to ensure that the City can properly operate and maintain the water, sewer and electric systems, and address such items as upgrading electric system components, replacing deteriorated water lines, correcting sewer system inflow and infiltration problems, and protecting the significant investments the new water and wastewater treatment plants. ~~These~~

Summary Chair Water Resources Meeting July 30, 2014

1995	Lawsuit	Rate Authorization	94 levels
		Utilities	
		Engineering Studies	
		Copying Documents	
		Gorse Abatement	
		Applications	
		Rental of Equipment	
		Use of Personnel	
1996	Legislature	Portland	Measures 47 and 50
		Property Tax “mills”	95 levels
		Myrtle Point	7.99
		Coos Bay	6.36
		Powers	7.39
		North Bend	6.18
		Coquille	6.10
		Bandon	.46
		Bandon School District	5.00
		Portland	16.40

Intention of 47 and 50:

“These permanent taxes (rates/mills), sometimes referred to as “operating taxes”, are to be used to fund the general operating budgets of the taxing districts and account for the single largest component of property taxes.” (i.e. adding Local Option Taxes or Bonds)

(e.g. Bandon .46 .85 1.30 = 2.61)

1995-1996-1997 Perfect Storm

Bandon has less than 5% of the Revenue from basic Property Taxes than neighboring communities as well as communities throughout Oregon.

Coquille 37%

Bandon 22,000,000 property tax 80,000

And

Bandon governing body responsibility without authority

Cannot adjust revenue rates to meeting rising costs

Consequences: Constant Choices/ Periodic Emergencies

1997 through 2010

17 Ballot Measures

8 Dealing with Authorization and/or rates or levees

7 Seven Rejected

No to Parks and Recreation .58 add to property tax

No to utility 10% for 10 years

No to water 10% to improve fire flows pressure

No to City Council Authority

No to Park Maintenance of 2.00

No to Police Levy of .56


No to Police Levy of .56 again

2002-2003 Executive Warnings Example

(Separate handout)

Ballot Title Process

A ballot title is a concise and impartial statement that will be printed on the ballot summarizing the referral. The ballot title is prepared by the appropriate governing body, district attorney or city attorney and filed with the local elections official for publication. Any voter may challenge the ballot title and the referral may only appear on the ballot once this process is complete.


-  See County Referral Steps on page 7, City Referral Steps on page 9 or District Referral Steps on page 11 for the appropriate timeline of the ballot title process.


Ballot Title Preparation

ORS 250.035, 250.185, 250.285 and 255.085

Any ballot title prepared for a county, city or district referral must contain all of the following elements:

- a caption that does not exceed 10 words describing the subject of the referral *(yes/no)*
- a question that does not exceed 20 words plainly phrasing the main purpose of the referral so that an affirmative response to the question corresponds to a yes vote on the referral
- and
- a summary that does not exceed 175 words describing the major effect of the referral

 Additional ballot title requirements apply to referrals requesting a general obligation bond, a local option tax, or a permanent rate limit.

 For further information you may contact the Elections Division, your bond counsel, or the Oregon Department of Revenue, Property Tax Division 800 356 4222.

Publication of Notice

ORS 250.175, 250.275, 255.085, 255.145 and 255.215

After receiving a ballot title from the governing body, district attorney, city attorney or form SEL 803 from the district elections authority the local elections official publishes notice that a ballot title has been received. A notice of election must also be published for district referrals.



Notices must be published in the next edition of a newspaper of general circulation in the jurisdiction and may also be posted on the local elections official's website for a minimum of seven days.



For a district referral, notice of election and receipt of ballot title may be mailed to each district voter within 3 days of receiving a ballot title instead of publishing in a newspaper.



The notice must be published prior to the deadline to file a petition review the ballot title.

The notice must include all of the following:

- a statement the ballot title has been received and that any voter may file a petition for review of the ballot title
- the deadline for filing a petition for review of the ballot title with the Circuit Court
- the ballot title provided by the governing body, district attorney, city attorney or information on how to obtain a copy
- and
- For district referrals
- district and notice information from Form SEL 803

Petition to Review Ballot Title

ORS 250.195, 250.296 and 255.155

Any registered voter who is dissatisfied with the ballot title may petition the Circuit Court to review the ballot title.

If a registered voter files a petition to review a ballot title with the Circuit Court, the voter must:

- name the appropriate governing body or attorney as respondent, depending who prepared the ballot title
- state the reasons why the ballot title is insufficient, not concise or unfair
- and

Exhibit A
Resolution No. 02-32

BALLOT MEASURE FOR NOVEMBER 5, 2002 ELECTION

CAPTION: Limited Authority for the City Council to Increase Utility Rates

QUESTION: Shall 10 year authorization be granted to the City Council to increase utility rates a maximum of 10% per year?

SUMMARY: The City Charter contains provisions which limit the ability of the City Council to increase utility rates without voter approval. Current and projected financial data indicate that expenditures in the water, sewer, and electric utilities will exceed revenues, unless utility rates are increased or the General Fund is used to subsidize the operation, maintenance, and improvement of the utility systems. The departments which would potentially be most impacted by such General Fund transfers are Police, Planning, and Parks & Recreation. As an option to large utility rate increases every several years or utilizing General Fund subsidies, this measure would authorize the City Council to raise utility rates a small amount each year as necessary to balance the budget. The effect of a YES vote will be to authorize the City Council to increase utility rates a maximum of 10% per year. This authorization would automatically expire in 10 years. The effect of a NO vote will be to prevent the City Council from increasing utility rates, except as currently allowed under the City Charter.

Exhibit A
Resolution No. 03-35

BALLOT MEASURE FOR NOVEMBER 4, 2003 ELECTION

CAPTION: Water rate increase for fire flow, pressure, and reliability improvements.

QUESTION: Shall water rates be increased 10% to pay for a water line to improve fire flows, pressure, and system reliability?

SUMMARY: The City is proposing to install a water line loop from Harvard Street to Seabird Drive to improve fire flows, water pressure, and system reliability. The total cost of the project is estimated to be \$613,769. Of that total amount, a maximum of \$504,825 can be financed by City's System Development Charges, which are paid by property developers. The remaining \$108,944 has to come from other sources, since it will benefit existing residences, businesses, and other uses. To keep costs as low as possible, the City is proposing to borrow the necessary \$108,944 from its Capital Improvement Fund. To repay that loan over a period of 5 years, it is estimated that a 10% water rate increase will be necessary. A YES vote will authorize a 10% water rate increase, which will be in effect for a period of 5 years, to finance the \$108,944 share of the proposed water line. A NO vote will prevent the City from increasing water rates for this project.

Exhibit A
Resolution No. 05-37

BALLOT MEASURE FOR NOVEMBER 8, 2005 ELECTION

CAPTION: City Council Authority to Set Water Utility Rates.

QUESTION: Shall the City Charter be amended to authorize the City Council to set water utility rates?

SUMMARY: The City Charter currently restricts the ability of the City Council to set water utility rates, except by consent of the voters. Since the existing water rates are not sufficient to generate adequate revenues for the proper operation and maintenance of the water treatment and distribution systems, the City has been annually transferring money from the General Fund into the Water Fund. This measure would allow the City Council to set water utility rates to generate sufficient revenues for proper water system operation and maintenance. It would also allow the General Fund subsidies to be ended, so those funds could be used for other public purposes. If approved, the following provision would be added to the City Charter: "Section 50. City Council Authority to Set Water Utility Rates. Notwithstanding the restrictions on setting other taxes, rates, fees, and charges, the City Council is authorized to set water utility rates." A YES vote would authorize the City Council to set water utility rates. A NO vote would retain the existing restrictions on setting water utility rates.

