



SISTERS CITY COUNCIL
520 E. Cascade Avenue
Sisters, OR 97759

FEBRUARY 25, 2016

6:00 p.m. EXECUTIVE SESSION

- I. Pursuant to ORS: 192.660(2)(h) Pending Litigation

7:00 P.M. CITY COUNCIL REGULAR MEETING

- I. **CALL TO ORDER/PLEDGE OF ALLEGIANCE**

- II. **VISITOR COMMUNICATION**

- III. **CONSENT AGENDA**
 - A. Minutes
 1. October 08, 2015 – Regular Meeting
 2. February 11, 2016 – Workshop
 3. February 11, 2016 – Regular Meeting
 4. February 18, 2016 - Workshop

 - B. Bills to Approve
 1. February Accounts Payable

- IV. **STAFF REPORTS**
 - A. Deschutes County Sheriff's Office

- V. **COUNCIL BUSINESS**
 - A. **Public Hearing and Consideration of Resolution 2016-03: A RESOLUTION ADOPTING A WASTEWATER SYSTEM CAPITAL FACILITIES PLAN DATED JANUARY 2016 – A. Gorayeb/P. Bertagna/Erik Huffman**

 - B. **Discuss and Consideration of Ordinance No. 467: AN ORDINANCE REGARDING TRANSIENT ROOM TAX IN THE CITY OF SISTERS AND INCREASING SAID TAX TO 8.99 PERCENT – J. O'Neill**

This agenda is also available via the Internet at www.ci.sisters.or.us

*The meeting location is accessible to persons with disabilities. Requests for an interpreter for the hearing impaired or for other accommodations for persons with disabilities should be made at least 48 hours before the meeting by calling Kathy Nelson, City Recorder, at the number below.
520 E. Cascade Ave. – P.O. Box 39, Sisters, OR 97759 – 541-323-5213*

February 25, 2016

VI. OTHER BUSINESS

A. Discuss Application for the Sisters Fall Street Festival and Sisters Wild West Show

VII. MAYOR/COUNCILOR BUSINESS

VIII. ADJOURN

REGULAR MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
OCTOBER 08, 2015

MEMBERS PRESENT:

Chris Frye	Mayor
Nancy Connolly	Council President Pro-tem
David Asson	Councilor
Amy Burgstahler	Councilor
Andrea Blum	Councilor

STAFF PRESENT:

Andrew Gorayeb	City Manager
Steve Bryant	City Attorney
Lynne Fujita-Conrads	Finance Officer
Patrick Davenport	CD Director
Paul Bertagna	PW Director
Julie Pieper	Finance Assistant

ABSENT:

Kathy Nelson	City Recorder
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I. CALL TO ORDER/PLEDGE OF ALLEGIANCE

The meeting was called to order by Mayor Frye at 7:08 p.m.

II. COUNCIL APPOINTMENT

Councilor Connolly moved to appoint Andrea Blum to the City Council. Councilor Burgstahler seconded the motion. The motion carried unanimously.

III. OATH OF OFFICE

City Attorney Bryant administered the oath of office to Councilor Blum.

IV. VISITOR COMMUNICATION

Rima Givot, Sisters High School Astronomy Teacher

Dylan Wright, Sisters High School Astronomy Student

Ms. Givot explained that as an astronomy teacher she was interested in educating her students about the City's dark skies ordinance. She stated she was hoping the City might partner with the students on a survey to find out how the community feels about dark skies. She stated it would provide a good opportunity for the students to do some outreach and the information could provide the City with a gauge of how the community views the preservation of its dark skies. Mayor Frye replied he felt it would be good information for the City to have and staff could be used as a resource. Councilor Burgstahler stated the Council had also talked about sending out surveys and some questions relating to dark skies preservation could be incorporated into one of those surveys. Mayor Frye stated he felt it would be beneficial for the students to research the history of the ordinance and determine the reasoning behind why it was initially adopted. Manager Gorayeb stated staff would meet with Ms. Givot to discuss possible next steps. Student Dylan Wright remarked he felt that Sisters skies were a valuable resource and appreciated having its dark skies protected since many communities did not.

V. CONSENT AGENDA

A. Minutes

1. February 26, 2015 – Workshop
2. March 05, 2015 – Workshop
3. September 22, 2015 – Special Meeting

B. Bills to Approve

October Accounts Payable

Councilor Burgstahler moved to approve the consent agenda. Councilor Connolly seconded the motion. The motion carried unanimously.

VI. STAFF REPORTS

A. October Staff/Council Work Plan

Councilor Connolly asked about the on-line reservation system program listed on the Finance page work plan. **Finance Officer Fujita-Conrads** stated she would begin researching options soon in order to implement an on-line reservation system before the campground opened for 2016. **Manager Gorayeb** stated the reservations were currently handled by Finance Assistance Pieper and took a great deal of time certain times of the years so the on-line system would be more efficient.

Councilor Connolly asked if there were any updates relating to the Land Use Board of Appeals (LUBA) items. **City Attorney Bryant** replied the City had received a ruling from LUBA earlier in the week regarding the appeal on a 2014 temporary use permit for property on Cascade Avenue. He stated LUBA had remanded some items back to the Council for decision as LUBA did not feel it had sufficient information to make the ruling. He stated with regard to the appeal on the McKenzie Meadow Village, the record had been submitted and there had been some requests for additional information which were being finalized.

B. New Business License Report for September 2015 – list included

VII. COUNCIL BUSINESS

A. Public Hearing and Consideration of Resolution No. 2015-22: A

RESOLUTION OF THE CITY OF SISTERS ADOPTING A SUPPLEMENTAL BUDGET AND ESTABLISHING APPROPRIATIONS WITHIN THE 2015-16 BUDGET

Mayor Frye opened the public hearing for Resolution No. 2015-22 adopting a supplemental budget.

REGULAR MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
OCTOBER 08, 2015

Finance Officer Fujita-Conrads stated the supplemental budget covered several items including a transfer from the General Fund strategic reserve to the Street Fund for the Hood Avenue project, a project in Edge of the Pine subdivision, contracted services for a traffic study for Creekside Campground, reclassification of a Utility Technician to a Maintenance Supervisor which included a salary increase and additional principal payment for the Lazy Z and City Hall loans.

Councilor Asson questioned how system development charge (SDC) funds could be used to pay for the loan on the Lazy Z property. **Manager Gorayeb** explained since the property had been purchased as a place to spray effluent when future expansion and development warranted doing so, SDC funds had always been the source of payment on the loan.

Mayor Frye asked if there was anyone that wished to testify on the resolution and as there was no one that wished to testify, **Mayor Frye** closed the public hearing.

Councilor Connolly moved to approve Resolution No. 2015 adopting a supplemental budget and establishing appropriations within the 2015-16 Budget. Councilor Asson seconded the motion. The motion carried unanimously.

B. Discussion and Consideration of Resolution No. 2015-23: A RESOLUTION AMENDING THE PAY PLAN CLASSIFICATION OF THE CITY OF SISTERS

Finance Officer Fujita-Conrads explained this was to update the pay plan to include the maintenance supervisor position previously discussed in the supplemental budget.

Councilor Connolly moved to approve Resolution No. 2015-23 amending the pay plan classification of the City of Sisters. Councilor Burgstahler seconded the motion. The motion carried unanimously.

C. Discussion and Consideration of a Motion to Accept Public Improvements for Clear Pine Phase I

Director Bertagna stated this action was to formally accept the improvements for the first Phase of the Clear Pine development. He stated it was a 14 lot subdivision. **Councilor Connolly** asked what the acronym "UIC" stood for. **Director Bertagna** explained it was for a dry well, or 'underground injection control (UIC) device. He explained a permit from the Department of Environmental Quality (DEQ) was required for a UIC and this was the City's method of tracking the permit.

Councilor Burgstahler moved to accept the public improvements for Clear Pine Phase I. Councilor Asson seconded the motion. The motion carried unanimously.

VI. OTHER BUSINESS

Councilor Burgstahler discussed the news release she had drafted to inform the community of the October 22nd public hearing on the matter of transient merchants. She stated she wanted to create a sense of urgency in the release in hopes it would motivate community members to come and provide their views on the issue at the meeting. She stated the news release would be published in the Nugget newspaper for two weeks and the information would be sent to the Sisters radio station. The **Council** was supportive of sending the release out and also discussed using monthly utility bills for direct mailing opportunities.

VII. MAYOR/COUNCILOR BUSINESS

Councilor Connolly reported the City Parks Advisory Board (CPAB) had met and after additional conversation and input from effected business and homeowners surrounding the overnight park, reversed their initial recommendation to have only one way in and one way out of the overnight park. The CPAB decided using either Buckaroo Trail or Locust for both ingress and egress was appropriate as it would provide more flexibility for campers. Having to use a particular entrance and exit could make it harder for the RV's depending on the direction they were coming from and allowing campers to use either entrance/exit would be fair to both effected businesses and property owners. She questioned when the planting of the additional trees to create even more of a buffer would begin and **Manager Gorayeb** they would begin planting soon.

Councilor Connolly stated there were some member of the community at the CPAB meeting that had suggested the campground be closed altogether, be limited to tent camping only or that size restrictions for RV's be set. She questioned whether it was appropriate for the CPAB to continue discussing those options. **Mayor Frye** replied that since the Council was the final decision maker, the CPAB members could discuss and recommend whatever they chose. **Councilor Burgstahler** added it was her understanding the Council would be reviewing the campground ingress/egress topic after a year to see how it was working.

The **Council** discussed how the recruitment process for the Community Assets Technical Advisory Committee was going. It was reported there were no applicants so far.

Councilor Burgstahler suggested that as part of the recruitment process, applicants were made aware that funds had been budgeted to perform the preliminary design and cost analysis.

REGULAR MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
OCTOBER 08, 2015

Mayor Frye appointed Councilor Blum to act as the City's representative to the Central Oregon Area Commission on Traffic (COACT). The Council concurred.

VIII. ADJOURN – 7:55 p.m.



Kathy Nelson, City Recorder

Chris Frye Mayor

WORKSHOP MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 11, 2016

MEMBERS PRESENT:

Chris Frye Mayor
Nancy Connolly Council President
David Asson Councilor
Amy Burgstahler Councilor
Andrea Blum Councilor

STAFF PRESENT:

Paul Bertagna PW Director
Patrick Davenport CD Director
Joe O'Neill Finance Officer
Kathy Nelson City Recorder

GUESTS:

Erik Huffman City Engineer of Record

ABSENT:

Andrew Gorayeb City Manager

The workshop was called to order by Mayor Frye at 6:00 p.m.

1. Wastewater System Capital Facilities Plan

Director Bertagna stated the process to update the wastewater system plan began with the infrastructure capacity memo staff provided to Council last spring which resulted in the Council directing staff to update the plan. **City Engineer of Record Erik Huffman** explained that Manager Gorayeb, Director Bertagna and he had gone through each section of the 2006 plan and he provided highlights from some of the sections. He noticed Councilor Asson's previous concern relating to the population forecast and reported the data for the population forecasts had come from Deschutes County records. **Director Bertagna** added staff had researched the population data since the sewer system was installed and found growth to be very erratic with percentage growth as high as 13.6% and less than 3% within the previous 15 years. He stated staff had added language to the plan that population growth would be re-evaluated every five years and the Capital Improvement Plan amended as needed.

Engineer Huffman stated Section 5 covered the wastewater flow details and characteristics, Section 7 dealt with the biological capacity of the treatment plant and Section 8 dealt with the most imminent need of the city which was effluent application to the Lazy Z property. He explained the City was nearing its effluent application limits. He stated Section 9 dealt with biosolids management which included creating an approved Department of Environmental Quality (DEQ) plan to deal with the sludge accumulation on the bottom of the treatment plant ponds.

Director Bertagna stated in researching how the plan had been adopted in the past, staff found a public hearing had been held to provide an opportunity for interested parties to provide input. He noted a public hearing was not required for updating the plan, and since there was no specified time frame required for the update, staff recommended pulling the item from the agenda at the regular meeting and hold a public hearing at the February 25th regular meeting. The **Council** concurred with staff's recommendation.

Director Bertagna stated the next step was to take the project list and determine what portion of each project was SDC funding eligible. He stated staff would then talk to funding providers to determine what grants or loans might be available and bring the finalized list back to the Council once staff had determined how much funding could be obtained from outside resources. He stated determining the new SDC rates would be the last step and any changes to the SDC's required a public hearing. He stated there were very strict guidelines surrounding SDC's and how they were calculated. He stated SDC's were comprised of two parts; improvement fees and reimbursement fees.

Questions asked, answered and comments on the plan included:

- Is the City in compaction? Staff will check.
- H₂S is a by-product of decomposition. It is a corrosive sewer gas that occurs when oxygen gets into the pipes.
- Pump #1 has 500 gallons of diesel which is enough to run the pump for two to three days.
- A polishing pond is the third and cleanest of the effluent treatment ponds.
- Effluent will not be sprayed near the buffers of the Coyote Springs and Buck Run neighborhoods.
- The Lazy Z property will be the next area to expand for spraying effluent. It will be fenced and signed.
- General obligations bonds require a double majority.
- The sewer fund does not use property tax ad valorem.
- The transfer of the last irrigation certificate with Oregon Water Resources Department (OWRD) is almost complete. It was related to the Uncle John Ditch piping project where the point of diversion was changed.
- The first phase of the Lazy Z effluent spraying project will be for forest irrigation as opposed to crop irrigation. The reason behind the decision is so crops will not need to be harvested.
- The City just received its DEQ permit.
- There is no deadline for adoption of the plan.
- Staff will review and answer the handout of questions from Councilor Asson prior to the plan coming to the Council for adoption.
- Should Council be participating in the one-stop meetings? Staff will check.
- A consultant was not used to update the plan as staff and the City's Engineer had the appropriate knowledge to perform the update. The City Engineer will stamp the plan.
- There was discussion as to whether the plan goes through 2035 or 2036.
- The goal is to provide for comfortable growth without over building the system.

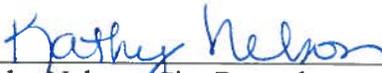
2. Other Business

- The **Council** discussed a request from Forest Service for a letter of support for a grant the agency is applying for the Petersen Ridge Trailhead. The **Council** was supportive of providing the letter of support.

WORKSHOP MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 11, 2016

- The **Council** discussed who would be attending the Economic Development for Central Oregon (EDCO) annual luncheon.
- **Councilor Burgstahler** brought up an email Council members had received from Habitat for Humanity Executive Director Sharlene Weed relating to inclusionary zoning. **Mayor Frye** replied he would like to have that conversation under *Other Business* during the regular meeting.
- **Councilor Burgstahler** stated with regard to the format for the monthly newsletter, she felt the Council should invest in having a professional template designed. She stated the cost would be under \$1,000. She reported she had created a request for quote (RFQ). The **Council** was supportive of having the professional template designed.
- The **Council** discussed who would attend the next Dark Skies meeting.
- **Councilor Asson** stated a presentation related to the topic of implementing a minimum wage and taxing gross receipts for companies meeting certain thresholds at the Economic Development for Central Oregon (EDCO) Board meeting had been discouraging. He stated it was felt this legislation would be quite damaging to Central Oregon.

The meeting was adjourned at 6:55 p.m.


Kathy Nelson, City Recorder

Chris Frye, Mayor

REGULAR MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 11, 2016

MEMBERS PRESENT:

Chris Frye Mayor
Nancy Connolly Council President
David Asson Councilor
Amy Burgstahler Councilor
Andrea Blum Councilor

STAFF PRESENT:

Steve Bryant City Attorney
Patrick Davenport CDD Director
Paul Bertagna PW Director
Joe O'Neill Finance Officer
Kathy Nelson City Recorder

ABSENT:

Andrew Gorayeb City Manager

I. CALL TO ORDER/PLEDGE OF ALLEGIANCE

The meeting was called to order by Mayor Frye at 7:06 p.m.

II. VISITOR COMMUNICATION

Sharlene Weed, Executive Director Sisters Habitat for Humanity, 406 Sisters View, Sisters, OR 97759

Ms. Weed stated she was in attendance to request the Council write letters to State Senator Ted Ferrioli and State Representative John Huffman to support overturning the statewide ban on inclusionary zoning for housing. She stated she felt that local jurisdictions should have the ability to determine for themselves if this tool might be useful to help address their community's housing and development needs. She reported there were only two states in the nation, Oregon and Texas, which had this in place. She stated there were very strong building lobbyist fighting to keep this zoning in Oregon.

Mayor Frye stated the Council would take up the discussion on the Ms. Weed's request under *Other Business* later in the meeting.

III. CONSENT AGENDA

A. Minutes

1. January 14, 2016 – Regular Meeting
2. January 28, 2016 – Workshop
3. January 28, 2016 – Regular Meeting
4. February 04, 2016 – Workshop

B. Bills to Approve

1. February Accounts Payable

C. Liquor License Applications

1. Sisters Saloon and Ranch Grill
2. Sisters Meats & Smokehouse
3. Hop in the Spa
4. Rio Restaurant

Councilor Asson moved to approve the consent agenda including the additional page of accounts payable and an edit to the January 28, 2016 workshop minutes. Councilor Burgstahler seconded the motion. The motion carried unanimously.

IV. STAFF REPORTS

A. February Staff/Council Work Plan

Councilor Connolly requested additional detail be added to the work plan so it was apparent what project was being referenced.

Mayor Frye asked when the campground upgrades would be completed and **Director Bertagna** replied they would be completed in time for the campground to open on May 1st.

B. New Business License Report for January 2016 – list included

V. COUNCIL BUSINESS

A. Public Hearing and Consideration of Resolution No. 2016-02: A RESOLUTION OF THE CITY OF SISTERS ADOPTING A SUPPLEMENTAL BUDGET AND ESTABLISHING APPROPRIATIONS WITHIN THE 2015/16 BUDGET

Finance Officer O'Neill stated the supplemental budget was to fund Creekside Campground improvements and for the purchase of a large feedback sign for eastbound traffic. He stated the current smaller feedback sign would be re-located to a different area in Sisters.

Councilor Burgstahler asked when the feedback sign would be installed and **Director Bertagna** replied Oregon Department of Transportation (ODOT) would be doing the installation and he had not received notice of that date yet.

Mayor Frye opened the public hearing for Resolution 2016-02.

Mayor Frye asked if there was anyone that wished to speak. As there was no one that wished to speak, **Mayor Frye** closed the public hearing.

Councilor Burgstahler moved to approve Resolution No. 2016-02 adopting a supplemental budget and establishing appropriations within the 2015/16 budget. Councilor Connolly seconded the motion. The motion carried unanimously.

B. Public Hearing and Consideration of Resolution 2016-03: A RESOLUTION ADOPTING A WASTEWATER SYSTEM CAPITAL FACILITIES PLAN DATED JANUARY 2016

This item was pulled and rescheduled for the February 25th regular meeting.

C. Consideration of Resolution 2016-04: A RESOLUTION OF THE CITY OF SISTERS CITY COUNCIL, STATE OF OREGON, REGARDING APPEAL APPLICATION AP#15-03, AN APPEAL OF PLANNING COMMISSION RESOLUTION OF APPROVAL (PC 2015-16) REGARDING APPLICATION EST 15-01 EXTENSION TO A TENTATIVE SUBDIVISION PLAT FOR MCKENZIE MEADOW VILLAGE

Mayor Frye read the script for the public hearing of appeal (AP 15-03) of the Planning Commission approval of an extension (EXT 15-01) to an approved tentative subdivision plat (SUB 10-02) for McKenzie Meadow Village. He stated the Council's deliberations were on the 'de novo' hearing and allowed all aspects of the application to be re-evaluated as if it were a newly submitted application. He explained how the deliberation would continue including the introduction of new items added to the record since the January 28, 2016 meeting and allowing the Council the opportunity to ask questions. **Mayor Frye** asked for any disclosures from the City Council and there were none. There were no members of the audience that wished to challenge the ability of any Council member to hear the matter. He requested Director Davenport provide a summary of items added to the record.

Director Davenport reported there were two letters from Brix Law dated February 4th and February 11th, two letters from Perkins Coie dated February 4th and February 11th, the applicable section of the Development Code in effect at the time of the decision and a staff report dated February 9th in response to the February 4th Perkins Coie letter.

Councilor Burgstahler questioned if it would be beneficial to the City to incorporate language into the Development Code for situations such as this when entitlements were nearing expiration and the project was under appeal to the Land Use Board of Appeals (LUBA). **City Attorney Bryant** responded the City could set a provision that the date was automatically extended because of an appeal. He explained that any project only had a certain number of years in which to begin construction and the project was approved under the Development Code in effect at the time of approval. He stated if a project waited for a long period of time before construction began, it could be out of step with changes to the Development Code that had been added to keep a particular vision of how the Council and Planning Commission wanted the city to look.

Councilor Blum asked if there was any new argument or evidence brought up in the Perkins Coie letter the City received earlier in the day and **Director Davenport** replied that in his opinion it was just a re-iteration of the first letter. **City Attorney Bryant** added the Council was the arbitrator of the City's Development Code and how it was applied and so the Council did in fact have the authority to interpret it.

Councilor Connolly moved to adopt Resolution 2016-04 to approve EXT 15-01, the McKenzie Meadow Village Extension application for a Tentative Subdivision Plat Application SUB 10-02 and adopt the findings and recommendations contained in Planning Commission Resolution PC 2015-16 and the incorporate staff report and Conditions of Approval and the staff report captioned as Appeal 15-03: Appeal of Planning Commission Decision of Approval regarding Application EXT 15-01 Extension to McKenzie Meadow Village Subdivision Plan (SUB 10-02) Planning Commission Decision date: November 19, 2015, PC resolution 2015-16. Councilor Burgstahler seconded the motion. The motion carried unanimously.

D. Discussion and Consideration of a Motion to Extend the Abatement Agreement of the Greater Redmond Enterprise Zone for PCC Schlosser

Sisters Economic Development Manager Caprielle Foote-Lewis explained that as co-sponsors of the enterprise zone the City's signature was necessary for the City of Redmond to extend the tax abatement agreement with PCC Schlosser. She stated PCC Schlosser had met all the necessary standards for job creation and salary.

Councilor Connolly moved to extend the abatement agreement of the Greater Redmond Enterprise Zone for PCC Schlosser. Councilor Burgstahler seconded the motion. The motion carried unanimously.

E. Public Hearing and Discussion on the Possibility of Raising the Transient Room Tax (TRT) Rate to 9.99%

Mayor Frye opened the public hearing on the possibility of raising the transient room tax rate. He explained the City would raise its rate to from 8:00% to 8.99% with the additional one percent going to the State. **Mayor Frye** asked if there was anyone that wished to speak and as there was no one that wanted to speak, he closed the public hearing.

VI. OTHER BUSINESS

• **Inclusionary Zoning**

The **Council** discussed whether to write a letter of support to overturn the ban on inclusionary zoning. **City Attorney Bryant** explained efforts to remove the ban had been ongoing for a number of years. He stated, if removed, it would allow local government to have control over what works best for their community. **Councilor Asson** asked if the City were to support removing the ban whether it would create a more hostile environment with

builders and negatively impact the City's ability to negotiate with them. **City Attorney Bryant** replied it might initially as there were strong feelings on both sides but it would not be too difficult if the City implemented a process and regulations. He stated as part of the

REGULAR MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 11, 2016

discussion, the Council would determine if creating affordable housing was mandatory, voluntary, or if the City would provide some incentives to the developers.

Councilor Asson questioned if it might be too onerous and whether it would be better to leave the issue alone in order to provide the City with a better negotiating tool. He asked for Ms. Weed to comment. **Ms. Weed** stated she understood Councilor Asson's concerns it could create conflict between the city and the developers but noted since each city could decide what would work best for their situation, she saw it as a tool for working with developers to come up with a program that kept everyone whole. **Mayor Frye** added he felt it would be better to use a 'carrot and stick' approach to create a balance for everyone involved. The **Council** voiced support of writing a letter to State Representative Huffman and State Senator Ferrioli asking they support overturning the ban.

- Transient Room Tax

The **Council** discussed its next steps with regard to raising the transient room tax an additional .99%. **Mayor Frye** stated 70% of the additional funds collected would go to the Chamber of Commerce and remaining 30% would be slated for affordable housing. He added he would like to add additional funds from the General Fund to have an amount that could be used for gap funding. He stated he envisioned creating a due diligence committee to determine the parameters for developers seeking to utilize those funds. The **Council** instructed staff to bring the matter forward at its next regular meeting for approval.

VII MAYOR/COUNCILOR BUSINESS

VIII. ADJOURN – 7:55 p.m.


Kathy Nelson, City Recorder

Chris Frye Mayor

WORKSHOP MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 18, 2016

MEMBERS PRESENT:

Chris Frye Mayor
David Asson Councilor
Nancy Connolly Councilor
Amy Burgstahler Councilor

ABSENT:

Andrea Blum Councilor

GUESTS:

Chuck Ryan Forgivable Loan Due Diligence Committee
Bill Hall Forgivable Loan Due Diligence Committee
Bill Kuhn Forgivable Loan Due Diligence Committee
Caprielle Lewis Sisters Economic Development Manager

STAFF PRESENT:

Andrew Gorayeb City Manager
Patrick Davenport CD Director
Joe O'Neill Finance Officer
Joe O'Neill Finance Officer
Kathy Nelson City Recorder

ABSENT:

Paul Bertagna PW Director

The meeting was called to order by Mayor Frye at 8:00 a.m.

1. Forgivable Loan Program Parameters

The **Council** and **Forgivable Loan Due Diligence Committee** discussed the purpose of the forgivable loan program. It was stated that although the forgivable loan program memorandum of understanding (MOU) between the City and Economic Development of Central Oregon (EDCO) cited job creation as the primary function, the retention of businesses and jobs was also an important component of continued economic development success. **Manager Gorayeb** stated the MOU had purposely been written in order to provide ultimate flexibility. **Councilor Burgstahler** suggested the Council could consider implementing a tiered approach to forgivable loans with primary funding going to job creation and job retention considered for secondary funding. **Manager Gorayeb** reiterated that the parameters being set were for future applications to the forgivable loans and not the loan applications currently in process. **Economic Development Manager Lewis** stated that a cookie cutter approach could not be used with any of the loan applications as each situation was unique to the company involved.

There was discussion on the eight questions presented to determine what the parameters for the forgivable loans should be.

1. The commencement date for the Forgivable Loan Program was set at July 10, 2015.
2. An eligible job for the purposes of the program should be a job created within or transferred (relocation) to the City of Sisters after the submittal of a loan application.
3. The minimum number of eligible jobs per application will be set at five, with jobs #1 through #4 counting but only eligible for funding after the fifth job is created.
4. The maximum allowable time period allowed for the creation or transfer of eligible jobs will be three years.
5. The retention period would begin as soon as all eligible jobs have been created. A suggested table for determining allowable funding per new job created was distributed that

WORKSHOP MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 18, 2016

based funding on the return of investment (ROI) and total score from the balanced scoresheet for the company from the due diligence committee.

6. No maximum amount of funding per recipient will be set as each application will be considered on a case-by-case basis.
7. The job retention period will be three years.
8. The loan program is available only to firms currently operating in Sisters.

Mayor Frye suggested the discussion relating to options for rolling out the forgivable loan program parameter clarifications be discussed after the Executive Session concluded and the workshop reconvened.

Mayor Frye called for a break in the workshop to convene the executive session at 8:53 a.m.

Council President Connolly reconvened the workshop at 9:47 a.m.

Mr. Hall discussed an additional handout relating to the retention period issues needing resolution along with wording on the retention period requirement qualifications wording to address those issues. The **Council** chose to take some time to review the document and continue the discussion with the due diligence committee at a future workshop.

2. Preview February 25, 2016 Workshop and Regular Meeting

Council President Connolly previewed the February 25th workshop and regular meeting agenda. She questioned whether the City Council should wait to vote on the item to increase the City of Sisters transient room tax to 8.99 percent until after the Affordable Housing Policy Board had completed its work and provided its recommendation to the Council. **Manager Gorayeb** replied the issue of whether to raise the transient room tax was more of a Council policy decision and not within the purview of the Affordable Housing Policy Board. He stated the funding structure was a Council decision and how to use that funding would be recommended by the policy board.

Director Davenport agreed, stating the advisory board would be making recommendations related to affordable and work force housing. He stated an ordinance would be coming to the Council in March. **Councilor Connolly** asked for an update on the housing needs analysis.

Director Davenport reported that since the Council had reviewed Chapter 4, staff was still reviewing the document. **Manager Gorayeb** reported staff had met with the Department of Land Conservation and Development (DLCD) to discuss the document.

3. Other Business

- **Manager Gorayeb** reported on an update to the City's website to separate disaster preparedness/public safety into two separate listings. He stated additional information on disaster preparedness was being linked to the City's website.
- **Director Davenport** reported the City Parks Advisory Board (CPAB) had met and voted to approve the updated City Parks Master Plan. He stated the plan would be coming to the

WORKSHOP MEETING MINUTES
SISTERS CITY COUNCIL
520 E. CASCADE AVENUE
FEBRUARY 18, 2016

Council for adoption first and then park system development charges (SDC's) would be reviewed, adjusted as needed and adopted at a later time.

- **Director Davenport** reported on a grant opportunity from the Oregon Parks and Recreation Department (OPRD) the City would be applying for. He stated staff had determined it would apply for a grant for Creekside Overnight Park to bring the park into Americans with Disabilities (ADA) compliance, make restroom improvements and add a dishwashing station. He stated staff felt since the overnight park was revenue generating, it made sense to try and receive funding for the project as the revenue generated could be used towards other improvement projects. **Manager Gorayeb** added that staff would search for other grant opportunities to build restrooms for Clemens Park.

The meeting was adjourned at 10:08 a.m.


Kathy Nelson, City Recorder

Chris Frye, Mayor

PACKET: 02451 2/25/16 KK
VENDOR SET: 01 CITY OF SISTERS
SEQUENCE : ALPHABETIC
DUE TO/FROM ACCOUNTS SUPPRESSED

-----ID-----			GROSS	P.O. #			
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----		DISTRIBUTION
=====							
01-1	MISC VENDOR						
I-021816		131 W CASCADE LLC:GRANT REIMB	1,412.50				
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N			
		GRANT REIMBURSEMENT		21 5-00-906	CAPITAL OUTLAY		1,412.50
I-02182016		131 W CASCADE LLC:GRANT REIMB	2,917.50				
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N			
		GRANT REIMBURSEMENT		21 5-00-906	CAPITAL OUTLAY		2,917.50
		=== VENDOR TOTALS ===	4,330.00				
=====							
01-0858	ACTION AIR HEATING AND COOLING						
I-1866		HEATING SYSTEM MAINTENANCE-CH	495.00				
2/16/2016	AP-US	DUE: 3/18/2016 DISC: 2/26/2016	9.90CR	1099: Y			
		HEATING SYSTEM MAINTENANCE-CH		01 5-03-785	MAINTENANCE CITY HALL		495.00
		=== VENDOR TOTALS ===	495.00				
=====							
01-1019	BATTERIES + BULBS						
I-825-103261-01		BULBS-RECYCLE CENTER	38.97				
2/04/2016	AP-US	DUE: 2/04/2016 DISC: 2/04/2016		1099: N			
		BULBS-RECYCLE CENTER		01 5-03-784	MAINTENANCE RECYCLE CENT		38.97
I-825-103268-01		BULB-RECYCLE CENTER	12.99				
2/11/2016	AP-US	DUE: 2/11/2016 DISC: 2/11/2016		1099: N			
		BULB-RECYCLE CENTER		01 5-03-784	MAINTENANCE RECYCLE CENT		12.99
		=== VENDOR TOTALS ===	51.96				
=====							
01-0018	BAXTER AUTO PARTS						
I-21-427673		UJOINT-STOTTS	26.22				
2/07/2016	AP-US	DUE: 3/15/2016 DISC: 3/10/2016	0.52CR	1099: N			
		UJOINT-STOTTS		01 5-03-796	VEHICLE MAINTENANCE		2.62
		UJOINT-STOTTS		01 5-05-796	VEHICLE MAINTENANCE		2.62
		UJOINT-STOTTS		02 5-00-796	VEHICLE MAINTENANCE		5.24
		UJOINT-STOTTS		03 5-00-796	VEHICLE MAINTENANCE		10.49
		UJOINT-STOTTS		05 5-00-796	VEHICLE MAINTENANCE		5.25
I-28-524932		ABSORBANT-PWHQ	25.68				
2/01/2016	AP-US	DUE: 3/15/2016 DISC: 3/10/2016	0.51CR	1099: N			
		ABSORBANT-PWHQ		01 5-03-788	PWHQ MAINTENANCE		25.68
I-28-525177		YOKE-STOTTS TRUCK	73.26				
2/03/2016	AP-US	DUE: 3/15/2016 DISC: 3/10/2016	1.47CR	1099: N			
		YOKE-STOTTS TRUCK		01 5-03-796	VEHICLE MAINTENANCE		7.33
		YOKE-STOTTS TRUCK		01 5-05-796	VEHICLE MAINTENANCE		7.33
		YOKE-STOTTS TRUCK		02 5-00-796	VEHICLE MAINTENANCE		14.65
		YOKE-STOTTS TRUCK		03 5-00-796	VEHICLE MAINTENANCE		29.30

PACKET: 02451 2/25/16 KK

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-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
01-0018	BAXTER AUTO PARTS	(** CONTINUED **)				
		YOKE-STOTTS TRUCK		05 5-00-796	VEHICLE MAINTENANCE	14.65
I-28-525383		U-JOINT, CLAMP KIT-STOTTS	37.14			
2/06/2016	AP-US	DUE: 3/15/2016 DISC: 3/10/2016	0.74CR	1099: N		
		U-JOINT, CLAMP KIT-STOTTS		01 5-03-796	VEHICLE MAINTENANCE	3.71
		U-JOINT, CLAMP KIT-STOTTS		01 5-05-796	VEHICLE MAINTENANCE	3.71
		U-JOINT, CLAMP KIT-STOTTS		02 5-00-796	VEHICLE MAINTENANCE	7.43
		U-JOINT, CLAMP KIT-STOTTS		03 5-00-796	VEHICLE MAINTENANCE	14.86
		U-JOINT, CLAMP KIT-STOTTS		05 5-00-796	VEHICLE MAINTENANCE	7.43
I-28-526301		BULB FOR STREET SWEEPER	3.66			
2/17/2016	AP-US	DUE: 3/15/2016 DISC: 3/10/2016	0.07CR	1099: N		
		BULB FOR STREET SWEEPER		03 5-00-796	VEHICLE MAINTENANCE	3.66
I-28-526399		LIGHTS-BENTZ TRUCK	93.10			
2/18/2016	AP-US	DUE: 3/15/2016 DISC: 3/10/2016	1.86CR	1099: N		
		LIGHTS-BENTZ TRUCK		01 5-03-796	VEHICLE MAINTENANCE	9.29
		LIGHTS-BENTZ TRUCK		01 5-05-796	VEHICLE MAINTENANCE	9.29
		LIGHTS-BENTZ TRUCK		02 5-00-796	VEHICLE MAINTENANCE	37.22
		LIGHTS-BENTZ TRUCK		03 5-00-796	VEHICLE MAINTENANCE	27.94
		LIGHTS-BENTZ TRUCK		05 5-00-796	VEHICLE MAINTENANCE	9.36
		=== VENDOR TOTALS ===	259.06			
01-0716	BI-MART CORPORATION					
I-1730		RUBBER BOOTS-KEIFER	29.99			
2/17/2016	AP-US	DUE: 2/17/2016 DISC: 2/17/2016		1099: N		
		RUBBER BOOTS-KEIFER		01 5-03-782	UNIFORMS	1.50
		RUBBER BOOTS-KEIFER		01 5-05-782	UNIFORMS	3.00
		RUBBER BOOTS-KEIFER		02 5-00-782	UNIFORMS	9.00
		RUBBER BOOTS-KEIFER		03 5-00-782	UNIFORMS	15.00
		RUBBER BOOTS-KEIFER		05 5-00-782	UNIFORMS	1.49
I-1885		DOOR MATS, PAPER TOWELS	26.96			
2/10/2016	AP-US	DUE: 2/10/2016 DISC: 2/10/2016		1099: N		
		DOOR MATS, PAPER TOWELS		01 5-05-795	SUPPLIES	26.96
I-2036		GARBAGE BAGS, DRINKS, HEADPHONE	21.78			
2/19/2016	AP-US	DUE: 2/19/2016 DISC: 2/19/2016		1099: N		
		GARBAGE BAGS, DRINKS, HEADPHONES		05 5-00-793	MEETINGS/WORKSHOPS	0.71
		GARBAGE BAGS, DRINKS, HEADPHONES		02 5-00-793	MEETINGS/WORKSHOPS	0.78
		GARBAGE BAGS, DRINKS, HEADPHONES		03 5-00-793	MEETINGS/WORKSHOPS	1.00
		GARBAGE BAGS, DRINKS, HEADPHONES		01 5-05-793	MEETINGS/WORKSHOPS	0.75
		GARBAGE BAGS, DRINKS, HEADPHONES		01 5-03-793	MEETINGS/WORKSHOPS	0.48
		HEADPHONES FOR NICOLE-STREETS		03 5-00-714	OFFICE SUPPLIES	9.99
		GARBAGE BAGS-RESTROOMS		01 5-05-795	SUPPLIES	8.07

pg 2 of 9

PACKET: 02451 2/25/16 KK
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-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
=====						
01-0716	BI-MART CORPORATION	(** CONTINUED **)				

I-8170		KITTY LITTER-PWHQ OIL SPILLS	25.74			
2/09/2016	AP-US	DUE: 2/09/2016 DISC: 2/09/2016		1099: N		
		KITTY LITTER-PWHQ OIL SPILLS		01 5-03-786	MAINTENANCE CITY SHOP	25.74
		=== VENDOR TOTALS ===	104.47			
=====						
01-0047	C & K MARKET INC.					

