City of Brookings

WORKSHOP Agenda

CITY COUNCIL

Monday September 21, 2015, 4:00pm
City Hall Council Chambers, 898 Elk Drive, Brookings, OR 97415

A. Call to Order

B. Roll Call

C. Topics

1. Request for Recognition of Elmo Williams [City Manager, pg. 2]
    a. Letter from Barbara Wieneke [pg. 3]
2. Redundant Water Supply Plan [City Manager, pg. 4]
3. Draft 2015 Strategic Plan - Short Term [City Manager, pg. 45]

D. Council Member Requests for Workshop Topics

E. Adjournment

All public City meetings are held in accessible locations. Auxiliary aids will be provided upon request with at least 14 days advance notification. Please contact 469-1102 if you have any questions regarding this notice.

CITY OF BROOKINGS

COUNCIL WORKSHOP REPORT

Meeting Date: September 21, 2015

Originating Dept: City Manager

(Signature submitted by)

City Manager Approval

Subject: Request for Recognition of Elmo Williams

Recommended Action:
Provide direction to staff.

Background/Discussion:
The City Council has received a letter from Barbara Wieneke requesting that the City Council consider renaming Azalea Park as "*Elmo Williams Azalea Park*" or provide some other form of recognition for the community service provided by Elmo Williams. See attached letter.

Attachment(s):

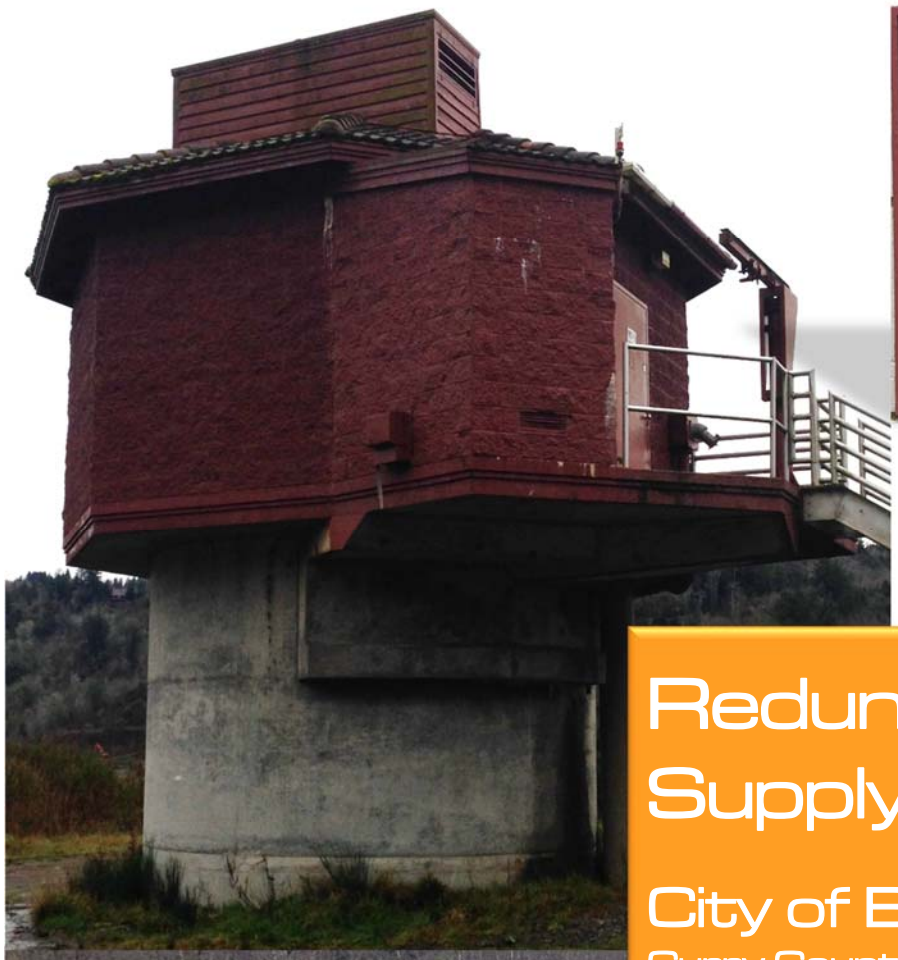
a. Letter from Barbara Wieneke

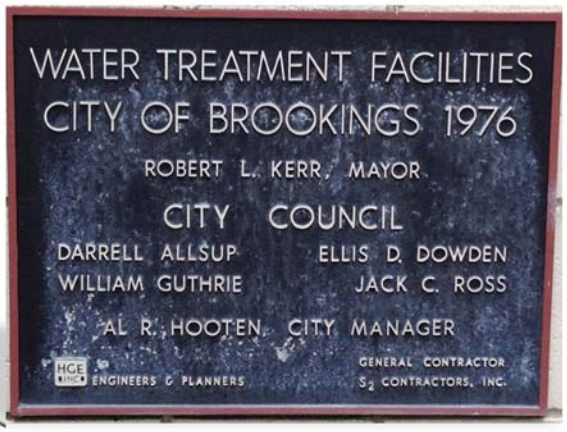
Monday, Aug. 31, 2015

To: The City Council of Brookings, OR.
From: Barbara Wieneke
859 Jodee Lane Tel.: 541-469-9632
Brookings, OR

I wish to propose to the Council that the City of Brookings honor Elmo Williams in some way. Elmo has contributed a great deal to the town of Brookings. First, with his wife Lorraine and the help of many supporters and volunteers, he restored Azalea Park to the beautiful park it is today. In addition, he built the beautifully-designed Capella in Azalea Park to honor his late wife Lorraine and then left it to the city.

While Elmo is still with us at the age of 102, I think it appropriate to rename Azalea Park Elmo Williams Azalea Park. If not in this way, perhaps he could be honored in some other way and to do something before too much time passes. Respectfully submitted
Barbara Wieneke





Redundant Water Supply Plan

City of Brookings

Curry County, Oregon

AUGUST 2015

Civil West Engineering Services, Inc.
486 E Street • Coos Bay, Oregon 97420
609 SW Hurbert Street • Newport, Oregon 97365
10558 Hwy 62, Suite B-1 • Eagle Point, Oregon 97524

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1.0 Executive Summary

Section 1

1.1 Introduction

The City of Brookings is situated just north of the Oregon-California border along Highway 101 where the Chetco River meets the Pacific Ocean. The City owns and operates a public water system which is designed and built to provide potable water to approximately 7,500 customers in the City, as well as fire protection within the City. The City's system includes a raw water intake known as a Ranney Collector, a water treatment plant, booster pump stations, storage tanks, a water distribution network, and a controls and telemetry system.

This existing water system draws from a single source on the north bank of the Chetco River, approximately 5.3 miles upstream from the Pacific Ocean, where the North Fork Chetco River and the Chetco River meet. While the river has been a reliable source of water, only having one source of supply for the system carries risks, such as if that source becomes contaminated.

The Harbor Water District (HWD) is an independent water district located immediately to the south of Brookings within the same Urban Growth Boundary (UGB). Like Brookings, the HWD relies on a single source for its water supply in the Chetco River. The intake station is located almost two miles downstream from the Brookings intake. In the summers of 2014 and 2015, the HWD intake experienced saltwater intrusion which contaminated the District's water supply and left the residents to rely on bottled water for their potable water needs until the saltwater intrusion had subsided.

This study was prepared for the City of Brookings in order to help the City to consider various alternatives available for completing a backup water supply system for use in the event that the Brookings intake station is ever compromised. In an effort to alleviate the problems that would be caused by saltwater contamination in the City's potable water supply, the City of Brookings retained Civil West Engineering Services, Inc. to complete this study, which includes recommendations of capital improvement projects to complete a backup water supply system.

1.2 Existing Water System

The City of Brookings owns and operates a water system that provides water service to approximately 7,467 water system users within the community's UGB north of the Chetco River. The community's water system can trace its roots back to a privately owned system that was first established in the early 1900's. At that time the system consisted of the Ferry Creek reservoir and a limited distribution system. In the 1970's the City of Brooking acquired the private system and began major improvements. Some of the first significant improvements included the construction of a river intake on the Chetco River. Due to concerns with saltwater intrusion at the intake site, the first intake the City constructed was abandoned and a new intake was constructed further up river. The newer intake that was constructed is called the Ranney Collector and is still the intake that the city uses for its water system today. This intake station houses three vertical turbine pumps, which are employed via simplex operation (one pump at a time) to produce approximately 2.0 million gallons per day (MGD).

During the 1970's the City constructed a rapid sand filtration water treatment plant with a treatment capacity of 1.5 MGD. It was then upgraded in 1988 to be able to treat 2.0 MGD to match the capacity of the Ranney Collector. In addition to the water intake and treatment facilities, the City's water system includes 9 booster pumps stations and 11 storage tanks which together achieve a treated water storage capacity of approximately 3.6 million gallons. The distribution system delivers water to 3,354 water meters (2012 meter count) via a network of water mains that range in size from 2-inches to 16-inch

diameter pipe. Although the City has worked hard to update the distribution system, the system still has older lines constructed of steel, cast iron, and asbestos cement (AC) in service today.

1.3 Capital Improvement Plan

The cost for the improvements recommended in this study is approximately $8.6 million. These improvements were selected from a variety of alternatives in order to optimize the use of the City's existing water rights and to establish a reserve system that will be reliable and long-lasting. The projects recommended for inclusion in the Capital Improvement Plan (CIP) include improvements to five distinct system features:

1. Ferry Creek Reservoir: to be upgraded for use as a backup water storage reserve (Section 3.1.3);

2. The old "Tide Rock" intake station: to be demolished, reconstructed, and integrated into the existing raw water intake system for scheduled flow to Ferry Creek Reservoir (Section 3.3.2);

3. Transmission Piping: to be installed between the Water Treatment Plant (WTP) and Ferry Creek Reservoir (Section 3.1.4);

4. Emergency domestic intertie with the HWD water system (Section 3.1.5).

5. Existing water storage tanks to be seismically retrofit with seismic valving, in addition to the completion of a detailed seismic analysis of each tank for consideration of future improvements.

A cost summary of these projects has been included in Table 4.2.1-1. In addition to these improvements, the City would need to acquire additional water rights to store water in Ferry Creek Reservoir for municipal use. Details regarding this requirement are addressed in Section 3.4.

2.0 Introduction

Section 2

2.1 Plan Background

The City of Brookings currently relies on the Chetco River as the single source of water for the public water system. The river and the existing water intake, known as the Ranney Collector, have been a reliable source of water, however, having only one source of water leaves the City in a position of vulnerability.

The Chetco River is also a source of water for the neighboring Harbor Water District (HWD). The HWD river intake structure is downstream of the Brooking's Ranney Collector. In the summers of 2014 and 2015, the HWD experienced saltwater intrusion in their raw water supply during the low river flows and high tides of summer.