Exhibit A
Resolution No. 06-24

BALLOT MEASURE FOR NOVEMBER 7, 2006 ELECTION
(Ballot Measure No. 6-116)

CAPTION: Water Rates

QUESTION: Shall water rates be increased to provide additional revenues for proper water system operation, maintenance, and building reserves?

SUMMARY: The City Charter requires voter consent to increase water rates. Since the existing rates are not sufficient to pay for proper operation and maintenance of the water system, and since water reserve funds have been depleted, the City has been forced to transfer money from the General Fund into the Water Fund. This measure would increase water rates to provide additional funds for water system operation and maintenance, and to build reserves for future water system improvements, watershed protection, and securing additional sources of water. It would also reduce the need for General Fund subsidies, so those funds could be used for other purposes. A YES vote would allow the City to set the inside-City monthly base rate for a single-family residence at \$13.50 including the first 2,000 gallons of water, to set the water consumption rate at \$1.30 per 1,000 gallons after the first 2,000 gallons, and increase all commercial, industrial, public, multiple-unit, and other water rates a proportionate amount. A NO vote would retain the existing water rates.

WATER, PARKS & POLICE BALLOT MEASURES

RES #	DESCRIPTION	RESULTS
95-19	Special Election to Consider the Issuance of Water Revenue Bonds.	FAILED
	9/19/95 Election: Measure 6-22	Yes 447; No 517
95-26	Special Election to Vote Upon the Question: Shall Charter require Voter Approval to increase any water rates above the rates in effect September 1, 1994 (<i>ed. note: rates in effect since 1991</i>).	PASSED
	9/19/95 Election: Measure 6-19	Yes 615; No 357
95-27	Special Election to Vote Upon the Question: Shall Charter require Voter Approval to increase any sewer rates above the rates in effect September 1, 1994 (<i>ed. Note: courts rules DEQ loan Requirements Supercede</i>)	PASSED
	9/19/95 Election: Measure 6-20	Yes 629; No 354
95-28	Special Election to Vote Upon the Question: Shall City Charter Require Voter approval for all new taxes, fees or charges or increases to present ones?	PASSED
	9/19/95 Election: Measure 6-21	Yes 618; No. 349
97-09	Water Treatment Plant - \$3,550,000 GO Bond for Water Plant Improvements	PASSED
	5/20/97 Election: Measure 6-46	Yes 573; No 490
97-10	Election to Vote Upon the Question: Shall out-of-city water Rates be increased by \$16.68 per month so those customers share water system improvement costs? (<i>ed. Note: put into effect August 2000</i>)	PASSED
	5/20/97 Election: Measure 6-47	Yes 773; No 288

WATER, PARKS & POLICE BALLOT MEASURES

RES #	DESCRIPTION	RESULTS
97-47	Special Election to vote on question: Shall City Summer Residential sewer rates be adjusted to reflect water usage for residential landscape watering?	PASSED
	3/10/98 Election: Measure 6-51	Yes 552; No 196
00-30	Shall the City impose \$0.58/\$1,000 of assessed valuation for parks and recreation for five years beginning 2001-2002?	FAILED
	11/7/2000 Election: Measure 6-70	Yes 380; No 989
02-24	Election to Add Multiple-Unit Base Rates to Water Schedule.	PASSED
	9/17/02 Election: Measure 6-85	Yes 542; No 307
02-32	Shall 10 year authorization be granted to the City Council to increase utility rates a maximum of 10% per year?	FAILED
	11/5/02 Election: Measure 6-86	Yes 299; No 946
03-35	Election of 11/4/03: Shall water rates be increased 10% to pay for a water line to improve fire flows, pressure and system Reliability?	FAILED
	11/4/03 Election: Measure 6-95	Yes 293; No 746
04-19	Election to set SDC's up to maximum allowable amounts.	PASSED
	9/21/04 Election: Measure 6-108	Yes 574; No 367
05-37	Election of 11/6/05. Amend the City Charter to grant the City Council the authority to set water utility rates.	FAILED
	11/8/05 Election: Measure 6-111	Yes 389; No 605
06-01	Water Plant Improvements - \$590,000 GO Bond for New Clarifier and Ultra Violet Disinfection System	PASSED
	5/16/06 Election: Measure 6-113	Yes 785; No 186

WATER, PARKS & POLICE BALLOT MEASURES

RES #	DESCRIPTION	RESULTS
06-02	Water Plant Improvements - \$590,000 GO Bond for New Clarifier and Ultra Violet Disinfection System for Outside City Charge	Passed
	5/16/06 Election: Measure 6-114	Yes 845; No 120
06-24	Water Rate Increase (per Ad Hoc Committee on Water System Finances)	Passed
	11/7/06 Election: Measure 6-116	Yes 859; No 470
08-31	Park Maintenance Fee - \$2.00 per Month on Electric Bills	FAILED
	3/10/09 Election: Measure 6-127	Yes 369; No 612
09-19	5 Year Police Operating Levy - \$.56 per \$1,000 AV	FAILED
	11/3/09 Election: Measure 6-128	Yes 462; No 493
10-04	5 Year Police Operating Levy - \$.56 per \$1,000 AV	FAILED
	5/18/10 Election: Measure 6-130	Yes 477; No 605

Water Rights & Supply

4.1 Raw Water Sources

Ferry and Geiger Creeks. The City of Bandon has water rights within the Ferry Creek and Geiger Creek drainage systems and currently utilizes these as the City's water supply source. The intakes are located in the Ferry Creek Watershed in the Coquille River Sub-Basin. The geographic area providing water to Bandon's intake (the drinking water protection area) extends upstream approximately two miles in a southeasterly direction and encompasses a total area of 4 square miles. The elevation change from the upper edge of the watershed to the intake is approximately 400 feet. These basins drain into the estuary portion of the Coquille River.

Ferry Creek basin has an area of 1130 acres (1.75 square miles) above its diversion point. Geiger Creek basin has an area of 1290 acres (2.0 square miles) above its diversion point. Both Ferry and Geiger Creeks have perennial features. However, flows vary significantly based upon rainfall and season. Both streams typically run high during the winter and low during the drier summer months. In most years, flow levels are at a minimum in the months of August and September, coinciding with the time when water demand in the City of Bandon is at its peak and other area streams are nearly dried up. High winter flows bring with them turbidity, which results in more difficult water treatment conditions. The low summer flows require careful monitoring of water availability from the creeks and conservative use by the community. These sources are generally adequate and reliable at the present time.

Information regarding predicted low flows for these sources includes the Tucson Myers report of April 1990. A data correlation of Ferry Creek flow with Pony Creek flow was performed. The correlation location was at the confluence of Geiger and Ferry Creeks. Data used was from 1950 to 1980. The value was computed for flow that exceeded 99 out of 100 years. The lowest flow month was calculated for September at 1.06 mgd or 1.64 CFS. CH2M Hill prepared another report in July of 1993 for Coos County based on assumed run off values and predicted rain fall. This report predicted much lower flows than the Tucson Myers report. However CH2M Hill acknowledged in the report that the mathematical basis of their estimate does not match observed flow. The explanation was that "springs" add to the volume. Basing the flows on observed Pony Creek flows, the Tucson Myers report can be expected to under report as well. Therefore, for purposes of this report 1.3 CFS (lowest recorded value) can safely be assumed to be the 1/100 year low flow value for Ferry Creek. Low flow values reported for Geiger Creek are 0.9 CFS.