I-1636460		PC MEETING	27.49			
2/18/2016	AP-US	DUE: 3/25/2016 DISC: 3/25/2016		1099: N		
		PC MEETING		01 5-07-757	PLANNING COMMISSION	27.49
		=== VENDOR TOTALS ===	27.49			
=====						
01-0014	CENTRAL ELECTRIC COOP					

I-5016080107-0216		CITY STREET LIGHTS	350.18			
2/16/2016	AP-US	DUE: 2/16/2016 DISC: 2/16/2016		1099: N		
		CITY STREET LIGHTS		03 5-00-743	ELECTRICITY	350.18
		=== VENDOR TOTALS ===	350.18			
=====						
01-0024	CURTS ELECTRIC					

I-4257		PWHQ MAINTENANCE	181.12			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		PWHQ MAINTENANCE		01 5-03-788	PWHQ MAINTENANCE	181.12

I-4258		FIR ST PARK LIGHT REPAIRS	163.14			
2/04/2016	AP-US	DUE: 2/04/2016 DISC: 2/04/2016		1099: N		
		FIR ST PARK LIGHT REPAIRS		01 5-05-786	PARK MAINTENANCE	163.14

I-4260		ST1401-HOOD ST IMP	225.00			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		ST1401-HOOD ST IMP		03 5-00-906	CAPITAL OUTLAY	225.00
		=== VENDOR TOTALS ===	569.26			
=====						
01-1001	EDGE ANALYTICAL, INC.					

I-16-01935		SEWER LAB FEES	81.00			
2/10/2016	AP-US	DUE: 2/10/2016 DISC: 2/10/2016		1099: N		
		SEWER LAB FEES		05 5-00-775	LABORATORY FEES	81.00

I-16-03550		WATER SAMPLES	33.00			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		WATER SAMPLES		02 5-00-775	LABORATORY FEES	33.00
		=== VENDOR TOTALS ===	114.00			

pg 3 of 9

PACKET: 02451 2/25/16 KK

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SEQUENCE : ALPHABETIC

DUE TO/FROM ACCOUNTS SUPPRESSED

-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
01-0909	FASTENAL					
I-ORBEN99900		LATEX GLOVES	37.25			
2/11/2016	AP-US	DUE: 2/11/2016 DISC: 2/11/2016		1099: N		
		LATEX GLOVES		01 5-05-795	SUPPLIES	37.25
=== VENDOR TOTALS ===			37.25			

01-0028	FERGUSON ENTERPRISES, INC.					
C-CM090349		RETURN CLAMP-CHAMBER PROJECT	21.17CR			
2/08/2016	AP-US	DUE: 2/08/2016 DISC: 2/08/2016		1099: N		
		RETURN CLAMP-CHAMBER PROJECT		01 5-03-906	CAPITAL OUTLAY	21.17CR
I-0501540-1		MXU'S	3,537.00			
2/01/2016	AP-US	DUE: 2/01/2016 DISC: 2/01/2016		1099: N		
		MXU'S		02 5-00-788	METERS & PARTS	3,537.00
I-0503159		PVC, FITTINGS-CHAMBER PROJECT	450.53			
2/05/2016	AP-US	DUE: 2/05/2016 DISC: 2/05/2016		1099: N		
		PVC, FITTINGS-CHAMBER PROJECT		01 5-03-906	CAPITAL OUTLAY	450.53
I-4030332		3/4 PVC, RING-CHAMBER PROJECT	30.91			
2/08/2016	AP-US	DUE: 2/08/2016 DISC: 2/08/2016		1099: N		
		3/4 PVC, RING-CHAMBER PROJECT		01 5-03-906	CAPITAL OUTLAY	30.91
I-4035779		FITTINGS,PIPE TAPE-CHAMBER PR	234.09			
2/09/2016	AP-US	DUE: 2/09/2016 DISC: 2/09/2016		1099: N		
		FITTINGS,PIPE TAPE-CHAMBER PRO		01 5-03-906	CAPITAL OUTLAY	234.09
=== VENDOR TOTALS ===			4,231.36			

01-1	MISC VENDOR					
I-02172016		FIRESIDE: ELEC PERMIT REFUND	88.48			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		FIRESIDE: ELEC PERMIT REFUND		01 5-07-301	ELECTRICAL INSPECTION	88.48
I-02192016		GRONINGER,ROBERT:ELEC REFUND	87.60			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		ELECTRICAL PERMIT REFUND		01 5-07-301	ELECTRICAL INSPECTION	87.60
=== VENDOR TOTALS ===			176.08			

PACKET: 02451 2/25/16 KK
VENDOR SET: 01 CITY OF SISTERS
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-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
=====						
01-0029	H. D. FOWLER COMPANY					
I-I4134974		JUCTION BOX, COVER	407.78			
2/16/2016	AP-US	DUE: 3/10/2016 DISC: 3/10/2016		1099: N		
		JUCTION BOX, COVER		01 5-03-906	CAPITAL OUTLAY	407.78
		=== VENDOR TOTALS ===	407.78			
=====						
01-0139	HOOKER CREEK COMPANIES, LLC					
I-322289		TROWEL, BROOM	168.45			
2/16/2016	AP-US	DUE: 2/16/2016 DISC: 2/16/2016		1099: N		
		TROWEL, BROOM		05 5-00-746	SMALL TOOLS & EQUIPMENT	32.04
		TROWEL, BROOM		02 5-00-746	SMALL TOOLS & EQUIPMENT	35.40
		TROWEL, BROOM		03 5-00-746	SMALL TOOLS & EQUIPMENT	45.36
		TROWEL, BROOM		01 5-05-746	SMALL TOOLS & EQUIPMENT	33.72
		TROWEL, BROOM		01 5-03-746	SMALL TOOLS & EQUIPMENT	21.93
		=== VENDOR TOTALS ===	168.45			
=====						
01-0883	MELVIN'S FIR STREET MARKET					
I-460844		CC WORKSHOP MTG	26.75			
2/11/2016	AP-US	DUE: 2/11/2016 DISC: 2/11/2016		1099: N		
		CC WORKSHOP MTG		01 5-01-700	MAYOR & COUNCIL	26.75
		=== VENDOR TOTALS ===	26.75			
=====						
01-0079	MIKE'S FENCE CENTER, INC					
I-63265		PWHQ GATE REPAIR	580.00			
2/01/2016	AP-US	DUE: 2/11/2016 DISC: 2/11/2016		1099: N		
		PWHQ GATE REPAIR		05 5-00-787	SEWER SYSTEM REPAIRS	580.00
		=== VENDOR TOTALS ===	580.00			
=====						
01-0851	MOTION & FLOW CONTROL PRODUCTS					
I-6259259		HOSE-MAG TRUCK	24.49			
2/04/2016	AP-US	DUE: 2/04/2016 DISC: 2/04/2016		1099: N		
		HOSE-MAG TRUCK		03 5-00-796	VEHICLE MAINTENANCE	24.49
I-6263923		STREET SWEEPER PARTS	29.95			
2/04/2016	AP-US	DUE: 2/04/2016 DISC: 2/04/2016		1099: N		
		STREET SWEEPER PARTS		03 5-00-796	VEHICLE MAINTENANCE	29.95
		=== VENDOR TOTALS ===	54.44			

pg 5 of 9

PACKET: 02451 2/25/16 KK

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DUE TO/FROM ACCOUNTS SUPPRESSED

-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
01-0515	OFFICEMAX					
I-122970		DESK CALENDAR	9.25			
2/03/2016	AP-US	DUE: 2/03/2016 DISC: 2/03/2016		1099: N		
		DESK CALENDAR		01 5-01-714	OFFICE SUPPLIES	1.39
		DESK CALENDAR		01 5-02-714	OFFICE SUPPLIES	1.48
		DESK CALENDAR		01 5-03-795	SUPPLIES	0.18
		DESK CALENDAR		01 5-05-714	OFFICE SUPPLIES	0.83
		DESK CALENDAR		01 5-07-714	OFFICE SUPPLIES	2.31
		DESK CALENDAR		02 5-00-714	OFFICE SUPPLIES	1.30
		DESK CALENDAR		03 5-00-714	OFFICE SUPPLIES	0.74
		DESK CALENDAR		05 5-00-714	OFFICE SUPPLIES	1.02
I-122970-1		COPY PAPER	51.96			
2/03/2016	AP-US	DUE: 2/03/2016 DISC: 2/03/2016		1099: N		
		COPY PAPER		01 5-01-721	COPIER/PRINTER	16.63
		COPY PAPER		01 5-02-721	COPIER/PRINTER	9.35
		COPY PAPER		01 5-05-721	COPIER/PRINTER	2.60
		COPY PAPER		01 5-07-721	COPIER/PRINTER	16.11
		COPY PAPER		02 5-00-721	COPIER/PRINTER	3.64
		COPY PAPER		05 5-00-721	COPIER/PRINTER	3.63
I-194237		RECEIPT PRINTER PAPER	106.05			
2/10/2016	AP-US	DUE: 2/10/2016 DISC: 2/10/2016		1099: N		
		RECEIPT PRINTER PAPER		01 5-01-714	OFFICE SUPPLIES	15.94
		RECEIPT PRINTER PAPER		01 5-02-714	OFFICE SUPPLIES	16.91
		RECEIPT PRINTER PAPER		01 5-03-795	SUPPLIES	2.12
		RECEIPT PRINTER PAPER		01 5-05-714	OFFICE SUPPLIES	9.57
		RECEIPT PRINTER PAPER		01 5-07-714	OFFICE SUPPLIES	26.49
		RECEIPT PRINTER PAPER		02 5-00-714	OFFICE SUPPLIES	14.85
		RECEIPT PRINTER PAPER		03 5-00-714	OFFICE SUPPLIES	8.48
		RECEIPT PRINTER PAPER		05 5-00-714	OFFICE SUPPLIES	11.69
I-244276		MOUSE-J. O'NEILL	23.01			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		MOUSE-J. O'NEILL		01 5-02-717	OFFICE EQUIPMENT	23.01
		=== VENDOR TOTALS ===	190.27			

01-0144 RESERVE ACCOUNT

I-02162016		RESERVE ACCOUNT POSTAGE	200.00			
2/16/2016	AP-US	DUE: 2/16/2016 DISC: 2/16/2016		1099: N		
		RESERVE ACCOUNT POSTAGE		01 5-01-715	POSTAGE	6.00
		RESERVE ACCOUNT POSTAGE		01 5-02-715	POSTAGE	74.00
		RESERVE ACCOUNT POSTAGE		01 5-07-715	POSTAGE	46.00
		RESERVE ACCOUNT POSTAGE		02 5-00-715	POSTAGE	36.00
		RESERVE ACCOUNT POSTAGE		03 5-00-715	POSTAGE	2.00
		RESERVE ACCOUNT POSTAGE		05 5-00-715	POSTAGE	36.00
		=== VENDOR TOTALS ===	200.00			

pg 4 of 9

PACKET: 02451 2/25/16 KK

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-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
=====						
01-0219	QUILL CORPORATION					
I-3159561		ADDING MACHINE TAPE	17.98			
2/09/2016	AP-US	DUE: 2/09/2016 DISC: 2/09/2016		1099: N		
		ADDING MACHINE TAPE		01 5-01-714	OFFICE SUPPLIES	2.70
		ADDING MACHINE TAPE		01 5-02-714	OFFICE SUPPLIES	2.87
		ADDING MACHINE TAPE		01 5-03-795	SUPPLIES	0.36
		ADDING MACHINE TAPE		01 5-05-714	OFFICE SUPPLIES	1.62
		ADDING MACHINE TAPE		01 5-07-714	OFFICE SUPPLIES	4.49
		ADDING MACHINE TAPE		02 5-00-714	OFFICE SUPPLIES	2.52
		ADDING MACHINE TAPE		03 5-00-714	OFFICE SUPPLIES	1.44
		ADDING MACHINE TAPE		05 5-00-714	OFFICE SUPPLIES	1.98
		=== VENDOR TOTALS ===	17.98			
=====						
01-0527	RANCH COUNTRY OUTHOUSES					
I-21304		PORTABLE TOILET RENTAL-CLEMEN	110.00			
2/01/2016	AP-US	DUE: 2/01/2016 DISC: 2/01/2016		1099: N		
		PORTABLE TOILET RENTAL-CLEMENS		01 5-05-786	PARK MAINTENANCE	110.00
		=== VENDOR TOTALS ===	110.00			
=====						
01-1021	REDHAWK NETWORK SECURITY, LLC					
I-30029		DEPOSIT ON PENETRATION TESTIN	4,778.75			
2/15/2016	AP-US	DUE: 2/15/2016 DISC: 2/15/2016		1099: Y		
		DEPOSIT ON PENETRATION TESTING		01 5-01-726	CONTRACTED SERVICES	477.88
		DEPOSIT ON PENETRATION TESTING		01 5-02-726	CONTRACTED SERVICES	573.45
		DEPOSIT ON PENETRATION TESTING		01 5-03-726	CONTRACTED SERVICES	191.15
		DEPOSIT ON PENETRATION TESTING		01 5-05-726	CONTRACTED SERVICES	621.24
		DEPOSIT ON PENETRATION TESTING		01 5-07-726	CONTRACTED SERVICES	812.39
		DEPOSIT ON PENETRATION TESTING		02 5-00-726	CONTRACTED SERVICES	812.39
		DEPOSIT ON PENETRATION TESTING		03 5-00-726	CONTRACTED SERVICES	716.81
		DEPOSIT ON PENETRATION TESTING		05 5-00-726	CONTRACTED SERVICES	573.44
		=== VENDOR TOTALS ===	4,778.75			
=====						
01-0866	SIGNS OF SISTERS					
I-02102016		RESTROOM HOURS SIGNS	33.00			
2/10/2016	AP-US	DUE: 2/10/2016 DISC: 2/10/2016		1099: Y		
		RESTROOM HOURS SIGNS		01 5-05-795	SUPPLIES	33.00
		=== VENDOR TOTALS ===	33.00			

pg 7 of 9

PACKET: 02451 2/25/16 KK

VENDOR SET: 01 CITY OF SISTERS

SEQUENCE : ALPHABETIC

DUE TO/FROM ACCOUNTS SUPPRESSED

-----ID-----			GROSS	P.O. #			
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----		DISTRIBUTION
=====							
01-0100	SISTERS AREA CHAMBER OF COMMER						
I-1012		ANNUAL CHAMBER AWARD CEREMONY	245.00				
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N			
		ANNUAL CHAMBER AWARD CEREMONY		01 5-01-700	MAYOR & COUNCIL		245.00
=== VENDOR TOTALS ===			245.00				
=====							
01-0083	SISTERS RENTAL						
I-0015278-00		CHAINSAW CHAIN, CHISEL	49.35				
2/01/2016	AP-US	DUE: 2/01/2016 DISC: 2/01/2016		1099: N			
		CHAINSAW CHAIN, CHISEL		05 5-00-746	SMALL TOOLS & EQUIPMENT		9.39
		CHAINSAW CHAIN, CHISEL		02 5-00-746	SMALL TOOLS & EQUIPMENT		10.37
		CHAINSAW CHAIN, CHISEL		03 5-00-746	SMALL TOOLS & EQUIPMENT		13.29
		CHAINSAW CHAIN, CHISEL		01 5-05-746	SMALL TOOLS & EQUIPMENT		9.88
		CHAINSAW CHAIN, CHISEL		01 5-03-746	SMALL TOOLS & EQUIPMENT		6.42
I-0015343-00		SURVEY FEATHERS, HUB-CHAMBER	23.00				
2/10/2016	AP-US	DUE: 2/10/2016 DISC: 2/10/2016		1099: N			
		SURVEY FEATHERS, HUB-CHAMBER		01 5-03-906	CAPITAL OUTLAY		23.00
I-0015367-00		BACKPACK BLOWER MAINT	413.31				
2/10/2016	AP-US	DUE: 2/10/2016 DISC: 2/10/2016		1099: N			
		BACKPACK BLOWER MAINT		05 5-00-746	SMALL TOOLS & EQUIPMENT		78.60
		BACKPACK BLOWER MAINT		02 5-00-746	SMALL TOOLS & EQUIPMENT		86.87
		BACKPACK BLOWER MAINT		03 5-00-746	SMALL TOOLS & EQUIPMENT		111.31
		BACKPACK BLOWER MAINT		01 5-05-746	SMALL TOOLS & EQUIPMENT		82.73
		BACKPACK BLOWER MAINT		01 5-03-746	SMALL TOOLS & EQUIPMENT		53.80
=== VENDOR TOTALS ===			485.66				
=====							
01-0044	TAYLOR TIRE CENTER						
I-76300137873		TIRES-JOHNSON	857.92				
2/05/2016	AP-US	DUE: 2/05/2016 DISC: 2/05/2016		1099: N			
		TIRES-JOHNSON		01 5-03-796	VEHICLE MAINTENANCE		171.57
		TIRES-JOHNSON		01 5-05-796	VEHICLE MAINTENANCE		300.25
		TIRES-JOHNSON		02 5-00-796	VEHICLE MAINTENANCE		128.69
		TIRES-JOHNSON		03 5-00-796	VEHICLE MAINTENANCE		171.57
		TIRES-JOHNSON		05 5-00-796	VEHICLE MAINTENANCE		85.84
I-76300138224		TIRES-BENTZ	746.20				
2/05/2016	AP-US	DUE: 2/05/2016 DISC: 2/05/2016		1099: N			
		TIRES-BENTZ		01 5-03-796	VEHICLE MAINTENANCE		74.43
		TIRES-BENTZ		01 5-05-796	VEHICLE MAINTENANCE		74.43
		TIRES-BENTZ		02 5-00-796	VEHICLE MAINTENANCE		298.35
		TIRES-BENTZ		03 5-00-796	VEHICLE MAINTENANCE		223.92
		TIRES-BENTZ		05 5-00-796	VEHICLE MAINTENANCE		75.07

pg 8 of 9

PACKET: 02451 2/25/16 KK

VENDOR SET: 01 CITY OF SISTERS

SEQUENCE : ALPHABETIC

DUE TO/FROM ACCOUNTS SUPPRESSED

-----ID-----			GROSS	P.O. #		
POST DATE	BANK CODE	-----DESCRIPTION-----	DISCOUNT	G/L ACCOUNT	-----ACCOUNT NAME-----	DISTRIBUTION
01-0044	TAYLOR TIRE CENTER	{ ** CONTINUED ** }				
I-76300138866		TIRES-MCINTOSH	804.24			
2/05/2016	AP-US	DUE: 2/05/2016 DISC: 2/05/2016		1099: N		
		TIRES-MCINTOSH		01 5-03-796	VEHICLE MAINTENANCE	80.41
		TIRES-MCINTOSH		01 5-05-796	VEHICLE MAINTENANCE	80.41
		TIRES-MCINTOSH		02 5-00-796	VEHICLE MAINTENANCE	80.41
		TIRES-MCINTOSH		03 5-00-796	VEHICLE MAINTENANCE	241.23
		TIRES-MCINTOSH		05 5-00-796	VEHICLE MAINTENANCE	321.78
		=== VENDOR TOTALS ===	2,408.36			
01-0563	TREASURE VALLEY COFFEE, INC.					
I-545463		TEA	22.65			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		TEA		01 5-01-714	OFFICE SUPPLIES	3.40
		TEA		01 5-02-714	OFFICE SUPPLIES	3.61
		TEA		01 5-03-795	SUPPLIES	0.45
		TEA		01 5-05-714	OFFICE SUPPLIES	2.04
		TEA		01 5-07-714	OFFICE SUPPLIES	5.66
		TEA		02 5-00-714	OFFICE SUPPLIES	3.17
		TEA		03 5-00-714	OFFICE SUPPLIES	1.81
		TEA		05 5-00-714	OFFICE SUPPLIES	2.51
		=== VENDOR TOTALS ===	22.65			
01-0225	X-PRESS PRINTING					
I-78912		UT START SERVICE FORMS	105.59			
2/18/2016	AP-US	DUE: 2/18/2016 DISC: 2/18/2016		1099: N		
		UT START SERVICE FORMS		02 5-00-714	OFFICE SUPPLIES	52.80
		UT START SERVICE FORMS		05 5-00-714	OFFICE SUPPLIES	52.79
		=== VENDOR TOTALS ===	105.59			
		=== PACKET TOTALS ===	20,580.79			

pg 9 of 9

SISTERS PATROL HOURS

	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	TOTAL PATROL	VACATION	SICK	TRAINING	SRO	TOTAL
JAN	114.5	110	130	129.5	53.5	537.5	55	0	10	162	764.5
FEB											0
MAR											0
APR											0
MAY											0
JUN											0
JUL											0
AUG											0
SEP											0
OCT											0
NOV											0
DEC						0					0
YEAR TO DATE						537.5	55	0	10	162	764.5

SISTERS CASE LOG REPORT

CASE#	DATE	LOCATION	OFFENSE	EXT
2016-00002963	01/04/2016 9:20	N CEDAR ST	Theft: Citizen reported unauthorized purchases on his credit card.	
2016-00003580	01/04/2016 20:18	W SISTERS VIEW AVE	Stalking: Citizen reported a violation of valid stalking order out of Marion County.	
2016-00004274	01/05/2016 15:22	HARRINGTON LOOP	Criminal Mischief: Citizen reported someone spray-painted her car.	1
2016-00006143	01/07/2016 12:56	E MAIN AVE	Code Ordinance Violation*: Business owner and landlord cited for violations of Sisters City Municipal Code.	1
2016-00006190	01/07/2016 13:32	BROOKS SCANLON RD / THREE CREEKS RD	Police Officer Hold*: Adult male taken to hospital on Police Officer Hold.	2
2016-00007753	01/09/2016 8:07	E CASCADE AVE	Warrant Arrest*: Adult male arrested on two outstanding Deschutes County warrants.	
2016-00008259	01/09/2016 20:05	HWY 126	Police Officer Hold*: Adult female taken to hospital on Police Officer Hold.	
2016-00008878	01/10/2016 18:11	E CASCADE AVE	Police Officer Hold* Adult male taken to hospital on Police Officer Hold.	
2016-00009438	01/11/2016 12:34	N VILLAGE MEADOWS RD	Drug Offense: DHS cross report for drug use around children.	1
2016-00012289	01/14/2016 9:02	E DESPERADO TRL	Information Report: Citizen reported his estranged wife was altering his bank accounts.	
2016-00012860	01/14/2016 19:47	HWY 126	Warrant Arrest*: Adult female cited for Parole Violation-DUII.	
2016-00013926	01/15/2016 18:59	E CASCADE AVE	Domestic Violence/Police Officer Hold*: Adult male cited for Domestic Violence-Harassment then transported to the hospital on a Police Officer Hold.	2
2015-00014970	01/16/2016 20:14	LUCKY LADY	Missing Person: Adult male and his young daughter reported missing by friends and family. Male and daughter eventually located. Male was not missing, just does not want contact from family or friends.	7
2016-00015518	01/17/2016 14:00	THREE CREEKS LAKE TR / UPPER 3 CRKS SNOW PARK	Found Property: Citizen turned in a pistol found in a snow park.	
2016-00019475	01/21/2016 13:23	PINE ST / BARCLAY DR	Warrant Arrest*: Adult male arrested on outstanding Deschutes County warrant.	2
2016-00021299	01/23/2016 12:16	N ARROWLEAF TRL	Theft: Adult male confronted with stolen item from business. Male returned item. No charges filed but male was trespassed from the business.	1
2016-00021437	01/23/2016 14:52	E DESPERADO TRL	Lost/Found Property: Citizen turned in found bicycle. Owner located. Bike returned.	

SISTERS CASE LOG REPORT

CASE#	DATE	LOCATION	OFFENSE	EXT
2016-00021994	01/24/2016 10:16	E CASCADE AVE	UEMV (Car Clout)/ Theft: Citizen reported cash taken from his vehicle.	
2016-00022007	01/24/2016 10:45	E CASCADE AVE	UEMV (Car Clout): Citizen reported his vehicle had been entered. Nothing taken.	
2016-00022057	01/24/2016 12:14	N DARK HORSE LN	UEMV (Car Clout)/ Theft: Citizen reported cash taken from his vehicle.	
2016-00022140	01/24/2016 14:55	E CASCADE AVE	UEMV (Car Clout)/ Theft: Citizen reported items taken from his vehicle.	
2016-00022144	01/24/2016 15:00	E CASCADE AVE	UEMV (Car Clout)/Theft: Citizen reported cash and other items taken from his vehicle.	
2016-00022211	01/24/2016 17:02	E CASCADE AVE	UEMV (Car Clout)/Theft: Citizen reported item taken from his vehicle.	
2016-00022272	01/24/2016 19:20	HWY 20/LOCUST	Assault IV/Harassment: Physical fight between several males. Investigation continuing.	2
2016-00022311	01/24/2016 20:24	E CASCADE AVE	DUII*: Adult male arrested for DUII.	
2016-00024119	01/26/2016 17:27	E JEFFERSON AVE	UEMV (Car Clout)/ Citizen reported cash and other items taken from his vehicle.	
2016-00024453	01/27/2016 7:12	N TAMARACK ST	UEMV (Car Clout)/ Citizen reported cash and other items taken from his vehicle. Investigation continuing.	2
2016-00025099	01/27/2016 16:06	S ASH ST / W BLACK CRATER	Abandoned Vehicle: Vehicle tagged and towed as abandoned.	
2016-00025546	01/28/2016 7:16	S FIR ST	Death Investigation-Natural: Adult female died at home.	2
2016-00025877	01/28/2016 12:18	HOLMES RD	Theft: Citizen reported the theft of a chainsaw.	
2016-00025925	01/28/2016 12:54	N ARROWLEAF TRL	Death Investigation-Natural: Elderly female died while being driven over the pass in route to Bend.	2
2016-00025987	01/28/2016 14:02	N LARCH ST	Lost/Found Property: Deputy found two wallet cards underneath his windshield wiper on his patrol vehicle. Property entered into evidence until owner can be located.	
2016-00026809	01/29/2016 10:47	S FIR ST	UEMV (Car Clout)/Theft / Criminal Mischief II/Criminal Trespass II: Citizen reported her vehicle window had been broken and items taken.	

SISTERS CASE LOG REPORT

CASE#	DATE	LOCATION	OFFENSE	EXT
2016-00028598	01/31/2016 3:57	N LARCH ST	Theft II* Citizen reported the theft of her purse. Suspect identified and arrested. Purse recovered with partial recovery of purse contents.	
* DENOTES CASE INCLUDED LAW ENFORCEMENT ACTION				
ADDITIONAL PERSONNEL NEEDED FROM OTHER DISTRICTS:				25

AGENDA ITEM



SUMMARY

CITY OF SISTERS SISTERS CITY COUNCIL

Meeting Date: February 25, 2016

Staff: Bertagna/Huffman

Type: Regular Meeting

Dept: Public Works

Subject: 2016 Wastewater Capital Facilities Plan Update

Action Requested/Motion: Conduct a Public Hearing and consider approval of Resolution 2016-03; A RESOLUTION ADOPTING THE WASTEWATER SYSTEM CAPITAL FACILITIES PLAN DATED FEBRUARY 2016.

Background: The City wastewater system was constructed during the period of 2000 to 2002. Construction included a complete gravity collection system, pumpstations, treatment plant and effluent disposal system on the existing 160 acre treatment plant site. Since the initial construction and over time the system has been expanded through development.

The primary objective of the Wastewater Master Plan update is to provide the City with an updated comprehensive wastewater utility planning document through the year 2035, and to identify improvements needed for system growth and to meet regulatory requirements. The update is intended to modify outdated sections of the 2006 plan and to utilize remaining sections for supporting data. Staff has worked with the City Engineer to evaluate the current treatment plant and effluent disposal capacities in order to determine the approximate timelines for implementing the recommended improvements. The recommended improvements are planned to accommodate collection, treatment and effluent disposal needs through 2035.

The most critical concerns for the system include effluent disposal, Pumpstation #1 pumps, 10" and 18" gravity mains, bio-solids and aeration capacity. The highest priority at this time is the development of additional effluent irrigation on the Lazy Z. The Lazy Z provides multiple possibilities for effluent reuse expansion including both forest and crop irrigation. The 2013 re-use and conservation study included, as an appendix in the update details, the various crop options, associated costs and funding options.

Staff presented the draft update to Council at the February 11, 2016 workshop and Council provided comments and edits during the workshop. Councilor Asson also provided a list of questions and concerns at the workshop which staff has reviewed and responded to as an attachment to this AIS.

Financial Impact:

<u>Project Description</u>	<u>Project Cost</u>
Lazy Z Forest Irrigation Effluent Expansion	\$580,000
Treatment Plant Software and Security Upgrades	\$80,000

Locust Street Interceptor	\$509,000
Aeration Improvements at Treatment Plant	\$224,000
Biosolids Removal at Treatment Plant	\$291,000
Pump Station #1 New Pumps	\$117,000
Crop Irrigation Effluent Expansion	\$787,000
<u>West Side Pump Station and Force Main</u>	<u>\$1,508,000</u>
Total:	\$4,096,000

*Project cost includes 10% for Engineering and 10% for Contingency

**Total cost to date for the Master Plan update is approximately \$5,500 in Engineering contracted services

Attachment(s):

- 1) Resolution No. 2016-03
- 2) 2016 Wastewater Capital Facilities Plan DRAFT was distributed to Council in December 2015, a revised formal version is attached
- 3) Councilor Q & C Responses

Concurrence:  CM  F&A PTD CDD  PW

RESOLUTION NO. 2016-03

**A RESOLUTION OF THE SISTERS CITY COUNCIL ADOPTING A
WASTEWATER SYSTEM CAPITAL FACILITIES PLAN, DATED
FEBRUARY 2016**

WHEREAS, the City of Sisters maintains a municipal wastewater system and provides wastewater collection and treatment services to the residents and businesses within the city limits of the City of Sisters; and

WHEREAS, the capital needs of the City's wastewater system are identified in a capital facilities plan adopted by the City Council and updated from time to time; and

WHEREAS, the City's Wastewater System Capital Facilities Plan was last updated in 2006; and

WHEREAS, the City, working with BECON Engineering, has prepared an updated Wastewater System Capital Facilities Plan, dated February 2016, to address the City's needs for future expansion and maintenance of the municipal wastewater system; and

WHEREAS, no person or organization has requested written notice pursuant to ORS 223.304(6); and

WHEREAS, a public hearing was held on February 25, 2016 regarding the adoption of this update to the Wastewater System Capital Facilities Plan, and the City Council has considered the information from staff and any testimony of the public;

NOW, THEREFORE BE IT RESOLVED that:

The Wastewater System Capital Facilities Plan, dated February 2016 and attached as Exhibit 1 to this Resolution, is hereby adopted.

Signed by the Mayor and adopted by the Common Council of the City on this 25th day of February 2016.

Chris Frye, Mayor

ATTEST:

Kathy Nelson, City Recorder

WASTEWATER SYSTEM
CAPITAL FACILITIES
PLAN UPDATE

CITY OF SISTERS
DESCHUTES COUNTY
OREGON

FEBRUARY 2016

TABLE OF CONTENTS

EXECUTIVE SUMMARY

S.1	Purpose	Summary - 1
S.2	Population and Growth.....	1
S.3	Existing Wastewater System	1
S.4	Wastewater Flows	1
	<i>Actual and Projected Wastewater Flows</i>	2
S.5	Collection System Improvements.....	2
S.6	Wastewater Treatment Facility Recommendations.....	3
S.7	Wastewater Reuse System Improvements.....	3

SECTION 1: INTRODUCTION

1.1	General	1-1
1.2	Background.....	1-1
	<i>Figure 1.1 - Vicinity Plan</i>	1-2
1.3	Previous Planning Documents.....	1-3
1.4	Current Situation	1-3
1.5	Authorization.....	1-3
1.6	Organization	1-4
1.7	Planning Area	1-4
1.8	Planning Scope	1-4
	<i>Figure 1.2 - Zoning Map</i>	1-6

SECTION 2: METHODOLOGY FOR WASTEWATER SYSTEM EVALUATION

2.1	General	2-1
2.2	Design Period	2-1
2.3	System Capacity and Layout	2-1
2.4	Regulatory Requirements	2-1
2.5	Priorities	2-1
2.6	Basis for Opinions of Probable Cost	2-2
	2.6.1 General	2-2
	2.6.2 Construction Cost.....	2-2
	<i>Table 2.1 Engineering News Record Construction Cost Index</i> <i>with Calculated Annual Percent Increases</i>	2-3
	2.6.3 Contingencies	2-3
	2.6.4 Engineering, Legal and Administrative.....	2-4
	2.6.5 Opinion of Probable Cost Summary.....	2-4
2.7	Recommended Improvements	2-4

SECTION 3: EXISTING WASTEWATER SYSTEM

3.1	General	3-1
3.2	Wastewater Collection System.....	3-1
	3.2.1 Gravity Mains and Manholes	3-1
	<i>Figure 3.1 - Existing Wastewater System</i>	3-2
	3.2.2 Collection System Quality.....	3-3
	3.2.3 Pressure Mains	3-3
3.3	Wastewater Pump Stations	3-4
3.4	Wastewater Treatment Facility.....	3-6
	<i>Figure 3.2 - T.P. Schematic</i>	3-7

	<i>Table 3.1 - Sisters Wastewater Treatment Facility Design Data</i>	3-8
3.4.1	Theory of Treatment Process.....	3-9
3.4.2	Influent Flow Measurement and Sampling	3-10
3.4.3	Headworks.....	3-10
3.4.4	Aerated Lagoons.....	3-11
	3.4.4.1 Aerators	3-11
	3.4.4.2 Transfer Structures	3-12
	3.4.4.3 Disinfection Facilities.....	3-12
	3.4.4.4 Effluent Flow Measurement and Sampling.....	3-13
	3.4.4.5 Treatment and Pumping Facility Control Building.....	3-13
	3.4.4.6 General Plant Conditions.....	3-13
3.5	Wastewater Effluent Reuse	3-14
	3.5.1 General	3-14
	3.5.2 Effluent Reuse System	3-14

SECTION 4: POPULATION AND LAND USE

4.1	Historical Population.....	4-1
4.2	Current Population.....	4-1
4.3	Projected Future Population in Year 2025	4-1
4.4	Comparison with Previous Growth Projections	4-1
4.5	Capital Facilities Plan Population Forecasts	4-1
4.6	Buildout Of Current UGB	4-1
4.7	Land Use.....	4-2
	4.7.1 Current Land Use	4-2
	4.7.2 Comprehensive Plans and Zoning Ordinance Revisions (2014)	4-2
	4.7.3 General Comments	4-2

SECTION 5: WASTEWATER CHARACTERISTICS

5.1	Introduction	5-1
	5.1.1 Definitions	5-1
	5.1.2 Parameters of Interest	5-3
	5.1.3 Methodology for Computing Flows	5-3
5.2	Accuracy of Data.....	5-4
	5.2.1 Influent Flowmeter and Sampler	5-4
	5.2.2 Bypass and Overflows	5-4
	5.2.3 Inflow and Infiltration (I/I).....	5-4
	5.2.4 Effects of Population Growth	5-4
5.3	Flow Analysis.....	5-5
	5.3.1 Observed Data	5-5
	<i>Table 5.1 – Wastewater Influent Flow Data</i>	5-5
	<i>Table 5.2 – Daily Wastewater Data Summary</i>	5-6
	<i>Table 5.3 – Summary of wastewater Flow Characteristics</i>	5-6
	5.3.2 Design Flows	5-7
	<i>Table 5.4 – Design Flow Summary</i>	5-7
5.4	Wastewater Quality	5-8
	5.4.1 Current Influent Loadings	5-8
	<i>Table 5.5 – Influent BOD's Data</i>	5-8
	<i>Table 5.6 – Influent TSS Data</i>	5-9
	<i>Table 5.7 – Influent TSS Data</i>	5-10
	<i>Table 5.8 – Influent TSS Data</i>	5-10

SECTION 6: COLLECTION SYSTEM IMPROVEMENTS

6.1	General	6-1
6.2	Design Parameters	6-1
	<i>Table 6.1 - EDU Designation</i>	6-1
6.3	System Assessment	6-2
	<i>Table 6.2 - System Flow Capacities</i>	6-2

SECTION 7: WASTEWATER TREATMENT ANALYSIS

7.1	WPCF Permit.....	7-1
	<i>Table 7.1 – WPCF (Permit 101779) Minimum Monitoring Requirements</i>	7-1
7.2	Effluent Quality	7-2
	<i>Table 7.2 – Effluent TSS Data</i>	7-2
	<i>Table 7.3 – Effluent E. Coli and Chlorine Data</i>	7-3
7.3	Treatment Capacity	7-4
	7.3.1 Hydraulic Capacity	7-4
	<i>Table 7.4 – Holding Pond Surface Areas and Volume</i>	7-4
	<i>Table 7.5 – Water Balance (October 2014-September 2015)</i>	7-5
	<i>Table 7.6 – Synthetic Water Balance and Estimate of Holding Pond Hydraulic Capacity</i>	7-6
	<i>Table 7.7 – Holding Pond Hydraulic Capabilities</i>	7-6
	7.3.2 BODs Capacity Evaluation.....	7-6
	<i>Table 7.8 – BODs Loadings and Capacity Utilization</i>	7-7
7.4	Recommendations	7-7

SECTION 8: WASTEWATER DISPOSAL

8.1	Introduction	8-1
	8.1.1 Current Status	8-1
	8.1.2 Disposal Alternatives - Preliminary Considerations.....	8-1
8.2	Regulatory Requirements	8-2
	8.2.1 General Regulatory Requirements.....	8-2
	8.2.2 WPCF Permit Requirements	8-2
8.3	Current Disposal Practices	8-4
	8.3.1 Effluent Water Quantity and Quality.....	8-4
	8.3.2 Irrigation Site.....	8-4
	8.3.3 Irrigation System	8-5
	8.3.4 Crops	8-5
	8.3.5 Effluent Application.....	8-5
	<i>Table 8.1 - Effluent Irrigation Application Totals (2005)</i>	8-5
	8.3.6 Access, Setbacks, and Aerosol Drift	8-5
	<i>Table 8.2 - Irrigation Season Wind Data - Summary (Redmond Airport)</i>	8-6
8.4	Compliance Evaluation	8-7
8.5	Future Irrigation Needs.....	8-7
	8.5.1 Water Quantity and Quality.....	8-7
	8.5.2 Irrigation Acreage Needed	8-7
	8.5.3 Expansion Sites	8-7
	8.5.4 Disinfection System.....	8-8
	8.5.5 Irrigation System	8-8
	<i>Figure 8.1 - Effluent Reuse Areas</i>	8-9
8.6	Recommendations.....	8-10

EXECUTIVE SUMMARY

S.1 PURPOSE

The purpose of this Wastewater Capital Facilities Plan Update is to provide the City of Sisters with a comprehensive wastewater utility planning document through the year 2035, and to identify improvements needed to satisfy wastewater demand of a growing community, including anticipated future regulatory requirements. The Update is intended to modify the Executive Summary and Section 8 of the 2006 Wastewater Capital Facilities Plan, and to utilize remaining sections for supporting data. Recommended improvements are based on the most cost effective alternatives, and provide planning for collection, treatment and effluent disposal needs through year 2035.