The District and City should also recognize that if ocean levels continue to increase due to global climate change, the number of occurrences of intrusion of salt water could increase. This ongoing concern, coupled with the recognition that both intake structures could be inundated in the event of a tsunami, leaving both jurisdictions with no viable water source until the saltwater event had subsided.

With the recent saltwater intrusion into an adjacent jurisdiction's river intake, the City of Brookings is concerned that their intake could be compromised, possibly cutting off the City's sole source of water. Using a proactive approach, the City has determined that they need to identify alternative water supplies

in order to provide a backup supply for emergency situations. This alternative water supply would allow the City to effectively manage emergency situations as well as meet peak demands.

2.1.1 Plan Authorization

The services of Civil West Engineering Services, Inc. were secured to complete a Redundant Water Supply Plan for the City in December 2014. During the subsequent few months, minor preliminary work was completed on this plan and final approval from the City Council to proceed was obtained at the end of April 2015.

2.1.2 Past Studies and Reports

The following plans, reports, and documents have been prepared for the City in the past by other firms and have been used as references for parts of the discussion within this report:

- *City of Brookings Water System Master Plan Update,* April 2014, PACE
- *Final Report on Feasibility Study for Restoration of Ferry Creek Reservoir Brookings, Oregon,* May 30, 1997, Dames & Moore
- *City of Brookings, 18" C905 PVC Raw Water Line on North Bank Chetco Co. Road*, Record Drawings, January 2007, HGE Project No. 06.101

2.1.3 Study Objective

The purpose of this Redundant Water Supply Plan is to furnish the City of Brookings with a comprehensive document that will provide clear recommendations, preliminary concepts and estimates for an alternative water supply. This study should also provide the city with the information required to plan for future funding requests and to develop improvement prioritization lists. Some specific alternatives that were identified early on for inclusion in this report include:

- Increasing the overall capacity of the existing Ferry Creek Reservoir.
- The construction of a waterline from the Chetco River that will fill the Ferry Creek Reservoir during times of low flow into the reservoir. This will allow the reservoir to act as reliable water storage.
- Determining the possibility of utilizing groundwater as a reliable source.
- Restoration of the original Chetco River water intake ("Tide Rock").

This list is not meant to be all-inclusive; other alternatives may be analyzed if they are determined to be viable options for addressing the City of Brookings' water supply needs.

2.2 Scope of Study

2.2.1 Study Organization

The following sections comprise this Redundant Water Supply Plan for the City of Brookings:

- **Section 1 – Executive Summary.** This section provides a brief overview and summary of this Plan and is intended to provide the reader with the important facts and findings contained in the overall plan.

- **Section 2 – Introduction.** This section provides a short description of the need and scope of this plan. It also includes a brief background summary of the water system and the study area.

- **Section 3 – Water Supply Alternatives.** This section outlines the possible alternatives for a redundant water supply for the City. It also includes preliminary cost estimates.

- **Section 4 – Recommended Water Supply Alternatives.** This section identifies the recommended redundant water supply alternatives with a cost summary.

- **Appendices.** The Appendices include information that is referenced in this study but is not included in the referenced planning documents.

2.2.2 Acknowledgments

Various current and former members of the City staff have contributed time and effort to ensure accurate record keeping and proper planning of the community's water system needs. Water treatment operators, water distributions staff, billing records personnel, and others have all helped to complete this effort. We wish to acknowledge and thank the following persons in particular for their assistance as we prepared this report/plan:

Gary Milliman – City Manager
LauraLee Snook – Public Works and Development Services Director
Ray Page – Treatment Supervisor

Civil West would also like to acknowledge the assistance of Kim Grigsby and Adam Sussman at GSI Water Solutions. GSI provided information in relation to water rights and options of how to utilize them more efficiently.

2.3 Study Area

2.3.1 Planning Area Details

The City of Brookings is located in Curry County, Oregon along Coastal Highway 101. The city is located approximately eight miles north of the California/Oregon border and is the last city before leaving Oregon.

The City of Brookings is located in Townships 40-41 S, Ranges 13-14 W, W.M. The city limits include areas north of the Chetco River while the urban growth boundary (UGB) extends south of the river. The City of Brookings is responsible for the water system north of the Chetco River while the Harbor Water District maintains the areas south of the river. Therefore, this plan will primarily deal with the water system and the customers north of the river. The lighter shaded area in the Figure on the following page (Figure 2.3.1) represents the Brookings city limits, and the larger dotted line represents the UGB.

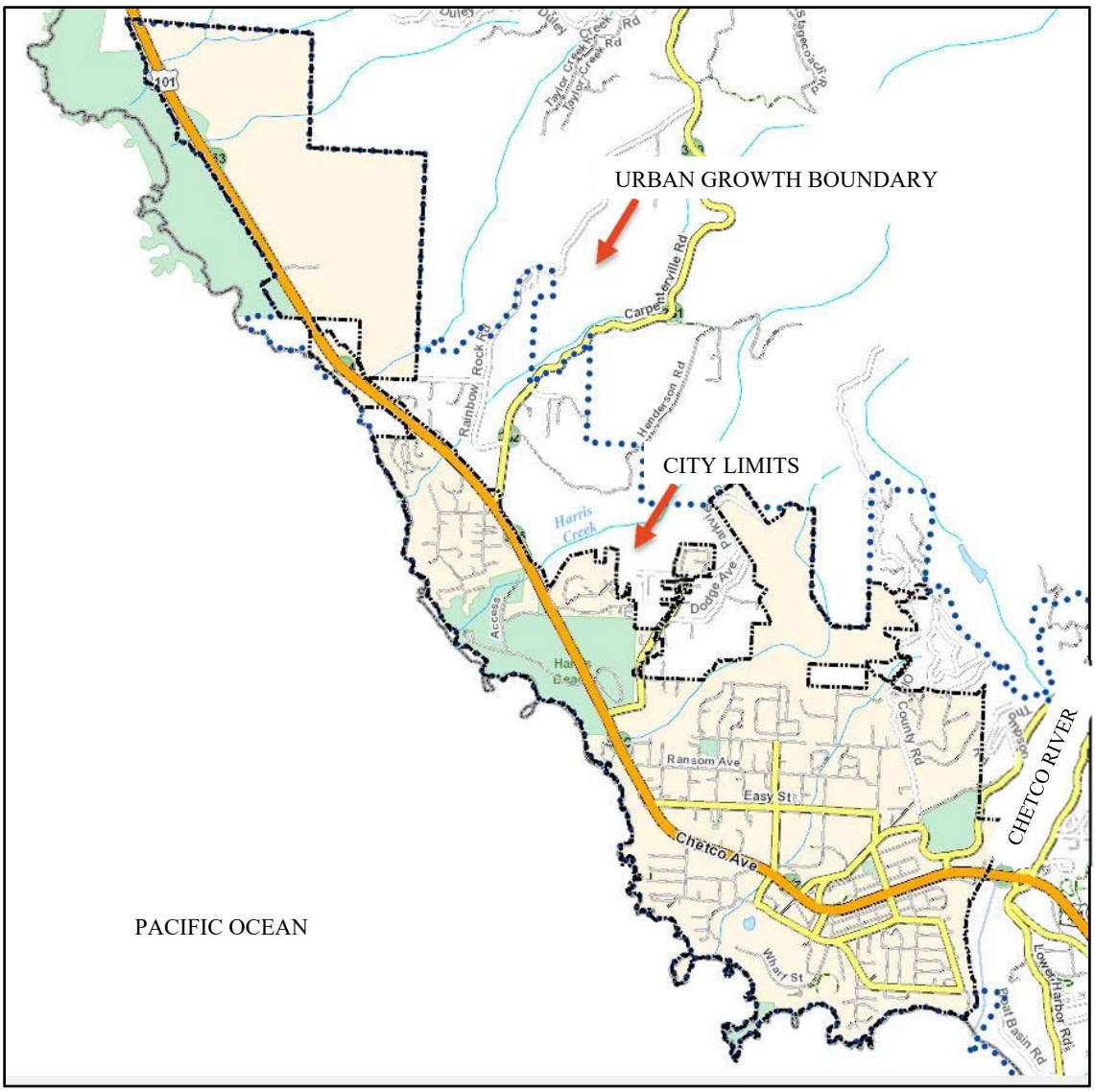

Figure 2.3.1 – City of Brookings UGB and City Limits Boundary Map (courtesy of Curry County maps, 2014)

2.4 Existing Water System

2.4.1 Water System Summary

The City of Brookings public water system provides quality water to approximately 7,467 persons and over 3,300 metered water connections (*Water Master Plan Update*, 2014, PACE). All metered connections are found north of the Chetco River. Components of this water system include:

- **Water Rights (Surface, Groundwater and Reservoir)**
  The City holds many water rights along the river and creeks throughout the UGB. Most of these rights are not being utilized at this time. The active water rights total to 5.57 cfs on the Chetco River and are considered a surface water right. These are located at the point of diversion (POD) for the Ranney Collector intake station. This POD is currently the only source of active withdrawal that the City utilizes.

- **Raw Water Intake**
  Originally, the City owned and maintained a water intake on the Chetco River called "Tide Rock." This intake was further downstream than the existing intake which caused concerns about saltwater intrusion during the summer months. This intake acted much like an infiltration gallery, therefore, it was considered a groundwater source under the influence of surface water. Eventually, this intake was abandoned due to the saltwater concerns and the current intake was constructed further upstream and is commonly known as the Ranney Collector. Three pumps are housed in this station, achieving a total design capacity of 9.3 cfs.

- **Water Treatment Plant (WTP)**
  The current WTP that was constructed in 1976 currently operates at approximately 2.0 MGD. Typically the WTP is bypassed in the summer months when turbidity levels are low and only disinfection is required. During the winter months the river levels increase and the filters and other plant components are utilized for water treatment.

- **Finished Water Storage Tanks**
  A total of 11 storage tanks are spread throughout the City for treated water storage. These tanks vary in material, size, age, configuration, condition, and location and total approximately 3.6 million gallons of treated water storage. Some of these tanks were constructed to serve a very specific area while others are much larger and serve a large percentage of the residents.

- **Distribution Network (Including Pump Stations)**
  Within the water distribution system are nine booster pump stations (BPS), water meters and water mains ranging from 2-inch to 16-inch. The 12", 14" and 16" mains primarily function as transmission mains. The BPS throughout the system serve areas of varying elevation and demand. This allows most customers in the city to have pressures of approximately 40-70 psi.

A more detailed description of these components can be found in the recent Water Master Plan update and will not be discussed in further detail in this plan. These details are provided as a basic summary of the existing water system.

3.0 Water Supply Alternatives

Section 3

3.1 Ferry Creek Reservoir

The Ferry Creek Reservoir was the original water supply for the residents of the Brookings area during the early years of the water system. It served the area for nearly 60 years but has been relatively unused since the 1960s. Since that time, the primary water source has been the Chetco River. The current capacity of Ferry Creek Reservoir is 29 million gallons and it occupies approximately 5 acres (Figure 3.1.1). The City holds water rights that will allow for 55 million gallons (167.4 acre-feet) of storage at the reservoir location.