Simpson Creek

In addition the City has certificate water rights to Simpson Creek (#9754) in the amount of 2.0 CFS and a priority date of January 24, 1910 near its headwater. Associated with this water right is a reservoir certificate (#9755) for 20 5/8 acre-feet. This is 6,720,219 gallons of storage, not all of which would be usable. The source is based on a very small basin with headwaters beginning north of Highway 42S and east of the Winterville area. There is significant development in this basin consisting of cranberry bogs, roads and homes with septic tanks. The City has not used the Simpson Creek source since the 1950's. It is reported that water quality issues made use of this water unattractive in comparison with water available

from the City's other sources. Little is currently known regarding its reliability or quality. The original impoundment and diversion site was recently investigated (May 29, 2003) and found to still be in existence as an impoundment on Mill Creek (A.K.A. Simpson Creek). The flow on this day appeared to be between 3/4 and 1 CFS. The pond has a sandy/mud bottom and is surrounded by heavy vegetation. The remains of a concrete weir still exist. The local property owners currently have pumps in the impoundment for irrigation. One property owner who was interviewed indicated that they were aware that the City of Bandon had a water right in this impoundment. Remains of a 12" wooden pipe and a valve were also located downstream from the impoundment dam. Use of this source would require installation of a new raw water pipe line. Access to the site is by means of a private driveway across from the Twin Fir Saw Shop on Highway 42S. One then proceeds 1/8 of a mile to the drive fork between #55518 and #55519. By foot, one follows the east fork branch and stream to a 100-foot trail leading to the Mill Creek concrete weir remains. Information from a 1948 report by Cornell, Howland, Hayes & Merryfield titled, "City of Bandon, Water Supply Investigation, Flow Measurements on Possible New Sources" provides flow data at the Mill Creek weir for the months of June 11 through October 8 of that year. Minimum flow in August was about 95,000 gallons per day, 66 gpm or 0.147 cfs. The high flow in the limited flow measurement period was June 11 through 14 at 190,000 gallon per day. A more complete study would be required to determine the projected 95% exceedance flow for this source. An agreement dated 8 September 1910 (Filed 1 April, 1911 Book 59 deeds, 402) appears to convey perpetual easement for a water line which originally supplied Bandon from the Mill Creek impoundment. It is recommended that a yield of 139 gpm (0.2 mgd) be considered as the minimum useful yield for Bandon to consider for development as a viable source of raw water considering the volume of water required for a municipal water supply. However, due to the relative proximity of this source to the water treatment plant, a lower yield might be considered cost effective. At a minimum, it is recommended that the City establish a recording gage station at this location and that water quality testing be conducted.

Consideration has also been given to pumping water to the Simpson Creek reservoir after restoration from Geiger and Ferry Creeks during high flow periods, rather than use the assumed lower quality Simpson Creek water. This would require that the reservoir be taken "off-line" from Simpson Creek.

Discussion with the Oregon Water Resources Department (WRD) indicated that all of the above actions are viable alternatives. However they also indicated that due to non-use of the water or storage for such a long period of time, a review of the existing water and storage rights must be performed if use is now considered. This would require the equivalent of the new water rights application. Water rights transfer issues also arise if a transfer of water from Geiger and Ferry Creeks to the Simpson reservoir is proposed. If the Simpson source is not determined to be viable or adequate in volume to warrant re-development, then lease of the water right for in-stream use by the State or others might be considered. The WRD also indicated that they wish to revoke the rights, if they believe the City will not be able to use these rights in the future even though they are "certificated".

Therefore, to develop Simpson Creek as a water source or off line storage facility will require that the City take the following actions prior to construction:

- Gage the Simpson Creek Flow
- Perform a source water assessment
- Conduct water quality analysis
- Perform a dam safety/geotechnical evaluation
- Apply to WRD for a revised water rights/storage permit for Simpson Creek or water transfer permit from Ferry and Geiger Creeks
- Preliminary Engineering Report for pump stations, transmission lines, intakes and impoundment
- Easements, permits, public participation
- Plans and Specifications

Source Water Assessment

A Source Water Assessment was completed in May, 2000 by the Department of Environmental Quality for Bandon. The assessment was made in order to identify the surface areas that supply water to the City of Bandon's public water system intake and to inventory the potential contaminant sources that may impact Ferry and Geiger Creeks. An assessment summary publication, dated 2/14/03 is available at: http://www.deg.state.or.us/wq/dwp/swareports/pws00074_Bandon.pdf

An inventory of potential contamination sources was performed within Bandon's drinking water protection area for Ferry Creek and Geiger Creek watersheds. The delineated drinking water protection area is primarily dominated by forest and agricultural land uses, interspersed with areas of residential use. A total of 27 potential contaminant sources were identified in the watershed. The potential contaminant sources consisted of roadways, bridges, excavation locations, utilities stations and transmission lines, forest clear cuts, cranberry bogs, and residential housing development.

Risk associated with the roadways is considered moderate due to low volume of traffic. The greatest number of concerns is associated with cranberry bogs due to the potential use of pesticides and herbicides, which may be washed into the impoundments as run-off. Residential development is currently considered to be a low to moderate risk. The principal risk is due to septic tank leachate. A transformer storage and maintenance facility located in the watershed is considered a high risk due to concern regarding spills, leaks, or improper handling of chemicals and other materials. The materials, including PCBs, may pose a risk during transportation, use, storage and disposal.

The City prepared a Water Sampling Project in response to the issues raised by the Source Water Assessment. The test program was conducted between 3/18/01 and 3/4/02 with a final report issued 1/2/03. The program tested for 25 chemicals commonly used for roadside maintenance, transmission line maintenance, forestry and agriculture. Only 3 herbicides were detected in trace amounts well below the Health Advisory Level using EPA standards. Seventeen samples were taken. Norflurazon (Evelal) was detected in one sample, Napropamide (Devrinol) in three samples and Dichlobenil (Casoron) in 9 samples. Water which passed through the water treatment plant showed no traces of the herbicides.

4.2 Water Rights

All water in Oregon is publicly owned. Because of this public ownership, a water right is generally required for anyone to use water regardless of whether the water originates from surface or underground sources.

Oregon's water laws are based on the principal of prior application. That is, if a person obtains a water right on a particular source before someone else, that person would then possess a "senior" water right that would permit them first use of the water during times of lower flows or droughts. A "junior" water right is one that is obtained after other water rights for a particular source have been assigned. A water right may be both "senior" to some and "junior" to others.

During periods of low water availability under previous state law, a water right holder could use as much water as their water right allows as long as the use is truly beneficial and all senior water rights are satisfied. This method of resource appropriation governed all water used until the water is exhausted. Under the current revised rules surrounding water permit extensions in OAR 690-315, the withdrawal of water for a municipal user becomes more complicated. Updated rules contained in OAR 690-86 modify the formerly routine five-year extension, which allowed cities to "grow into" their water right. Extensions will now generally be for longer periods of time (typically 20 years) and will require preparation of a

Water Management and Conservation Plan (WMCP). The rule modifications introduce the concept of "green light water" which is a portion of the water right which the city may divert until an updated WMCP is submitted and approved by the Oregon Water Resources Department (WRD). Certificated water rights do not fall under this requirement.

The City holds permit water rights to obtain a total of 3.0 cfs of surface water from Ferry Creek by way of the Ferry Creek Reservoir. Additionally, permits exist to remove water from Geiger Creek in the amount of 5.0 cfs from a point of diversion upstream of the Geiger Creek reservoir and 3.0 cfs from the reservoir itself.