S.2 POPULATION AND GROWTH

Current population was certified at 2,280 residents on July 1, 2015. Year 2035 population of 4,375 residents was projected and based on projected growth rates from analysis provided by Portland State. This reflects an average annual growth rate of 3.23% per year for the planning period. *It should be noted that Sisters has experienced periods of rapid growth in the recent past, therefore, it is recommended that a population forecast update be prepared at a minimum of every 5 years, and, if necessary, corresponding revisions to the capital facilities plan. Regular population forecast updates will ensure that the capital facilities plan remains closely aligned with current population and current demand on City infrastructure.*

S.3 EXISTING WASTEWATER SYSTEM

The City wastewater system is relatively new, with construction occurring during the period of 2000 to 2002. Gravity collection system piping varies from 6" to 24" diameter PVC wastewater mains, with four (4) wastewater pump stations. The entire system flows to Pump Station No. 1, which transmits all flow under pressure to the Wastewater Treatment Plant. The wastewater treatment plant is a 3-cell aerated lagoon system with winter holding, discharging to a dike and forest irrigation reuse system. Each of the two aerated treatment cells are 2.41 acres, providing for a capacity of 19.5 Ac. Ft. An 18-acre aerated winter holding lagoon is provided for storage, containing 213 Ac. Ft. of storage. Land reuse of the stored water is provided on 88.5 acres of natural forest and 11.8 acres of dike and lawn areas, and application is applied at agronomic rates.

S.4 WASTEWATER FLOWS

Treatment Plant and Reuse System Design Flows:

Summer average daily flows	395,604 gallons per day (gpd)
Winter average daily flows	291,042 gpd
Average net reuse application	16 inches per year average on site
Permitted reuse volume	178.3 Ac. Ft.

Actual and Projected Wastewater Flows

	Average Daily Flow (gpd) (2015)	Maximum Monthly Flows (gpd) (2015)	Maximum Weekly Flows (gpd) (2015)	Peak Daily Flow (gpd) (2015)	Average Reuse (in./yr applied to land)	Reuse Volume (Ac. ft.) (2015)
Summer Wastewater Flows	203,864	220,900	230,100	248,000	17.74 *	148.78
Winter Wastewater Flows	183,967	189,800	207,900	256,000		
2035 Projected Summer Wastewater Flows	391,186	422,000	442,000	472,000	16.00	282.00
2035 Projected Winter Wastewater Flows	353,007	364,000	399,000	487,000		

* (includes forest and dike irrigation)

Year 2035 flow projections were based on current flows multiplied by the ratio of the projected 2035 population to the current population of 2,280 residents. This approach includes infiltration/inflow in current flows, and it is assumed that future I/I will be proportional to the existing, which is minimal.

Year 2035 flows can receive adequate treatment within the existing wastewater treatment facility design capacity. The most critical concern is the effluent reuse system and the lack of land area for effluent irrigation. The City’s acquisition of a portion of the Lazy Z has adequate land for discharge of effluent waters, but it must be developed soon. Sufficient land is not available at this time for projected flows of water stored during winter months, with requirements for the effluent to be applied at agronomic rates.

S.5 COLLECTION SYSTEM IMPROVEMENTS

Collection system improvements in Sisters were analyzed to satisfy long-term growth projections for current zoning in the City. Our analysis utilized zoning classifications to project population and flows from each area being considered, to the limits of the current Urban Growth Boundary. Design review found that each element of the existing collection system has sufficient capacity to handle projected flows for 2035, but capacity of Pump Station No. 1 and the main gravity 18" main will be marginal with anticipated flows. To develop capacity in these portions of the collection system, it is recommended that a new Pump Station No. 5 and Pressure Main No. 5 be provided to assume the system

capacity needs West of Highway 20 in this rapidly expanding portion of the City. This work will need to be developed prior to 2035, and sooner if the USFS land is developed into residential, commercial, or industrial usages. The pumps in Pump Station No. 1 are used extensively, and the effective lifetime of these units will be reached in the planning period. We also recommend that provisions be made to replace these pumps prior to 2035.

S.6 WASTEWATER TREATMENT FACILITY RECOMMENDATIONS

Wastewater treatment facility improvements will be required to satisfy increasing population demand. Based on population projections, expansion of wastewater treatment capabilities and effluent reuse facilities will be required. Treatment facility needs are limited to software and security upgrades, and the irrigation reuse system needs to be expanded into the 49 acre forested parcel of the City's portion of the Lazy Z Ranch. Existing and recommended land area to provide reuse capacity for wastewater disposal in Sisters is adequate to allow for reuse of effluent waters through the Year 2035.

SCADA (Supervisory Control And Data Acquisition) and security upgrades for the existing treatment facility are recommended when each of the Lazy Z irrigation improvements occur.

Wastewater treatment facility improvements will involve biosolids removal and disposal, and removal and replacement of the existing lagoon aerators with larger, new energy efficient units.

S.7 WASTEWATER REUSE SYSTEM IMPROVEMENTS

Wastewater reuse system improvements will be required in the near future to satisfy increasing resident demand. Population growth will require additional reuse capabilities, which will involve expansion into the 49-acre forested parcel of the City's ownership on the Lazy Z Ranch.

Additional reuse improvements should include developing additional agricultural portions of the City's Lazy Z property for reuse purposes when necessary.

8.6.1	Crops	8-5
8.6.2	Effluent Application.....	8-5
	<i>Table 8.1 - Effluent Irrigation Application Totals (2005)</i>	8-5
8.6.3	Access, Setbacks, and Aerosol Drift	8-5
	<i>Table 8.2 - Irrigation Season Wind Data - Summary</i> <i>(Redmond Airport)</i>	8-6
8.7	Compliance Evaluation	8-7
8.8	Future Irrigation Needs.....	8-7
8.8.1	Water Quantity and Quality.....	8-7
8.8.2	Irrigation Acreage Needed	8-7
8.8.3	Expansion Sites	8-7
8.8.4	Disinfection System.....	8-8
8.8.5	Irrigation System	8-8
	<i>Figure 8.1 - Effluent Reuse Areas</i>	8-9
8.9	Recommendations.....	8-10

SECTION 9: BIOSOLIDS MANAGEMENT

9.1	Introduction	9-1
9.2	General Regulatory Requirements.....	9-1
9.3	WPCF Permit Requirements	9-2
9.4	Current Biosolids Treatment and Disposal.....	9-3
9.5	Accumulated Biosolids.....	9-3
9.5.1	Quantity	9-3
9.5.2	Quality	9-4
9.6	Compliance Evaluation	9-4
9.7	Recommendations	9-4

SECTION 10: IMPROVEMENT RECOMMENDATIONS

10.1	Effluent Reuse Disposal Improvements.....	10-1
10.2	Treatment Plant Improvements.....	10-2
10.3	Collection System Improvements	10-3
10.4	Proposed Sewer System Infrastructure Improvements Timing and Cost Summary.....	10-4

SECTION 11: FINANCE OPTIONS

11.1	Introduction.....	11-1
11.2	Public Works Financing Programs	11-1
11.2.1	US Department of Agriculture (USDA) Rural Development.....	11-2
11.2.2	Department of Environmental Quality.....	11-2
11.2.3	Infrastructure Finance Authority (IFA)	11-3
11.2.4	League of Oregon Cities (LOC)	11-3
11.2.5	Municipal Bond Financing	11-3
11.3	Local Funding Sources	11-3
11.3.1	General Obligation Bonds	11-4
11.3.2	Revenue Bonds	11-5
11.3.3	Improvement Bonds (Local Improvement District).....	11-6
11.3.4	Serial Levies	11-7
11.3.5	Sinking Funds	11-7
11.3.6	Ad Valorem Tax	11-7

11.3.7	System User Fees.....	11-8
11.3.8	Assessments.....	11-8
11.3.9	System Development Charges.....	11-8
11.4	Proposed Financial Program.....	11-8

SECTION 12: WASTEWATER RATES AND FINANCING

12.1	Wastewater Fund Budget.....	12-1
	<i>Table 12.1</i>	12-1
12.2	Wastewater System Revenue.....	12-1
	12.2.1 Current Wastewater Rates.....	12-1
	12.2.2 Current Rate Revenue.....	12-2
	12.2.3 Property Tax	12-2
	12.2.4 Other Revenue	12-2
12.3	Wastewater System Expenses.....	12-2
	12.3.1 Debt Service.....	12-2
	12.3.2 Operations and Maintenance (O &M)	12-2
12.4	Current Rates – Analysis and Recommendations.....	12-2
12.5	Future Rates	12-3
12.6	Capital Improvements Plan.....	12-3
	12.6.1 Capital Improvements.....	12-3
	12.6.2 Financing	12-4
12.7	System Development Charges (SDC's).....	12-4

- A. City of Sisters Wastewater Reuse and Conservation Plan
- B. Discharge Monitoring Reports
- C. Water Pollution Control Facility (WPCF) Permit

SECTION 1

INTRODUCTION

1.1 GENERAL

Sisters is located in Deschutes County, 21 miles northwest of Bend and 20 miles west of Redmond (*Figure 1.1*). The major transportation routes between the mid-Willamette Valley and central and eastern Oregon pass through Sisters. The City is a focal point for travelers, tourists, and part-time residents. Sisters was established along the Santiam and McKenzie Highways around 1880, and became an incorporated City in 1946.

Resident population was estimated on July 1, 2015 as approximately 2,280 people, with a significant influx of retirees, tourists, travelers, part time residents and associated commercial development. Sisters has been rapidly growing since completion of a new wastewater system in 2002, which allowed for a number of residential developments to occur.

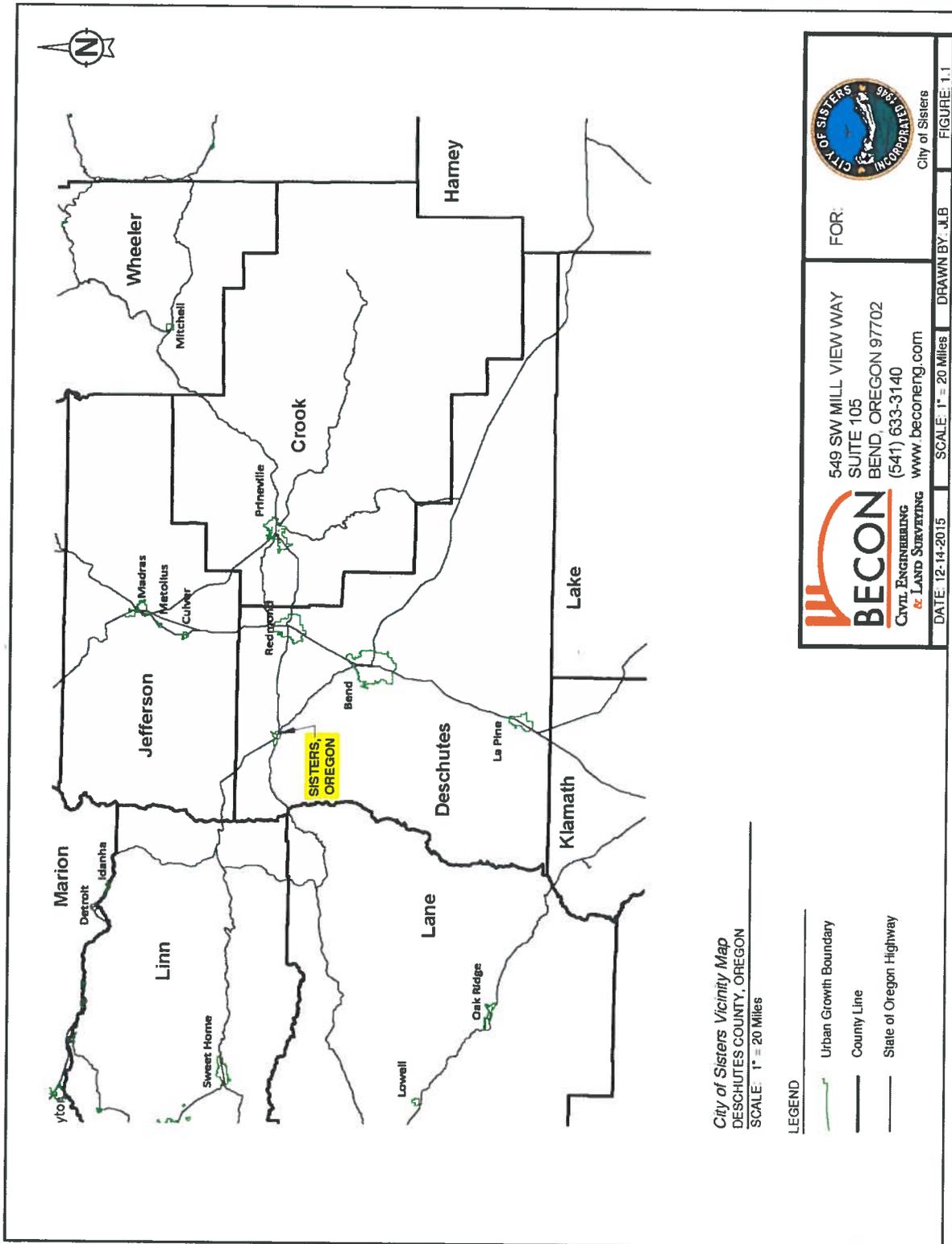
1.2 BACKGROUND

The City of Sisters owns and operates a municipal wastewater collection and treatment system. The system is relatively new, with construction extending from 2000-2002. Sisters had contemplated construction of a municipal sewer system since 1972, and residents approved bonds for \$7,000,000 in construction funds on May 19, 1998. Construction grants and loans for construction were received from Rural Development, OECD, EDA, Oregon Community Development Block Grants, the Rural Investment Fund, and from the Oregon Department of Environmental Quality to allow the project to proceed. Planning projections from the City of Sisters and from Deschutes County projected a resident population of 1,575 people by the year 2020, and this projection was exceeded in 2004. Oregon State funding sources were not willing to assist with major financial contributions for construction of the wastewater system, because they believed that planning projections were overly optimistic, and would not occur.

The entire City wastewater collection system was constructed of quality ASTM 3034 PVC pipe materials, with rubber ring joint connections. Construction included new service lines to connect every residence and business to the sewer system, and all lines were pressure tested. In addition, all manholes were vacuum tested, and all main lines were televised to make certain that a quality installation was achieved. Since the initial construction, similar materials have been utilized for all extensions, and all main and service line connections have been installed to City of Sisters and Oregon Plumbing Specialty Code Standards. Emphasis has been placed on maintaining a quality wastewater system. Continued community growth will demand substantial improvements in sizing, with construction of a new major pump station no. 5 and force main no. 5 to contain expansion.

An aerated lagoon wastewater treatment plant was constructed with two 2.41 acre cells, each holding 19.5 Ac. Ft. The treatment facility was followed with an 18-acre winter holding lagoon containing 213 Ac. Ft. of storage for wastewater. Land reuse of the stored

water is provided on 125 acres of natural forest, where application is applied at agronomic rates.



The City of Sisters purchased a 230 acre parcel of the Lazy Z Ranch following development of the November 2006 Wastewater Capital Facilities Plan, and this can readily be utilized for effluent reuse. Initial plans are to utilize a 49 acre forested section of the parcel for continuance of irrigation on natural forest, again at agronomic rates. As the community grows, adequate land is available on the Lazy Z parcel to provide reuse for the long term future needs of the City. Reuse on the remaining portions of the parcel will concentrate on agricultural production, with crops that are self-sustaining and consume reuse waters at agronomic rates.

1.3 PREVIOUS PLANNING DOCUMENTS

Master Planning for public wastewater improvements in Sisters has occurred on a regular basis in Sisters since 1972, including the following:

1. Comprehensive Development Plan for Sewerage Improvements, @ May 1972, HGE Inc., Engineers & Planners
2. Comprehensive Wastewater Facilities Plan, 1977, HGE Inc., Engineers & Planners
3. Sewer System Local Improvement District, 1979, HGE Inc., Engineers & Planners
4. Phase 1 Engineering and Sewer Technical Assistance Study, 1987-1990, Century West Engineers.
5. Wastewater System Engineering Study, 1994, HGE Inc., Architects, Engineers, Surveyors & Planners.
6. Wastewater System Facilities Plan, 1997, HGE Inc., Architects, Engineers, Surveyors & Planners
7. Wastewater System Capital Facilities Plan, 2006, HGE Inc., Architects, Engineers, Surveyors & Planners.
8. Wastewater Reuse and Conservation Project Planning Study, 2013, Newton Consultants, Inc.

1.4 CURRENT SITUATION

The City of Sisters has and continues to experience rapid growth and an update to the 2006 Wastewater Capital Facilities Plan is needed to evaluate and provide capacity for anticipated growth to year 2035. Land for treatment and disposal needs is owned at this time by the City of Sisters, and expansion plans will be addressed in this Capital Facilities Plan Update.

1.5 AUTHORIZATION

The City of Sisters has prepared this Wastewater System Capital Facilities Plan Update for current zoning of property within the Sisters Urban Growth Boundary (UGB).

1.6 ORGANIZATION

The overall structure of this Wastewater System Capital Facilities Plan Update follows the flow of wastewater from consumers to treatment and ultimate disposal of the effluent. Much of the 2006 Plan remains valid, and needed modifications to consider changed conditions are addressed in this Update. Separate chapters have been written to evaluate each of the following system components: wastewater collection and pumping improvements, wastewater treatment and winter holding facilities, and effluent land reuse meeting WPCF and Oregon Department of Environmental Quality Standards. Tables and figures in this update are numbered consecutively within each chapter, and they generally appear in the text of the report on the page or pages following the first reference.

1.7 PLANNING AREA

The planning area used in this Wastewater System Capital Facilities Plan Update is the area encompassed by the current Sisters UGB. See Figure 1.2

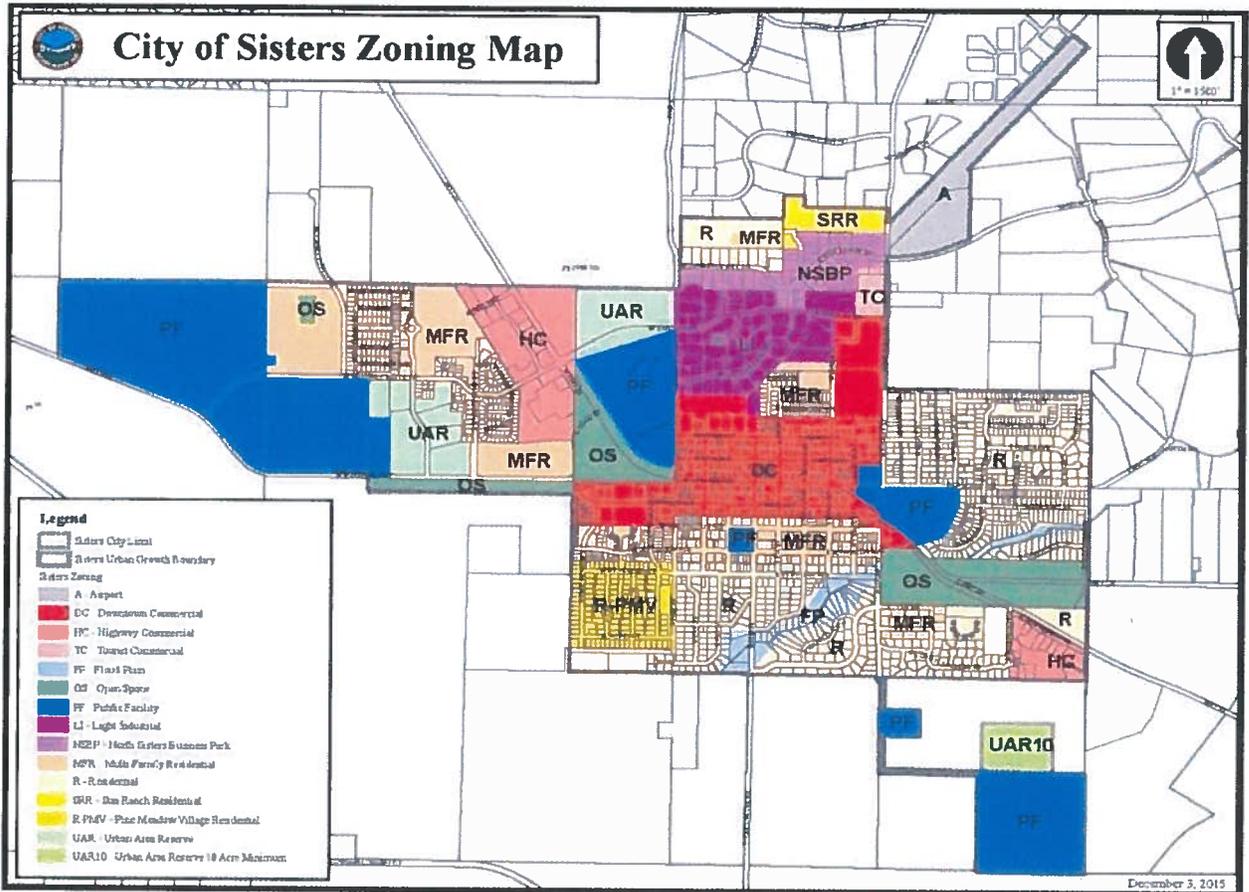
1.8 PLANNING SCOPE

The objective of this updated plan is to establish a short-term and long-term wastewater system capital facilities plan for the present and future needs of the City of Sisters. Overall, the scope of work is meant to enumerate an exacting plan for growth and satisfy requirements for potential funding sources. Needs will be addressed relative to wastewater collection, pumping, treatment and land reuse. An outline of basic considerations of the facilities plan update is as follows:

1. Describe the existing wastewater facilities and the area to be served. Include land use, current and estimated future population, and environmental concerns.
2. Utilize existing wastewater system requirements from the 2006 plan, based on estimated water consumption, and land use plans. Develop projected wastewater capacity needs to the year 2035.
3. Description of the existing collection, pumping, treatment, and land reuse systems, and their ability to meet existing and future wastewater system demand. Long-range system needs will also be developed by the application of growth projections into the collection system model, and with a detailed layout of future system needs within the UGB.
4. Provide a base map showing the wastewater collection system, with pumping stations. Separate mapping shall be provided showing the wastewater treatment and land reuse systems.
5. Opinions of probable costs for various alternatives will be prepared and recommendations will be separated into priorities for development.

6. Preparation of a complete report of the updated work. Information will be presented to show designs with supporting data, preliminary drawings or sketches, and opinions of probable costs.

Figure 1.2



SECTION 2

METHODOLOGY USED FOR WASTEWATER SYSTEM EVALUATION

2.1 GENERAL

This section of the study covers the procedure used to establish the design parameters for the upgraded wastewater system, priorities for implementation, and the method used to develop opinions of probable cost.

2.2 DESIGN PERIOD

This update is based on a 20-year planning period with future projections to the year 2035. It is felt that this time frame is adequate to allow for adaptation to future needs, while being short enough to ensure that the facilities will be effectively utilized within their economic life. System recommendations are developed for construction in phases (priorities) and all components are designed to allow future expansion. Alternate recommendations are made to future improvements which are dependent on growth patterns and other variables which cannot be accurately predicted at this time.

2.3 SYSTEM CAPACITY AND LAYOUT

Capacity requirements and consequent system sizing are based on evaluations of population, and land use. Potential wastewater system volume is estimated based on actual flows received at the wastewater treatment facility, and on experience with facilities in other communities. System collection system layout includes an allowance for future growth to the limits of the established UGB.

2.4 REGULATORY REQUIREMENTS

Wastewater treatment in the state of Oregon must meet the requirements of the Oregon Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA).

2.5 PRIORITIES

Major wastewater system construction requires considerable financial resources. In developing a wastewater system capital facilities plan, it is necessary to consider the relative importance of the proposed improvements and to assign priorities to the development program accordingly. An advantage of the phased approach, especially in regard to collection, treatment and land reuse system expansion, is the allowance of time in which actual system usage and growth can be evaluated in order to refine the sizing of subsequent improvements.

By prioritizing the proposed improvements, construction costs can be extended over a longer period of time in an effort to remain within the financial capabilities of the community. This will allow the City to take maximum advantage of potential Federal and State grants and loans that are available to assist small communities with major wastewater system improvements. Initial improvements should be based on the most immediate

critical needs and should provide the greatest benefit at the lowest cost. Later improvements should follow the short and long-range guidelines and meet future demands as the community develops and can finance the improvements.

2.6 BASIS FOR OPINIONS OF PROBABLE COST

2.6.1 General

Opinions of probable cost presented in this study include three components, each of which is discussed separately in this section. It must be recognized that opinions of probable cost are preliminary and are based on the level and detail of planning presented in this study. As any project element proceeds forward, it may be necessary to update the costs from time to time, as more information becomes available.

2.6.2 Construction Cost

Opinions of probable construction costs in this capital facilities plan are based on actual construction bidding results for similar work, published cost guides, and other construction cost experience of the authors within the state of Oregon. Opinions of probable cost are based on preliminary layouts of the proposed improvements.

Future changes in the cost of labor, equipment, and materials, may justify comparable changes in the opinions of probable cost presented herein. For this reason, it is common engineering practice to relate the costs to a particular index that varies in proportion to long-term changes in the national economy. The Engineering News Record (ENR) Construction Cost Index is most commonly used. It is based on a value of 100 for the year 1913, and the values since 1982 are shown in *Table 2.1* along with calculated annual percent increases.

All costs in this study are based on the August 2015 ENR Construction Cost Index value of 10,055. Opinions of probable costs should be updated at the actual time of funding applications and a decision made as to whether loan funds will be required. Note that when the community secures financing, a reserve factor should be added at that time for estimated increases in cost due to inflation. Estimates can be prepared at any future date by comparing the future ENR Construction Cost Index with the index value of 10,055; however, this approach is generally only considered valid for a 2 or 3 year period since construction techniques and materials change with time. If more time than this has elapsed, opinions of probable cost should be updated by an Engineer.

*Table 2.1: Engineering News Record Construction Cost Index
With Calculated Annual Percent Increases*

<i>YEAR</i>	<i>20-CITY ENR (August)</i>	<i>% CHANGE</i>	<i>YEAR</i>	<i>20-CITY ENR (August)</i>	<i>% CHANGE</i>
1982	3,899		1999	6,091	2.7
1983	4,066	4.3	2000	6,233	2.3
1984	4,146	2.0	2001	6,389	2.5
1985	4,195	1.2	2002	6,592	3.2
1986	4,295	2.4	2003	6,733	2.1
1987	4,401	2.5	2004	7,188	6.8
1988	4,541	3.2	2005	7,479	4.0
1989	4,607	1.5	2006	7,722	3.2
1990	4,752	3.1	2007	8,007	3.7
1991	4,892	2.4	2008	8,362	4.4
1992	5,032	2.9	2009	8,564	2.4
1993	5,230	3.9	2010	8,837	3.2
1994	5,424	3.7	2011	9,088	2.8
1995	5,506	1.5	2012	9,351	2.9
1996	5,652	2.7	2013	9,524	1.9
1997	5,854	3.6	2014	9,840	3.3
1998	5,929	1.3	2015	10,055	2.2
Average Annual Increase (%)					2.9

2.6.3 Contingencies

In recognizing that the opinions of probable cost are based on preliminary design, allowances must be made for variations in final quantities, bidding market conditions, adverse construction conditions, unanticipated specialized investigation and studies, and other difficulties that cannot be foreseen at this time, but which may tend to increase final costs. A contingency factor of 10 percent of the construction cost has therefore been added.

2.6.4 Engineering, Legal and Administrative

An allowance of 10 percent of the projected construction cost has been added for engineering, legal and administration. This allowance is intended to include internal project planning and budgeting, grant administration, liaison, interest on interim financing, legal services, review fees, legal advertising, and other related expenses associated with the project.

2.6.5 Opinion of Probable Cost Summary

Opinions of probable costs presented in this study include a combined allowance of 20 percent for contingencies, engineering, legal, and administrative costs.

2.7 RECOMMENDED IMPROVEMENTS

The assessment of the proposed wastewater system will be summarized and a recommended plan for construction will be developed in Section 10.

SECTION 3:

EXISTING WASTEWATER SYSTEM

3.1 GENERAL

This section includes a brief description of existing wastewater facilities in Sisters. The City wastewater system is relatively new, with construction occurring during the period of 2000 through 2002. Following sections discuss components of the system in greater detail, and present recommended improvements. The current wastewater system consists of a gravity sewer system with over 122,000 lineal feet of wastewater mains, four wastewater pump stations and force mains, a three-cell aerated lagoon treatment system with winter holding, and a 100.3 acre automated land reuse system. Land reuse is provided on 11.8 acres of dike and pasture grass, and on 88.5 acres of natural forest land.

System locations and sizing were developed from available as-built records in the City, and in extensive records available in the City Engineer's files. Construction plans were provided for all developments since the original wastewater system was completed, and City staff provided their knowledge of existing facilities.

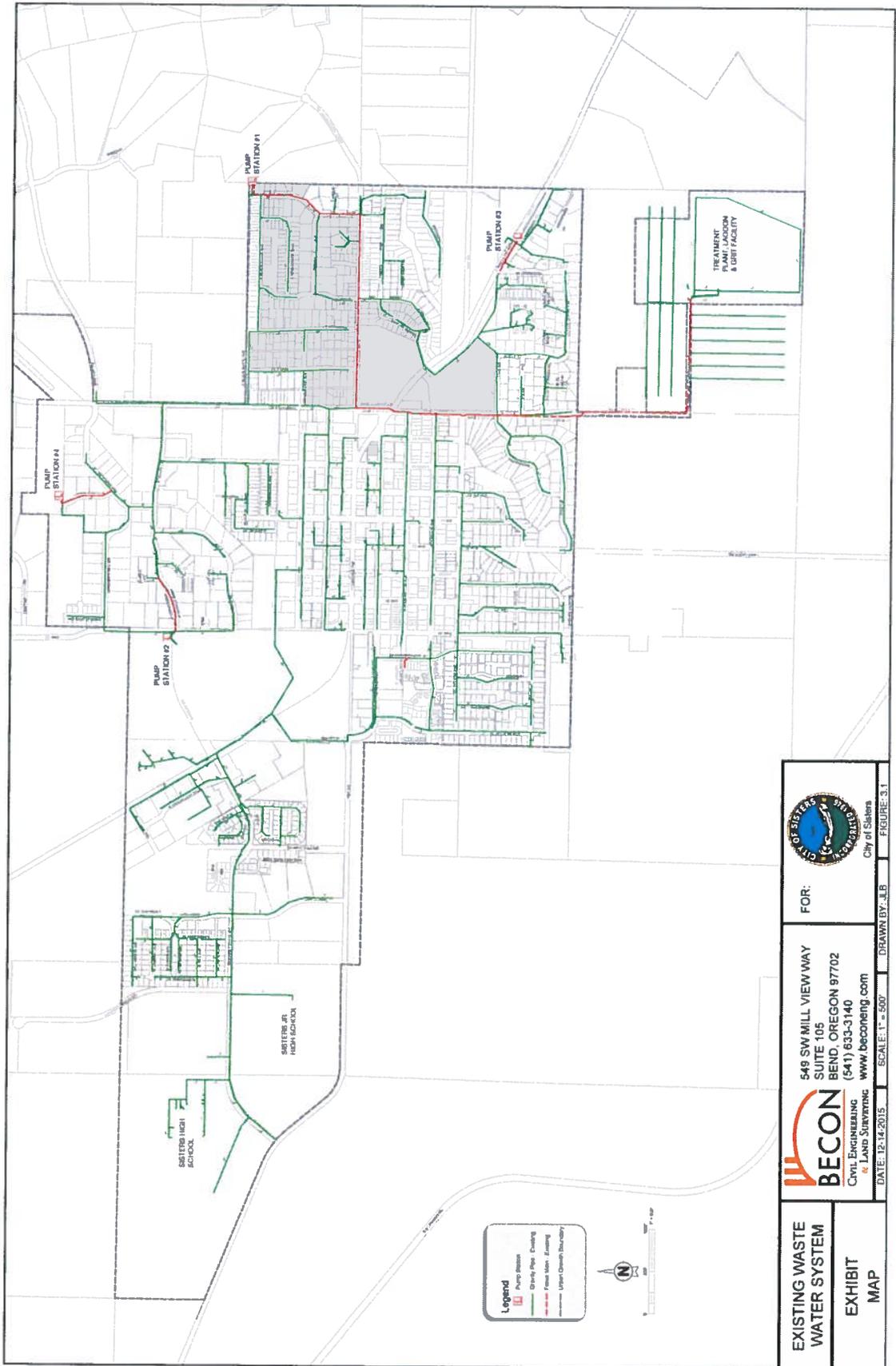
3.2 WASTEWATER COLLECTION SYSTEM

The existing wastewater collection system is shown in *Figure 3.1*. Collection facilities include 6" to 24" diameter ASTM 3034 PVC wastewater mains with 4" and 6" PVC service lines, all laid at varying grades. There are a limited number of individual semi-positive displacement grinder wastewater pump stations that provide wastewater service to residences that could not be served through the gravity collection system (Creekside and Timber Creek Phase VI subdivisions). Gravity conveyance facilities convey wastewater by gravity from individual users to the four wastewater pump stations. Individual developments have completed major expansions to the wastewater collection system since the original construction was completed in 2002. Two of the existing wastewater pumping facilities were completed by new private development, and numerous main extensions have been completed. All of the wastewater pump stations transmit flows through AWWA C-900 force mains of varying sizing.