On May 30, 1998 a Feasibility Study for the Restoration of Ferry Creek Reservoir was completed. Dames & Moore included a discussion on how the reservoir's capacity could be increased. This study identified and discussed several options including:

1. Dike construction further up Ferry Creek as a means of developing additional storage volume.

2. Dredging of the reservoir to remove any sediment that could have reduced reservoir capacity of the years.

3. Construction of a parapet wall along the dam crest to increase storage capacity.

4. Raising of the dam crest by the addition of earthen fill to the dam to increase storage capacity.

The study discusses and eliminates the first three options as either not viable or not cost effective for increasing the storage capacity of the facility. The fourth and final option was investigated further in the study to look at a number of increases to the dam crest elevation as a means to increase the reservoir's storage capacity. This extended discussion ultimately concluded that raising the dam's crest to achieve storage capacity to take full advantage of the city's water rights is feasible. Through continued discussion with the City, this study focused on minimizing the required improvements to the dam which would produce the largest increase in capacity. This is accomplished by increases of either 6 feet or 9 feet to the crest of the dam. Such an increase would extend the crest of the dam up while limiting the need to add a significant amount of material on the downstream face of the dam. Increasing the capacity of the reservoir to the full water rights level of 55 million gallons would require significant additional material to the downstream face as well as the crest. These options were not investigated further in this report due to the extensive improvement costs.

Figure 3.1.1 – Ferry Creek Reservoir currently (January 2015)

A peak discharge report was obtained from the Oregon Water Resources Department (OWRD) database for the Ferry Creek watershed and is included in the Appendix. A summary of this report is included along with a map of the watershed in Figure 3.1.2:

- Drainage Area – 0.507 square miles
- Mean January Precipitation – 12.9 inches
- Mean July Precipitation – 0.521 inches

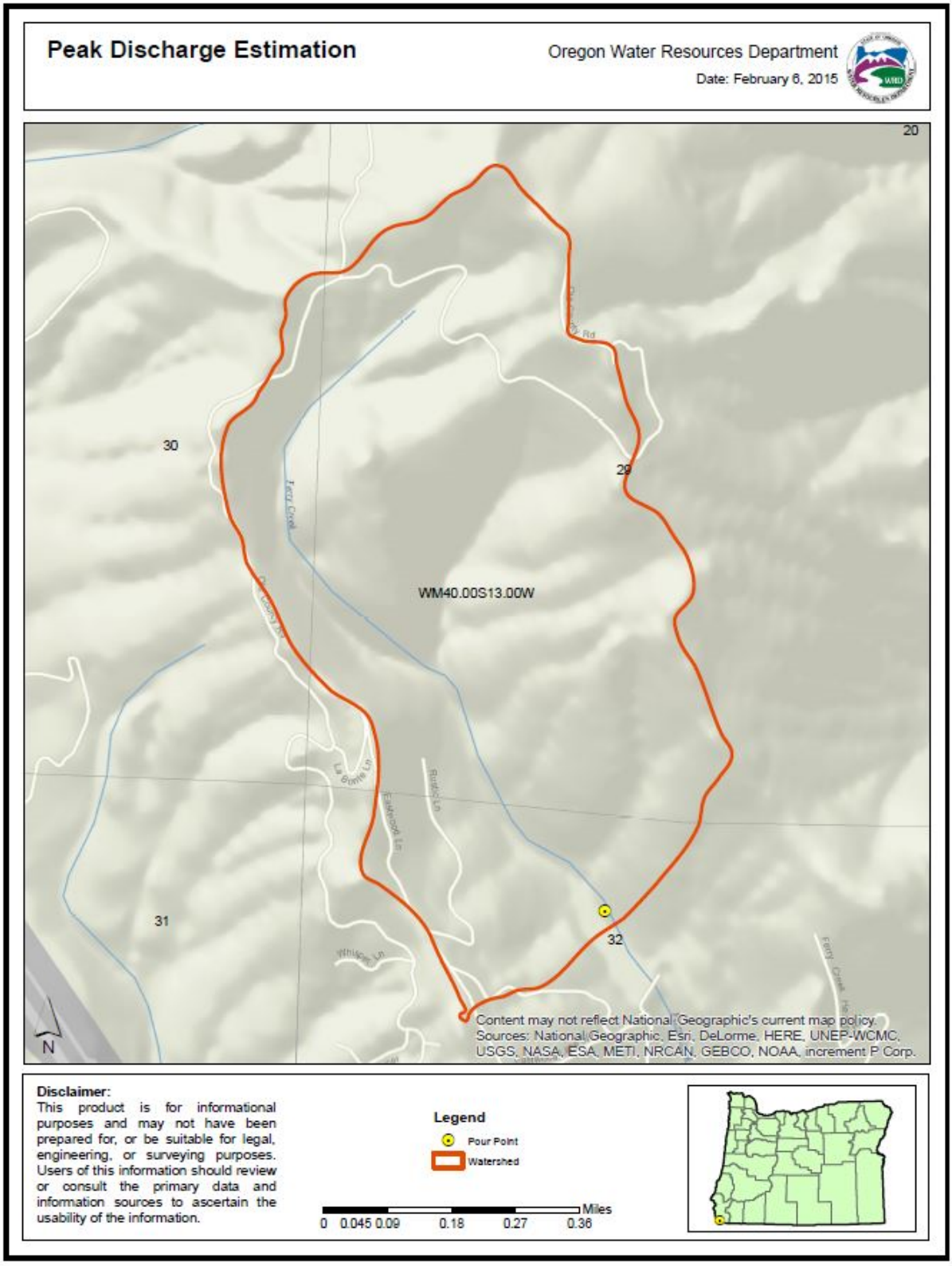

Figure 3.1.2 – Ferry Creek Watershed Map (OWRD, 2015)

Possible alternatives for Ferry Creek Reservoir are listed below and described in more detail in upcoming sections of this plan.

Ferry Creek Reservoir Alternatives

1. Leave reservoir as-is with no improvements/modifications (No Action Alternative)
2. Removal of the reservoir and restoration of Ferry Creek
3. Expansion of the reservoir capacity

3.1.1 No Reservoir Modifications (No Action Alternative)

A "No Action" alternative is an option that includes only the regular maintenance and upkeep that is required to keep the reservoir functioning in its current state. This would keep the reservoir in compliance with state guidelines and recommendations. Some of the major items that would need to be addressed include: replacement of the spillway/chute, general brush clearing, existing valve inspection/replacement, and existing pipeline repairs (Table 3.1.1-2).

Regular deterioration and damage done by brush and tree growth has limited the capacity of the existing spillway. Therefore, the spillway is not able to adequately function as an overflow in emergency situations. Based on recommendations from previous studies, as well as research and current site visits, replacement of this spillway is still recommended. The valve replacement and piping rehabilitation includes the 16" and 30" piping that runs under the reservoir. These components have seen limited to no use and have deteriorated to a point where they are not functioning properly.

Previous inspections and site visits have shown possible leaking from the pipes. The repair or replacement of these pipes may be a difficult task to resolve, but it is necessary if this reservoir is to remain or be used for potential storage as part of the municipal water supply. Various methods of repair are included in the table below, Table 3.1.1-1, along with advantages and disadvantages of each. Further analysis and design should be completed prior to final recommendation.

Table 3.1.1-1 – Possible methods of repair to reservoir piping.

Method of Repair	Advantage	Disadvantage
Slip-lining	• Used regularly • Least expensive	• Can alter pipe diameter significantly • Requires some type of grout/fill between host pipe and new pipe
Cured In Place Pipe (CIPP)	• Very little change to pipe diameter	• Reliant on existing valving • Not recommended for structural integrity
Spiral Wound Pipe	• No grout/fill required between host pipe and new pipe	• May be difficult to do based on existing situation

At this phase in the planning process it is difficult to determine the exact scale and scope of the repairs that will be required for these components. To more clearly define these pipe repair alternatives it is recommended that additional investigations be completed prior to commencing final design.

Table 3.1.1-2 – Ferry Creek Reservoir general maintenance/improvements cost estimate.

Improvements & Maintenance to Keep the Reservoir In Current State					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$ 146,444	$ 146,444
2	Spillway/Chute Replacement	ls	1	$ 411,963	$ 411,963
3	Brush Clearing	ls	1	$ 25,000	$ 25,000
4	Valve Replacement	ls	1	$ 67,333	$ 67,333
5	Piping Rehabilitation	ls	1	$ 472,000	$ 472,000
		Construction Cost Subtotal			$ 1,122,740
		Contingency	20%		$ 224,548
		Engineering	20%		$ 224,548
		Admin./Env. Costs	5%		$ 56,137
		Subtotal			$ 505,233
		Total Project Estimate			**$1,627,972**

3.1.2 Reservoir Removal Alternative

This alternative calls for the existing reservoir to be completely removed. This would eliminate the ongoing costs associated with regular maintenance and compliance costs discussed in the previous section. This could be a benefit to the City in the future by allowing City funds to be utilized for other purposes, such as expanding water system storage and performing maintenance thereon. In this alternative, the major cost is incurred in the removal of the reservoir dam which would require the excavation and disposal of approximately 7,000 cubic yards of material. To allow for this alternative to be completed, improvements to the access road would most likely be required in order to support the heavy equipment that will be accessing the site.

The remaining costs included in this cost estimate (Table 3.1.2-1) include the cost to restore the Ferry Creek stream bed.

Table 3.1.2-1 – Ferry Creek Reservoir removal cost estimate.

Reservoir Removal and Decommissioning					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$ 65,327	$ 65,327
2	Access Road Improvements	ls	1	$ 71,766	$ 71,766
3	Erosion Control	ls	1	$ 20,000	$ 20,000
4	Sediment Removal Allowance	ls	1	$ 25,000	$ 25,000
5	Excavation & Disposal	cy	7,000	$ 25	$ 175,000
6	Rock Excavation	cy	350	$ 85	$ 29,750
7	Riprap Installation	ton	1,200	$ 45	$ 54,000
8	Slope Stabilization (Vegetation, Fabric, etc.)	ls	1	$ 35,000	$ 35,000
9	General Site Work	ls	1	$ 25,000	$ 25,000
		Construction Cost Subtotal			$ 500,844
		Contingency	20%		$ 100,169
		Engineering	20%		$ 100,169
		Permitting/Regulatory Coordination			$ 50,000
		Administrative Costs	5%		$ 25,042
		Subtotal			$ 275,380
		Total Project Estimate			**$ 776,224**

3.1.3 Reservoir Expansion Alternative

Expansion of the reservoir can also be considered as an option for municipal water storage for the City of Brookings. This option has been included in studies completed in the past. A similar method for reservoir expansion will be used in this study with updated costs. Two suggested expansions are suggested in the following paragraphs. It should be noted that each of these expansion options requires the raising elevation of the dam crest of the reservoir. The current crest elevation is approximately 392 feet and approximately 24 feet in width. Overall capacity at this elevation is 29.3 million gallons.