In April 2000 an order was issued by WRD approving transfer application T-8195. This order allows Bandon to divert water associated with all three water rights discussed above from an alternative location downstream of the fish hatchery. This avoids a conflict of water rights with the fish hatchery during periods of low flow because the hatchery use is non-consumptive. The water is available to the City after flowing through the hatchery pens. The City briefly used this option in the summer of 2002.

Bandon has total water rights as follows: Spring Source 2 cfs 1910 priority; Geiger Creek 5 CFS 1916 priority; Lower Geiger Creek 3 CFS 1961 priority; Ferry Creek 3 CFS 1961 priority. The hatchery has rights for 1.5 CFS on Ferry Creek and 1.5 CFS on Geiger Creek, totaling 3 CFS. The hatchery water passes through the hatchery facility and can be pumped afterward for use by the City.

Table 4.2.1 summarizes all water rights held by the City for surface water sources.

Table 4.2.1
Surface Water Rights Documentation Summary

Location	Identification	Right Type	Magnitude	Priority Date
NE 1/4, SE 1/4, & NE 1/4, NE 1/4 Sec 29 T29S, R14W	Spring Br. #3 , Mill Cr #4 (Simpson Cr.)	Certificate 9754	2.0 CFS	January 24, 1910
NE 1/4, NE 1/4, SW 1/4 Sec 4 T29S, R14W	Upper Geiger Creek	Permit 3011	5.0 CFS	June 19, 1916
SW 1/4, SE 1/4, Sec 28 T28S, R14W	Geiger Creek & Geiger Cr. Res.	Permit 27232	3.0 CFS	March 7, 1961
SW 1/4, SE 1/4, Sec 29 T28S, R14W	Ferry Creek & Ferry Cr. Res.	Permit 27233	3.0 CFS	March 7, 1961

Note that Bandon is permitted to withdraw water for permits 3011, 27232 and 27233 below the point of confluence of Ferry Creek and Geiger Creek through permit amendment 8195 issued March 29, 2000. No additional water rights, for either surface or groundwater sources, are currently held by the City of Bandon.

Water rights withdrawal location transfers have been executed and pump equipment installed so that a conflict between the City and the fish hatchery need not occur. The City is now able to withdraw water below the hatchery discharge. This also has the consequence, for the City, of being able to use water that Ferry Creek rights holders above the hatchery and senior to the City but junior to the hatchery (totaling

0.65 CFS) would not be able to withdraw, because the hatchery's senior right water (3 CFS) must be allowed to and through the hatchery. Once water passed the hatchery, there would be no way for these upstream users to withdraw it. However, there is still a 0.5 CFS claim with priority senior to the City's below the alternative City withdrawal location on Ferry Creek. The lowest recorded flow in Ferry Creek is 1.3 CFS. The net result is that 0.8 CFS from Ferry Creek would be available to the City during a predicted low flow period because all other senior water rights holders must let the hatchery claim pass.

The lowest estimated flow on Upper Geiger Creek is 0.45 CFS. The City has the most senior water right for this water (5 CFS). Water rights senior to the City's on lower Geiger Creek, notwithstanding the hatchery's use, total 1.6 CFS, with an estimated low flow of 0.9 CFS. Under the arrangement of the City's water rights diversion transfer executed in 2000, the City could remove all the available Upper Geiger Creek flow of 0.45 CFS (if it was actually present in the upper reach of Geiger Creek) but would have no other direct claim. However the net result is that after hatchery use, at least 0.9 CFS would be usable by the City during low flow for reasons similar to the explanation of the Ferry Creek water rights situation.

Therefore, the total water supply available to the City in Ferry and Geiger Creeks could be as low as 1.70 CFS during a dry month. This supply will consist of water that has passed through the hatchery fish pens from both Ferry and Geiger Creeks and was diverted by the City from downstream of the confluence of the two creeks by means of the alternative lower pump station.

The current water use projections as developed in Section 3 indicated a 1.70 CFS (MDD) for 2003 increasing to 2.41 CFS by 2023. The single day demand exceeding the supply stream could be met by tank storage and impoundment reservoir storage for a few days. On a maximum month basis in 2023, the City is only projected to require 1.44 CFS from an estimated minimum available source of 1.70 CFS. This demand assumes no unexpected increases (or decreases) in projected demand patterns. Therefore, the existing raw water supply source from Ferry and Geiger Creeks is anticipated to provide adequate water during the maximum demand month. However, during some period of days in a dry period, the City may have to curtail water use for a several days.

4.3 Instream Water Rights

Instream rights are protective water rights established to preserve minimum perennial streamflows in our waterways. Like regular water rights, instream rights are issued with a priority date, a flow magnitude, and a certificate number. Instream rights differ from normal water rights in that they commonly vary from month to month and sometimes week to week throughout the year. For instance, the instream rights for a stream in January may be 5 cfs, while in September the instream right requires 1.5 cfs in the same stretch of water. The primary reason for the establishment of instream water rights has been for the protection and preservation of salmon and other anadromous fish species.

An individual or community may hold water rights on bodies of water where instream rights have been established. However, if the instream right priority date is senior to the individual or community right, the instream right flow magnitude must be satisfied before the individual or community is able to remove water from that source.

Instream rights have been applied for in both Geiger and Ferry Creeks by the State of Oregon in 1991. Quantities range from 7 CFS to 19 CFS downstream of the hatchery depending on the month. Under current laws this application has no effect on the existing water rights senior to it including the City's, but would prohibit the State from granting additional water rights in the future, since the instream water rights exceed the total flow available in the creeks. There has been concern that legislation may be passed in the

future which would set the priority date for instream water rights at 1859, the date of Statehood. Passage of this legislation is not considered likely due to the impacts that would occur throughout the State of Oregon.

4.4 Interconnections With Other Systems

The City of Bandon is not close enough to another significantly sized public water supply system to develop a physical interconnection to the benefit of Bandon. Due to the distance from other public water suppliers there are no plans to investigate the viability of developing a regional water system.

4.5 Groundwater Sources - Wells

No groundwater sources are presently utilized by the Bandon water system. As discussed in the 1992 Water Master Plan, a review of well logs for the area indicates that there is a low probability of developing new wells with sufficient capacity for municipal production. Although a hydrologic study of the area has not been performed, information regarding the yield of existing wells within several miles of the City indicates that groundwater is not a viable source for meeting the City's water needs. Well log records for the past five years were thoroughly examined for the following locations. The highest yield (85.7 gpm) occurred in R14W/T28S Section 31, SW 1/4 of SW 1/4. This is a location adjacent to and east of Highway 101 and just north of Johnson Creek.

**Table 4.5.1
Bandon Area-Maximum Well Yields**

Bandon Area Well Log Review (1/1/98 to Present)			
Range	Township	Sections	Max. Yield, GPM
14W	28S	All 36	85.7
14W	29S	3 to 10 & 16 to 21	67.7
15W	28S	24, 25, 36	50.0
15W	29S	1, 12, 13, 24	53.0

A well yield of 139 gpm (0.2 mgd) is recommended as the minimum useful yield for Bandon to consider as a viable source of raw water considering the volume of water required for a municipal water supply.