In general, wastewater is conveyed to the primary wastewater pumping facilities via gravity lines. Wastewater from three of the pumping facilities is transmitted through force mains and additional gravity mains to the location of Wastewater Pump Station No. 1. All wastewater in the system is currently processed through Pump Station No. 1 and transmitted through a 12" diameter force main to the wastewater treatment facility, for ultimate land application to the forested reuse site.

3.2.1 Gravity Mains and Manholes

Mains. The collection system has 916 lineal feet of 6" gravity main, 95,050 lineal feet of 8" gravity main, 11,992 lineal feet of 10" gravity main, 5,909 lineal feet of 12" gravity main, 859 lineal feet of 15" gravity main, 8,204 lineal feet of 18" gravity main, 104 lineal feet of 21" gravity main, and 106 lineal feet of 24" gravity main. All mains are constructed of ASTM 3034 PVC pipe. Burial depths



EXISTING WASTE WATER SYSTEM EXHIBIT MAP	 City of Sisters	FOR: 549 SW MILL VIEW WAY SUITE 105 BEND, OREGON 97702 (541) 633-3140 www.beconeg.com	DRAWN BY: JLB SCALE: 1" = 500' DATE: 12-14-2015	FIGURE 3-1
	 BECON Civil Engineering & Land Surveying			

are typically 5' - 10' deep, with 16' feet being the deepest. Layout of the collection system is shown in *Figure 3.1*.

Manholes. There are 488 precast manholes in the collection system.

Overflows/Bypasses. There are no constructed overflows or bypasses in the system

Hydrogen Sulfide. City staff regularly maintains the collection system, and they have little evidence of hydrogen sulfide damage in the system.

3.2.2. Collection System Quality

Mains. The City of Sisters has worked diligently to develop a wastewater collection system that minimizes infiltration/inflow into the system. All construction has been air-tested in compliance with adopted Public Works Construction Standards for the City of Sisters, and with Oregon DEQ regulations. All gravity mains have been air-tested, and had a 95% mandrel pulled to verify that excessive deflection was not present. When all testing was completed, a television inspection was performed on the interior of all pipelines, and any deficiencies were corrected.

Manholes. All manholes have also been constructed in compliance with adopted Public Works Construction Standards for the City of Sisters, which are in excess of adopted DEQ regulations. All manholes have been vacuum tested, applying 10 inHG of vacuum and limiting allowable air loss to 1 psi for a fixed period of time. This test is the best means of testing to prevent infiltration available today, and the success of the program is evident in the infiltration/inflow discussion below.

Infiltration/Inflow. Infiltration/Inflow in the Sisters wastewater system is virtually non-existent. Influent flows to the wastewater treatment facility are substantially less than water consumption within the community, which indicates that infiltration and inflow to the system are very minimal.

3.2.3. Pressure Mains

Pressure mains are shown in *Figure 3.1*. Four pressure mains exist to transmit flows from each of the existing wastewater pump stations. All of the force mains are constructed of AWWA C-900 piping, of the following lengths and sizing.

Force main for Pump Station No. 1. 9,290 lineal feet -12" inch force main.
Force main for Pump Station No. 2. 710 lineal feet - 4" inch force main.
Force main for Pump Station No. 3. 1,152 lineal feet - 6" inch force main.
Force main for Pump Station No. 4. 687 lineal feet - 6" inch force main.

3.2.4 Wastewater Pump Stations

Four wastewater pump stations currently exist in the collection system. The stations are described as follows:

Wastewater Pump Station No. 1. This station was constructed in place, and is a triplex submersible facility with a trench style wetwell. Pumping is provided with three KSB pumps initially designed with two pumps capable of providing 850 gpm @ 95' feet TDH when pumping together. The third pump is provided for redundancy. The pump manufacturer made an error in trimming the impellers for all of the pumps, and the pumps were actually installed with the capability for two pumps to provide approximately 525 gpm @ 95' feet TDH. It was determined to be in the best interests of the City to have the correct impellers provided, but that the original impellers be utilized until demand necessitated the additional pumping capacity. City staff replaced the original impellers with the new impellers from storage in 2009 to increase the capacity of the pumps to the original design. Normal wear from the 14 years of system operation has incurred to the original pumps and staff will need to monitor the pumps through motor oil and amperage testing to determine when these pumps need to be re-built or if capacity issues arise be replaced.

100% of wastewater flow in the City of Sisters collection system is tributary to Pump Station No. 1. The station (constructed in 2001), is located at the north end of Rope Place, in the far northeast corner of the UGB. Flows from this station are conveyed via 9,290 lineal feet of 12" class 150 AWWA C-900 force main to the headworks of the WWTP. This station was constructed as a portion of the original Sisters wastewater system, and was completed in 2001.

Triplex submersible pumps located in a self-cleaning trench style wetwell are KSB, Model KRTK 100-316/294 XG, with 37 Hp motors. The station is a site-constructed submersible pump station with a block building constructed over the top. The building is insulated and has a concrete floor with drains. Pump controls are located in the building. The overall condition of the pump station is very good, and all equipment functions properly as originally constructed.

A 135 KW diesel generator manufactured by Kohler, Model 135ROZJ is provided for standby power purposes, complete with a 400 Amp Kohler automatic transfer switch. This unit is set on a 125 gallon double wall fuel tank that provides protection against contamination.

A sluice gate is provided on the influent to the station to stop the influent flows, and to allow buildup of flows for wetwell cleansing purposes. A Chatterbox dialer is utilized to call operators in the event that problems develop with station operation. New telemetry equipment will be needed to communicate with the treatment plant SCADA system during the planning period when increased flows result in capacity related concerns with the station (i.e. 2 pumps need to run to keep up with influent flows).

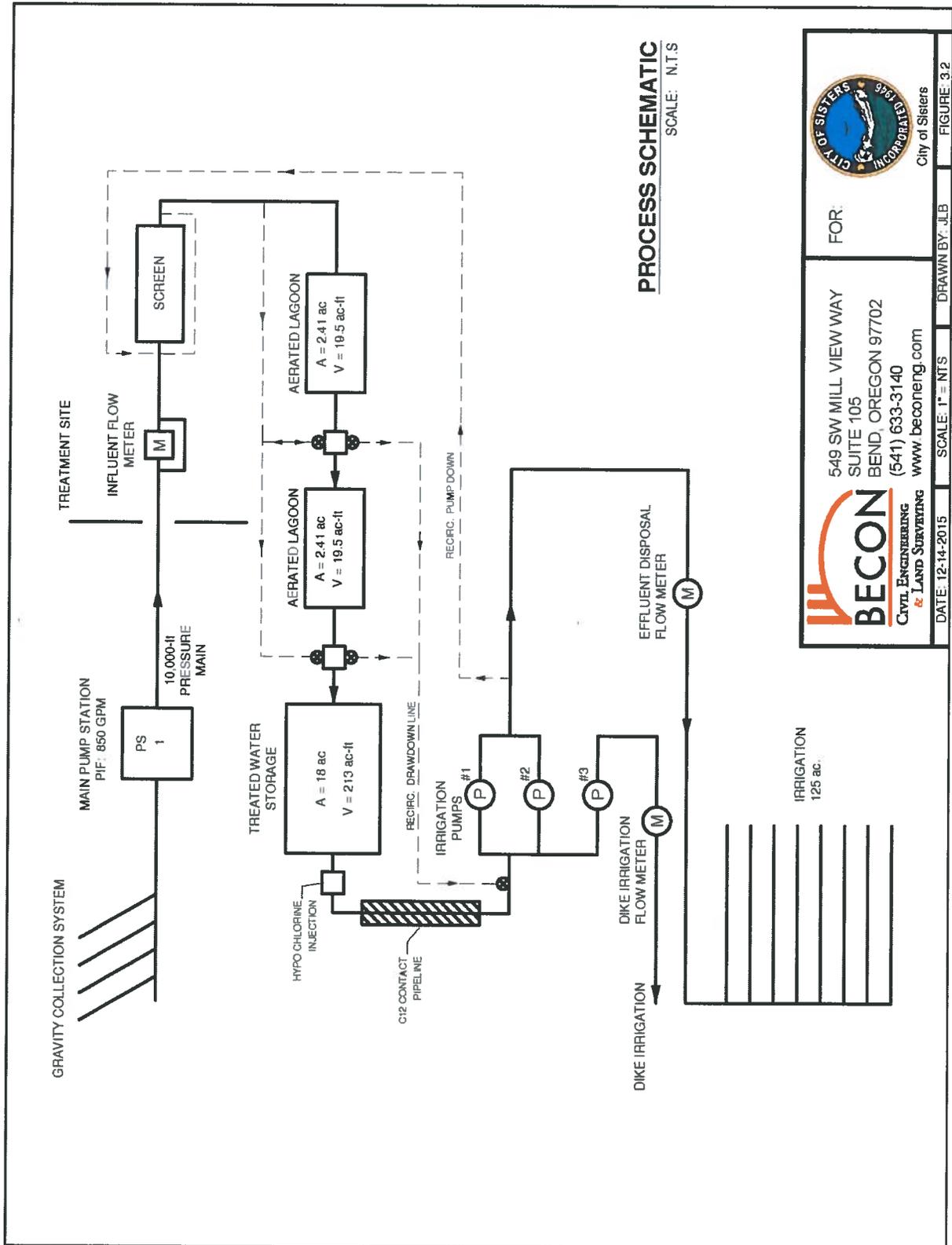
Wastewater Pump Station No. 2. This station is a package wetwell mounted vacuum lift duplex pump station by Smith & Loveless, mounted on a 5' diameter precast concrete manhole. All pumping and electrical equipment is mounted under a fiberglass structure, and is above the wetwell. The station provides service to a small portion of the industrial park, and is located on the Northwest corner of Barclay Drive and North Pine Street. Pumping is provided with two Smith & Loveless Model 4B2B pumps, each capable of pumping 150 gpm at 43' feet TDH. Motors are 5 Hp, located under the fiberglass shell, and the station includes two small compressors for creating vacuum for operation. All electrical controls are also located inside the station cover. All pump station equipment functions properly as originally constructed with the Sisters wastewater system in 2002. A Chatterbox dialer is utilized to notify operators in the event that problems develop with system operation.

Wastewater Pump Station No. 3. This station is a package wet well mounted vacuum lift duplex pump station by Smith & Loveless, mounted on an 8' diameter precast concrete manhole. All pumping and electrical equipment is mounted under a fiberglass structure, and is above the wetwell. The station is located in the Five Pine Development, and provides service to the most easterly portion of the City, both North and South of Highway 20. Pumping is provided with two Smith & Loveless Model 4B2B pumps, each capable of pumping 260 gpm at 20' feet TDH. Motors are 3 Hp, located under the fiberglass shell, and the station includes two small compressors for creating vacuum for operation. All electrical controls are also located inside the station cover. The pump station equipment functions properly as originally constructed in 2004. This station was provided by developers in expansion of the Sisters wastewater system. A Chatterbox dialer is utilized to notify operators in the event that problems develop with system operation.

Wastewater Pump Station No. 4. This station is a package wet well mounted vacuum lift duplex pump station by Smith & Loveless, mounted on an 8' diameter precast concrete manhole. All pumping and electrical equipment is mounted under a fiberglass structure, and is above the wetwell. The station is located in the Sun Ranch Business Park, and provides service to the Sun Ranch and Three Sisters Business Parks North of Barclay Drive. Pumping is provided with two Smith & Loveless Model 4B2D pumps, each capable of pumping 270 gpm at 45' feet TDH. Motors are 7.5 Hp, located under the fiberglass shell, and the station includes two small compressors for creating vacuum for operation. All electrical controls are also located inside the station cover. The pump station equipment functions properly as originally constructed in 2006. This station was provided by developers in expansion of the Sisters wastewater system. A Chatterbox dialer is utilized to notify operators in the event that problems develop with system operation.

3.3 WASTEWATER TREATMENT FACILITY

The existing Sisters wastewater treatment plant (WWTP) is shown schematically in *Figure 3.2*. The wastewater treatment plant and effluent reuse site are located immediately south of the Sisters City limits on the south ½ of Section 9, T15S, 10E, W.M. Treatment is provided with two 2.41 acre aerated lagoons, followed by an 18 acre storage lagoon and 100.3 acres of land utilized for automated land reuse purposes. Design data for the existing wastewater treatment facility is provided in *Table 3.1*.



FOR:

549 SW MILL VIEW WAY
SUITE 105
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BECON
Civil Engineering
& Land Surveying

DATE: 12-14-2015 SCALE: 1" = N.T.S DRAWN BY: JLB

CITY OF SISTERS
INCORPORATED 1963
City of Sisters

FIGURE 3.2

**Table 3.1 Sisters Wastewater Treatment Facility
 Design Data**

Influent Flow -		Summer, gpd	395,604			
		Winter, gpd	291,042			
Waste Loadings (BOD₅ and TSS) -		Summer, ppd	759			
		Winter, ppd	607			
Effluent Requirements		E. Coli - Shall not exceed monthly geometric mean of 126/100 ml				
Headworks		Type:	Rotary Bar Screen w/Bypass Channel			
		Spacing:	1/4"			
		Max. Flow (gpm):	2061			
Influent Flowmeter		Type:	8" Magnetic			
Treatment		Type:	Aerated Lagoons in Series			
		Number of Cells:	3			
Pond No.	Water Depth (Ft)	Freeboard (Ft)	Surface Area (Acres)	Volume (Ac-Ft)	Number of Aerators	Total Aeration Power (Hp)
1	10'	3'	2.41	19.5	6	45
2	10'	3'	2.41	19.5	2	15
3	13'	3'	18.0	213	3	22.5
Effluent Reuse						
Crop Data:		Dike and Lawn Irrigation				
		Ponderosa, Lodgepole, Sage and Bitterbrush				
Crop Area (ac)		11.8 acres of dike and lawn irrigation				
		88.5 acres of ponderosa, lodgepole, sage, and bitterbrush				
Net Reuse Requirements		Season: Dike and Lawn Reuse -		28.79 inches		
		Forest Reuse -		14.3 inches		
		Peak month: Dike and Lawn Reuse -		6.5 inches		
		Forest Reuse -		4.27 inches		

Reuse Equipment	Forest Reuse	Dike and Lawn Reuse	
Type:	Fixed Cannon Sprinklers	Fixed Sprinklers	
Max. App. Rate (gpm):	1000	125	
Flow Meter:	6" Magnetic	4" Magnetic	
Effluent Reuse/Recirculation Pumps			
No.	# 1	# 2	# 3
Horsepower:	100	100	15
Capacity (gpm):	1000	1000	125
Total Dynamic Head (ft)	200	200	75
Chlorination Facilities			
Type:	Sodium Hypochlorite Solution		
Contact Chamber:	1140' of 36" pipe		
Volume (gal):	60,000		
Detention Time (min):	60 minutes @ 1,000 gpm		

3.3.1 Theory of Treatment Process

Aerated lagoons can be described as very lightly loaded activated sludge wastewater treatment systems. The microorganisms responsible for organic breakdown of incoming wastewater tend to be similar to those found in activated sludge systems. The process does not depend on algae and sunlight to furnish dissolved oxygen (DO) for bacterial respiration, but instead uses mechanical aeration to transfer the major portion of oxygen, and to achieve mixing of the wastewater. Because of the mixing, removal of suspended solids in the lagoon effluent is an important consideration.

The primary pond is provided for solids removal, and to further the aerobic treatment process for overall improved treatment performance. The theory of aerated lagoons involves necessity for oxygen additions in the major reactive phases of the lagoon, and mixing to improve the efficiency of the microorganisms. Transfer of oxygen into the lagoon wastewater occurs at the interface between the gas and liquid. Oxygen transfer is improved by increasing the interfacial area and by increasing turbulence through mixing. Oxygen transfer to a point of saturation or equilibrium occurs very rapidly at the interface. The interface is estimated to be only a few molecules thick. Oxygen molecules pass through this film and are diffused very gradually into the main body of liquid in the aerated lagoons.

Oxygen will transfer more readily into a liquid with low residual dissolved oxygen than when the dissolved oxygen level is at or near saturation. Therefore, mixing is required to create turbulence, so that liquid saturated with dissolved oxygen can be replaced with liquid that has an oxygen content less than saturation.

3.3.2 Influent Flow Measurement and Sampling

Influent flow measurement is provided in the pump room of the control building for the wastewater treatment plant. The meter is an 8" ASA electromagnetic flow meter which has been calibrated annually since installation.

Influent sampling is provided by an ISCO 3710FR refrigerated sampler located in the pump room of the control building at the treatment plant. This is a 24-hour composite sampler which provides composite data for influent BOD₅ and TSS.

3.3.3 Headworks

The headworks contains a mechanical fine screen with a coarse bar screen in the bypass channel and a fine screen in the normal channel for treatment operations. Only one screen is used at a time, and normal flows are directed through the fine screen mechanism unless problems prevent its operation. The screen is a Lakeside Equipment Corporation Rotamat, with weather protection. Operation of the fine screen allows for more efficient biological treatment within subsequent treatment units. Improved treatment is accomplished by removing all solids of a size 1/4" or larger from the raw influent. An aluminum gate is provided in front of each channel to manually direct flow in the desired location. During extreme flow periods, or during emergency conditions, the gate maybe overtopped with flow. This allows the bypass channel to automatically function for containment of excess flows. A spray wash system is provided on the fine screens to clean the removed screening prior to disposal. The main channel has been corroded by hydrogen sulfide action, and needs repair to function as it was originally intended.

A discharge chute, bagger and screenings collector are provided to dispose of screenings. Screenings are washed and dewatered upon deposit in the feed trough. The chute directs screenings to the bagger. Collected screenings are sent to the Deschutes County landfill for disposal.

All equipment in the Sisters Wastewater Treatment Plant is provided with control through the SCADA system provided for system operation. This unit is no longer supported by the manufacturer and will need to be replaced either with the expansion of the effluent disposal system or if there is a significant failure due to its importance of running the entire treatment plant.

3.3.4 Aerated Lagoons

The Sisters wastewater treatment plant has three aerated lagoons which are piped to flow in series. Total acreage provided at the top of the banks is approximately 22.82 acres of lagoon surface. Pond depths are capable of running at 10 feet in Lagoons No. 1 and No. 2, but are running at 9 feet due to inlet pipe placement, and 13 feet in Lagoon No. 3. (Holding Pond), when the units are filled to capacity. Total pond volume, with 3 feet of freeboard provided, is approximately 82 million gallons.

Lagoon levels in Lagoons No. 1 and No. 2 can be independently controlled with stop logs in their effluent transfer structures. An effluent structure with sluice gates controls the flow of effluent from the holding pond to the transfer structure, and an effluent decanter is provided to draw water from below the lagoon surface. 60 mil HDPE liners are provided to prevent leakage from all of the lagoons.

All the lagoons are provided with mechanical aeration. The holding pond operates as both a holding and polishing pond, and is also provided with mechanical aeration. Chlorine is introduced for disinfection purposes into a 1,140 feet long 36" contact pipeline installed in the diking West of Lagoons No. 1 and No. 3. Disinfection occurs prior to effluent reuse.

Varying flow regimes are possible in the lagoons, utilizing transfer structures provided. The lagoons can be operated on a flow through basis, which should be the normal process, batch basis, or a combination of the treatment methods. In addition, any lagoon can be bypassed for operational or cleaning purposes.

3.3.4.1 Aerators

Lagoons No. 1 and No. 2 are equipped with eight (8) Aire-0₂ aerators; six (6) in the first lagoon and two (2) in the second. Aerators are provided for reduction of much of the settleable solids (TSS) and associated BOD₅ loading from the liquid stream before it reaches the subsequent lagoons. The holding pond has three (3) identical aerators, which operate when the depth of liquid reaches a minimum of 5 feet underneath the aerators. Aerators are of the submerged aspirator type, meaning that they pull air from above the water surface and inject and disperse it below the water surface with a propeller aspirator pump. They are arranged to cause the contents of the lagoons to flow in a circular pattern, with the pattern created being away from the motor end of the aerator. This mixing action reduces short circuiting in the lagoons, thus effectively using the entire capacity for lagoon No. 1, and the area being aerated in the remaining lagoons.

Aerators are controlled through the SCADA system with the PLC provided, and timers are available to control the length of the operating cycle and the percentage of running time in that cycle for operation of all units. The

percentage of time on can be changed with the time of year to reflect changes in BOD₅ loading to the lagoons, water temperature, amount of solar energy and related algae growth, degree of ice cover, etc. In the summer, BOD₅ loading is the highest, but natural treatment activity is also the highest because of peak sunlight and water temperature. In the winter, BOD₅ loading is the lowest, but natural activity is also lowest because of low water temperature and ice cover. Aerators should be operated enough to maintain dissolved oxygen in the water, to prevent from freezing in winter ice and to produce an effluent which meets permit conditions.

Lagoon depths and surface areas are provided in *Table 3.1*. Lagoon levels are adjustable with stop logs provided in transfer structures, but generally lagoons No. 1 and No. 2 remain full depth, allowing variation in lagoon No. 3 with the season and the extent of land reuse. Control of lagoon depths can be utilized for operational flexibility, and to control the holding and biological capacity for the lagoons.

Holding capacity in lagoon No. 3 is provided to contain all flows from November 1 to March 31 when no effluent reuse is permitted. Containment is also provided when weather conditions, such as high humidity, high winds, and low ambient temperatures do not permit land reuse.

The aerators have been in nearly continuous operation since the plant became operational in 2001 with a maximum 20 year life expectancy, and will need continued maintenance and eventually replacement during the planning period for this study. Larger aerators and more efficient models will need to be installed as BOD levels rise to the point of needing additional aeration for adequate treatment. In addition, there are now more energy efficient models, including solar options that could be installed to reduce operational costs.

3.3.4.2 Transfer Structures

Transfer structures for the lagoons are equipped with wooden stop logs or slide gates to control the level in the ponds, and to provide for draining of each lagoon. An effluent decanter is attached to the effluent transfer structure to provide a means of securing quality water for land reuse purposes. A drain is also provided from lagoon No. 3 to the effluent transfer structure for draining of the final lagoon.

3.3.4.3 Disinfection Facilities

Disinfection of effluent at the Sisters plant is provided by chlorination, specifically through sodium hypo-chlorite. Equipment includes a Lightnin chemical mixer, a 500-gallon polyethylene sodium hypo-chlorite tank, a Wallace & Tiernan chemical feed pump, a Grundfos back-up chemical

feed pump, a Gas Masterr 3-hp flash mixer, a vacuum regulator, rate controller, ejector water supply system, and a chlorine contact pipeline. The chlorine contact pipeline is 1,140 feet of 36" PVC piping buried in the dike along the west side of lagoon # 1 and the holding pond. A Gas Masterr Series 32 chlorine induction feeder-flash mixer is provided in the transfer structure from the holding pond to the chlorine contact pipeline. This unit provides a positive flash mix of sodium hypo-chlorite solution which flows through the chlorine contact pipeline toward the land reuse system. A sampling tap is provided on the effluent (reuse) piping to allow for sampling of effluent pumped from the reuse pumps to either of the two reuse systems provided. Disinfection facilities are controlled through the SCADA system with the PLC provided.

The disinfection system is in good condition and working effectively. However, the chlorine pump and the flash mixer will need to be replaced as a portion of normal plant maintenance procedures, and budget should be provided for replacement of the aged equipment.

3.3.4.4 Effluent Flow Measurement and Sampling

Effluent flow measurements are provided in the pump room of the control building for the WWTP. Two meters are provided, with one on the dike and lawn reuse system, and one on the forest reuse system. Each meter is an ASA model IF6 electromagnetic flow meter, which have been calibrated annually since installation. Grab samples are taken out of the transfer structure before the effluent enters the chlorine contact line. These samples are then tested for concentration of e.coli. Flow measurements are recorded in the SCADA system provided.

Flowmeter performance has been excellent, all the units were rebuilt in 2007 due to the pump building inadvertently flooding. All flow meters are flow tested and calibrated annually to ensure accuracy within specifications. Operations have experienced no problems in meeting permit conditions for e-coli.

3.3.4.5 Treatment and Pumping Facility Control Building

The treatment and pumping facility control structure has functioned well. Existing pumps were flooded in 2007, and are being monitored and tested annually to help prevent pump and motor failures.

3.3.4.6 General Plant Conditions

Overall conditions at this treatment facility are adequate, other than for the age of installed equipment. Equipment has functioned well, however, all operating equipment has a lifetime, and proper maintenance would suggest

replacement of all pumping and aeration equipment on a 15-20 year basis.

3.4 WASTEWATER EFFLUENT REUSE

3.4.1 General

The effluent reuse facilities are intended to discharge treated and disinfected effluent for land reuse through irrigation of both forest land and lagoon dikes and lawns on the treatment plant site. The effluent reuse system that is in place includes a holding pond for storage, a chlorine contact line for effluent disinfection, three irrigation pumps, a re-circulation system, and a sprinkler system to provide reuse on treatment plant lagoon dikes and lawn areas, and on 88.5 acres of forest land. Additional area for reuse is set aside for buffer to adjacent properties on the North, East and South boundaries of the treatment plant site, in compliance with Oregon DEQ regulations. In addition, a separate buffer area was set aside initially between the forest reuse site and the Buck Run Subdivision, and this area is potentially available for future expansion of the reuse site, utilizing Class A effluent (current treatment plant processes result in a Class D effluent), although not recommended due to proximity to development.

Prior to land reuse, the effluent is disinfected in 1,140 feet of 36" chlorine contact line, which provides for a minimum detention time of 60 minutes at peak discharge flows of 1,000 gpm. Sodium hypochlorite from the 500 gallon HDPE storage tank is mixed with effluent from Lagoon No. 3, in the chlorine contact facility. Effluent is discharged to forest land and pond dikes and lawn areas from April 1 to October 31 and stored in the holding pond during the remaining months.

3.4.2 Effluent Reuse System

The land reuse system diverts the majority of the effluent to 88.5 acres of forest land, and the remaining to the treatment plant lagoon dikes and lawn areas (11.8 acres). The effluent is pumped to these locations using three pumps. Two 100 HP, 1000 gpm capacity pumps transport effluent to the forest land, while one 15 HP, 125 gpm capacity pushes the water to the dike. The effluent is carried to the forest land in a 10" main line which branches out into 8" lines across the irrigation area. There are flow meters stationed after the pumping facility that are measuring the quantity of effluent traveling to both the forest land and dike.

Both effluent reuse systems provided for discharge from the Sisters WWTP are controlled through the SCADA system, with the Programmable Logic Controller provided.

Both the SCADA system and the PLC have been in use since the plant became operational, and equipment of this type and age becomes outdated, is not supported and difficult to repair due to availability of parts. Both the SCADA system and the PLC will need to be replaced in the near future.

SECTION 4:

POPULATION AND LAND USE

4.1 HISTORICAL POPULATION

Sisters maintained a historical population from 600 residents to 690 residents for more than 30 years through the year 1990. Population growth was relatively stagnant between 1980 and 1990, but averaged approximately 2 percent a year from 1990 to 1996. The population reached 775 residents in 1996. Beginning in 1997, when the citizens approved construction funding for the community sewer system, growth has escalated rapidly, in similar fashion to the growth throughout all of Deschutes County. By the year 2003, population in Sisters had reached 1,430 residents, and despite the slowing of growth during the recession of 2008-2013, Sisters population now stands at around 2,315.

4.2 CURRENT POPULATION

The certified population in 2015 for the City of Sisters was 2,280 residents on July 1, 2015, by the Population Research Center at Portland State University.

4.3 PROJECTED FUTURE POPULATION IN YEAR 2035

The City of Sisters Comprehensive Plan projects that population in the City will be moderate within the planning period. From 2015 to 2035 population is expected to grow at 3.23% per year. Assuming that the projections are realistic, and that the growth has slowed to the projected 3.23% growth rate, the City should anticipate a 89% population growth by the year 2035. *It should be noted that Sisters has experienced periods of rapid growth in the recent past, therefore, it is recommended that a population forecast update be prepared at a minimum of every 5 years, and, if necessary, corresponding revisions to the capital facilities plan. Regular population forecast updates will ensure that the capital facilities plan remains closely aligned with current population and current demand on City infrastructure.*

4.4 COMPARISON WITH PREVIOUS GROWTH PROJECTIONS

Previous population projections by the City of Sisters and Deschutes County, and projections in the 1988 Water Facilities Study (Westech Engineering), and 1997 Wastewater System Facilities Plan (HGE Inc., Architects, Engineers, Surveyors & Planners) substantially underestimated the growth that has occurred in the City. The 1988 projection estimated that approximately 1,100 people would reside in Sisters by the year 2005, while the remaining projections all anticipated a population in the range of 1,000 people by the year 2005. Growth has been much more rapid than anticipated in projections during the 1980's and 1990's.

4.5 CAPITAL FACILITIES PLAN POPULATION FORECASTS

Development is occurring in Sisters and is anticipated to result in population growth of 3.23% per year between 2015 and 2035. (Source: Portland State University). A

population of 4,375 residents is forecast for year 2035.

4.6 BUILDOUT OF CURRENT UGB

The aforementioned population estimates assume year 2035 growth will occur as a result of the buildout of infill land within the existing UGB. Ultimate population in the Sisters UGB is difficult to estimate with continuing infill and partitioning of lots in older sections of the City. It is anticipated that future years will see a tendency toward partitioning of lots for coming generations, taking into account increasing land values. Growth projections should occur within the existing UGB, with the potential for continuing population expansion as existing land area continues to be redeveloped into smaller partitions. The Sisters Planning Department anticipates stable occupancy rates to occur within the 20-year planning period with an average of 2.08 people per dwelling unit by 2035 and approximately 2,140 dwelling units.

4.7 LAND USE

4.7.1 Current Land Use

Current land use is shown on *Figure 1.2* based on Sisters' Comprehensive Plan and zoning ordinances, effective in 2015. The Urban Growth Boundary (UGB) may be adequate for anticipated growth in the planning period.

4.7.2 Comprehensive Plans and Zoning Ordinance Revisions (Amended 2014)

The current Comprehensive Plan was adopted by the City of Sisters in 2005, and amended in 2014. Revisions since the 2005 plan include adoption of mixed use developments incorporating residential and light industrial development. The revisions also allow and encourage smaller minimum lot sizes, a density bonus and a height bonus when residential is incorporated with commercial development. Both have an impact on increasing needs for public infrastructure.

4.7.3 General Comments

Sisters is primarily a residential community, with a significant tourist-based economy. The City has a vibrant commercial district located on either side of U.S. Highway 20, and room for considerable expansion within the industrial district. Historically, there has not been a clear division between residential and industrial areas. As a result, the City has developed a zoning system that restricts industrial development to designated areas, while permitting mixed-use residential development in areas zoned for industrial purposes. Future industry, according to the City's Comprehensive Plan, will be encouraged to locate in areas with readily available utilities and minimal conflicts with existing development.

SECTION 5: WASTEWATER CHARACTERISTICS

5.1 INTRODUCTION

5.1.1 Definitions

The following terms are used to define seasonal differences in wastewater flow characteristics:

Dry-Weather (or Summer) Period: Generally defined as the period when precipitation is limited and stream flows are low. This period is commonly defined in the Oregon Administrative Rules (OARs) for specific basins as May 1 through October 31. Sisters WPCF Permit does not include any specific reference to, or definition of, this parameter. It roughly corresponds, in Sisters, to the period during which irrigation takes place. Summer is a shorthand reference.

Wet-Weather (or Winter) Period: Generally defined as the period when precipitation is greatest and stream flow is highest. This period is commonly defined in the OARs for specific basins as November 1 through April 30. It roughly corresponds, in Sisters, to the period when no irrigation takes place and all effluent is held in the wastewater lagoon. Winter is a shorthand reference.

The following terms are used to characterize wastewater flows:

Average Daily Flow (ADF): Total wastewater flow for a defined period divided by the number of days in the period or season.

Maximum Monthly Flow (MMF): Total wastewater flow in the month of the highest flow, within a defined period or season, divided by the number of days in that month.

Peak Daily Flow (PDF): Total flow for the day with the highest flow, within a defined period or season.

Peak Instantaneous Flow (PIF) or Peak Hourly Flow (PHF): Highest sustained one hour flow during the year. For purposes of this facilities plan, the terms are treated as synonymous.

The following subscripts are utilized to further define the flow parameters according to the period or season of interest:

A: Annual. Defines a full year period.
WW: Wet-Weather. As defined above.
DW: Dry-Weather. As defined above.

Flow parameters in this facilities plan are typically abbreviated and combined with subscripts as follows¹:

ADF _A :	Annual Average Daily Flow
ADF _{WW} :	Average Daily Wet-Weather Flow
ADF _{DW} :	Average Daily Dry-Weather Flow
MMF _{WW} :	Maximum Monthly Wet-Weather Flow
MMF _{DW} :	Maximum Monthly Dry-Weather Flow
PDF _{WW} :	Peak Daily Wet-Weather Flow
PHF _{WW} :	Peak Hourly Wet-Weather Flow

If a flow parameter is referenced without a subscript then it should be interpreted as applying equally to any season.

Flow parameters are typically abbreviated and expressed as:

mgd:	millions of gallons per day
gpd:	gallons per day
gpcd:	gallons per capita per day

Other flow rates commonly used include:

gpm:	gallons per minute
cfs:	cubic feet per second

Totalized flows are commonly referred to as:

gal:	gallons
MG:	million gallons
cf:	cubic feet
Ac-ft.:	acre feet

Water quality parameters discussed in this section include:

BOD ₅ :	Biochemical Oxygen Demand
TSS:	Total Suspended Solids

Water quality loadings are typically expressed as:

mg/l:	milligrams per liter
ppd:	pounds per day
ppcd:	pounds per capita per day

¹ Other combinations are easily formed and may be utilized for reference.

The following terms are included for clarification:

- Current:** Generally refers to recent condition valid for year 2015.
- Design:** With regard to flows, design refers to anticipated flows that would occur under conditions corresponding to the flow characteristics defined above. Design takes into account a full analysis of the flows and generally ignores current system limitation such as inadequate plant, pump station, and collection system capacities. As a result, current design flows may vary considerably from the record of flow currently or recently observed at the wastewater facility. Future design flows include allowances for community growth and, possibly, other changes in system characteristics. Unless qualified otherwise, future design parameters refer to projected parameters at the end of the design period. In this case, year 2035.

5.1.2 Parameters of Interest

The City's main pump station (Pump Station No. 1) transfers all of the City wastewater to the treatment facility. The primary parameter of interest is the extrapolated peak hourly flow. Headworks are also evaluated and sized according to peak hourly flow requirements.

Lagoon treatment/holding includes considerable equalization capabilities. Parameters of primary interest are averages of defined periods (winter or summer).

For mechanical treatment facilities, parameters of interest vary according to the nature of the processes involved. In general, hourly, daily, weekly, and monthly parameters may all be needed.

5.1.3 Methodology for Computing Flows

DEQ has developed guidelines for projecting wastewater flows, using relationships between wastewater flow and rainfall. These guidelines work well for estimating wastewater flows in Western Oregon, where winter rainfall often is a major contributor to the total and peak flows reaching the plant (through infiltration and inflow into the collection system). However, in Sisters these guidelines are not appropriate since rainfall does not directly have a significant impact on the amount or peaking of flow reaching the treatment facility. Sisters' design flows will be based on flows measured at the wastewater treatment facility. Peak hourly flow for Sisters will be extrapolated using general design guidelines.

5.2 ACCURACY OF DATA

5.2.1 Influent Flowmeter and Sampler

The influent flowmeter is located in the pump room of the control building at the Wastewater Treatment Plant. The meter is an 8" ASA electromagnetic flow meter, which records all flows received from Wastewater Pump Station No. 1. And was installed in 2001 as part of the City's wastewater treatment facility. Flowmeter calibration has been verified by a factory representative on an annual basis. Flowmeter performance has not been problematic.

The influent sampler is also located in the WWTP Control Building to record composite samples of influent flows. The sampler is an ISCO 3710 FR refrigerated sampler which provides for a 24 hour composite sample. Samples are taken weekly by the Lead Operator and all testing is provided by City staff. Sampler operation and sample handling/testing has not been problematic.