Increase Crest Elevation to 398 feet

Raising the crest to 398 feet increases the overall capacity to 34.2 million gallons. This is approximately 5.0 million gallons of additional water storage. Increasing the capacity of the reservoir to this extent will require additional fill and riprap, replacement of the existing spillway, and modifications/repair to the existing piping. The associated costs with this expansion can be found in Table 3.1.3-1 on the following page.

Table 3.1.3-1 – Cost Estimate for increasing reservoir capacity six feet at the crest.

Increasing Reservoir Capacity - Volume = 34.2 MG (Crest 398')					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$ 203,449	$ 203,449
2	Access Road Improvements	ls	1	$ 71,766	$ 71,766
3	Erosion Control	ls	1	$ 20,000	$ 20,000
4	Fill Material (Varying types)	cy	6,500	$ 45	$ 292,500
5	Spillway Replacement	ls	1	$ 412,000	$ 412,000
6	Piping Rehabilitation	ls	1	$ 472,000	$ 472,000
7	Riprap Installation	ton	68	$ 45	$ 3,060
8	Slope Stabilization (Vegetation, Fabric, etc.)	ls	1	$ 35,000	$ 35,000
9	General Site Work	ls	1	$ 50,000	$ 50,000
		Construction Cost Subtotal			$ 1,559,775
		Contingency	20%		$ 311,955
		Engineering	20%		$ 311,955
		Permitting/Regulatory Coordination			$ 50,000
		Geotechnical Eng./Investigation			$ 200,000
		Admin./Env. Costs	5%		$ 77,989
		Subtotal			$ 951,899
		Total Project Estimate			**$2,511,674**

Increase Crest Elevation to 401 feet

Raising the crest to 401 feet increases the overall capacity to 39.1 million gallons. This is approximately 10.0 million gallons of additional water storage. Increasing the capacity of the reservoir to this extent will require additional fill and riprap, replacement of the existing spillway, and modifications/repair to the existing piping. The associated costs with this expansion can be found in Table 3.1.3-2 on the next page.

Table 3.1.3-2 – Cost Estimate for increasing reservoir capacity nine feet at the crest.

Increasing Reservoir Capacity - Volume = 39.1 MG (Crest 401')					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$ 251,158	$ 251,158
2	Access Road Improvements	ls	1	$ 71,766	$ 71,766
3	Erosion Control	ls	1	$ 20,000	$ 20,000
4	Fill Material (Varying types)	cy	13,500	$ 45	$ 607,500
5	Spillway Replacement	ls	1	$ 412,000	$ 412,000
6	Piping Rehabilitation	ls	1	$ 472,000	$ 472,000
7	Riprap Installation	ton	136	$ 45	$ 6,120
8	Slope Stabilization (Vegetation, Fabric, etc.)	ls	1	$ 35,000	$ 35,000
9	General Site Work	ls	1	$ 50,000	$ 50,000
	Construction Cost Subtotal				$ 1,925,544
	Contingency		20%		$ 385,109
	Engineering		20%		$ 385,109
	Permitting/Regulatory Coordination				$ 50,000
	Geotechnical Eng./Investigation				$ 200,000
	Admin./Env. Costs		5%		$ 96,277
	Subtotal				$ 1,116,495
	Total Project Estimate				**$3,042,039**

3.1.4 Transmission and Distribution Piping for Reservoir

In order to use Ferry Creek Reservoir as a reliable water supply option, additional transmission and distribution piping would have to be added to the system. This section addresses the extent of piping that would be necessary in order to accomplish this purpose.

To fill the expanded reservoir, additional water would need to be pumped from either the existing raw water intake, the Ranney Collector, or from a reconstructed “Tide Rock” water intake, discussed in Section 3.3.2. The City of Brookings 2014 Public Facilities Plan indicates that in 2008, approximately 9,500 feet of 12-inch Asbestos Cement (AC) transmission piping was replaced with 16-inch Ductile Iron (DI) pipe, between the Ranney Collector and “Tide Rock” intakes. Additionally, the City possesses record drawings from a project also completed in 2008, which document the installation of 18-inch PVC pipe from the existing “Tide Rock” intake station to the Water Treatment Plant. This 18-inch transmission line runs parallel to a 12-inch AC line along the same path; both pipes are currently in service. A diagram of this existing pipe network can be seen in Figure 3.1.4, on the next page.

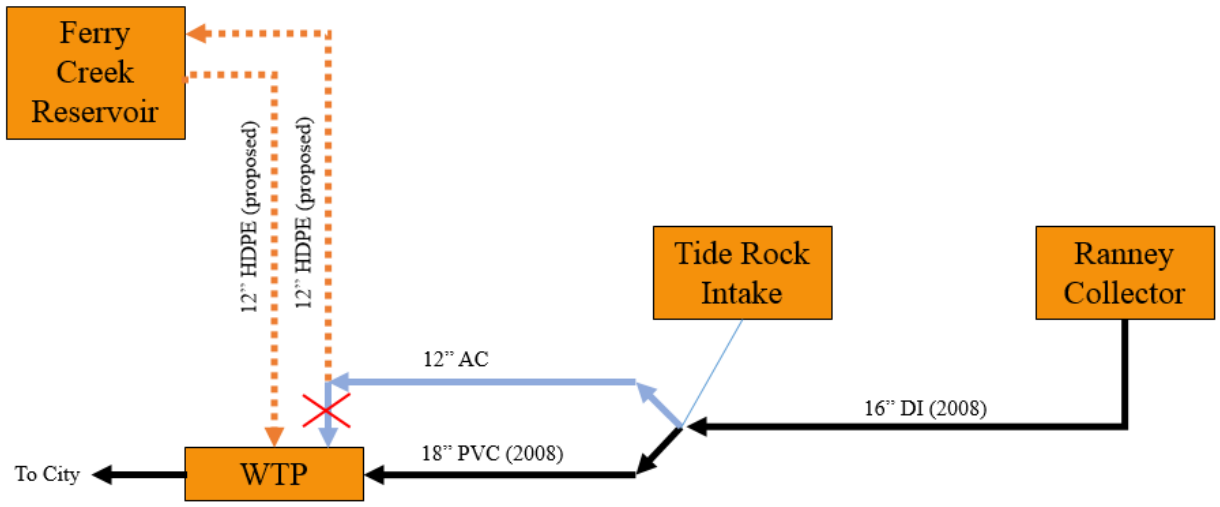

Figure 3.1.4 – Diagrammatic representation of existing transmission pipe network between Ranney Collector intake station and WTP plant. Proposed future piping to Ferry Creek Reservoir shown for reference.

With this information, it is evident that there is no "bottle-neck" in the system, and the existing pipe network is sufficiently sized to transmit current water withdrawals as well as future withdrawals for filling the reservoir. As shown in the above figure, the only area where additional piping would be needed is between the Water Treatment Plant and Ferry Creek Reservoir. Such piping would be tied into the existing raw water supply network. There will be some rough terrain installation leading up to Ferry Creek Reservoir that will most likely increase the installation costs.

Table 3.1.4-1 shows an estimate of the costs for completing the necessary transmission piping that would have to be installed between the WTP and Ferry Creek Reservoir. The size of the new supply piping was based on the current maximum permitted withdrawal rate that can occur at each of the intakes. At the existing Ranney Collector a withdrawal rate of 5.57 cubic feet per second (cfs) was used, and at the old "Tide Rock" intake, 6.0 cfs was used. These flow rates are based on existing water rights data that were obtained in the 2014 Water Master Plan (PACE, 2014) not the current capacity of the existing facilities.

It should be noted that the estimate in Table 3.1.4-1 includes the cost of installing two parallel pipes between the WTP and the reservoir, as shown in Figure 3.1.4. This arrangement would allow one pipe to be used solely for pumping raw water up to the reservoir, and a second pipe to send water from the reservoir back down to the Water Treatment Plant. There may be potential savings available if the City chose to consolidate these into a single pipe, and use valving to direct flow.

Table 3.1.4-1 – Cost estimate for transmission piping between WTP and Ferry Creek Reservoir.

Transmission Piping between WTP and Ferry Creek Reservoir					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$ 111,000	$ 111,000
	WTP to Reservoir				
2	12" HDPE, Trenching and Backfill, Along Road	lf	7,800	$ 85	$ 663,000
3	12" HDPE, Trenching and Backfill, Rough Terrain	lf	700	$ 110	$ 77,000
4	Valving/Appurtenances (15% of total piping)	ls	15%	$ 111,000	$ 111,000
	Reservoir to WTP				
5	12" HDPE, Trenching and Backfill, Along Road	lf	7,800	$ 85	$ 663,000
6	12" HDPE, Trenching and Backfill, Rough Terrain	lf	700	$ 110	$ 77,000
7	Valving/Appurtenances (15% of total piping)	ls	15%	$ 111,000	$ 111,000
	Construction Cost Subtotal				$ 1,813,000
	Contingency		20%		$ 301,235
	Engineering		20%		$ 301,235
	Property Acquisition (Allowance)				$ 45,000
	Admin./Env. Costs		5%		$ 75,309
	Subtotal				$ 722,778
	Total Project Estimate				**$2,535,778**

3.1.5 Intertie to Harbor Water District (HWD)

The Harbor Water District (HWD) is located immediately south of the Chetco River, adjacent to the City of Brookings, within the same Urban Growth Boundary. Harbor's water system relies on a Ranney Collector of its own, located almost two miles downstream from the Brookings Ranney Collector. It was the HWD who experienced the saltwater intrusion in the summer of 2014, causing residents to rely on bottled water for their potable water needs until the saltwater intrusion subsided sometime later.

Due to the close proximity of these two water systems, it is possible for the Brookings backup water supply system to tie into the HWD water system as well, via directional boring underneath the Chetco River. This connection would require the construction of a booster pump station in order to compensate for the elevation differences between the two water storage and supply networks. This would be a costly project, but it would be a valuable emergency alternative for the HWD residents who continue to be faced with threats of a brackish water supply during dry summer months.

This connection could be beneficial for both the City of Brookings and for the Harbor Water District. If the intake for either system is ever taken offline, the intertie could be used to provide temporary backup supply to the offline system. Due to the mutually beneficial nature of this system component, it is our recommendation that the costs for this project be shared between the City and HWD.

An estimate for these improvements is included in Table 3.5.1-1, on the following page:

Table 3.1.5-1 - Cost Estimate for providing a sub-surface connection between the Brookings water supply and the HWD water supply, for resource sharing during emergency situations.