4.6 Other Sources

Bradley Lake

Bradley Lake was discussed in the 1992 Water Master Plan as a potential municipal water source. Since that time, ownership of the lake area has passed from the Oregon Parks Department to private ownership. The watershed area for this lake is 1482 acres along the China Creek drainage basin. This drainage basin is slightly larger than either Ferry Creek or Geiger Creek sources above the City's diversion points. The surface of the lake is 18 feet above sea level. The lake is 1,800 feet from the Pacific Ocean. The lake has a surface area of approximately 20 acres yielding about 6.5 million gallons per foot of storage. This is a shallow lake. Therefore, the water quality would likely be affected by algae with associated taste and odor problems. As noted in the 1993 WMP, a large pump station and about 31,000 feet of transmission main would be required to convey water from Bradley Lake to the existing treatment plant. Estimated cost for this project would be about \$2,500,000. It is therefore anticipated that a less expensive option would be to construct a small treatment plant at or near Bradley Lake and convey the treated water to the existing 8-inch diameter line on Beach Loop. The distance of this transmission line would be about 5,500 feet. The cost for this project, including the package treatment plant is estimated to be about \$1,500,000.

In recent years, several Oregon communities have had success in using similar algae impacted waters from shallow lakes by treating with on-site chlorine generation systems that also provide other oxidizing agents such as the Miox process. These processes have greatly reduced taste and odor problems. It is recommended that Bandon make arrangements with the owner of the lake property and install a staff gage on the outlet from Bradley Lake to help determine if a viable flow of water exists during the summer time. Prior to any significant expenditure by the City, a water rights investigation should also be conducted to determine if all available summer flow is already allocated.

Windhurst Road Reservoir

Windhurst Road Reservoir was recently completed and has been in operation for less than 2 years. It was originally conceived and constructed as a cooperative supply of water for a group of cranberry growers. Due to a market recession and subsequent reduced requirement for irrigation water, the growers decided to sell additional capacity to help offset bond payments and operation costs. The reservoir is owned and operated by a local cranberry owners association. The reservoir is located on the south edge of Bandon and water from it may be released into Geiger Creek without additional infrastructure improvements. The City could withdraw it from their normal water diversion point. The reservoir has a useable storage volume of 405 to 425 acre-feet. At the time of this report, there was still about 100 acre-feet of storage available for yearly lease. The source of this water is Bill Creek, which is a tributary of Bear Creek, which flows into the Coquille River. Windhurst is an "off-line" reservoir. It is not formed by the impoundment of Bill Creek, but rather by pumping from Bill Creek during the months between November to May. Bill Creek watershed is approximately 7 square miles in area and has very steep sides. Therefore, during run-off events, large amounts of water are present. However, during dry periods of the year, the flow is minimal. The water quality is reported to be of good quality and appears to be suitable as municipal source water. The terms of use by the City as currently proffered by the reservoir owners are for \$500 per acre-foot per year. The reservoir operator's current position is that the City would be responsible for re-sale of the water if the City did not use it. Therefore, the City would have to budget \$50,000 per year (if the entire 100 acre-foot amount was reserved) and could only recover this cost unused water, if the City could find a buyer. Under these conditions, the raw water cost is \$1.53 per thousand gallons. The 100 acre-foot capacity translates to 31.8 million gallons. This quantity of water could be very useful in a drought situation to help supplement or supply raw water through a dry month or two.

It is recommended that the City attempt to negotiate an emergency use arrangement by which other leasers would commit to re-sell water to the City only if required. This arrangement is anticipated to be more cost effective in the long term even if the unit cost of emergency supply water was several times more expensive than \$500 per acre-foot. In a water shortage situation severe enough to warrant use of this source, it is also recommended that the unit cost for the purchased water be added as a surcharge to customer's water bills during declared curtailment stages as a further conservation measure.

Let us assume that the City could negotiate an arrangement whereby water was available on emergency demand for \$1000 or even \$1,500 per acre-foot payable only upon demand. The City is not anticipated to require additional water except for a period of days. Furthermore, on the highest demand day of the year in 2023, 2.41 CFS could be required and 1.70 CFS is met from Ferry and Geiger Creeks. Therefore, during a record low flow month, the cost for up to .71 CFS per day (458,853 gpd or .711 acre-foot per day) for 7 days would be \$4,977 to \$7,466. A reserve fund established for this purpose is anticipated to be much less expensive than any infrastructure improvements, which might be constructed.

Johnson Creek Reservoir

The Johnson Creek Reservoir project is in the development stage with the Bandon Cranberry Water District as the sponsoring agency. Most of the project participants are cranberry farmers. Progress has been made regarding permits and environmental studies, but these are not yet complete. The City has

committed \$150,000 to be set aside for this project which will address studies, design, permitting and all other costs apportioned to the City up to the sale of construction bonds. Preliminary design estimates provide for a total storage volume of 1,100 acre-feet, of which 200 acre-feet would be for use by the City of Bandon. To deliver water from the reservoir to the City of Bandon would require a pump station able to pump approximately 300 to 350 gallons per minute a distance of 2500 feet to a release point in upper Geiger Creek. The cost of this pump unit and 2500 feet of 8 inch pipe is estimated to be \$50,000 for the station and \$75,000 for the pipe line.

This project still requires the Environmental Wetland delineation to be completed and the in reservoir habitat study to be completed. It appears likely that a fish ladder requirement will be waived based upon planned mitigation activities which include removal of stream blockage about 1/2 mile downstream from the proposed reservoir and fish passage culvert construction on nearby streams. The dam will also include provision of a cone valve for aeration of overflow. Hydraulic studies need to be completed to confirm the annual fill characteristics of the proposed impoundment.

Progress on the reservoir has slowed due to the drop in cranberry prices from about \$70 a BBL to \$18 BBL. Cranberry prices are again rising. It is anticipated that the project will again become active in about 2 years. The best current estimate is that, geotechnical investigations, final design and construction can be expected to take another 2 to 3 years.

The construction cost is estimated to be between \$2 million and \$3 million depending on land purchase costs and the results of the geotechnical investigations, which may dictate sealing near the proposed dam location. Therefore, the City's share to bond is estimated to be $(200/1100) \times \$3 \text{ million}$ or \$546,000. Annual operation and maintenance costs in the future are expected to be about \$20/acre-foot per year or \$4,000 for all 200 acre-ft.. The volume of 200 acre-feet or 65.17 million gallons would supply the required difference between Geiger and Ferry Creek supplies during drought years (1.7 CFS or 1.099 MGD available) and the projected maximum month average day demand of 1.33 MGD well past the year 2053.

Desalination

Unless surface impoundments are constructed in the future, the most apparent source of long-term water supply is by seawater desalination. There are currently two basic technologies, Reverse Osmosis (RO) and Distillation. For RO, pressure is applied to the intake water, forcing water molecules through a semi-permeable membrane. The salt molecules do not pass, leaving potable product water. For distillation, the intake water is heated to produce steam. The steam is then condensed to produce water with low salt concentration. Distillation plants require significant economies of scale to be competitive with RO plants. Current California plants, other than offshore oil and gas platforms, range in size from 20 to 112,000 acre-ft production per year. Seawater plants in California which produce municipal quality water are estimated to operate at a cost of \$1350 to \$3000 per acre-foot. Energy use varies widely, depending upon the technology used and ranges from 2,500 to 29,500 kilowatt hours per acre-foot with RO plants at the lower end of the estimate. For every 100 gallons of seawater input, 15 to 50 gallons of fresh water is produced with RO producing the higher recovery rates. The remainder is concentrated brine solution. Produced water quality ranges from 1 to 500 ppm with 250 to 400 ppm typical for municipal use. Desalination plants can use either a pipeline into the ocean or wells on the beach or seafloor for intake of water. If brackish rather than seawater water is used, the costs are less. In comparison with a seawater source water, the cost of water produced from a brackish groundwater source is about 38%; for a municipal wastewater source the cost is about 42% (excluding pretreatment) of the seawater source cost. Plant sizes range from 5 to 65 square feet per acre-foot capacity per year. Plant height is 15 to 20 feet for reverse osmosis equipment and 30 to 45 feet for distillation equipment.