5.2.2 Bypass and Overflows

There are no constructed bypasses or overflows in the wastewater system.

5.2.3 Inflow and Infiltration (I/I)

There is little evidence of I/I in the Sisters collection system. The system itself was substantially constructed in 2002. Sewer lines are generally above the groundwater table. Annual precipitation is 13.62 inches; annual evaporation is approximately 46 inches (see Section 7.4.1). It is unlikely that I/I will pose a concern during the planning period.

5.2.4 Effects of Population Growth

Population growth has been very high in recent years. Growth from the 2000 Census figure of 959 persons to the Portland State Population Research Center (PSU) figure of 1,490 for July 1, 2004 averaged 11.65 percent per year. The largest growth occurred between 2002 and 2003 with an increase of 32.4 percent based on PSU figures of 1,080 and 1,430 persons respectively. Growth from 2003 to 2004 was more moderate at 4.2 percent (based on PSU figures on 1,430 and 1,490 respectively) and growth in population has reached 2,315 at 2015 end. The effect of such high growth rates on wastewater flows is marked; therefore, only the most recent flow data will be evaluated for the purposes of estimating current and future flow parameters.

The PSU figure of 2,280 persons will be used to estimate current per capita flows from the recent data. This will ensure a conservative design basis for recommended improvements and counter deficiencies associated with an abbreviated data set.

5.3 FLOW ANALYSIS

5.3.1 Observed Data

Observed data is summarized in *Table 5.1* for the two year period from November 2013 through October 2015. Primary source is the WPCF Discharge Monitoring Reports (*Appendix 5.1*).

Table 5.1: Wastewater Influent Flow Data

<i>Month</i>	<i>2013-2014 Total (MG)</i>	<i>2014-2015 Total (MG)</i>	<i>Percent Increase</i>
November	5.445	5.567	2.2
December	5.945	5.833	-1.9
January	5.501	5.664	3.0
February	5.530	4.972	-9.0
March	5.466	5.796	6.0
April	5.020	5.466	8.9
May	5.683	5.850	2.9
June	5.872	6.496	10.6
July	6.430	6.848	6.5
August	6.458	6.509	0.8
September	6.065	6.082	0.3
October	5.793	5.726	-1.2
Total	69.208	70.809	2.3
Daily Average	0.190	0.194	2.3

Table 5.1 shows the effects of population growth on flows. There was an average increase of 2.3 percent between the two years shown. Increases occurred throughout the year and in every month except December, February, and October, where the 2013-2014 totals were less than the 2014-2015 totals. Because of the flow increase associated with City growth, the flow analysis will focus on the 2014-2015 data.

Table 5.2 provides a further elaboration of flow data for the period November 2014 to October 2015.

Table 5.2: Daily Wastewater Data Summary
(November 2014 - October 2015)

Month	Monthly Average (mgd)	7-Day Maximum (mgd)	Maximum Day (mgd)	Minimum Day (mgd)
November	0.185	0.185	0.212	0.166
December	0.190	0.190	0.254	0.156
January	0.182	0.182	0.233	0.161
February	0.176	0.176	0.209	0.164
March	0.187	0.187	0.256	0.172
April	0.182	0.182	0.196	0.166
May	0.188	0.188	0.234	0.179
June	0.216	0.216	0.248	0.190
July	0.221	0.230	0.246	0.205
August	0.210	0.210	0.220	0.192
September	0.202	0.202	0.226	0.186
October	0.184	0.184	0.205	0.173
Summer	0.204	0.205	0.248	0.156
Winter	0.184	0.184	0.256	0.173
Annual	0.194	0.194	0.256	0.156

A summary of recent wastewater flow characteristics is shown in Table 5.3.

Table 5.3: Summary of Wastewater Flow Characteristics
(November 2014 - October 2015)

Flow Characteristics	Flow (mgd)	Flow (gpcd) ¹	Date of Occurrence
Annual: ADFA:	0.194	85.1	Nov 14-Oct 15
Summer: ADF _{DW} : MMF _{DW} : MWF _{DW} : PDF _{DW} :	0.204 0.221 0.230 0.248	89.4 96.9 100.9 108.8	May-Oct 2015 July 2015 July 5-11, 2015 June 14, 2015
Winter: ADF _{ww} : MMF _{ww} : MWF _{ww} : PDF _{ww} :	0.184 0.190 0.226 0.256	80.7 83.3 99.3 112.3	Nov 14 -April 15 December 2014 Dec 29 - Jan 4, 15 March 27, 2015

¹ Population Basis: 2,280 (Section 5.2.4)

The highest flows typically occur in the summer and are associated with the high number of seasonal visitors and tourists. Approximately 33 percent of metered water sales returned as wastewater during the period November 2014-October 2015.

5.3.2 Design Flows

Current design flows are based on data presented in Section 5.3.1. The data utilized does not appear problematic or inconsistent; therefore, there is no need for supplemental data or analyses. Current design flows are summarized in *Table 5.4*.

Peak hourly flows (PHF) are estimated using methodology described in *Recommended Standards for Wastewater Facilities, 2004 Edition* (also known as the 10 State Standards):

$$\frac{PHF}{ADF} = \frac{18 + P^{0.5}}{4 + P^{0.5}}$$

where *P* = population in thousands

Future (year 2035) design flows are also shown in Table 5.4. Future flows, except PHF, are based on the 2015 design flows increased by the population ratio of 4,375 persons (the projected year 2035 population) and the PSU 2014 figure of 2,280 persons. PHF figures were recomputed using the projected population forecast of 4,375 persons in year 2035. It is assumed that the relative ratio of commercial and residential development will continue during the planning period. Disproportionate growth of commercial, industrial, or institutional sectors could result in design level flows occurring prior to achieving the forecasted population of 4,375 persons. The 2035 design flows represent an increase of approximately 192 percent over current conditions.

Table 5.4: Design Flow Summary

<i>Flow Characteristics</i>	<i>Current 2015 Design Flow (mgd)</i>	<i>Future 2035 Design Flow¹ (mgd)</i>
<i>Annual:</i>		
ADF _A :	0.150	0.316
<i>Summer:</i>		
ADF _{DW} :	0.165	0.347
MMF _{DW} :	0.175	0.368
MWF _{DW} :	0.185	0.389
PDF _{DW} :	0.200	0.421
PHF _{DW} :	0.595	1.252
<i>Winter:</i>		
ADF _{WW} :	0.135	0.284
MMF _{WW} :	0.140	0.294
MWF _{WW} :	0.150	0.316
PDF _{WW} :	0.180	0.379
PHF _{WW} :	0.480	1.010

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¹ Population Basis: 4,375

5.4 WASTEWATER QUALITY

5.4.1 Current Influent Loadings

Influent BODs and TSS sampling and testing is conducted approximately four times per month. Influent BODs data for the period November 2014 to October 2015 is shown in *Table 5.5*; influent TSS data for the same period is shown in *Table 5.6*.

*Table 5.5: Influent BOD₅ Data
(November 2014 -October 2015)*

<i>Month</i>	<i>Number of Sample Events</i>	<i>Concentration (mg/l)</i>			<i>Loading (ppd)</i>		
		<i>Average</i>	<i>Max.</i>	<i>Min.</i>	<i>Average</i>	<i>Max.</i>	<i>Min.</i>
November	4	311	331	291	502	557	430
December	4	318	393	224	489	590	321
January	3	370	393	351	580	734	504
February	4	410	438	385	609	650	555
March	4	357	422	294	601	796	454
April	4	433	443	414	657	705	619
May	4	316	424	249	512	654	377
June	4	351	368	339	647	678	599
July	5	360	385	339	676	702	644
August	4	371	416	327	652	704	599
September	4	362	397	338	622	706	566
October	4	304	349	210	469	521	338
Summer	25	344	424	210	596	706	338
Winter	23	367	443	224	573	796	321
Annual	48	355	443	210	585	796	321

Table 5.6: Influent TSS Data
(November 2014 -October 2015)

Month	Number of Sample Events	Concentration (mg/l)			Loading (ppd)		
		Average	Max.	Min.	Average	Max.	Min.
November	4	201	212	191	322	338	295
December	4	165	198	103	255	325	148
January	3	170	190	138	268	346	198
February	4	188	201	190	280	292	248
March	4	175	194	144	287	414	222
April	4	195	220	172	296	350	265
May	4	160	210	89	262	364	135
June	4	122	165	85	227	323	159
July	5	171	200	130	297	368	247
August	4	219	245	201	387	449	340
September	4	195	202	189	335	375	316
October	4	175	210	140	272	324	202
Summer	25	174	245	85	297	449	135
Winter	23	182	220	103	285	414	414
Annual	48	178	245	85	291	449	449

Influent concentration data appears reasonable and does not include very low or very high figures that would suggest sampling errors or I/I.

Per capita BOD₅ and TSS Loadings are summarized in Table 5. 7. Average and Summer BOD₅ values are somewhat high. This is consistent with the substantial presence of visitors and tourists. TSS is relatively low throughout the year.

Table 5.7: Influent BOD / TSS Data
(November 2014 -October 2015)

BOD ₅ (ppcd)	TSS (ppcd)
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<i>Annual:</i>		
Average:	0.257	0.128
Average Monthly Maximum:	0.296	0.170
Daily Maximum:	0.349	0.197
<i>Summer:</i>		
Average:	0.261	0.130
Average Monthly Maximum:	0.296	0.170
Daily Maximum:	0.310	0.197
<i>Winter:</i>		
Average:	0.251	0.125
Average Monthly Maximum:	0.288	0.141
Daily Maximum:	0.141	0.182

¹Population Bases: 2,280 (See Section 5.2.4)

Design BOD5 and TSS loadings are summarized in Table 5.8.

Table 5.8: Influent BOD / TSS Data
(November 2014 -October 2015)

	2015		2035	
	BOD ₅ (ppcd)	TSS (ppcd)	BOD ₅ (ppcd)	TSS (ppcd)
<i>Annual:</i>				
Average:	585	291	1123	558
Average Monthly Maximum:	676	387	1297	743
Daily Maximum:	796	449	1527	862
<i>Summer:</i>				
Average:	596	297	1144	570
Average Monthly Maximum:	676	387	1297	743
Daily Maximum:	706	449	1355	862
<i>Winter:</i>				
Average:	573	285	1100	547
Average Monthly Maximum:	657	322	1261	618
Daily Maximum:	321	414	616	794

SECTION 6: COLLECTION SYSTEM IMPROVEMENTS

6.1 GENERAL

This section describes the process by which the proposed flows for the collection system were calculated as well as the impact of those results. Each branch of the gravity system was analyzed in addition to all four pump stations and their associated force mains. Some considerations were noted for expansion that might take place after the designated planning period for the study.

6.2 DESIGN PARAMETERS

Design flows for the collection system were calculated on an EDU basis at build out. A specific amount of square feet was designated per EDU for each zone. The zoning can be seen in *Figure 1.2* and the square foot per EDU are displayed in *Table 6.1*. The number of EDU's serving each sewer lateral and main and the flow in each, was calculated using the following equation:

$$EDU = \sum \frac{S_i}{D_i}$$

where: S is the total square foot for a given zone serving the sewer lateral or main, D is the square foot designation per EDU for that zone, and i is the summation for all the zones that are serving the given sewer lateral or main.

Once the EDU's were calculated for each sewer lateral or main they were multiplied by 125 Gallons/EDU, and increased by a peaking factor of 2.4 for a pipeline designed to run no greater than 50% full. Peak flows were then totaled for each main or lateral, including flows from upstream pipeline sections. This should be conservative for planning purposes.

The flow capacity for the gravity lines, given the slope, were calculated using Manning's equation shown below:

$$V = \frac{K}{N} (R_h)^{\frac{2}{3}} (S)^{\frac{1}{2}}$$

where V is the discharge velocity, K is the unit conversion factor, N is the Manning's coefficient, R_h is the hydraulic radius, and S is the slope of the pipe. The flow capacities were calculated with the pipes half full and can be seen in *Table 6.2*.

Table 6.1 - EDU Designation

<i>Description</i>	<i>FT.²/EDU</i>
Commercial	5,000
Multi-Family Res.	5,000
Industrial	20,000
Residential	10,000
Open Space	20,000
City Parks	30,000
Schools	10,000
Public Facilities	10,000

6.3 SYSTEM ASSESSMENT

Flows vs system capacity are shown in *Table 6.2*. Following is a list that summarizes the results of the analysis. Individual lines showing higher flow rates should be flow tested to confirm analysis:

- 1) All force mains appear to have sufficient capacity to handle projected flows and have additional capacity for growth after 2035.

Description	2035 Flow (gpm)	Capacity (gpm)
P.S. No. 1	850	850
Force Main No. 1	850	1670
P.S. No. 2	85	153
Force Main No. 2	85	235
P.S. No. 3	95	260
Force Main No. 3	140	529
P.S. No. 4	150	270
Force Main No. 4	176	529
8" Grav. Main	38	170
10" Grav. Main	138	260
12" Grav. Main	332	375
15" Grav. Main	362	667
18" Grav. Main	865	970
24" Grav. Main	1004	3813

Table 6.2 - System Flow Capacities

- 2) Most gravity lines appear to be sufficiently sized for 2035 flows with existing zoning, and provide capacity for growth with the exception of the main 18" gravity main and the 10" main that serves the Industrial Park, which may reach their capacity with increasing density of development and property annexations.
- 3) Pump capacities are well above the projected flow, with the exception of Pump Station No. 1. These pumps, the main 18" gravity main and the 10" main that serves the Industrial Park are the portions of the current collection system that will have the potential to be at or very near its capacity within the planning period. Dependent on whether flows reach the projected levels, on a peak hourly dry weather flow (PHFDW) basis, these system components will be marginal in capacity unless additional system capacity is developed. Density of development has increased significantly since the original system design, and it should be anticipated that this trend will continue in the future. A new Pump Station No. 5 and Force Main No. 5 should be planned and budgeted to reduce the flow to the 18" gravity main and Pump Station No. 1. The optimum location for a new major Pump Station No. 5 is on U.S.F.S. property planned to be sold for private development, which may further increase the flows to the existing system. The most economical

location for a new pumping facility would be where the existing 18" line approaches North Pine Street on the westerly side, although the pump station could be located at alternative locations along the 18" line. Alternate locations that appear feasible at additional cost are at the beginning of the 18" line just East of Highway 20, in the East Portal property.

The 10" mainline that serves the Industrial Park and then flows east to Pump station #1 also collects flow from the Edge of the Pines and Saddlestone subdivisions. This line will need to be intercepted after it leaves the Industrial Park and collects the northern downtown commercial areas in the general area of N. Larch St. and N. Locust St. A new mainline will need to be installed from that point to Pump station #1 to create new capacity in the existing 10" Industrial Park line. West of Highway 20, installation of the new Pump Station No. 5 will be required. Future development of all types in the City should provide SDC fees for the City's portion of the construction of this pump station, and developer contributions should be imposed for future development planned for the U.S.F.S. property. In addition, the needed force main will likely extend along Pine Street to potentially Jefferson Avenue or St. Helens Avenue to minimize construction costs. As parking, street, and sidewalk improvements continue, costs for construction of the needed force main will increase substantially. Force Main No. 5 should be extended to interconnect with the existing Force Main No. 1 at Jefferson Avenue or St. Helens Avenue, and a common force main from that point to the Wastewater Treatment Plant will suffice beyond 2035.

In addition to a need for additional pumping and main line capacity, the main pumps in Pump Station No. 1 will have been in operation for 20 years by 2021. These pumps currently pump all of the sewage transmitted to the wastewater treatment plant, and should be replaced within the planning period.

**SECTION 7:
WASTEWATER TREATMENT ANALYSIS**

7.1 WPCF PERMIT

Sisters Water Pollution Control Facilities (WPCF) Permit No. 101779 expired on February 28, 2011. A new permit has been issued by DEQ in 2016 and a copy of the Permit is provided in *Appendix C*. and expires December 31, 2025

- i. Schedule A of the permit includes provisions for waste disposal. Key provisions include: a permit flows basis of, less than or equal to, 0.38 mgd annual average daily influent flow; effluent to be disposed of in accordance with an approved Reclaimed Water Use Plan; and treated effluent may only be irrigated on land between April 1 through October 31 for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices.

Also included in the permit are the following bacterial limits which apply to the effluent and intended uses (from Schedule A (3)(b)):

- 1) Prior to reuse of treated effluent for Class D beneficial purposes, the wastewater shall comply with the following effluent limitations:

<u>Parameters</u>	<u>Limitations</u>
E coli	Shall not exceed a monthly geometric mean of 126 organisms/100mls and 406 E. coli organisms/100 milliliters in any single sample.

- 2) Prior to reuse of treated effluent for Class C beneficial purposes, the wastewater shall receive treatment required for Class C beneficial purposes and shall comply with the following effluent limitations:

<u>Parameters</u>	<u>Limitations</u>
Total Coliform	Shall not exceed a 7 day median of 23 organisms/100mls and no two consecutive samples shall exceed 240 organisms/ 100mls

The permit does not include other quantified effluent parameters such as BODs, TSS, and BODs and TSS removal efficiencies.

Minimum monitoring and reporting requirements are included in Schedule B of the permit. Monitoring requirements for influent and effluent are summarized in *Table 7.1*.

Table 7.1: WPCF (Permit 101779) Minimum Monitoring Requirements

<i>Item or Parameter</i>	<i>Minimum Frequency</i>	<i>Type of Sample</i>
<i>Influent</i>		
Total Flow (mgd)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
BODS	Weekly	Composite
TSS	Weekly	Composite
pH	3/Week	Grab

<i>Effluent</i>		
Total Flow (mgd)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
pH	3/Week	Grab
E. Coli Bacteria	1/Week	Grab*
Total Coliform	1/Week	Grab*
Chlorine Residual	Daily	Grab
Total P and Total N	Annually (During Irrigation)	Grab
Annual Irrigation Rate	Per Reclaimed Water Use	Per Reclaimed
Annual Nitrogen Loading	Plan	Water Use Plan

* The permittee is only required to sample for either E. coli or total coliform, but not both. If the permittee is irrigating on crops requiring only Class D quality effluent, E. coli shall be monitored. If the permittee is reusing the effluent for Class C uses, total coliform shall be monitored.

7.2 EFFLUENT QUALITY

Effluent quality data is limited to a few parameters and is collected during active irrigation periods. Effluent TSS data is summarized in *Table 7.2* for the 2014 and 2015 irrigation seasons.

Table 7.2: Effluent TSS Data

<i>Month</i>	<i>Parameter</i>	<i>Year 2014</i>	
		<i>TSS (mg/l)</i>	<i>TSS (lbs)</i>
April	Total	84	16
	Average Day	21	4
	Maximum Day	31	6
May	Total	90	173
	Average Day	18	35
	Maximum Day	23	47
June	Total	113	341
	Average Day	28	85
	Maximum Day	35	102
July	Total	118	528
	Average Day	29	144
	Maximum Day	51	220
August	Total	-	-
	Average Day	-	-
	Maximum Day	-	-
September	Total	-	-
	Average Day	-	-
	Maximum Day	-	-
Season (183 days)	Total	405	1058
	Average Day	24	67
	Maximum Day	51	220

¹ Estimated.

Based on *Table 5.6* annual average TSS loading of 227 ppd (101,105 lbs for year), and the average TSS removal efficiency was 80 percent.

Sisters samples and tests for *E. coli* rather than total coliform. *E. coli* data and chlorine data are summarized in *Table 7.3* for the 2014 and 2015 irrigation season.

Table 7.3: Effluent E. Coli and Chlorine Data

Month	Parameter	Year 2014			Year 2015		
		<i>E. coli</i> (MPN)	Chlorine (lbs)	Chlorine Residual (mg/l)	<i>E. coli</i> (MPN)	Chlorine (lbs)	Chlorine Residual (mg/l)
April	Total	-	60.28	138	-	40	94.2
	Average Day	1	2	4.6	1.0	2.3	6
	Maximum Day	-	6	3.3	1.0	5	9
	Minimum Day	-	2	0.08	0.0	0	1.2
May	Total	-	-	-	-	39.2	210
	Average Day	2	-	-	1.0	1.2	7
	Maximum Day	-	-	-	1.0	1.8	18
	Minimum Day	-	-	-	0.0	0.8	3
June	Total	-	81.4	257	-	51.2	202.5
	Average Day	2	2.7	8.5	4.25	1.7	6.75
	Maximum Day	-	5	31	11.0	5	20
	Minimum Day	-	0.8	2	0.0	1	0
July	Total	-	74.6	377	-	57.4	202
	Average Day	8.6	2.4	12	1.8	1.85	6.52
	Maximum Day	-	5	29	6.1	15	11
	Minimum Day	-	1.3	6	0.0	0.9	4
August	Total	-	33.9	248.2	-	53.1	199.1
	Average Day	8.9	1.4	9.3	3.6	1.71	6.42
	Maximum Day	-	1.6	22.7	11.0	4.1	11
	Minimum Day	-	0.5	2.1	0.0	0.8	0
September	Total	-	36.8	119.5	-	69.9	168.5
	Average Day	6.4	1.4	6.2	1.0	2.3	6
	Maximum Day	-	2.2	12.36	1.0	40	10
	Minimum Day	-	0.8	0	0.0	1.1	3
Season (183 days)	Total	-	286.98	1139.7	-	310.8	1076.3
	Average Day	4.82	1.65	6.77	2.12	1.84	6.45
	Maximum Day	-	30	31	11.0	40	20
	Minimum Day	-	0	0	0.0	0	0

There was an 8.3 percent increase in chlorine use in 2015 over 2014. All *E. coli* results are well within permitted limits.

Effluent nutrient data for August 2015 indicated the following:
Nitrate Nitrogen: 0.03 mg/l

Nutrient levels are reasonable and do not raise concerns regarding system performance or effluent loadings.

7.3 TREATMENT CAPACITY

7.3.1 Hydraulic Capacity

The treatment facility integrates both treatment and winter holding functions. Most treatment takes place in the first two cells; the third cell functions primarily as a storage reservoir for winter effluent holding and summer flow equalization and for storage associated with irrigation needs. Hydraulic capacity at the Sisters facility is therefore primarily related to the volumetric (holding) capacity of the pond system in general, and the holding pond specifically. Lagoon holding cell surface areas and volumes at various depths are shown in *Table 7.4*. Volumes are included for freeboard depths of less than 3.0 feet. Generally, facilities are not operated within this range; however, it does indicate potential reserve volume that could be utilized under extraordinary conditions.

Table 7.4: Holding Pond Surface Areas and Volumes

<i>Elevation (ft.)</i>	<i>Depth (ft.)</i>	<i>Water Surface Area (ft².)</i>	<i>Water Surface Area (Ac)</i>	<i>Incremental Volume (ft³)</i>	<i>Incremental Volume (Ac-ft)</i>	<i>Accumulated Volume (Ac.-ft.)</i>
3212	20	809,019	18.57	803,685	18.45	266.62
3211	19	798,351	18.33	793,046	18.21	248.17
3210	18	787,740	18.08	782,463	17.96	229.96
3209	17	777,186	17.84	771,937	17.72	212.00
3208	16	766,688	17.60	761,467	17.48	194.28
3207	15	756,247	17.36	751,054	17.24	176.80
3206	14	745,862	17.12	740,698	17.00	159.56
3205	13	735,533	16.89	730,398	16.77	142.55
3204	12	725,262	16.65	720,155	16.53	125.78
3203	11	715,047	16.42	709,968	16.30	109.25
3202	10	704,888	16.18	699,837	16.07	92.95
3201	9	694,786	15.95	689,763	15.83	76.89
3200	8	684,740	15.72	679,746	15.60	61.05
3199	7	674,751	15.49	669,785	15.38	45.45
3198	6	664,819	15.26	659,881	15.15	30.07
3197	5	654,943	15.04	650,033	14.92	14.92
3196	4	645,123	14.81	0	0	0.00

¹ Depth at deep end. 4.0 foot depth (elev. 3196) corresponds to 0.0 foot depth at shallow end of pond.

The aerated treatment cells, cell #1 and #2, are maintained at a depth of ten (10) feet (elevation 3209 feet). Utilization of potential capacity above elevation 3209

in the holding pond would require a comparable increase in cell #1 and #2 water surface elevations because of the hydraulic interconnections; as a result, the feasibility of utilizing potential capacity above elevation 3,209 feet is limited by the extent of surface agitation present in cell #1. For planning purposes, potential capacity above elevation 3209 feet will not be considered as a viable alternate to implementing capacity related improvements.

An abbreviated water balance for the period October 2014 to September 2015 is presented in *Table 7.5*.

Table 7.5: Water Balance (October 2014-September 2015)

Season	Initial Pond Depth (ft.)	Final Pond Depth (ft.)	Pond Volume Change (Ac.-ft.)	Influent Flow (Ac.-ft.)	Rain		Total Irrigation (Ac-ft)	Computed Evaporation	
					(in.)	(Ac-ft)		(in.)	(Ac-ft)
Holding (Oct. 2014 - Mar. 2015)	6	11.5	87.45	102.99	10.28	19.55	0.00	18.45	35.09
Irrigation (Apr.15-Sept. 15)	11.5	6	-87.45	114.32	3.34	6.35	155.36	27.74	52.76
Year (Oct. 2014-Sept. 2015)	6	6	0	217.31	13.62	25.90	155.36	46.19	87.85

Notes: Pond depth at deep end. Influent flow based in figures in *Table 5.1*. Rainfall records from Western Regional Climate Center. Tributary area based on area at elev. 3212 ft. for cells 1, 2, and 3. Irrigation totals based on DMR reported irrigation totals (in inches) for Dike and Forest irrigation. Evaporation computed by mass balance. Evaporation from water surface of cells 1, 2, and 3.

The U.S. Bureau of Reclamation AgriMet Station in nearby Bend, Oregon reported an average annual evapotranspiration value of 43.47 inches between 2003 and 2010. This provides corroboration for the computed figure of 43.60 inches and suggests that measurements associated with data in *Table 7.5* are relatively accurate.

A synthetic water balance to estimate the hydraulic capacity of the existing holding pond is presented in *Table 7.6*.

Table 7.6: Synthetic Water Balance and Estimate of Holding Pond Hydraulic Capacity

Season	Initial Pond Depth (ft.)	Final Pond Depth (ft.)	Pond Volume Change (Ac.-ft.)	Influent Flow (Ac.-ft.)	Rain		Evaporation		Total Irrigation (Ac.-ft.)
					(in.)	(Ac-ft)	(in.)	(Ac-ft.)	
Holding (Oct.-March)	4	17	212	227.54	10.28	19.55	18.45	35.09	0.0
Irrigation (Apr - Sept)	17	4	-212	252.57	3.34	6.35	27.74	52.76	418.16
Year (Oct.-Sept)	4	4	0	480.11	13.62	25.90	46.19	87.85	418.16

Notes: Influent flow (holding period) based on maximum flow to fill holding pond with allowances for rain and evaporation. Rain and evaporation data from Table 7.5 with no changes. Pond depth at deep end. Influent flow (irrigation period) determined by multiplying 114.32 Ac-ft (from Table 7.5) by the ratio of the holding period influent flows from Table 7.6 (227.54 Ac-ft) and the irrigation influent flows Table 7.5 (102.99 Ac-ft). Total irrigation computed as total volume needed to complete mass balance and return the pond level to 4 feet.

Table 7.7 relates current year 2015 and future year 2035 influent flows to current holding pond capacity. For purposes of the computation, rainfall and evaporation figures are not varied from year to year, and the means or adequacy of effluent disposal is not considered.

Table 7.7: Holding Pond Hydraulic Capabilities

Season	Maximum Holding Pond Capacity (Ac- ft)	Year 2015 Influent Volume (Ac- ft)	Year 2015 % of Maximum Capacity	Year 2035 Influent Volume (Ac- ft)	Year 2035 % of Maximum Capacity
Holding (Oct-March)	227.54	102.99	45.3	197.62	86.9
Irrigation (Apr-Sept)	252.57	114.32	45.3	219.36	86.9
Year (Oct-Sept)	480.11	217.31	45.3	416.99	86.9

The holding pond has sufficient reserve capacity to handle projected influent flows through year 2035. This assumes that the pond is managed such as to have a 4.0 foot depth at the end of the irrigation season. Currently, the end of season depth is approximately 6 feet in order to keep the surface aerators in operation and to avoid the need for removing the unutilized aerators prior to the pond freezing over.

7.3.2 BODs Capacity Evaluation

The treatment facility was designed to provide treatment for summer influent with an average of 759 ppd BODs and for winter influent with an average of 607 ppd. Current 2015 BODs loadings are 608 ppd (summer) and 554 ppd (winter). *Table 7.8* summarizes capacity and utilization for the existing treatment facility.

Table 7.8: BODs Loadings and Capacity Utilization

	<i>Influent (ppd)</i>	<i>Design Capacity (ppd)</i>	<i>Percent Capacity Utilization</i>
2015 Summer Average	608.0	759	80.1
2015 Winter Average	554.4	607	91.3
2035 Summer Average	1098.2	759	1.45
2035 Winter Average	1001.4	607	1.65

Based on projected system growth, winter influent BODs will reach design capacity in approximately 3 years (year 2018). Summer influent BODs will reach design capacity in approximately 7 years (year 2022). BODs handling capabilities are directly related to the aeration provided. As the BODs design capacity is approached, consideration should be given to upgrading the aeration capabilities of the system either through additional units or replacement with new equipment.

7.4 RECOMMENDATIONS

Assuming adequate irrigation opportunities can be provided and/or development of a stream discharge so as to utilize all net flows generated, the existing facility has sufficient hydraulic capacity to meet projected year 2035 demands. The existing facility has sufficient BODs handling capabilities to meet loading projected through year 2018 at which time aeration equipment will require upgrade or replacement. We recommend that this project be completed in 2017.

Existing aeration equipment is operating nearly continuously, and will need extensive maintenance or replacement during the planning period to year 2035. In addition, energy costs are becoming more expensive, and energy conservation options should be explored. Solar and wind powered aerators with electrical power assists are proving success for similar facilities. It is recommended that the existing units be upgraded with energy saving

eration devices as the units require replacement. Aeration equipment recommendations are described further in Section 10.

If water quality improvements are needed to allow other effluent disposal opportunities, such as stream discharge or less restrictive irrigation, then treatment improvements or alternate facilities will be needed. These should be developed consistent with the needs of the disposal scenarios considered. Other disposal opportunities are discussed in Section 8.

SECTION 8: WASTEWATER DISPOSAL

8.1 INTRODUCTION

8.1.1 Current Status

Sisters currently holds all effluent over winter and irrigates all effluent on sites adjacent to the treatment facility. The 100.3 acre irrigation site currently includes: *88.5 acres of forest with an annual application limit of 14.3 inches, and 11.8 acres of grass-covered dikes with an annual application limit of 28.79 inches* (the overall average application rate is 16.00 inches¹). Current (2015) application (reported) totals are: forest – 17.04 inches, and dikes - 30.20 inches. These totals did not include a correction for irrigation evaporation. The overhead sprinklers have an approximate 75% efficiency; therefore, *actual 2015 application totals were: forest -12.78 inches and dikes - 22.65 inches*. Although these totals are within imposed limits, it is evident that additional acreage for effluent irrigation must be provided in the near future on the Lazy Z Ranch.

With current City growth, the City must pursue expansion of irrigation opportunities on their portion of the Lazy Z Ranch in the near future. At the projected growth rate, Sisters must have new disposal options completed by 2018 to remain within permit conditions. Growth in the past five (5) years has averaged 1.91% per year, and projections anticipate that continued population growth will increase to a 3.23% rate through the year 2035.

8.1.2 Disposal Alternatives - Preliminary Considerations

The 1994 Wastewater System Engineering Study (WSES) included consideration of numerous effluent disposal alternatives including: year-round discharge to Whychus (formerly Squaw) Creek, wetlands polishing, winter holding and summer land irrigation, summer land irrigation and winter discharge to Whychus Creek, effluent filtration, and a subsurface drainfield. Treatment options were considered for Level 1 to Level 3 discharges. Subsequent discussions with DEQ indicated that Whychus Creek was considered to be a high quality water as (then) defined in OAR 340-41-026 and that stream discharge at any location would not be a viable option for Sisters. Moderate rate infiltration, which allows a controlled rate of subsurface percolation, was also considered to be a viable option. The City of Redmond was also pursuing a similar option at the time. Due to regulatory reservations and the great expense of demonstrating no adverse impact to groundwater, the subsurface disposal option was not deemed to be a viable option for Sisters. During preparation of the 1997 Wastewater System Facilities Plan (WSFP) it became apparent that winter holding

¹ [(88.5 acres)(14.3 inches) + (11.8 acres)(28.79 inches)]/100.3 acres = 16 inches

and summer irrigation was the only option practicable. The City's present system was developed against this background and history.

8.2 REGULATORY REQUIREMENTS

8.2.1 General Regulatory Requirements

General regulatory requirements related to wastewater disposal are described in:

- OAR Chapter 340, Division 40 (Groundwater Quality Protection)
- OAR Chapter 340, Division 41 (Water Quality Standards: Beneficial Uses, Policies, and Criteria for Oregon)
- OAR Chapter 340, Division 55 (Regulations Pertaining to the Use of Reclaimed Water (Treated Effluent) from Sewage Treatment Plants).

The rules include numerous provisions and exceptions, but in general reflect a concern with preservation or enhancement of receiving surface waters or groundwater. This is expressed in the OAR's as an anti-degradation policy.

8.2.2 WPCF Permit Requirements

Sisters' WPCF permit expired in 2011. DEQ has issued a draft WPCF permit which is anticipated to be issued in 2016. Schedule A of the draft Sisters' WPCF Permit includes the following provisions:

1. The permittee is authorized to construct, operate, and maintain wastewater collection, treatment and disposal systems to serve the City of Sisters in accordance with the conditions set forth in the permit.
2. The wastewater collections, treatment and land application system must not be hydraulically or organically loaded in excess of their respective, DEQ approved design capacities. At full build-out, however, the annual average daily influent flow must not exceed 0.38 MGD.
3. All wastewater treatment and disposal systems must be operated in compliance with the following conditions:
 - a. No discharge to state waters is permitted. All wastewater must be stored and treated for disposal by land application following sound irrigation practices.

b. Recycled Wastewater

- i. Prior to land application of the recycled water, it must receive at least Class D treatment as defined in OAR 340-055. Class D recycled water must not exceed a 30-day log mean day log mean of 126 E. coli organisms per 100 milliliters and 406 E. coli organisms per 100 milliliters in any single sample. Class C recycled water must not exceed a 7 day median of 23 organisms/100 milliliters and no two consecutive samples must exceed 240 organisms/100 milliliters.
- ii. Irrigation must conform to a Recycled Water Use Plan approved by DEQ and meet the required setbacks as defined in OAR 340-055.
- iii. The City of Sisters must restrict public access to the reuse site(s) for the protection of public health.
- iv. Treated effluent may only be irrigated on land between April 1 through October 31 for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices unless otherwise approved in writing by DEQ.
- v. Recycled water equipment must be operated so as to prevent:
 - (A) Prolonged ponding of treated recycled water on the ground surface;
 - (B) Surface runoff or subsurface drainage through drainage tile;
 - (C) The creation of odors, fly and mosquito breeding or other nuisance conditions;
 - (D) The overloading of land with nutrients, organics, or other pollutant parameters; and
 - (E) Impairment of existing or potential beneficial uses of groundwater.

(F) Until otherwise approved in writing by the Department via a revised reclaimed water use plan, treated effluent must only be reused on Class D beneficial uses.

4. The storage lagoon must be lowered sufficiently by the end of the irrigation season to ensure maximum practicable storage capacity during the non-irrigation months.
5. The permittee must, during all times of treatment and disposal, provide personnel whose primary responsibilities are to assure the continuous performance of the disposal system in accordance with the conditions of this permit.
6. No activities must be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

8.3 CURRENT DISPOSAL PRACTICES

8.3.1 Effluent Water Quantity and Quality

Quantity. Based on computations in *Table 7.5 (Water Balance Table)*, a total of 155.36 Ac-ft of effluent was produced in 2015.

Water Quality. Effluent quality is discussed in Section 7.3. There are no parameters of concern. Effluent is classed as Class D. Class D is the most restrictive in terms of application and use.

8.3.2 Irrigation Site

Irrigation Site. The existing wastewater treatment facility and reclaimed water use irrigation site is on a 160 acre site immediately south of the Sisters City Limits on the South ½ of Section 9, T 15S, 10 E, W.M. Irrigation of the lagoon dikes provide for approximately 11.8 acres of grass irrigation, and irrigation of a natural forest provides for another 88.5 acres of irrigation area. Site elevation is approximately 3,200 feet above mean sea level.