Emergency Intertie to Harbor Water District water system (Directional Boring)					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$101,951	$ 101,951
	Directional Bore				
2	Directional Boring, Installation of 12" HDPE	lf	1,130	$ 225	$ 254,250
3	Booster Pump Station	ls	1	$400,000	$ 400,000
4	Valving/Appurtenances (10% of total piping)	ls	10%	$ 25,425	$ 25,425
		Construction Cost Subtotal			$ 781,626
		Contingency	20%		$ 156,325
		Engineering	20%		$ 156,325
		Property Acquisition (Allowance)			$ 45,000
		Admin./Env. Costs	5%		$ 39,081
		Subtotal			$ 396,732
		Total Project Estimate			**$1,178,358**

3.2 Groundwater Supply

The groundwater supply in and around the City of Brookings should be considered as a possible alternative water supply. Often municipalities will utilize groundwater wells to supplement water supply during peak months or times of high turbidity in rivers or streams. By reviewing wells within close proximity of potential locations where future wells could be constructed, estimated yield can be determined. Other aspects of a new well that also must be considered are: potential draw down of neighboring wells, water quality, and types of soil in the area.

A major tool in determining potential groundwater supply is well logs. These are reviewed to determine the potential yield that groundwater would provide for the City based on other local wells. Well Log Queries can be found through OWRD that show the yield of wells throughout the Brookings area. After reviewing the well logs throughout the study area for this plan, only four wells were found to produce more than 100 gpm. Therefore, groundwater does not appear to be a reliable source for establishing an alternative water supply for the City.

3.3 Original Intake Station Restoration (Tide Rock)

The old intake station on the Chetco River, the Tide Rock intake station, was taken out of use in the 1980's due to salt water intrusion (Figure 3.3.1). According to previous study documents, a 7' diameter caisson that has perforations at the bottom is located at the edge of the water. This type of intake is considered an infiltration gallery. Therefore, this source acts as a groundwater source. There are two options for this intake station:

1. Completely remove station and equipment
2. Rebuild station and use as an alternative water source

Figure 3.3.1 – Abandoned intake station on the Chetco River (Tide Rock Intake Station).

3.3.1 Station Removal Alternative

Since the time that this intake station was abandoned it has not been maintained or secured. Therefore, vandalism, exposure and time have caused the facility to deteriorate to the point where it is not operational. To ensure the facility was not used, the City cut the existing pipes at the station.

Removal of this station should include demolition of the following components: wood structure, piping (including large caisson removal and capping, as necessary), and other miscellaneous items. The removal process should also include appropriately transferring or abandoning the existing water right that is associated with this intake station. Currently, a total of 6 cubic feet per second (cfs) is the apportioned quantity of water that can be withdrawn at this facility, as afforded by Certificate 64614, the City's water right certificate for this location.

It was anticipated that anywhere between 1-2 weeks would be required to remove all existing equipment from this station. Based on the Bureau of Occupational Licenses (BOLI) rates the demolition is expected to cost approximately $43,000. This would provide for 2-3 laborers/operators along with the expected equipment required for a full removal.

3.3.2 Station Reconstruction Alternative

As mentioned earlier, the Tide Rock Intake Station was abandoned due to the salt water intrusion that occurred. With that in mind, rebuilding the station to act as a primary water source is not something that should be considered. The purpose of rebuilding this intake station would solely be to establish a dedicated supply line for filling Ferry Creek Reservoir, if it was decided to expand the capacity of that reservoir. By using the Tide Rock Intake Station instead of the Ranney Collector station for this purpose, the City could take advantage of already existing water rights at Tide Rock while continuing to devote the entire supply from the Ranney Collector to meeting the City's ongoing water demand.

In this alternative, station operation would have to be closely monitored in order to make sure that withdrawals from this intake station occur only during times when salt water intrusion is impossible. During such times, this station could supply the reservoir with the additional raw water needed to store for use in times of emergency. This new intake could also provide backup support to the Ranney Collector for annual maintenance or other outages.

The table below (Table 3.3.2-1) summarizes the preliminary cost estimate for this alternative, based on the information that we currently have.

Table 3.3.2-1 – Preliminary cost estimate for new intake station at old intake station site

New Intake Station at Existing "Tide Rock"					
Item No.	**Description**	**Units**	**Quantity**	**Unit Cost**	**Total Cost**
1	Mobilization, Overhead, Bonds	ls	15%	$ 142,500	$ 142,500
2	Demolition of Abandoned Intake Station	ls	5%	$ 47,500	$ 47,500
3	Intake Building (Stairs, Roof, etc.)	ls	1	$ 150,000	$ 150,000
4	7' Steel Caisson, Perforated	lf	50	$ 2,000	$ 100,000
5	Vertical Turbine Pumps	ea	2	$ 75,000	$ 150,000
6	Site Piping/Appurtenances	ls	1	$ 150,000	$ 150,000
7	Controls/Integration	ls	1	$ 200,000	$ 200,000
8	Electrical	ls	1	$ 150,000	$ 150,000
9	General Site Work	ls	1	$ 50,000	$ 50,000
	Construction Cost Subtotal				$ 1,140,000
	Contingency		20%		$ 228,000
	Engineering		20%		$ 228,000
	Environmental Costs		5%		$ 57,000
	Admin./Legal Costs		5%		$ 57,000
	Subtotal				$ 570,000
	Total Project Estimate				**$1,710,000**

3.4 Water Rights Requirements

With many of the modifications above, either existing water rights would need to be modified or additional water rights would need to be acquired. GSI Water Solutions, Inc. was used during the preparation of this plan to review and recommend possible options related to the necessary water rights in order to plan for an alternative water supply. The full document is included in the Appendix for reference.

3.4.1 Storage and Surface Water Rights

In order for the City to properly utilize the expanded Ferry Creek Reservoir, additional water storage rights will need to be obtained. The only alternative to acquiring additional storage rights is to utilize the reservoir for short term storage, which Oregon Water Resources Department (OWRD) refers to as a "bulge in the system." If the City could use the water placed into the reservoir within a few days (not more than 72 hours), it could divert water from the Chetco River under its existing water rights, and pipe that water to the reservoir.

Since it is expected that the City will store water in the reservoir for periods longer than 72 hours, it would be more beneficial to obtain a brand new storage permit. The permit application process goes through OWRD where they evaluate proposals based on the following criteria:

1. Compliance with the applicable basin program rules or provisions, interstate compacts, and statewide administrative rules.
2. Water availability from the proposed source during the times and in the amounts requested.
3. Injury caused to existing water rights.
4. Significant detrimental impact to existing fishery resources based on information submitted by the Oregon Department of Fish and Wildlife.
5. Consistency with the State Scenic Waterway statutes.

According to some preliminary review from GSI, it would appear that everything is favorable should the City choose to pursue additional storage water rights.

3.4.2 Groundwater Rights

The City currently holds a groundwater right certificate (Certificate 64614) that authorizes the use of up to 6.0 cfs from River Well #1 for municipal purposes. This existing groundwater right can be utilized in a number of ways. It can first be utilized to feed Ferry Creek Reservoir as mentioned above. If used in this way, many of the steps mentioned above regarding additional storage rights should be followed. It was mentioned in Section 3.3 that the City quit using this right due to the saltwater intrusion that threatened the water system many years ago. Beginning to use this right again would require close monitoring and control of this water supply in order to prevent future intrusion and contamination.

Within the GSI water rights document, other options were discussed that include: transferring the water right upstream, transferring the water right away from the Chetco River, or obtaining a new water right altogether.

3.5 Existing Water Storage Tanks

3.5.1 Seismic Valving Upgrades

As a part of the improvements to be undertaken by the City to secure a viable backup water supply, it is recommended that the City take action to preserve and protect existing storage facilities as well. The City of Brookings has in its system eleven (11) treated water storage reservoirs which range in size from approximately 3,000 gallons to 1.6 million gallons. These tanks vary greatly in age, configuration and condition. A detailed description of each of these tanks was provided in the 2014 City of Brookings Water System Master Plan (PACE), but a summary of that information has also been provided in the table below (Table 3.5.1-1).

In order to properly determine the needed improvements for the existing water storage tanks, a detailed seismic analysis of each tank would be required. Before completing such an analysis though, it is possible for the City to implement some basic seismic upgrades on the tanks in order to more immediately accomplish minimum preservation efforts while more detailed analysis and design is still underway. These upgrades would include the installation of seismic valving on each tank, the purpose of which would be to prevent water loss in the event that an earthquake caused the pipes to experience shear failure at their connections. These valving upgrades are estimated to cost approximately $60,500.

These improvements are recommended as a means of protecting the City's existing water storage facilities until more detailed upgrade alternatives can be evaluated and designed.

Table 3.5.1-1 - Summary table of existing treated water storage tanks in the City of Brookings

Tank No.	Name	Capacity (gal)	Construction Date	Material	Location
1	1.5 MG	1,500,000	1975	Welded Steel	271 Marine Drive
2	Seacrest	1,600,000	2010	Bolted glass fused steel	1303.5 Seacrest Lane
3	Old County	200,000	1977	Concrete	16903 Old County Road
4	Pacific View (Marina Heights)	23,000	before 1974	Concrete	16792 Pacific View
5	Tidewater	20,000	"Old"	Concrete	17301 LaBonte Lane
6	Pacific Terrace	158,000	2006	Bolted Steel	1053 Marina Heights Loop
7	Vista Ridge	84,000	2004	Welded Steel	7190.5 Vista Ridge Road
8	Mountain Drive #1	14,600	1992	Bolted Steel	17164 Mountain Drive
9	Mountain Drive #2	13,000	before 1984	Welded Steel	17294 Mountain Drive
10	Mountain Drive #3	13,000	before 1984	Welded Steel	17390 Mountain Drive
11	Mountain Drive #4	3,000	2011	Welded stainless steel	17450 Mountain Drive

3.5.2 Seismic Analysis

Completing a seismic analysis of each tank would require that load based structural analysis and site observed visual assessments be performed on all eleven reservoir structures. The findings of this structural evaluation would be transmitted via a Structural Evaluations and Recommendations report, which would include recommendations for improvements that should be completed to preserve the tanks in an earthquake event.

The process for completing this seismic analysis would begin with site visits to all eleven storage tanks where critical site and structural information would be collected and documented. Then, this site-acquired data would be compared to existing construction and historic report documentation of the tanks. From there, a full, mathematical, structural analysis would be performed for gravity and seismic loading, which would allow each reservoir's seismic performance to be evaluated. Based on this evaluation, preliminary reservoir upgrade alternatives would be considered, along with their associated costs. The findings and recommendations generated from this analysis would be presented to the City in a report.

The estimated cost for completing the seismic analysis services discussed above is $70,000 using assumed geotechnical site criteria. This section addresses only the need for seismic analysis, the results of which would enable the City to more accurately consider what upgrades to enact on its existing structures. Should upgrade designs be initiated in the future, formal geotechnical site evaluation would need to be performed for each tank site prior to the finalization of structural upgrade designs.

As a part of this Redundant Water Supply Plan, we recommend that all of the City's water storage tanks undergo seismic design review and eventual seismic retrofitting to ensure the City has access to potable water in the event of an earthquake.