In the case of Bandon, a "beach" well intake along the Coquille River could be envisioned so that brackish well water is utilized. Ideally, waste brine would be mixed with sewage outflow to provide dilution and mitigate the environmental effects of concentrated brine or temperature effects. If such a facility were constructed, it is anticipated to be in the 500,000 gallons per day or 560 acre-feet per year range, assuming a reliable minimum 1.70 CFS from Ferry and Geiger Creeks. This type of facility is not anticipated prior to 2023. Based on current technology the cost of water produced is estimated to be \$600 per acre-foot.

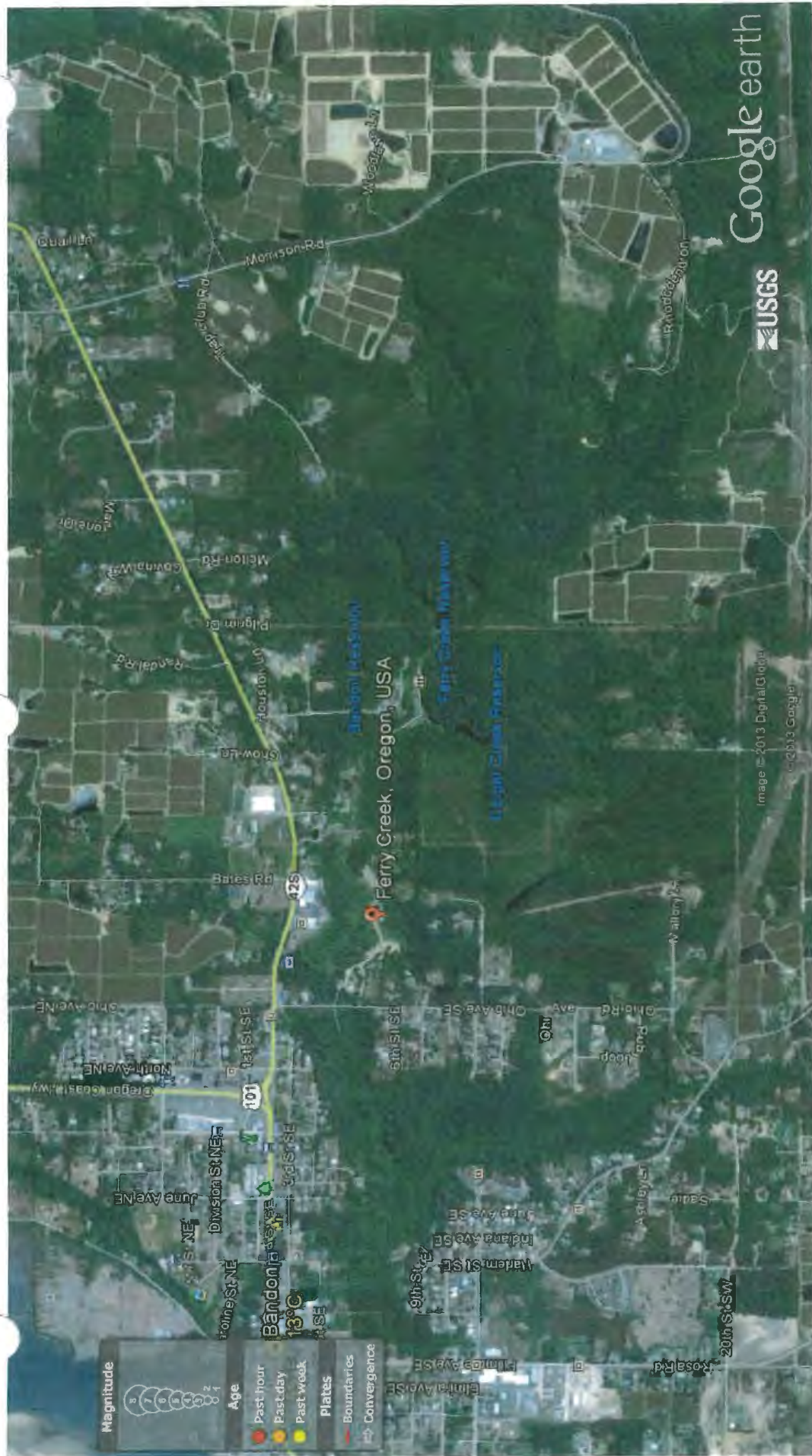
Long Term Goal

The long-term goal for Bandon should still be to develop, or by cooperative venture participate in, a major impoundment. The Ferry Creek impoundment, discussed in previous years, located downstream of the hatchery is at this time assumed to generate widespread public and regulatory opposition and to be cost prohibitive. The cooperative ventures with the Cranberry Water District for Windhurst and or Johnson Creek appear to be the most feasible within the 20 year planning period.

Summary

The supply of Ferry Creek and Geiger Creek water available to the City is estimated to be as little as 1.099 MGD (1.7 CFS) during drought conditions if there are no negative changes to the watersheds and the current water rights arrangements with the hatchery and cranberry growers remain the same. The current maximum month average day demand is 0.656 MGD and the maximum demand day of the year is estimated to be 1.100 MGD. From this year forward, it is possible for the City to see a period of demand days which exceed the available raw water supply, requiring use of reservoir storage. By 2023 the maximum month average day demand is projected to be 0.939 MGD and the maximum demand day of the year is estimated to be 1.560 MGD. Either a purchase arrangement for Windhurst Water or participation in the Johnson Creek Reservoir project is recommended to avoid water curtailment situations for a period of several days per year, during the next 20 year period. The use of Simpson Creek impoundment as a reserve raw water storage option does not appear promising. Participation in the Johnson Creek Reservoir project would provide adequate raw water supply in conjunction with the Ferry Creek and Geiger Creek sources and given careful management, for at least the next 50 years.