Soils. Soils in the existing wastewater treatment and irrigation site were sampled (84 drilled holes and 16 test pits) and evaluated in 1997 by Wert & Associates, Inc. Soils are generally well drained and consist of a fine sand or loamy fine sand top layer (4" to 20" deep) followed by brown sand to a depth of 35"-60". Gravels

and sands form the lowest layer sampled. Detailed descriptions are included in the City's original *Wastewater Reclaimed Water Use Plan*, HGE, Inc, April 2002.

8.3.3 Irrigation System

The existing irrigation site surrounds the wastewater treatment and holding ponds. Two separate irrigation systems are provided. The forest irrigation site is served by two separate 10-inch diameter PVC irrigation headers from the effluent pumps located in the control building. The dike irrigation system is fed through a looped 4-inch diameter irrigation system. A marking ribbon is buried with each pipe to indicate non-potable water. Two alternating 100 Hp pumps are provided to deliver treated reclaimed water to the forest irrigation system, and a single 15 Hp pump is utilized for the dike irrigation system.

8.3.4 Crops

"Crops" are limited to 88.5 acres of ponderosa pine - Juniper - sage and bitterbrush forest, and 11.8 acres of pond dikes planted with grass.

8.3.5 Effluent Application

Application Totals. Irrigation application totals for the season ending in 2015 are presented in *Table 8.1* for the existing irrigation site.

Table 8.1: Effluent Irrigation Application Totals (2015)

	<i>Irrigation Volume (Ac-ft)</i>	<i>Irrigated Acreage (Ac)</i>	<i>Net Application¹ (in.)</i>	<i>Permitted Application (in.)</i>	<i>Percent of Permitted Application</i>
Dike	29.69	11.8	22.65	28.79	78.7
Forest	125.67	88.5	12.78	14.3	89.4
Total	155.36	100.3	-	-	-

¹@ 75% efficiency.

The dike and forest irrigation systems are operated independently.

8.3.6 Access, Setbacks, and Aerosol Drift

Access and Setbacks. Public access is prevented from entry into the existing area by barb wire fences around the irrigation site, a 6-foot chain link site with barb wire around the treatment plant lagoon site, and locked gates for both. Signs are posted around the perimeter of the irrigation field to indicate the water is not safe for drinking and that effluent is being applied as irrigation. Site buffers include 10 feet from open waterways, 75 feet from the property boundary, on all except the North

boundary, where the USFS required a buffer of 250-300 feet in the environmental assessment for utilization of this site for reclaimed water use. At the present time, the setback from the North boundary of the treatment site is approximately 550 feet

Aerosol Drift. Adequate control of aerosol drift is now a regulatory requirement. Research in pesticide drift, for which studies and data are relatively abundant, indicate that drift is not linearly related to wind speed, but rather increases significantly as wind speeds reach approximately 15 mph. Guidelines for pesticide application (Clemson University Pesticide Information Program) recommends no application at times when wind speed exceeds 15 mph. Ontario, Oregon has used 15 mph as an upper limit in determining when effluent irrigation should be stopped.

Wind direction is also a factor, since wind blowing in a direction of potentially greater human contact increases potential exposure and compromises the adequacy of the aerosol control. The primary area of potential human contact in the vicinity of the irrigation site is along the North boundary; the prevailing NW and WNW winds blow toward the irrigation site, thereby significantly reducing this risk. In addition, the very large setback also significantly reduces any risks. Lastly, trees in the forest irrigation area also provide a barrier to wind drift of aerosols.

During the irrigation season, the prevailing wind direction is WNW and NW and the average wind speed is 8.8 mph. Monthly average wind data is summarized in *Table 8.2*. *Table 8.2* is based on Oregon Climate Service data for Redmond Airport.

Table 8.2: Irrigation Season Wind Data - Summary (Redmond Airport)

<i>Month</i>	<i>Prevailing Direction (From)</i>	<i>Average Speed (mph)</i>	<i>Percent of Time Exceeding</i>	
			<i>12 mph</i>	<i>19 mph</i>
April	WNW	9.2	18.9	2.4
May	NW	9.2	18.2	1.7
June	NW	9.0	16.9	1.5
July	NW	8.7	14.5	0.8
August	NW	8.3	11.3	0.7
September	NW	8.2	10.8	0.9
October	SSE	9.0	9.8	0.8
Average	NW	8.8	14.3	1.3

The City maintains a weather station on site. The system automatically terminates irrigation operations if winds are excessive. To date, excessive aerosol drift has not been noted. The existing SCADA system has the ability to shut down operations for the forest irrigation reuse system at any programmed wind speed.

8.4 COMPLIANCE EVALUATION

In general, the City is in compliance with its WPCF Permit and Reclaimed Water Reuse Plan. It should be noted, however, that to-date, City reported irrigation totals have not included a reduction for irrigation efficiency.

8.5 FUTURE IRRIGATION REQUIREMENTS

8.5.1 Water Quantity and Quality

Water Quantity. Projected year 2035 irrigation water disposal needs will be 282.5 Ac.ft., representing a 127.1 Ac.ft. increase over the current total of 155.36 Ac.ft. This estimate includes the assumption that precipitation and evaporation totals will be comparable and proportional to those indicated in *Table 7.6²* of the original plan.

Water Quality. No significant change in water quality is anticipated over the design period. However, new business proposals with high strength wastewater discharges, including water from commercial or industrial processes, should be evaluated by an engineer to determine the potential impact on treatment and disposal. It may be necessary to require pretreatment of some business wastewater prior to discharge to the public sewer.

8.5.2 Irrigation Acreage Needed

The current irrigation systems, when utilized to the DEQ permitted applications, taking evaporation into account, will allow for irrigation of 178.32 Ac-ft of reuse water. If land irrigation is to remain as the primary means of effluent reuse, approximately 95.33 net acres of new irrigation site³ with similar capabilities will need to receive reuse water to accommodate year 2035 projected growth (In addition to full usage of the existing site). This land area assumes continued application of Class D effluent. Any parcels considered will need to be sufficiently larger to accommodate set-backs, unsuitable areas, and areas that cannot be irrigated with the type of irrigation system selected.

8.5.3 Expansion Sites

During the design of the original City of Sisters wastewater system, reuse on adjacent farm lands, such as portions of the Lazy Z Ranch, was considered. However, ownership of the land at that time was opposed to effluent reuse, and none of the Lazy Z was made available for reuse purposes. Several alternative reuse sites were considered, but owners were hesitant to commit lands for use over an extended period of time, or required other considerations such as future development guarantees.

Near the completion of the November 2006 Wastewater System Capital Facilities Plan, the opportunity arose for the City of Sisters to purchase 230.98 acres of the Lazy Z Ranch, in close proximity to the wastewater treatment facility. This site should have adequate area for effluent reuse, without modifications to the existing reuse site, for the design period of 2035 and beyond. Soils on the site were extensively sampled by Wert & Associates, Inc. prior to the purchase, and the majority of the purchased site appears to meet Oregon statutes for effluent reuse with Class D effluent. This site is immediately accessible from the existing wastewater treatment plant and effluent reuse site, contains adequate land area for required buffers to meet Oregon DEQ regulations, and topography is conducive to installation of automated type reuse systems. Portions of the purchased land has been farmed for many years, and effluent reuse can provide benefit to crop production on this portion of the site. A 62-acre portion of the Lazy Z site remains forested, and it is anticipated that this area will be the first to receive reuse waters, since it is remote from residential homes and is bounded on two sides by other forested properties. 3200' of mainline was installed to this area as part of the Uncle John Ditch piping project. This site is planned to receive reuse waters in a manner very similar to the existing reuse site, with the existing effluent pumps, a similar forest irrigation system for disposal, identical irrigation rates of application, use of the existing weather control system to control aerosol drift, and the existing SCADA system for reuse operation on both the existing and Lazy Z sites. Effluent reuse on remaining portions of the Lazy Z can utilize higher application rates, dependent on the crop utilized for harvesting. Crop choices for farmed sections of the site were analyzed in the 2013 Reuse Study and options are provided for future decision making.

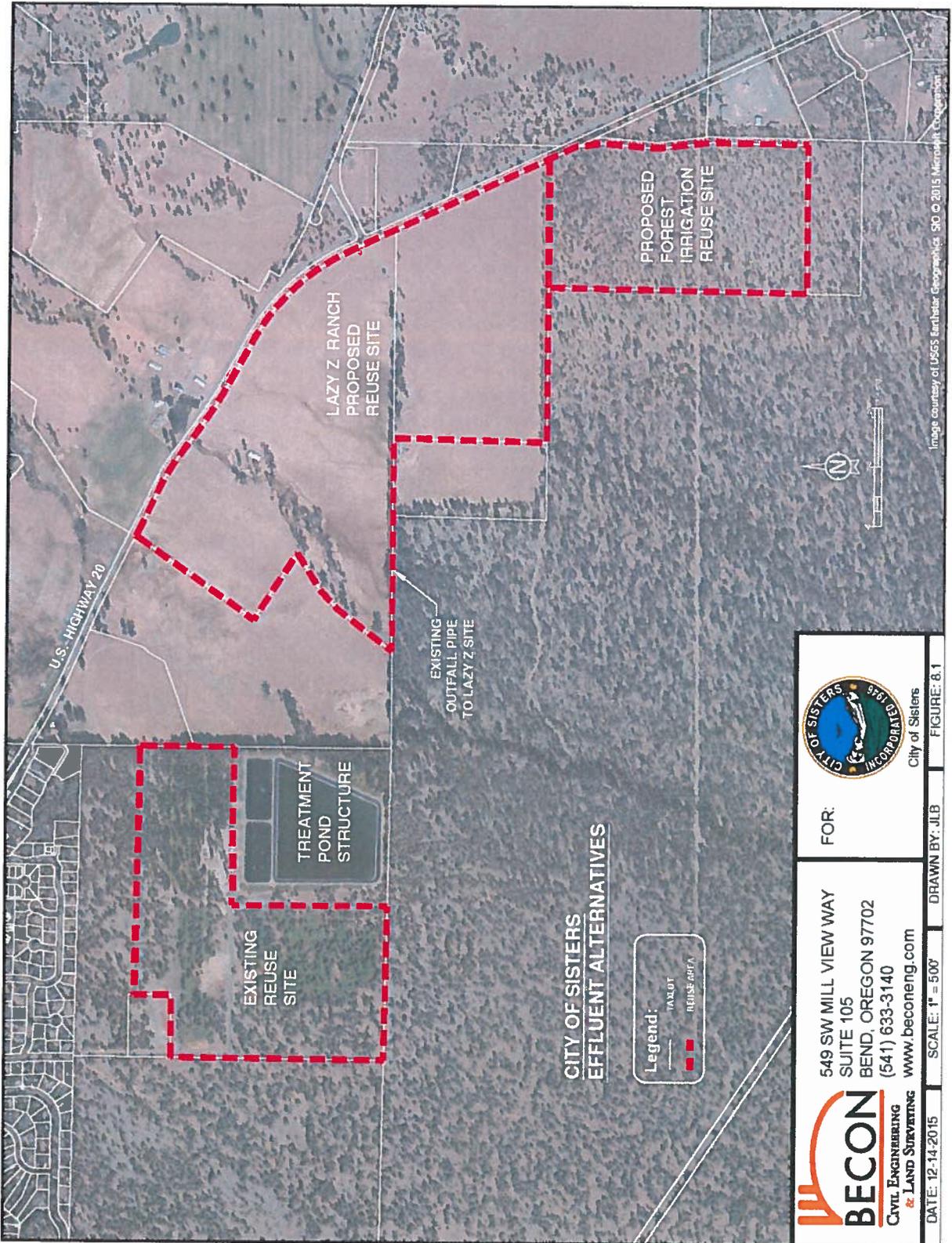
Figure 8.1 shows the proximity of potential reuse and disposal sites described in this plan.

8.5.4 Disinfection System

The existing hypochlorite system is designed to provide 60 minutes of contact time at the capacity of the irrigation pumps (1,000 gpm each). Allowing for higher mid-summer application rates, and potential downtime for wind, the system should be adequate for projected year 2035 needs.

8.5.5 Irrigation System

Any new irrigation areas developed will need an irrigation system constructed and connected to the existing system. The two existing irrigation pumps (1,000 gpm each) should be adequate to transfer effluent to the irrigation site for the planning period to year 2035.



8.6 RECOMMENDATIONS

Effluent disposal recommendations are summarized below:

- Continue with forest and dike irrigation up to the maximum allowed.
- Develop the forested 62-acre (net 49 acres) portion of the Lazy Z site as described previously, in a very similar manner to the existing City reuse site as part of the Phase I Lazy Z Re-use improvements.
- Expand effluent disposal onto the remaining portions of the Lazy Z property as outlined in the 2013 Wastewater Re-Use study (Appendix A)
- The City of Sisters purchase of the 230.98 acre portion of the Lazy Z assures the City of a long term reuse site, with immediate accessibility to the existing wastewater treatment plant. The site appears to meet all of the Oregon Department of Environmental Quality effluent requirements for Class D reuse application, and a water reuse plan needs to be updated and approved by DEQ prior to disposing of effluent.
- The City of Sisters must continue to plan for long term disposal of wastewater effluent from the expanding community.

SECTION 9: BIOSOLIDS MANAGEMENT

9.1 INTRODUCTION

Biosolids contain beneficial nutrients and soil conditioning properties for vegetation; however, they also contain viruses, parasites, and other disease-causing organisms (pathogens) considered potentially dangerous to human health and the environment. Biosolids are not stabilized when removed from the waste stream and must be handled and disposed of properly. Biosolids management practices are therefore needed to reduce the biological activity of the sludge and make it a relatively benign material for final disposal.

9.2 GENERAL REGULATORY REQUIREMENTS

Regulations for biosolids use and disposal were promulgated on February 19, 1993, as 40 CFR Part 503 (Subpart D). The regulation protects public health and the environment through requirements designed to reduce the potential for contact with disease-bearing microorganisms (pathogens) in wastewater biosolids applied to the land or placed on a surface disposal site. Wastewater biosolids cannot be applied to land or placed on a surface disposal site unless it has met the following two requirements:

- Requirements for pathogen reduction.
- Requirements to reduce the potential of the sewage to attract vectors (rodents, birds, insects, and other organisms that can transport pathogens).

Compliance with these two requirements must be demonstrated separately, which allows for some flexibility in biosolids management practice. The basic concepts for implementation of these rules are to understand potential routes of exposure to biosolids, both direct and indirect contacts. Direct and indirect contacts are defined as:

Direct Contact:

- Inadvertent contact with wastewater biosolids.
- Walking through an area (i.e. field, forest, or reclamation area) shortly after wastewater biosolids application.
- Handling soil and raw produce from fields or home gardens where wastewater biosolids has been applied.
- Inhaling microbes that become airborne (via aerosols, dust, etc.) during wastewater biosolids spreading or by strong winds, plowing, or cultivating the soil after application.

Indirect Contact:

- Consumption of pathogen-contaminated crops grown on wastewater biosolids amended soil or of other food products that have been contaminated by contact with these crops.
- Consumption of pathogen-contaminated milk or other food products from animals grazing in pastures or feed crops grown on wastewater biosolids amended fields.
- Ingestion of drinking water or recreational waters contaminated by runoff from nearby land application sites or by organisms from wastewater biosolids migrating into groundwater aquifers.
- Consumption of inadequately cooked or uncooked pathogen-contaminated fish from water contaminated by runoff from a nearby land application site.
- Contact with wastewater biosolids or pathogens transported away from the land application or surface disposal site by rodents, insects, or other vectors, including grazing animals.

Understanding routes of potential exposure allows for development of an overall strategy to protect public health and the environment. The biosolids rules were developed to implement this strategy. The overall strategy is described as follows:

- Reduce the number of pathogens in wastewater biosolids through treatment and/or environmental attenuation.
- Reduce transport of pathogens by reducing the attractiveness of the sewage wastewater biosolids to disease vectors (insects, rodents, birds, and other living organisms that can transport pathogens).
- Limit human and animal contact with the wastewater biosolids through site restrictions to allow natural die-off to reduce pathogen levels to low levels.

A detailed discussion of pathogen reduction requirements, vector attraction reduction requirements, and land application for biosolids disposal, is included as *Appendix 9.1*.

9.3 WPCF PERMIT REQUIREMENTS

Schedule D of Sisters draft WPCF Permit (No. 101779) includes the following special conditions:

Within 6 months of such time as the sewage lagoons require removal of accumulated biosolids, the permittee shall submit a biosolids management plan that complies with the Department's biosolids management regulations as established in OAR 340-50

This permit may be modified to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in this permit.

9.4 CURRENT BIOSOLIDS TREATMENT AND DISPOSAL

Sisters retains all biosolids in its aerated lagoon treatment and holding facilities. The City has not yet needed to dredge and dispose of accumulated solids, nor has it been required to do so by any regulatory authority. The City should plan for removal in Lagoon 1 in 2021, the 20th year of operation.

Untreated solids, separated from the raw wastewater by means of the fine screen at the headworks, are collected, bagged, and sent to the Deschutes County Landfill.

9.5 ACCUMULATED BIOSOLIDS

9.5.1 Quantity

Solids accumulations in pond systems can vary considerably based on overall facility sizing and relative BOD₅ loading rates. As long as a facility is not overloaded (with BOD₅), solids tend to be digested over an extremely long retention time. It is quite common for such facilities to go well beyond their initial design life prior to needing solids removal. The original design provided additional depth in the lagoon system to provide an allowance for solids accumulation, without impacting the effective hydraulic capacity of the facility under normal hydraulic regimes, and this will allow for accumulation over time.

Because of the potential variability in real-world solids accumulations, the most reliable means of determining accumulations and, potentially, accumulation rates, is by physically sampling with a device called a "sludge-judge". As average BOD₅ influent loadings approach that of the facilities design, sampling should be undertaken to determine the amount of accumulated solids. Recommendations for handling the accumulated solids, or recommendations for future sampling, can be made at that time. The City of Sisters has acquired a sludge-judge and should periodically taken measurements of sludge depths, in order to calculate cumulative sludge volume.

Increased loading to this facility will ultimately create a need for some level of solids removal, and planning to the year 2035 should make provisions for removal and disposal of biosolids in compliance with an approved biosolids management plan. Cost projections for biosolids removal are provided in Section 10.

9.5.2 Quality

No sampling or testing of accumulated solids has been conducted to date. Typical test parameters for any given treatment facility are fairly extensive. Testing is primarily conducted to verify compliance with pathogen reduction requirements, vector attraction reduction requirements, and constituents that may potentially limit application, site usability, and longevity. Small rural, primarily residential, communities typically generate biosolids that comply with all regulatory requirements - assuming proper sizing and operation of the treatment facility. Sampling and testing is not needed at this time. Future timing and need for biosolids removal will necessarily be based on results of sampling and measurement of accumulated solids (as discussed in Section 9.5.1).

9.6 COMPLIANCE EVALUATION

Sisters is basically in compliance with requirements of its WPCF Permit. The City has not yet developed a need for a biosolids management plan.

9.7 RECOMMENDATIONS

As the treatment facility approaches its design BOD₅ capacity, the City should sample accumulated solids in the cells, determine accumulation depths, and determine if removal of the solids is warranted. Planning for development of a disposal site and a biosolids management plan, in full conformance with Oregon DEQ requirements, should be anticipated within three (3) years. Anticipated costs for a biosolids management plan and for biosolids removal from the existing lagoon system are provided in Section 10.

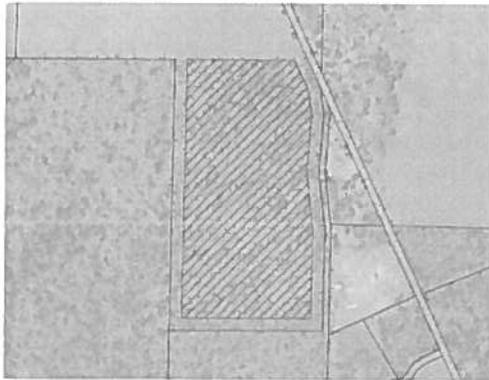
SECTION 10: IMPROVEMENT RECOMMENDATIONS

10.1 Effluent Reuse Disposal Improvements:

The Lazy Z Ranch property provides multiple possibilities for effluent reuse expansion. Both forest irrigation and crop irrigation opportunities are available.

Forest Irrigation Effluent Expansion: A 49 acre forested area (after accounting for all setbacks) is available for effluent irrigation at the far southeast corner of the Lazy Z Ranch property. It is anticipated that this area would have a permitted application rate of 14.3 inches per year and could be connected to the existing pipeline which terminates approximately 900 feet from the site. This area could provide for the disposal of 77 acre feet of effluent per year.

This expansion would increase the City's effluent disposal capacity from 178 acre feet per year to 255 acre feet per year. Assuming constant sewer influent growth rates, this expansion would provide effluent disposal capacity until 2031.



Forest Irrigation Area with an effluent disposal potential of 77 acre feet per year

Crop Irrigation Effluent Expansion: A 52 acre crop land area (after accounting for all setbacks) is available for effluent irrigation in the southeast portion of the Lazy Z Ranch property. It is anticipated that this area would have a permitted application rate of 28.79 inches per year (the same as the existing dike irrigation area) and could be connected to the existing pipeline which terminates in the center of the site. This area could provide for the disposal of 166 acre feet of effluent per year. The disadvantage of this area is that it would have to be a managed crop with maintenance costs. Per the 2013 Wastewater Reuse and Conservation Project Planning Study (Appendix A), this area would be best managed as a hay crop or an ornamental tree crop.

This expansion would increase the City's effluent disposal capacity from 178 acre feet per year to 344 acre feet per year, which would account for all effluent reuse demand until full UGB build out.



Crop irrigation with an effluent disposal potential of approximately 166acre feet per year

It is recommended that Forest irrigation improvements are constructed prior to 2018 to maintain compliance with DEQ effluent permit limits. It is recommended that Crop Irrigation improvements are implemented prior to 2031 to again maintain compliance with DEQ effluent permit limits.

Costs for Effluent Reuse Expansion Improvements:

Conceptual plans have not yet been prepared, but for budgetary purposes, the approximate costs for effluent expansion improvements are as follows:

Forest Irrigation Effluent Expansion

Construction Cost		\$485,000
Engineering and Administration	(10%)	\$ 48,500
Contingency Factor (10%)		\$ 56,100
Estimated Total Cost		\$579,600

Crop Irrigation Effluent Expansion

Cost (provided by Water Reuse Study)		\$786,857
Estimated Total Cost		\$786,857

10.2 Treatment Plant Improvements:

Treatment Facility Software and Security System Upgrades

This infrastructure is shown in the capital facilities plan as a short term priority. The proposed software improvements will improve monitoring of activities at the treatment plant. Security system upgrades include additional software and on-site cameras to provide additional monitoring of the treatment plant and disposal sites. It is recommended that these improvements be implemented by 2018.

Treatment Facility Software and Security Upgrades

Software and Security Upgrades		\$72,000
Contingency Factor (10%)		\$ 7,200

Estimated Total Cost **\$79,200**

Aeration Improvements

The Capital Facilities Plan recommends replacement of the existing aerators at the treatment plant to provide more aeration which will improve the capacity and efficiency of the treatment process in the lagoons. The aeration improvements are recommended to be implemented by 2018 which is when the treatment plant will have been in operation for 17 years. If BOD design loading limits are exceeded then aeration improvements will be necessary to provide adequate treatment.

Replacement of Aeration Equipment in Effluent Ponds

Replacement of Existing Aerators	\$185,000
Engineering and Administration (10%)	\$ 18,500
<u>Contingency Factor (10%)</u>	<u>\$ 20,350</u>
Estimated Total Cost	\$223,850

Biosolids Removal

Biosolids Removal includes the removal of "sludge" or the remaining material in the treatment ponds after treatment. These biosolids accumulate in the ponds and reduce the capacity of the treatment ponds over time. The removal of biosolids requires the creation of a biosolids management plan to determine the disposal methods and locations of the material. It is recommended that the biosolids management plan be prepared in 2017 and that preparations for the biosolids removal could begin as early 2018, which is 17 years from the construction of the treatment facility.

Biosolids Removal and Disposal

Biosolids Management Plan	\$ 24,000
Biosolids Removal	\$240,000
<u>Contingency Factor (10%)</u>	<u>\$ 26,400</u>
Estimated Total Cost	\$290,400

10.3 Collection System Improvements

Pump Station #1 New Pumps

The existing pumps at Pump Station #1 are anticipated to reach capacity between 2022 and 2025. It is recommended that the existing pumps be replaced by larger pumps when the pumps are at a maximum of 75% of their operating capacity.

Pump Station #1 New Pumps

Pump Replacement	\$106,000
<u>Contingency Factor (10%)</u>	<u>\$ 10,600</u>
Estimated Total Cost	\$116,600

Locust Street Interceptor

The Locust Street Interceptor is a proposed new sewer main which will divert sewer flows from the area of town north of Adams Avenue and east of Pine Street. Sewer

main lines located on North Locust St and Black Butte Avenue will be reaching their design flow capacity prior to full build-out of the UGB. It is recommended that the Locust Street Interceptor be constructed by 2020.

Locust Street Interceptor

Sewer Main Construction	\$420,000
Engineering and Administration (10%)	\$ 42,000
Contingency Factor (10%)	<u>\$ 46,200</u>
Estimated Total Cost	\$508,200

West Side Pump Station and Force Main

The West Side Pump Station and Force Main is primarily tied to the development of the USFS property between Pine Street and Hwy 20. This force main provides an alternate route for sewer flows directly to the treatment plant, by-passing Pump Station #1. The timing of this infrastructure improvement would be based on the sale and development of the USFS property.

West Side Pump Station and Force Main

West Side Pump Station	\$ 925,000
West Side Force Main	\$ 321,000
Engineering and Administration (10%)	\$ 124,600
Contingency Factor (10%)	<u>\$ 137,060</u>
Estimated Total Cost	\$1,507,660

10.4 Proposed Sewer System Infrastructure Improvements Timing and Cost Summary

Project Description	Timing	Project Cost (rounded)	Potential Funding Source(s)
Effluent Expansion Phase I (Forest)	2017-18	\$580,000	SDC Fund/Grants/Loans
Treatment Plant SCADA/Software Upgrades	2017-18	\$80,000	SDC/Operating Funds/Grants/Loans
Locust Street Interceptor	2020	\$509,000	SDC/Operating Funds
Aeration Improvements	2017	\$224,000	SDC/Operating Funds
Biosolids Management Plan	2017	\$27,000	Operating Fund
Biosolids Removal	2018	\$264,000	Operating Fund
Pumpstation #1 New Pumps	2022-25	\$117,000	SDC/Operating Funds
Effluent Expansion Phase II Crop Irrigation	2031	\$787,000	SDC Fund/Grants/Loans
Westside Pumpstation and Force Main	USFS Development	\$1,508,000	SDC/Development
Total:		\$4,096,000	

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SECTION 11

FINANCE OPTIONS

11.1 INTRODUCTION

The funding of needed wastewater improvements for the City of Sisters may utilize one or more of the following funding sources:

- Sale of Bonds by Acquiring Federal or State Grants and/or Loans
- Special Assessments
- Local Improvement Districts
- Serial Levies
- Capital Improvements (Sinking) Funds
- Systems Development Charges

The most successful financing plans utilize state or federal grants and/or loans that best address the characteristics of needed improvements. It is difficult to finance improvements with grant funding alone, and grant funding in general is limited. Some level of local funding or borrowing from available loan programs is usually necessary, although some cities accumulate sufficient reserves for construction. Funding programs vary in terms of their economic impact on the community, and often are created with specific program focuses. Some programs are available to create and retain jobs or benefit areas of low to moderate income families. Other programs provide for specific types of infrastructure improvements, such as improvements to address wastewater related compliance issues.

A thorough consideration of applicable state and federal funding programs, in addition to a potential means of securing local funding, is needed to minimize the long-term cost of wastewater system improvements, while providing quality construction.

If the City decides to pursue agency funding for recommended projects, it should contact Oregon DEQ, Oregon Business Development (Infrastructure Finance Authority), USDA and Rural Community Assistance for information and scheduling of a one-stop meeting. One-stop meetings are held in Salem or in Sisters. These meetings bring together staff from the various agencies that could potentially contribute funds, and representatives of the community, to discuss the project and funding needs. Staff has already begun this process and preliminary meetings have occurred in anticipation of adoption of this Master Plan.

This section is intended to provide a general overview of recently available programs. **Agency and program policies are continually evolving and specifics may vary if funding of improvements is delayed to any major extent.**

demographics / economic distress). Up to \$500,000 in principle forgiveness is available for distressed communities. Between \$500,000 and \$1,000,000 can be available for Green Infrastructure / Storm Water restoration projects

11.2.3 Infrastructure Finance Authority (IFA)

Oregon Health Authority / Safe Drinking Water Revolving Loan Fund (SDWRLF) – This program offers funding for resolving potential or existing compliance issues. Loans can be amortized for up to 20 years at 80% of the current Municipal Bond market rate. For distressed communities loans are available for up to 30 years at 1% interest.

11.2.4 League of Oregon Cities (LOC)

Capital Asset Program – This loan program is available through LOC for cities that lack the expertise to avail themselves of public market financing. It offers Municipal Bond funds at market rates.

11.2.5 Municipal Bond Financing

The city of Sisters can use the Municipal Bond markets, through an underwriter, to obtain financing at then current market rates.

11.3 LOCAL FUNDING SOURCES

A significant portion of a project may need to be financed with local funding sources. Local funding sources are listed below:

- General Obligation Bonds
- Revenue Bonds
- Improvement Bonds (*Local Improvement District*)
- Serial Levies
- Sinking Funds
- Ad Valorem Tax
- System User Fees
- Assessments
- System Development Charges (*SDC's*)

The 1991 legislature clarified and defined the impact of Ballot Measure 5 on municipal finance in several special ways. Cities, counties, and special districts need to clearly

understand, and follow these rules, when they consider bonding for the financing of needed improvements.

The following information was provided in part by Howard A. Rankin, retired Bond Counsel:

1. Chapters 287 and 288 of the Oregon Revised Statutes describe the borrowing and bonding of counties, cities, and special districts, generally.
2. The advance sheets of the Laws of 1991 indicate that the general bond limitations of ORS 287.004 are still in force. Except with regard to the old 3% limitation on all issued and outstanding bonds, on true-cash value of all taxable property within the city's boundaries, has been changed to a 3% limitation on "real market value" as determined by the County Assessor.
3. The above limitation still does not apply to bonds issued for water, sanitary or storm sewers, sewage disposal plants; nor to bonds issued to pay assessments for improvements in installments under statutory or charter authority (i.e., revenue bonds).

A description of each of the preceding listed funding sources follows.

11.3.1 General Obligation Bonds

Financing of wastewater improvements by General Obligation (*G.O.*) Bonds is accomplished by the following procedures:

1. The City Engineer prepares a detailed cost estimate to determine the total monies required for construction.
2. An election is held.
3. When voter approval is granted (by a simple majority or a majority of the registered voters, depending on when the vote occurs), bonds are offered for sale. The money for detailed planning and construction is obtained prior to preparation of final engineering plans and the start of project construction unless interim financing has been developed.

G.O. bonds are backed by the full credit of the issuer and authorize the issuer to levy ad valorem taxes. The issuer can make the required payments on the bonds solely from the new tax levy or may instead use revenue from assessment, user charges, or some other source.

Oregon Revised Statutes limit the maximum term of G.O. bonds to 40 years for cities and 25 years for sanitary districts. Except in the event that RD purchases the bonds, the realistic term for which general obligation bonds would be issued is 15 to 20 years.

Ballot Measure 5 has limited the ability of communities to levy property taxes. Capital improvement projects, such as the proposed wastewater system improvements, are exempt from property tax limitations if an election is held and new public hearing requirements are met.

Cities, counties and special districts (all non-school taxing entities) must be very careful when seeking approval from the voters for a general obligation bond, new tax base, annual budget levy, or special levy. The current law now requires that all non-school taxing entities, including cities, counties, and special districts, hold a special public hearing more than 30 days before filing the election statement with the County Clerk. Notice of this special public hearing must be sent to all other non-school taxing entities with overlapping taxing jurisdictions no later than 10 days before the special public hearing. This special public hearing offers the opportunity for all overlapping taxing entities to determine the compaction impact of the proposed election on their respective assessment capability. Effectively, the municipality proposing the election measure must be thoroughly prepared with notice of special public hearing published no later than 41 days before a final public hearing and filing of the election statement.

If the special public hearing procedures are not followed, and no certificate is included in the filing that attests that the special public hearing was conducted pursuant to law, the County Clerk is required to reject the filing for an election. This results in additional unnecessary delays. Consideration should be given to hiring a competent Bond Counsel before proceeding with a General Bond Election. This action will insure that all requirements of current law are met.

Since bonding requirements are very stringent, most recent municipal improvements have been financed with either revenue bonds or one of the state financing programs which can be accomplished outside of bonding requirements.

11.3.2 Revenue Bonds

A revenue bond is one that is payable solely from charges made for the services provided or from collection of Systems Development Charges, although the City would need to be very careful that SDCs would be collectible. Such bonds cannot be paid from tax levies or special assessments, and their only security is the borrower's promise to operate the wastewater system in a way that will provide sufficient net revenue to meet the obligations of the bond issue. Revenue bonds are most commonly retired with revenue from user fees.

Successful issuance of revenue bonds depends on bond market evaluation of the dependability of the revenue pledged. Normally there are no legal limitations on the amount of revenue bonds to be issued, but excessive bond issue amounts are generally unattractive to bond buyers because they represent high investment risk. In rating revenue bonds, buyers consider the economic justification for the project, reputation of the borrower, methods for billing and collection, rate structures, and the degree to which forecasts of net revenues are realistic. RD will fund revenue bonds in which user rates are committed for the repayment of the bonds.

Under the provisions of the Oregon Uniform Revenue Bond Act (ORS 288.805-288.945), municipalities may elect to issue Revenue Bonds for revenue producing facilities without a vote of the electorate. In this case, certain notice and posting requirements must be met including a mandatory 60-day waiting period. A petition signed by 5% of the municipalities' registered voters may cause the issue to be referred to an election.

Laws enacted by the 1991 legislature have eliminated the limitation on revenue bonds. The law formally required that the revenues pledged for payment of the bonds have a direct relationship to the services financed by the bonds. Current law now allows revenue bonds to be paid with any revenue pledged for "any public purpose," without the relationship restriction.

11.3.3 Improvement Bonds (Local Improvement District)

Improvement bonds may be issued to assess certain portions of wastewater improvements directly against the parties being benefitted. An equitable means of distributing the assessed cost must be utilized so that all property, whether developed or undeveloped, receives the assessment on an equal basis. Cities are limited to improvement bonds not exceeding 3% of true cash value. For a particular improvement, all property within the assessment area is assessed on an equal basis, regardless of whether it is developed or undeveloped.

Improvement bond financing requires that an improvement district be formed, the boundaries established, and that benefitted properties and property owners be determined. The engineer usually determines an approximate assessment based on a square-foot, a front-foot basis, or a combined basis. Property owners are then given an opportunity to remonstrate against the project. The assessment against the properties is usually not levied until the actual total cost of the project is determined. Since this determination is normally not possible until the project is completed, funds are not available from assessments for the purpose of making monthly payments to the contractor. Therefore, some method of interim financing must be arranged, or a pre-assessment program, based on the estimated total costs,

must be adopted. It is common practice to issue warrants, which are paid when the project is completed, to cover debts.

The primary disadvantages to this source of revenue (improvement bonds) are described below:

1. The property to be assessed must have a true cash valuation at least equal to 50% of the total assessments to be levied. This may require a substantial cash payment by owners of undeveloped property.
2. An assessment district is very cumbersome and expensive when facilities for an entire community are contemplated.
3. The project is impacted by Measure 5 tax limitations because the improvement bonds are backed or guaranteed by the city's authority to raise revenue via taxation. If the city is in compaction, then a general election (same procedures as for a general obligation bond) is required. If the city's property taxes are not under compaction, then the city can proceed with a L.I.D. as in the past; however, the project cost will count against the \$10.00 limitation for non-school taxes.

This program should not be considered for improvements to satisfy the City's needs in general, but could be a definite consideration for specific projects benefitting an area of the community.

11.3.4 Serial Levies

Under Oregon Revised Statutes, if approved by the voters, the City can levy taxes for a fixed period of time to construct new facilities and maintain existing facilities. Generally, when a serial levy is presented to the voters, it is based upon a specific program and listing of planned improvements.