4.0 Recommended Redundant Water Supply Capital Improvement Plan

Section 4

4.1 Capital Improvement Plan Purpose and Need

This section summarizes the water system capital improvements recommended for resolving the vulnerability of the City's water supply, as determined by the detailed analyses included in this Redundant Water Supply Plan. The Capital Improvement Plan (CIP) consists of a variety of projects designed to enable the City to properly serve the community's needs and prepare for emergencies.

The water system CIP is used to help establish funding needs, and to plan for and prioritize various project needs. The CIP can change over time as projects are completed and/or new unforeseen needs arise.

4.2 Capital Improvement Plan Projects

4.2.1 CIP Summary

Based on the alternatives developed in Section 3.0, a Capital Improvement Plan has been assembled that is comprised of recommended projects that the City of Brookings should undertake to establish an alternative water supply system. This list does not include projects to maintain or upgrade the existing water system, but is focused solely on creating a backup reserve for emergencies, as described in Section 2.1. The various capital improvement projects recommended from this Redundant Water Supply Plan are summarized below (Table 4.2.1-1).

Table 4.2.1-1 - List of projects recommended to be included in the Capital Improvement Plan (CIP)

Recommended Capital Improvement Plan (CIP)			
Project No.	**Project Name**	**Project Estimate**	
Ferry Creek Reservoir			
1	Increase Reservoir Capacity (nine feet at crest)	$	3,042,039
Transmission & Distribution Piping			
2	Transmission Piping between WTP and Ferry Creek Reservoir	$	2,535,778
Station Reconstruction			
3	New Intake Station at existing "Tide Rock" location	$	1,710,000
Harbor Water District Connection			
4	Emergency Intertie to HWD (Directional Boring)	$	1,178,358
Upgrade to Existing Storage Tanks			
5	Seismic Valving Retrofit of Existing Storage Tanks (11 Tanks)	$	60,500
6	Seismic Analysis of Existing Storage Tanks (11 Tanks)	$	70,000
	Total	**$**	**8,596,675**

By reconstructing the "Tide Rock" intake station, the City will be able to resume use of the existing water rights already in place at that location. Furthermore, by drawing water from the Tide Rock station to fill

Ferry Creek Reservoir, instead of from the Ranney Collector intake, the City will be able continue to devote the entire supply from the Ranney Collector to meeting the community's ongoing water demand.

A dedicated transmission line between the Tide Rock intake and Ferry Creek Reservoir will require close monitoring in order to make sure that withdrawals from this intake station occur only during times when salt water intrusion is impossible, but the implementation of this independent system will allow the City to be prepared to meet demand if the Ranney Collector intake station is ever compromised.

4.2.2 CIP Priorities

The cost for the recommended water system improvements is great, so there may be reason to prioritize the improvements or take on projects in phases. It should be noted that the recommended improvements are highly interconnected, such that some projects may not produce any increased functionality in the water system without the completion of others on the list as well. Nevertheless, the following table, Table 4.2.2-1, outlines one approach for implementing the CIP list.

Table 4.2.2-1 - CIP Priority List for the City of Brookings

Project No.	Project Name	Project Estimate
1	Increase Reservoir Capacity (nine feet at crest)	$ 3,042,039
3	New Intake Station at existing "Tide Rock" location	$ 1,710,000
2	Transmission Piping (between WTP & Ferry Creek)	$ 2,535,778
4	Emergency Intertie to HWD (Directional Boring)	$ 1,178,358
5	Seismic Valving Retrofit of Existing Storage Tanks (11 Tanks)	$ 60,500
6	Seismic Analysis of Existing Storage Tanks (11 Tanks)	$ 70,000
	Total	**$ 8,596,675**

In this table, projects have been ordered based on their geographic proximity to the City, with improvements to tanks, reservoirs, and intakes being completed prior to the construction of pipeline flowing into and out of those locations. The exception to this rule is the Emergency Intertie project for connecting the Brookings water supply to HWD. This intertie could be completed in a variety of locations, but currently it is being considered near the Hwy 101 Bridge. The seismic retrofit of the City's existing storage tanks is given the least priority in the CIP list, but it may be completed at any time according to the City's needs and as funding allows.

The prioritization listed above is only a recommendation meant to act as a guide in assisting the City to carry out these improvements in a very methodical and logical order. It is possible to break these projects up into phases if the City should wish to do so. The City should classify the projects into their own list of priorities as City resources become available or as needs dictate. No prior approval is needed from the State or regulating authorities to re-order these projects, or to eliminate projects as the City sees fit. For example, if the City wishes to complete the emergency intertie project with the HWD first, it would be prudent for the City to do that. Also, as explained in Section 3.1.4, potential savings could be available in the Transmission Piping project if the City chose to consolidate the supply and return pipes into a single pipe. The City should carefully consider such options and alternatives prior to commencing final design.

4.2.3 CIP Updates

Periodically, the Capital Improvement Plan should be updated and evaluated. It is suggested that every three to five years the CIP be evaluated and modified as necessary to reflect current development trends,

system needs, and prior accomplishments. The City may modify the CIP at any time under ORS 223.309(2).

Appendix A: GSI Water Solutions Water Rights Analysis

GSI Water Solutions, Inc.

June 9, 2015

TO: Quinn Dance, Civil West Engineering Services, Inc.

FROM: Kimberly Grigsby, GSI Water Solutions, Inc.
Adam Sussman, GSI Water Solutions, Inc.

SUBJECT: Water supply redundancy options for the City of Brookings

You have requested GSI Water Solutions, Inc. (GSI) to conduct a brief water rights analysis of water supply redundancy options for the City of Brookings (City). In particular, you have asked us to evaluate opportunities, from a water rights perspective, for the City to expand the capacity and store additional water in Ferry Creek Reservoir, and to obtain groundwater from new water supply wells. The following memorandum briefly summarizes the water rights considerations for both of these opportunities to obtain additional water supply.

A. Storing Additional Water in an Expanded Ferry Creek Reservoir

The City currently holds a water right certificate (Certificate 46860) that authorizes the storage of up to 167.4 acre-feet of water from Ferry Creek in Ferry Creek Reservoir. The City also holds a water right (Certificate 46861) to use the 167.4 acre-feet of stored water for municipal purposes. We understand that the City is considering the opportunity to expand the current capacity of Ferry Creek Reservoir, and to divert water from the Chetco River to be stored in the expanded reservoir.

To implement this approach, the City could apply for a new water right authorizing the storage of the additional amount of water, or potentially use an existing water right to obtain water that would be put into the expanded reservoir.

1. Use an Existing Water Right ("Bulge in the System")

Although the Oregon Water Resources Department (OWRD) typically requires a storage water right to store water in a reservoir, the agency does allow water that is appropriated under an existing water right to be stored, without a storage water right, for a limited period of time. (This time period is not identified in rule but is understood to be in the range of not more than 72 hours). This short-term storage is referred to as a "bulge in the system."

If the City could use the water placed into the reservoir within a few days, it could divert water from the Chetco River under its existing water rights, and pipe that water to the reservoir.

A second (theoretical) alternative exists for using the City's existing water rights to fill an expanded reservoir. The City could potentially "transfer" (change) one of its existing water rights to allow the storage of that water. For example, the City could transfer Certificate 64614 (for the use of up to 6.0 cfs from River Well #1 for municipal purposes) to authorize the storage of water in the reservoir at the same rate. However, to our knowledge OWRD has never approved a transfer that changed a groundwater right into a storage water right.

2. Obtain a New Storage Permit

If the City intended to store water for periods of time longer than a few days, it would need to apply for and obtain a new storage permit that would authorize the diversion of water from the Chetco River for storage in the expanded reservoir. OWRD reviews permit application to determine if: 1) the proposed use is prohibited by law because the water source has been withdrawn from appropriation; 2) water is available; 3) the proposed use would cause injury to existing water rights; 4) the use is allowed in the applicable basin program rules; and 5) the proposed use is consistent with other rules of the Oregon Water Resources Commission. If OWRD determines that each criteria is favorably met, the agency can approve the application.

We have evaluated the City's opportunity to obtain a permit for the storage of water from the Chetco River consistent with OWRD's review process as follows: 1) the water from the Chetco River has not been withdrawn from appropriation; 2) water is available for a new storage water right from the Chetco River from November through June; 3) the City's storage of water would not injure existing water rights; 4) Nothing in the South-Coast basin program rules would preclude issuance of a water right for an expanded storage project; and 5) a new storage permit would likely be conditioned to protect species listed under the state and federal endangered species acts based on recommendations from the Oregon Department of Fish and Wildlife (ODFW) and the Department of Environmental Quality (DEQ). In sum, the elements of OWRD's permit application review criteria appear to be favorable, but it is not currently known what conditions might be placed on a new storage permit from the Chetco River. Additional research would be needed to determine what conditions might be required by ODFW and DEQ.

Once the City had obtained a new storage permit, it would need to obtain a new "secondary" water right that authorized the use of water for municipal purposes. The process to obtain a "secondary" water right is typically relatively simple. OWRD would review an application for such a right using the criteria described above for a storage right. Based on the information available, we do not see a reason why OWRD would not issue a new "secondary" permit for the use of additional water stored in the Ferry Creek Reservoir for municipal purposes.

3. Obtain a New Storage Water Right and Use an Existing Water Right

A final option related to an expanded reservoir would be for the City to combine the two options described above. The City could obtain a new storage permit that authorized the storage of water from November through June. After June 30, the City could appropriate water from River Well #1 and store the water for short periods of time by using the expanded reservoir as a bulge in the system. This could allow the City to maintain reservoir levels during the summer months.

B. Obtain Access to Groundwater Supply

As an alternative to storing additional water in Ferry Creek Reservoir, the City could obtain access to groundwater to provide a redundant water supply. OWRD would require the City to have a groundwater right authorizing the use of groundwater for municipal purposes. The City could either use groundwater under its existing groundwater right, or could apply for a new groundwater right.

1. Transfer the City's Existing Groundwater Right

The City currently holds a groundwater right certificate (Certificate 64614) that authorizes the use of water from River Well #1 at a rate of up to 6.0 cfs for municipal purposes. Certificate 64614 has a priority date of August 14, 1972. According to the map for this water right, Well #1 is located immediately adjacent to the Chetco River, at the top bank vegetation line.

We understand there are concerns about salt water intrusion at the current well location. The City would, therefore, likely want to appropriate groundwater from a different location. It is unlikely that the City would want to appropriate groundwater at a downstream location due to increased likelihood of problems with salt water. The City could appropriate groundwater at an upstream location, but the strong hydraulic connection between Well #1 and the Chetco River could make this problematic. As a final alternative, the City could appropriate groundwater further away from the river, but this is expected to significantly reduce the quantity of water available under the water right. The latter two options are described in more detail below. In either case, Certificate 64614 would need to be "transferred" (changed) to authorize the new well location.