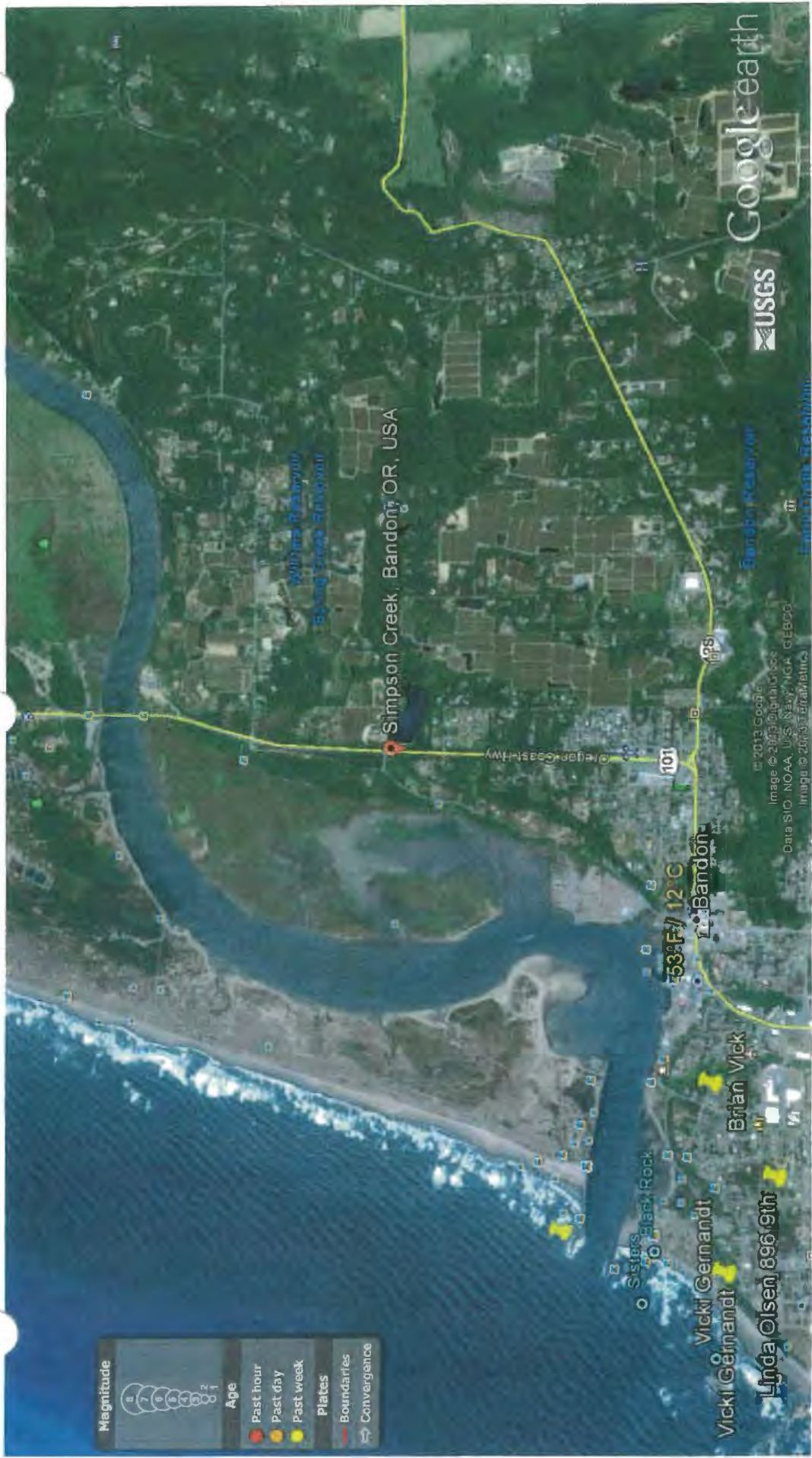


Google earth

miles
km

1
2





Magnitude

8
7
6
5
4
3
2
1

Age

● Past hour
● Past day
● Past week

Plates

— Boundaries
— Convergence

Google earth

miles
km





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Source Water Assessment Results

Bandon's Drinking Water Protection Area with Sensitive Areas and Potential Contamination Sources

PWS 4100074

-  Drinking Water
Protection Area
-  Drinking Water
Intake - Surface Water
Sensitive Areas
-  Area Feature (see Note 2)
-  Point Feature (see Note 2)

Notes on Potential Contaminant Sources

Note 1: Sites and areas noted in this Figure are potential sources of contamination to the drinking water identified by Oregon drinking water protection staff. Environmental contamination is not likely to occur when contaminants are used and managed properly.

Note 2: Feature identification markers correspond to the potential contaminant source numbers in the SWA Report. The area features represent the approximate area where the land use or activity occurs and is marked at the point closest to the intake. The point features represent the approximate point where the land use or activity occurs.



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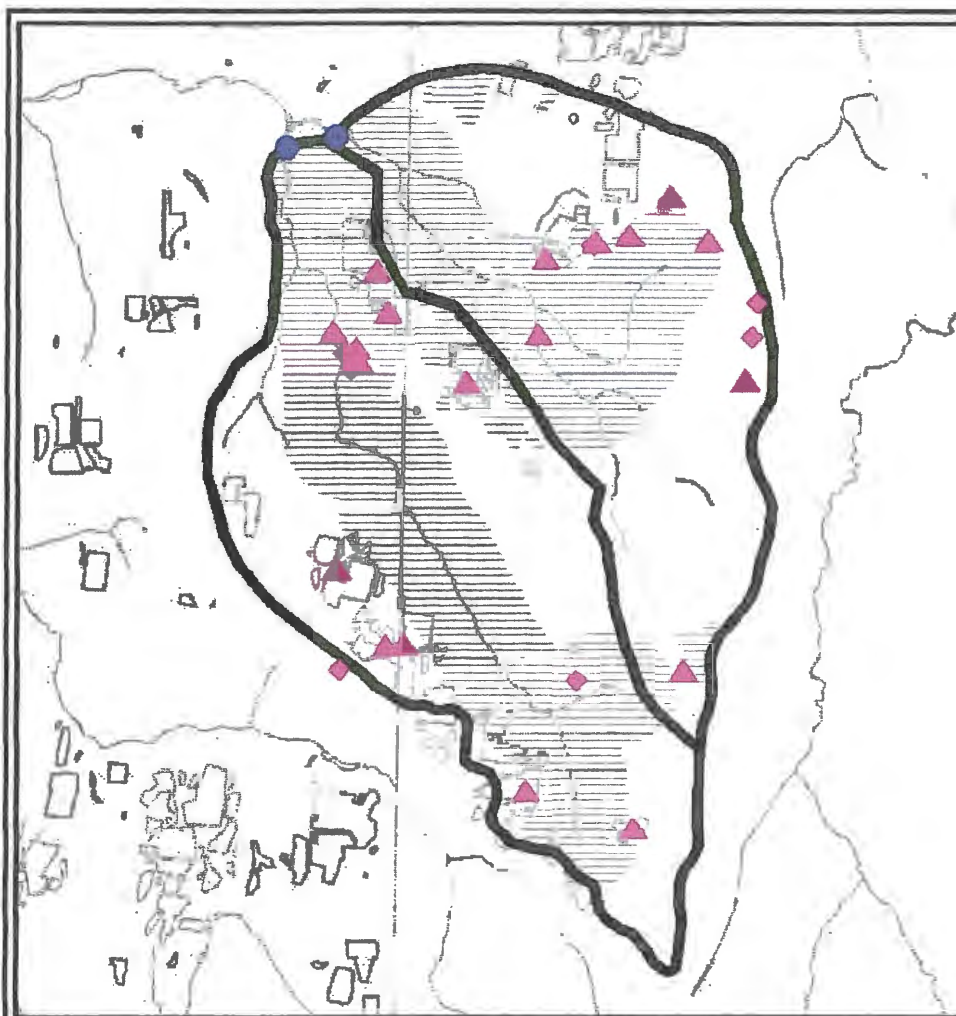


TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100074 BANDON, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
1	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	NORTHEAST OF CREEK AND SOUTHWEST OF MORRISON RD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk	
2	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	SOUTH OF CREEK AND WEST OF MORRISON ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk	
3	Transmission Lines - Right-of-Ways	POWERLINES	CROSS WATERSHED EAST TO WEST	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Lower	Construction and corridor maintenance may contribute to increased erosion and turbidity in drinking water supply. Over-application or improper handling of pesticides or fertilizers may impact	
4	Utility Stations - Maintenance Transformer Storage	SUBSTATION	JUST SOUTH OF POWERLINES AND WEST OF MORRISON RD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Spills, leaks, or improper handling of chemicals and other materials including PCBs during transportation, use, storage and disposal may impact the drinking water	
5	Utility Stations - Maintenance Transformer Storage	SUBSTATION	NORTH OF POWERLINES AND EAST OF MORRISON	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Spills, leaks, or improper handling of chemicals and other materials including PCBs during transportation, use, storage and disposal may impact the drinking water	
6	Homesteads - Rural - Septic Systems (< 1/acre)	RURAL RESIDENTIAL HOUSING WEST OF MORRISON ROAD	SOUTH OF POWERLINES AND WEST OF MORRISON ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Lower	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Use of drain cleaners and dumping household hazardous wastes can result in groundwater	

Note: Sites and areas identified in this Table are only potential sources of contamination to the drinking water. Environmental contamination is not likely to occur when contaminants are used and managed properly.