Since the time frame required for construction of the needed wastewater improvements is quite limited, it is doubtful that residents could afford a serial levy of sufficient size to provide for needed construction revenues.

11.3.5 Sinking Funds

Sinking funds can be established by budget for a particular capital improvement need. Budgeted amounts, from each annual budget, are carried in a sinking fund until sufficient revenue is available for the needed project. Funds can also be developed with revenue derived from system development charges or serial levies. The City's wastewater system financial needs can be met with a sinking fund,

although the cost of needed facilities will be higher after funds are collected than if revenues are utilized to repay a loan for construction in the near term.

11.3.6 Ad Valorem Tax

Many communities utilize an ad valorem tax as the basis for repaying general obligation bonds for system expansions, and provide partial or full repayment through means of additional wastewater use charges. This means of financing reach all properties to be ultimately benefitted by the wastewater system, whether the property is presently developed or not. Construction costs are more equally distributed among all property owners and the program does not impose a penalty on existing residential or business development. However, with Oregon tax limitations and the public's perception of taxes, this means of securing funds would not be popular.

11.3.7 System User Fees

Monthly charges are made to all residences, businesses, etc., that are connected to the wastewater system. Wastewater use charges are established by resolution, and can be modified as needed to serve increased or decreased operating costs. Rates are established depending on the various classes of users and the metered demand through their connection. By establishment of proper use charges, the City could repay the local share of bond amortization without imposition of property taxes. An increase in user fees could finance portions of the wastewater system that are maintenance related, particularly if done in conjunction with a revenue bond.

11.3.8 Assessments

In some cases the beneficiary of a public works improvement can simply be assessed for the cost of the project. It is not uncommon for an industrial or commercial developer to provide up-front capital to pay for a community administered improvement which serves the development.

11.3.9 System Development Charges

System Development Charges (*SDC's*) are charges assessed against new development to recover the costs incurred by local government who provide the capital facilities required to serve the new development. *SDC's* apply to new developments that generate revenue for the expansion or construction of facilities located outside the boundaries of new development. When capital improvements increase usage, *SDC's* can be billed for water, wastewater, drainage and flood control, transportation, and parks or recreational facilities.

11.4 PROPOSED FINANCIAL PROGRAM

Initially it appears that either the DEQ or IFA programs may be the most attractive since they offer lower rates and the potential for grants / principle forgiveness as well as loans at below market rates. Funding is likely to be predominantly loan, under any of the available funding programs.

A combination of loan, grant and systems development charges are recommended for funding of needed system improvements. Systems Development Charges should fund system improvements either through repayment of loans, or potentially by utilizing sinking funds to pay for improvements as monies become available. After selection of the initial project scope, the City will contact the IFA, DEQ and Regional Solutions Team to schedule a one-stop meeting with available state and federal funding agencies, to discuss project needs. When the project is presented to all funding agencies, each agency will evaluate their program's potential to assist with financing the needed wastewater system improvements, and the City can determine how construction can best be implemented.

SECTION 12: WASTEWATER RATES AND FINANCING

12.1 WASTEWATER FUND BUDGET

Table 12.1 includes recent wastewater fund budgets. Table 12.2 provides the information in summary form with a focus on ordinary revenue and expenses.

Table 12.1: Recent Wastewater Fund Budgets

Description	Actual FY 12-13	Actual FY 13-14	Actual FY-14-15	Adopted FY 15-16
Revenues				
Sewer Receipts	\$ 678,342	\$ 705,461	\$ 800,314	\$ 825,000
Charges for Services	\$ 8,389	\$ 9,402	\$ 10,308	\$ 8,500
Licenses and Fees	\$ 1,588	\$ 9,227	\$ 11,060	\$ 9,000
Intergovernmental	\$ 21,210	\$ -	\$ -	\$ 134,226
Interest / Loan Proceeds	\$ 4,414	\$ 783,263	\$ 3,893	\$ 4,000
Rental Income	\$ 48,000	\$ 48,000	\$ 24,000	\$ 12,000
Miscellaneous	\$ 88,831	\$ 20,603	\$ 1,869	\$ 1,100
Total Revenues	\$ 850,774	\$ 1,575,956	\$ 851,444	\$ 993,826
Cash Carry Forward (Beginning Fund Balance)	\$ 944,415	\$ 942,062	\$ 896,917	\$ 1,004,116
Total Resources	\$ 1,795,189	\$ 2,518,018	\$ 1,748,361	\$ 1,997,942
Expenditures				
Personnel Services	\$ 196,038	\$ 183,905	\$ 153,866	\$ 166,977
Materials & Services	\$ 218,024	\$ 190,220	\$ 208,291	\$ 227,980
Capital Improvements	\$ -	\$ 5,664	\$ 7,563	\$ 134,226
Debt Service	\$ 406,065	\$ 1,208,312	\$ 368,940	\$ 374,070
Total Expenditures	\$ 820,127	\$ 1,588,101	\$ 738,660	\$ 903,253
Unappropriated Reserves	\$ -	\$ -	\$ -	\$ 313,310
Operating Contingency	\$ -	\$ -	\$ -	\$ 150,122
Reserves	\$ -	\$ -	\$ -	\$ 617,857
Transfers Out	\$ 33,000	\$ 33,000	\$ 12,216	\$ 13,400
Net Total (Revenues less Expenditures)	\$ 942,062	\$ 896,917	\$ 997,485	\$ -

Reference to these Tables are made in sub-sections that follow.

12.2 WASTEWATER SYSTEM REVENUE

12.2.1 Current Wastewater Rates

Residential usage charges of \$39.00 per month were adopted by the City Council for repayment of the original bond issues, and for needed operation and maintenance revenues. All residential rates are based on 1 Equivalent Dwelling

Unit (EDU) per residence or equivalent dwelling unit. All other system users are charged on an equivalent residential or dwelling unit basis, at the identical cost per EDU.

12.2.2 Current Rate Revenue

Potential rate revenue, based on projected service connections, is anticipated to equal \$825,000 in the adopted 15/16 fiscal budget.

12.2.3 Property Taxes

Currently wastewater system revenue includes no property tax component.

12.2.4 Other Revenue

Other revenue may include such revenue as wastewater connections, lateral connection fees, interest, carryover funds, grants, etc. These sources, typically, contribute a relatively small portion of overall revenue and may vary considerably from year to year. Grant funding revenue may be significant; however, it is typically obtained and obligated for specific projects or purposes. Lateral connection fees are generally developed to cover the actual cost of making a new connection. System development charges (SDCs) can only be used for adding system capacity and cannot be used for general operating and maintenance expenses.

12.3 WASTEWATER SYSTEM EXPENSES

12.3.1 Debt Service

The wastewater system had outstanding bonds of \$5,207,541 on September 2015.

12.3.2 Operations and Maintenance (O&M)

Operations, maintenance, and administrative costs are summarized in *Table 12.1*. Current expenditures appear to approximate revenues in both actual and adopted budgets. There are cash carry forward funds to cover the costs of major equipment or facility replacements, capital outlay reserves, and a contingency. Good fiscal planning would maintain the contingency fund for emergency purposes. Sisters has a relatively simple wastewater system, but replacements and maintenance are necessary. Mechanical equipment should be repaired or replaced as needed.

12.4 CURRENT RATES - ANALYSIS AND RECOMMENDATIONS

A simple formula for budget viability is: $Revenue - Expenses = 0$. At the present time, with a minimum level of reserves for emergencies, and contingencies, the budget is in balance, with the exception of the cash carried forward and the capital outlay reserves.

These funds include monies obtained from grant reimbursements from the original wastewater construction project, and are available for facility expansion. Available budget revenues for future construction total approximately \$463,000.

The current rate structure is very simple and easy to apply. A specific reserve fund is probably not required, since unplanned expenses should not exceed the budgeted reserve and contingency amounts. However, rates may need to be adjusted for equipment replacement and increased operation and maintenance expenses addressed in the Capital Improvement Plan provided in Section 10.

12.5 FUTURE RATES

Usage fees are currently based on EDUs derived from winter water consumption for all users. This approach was originally adopted such that summer irrigation was not a factor in establishing usage fees for non-residential users. However, with a substantial tourist based economy, many commercial users are not paying fairly for sewer service, and water meter records are available to indicate overall summer peak usage. It is recommended that the rate structure be modified for non-residential users to charge equitably for flows contributed to the sewer system, on the basis of metered flows to the user. A primary factor in wastewater treatment plant design is peak flow volumes and capacity as described thoroughly in this Capital Facilities Plan.

For consideration of commercial flow contributions to the wastewater system, calculation of EDUs must take into account flows on a monthly basis throughout the year, rather than for 3 winter months as originally provided for residential evaluation purposes. Many commercial establishments do not provide landscape irrigation during summer periods, and the majority of their water usage generally enters the wastewater system throughout the year. Commercial usage should be considered separately on a monthly basis, based on total metered water usage averaged per day and equated to average residential usage. An equivalent number of EDUs should be calculated monthly for each non-residential user, and monthly service fees based on the current adopted monthly service fee per EDU. It is recommended that a minimum of 1 EDU per commercial user be maintained in establishment of monthly service fees.

12.6 CAPITAL IMPROVEMENTS PLAN

12.6.1 Capital Improvements

Recommended Capital improvements are addressed in detail in the Wastewater Capital Improvement Recommendations provided as Section 10. Costs are itemized in both priorities and by funding sources. It is recommended that available revenues from capital outlay funds be combined with available SDC funds to finance needed wastewater system improvements. It is recommended that bonds be issued for all improvements other than the West Side Pump Station, in order to minimize capital costs and to maintain rates at the lowest possible level. Capital costs which are eligible for Systems Development Charges total \$ 3,823,000.

12.6.2 Financing

A general discussion of financing options is presented in Section 11. Probable financing is limited to loans (based on project scope, cost, impact on rates, and City eligibility). Loans can be obtained from either DEQ or IFA.

12.7 SYSTEMS DEVELOPMENT CHARGES (SDCs)

System Development Charges (SDCs) can be charged to all users of transportation, water, sewer, storm drainage, and parks and recreation facilities. The fee is usually charged as each piece of property is developed in the future and goes into a capital construction fund to pay for improvements required by growth in the community. The Oregon System Development Charges Act, House Bill 3224, became effective in 1991. Legislation requires that capital improvement plans be developed, and that methodology used to compute SDCs be documented and reviewed by the community before SDCs can be charged.

The Oregon System Development Charges Act permits two types of charges: 1) a reimbursement fee, and 2) an improvement charge. A reimbursement fee is a charge for unused capacity in existing capital improvements. An improvement charge is associated with capital improvements to be constructed, which creates new capacity. Improvement fees will likely need to be utilized for needed improvements to the Sisters Wastewater System. In addition, a reimbursement fee should be considered for eligible portions of the existing wastewater system that will benefit new development.

Inflation does continue at a steady pace, and all construction projections are based on an Engineering News Record Index (ENR) of 10,055. This index of construction costs is updated monthly, and it is recommended that the ENR be utilized to provide for inflation on an annual basis. Beginning in July 2016, we recommend that the City update SDC values based on this updated plan and construction estimates.



CITY OF SISTERS

June 26, 2013

Mr. Bill Fujii
Oregon Water Resources Department
725 Summer Street NE, Suite A
Salem, Oregon 97301

**CITY OF SISTERS, WASTE WATER REUSE AND CONSERVATION PROJECT
PLANNING STUDY**

Dear Mr. Fujii:

The City of Sisters planning study for its waste water reuse and conservation project is submitted herewith to the Oregon Water Resources Department (OWRD). This study was completed with financing under the Oregon Water Resources Department Water Conservation, Reuse and Storage Grant Program.

The study purpose was to determine the feasibility for the City to provide for its future water supply and waste water management needs through a unique program that reuses treated waste water and restores flow in Whychus Creek. The program transfers surface water irrigation rights back to Whychus Creek, their source, and replaces the rights with treated effluent for irrigation. The water right transfers to instream flow may be used to provide additional flows for fish and wildlife and to provide mitigation for new ground water permits needed for future City water supply. Use of treated effluent for irrigation allows the City to manage its future waste water discharges through the year 2033.

The study finds that the proposed program is feasible. The implementation plan to transition from surface water irrigation to effluent irrigation is presented in the accompanying planning study.

Please contact me if you have any questions or inputs to this planning study report. The assistance of the OWRD through the grant made this study possible and is a key element in initiating unique water supply and water reuse management actions through the City's implementation plan.

Sincerely,

Paul Bertagna, Director of Public Works

Enclosure

520 E. Cascade Avenue – PO Box 39 – Sisters, OR 97759 Ph: 541-549-6022/Fax: 541-549-0561
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CITY OF SISTERS



NEWTON
CONSULTANTS INC.
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WASTE WATER REUSE & CONSERVATION PROJECT PLANNING STUDY

**Transitioning Irrigation from the Lazy Z Property from Surface
Water to Treated Effluent**

Oregon Water Resources Department

Water Conservation, Reuse and Storage Grant Program

Prepared for:

City of Sisters
Sisters City Hall
520 East Cascade
P.O. Box 39
Sisters, OR 97759

June 26, 2013

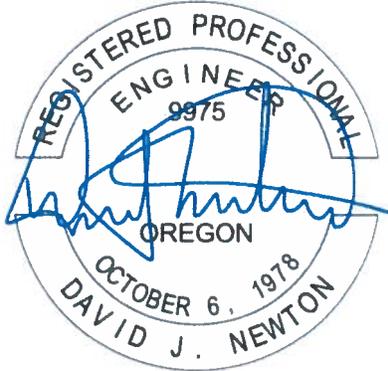
Project No.: 1138-101

**WASTE WATER REUSE AND CONSERVATION PROJECT
PLANNING STUDY**

***TRANSITIONING IRRIGATION FROM THE LAZY Z PROPERTY FROM SURFACE
WATER TO TREATED EFFLUENT***

**OREGON WATER RESOURCES DEPARTMENT
WATER CONSERVATION, REUSE AND STORAGE GRANT PROGRAM**

June 26, 2013



EXPIRES: 12/31/13

**City of Sisters
Sisters City Hall
520 East Cascade
P.O. Box 39
Sisters, Oregon 97759**

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INTRODUCTION	3
EXISTING FACILITIES	3
General	3
Waste water Facilities	6
Waste water Treatment Facility	6
SUMMARY OF REGULATORY REQUIREMENTS.....	8
Site Specific ODEQ Regulations (Administrative Rules) for Recycled Water	8
Land Use Requirements for Recycled Water.....	10
Other General Requirements for Recycled Water	13
Ground Water Protection Requirements.....	14
Other Considerations	14
EFFLUENT AVAILABLE FOR IRRIGATION.....	14
Background	14
Analysis.....	15
WATER RIGHT ANALYSIS	17
Lazy Z Property Water Rights Summary.....	17
Surface Water Rights	17
Transfer Application T-11318 and Conserved Water Application CW-71	17
Certificate 83355 (Squaw Creek Decree)	20
Certificate 86824 (Squaw Creek Decree)	20
Certificate 85389 (Squaw Creek Decree)	20
Certificate 86828 (Squaw Creek Decree)	20
Certificate 85391 (Squaw Creek Decree)	21
Certificate 86826 (Squaw Creek Decree)	21
Certificate 85392 (Squaw Creek Decree)	21
Ground water Rights	22
Certificate 85254 (Permit G-3095, Application G-3489)	22
Certificate 82875 (Permit G-8148, Application G-8548)	22
Certificate 87345 (Permit G-4841, Application G-5295)	22
Certificate 87347 (Permit G-3095, Application G-3489)	22
Conclusion	23
POTENTIAL CROPS AND IRRIGATION DEMAND	23
Purpose and Data Sources.....	23
Regulatory Limitations Relative to Potential Crops	24
Constraints & Opportunities for Crop Types.....	24
Locality	24
Localized Climate Zones and Frost Free Days	24

Crop Types.....	25
Water Demand.....	27
Irrigation Constraints.....	28
Economic Considerations.....	31
Production Costs.....	31
Market Value.....	31
Deschutes County Soil and Water Conservation District Input.....	33
International Agri-Business Consultant Input.....	33
Constructed Wetlands.....	34
Conclusions.....	34
OPPORTUNITIES AND TIMING – CONVERTING SURFACE WATER RIGHTS TO INSTREAM RIGHTS.....	36
Opportunities to Convert Surface Water Right to Instream Rights.....	36
Transactions and Market Characterization.....	37
Types of Transactions Available.....	38
Permanent Transactions.....	38
Temporary Transactions.....	38
Timing of Opportunities.....	39
EFFLUENT IRRIGATION MECHANISMS.....	43
Purpose and Data Sources.....	43
Regulatory Limitations Relative to Irrigation Mechanisms.....	44
Evaluation Criteria - Irrigation Mechanisms.....	44
Effluent Irrigation Mechanisms.....	45
Conclusions.....	48
COST ANALYSIS – IRRIGATION MECHANISMS.....	49
Identified Irrigation Mechanisms.....	49
Preferred Irrigation Mechanisms.....	50
Irrigation of Poplar Trees.....	53
FINANCING OPPORTUNITIES – CONVERSION OF SURFACE WATER RIGHTS TO INSTREAM RIGHTS.....	56
Valuation & Feasibility of Transactional Opportunities.....	56
Permanent Transactions.....	56
Temporary Transactions.....	58
Conclusion.....	61

LIST OF TABLES

Table 1. Effluent Irrigation Water Usage for 2010 and 2011	15
Table 2. Treated Effluent Available for Irrigation.....	16
Table 3. Treated Effluent Available for Irrigation, 5 Year Increments	17
Table 4. Frost Free Days in Central Oregon.....	25
Table 5. Net Irrigation Water Demand	28
Table 6. Estimated Acreage and Cost for Wetlands	34
Table 7. Whychus Creek Instream Water Rights.....	36
Table 8. Water Rights and Available Acreage by Phase	42
Table 9. Basic Design Considerations for Irrigation System.....	45
Table 10. Reuse Improvements *	50
Table 11. Cost Summary for Irrigation of Hay/Alfalfa/Grass	52
Table 12. Estimated Annual Power Cost for Irrigation (Hay/Alfalfa/Grass)	53
Table 13. Cost Summary for Irrigation of Poplar Tree Crop.....	54
Table 14. Estimated Annual Power Cost for Irrigation (Poplar Trees)	54
Table 15. Water Rights and Available Acreage by Phase	55
Table 16. Summary of Capital Costs and Potential Benefits.....	61

LIST OF FIGURES

Figure 1. Vicinity Map.....	4
Figure 2. Site Area - Proposed Conversion of Surface Water	5
Figure 3. Waste Water Facilities Plan.....	7
Figure 4. Lazy Z Water Rights	19
Figure 5. Wert Identified Soil Areas.....	29
Figure 6. Wert Identified Sprayfield Locations	30
Figure 7. Lazy Z Proposed Phasing	40
Figure 8. Lazy Z Existing Infrastructure and Proposed Phasing	41
Figure 9. Irrigation Mechanisms Scenarios – Phases 1-3	51
Figure 10. Potential Transaction Pathways for Phases I and II	60

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

EXECUTIVE SUMMARY

The City of Sisters, Oregon (the City) presently recycles its waste water for irrigation uses. The City collects waste water from within its service area, treats the effluent in aeration lagoons, stores it in a large holding pond over the winter and irrigates pine forest and grass areas with the treated effluent in the summer. The effluent collection, treatment and irrigation process is conducted under a Water Pollution Control Facilities permit (WCPF) issued to the City by the Oregon Department of Environmental Quality (ODEQ). This process is also conducted according to the City's updated Recycled Water Use Plan approved by the ODEQ in 2007.

The City is growing. Demand for water supply is increasing and provisions are required for managing increasing waste water discharges in the future. The increasing water demand and waste water discharge brings unique opportunities to the City and to Whychus Creek. The source of supply for increasing water demand is ground water. Hydraulic connectivity between the aquifer system and Whychus Creek requires mitigation of ground water pumping effects on creek flows. Water supply is needed by the City to accomplish the required mitigation, which is done conventionally in the upper Deschutes Basin by vacating irrigated land of water rights and transferring the rights back to their source stream to restore flows as an offset to pumping effects. Provisions for future water supply and waste water management contemplated by the City can also benefit Whychus Creek through flow restoration with surface water rights held by the City.

The present City process of recycling its waste water for irrigation use is successful. Accordingly, the City purchased 240 acres of Lazy Z Ranch property as a component of its plan for additional water supply and for managing additional waste water flows into the future. Under this plan, the City can transfer irrigation water rights on the Lazy Z property back to Whychus Creek, responding to its mitigation obligations and restoring flows in the creek. In exchange for the water right transfers, the City will irrigate the effected lands with treated effluent, expanding its capacity to manage increasing waste water discharges into the future.

The planning study presented in this report was intended to evaluate the feasibility of this plan to transition from surface water irrigation to effluent irrigation on the Lazy Z property. Feasibility depends on several factors including: 1) regulatory requirements; 2) amount of effluent available for future irrigation; 3) existing water rights on the Lazy Z property; 4) crops best-suited for effluent irrigation at the site and their irrigation water demand; 5) timing for conversion of surface water rights to instream rights; 6) suitable effluent irrigation mechanisms and their costs; and 7) financing opportunities for converting surface water rights to instream rights.

Evaluation of the feasibility factors finds that implementation of this plan or phases of the plan is feasible. The Lazy Z property provides more than enough capacity to irrigate 294 acre-feet of effluent under the Case I option in the year 2033 (and enough capacity to irrigate the total estimate effluent volume of 361 acre-feet in 2033). Hay (alfalfa, grass and timothy), poplar trees for wood fiber and ornamental trees can be grown by irrigation with treated effluent and are best suited for the site.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Irrigation can be done with conventional mechanisms including hand lines, K-lines and circle-pivot systems. Whychus Creek is a priority stream for steelhead reintroduction, the existing surface water rights on the Lazy Z property are supplied with Whychus Creek water and various proven administrative and financial mechanisms exist for transferring the water rights back to Whychus Creek as insteam flows for restoration purposes. Timing and opportunities are best accommodated through three phases of plan implementation.

The City plans to proceed with development of this transition plan, which will result in a unique set of benefits relative to future water supply and future waste water discharges in response to growth, and relative to flow restoration in Whychus Creek. However, to proceed, the City must secure adequate financial resources to develop and execute the plan in a timely manner. Financial needs and benefits for executing the three phases are summarized below in the following table:

	Costs		Benefits			
	Infrastructure		Lease ¹	Split-Season Lease	Restoration Transfer	Temporary Transfer
	Hay	Poplar				
Phase I (48.84 acres)	\$786,857	\$865,745	\$1,026-\$1,709	0	\$219,780- \$317,460	No data
Phase II (37.38 acres)	\$636,352	\$749,780	\$785-\$1,308	0	\$168,210- \$242,970	No data
Phase III (47.79 acres)	\$727,417	\$846,668	\$1,004-\$1,673	0	\$215,055- \$310,635	No data
Total	\$2,150,626	\$2,503,193	\$2,815-\$4,690	0	\$603,045- \$871,065	No data

¹ The DRC pays \$7/AF. This range is based on \$3 AF/acre and \$5 AF/acre leased.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

INTRODUCTION

Over time the City of Sisters (the City) must expand its waste water disposal capacity. To this end, the City is developing this planning study to transition from surface water irrigation to effluent irrigation on the City's Lazy Z Ranch property (Lazy Z property). This will fulfill the City's original intent in acquiring the property, expand waste water disposal capacity, and provide instream benefits to Whychus Creek.

The City has a Recycled Water Use Plan (RWUP) that was updated for the Lazy Z property and approved by the Oregon Department of Environmental Quality (ODEQ) in 2007. The City submitted for renewal of its Water Pollution Control Facilities (WPCF) permit in 2011.

This planning study evaluated considerations associated with (a) disposal of treated effluent by irrigation, including regulatory requirements, (b) the amount of treated effluent available over time, (c) surface water rights and phasing of the transition from surface water irrigation to effluent irrigation, and (d) irrigation mechanisms and costs, and financing. The study also assessed whether modifications to the RWUP or the WPCF permit are required.

The results of the study are described below and include conceptual design framework, timeline for implementation and opportunities to use the City's Lazy Z property water rights to meet instream water demands and help finance the infrastructure necessary to irrigate with effluent.

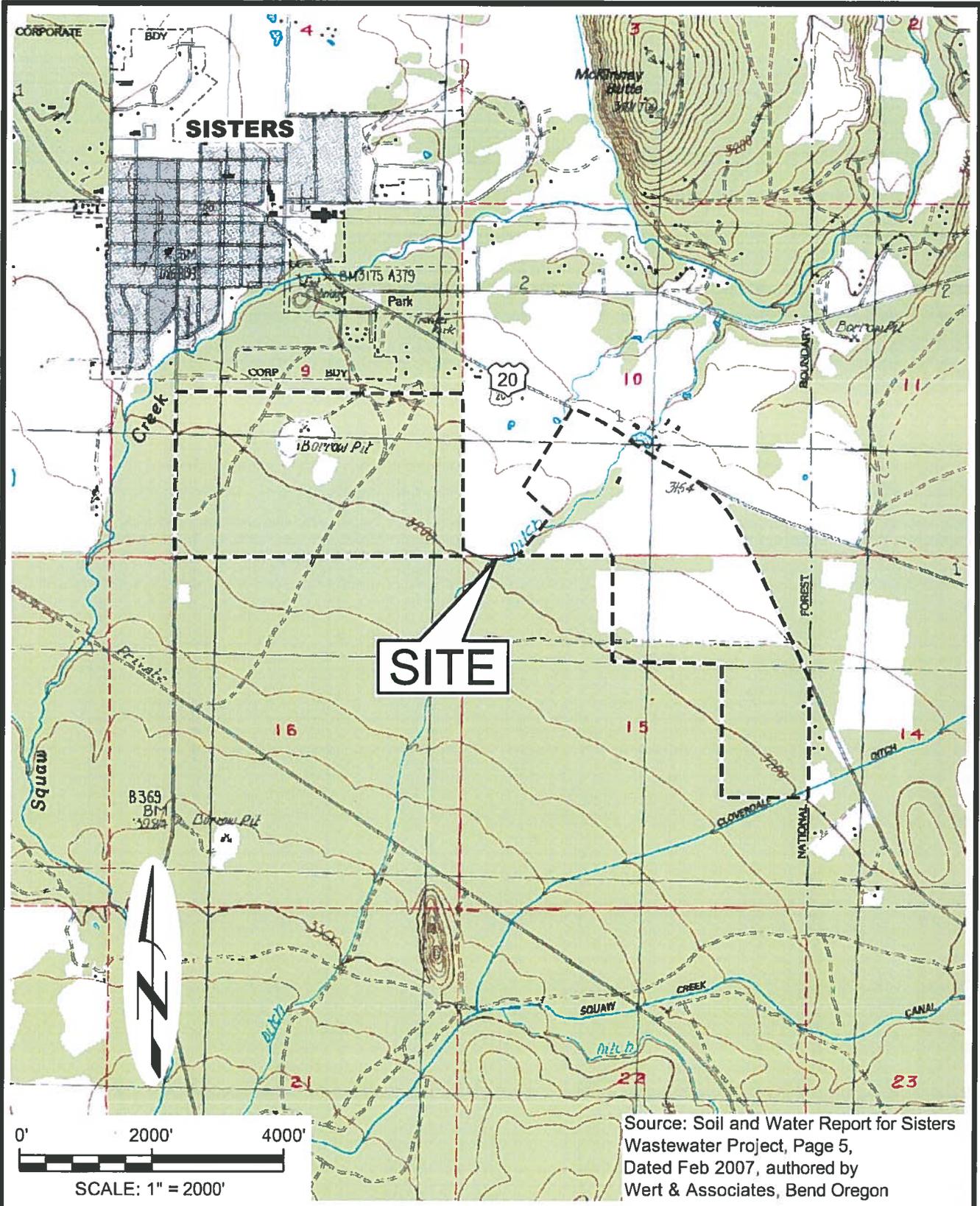
The location of the site is shown on Figure 1 (Vicinity Map). The site area, existing waste water treatment facilities and Lazy Z property are shown on Figure 2.

EXISTING FACILITIES

General

The description of existing waste water facilities in this report section is focused on the waste water treatment facility. A brief summary of the City's waste water system is below. A detailed description of the waste water facilities is presented in the document "*Wastewater System Capital Facilities Plan – Final; City of Sisters, Deschutes County, Oregon,*" November 2006 (Facilities Plan).

G:\1100\1138_Lazy Z\01\Cad\Water\W1138101_F1_Site 08:10 05/24/2013 SS



NEWTON
CONSULTANTS INC.
 Earth, Water and Rock Specialists
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Vicinity Map
 Lazy 'Z' Evaluation
 Sisters, Deschutes County, Oregon

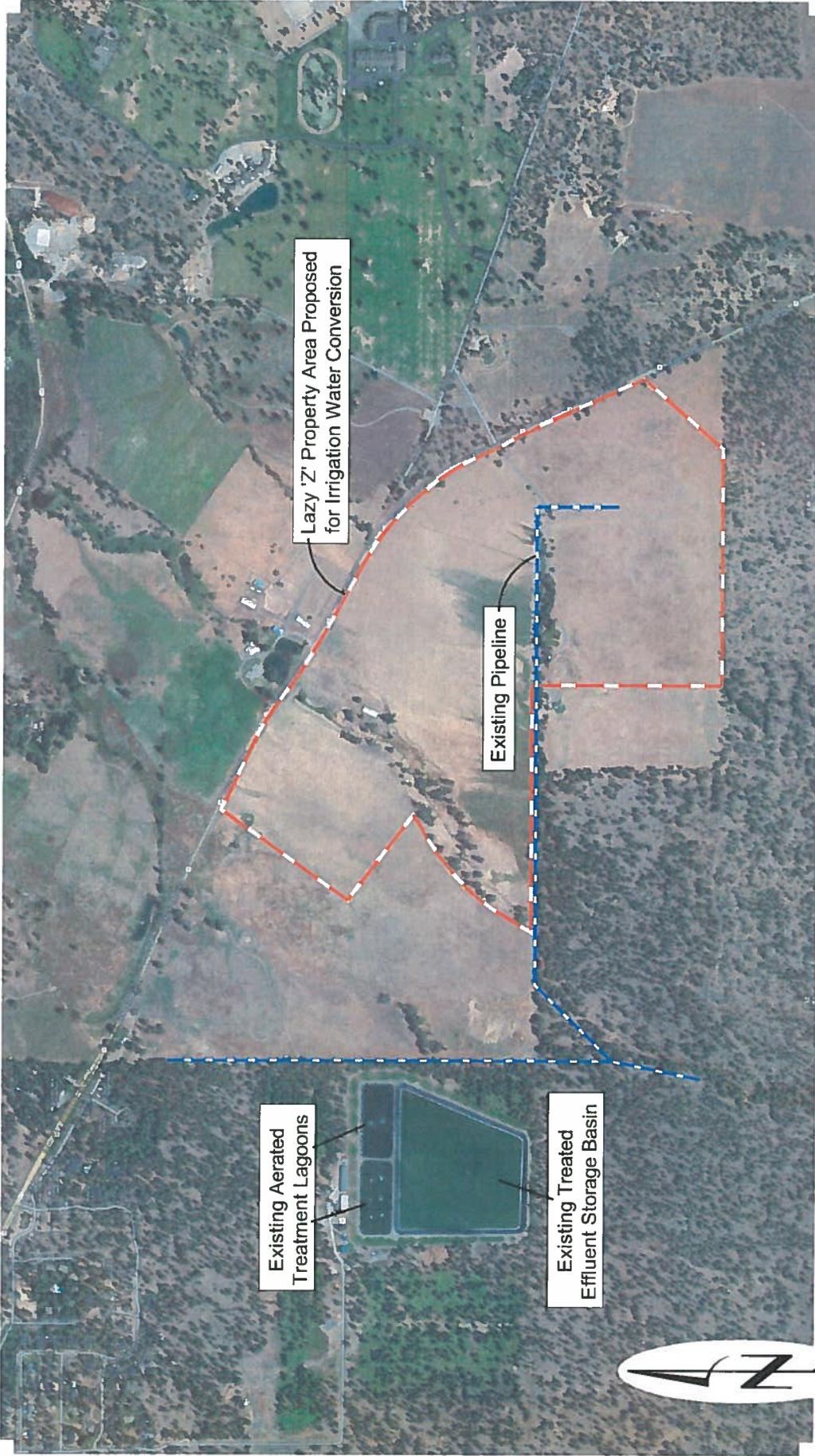
DESIGNED BY:
 D. Newton

DRAWN BY:
 S. Schenck

DATE:
 MAY 2013

PROJECT NO.
 1138-101

FIGURE 1



Existing Aerated Treatment Lagoons

Existing Treated Effluent Storage Basin

Existing Pipeline

Lazy 'Z' Property Area Proposed for Irrigation Water Conversion



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 Earth, Water and Rock Specialists
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DESIGNED BY:
D. Newton

DRAWN BY:
S. Schenck

DATE:
MAY 2013

PROJECT NO.
1138-101

FIGURE
2

Site Area - Proposed Conversion of Surface Water Irrigation to Treated Effluent Irrigation
 Lazy 'Z' Evaluation
 Sisters, Deschutes County, Oregon

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Waste water Facilities

The City of Sisters constructed its waste water facilities during the period 2000 through 2002. The facilities consist of a gravity sewer system with 106,775 lineal feet of waste water sewers, three waste water pump stations and force mains, two aerated treatment lagoons, a storage lagoon, and an automated system that irrigates 100.3 acres of land with treated effluent. Treated effluent is provided to 11.8 acres of dike and pasture grass, and 88.5 acres of forest land.

Waste water Treatment Facility

The waste water treatment facility and the effluent irrigation sites are located immediately south of the Sisters City limits on the south ½ of Section 9, Township 15 South, Range 10 East, W.M. (Figure 2). A schematic illustration of the facility is shown on Figure 3.

Waste water treatment is provided with two aerated lagoons. The holding capacity of each lagoon is 19.5 acre-feet with a maximum water surface area of 2.41 acres. Treated waste water is then conveyed from the treatment lagoons to a storage lagoon with storage capacity of 213 acre-feet at a maximum water surface area of 18 acres.

The aerated lagoons use mechanical aeration systems to provide oxygen for bacterial respiration and to achieve mixing of the waste water. Mixing of the waste water in the aeration process contributes to suspension of solid particles in the lagoon effluent. Solids removal and additional aerobic treatment are provided in the storage lagoon. A full discussion of the waste water treatment process is presented in the above-cited Facilities Plan.

Waste Water Irrigation Facility

The treated effluent is conveyed from the storage lagoon to pump stations that distribute it to 100.3 acres of land for irrigation reuse. Of the 100.3 acres, 88.5 acres are forested land; 11.8 acres are dikes that surround the waste water treatment and storage facilities. The maximum irrigation rates for these two areas are described in a later section of this report.

Township 15 South, Range 10 East (W.M.)



Lazy Z Water Rights City of Sisters

- LEGEND**
- Priority Date**
- 1880
 - 1886
 - 1881
- Water Right Certificates**
- 82875 S (GW)
 - 83355 (1880)
 - 85254 S (GW)
 - 85388 (1880)
 - 85391 (1880)
 - 85392 (1886)
 - 86024 (1880)
 - 86026 (1881)
 - 86028 (1880)
 - 87346 S (GW)
 - 87347 S (GW)
- All Other Features**
- City of Sisters UGB
 - Tax Lots
 - Uncle John Ditch
 - Existing Pipeline
 - PLSS Section
 - PLSS QG Section

Figure 3



GSI
Water Solutions, Inc.

MAP NOTES:
May 10, 2016
Data Source: Duchesne Co GIS, Duchesne River Conservancy, CGIC

SUMMARY OF REGULATORY REQUIREMENTS

The City of Sisters waste water facility operates under the authority of a Water Pollution Control Facilities (WPCF) permit issued by the Oregon Department of Environmental Quality (ODEQ). The permit allows the current waste water facility to produce and irrigate with an “enhanced” Level I effluent. The only effluent quality limitation in the permit for this level of treatment is that the E. coli in the effluent “shall not exceed a monthly geometric mean of 126 organisms per 100 milliliters. According to the City, it has no plans to upgrade its waste water facility to produce a higher class of effluent.

Site Specific ODEQ Regulations (Administrative Rules) for Recycled Water

The use of recycled water (treated effluent) is governed by Oregon Administrative Rules (OAR) Chapter 340, Division 55. Since the City’s current permit was issued in May of 2008, ODEQ updated its administrative rules that restrict the use of recycled water. An “enhanced” Level I effluent is now called Class D effluent.