OWRD reviews transfer applications to determine whether the proposed change would cause "enlargement" (expansion) of the right or "injury" to existing water rights (prevent other water rights from receiving the water to which they are entitled). OWRD provides public notice of proposed transfers and allows third parties to file protests, but only on the grounds that the requested change will cause injury.

a. Transfer to an upstream location. If the City wanted to move Certificate 64614 to a location upstream, it would need to file a transfer application. If the City wanted to move the water right to its Ranney Collector Well, the first step would be to receive confirmation that OWRD considers it to be a well, even though the City's water rights at that location are surface water (rather than groundwater) rights. As part of its review of a transfer application, OWRD determines whether the requested change would cause "injury" to other water rights, including instream water rights. Instream water right certificate 73087 protects water instream in the Chetco River at rates between 101 and 595 cfs from river mile 5.4 to the mouth, and has a priority date of November 8, 1990. A review of gage data shows that this instream water right is routinely not met from June through October.

Moving Certificate 64614 upstream would likely reduce the stream flows for a greater portion of the instream water right's reach due to the following factors: 1) the City's water right is "senior" to (has an earlier priority date than) the instream water right; 2) the Ranney Collector Well has close hydraulic connection to the river; and 3) the instream water right is routinely not met. As a

result, OWRD would likely determine that moving the authorized point of appropriation (well) for Certificate 64614 upstream to a location with hydraulic connection with the Chetco River would cause injury to the instream water right. OWRD would likely deny the transfer application if the City could not mitigate for the impact to the instream water right. A possible method for providing mitigation would be to reduce the water right's maximum authorized rate. Additional evaluation, however, would be required to determine available opportunities to provide mitigation for the anticipated injury determination.

b. Transfer to a location further away from the Chetco River. The City could also move the point of appropriation for Certificate 64614 further away from the river. This could eliminate concerns about injury to the instream water right. Such a move could also reduce the amount of water available for appropriation. As with other transfers, OWRD would review the application to determine whether it would cause injury. So long as the new well was not located near existing wells, it is unlikely that the agency would find injury.

2. Obtain a new Groundwater Right

As a final alternative, the City could obtain a new groundwater right authorizing the use of groundwater from a new well. The new well would need to be strategically located from surface water to avoid permitting problems associated with hydraulic connection to surface water. OWRD would review a groundwater permit application using criteria similar to those described above for a new storage water right. Our evaluation of the City's opportunity to obtain a groundwater permit is summarized as follows: 1) the groundwater has not been withdrawn from appropriation; 2) groundwater is likely available for a new permit, depending on the rate of appropriation proposed; 3) the City's use of groundwater would not injure existing water rights (assuming the well was located strategically); 4) Nothing in the South-Coast basin program rules would preclude issuance of a new groundwater right; and 5) the use would be expected to be consistent with the rules of the Water Resources Commission (assuming the well is more than a mile from a surface water source). In sum, the City could likely obtain a new groundwater permit. The amount of groundwater in the area is generally limited and additional investigation would be required to determine whether sufficient supply could likely be obtained to meet the City's needs.

C. Conclusion

Several opportunities exist (from a water rights perspective) for the City to obtain a redundant source of water supply.

The City could likely obtain new water rights that would authorize the storage of water from the Chetco River in an enlarged reservoir during the winter months and the use of the stored water for municipal purposes. The City could also use its existing groundwater right (Certificate 64614) to appropriate water and store it in the reservoir for short periods of time as a "bulge in the system."

The City would likely be able to move its existing groundwater right Certificate 64614 away from the river or to obtain a new water right from a well that is strategically located to avoid hydraulic connection with a surface water source. The City could also move Certificate 64614

upstream to the Ranney Collector Well, but additional investigations would be required to confirm that OWRD would consider the Ranney Collector to be a well, and to determine how to mitigate for an anticipated finding of injury caused by the change.

Appendix B: Ferry Creek Watershed Peak Discharge Report

PEAK DISCHARGES FOR SELECTED FREQUENCIES

Report prepared for: auto-delineation
Time: 11:43 AM Date: 2/6/2015
Watershed Name: FERRY CR

PEAK DISCHARGE CALCULATION BY PREDICTION EQUATION

Peak discharges for the ungaged watershed have been determined from a set of hydrologic prediction equations derived using generalized least squares. The models relate peak discharges to physical watershed characteristics such as area and precipitation. The equations take this form:

```
-------------------------------------------------
Q(T)=(10.0^C0(T))*(CHR1^C1(T))* . . . (CHRn^Cn(T))
-------------------------------------------------
   Q(T)  =  Peak Discharge for Return Period T
   Cx(T) =  Coefficient x for Return Period T
   CHR1  =  The First Watershed Characteristic
   CHRn  =  The nth Watershed Characteristic
-------------------------------------------------
   Note: * = multiplication, ^ = exponentiation
```

For this ungaged watershed, peak discharges were estimated using prediction equations for this flood region:

COASTAL WATERSHEDS

Prediction Equation for Coastal Watersheds

```
-------------------------------------------------------------------------
Q(T)=(10.0^C0(T))*(X1^C1(T))*(X2^C2(T)*(X3^C3(T))*(X4^C4(T))*(X5^C5(T))
-------------------------------------------------------------------------
    Q(T)   =  Peak Discharge for Return Period T
    Cx(T)  =  Coefficient x for Return Period T
    X1     =  Drainage Area                  (square miles       )
    X2     =  Precip Intensity 2-yr 1-day    (inches             )
    X3     =  Soils Mean Permeability        (inches per hour    )
    X4     =  Mean January Max Temp          (degrees Fahrenheit )
    X5     =  Soils Storage Capacity         (inches             )
-------------------------------------------------------------------------
              Note: * = multiplication, ^ = exponentiation
```

Prediction Equation Coefficients

Return Period T	C0(T)	C1(T)	C2(T)	C3(T)	C4(T)	C5(T)
2	-1.296e+00	9.489e-01	1.360e+00	-1.576e-01	1.280e+00	-4.421e-01
5	-1.881e+00	9.385e-01	1.272e+00	-2.234e-01	1.738e+00	-5.026e-01
10	-2.095e+00	9.324e-01	1.226e+00	-2.552e-01	1.926e+00	-5.267e-01
20	-2.248e+00	9.273e-01	1.190e+00	-2.812e-01	2.069e+00	-5.438e-01
25	-2.291e+00	9.258e-01	1.179e+00	-2.888e-01	2.109e+00	-5.484e-01
50	-2.410e+00	9.215e-01	1.151e+00	-3.111e-01	2.223e+00	-5.605e-01
100	-2.516e+00	9.176e-01	1.126e+00	-3.319e-01	2.325e+00	-5.701e-01
500	-2.723e+00	9.099e-01	1.078e+00	-3.770e-01	2.527e+00	-5.855e-01

Required Watershed Characteristics

Drainage Area	(square miles)	0.507

Precip Intensity 2-yr 1-day	(inches)	3.970
Soils Mean Permeability	(inches per hour)	1.060
Mean January Max Temp	(degrees Fahrenheit)	53.300
Soils Storage Capacity	(inches)	0.204

Selected Watershed Characteristics

Drainage Area	(square miles)	0.507
Maximum Relief	(feet)	1020.000
Mean Slope	(degrees)	21.000
Average Aspect	(degrees)	186.000
Mean Elevation	(feet)	848.000
Precip Intensity 2-yr 1-day	(inches)	3.970
Mean January Precip	(inches)	12.900
Mean July Precip	(inches)	0.521
Mean Annual Snow Fall	(inches)	0.000
Mean January Min Temp	(degrees Fahrenheit)	40.800
Mean July Min Temp	(degrees Fahrenheit)	52.500
Mean January Max Temp	(degrees Fahrenheit)	53.300
Mean July Max Temp	(degrees Fahrenheit)	69.600
Soils Storage Capacity	(inches)	0.204
Soils Mean Permeability	(inches per hour)	1.060
Soils Depth to Bedrock	(inches)	49.500

PEAK DISCHARGE ESTIMATES BASED ON PREDICTION EQUATIONS

Return Period	Peak Flow	95% Confidence Lower Limit	95% Confidence Upper Limit
years	cfs	cfs	cfs
2	56.2	32.8	96.1
5	88.3	53.1	147
10	112	66.7	187
20	135	79.4	230
25	143	83.6	245
50	168	96.0	293
100	194	107	349
500	258	134	498

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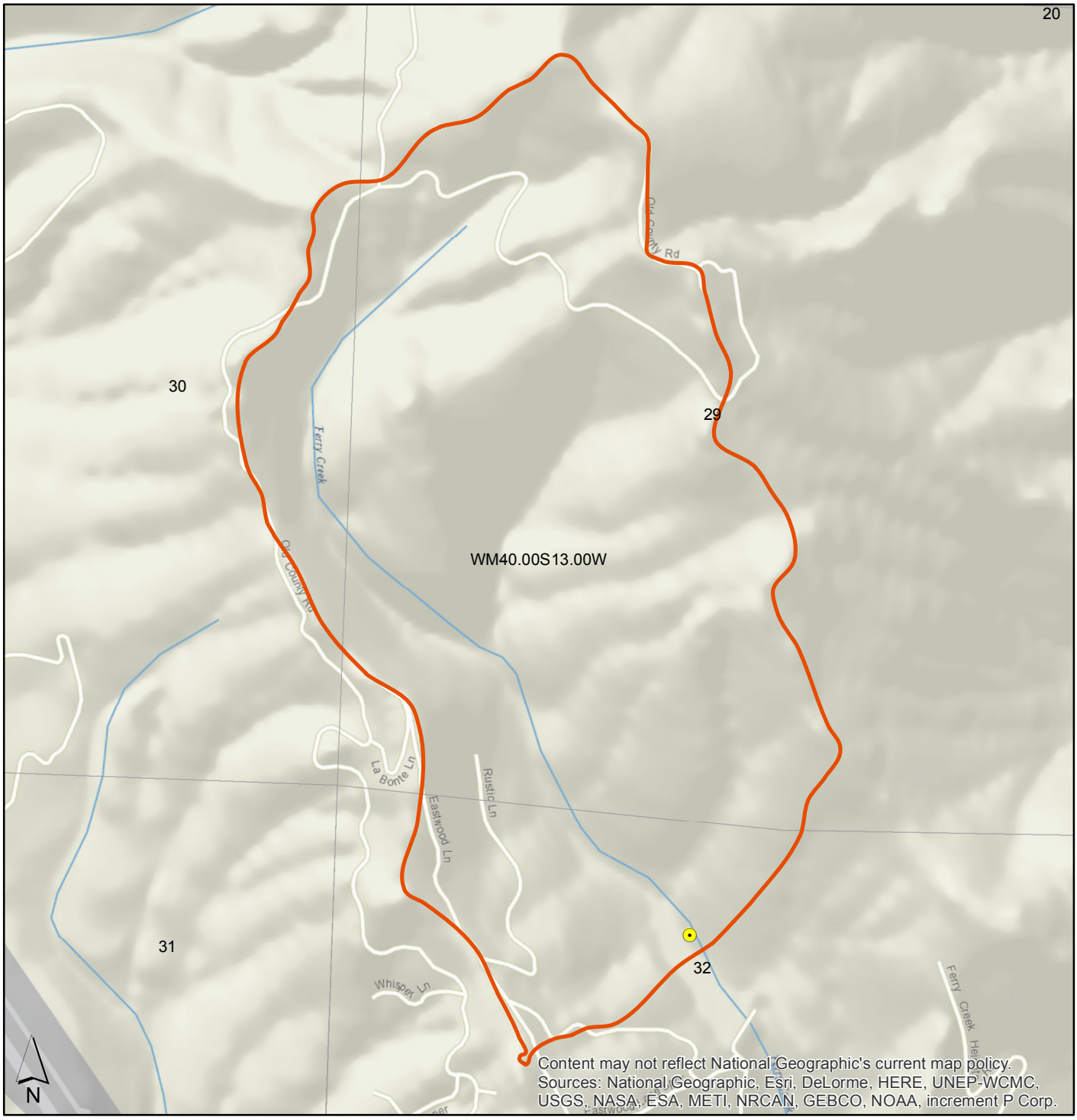
Peak Discharge Estimation