(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

(2) See Table 3 for database listings (if necessary).

TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100074 BANDON, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
7	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	EAST OF CREEK AND NORTH AND EAST OF MORRISON ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	
8	Homesteads - Rural - Septic Systems (< 1/acre)	RURAL RESIDENTIAL HOUSING NORTH OF MORRISON ROAD	EAST OF CREEK AND NORTH OF HAIRPIN TURN IN MORRISON ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Lower	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Use of drain cleaners and dumping household hazardous wastes can result in groundwater	
9	Managed Forest Land - Clearcut Harvest (< 35 yrs.)	FOREST LAND RECENTLY CLEARCUT AND REPLANTED	SOUTH OF HAIRPIN TURN IN MORRISON ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	Cutting and yarding of trees may contribute to increased erosion, resulting in turbidity and chemical changes in drinking water supply. Over-application or improper handling of pesticides or fertilizers may impact drinking water source.	
10	Transportation - Freeways/State Highways/Other Heavy Use Roads	MORRISON ROAD	RUNS APPROXIMATELY NORTH TO SOUTH ALONG EASTERN ED	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.	Risk Reduced to Moderate because ROAD IS NOT HEAVILY USED.
	Transportation - Right-Of-Ways - Herbicide Use						Moderate	Over-application or improper handling of pesticides may impact drinking water	Risk Reduced to Moderate because ROAD IS NOT HEAVILY USED.

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(1) Where multiple potential contaminant sources exist at a site, the highest level of risk is used.

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TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100074 BANDON, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
11	Transportation - Stream Crossing - Perennial	MORRISON ROAD CROSSING FERRY CREEK	CROSSES NORTHERN MOST BRANCH OF CREEK WHERE ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Lower	Road building, maintenance & use may increase erosion & slope failure causing turbidity. Vehicle use increases the risk of leaks or spills of fuel & other chemicals. Over-application/improper handling of pesticides in right-of-way may also impact.	
12	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	EAST OF CREEK AND NORTH OF BILL CREEK RD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	
13	Transmission Lines - Right-of-Ways	POWERLINES	CROSS CREEK NORTH OF BILL CREEK RD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Construction and corridor maintenance may contribute to increased erosion and turbidity in drinking water supply. Over-application or improper handling of pesticides or fertilizers may impact	
14	Septic Systems - High Density (> 1 system/acre)	POSSIBLE HIGH DENSITY HOUSING WITH HIGH DENSITY SE	EAST OF CREEK/INSIDE BEND OF BILL CREEK	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	If not properly sited, designed, installed, and maintained, septic systems can impact drinking water. Cumulative effects of multiple systems in an area may impact drinking water supply.	
	Housing - High Density (> 1 House/0.5 acres)						Moderate	Improper use, storage, and disposal of household chemicals may impact the drinking water supply. Stormwater run-off or infiltration may carry contaminants to drinking water supply.	

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TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100074 BANDON, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
15	Transportation - Stream Crossing - Perennial	BILL CREEK RD CROSSING GEIGER CREEK	SOUTH OF POWERLINES CROSSING CREEK	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Higher	Road building, maintenance & use may increase erosion & slope failure causing turbidity. Vehicle use increases the risk of leaks or spills of fuel & other chemicals. Over-application/improper handling of pesticides in right-of-way may also impact	
16	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	FIRST CLUSTER OF BOGS SOUTH OF BILL CREEK RD AND W	BANDON	Field-Observation	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	
17	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	SECOND CLUSTER OF BOGS SOUTH OF BILL CREEK RD AND	BANDON	Field-Observation	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	
18	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	THIRD CLUSTER OF BOGS SOUTH OF BILL CREEK RD AND W	BANDON	Field-Observation	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	

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TABLE 2. INVENTORY RESULTS - LIST OF POTENTIAL CONTAMINANT SOURCES

PWS# 4100074 BANDON, CITY OF

Reference No. (See Figure)	Potential Contaminant Source Type	Name	Approximate Location	City	Method for Listing	Proximity to Sensitive Areas	Relative Risk Level (1)	Potential Impacts	Comments
19	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	SET OF BOGS AT EXTREME SOUTHERN TIP OF CREEK	BANDON	Field-Observation	Unknown if in a sensitive area	Higher	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	
20	Mines/Gravel Pits	BORROW PIT	JUST SOUTH OF CRANBERRY CLUSTER #6	BANDON	Field-Observation	Unknown if in a sensitive area	Higher	Spills, leaks, or improper handling of chemicals and wastes generated in mining operations or from heavy equipment may impact the drinking water supply.	Site is located beyond DWPA but it may impact the DWPA.
21	Other HISTORIC SPILL	SITE OF BOG BUILDERS EXCAVATION EQUIPMENT INTO CRE	JUST SOUTH OF BILL CREEK RD STREAM CROSSING	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	The impacts of this potential contaminant source will be addressed during the enhanced inventory.	PWS SHOULD VERIFY THAT CLEANUP IS COMPLETE
22	Upstream Reservoirs/Dams	PLANNED CRANBERRY BOG	JUST NORTH OF UPPER BRANCH AT CREEK FORK	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	During major storm events, reservoirs may contribute to prolonged turbidity for downstream intakes for drinking water. Construction, fluctuating water levels, and heavy waterside use can increase erosion and turbidity in reservoir/drinking water source.	PWS SHOULD VERIFY WHETHER RESERVOIR IS ACTUALLY PUT INTO USE.
23	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	JUST SOUTH OF BILL CREEK RD STREAM CROSSING	BANDON	Interview	Unknown if in a sensitive area	Moderate	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	Location based on map and/or aerial photograph provided by PWS.

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24	Crops - Irrigated (inc. orchards, vineyards, nurseries, greenhouses)	CRANBERRY BOGS	AT SOUTHEAST END OF BILL CREEK ROAD	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	Over-application or improper handling of pesticides/fertilizers may impact drinking water. Excessive irrigation may transport contaminants or sediments to groundwater/surface water through runoff. Drip-irrigated crops are considered to be a low risk.	
25	Transportation - Freeways/State Highways/Other Heavy Use Roads	BILL CREEK ROAD	RUNS THROUGH UPPER WATERSHED EAST TO WEST	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.	Risk Reduced to Moderate because ROAD IS NOT HEAVILY USED.
26	Transportation - Right-Of-Ways - Herbicide Use	BILL CREEK ROAD	RUNS THROUGH UPPER WATERSHED EAST TO WEST	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	Over-application or improper handling of pesticides may impact drinking water	
27	Transportation - Right-Of-Ways - Herbicide Use	WINDHURST ROAD	RUNS THROUGH LOWER WATERSHED AT WESTERN EDGE	BANDON	Field-Observation Interview	Unknown if in a sensitive area	Moderate	Over-application or improper handling of pesticides may impact drinking water	Risk Reduced to Moderate because ROAD IS NOT HEAVILY USED.
	Transportation - Freeways/State Highways/Other Heavy Use Roads						Moderate	Vehicle use increases the risk for leaks or spills of fuel & other haz. materials. Road building, maintenance & use can increase erosion/slope failure causing turbidity. Over-application or improper handling of pesticides/fertilizers may impact water.	Risk Reduced to Moderate because ROAD IS NOT HEAVILY USED.

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