Oregon Water Resources Department

Date: February 6, 2015

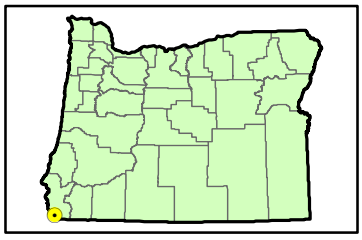


Disclaimer:
This product is for informational purposes and may not have been prepared for, or be suitable for legal, engineering, or surveying purposes. Users of this information should review or consult the primary data and information sources to ascertain the usability of the information.

Legend

- Pour Point
- Watershed

0 0.045 0.09 0.18 0.27 0.36 Miles



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DRAFT - City of Brookings 2015 Strategic Plan – Short Term (24 months)

Dated: June 29, 2015

GOAL 1: *An Effective, Responsive, Ethical City Government That Is Fiscally Sustainable.*							
Objectives		**Action Items**		**Priority**	**Due Date**	**Resp Party**	**Status/Notes**
1	Sufficient revenue to sustain City services at appropriate levels.	1.1	Review/update storm water fees.			PWD/FHD	Master plan update; budgeted - in progress
		1.2	Maximize non-City revenue resources to pay for services provided to unincorporated area.				
		1.3	Encourage new private investment in the community				
		1.4	Maintain General Fund reserve at 5 percent of operating budget.			BC	Included in 2014-15 budget
		1.5	Conduct conservation improvements at water and wastewater plants.			PWD	Baseline energy use documented; staff will monitor to see if operational changes will reduce energy. In progress
		1.6	Significantly reduce vehicle fuel consumption.			PWD	
2	Stable, effective and accountable management. Sustain positive workplace environment and employee morale.	2.1	Provide competitive employee compensation through a merit-based system.				
3	Balanced revenue system that recognizes demands on City services by residents, businesses and visitors.		Complete infrastructure GIS project			PWD	In progress.
4	Assure internal consistency and efficiency.		Implement alternative energy program			PWD	Implement alternative energy program
5	Succession planning.		Develop plan for recruiting and sustaining volunteers.			PWD	Parks/Tech Supervisor and Public Safety Dept. developing plan for park ranger program
6	Utilize local contractors.						
GOAL 2: *A Safe Community*							
Objectives		**Action Items**		**Priority**	**Due Date**	**Resp Party**	**Status/Notes**
1	Adequately staff, equipped and housed police/fire departments.						
2	Provide clean drinking water and compliant waste water treatment.						
3	Improve community health care.	3.1	Establish Emergency Department at Brookings clinic.			CM	State authorized
4	Improve personal/family preparedness.	4.1	Promote “Map your Neighborhood” preparedness program.			PSD	Several neighborhood meetings held; little public interest.
5	Maintain streets in safe/serviceable condition.	5.1	Allocate $250,000 annually for street reconstruction and major maintenance.			BC	Annual program.
		5.2	Improve pedestrian/vehicle safety; replace hazardous storm drain grate; make pedestrian facilities more accessible.			PWD	ODOT signage request; work w/Vision Council; TSP update underway;RARE creating GIS data.
		5.3	Develop multi-year street/sidewalk improvement plan			PWD	
6	Improve pedestrian safety	5.4	Develop bicycle plan & pursue funding for improvements.			PWD	Bicycle Plan Adopted - Harris/Dawson Project to begin 2013; more grants in progress. TSP update underway; includes bike amenities.
7	A disaster resilient community						
GOAL 3: *Influence Economic Growth / Improve Quality of Life*							
Objectives		**Action Items**		**Priority**	**Due Date**	**Resp Party**	**Status/Notes**
1	Establish pro-growth policy	1.1	Develop business and resident attraction program.			CM	Chamber distributed ~900 relocation packets. Video library promoting City now on website.
		1.2	Develop business retention strategy			CM	
2	Establish development policies and public improvements/standards that recognize economic trends.	2.1	Develop comprehensive plan for addressing wastewater I&I issue			PWD	Flow meter installed; will take 1 year to collect data and compare to baseline.
		2.2	Prepare annexation pros/cons and fiscal analysis.			CM	RFP submitted to Portland State; funding
		2.3	Develop program to “cash out” DIA program			PWD/FHD	Long term; requires substantial staff resources
		2.4	Adopt ordinance to implement Downtown Master Plan 2002			PM	
		2.5	Implement a Main Street Program			CM	
		2.6	Work with private interests to improve appearance of downtown through building & streetscape improvements			BLD	
		2.7	Develop UGB transition agreements with special districts.			PWD	Delayed by HSD; County not pursuing.

KEY: BC = Budget Committee BLD = Building Official CA = City Attorney CC = City Council CE = City Engineer CM = City Manager FHD = Finance & Human Resources Director
PM = Planning Manager PTS = Parks & Tech Services Supervisor PSD = Police Safety Director PWD = Public Works & Development Director

DRAFT - City of Brookings 2015 Strategic Plan – Short Term (24 months)

Dated: June 29, 2015

GOAL 3: *Influence Economic Growth / Improve Quality of Life (Continued)*							
Objectives		**Action Items**		**Priority**	**Due Date**	**Resp Party**	**Status/Notes**
3	Provide infrastructure to support economic growth.	3.1	Develop schedule to review/update infrastructure master plans and development standards; consolidated implementation plan for infrastructure; existing SDC credit inventory and exchange program.			PWD	Water Master Plan complete; Storm and sewer in progress.
4	Complete approved capital projects in a timely and cost efficient manner.	4.1	Reduce I&I			PWD	In progress
		4.2	Reconstruct uncompleted block of Hemlock Street,			PWD	Plan/budget developed
		4.3	Complete Railroad reconstruction project			PWD	
		4.4	Complete Airport Infrastructure project			PWD	
		4.5	Pursue pedestrian improvement funding: Hwy101 north of Lucky Lane			PWD	
		4.6	Pursue State/Federal grants to fund economic development and infrastructure improvements			CM	
		4.7	Develop public restrooms in the downtown area			PWD	
5	Maintain and enhance quality of coastal experience.	5.1	Develop coastal access				
6	Attract tourists to stop in downtown.	6.1	Landscaping along South Chetco			PWD/PTS	Obtained cost; not in budget.
		6.2	Improve downtown directional/parking signs			PWD/PTS	Need further direction
		6.3	Central Building historic landmark sign			PWD/PTS	Issues with ODOT approval
		6.4	Incentive program for downtown shops			PWD/BLD	Need further direction
		6.5	More bears			CM	Ongoing visits
		6.6	Traffic study to improve parking downtown			PWD	Need budget and funding
		6.7	Limit retail commercial land supply to encourage retail infill & redevelopment to areas within existing UGB, especially downtown			PM	
		6.8	Promote downtown public art			PWD	
		6.9	Develop RV parking along Frontage Rd.			PWD/PTS	TPAC; TSP; proposed Frontage budget 2014/15; mural, weeding, flower baskets, proposed blight policy
7	Conserve open space and protect natural, scenic resources and cultural and historic areas while providing for orderly growth and development.	7.1	Work with Curry County & Harbor Water Districts to develop alternatives to water withdrawals from the Chetco River during late summer months			CM	
		7.2	Limit size/scale of ocean shoreline access facilities & provide opportunities to reduce crowding/overuse of any single access point			PM	
		7.3	Provide opportunities for public access to reduce crowding & overuse of any individual access point			PTS	
		7.4	Provide signage to direct visitors to all access sites & to clearly define boundaries of State parks			PTS	
8	Provide additional recreational opportunities and facilities to include neighborhood parks, beach and river access points, and possible downtown park.	8.1	Traffic study to improve parking downtown			PWD	Need budget and funding
		8.2	Lighting at Stout Park			PWD/PTS	
		8.3	Reconfigure Azalea Park Athletic Fields			PWD/PTS	Plan/budget completed. Funding needed.
		8.4	Install restrooms at Chetco Point and Stout Parks			PWD/PTS	Plan/budget developed
		8.5	Develop Aquatics & Recreation Center			PTS	
		8.6	Develop Community Center			PTS	Develop Community Center
9	Implement policies and implementation items included under economic section of Comprehensive Plan.	9.1	Implement citizen advisory group, citizen involvement program & update Comprehensive Plan every two years			PWD	
		9.2	Recognize/support the Port of Brookings Harbor Master Plan of Development and work with Port to develop land within its jurisdiction.			CM	

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GOAL 3: *Influence Economic Growth / Improve Quality of Life (Continued)*							
Objectives		**Action Items**		**Priority**	**Due Date**	**Resp Party**	**Status/Notes**
		9.3	Utilize zoning ordinance to provide commercial & industrial lands for development			PM	
		9.4	Form an organization to initiate, coordinate & help implement an industrial and employment expansion program			CM	
		9.5	Work with landowners to create larger development opportunity sites			CM	
		9.6	Encourage small-scale home occupations for cottage industries & professional services			PM	
		9.7	Provide development opportunities for a range of senior housing				Housing has not been City function
		9.8	Develop an overall economic development plan			CM	
		9.9	Review zoning & development standards to consider including techniques to maximize energy conservation			PM	
GOAL 4: *Effective Intergovernmental Relations*							
Objectives		**Action Items**		**Priority**	**Due Date**	**Resp Party**	**Status/Notes**
1	Influence regional, state, national policy on issues important to achieving City goals.						
2	Secure grant funding.						
3	Achieve City goals through strategic partnerships.						
4	Prepare for potential County fiscal failure.	4.1	Evaluate possible assumption of County services on a cost recovery basis.			CM/FHD	Reviewed Planning/Building; not feasible. Provided Port District policing proposal. Offered to assume airport management; declined.
		4.2	Complete UGB annexation study				

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