The effluent quality requirements for Class D effluent state that the recycled water shall “not exceed a 30-day log mean of 126 E. coli organisms per 100 milliliters and 406 E. coli organisms per 100 milliliters in any single sample. A log mean as required by the new rules and a geometric mean, as required by the current permit, produce the same result.

OAR 340-041-0009(5) allows an exceedance of effluent limits for bacteria provided immediate and subsequent monitoring after an exceedance event shows no exceedances. The exception, however, is written to only apply to NPDES permits or storage and irrigation facilities with total coliform limits. The exception does not appear to apply to the type of facility and limitations required in the City’s WPCF permit. While not certain, ODEQ may interpret the exception rule to apply to the City’s facility. If it does, no violation would be found, for an exceedance of a single sample test if the permittee takes at least five consecutive re-samples at four-hour intervals beginning as soon as practicable (preferably within 28 hours) after the original sample was taken and the log mean of the five re-samples is less than or equal to 126 E. coli.

The original administrative rules, under which the current permit was issued, allowed effluent limits to be met anywhere in the treatment process. This meant that if the limits were met after treatment but prior to storage and irrigation, the requirements were met. The updated rules do not have this same allowance. When the permit is renewed, ODEQ may require that the effluent limits be met just prior to irrigation.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

According to the current ODEQ rules, irrigation of Class D effluent is restricted to growing fodder, fiber, seed crops not intended for human ingestion, commercial timber, firewood, ornamental nursery stock, Christmas trees, sod, or pasture for animals.

In addition to the restrictions on the irrigation of Class D effluent, the following requirements also apply:

1. Monitoring for E. coli organisms must occur once per week at a minimum.
2. The following setback distances apply.
 - a. Where an irrigation method is used to apply recycled water directly to the soil, there must be a minimum of 10 feet from the edge of the site used for irrigation and the site property line.
 - b. Where sprinkler irrigation is used, there must be a minimum of 100 feet from the edge of the site used for irrigation and the site property line.
 - c. There must be a minimum of 100 feet from the edge of an irrigation site to a water supply source used for human consumption.
 - d. Where sprinkler irrigation is used, recycled water must not be sprayed within 70 feet of an area where food is prepared or served, or where a drinking fountain is located.
3. Access and Exposure.
 - a. Animals used for production of milk must be restricted from direct contact with the recycled water.
 - b. When using recycled water for irrigation of sod, ornamental nursery stock, or Christmas trees, the personnel at the use area must be notified that the water used is recycled water and is not safe for drinking. The recycled water use plan must specify how notification will be provided.
4. Site Management.
 - a. When irrigating, signs must be posted around the perimeter of the irrigation site stating recycled water is used and is not safe for drinking.
 - b. Irrigation of fodder, fiber, seed crops not intended for human ingestion, sod, commercial timber, firewood, ornamental nursery stock, or Christmas trees is prohibited for three days before harvesting.

The City could propose to blend its recycled water with other irrigation water in order to irrigate more land. Before blending recycled water, however, the owner must obtain written authorization from the ODEQ. In obtaining authorization, the waste water treatment system owner must submit to the ODEQ, at a minimum the following:

1. An operations plan,
2. A description of any additional treatment process,
3. A description of blending volumes, and
4. A range of final recycled water quality at the compliance point identified in the NPDES or WPCF permit.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Land Use Requirements for Recycled Water

The regulations requiring a recycled water use plan are ambiguous as it applies to the City. The City has a WPCF permit that authorizes reuse and it has an approved recycle water use plan for its current operation. OAR 3400-055-0016(2)(a) states that, except for use of recycled water authorized by a NPDES or WPCF permit, a waste water treatment system owner may not provide any recycled water for distribution or use or both until a recycled water use plan meeting the requirements of OAR 340-055-0025 has been approved in writing by the ODEQ. Upon approval of the plan, the permittee must comply with the conditions of the plan. OAR 3400-055-0016(2)(c) states that for use of recycled water previously authorized under a NPDES or WPCF permit but without a department approved recycled water use plan, the waste water treatment system owner must submit a recycled water use plan to the ODEQ within one year of the effective date of these rules. It would appear that the City would not have to submit a recycled water use plan because it has a WPCF permit authorizing use and it has an approved plan. It is highly unlikely, however, that ODEQ will allow use of recycled water on the Lazy Z Ranch property without an updated recycled water use plan. Most likely, the City will need to update the recycled water use plan to identify the location of treated effluent use.

Assuming that a new recycled water use plan will be required, the following requirements relative to land use will apply:

OAR 340-055-0016(3) states that: A recycled water use plan will not be approved for the land application of recycled water on land zoned exclusive farm use until the requirements of ORS 215.213(1)(bb) and 215.283(1)(y) for recycled water are met. Since the ODEQ rules were adopted in 2008, the specific citations in ORS 215 have been re-codified. ORS 215.213(1)(bb) is now ORS 215.213(1)(y); ORS 215.283(1)(y) is now ORS 215.283(1)(v). The two statutes have to do with whether or not the county has or has not adopted marginal lands provisions. In any case, however, both statutes require compliance with in ORS 215.246 to 215.251. A summary of these requirement are provided in a ODEQ fact sheet and are repeated as follows:

- a. Subject to issuance of a permit or approval by ODEQ, land application of industrial process water, recycled water and biosolids is an allowed use on EFU zoned land. Because land application is listed as an allowed use in ORS 215.213(1), counties may not impose additional land use restrictions or conditions on land application practices, beyond those specified in the statute.
- b. Other facilities or uses on the same EFU tract are included in the allowed use if they are accessory to and reasonably needed for land application to occur on the

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

proposed site. The statutes also disallow certain uses, e.g. utility facility service lines.

- c. Before a county land use decision is made on a land application proposal, the applicant responds in writing to public comments received by the county that identify alternative sites or methods for managing the industrial process water, recycled water or biosolids. The applicant's response describes how the alternative sites or methods were considered and why they were not selected. The land use decision cannot be remanded or reversed, unless the applicant fails to provide a written response when required.
- d. ODEQ is required to determine, through its review and approval process, that the practice of land application will not reduce the productivity of the subject land.
- e. Land application of biosolids is exempt under the Act when transported by vehicle to EFU land. A ODEQ Land Use Compatibility Statement (LUCS) is not required.
- f. Land application of materials that are not described in the Act are not subject to the Act's provisions, e.g. confined animal feeding operation wastes.
- g. Land division, for purposes of land application, is not allowed in EFU zones.
- h. Restrictions apply in changing the use of land where land application practices has occurred.

ODEQ has adopted a process for assuring that the requirements of these land use statutes are met. Also from the ODEQ fact sheet, the process is as follows:

- a. The applicant obtains the required ODEQ application and LUCS forms, and submits the LUCS to the county planning office for its review and approval.
- b. The county conducts its land use review process in accordance with the requirements under the Act.
- c. The county completes the LUCS form and returns it to the applicant with the attached findings:
 - o The proposed activity constitutes land application for purposes of agricultural, horticultural, silviculture production, or for irrigation in connection with a use allowable in EFU zoned land under ORS 215.
 - o Any proposed facilities necessary for the land application practice to occur on the subject site are accessory to and reasonably necessary as allowed by the Act.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

- Approval of the LUCS is subject to ODEQ's issuance of the necessary environmental approvals or permits.
- d. The applicant submits the ODEQ application and approved LUCS to ODEQ for processing. ODEQ processes the application and conducts a technical review in accordance with its rules. The review, depending on what material is applied to the land, may include the following:
 - Pollutant and nutrient testing
 - Determination of agronomic rate
 - Determination of agronomic or pollutant loading
 - Determination of water assimilation capacity
 - Site assessment and evaluation
 - Crop type and cropping system
 - Application methods and equipment requirements
 - Site access and harvest restrictions
 - Monitoring requirements
 - A written determination that the land application activity will not reduce the productivity of the land in question.
- e. ODEQ submits all Recycled Water Reuse Plans to the DHS for comment (OAR 340-055-0015(2)), and consults with DHS on any effluent quality limitations (OAR 340-055-0015(4)).
- f. Applicants intending to land apply recycled water are required to submit a "Registration of Recycled Water Use" form (<http://www1.wrd.state.or.us/pdfs/reclaimform96.pdf>) to the Oregon Water Resources Department (ORS 537.131, 537.132 and 537.610(h)). Either agency can supply applicants with this form, however it requires a ODEQ signature.
- g. DEQ issues an approval or denial to the applicant, and provides a copy to the county planning office.

In situations where a LUCS is denied or appealed:

- a. When ODEQ receives a county-denied LUCS, the applicant is informed that ODEQ cannot process the application until county approval is provided.
- b. If a county land use decision is appealed after ODEQ receives an approved LUCS, ODEQ's policy is to process the application unless ordered otherwise by a court stay or invalidation of the county decision.
- c. A county may withdraw or modify its LUCS decision before the permit is issued.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

- d. If a county-approved LUCS is successfully appealed after ODEQ issues a permit, ODEQ may revoke or suspend the permit, or delay its decision until the appeals process is exhausted. In making its decision, ODEQ consults closely with the applicant and county government.

Other General Requirements for Recycled Water

The following requirements must also be met when reusing recycled water. Most of these are likely already met by the City under its current, approved recycled water use plan.

1. Bypassing. The intentional diversion of waste water from any unit process in the waste water treatment system for a beneficial purpose is not allowed, unless with the unit process out of service the recycled water meets the criteria of this division for a specific class and beneficial purpose described in the recycled water use plan.
2. Alarm devices. Alarm devices are required to provide warning of power loss and failure of process equipment essential to the proper operation of the waste water treatment system and compliance with this division.
3. Standby power. Unless otherwise approved in writing by the ODEQ, a waste water treatment system providing recycled water for use must have sufficient standby power to fully operate all essential treatment processes. The ODEQ may grant an exception to this section only if the waste water treatment system owner demonstrates that power failure will not result in inadequately treated water being provided for use and will not result in any violation of an NPDES or WPCF permit limit or condition or Oregon Administrative Rule.
4. Redundancy. A waste water treatment system that provides recycled water for use must have a sufficient level of redundant treatment facilities and monitoring equipment to prevent inadequately treated recycled water from being used or discharged to public waters.
5. Distribution system requirements. Unless otherwise approved in writing by the department, all piping, valves, and other portions of the recycled water use system that is outside a building must be constructed and marked in a manner to prevent cross-connection with a potable water system. Unless otherwise approved in writing by the department or as required by the rules of this division, construction and marking must be consistent with sections (2), (3), (4), and (5) of the 1992 "Guidelines for the Distribution of Nonpotable Water" of the California-Nevada Section of the American Water Works Association.
6. Cross-connection control. Connection between a potable water supply system and a recycled water distribution system is not authorized unless the connection is through an air gap separation approved by the ODEQ. A reduced pressure principle backflow

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

prevention device may be used only when approved in writing by the ODEQ and the potable water system owner.

7. Annual report. The City must submit an annual report to the ODEQ describing the effectiveness of the system to comply with the approved recycled water use plan, the rules of this division, and the permit limits and conditions for recycled water.

Ground Water Protection Requirements

Recycled water will not be authorized for use unless all ground water quality protection requirements in OAR chapter 340, division 40 are met. The requirements in OAR chapter 340, division 40 are considered to be met if the waste water treatment system owner demonstrates recycled water will be used or land applied in a manner and at a rate that minimizes the movement of contaminants to ground water and does not adversely impact ground water quality. Generally, if the recycled water is irrigated at rates consistent with the needs to the crop being irrigated, compliance with the ground water quality requirements are deemed to be met.

Other Considerations

The current ODEQ rules do not require the City to have a contract if it decides to provide its recycled water to another party for use. Regardless of this omission, if the City does decide to provide its recycled water, it is highly recommended that a well-conceived contract be established between the City and the other party to ensure the City's interests are protected.

EFFLUENT AVAILABLE FOR IRRIGATION

The opportunity for the City to transition from irrigation with surface water to treated effluent over time depends on the projected volume of treated effluent. The section below estimates the total volume of treated effluent that would be available for irrigation on the Lazy Z lands from the present time to the year 2033.

Background

The City currently uses treated effluent to irrigate lands near its waste water treatment facilities. These lands include grasses on the lagoon system dikes and forest lands (Ponderosa pine trees). The analysis for estimating the total volume of available treated effluent water in 2033 for irrigation at the Lazy Z lands was completed with the following assumptions:

1. The dikes are irrigated at 14.375 inches per season; the forest is irrigated at 7.15 inches per season; and the remainder is irrigated at the Lazy Z lands.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

2. The dikes are irrigated at 28.75 inches per season; the forest is irrigated at 14.30 inches per season; and the remainder is irrigated at the Lazy Z lands.
3. All available water is irrigated at the Lazy Z lands; none on the dike or forest.

The irrigation volumes of 14.375 and 28.75 inches per year for the dikes (Case 1 and 2) were provided by the City of Sisters; the irrigation volume of 14.30 inches per season (Case 2, forest) is the maximum amount allowed by ODEQ to be irrigated on the forest land. The volume of 7.15 inches per season for the forest in Case 1 was suggested by the City as a reasonable amount to sustain the Ponderosa pine trees on the forest land. Although Ponderosa Pine trees grow naturally in the Sisters area and near the site without artificial irrigation, the trees presently irrigated with treated effluent were planted and nurtured with artificial irrigation. As such, the trees require continued irrigation to survive, which is the basis for the seasonal irrigation volume of 7.15 inches suggested by the City.

Estimations of future effluent flows for potential irrigation were presented in the report “*Waste Water Capital Facilities Plan Update*”, dated October 2011 (hereinafter referred to as Report); however, these estimates of future flows were only to the year 2025. The flow estimates were based on a population growth rate of 3.13% which was taken from the City of Sisters Comprehensive Land Use Plan. This growth rate was also used to estimate the availability of treated effluent for irrigation presented in this report. .

Analysis

The following table summarizes the effluent irrigation water usage for 2010 and 2011.

Table 1. Effluent Irrigation Water Usage for 2010 and 2011

		Irrigation Volume, Acre- Feet	Irrigated Acreage, Acres	Net Application, inches
2010	Dike	40.12	11.8	40.80
	Forest	146.21	88.5	19.83
	Total	186.33	100.3	
2011	Dike	38.32	11.8	29.23
	Forest	142.2	88.5	14.46
	Total	180.52	100.3	
2012	Dike	31.43	11.8	23.97
	Forest	115.72	88.5	11.77
	Total	147.15	100.3	

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Pursuant to discussions with City staff, the estimated volume of treated effluent available for irrigation in 2033 is based on the average of the 2010 and 2011 irrigation usage projected from 2011 to 2033 according to an assumed population growth rate of 3.13%. Irrigation data for 2012 was not used because an estimated 40 acre-feet were carried over to the following irrigation season and not irrigated.

Using the above information, the following table shows the volume of treated effluent that may be available for irrigation at the Lazy Z lands under the three cases listed above:

Table 2. Treated Effluent Available for Irrigation

	Case 1		Case 2		Case 3	
	Application Rate, Inches per Season	Total Amount, Acre-Feet	Application Rate, Inches per Season	Total Amount, Acre-Feet	Application Rate, Inches per Season	Total Amount, Acre-Feet
Total Estimated 2033 volume	-	361	-	361	-	361
Dike Irrigation (11.8 Acres)	14.375	14	28.75	28	0	0
Forest Irrigation (88.5 Acres)	7.15	53	14.30	105	0	0
Available for Lazy Z Lands	-	294	-	228	-	361

The following table summarizes the potential amount of available treated effluent for irrigation at the Lazy Z property at 5 year increments: 2018, 2023, 2028, and 2033.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 3. Treated Effluent Available for Irrigation, 5 Year Increments

Year	Estimated Total Available, Acre-Feet/Year	Estimated Available Water Available to Lazy Z Ranch, Acre-Feet/Year		
		Case 1	Case 2	Case 3
2013	195	128	62	195
2018	228	161	95	228
2023	266	199	133	266
2028	310	243	177	310
2033	361	294	228	361

The irrigation application rate for the Lazy Z lands will depend on the type of crop grown, which will be addressed in subsequent sections of this report.

WATER RIGHT ANALYSIS

Lazy Z Property Water Rights Summary

The City purchased a portion of the Lazy Z property that contains both surface and ground water rights for irrigation uses. There are four ground water rights and seven surface water rights appurtenant to the City’s Lazy Z property. The priority dates of the Lazy Z surface water rights held by the City are generally senior in priority dates. These senior rights are some of the last water rights to be “regulated off” from Whychus Creek during low water flows. The following information details each of the water rights appurtenant to the City’s Lazy Z property and the current status and are shown on Figure 4.

Surface Water Rights

Transfer Application T-11318 and Conserved Water Application CW-71

On November 17, 2011, Three Sisters Irrigation District (TSID) and the water right holders on the Uncle John Ditch (which serves the City’s Lazy Z property) submitted a transfer application (T-11318) to the Oregon Water Resources Department (OWRD) requesting a change in point of diversion. The point of diversion is proposed to be changed from the current in-creek push-up dam that diverts water into the Uncle John Ditch to TSID’s main diversion, which has Oregon Department of Fish and Wildlife approved fish passage.

Additionally, on January 12, 2012 OWRD received a conserved water application (CW-71) from the “landowners of the Uncle John Ditch”. The pending conserved water application proposes that the piping of 3.8 miles of open ditch (Uncle John Ditch) and the point of diversion change in transfer application T-11318 will conserve 2.49 cubic feet per second (cfs) from all of the

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

included Lazy Z water rights. The City's portion of conserved water is proposed to be a total of 0.76 cfs.

The transfer and conserved water project affect all of the City's surface water rights appurtenant to the Lazy Z property. On November 27, 2012, OWRD issued a draft Preliminary Determination proposing to approve the transfer request. To date, no orders have been issued regarding the conserved water application. The following water rights are appurtenant to the City's Lazy Z property.

PROJECT:

WASTEWATER FACILITIES PLAN

PROJECT NO.:

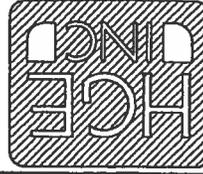
05.63

DATE:

11-02-05

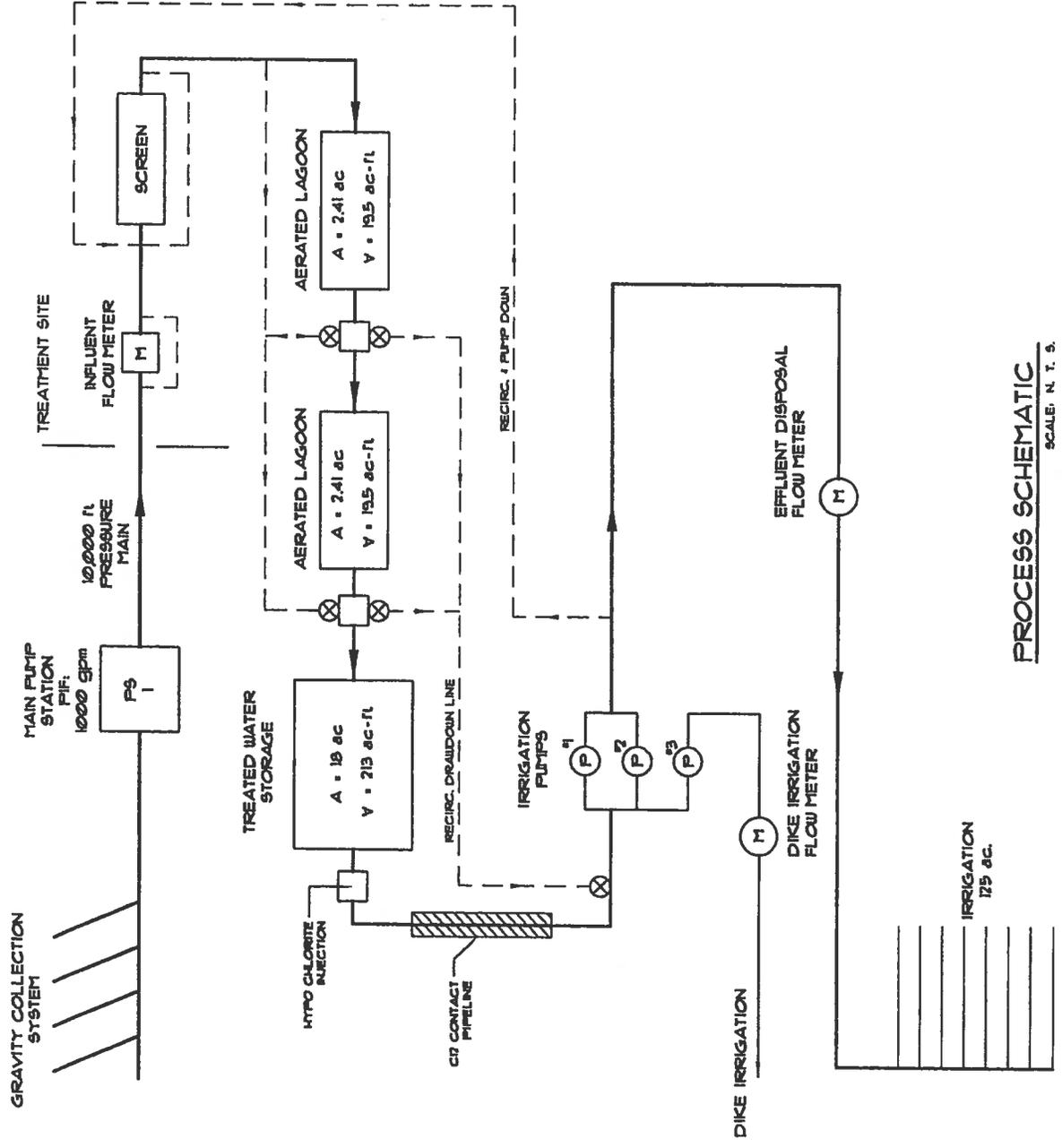
Figure

Figure 4



ARCHITECTS, ENGINEERS,
SURVEYORS, & PLANNERS
375 Park Avenue Coos Bay, OR, 97420
(541) 269-1166
19 N.W. Fifth Avenue Portland, OR, 97209
(503) 222-1687

TITLE:
T.P. SCHEMATIC



PROCESS SCHEMATIC
SCALE: N. T. S.

IRRIGATION
125 ac.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Certificate 83355 (Squaw Creek Decree)

The water right allows the use of up to 0.62 cfs, from Whychus Creek (formerly Squaw Creek), for primary irrigation of 30.0 acres with a priority of 1880. The water rights approved through the Squaw Creek Decree do not have an assigned volume per acre (duty).

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 83355 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated from the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.136 cfs, leaving a remaining rate of 0.48 cfs.

Certificate 86824 (Squaw Creek Decree)

The water right allows the use of up to 1.23 cfs, from Whychus Creek for primary irrigation of 59.5 acres with a priority of 1880. The water right does not have an assigned duty.

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 86824 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated from the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.271 cfs, leaving a remaining rate of 0.96 cfs.

Certificate 85389 (Squaw Creek Decree)

The water right allows the use of up to 0.08 cfs, from Whychus Creek for primary irrigation of 2.5 acres with a priority of 1880. The water right does not have an assigned duty.

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 85389 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated at the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.018 cfs, leaving a remaining rate of 0.06 cfs.

Certificate 86828 (Squaw Creek Decree)

The water right allows the use of up to 0.57 cfs, from Whychus Creek, for primary irrigation of 18.0 acres with a priority of 1880. The water right does not have an assigned duty.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 86828 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated at the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.126 cfs, leaving a remaining rate of 0.44 cfs.

Certificate 85391 (Squaw Creek Decree)

The water right allows the use of up to 0.10 cfs, from Whychus Creek for primary irrigation of 3.0 acres with a priority of 1880. The water right does not have an assigned duty.

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 85391 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated at the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.022 cfs, leaving a remaining rate of 0.08 cfs.

Certificate 86826 (Squaw Creek Decree)

The water right allows the use of up to 0.71 cfs, from Whychus Creek, for primary irrigation of 35.5 acres with a priority of 1881. The water right does not have an assigned duty.

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 86826 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated at the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.156 cfs, leaving a remaining rate of 0.55 cfs.

Certificate 85392 (Squaw Creek Decree)

The water right allows the use of up to 0.14 cfs, from Whychus Creek, for primary irrigation of 7.0 acres with a priority of 1886. The water right does not have an assigned duty.

Current Status:

Upon OWRD's issuance of the final order approving transfer T-11318, water right Certificate 85392 will be cancelled. A new confirming certificate will be issued once beneficial use is demonstrated at the new point of diversion, consistent with the order approving the transfer. The rate the water right is projected to be reduced by upon approval of CW-71 is 0.031 cfs, leaving a remaining rate of 0.11 cfs.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Ground water Rights

There are 4 ground water rights appurtenant to the City's Lazy Z property. Three rights are for supplemental irrigation only and the fourth is for both primary and supplemental irrigation.

Certificate 85254 (Permit G-3095, Application G-3489)

The water right allows the use of up to 0.246 cfs from a well in Whychus Creek basin, with a priority date of May 13, 1966. The use is for supplemental irrigation of 19.7 acres. The diversion is limited to 1/80th of a cfs per acre and is further limited to a diversion not to exceed 3 acre-feet (AF) per acre.

Current Status:

This certificate is in the name of Lloyd Brogan and was issued on December 26, 2008. There are no transactions currently pending on this water right.

Certificate 82875 (Permit G-8148, Application G-8548)

The water right allows for the use of up to 0.11 cfs from a well in Whychus Creek basin and has a priority date of November 25, 1977. The use is for supplemental irrigation of 8.7 acres. The diversion is limited to 1/80th of a cfs per acre and is further limited to a diversion not to exceed 3 AF per acre.

Current Status:

This certificate is in the name of Lloyd Brogan and was issued on November 17, 2006. Currently there are no transactions pending on this water right.

Certificate 87345 (Permit G-4841, Application G-5295)

This water right allows for the use of the up to 0.039 cfs for primary irrigation of 3.1 acres and 0.108 cfs for supplemental irrigation of 29.7 acres. The source is a well in Whychus Creek basin and has a priority date of August 25, 1970.

Current Status:

The City still holds the rights to 3.1 acres of primary irrigation under Certificate 87345 but the purchase agreement for the Lazy Z stated that 3.1 acres of this right would be transferred to the seller (David Herman) in the future. To date no transfer application requesting a change in place of use (off City property) has been submitted to OWRD.

Certificate 87347 (Permit G-3095, Application G-3489)

This water right allows for the use of up to 0.094 cfs from a well in Whychus Creek basin and has a priority date of May 13, 1966. The use is for supplemental irrigation of 7.5 acres. The

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

diversion is limited to 1/80th of a cfs per acre and is further limited to a diversion not to exceed 3 AF per acre.

Current Status:

This water right was issued on December 9, 2011. There does not appear to be any transactions occurring currently related to this water right.

Conclusion

The City holds 155.5 acres of senior surface water rights for primary irrigation on the Lazy Z property; in addition they hold a few ground water rights which are mostly supplemental to the surface water. Currently all the surface water rights are involved in a point of diversion transfer and an allocation of conserved water project. Currently the City is irrigating two sections of the property and the remaining section is included in a one-year instream lease.

POTENTIAL CROPS AND IRRIGATION DEMAND

Purpose and Data Sources

Key considerations in evaluating the feasibility of irrigation with treated effluent include types of crops and their water demand, regulatory limits and opportunities, and economic factors important to the City. This section describes an evaluation of potential crops based on these considerations. Several information sources were used for evaluating allowable and likely crop choices for the Lazy Z property, including:

- ODEQ Oregon Administrative Rules (OAR)340-055-0012;
- Oregon State University Extension Service (OSU) personnel and Extension Miscellaneous 8530 Report, "Oregon Crop Water Use and Irrigation Requirements" 1999;
- Wert & Associates, Inc. Report "Soil and Water Reuse Report for Sisters Wastewater Project" Sisters, Oregon, February 2007 (Wert);
- Deschutes County Soil and Water Conservation District;
- Richard Zimmerlee, International Agri-Business Consultant; and
- Available online sources for climate and agricultural crops and potential seasonal growing conditions related to the Site.

The above sources provided useful, detailed information regarding potential crop types for the Lazy Z property and potential for crop value upon harvest.

Regulatory Limitations Relative to Potential Crops

An initial review of OAR 340-055-012(4)(a) identifies allowable crops for a class D effluent; stating “*Any beneficial purpose defined in subsection (3)(a) of this rule; [(3)(a) allows fodder, fiber, seed crops not intended for human ingestion, or commercial timber]; (B) Irrigation of firewood, ornamental nursery stock, Christmas trees, sod, or pasture for animals*”. These allowable crops may not be produced for human consumption; although, as discussed below, additional restrictions may be applied as well.

Constraints & Opportunities for Crop Types

Locality

The OSU extension service (OSU) was contacted to determine a list of crops that are compatible with the Lazy Z property, considering location, elevation and soil type. Based on the location, OSU narrowed the crops more suited for cultivation on the Lazy Z property to two basic groups: 1) hay, including grass hay and alfalfa hay, orchard grass and timothy hay; and 2) cereal grains. Cereal grains include oats, barley, wheat and triticale. Both general categories of grasses and cereal grains would be a marketable crop for animal feed, specifically cows, cattle and possibly horses.

OSU also provided insight as to the likely period of irrigation for the two crop categories. The grass hay, alfalfa hay and timothy hay will take water from essentially the beginning of the irrigation season, weather dependent, to November 1 of each year. The nutrient uptake and need for irrigation could be variable in April and October of each year depending on temperature, precipitation and overall climate conditions; however, a relatively full irrigation season for application of water is likely.

Localized Climate Zones and Frost Free Days

A summary table of frost free days throughout the major areas of Central Oregon is presented below:

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 4. Frost Free Days in Central Oregon

Location	Elevation, feet, MSL	Average Last Frost	Average First Frost
Bend	3500	July 1-10	Sept 1-10
Madras	2398	June 11-20	Sept 11-20
LaPine	4234	July 1 -10	August 21-31
Prineville	2998	July 1 -10	August 21-31
Redmond	3031	July 21-31	Sept 1-10
Sisters	3200	July 11-21	August 11-20
http://www.plantmaps.com/interactive-oregon-usda-plant-zone-hardiness-map.php			

Based on above table, Sisters has the shortest period of frost free days of the locations throughout Central Oregon. The shorter period of frost-free days reflects a greater limitation to crop types for the Lazy Z lands that are most effective in responding to the City’s potential reuse project. Because of the very limited period of frost free days, upgrading effluent quality to produce Class A effluent would likely not provide any benefit because the high quality crops requiring Class A effluent cannot be grown in the Sisters area.

Crop Types

Grass Hay and Alfalfa

Grass hay and alfalfa hay were generally characterized by OSU staff as a fairly straight forward crop to cultivate on the Lazy Z property as there are many hay crop growers in the Sisters area and throughout Central Oregon. Grass hay and alfalfa hay tend to have up to three harvest cuttings per irrigation season with a likely total seasonal average of 4 to 6 tons per acre. According to OSU staff, harvest cuttings typically mature in June to July, with subsequent harvest cuttings occurring approximately 6 weeks after each previous harvest; with each harvest cutting being similar in yield.

Timothy Hay

Timothy hay was characterized by OSU staff generally as either early or late maturing varieties. The early maturing timothy hay tends to mature faster and the crop produces smaller crop heads with a typical first cutting harvest in July. Late maturing timothy hay tends to mature slower and produces larger crop heads with a typical first cutting harvest in August. Timothy hay usually has only two cutting harvests per irrigation season, with the first cutting producing in the range of 4 to 5 tons per acre, with the second cutting producing 1 to 2 tons per acre, regardless of the maturation variety.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Cereal Grain

Cereal grains, on the other hand, are limited in the need for irrigation, as the crops tend to mature faster and are harvested usually beginning in August. Because of this, the cereal crop would likely not need irrigation after the first part of August, allowing time for the crop to cure prior to harvest. There would be no growing crop after harvest to assimilate the recycled water. Because of this, cereal crops are not a likely suitable crop for irrigation of the City's effluent.

Additional Crop Constraints

Crop types were narrowed by OSU based on the likely growing conditions of the site, specifically the likely temperature and average frost free days that significantly reduce the crops that are capable of being grown on the site. Discussions with OSU led to the understanding that Central Oregon is highly variable with localized climate zones, with the area of Sisters being the more restrictive areas for viable crop types.

These limitations as described by OSU staff negates crops that qualify under DEQ regulations, such as seed crops (carrot seed, grass seed, etc.) that are grown in other areas of Central Oregon with longer frost free days to allow for crop maturation for harvest. Grass hay, alfalfa hay and timothy hay were identified as being hardy crops that can withstand ice encasement and have growing seasons that generally can accept irrigation water throughout the available irrigation season. Cereal grain crops are tend to be hardy crops that can likely withstand the growing conditions in the Sisters area, however, cereal grains have a limited duration growing season.

Poplar

The City of Woodburn developed a small poplar plantation around 1999 to dispose of their treated effluent. According to the City of Woodburn, its poplar irrigation program indicates it has very stringent effluent limits relative to discharge to the Pudding River and irrigation of treated effluent in the summer is essential. The plantation has 80 acres of poplars. About 26 acres were harvested 3 to 4 years ago, for which the City obtained about \$15 per wet ton of chipped material after harvesting, chipping and shipping of the material to the pulp mill in Toledo, Oregon. Curtis Stultz, Woodburn waste water superintendent, did not readily have cost figures for growing the poplar trees, but stated that the operation is not a money maker for the City¹

In 2007, the cost of producing poplar for pulp ranged between \$24 and \$30 per dry metric ton (\$21.34 and \$26.67 per American ton).² Poplar wood moisture content is about 50% to 58% so

¹ Personal conversation with Curtis Stultz on February 8, 2013 and subsequent e-mail of the same date.

² Brian J. Stanton, Hybrid Poplar Feedstock Production: Economic Opportunity for Renewable Energy in North America, Power Point Presentation, Atlanta, Georgia, May 2007. Website: <http://www.tappi.org/content/Events/07renew/07ren05.pdf>.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

the price received by the City of Woodburn, in dry tons, is about half of that derived from wet tons, or about \$7.50 per dry ton. It is highly unlikely that The City of Sisters would receive the same price for its poplar production because the transportation costs would be higher due to the longer distance to the pulping plant. Poplar chips harvested by the City of Woodburn were transported to the pulp mill in Toledo, Oregon which was about 100 miles away. The City of Sisters is between 150 and 180 miles from Toledo, depending on which route is taken. If the pulp mill in Springfield would buy the City's poplar chips, the travel distance would be about 100 miles, the same as it was for Woodburn to Toledo. In another case, poplar chips harvested near Boardman are transported about 50 miles to Wallula, Washington. In any case, it is reasonable to expect that using treated effluent to grow poplars in Sisters could cost substantially more money than could be derived from the sale of the product.

Ornamental Nursery Stock

This could be a viable crop for the City of Sisters. The amount of water required for nursery stock will depend on the type of stock and its size (large plants would use more water than smaller, younger plants). The City would likely need to utilize soil moisture probes to determine crop water requirements over a given growing season. Managing nursery stock would also likely require more oversight by City employees to ensure proper irrigation, recognize and control pests and to plant and transplant stock. Irrigation methods would likely be similar to that used for poplar.

Hops

Hops require at least 120 frost free days so it is not a viable crop for the Sisters area.

Water Demand

A review of the OSU Extension Miscellaneous 8530 Report, 1999 (EM8530) separates the state into 27 distinct regions and provides tables for likely crop water need and the generalized growing season for up to 17 generalized crops for each of the 27 regions. The Sisters area resides in the western-most portion of region 17, which includes Bend in the northwest portion of the region, Brothers in the eastern portion and Christmas Valley in the far south-central portion of the region. Of the crops identified and recommended by OSU personnel, the general irrigation seasons and net irrigation water demand are shown below in Table 5.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 5. Net Irrigation Water Demand

Crop	5 of 10 yrs (inches)	6 of 10 yrs (inches)	7 of 10 yrs (inches)	8 of 10 yrs (inches)	9 of 10 yrs (inches)	19 of 20 yrs (inches)	Typical Growing Season
Alfalfa Hay	20.03	21.07	22.01	23.08	24.59	25.59	April 10 to Oct. 1
Grain (Spring)*	15.87	16.68	17.55	18.35	19.6	20.35	April 1 to Aug. 16
Grain (Winter)**	16.22	16.97	17.88	18.66	20.05	21.18	March 15 to Aug. 10
Pasture	22.17	23.31	24.73	25.95	27.84	29.18	April 12 to Oct. 24

*Representative of spring planted cereal grains, according to OSU personnel.

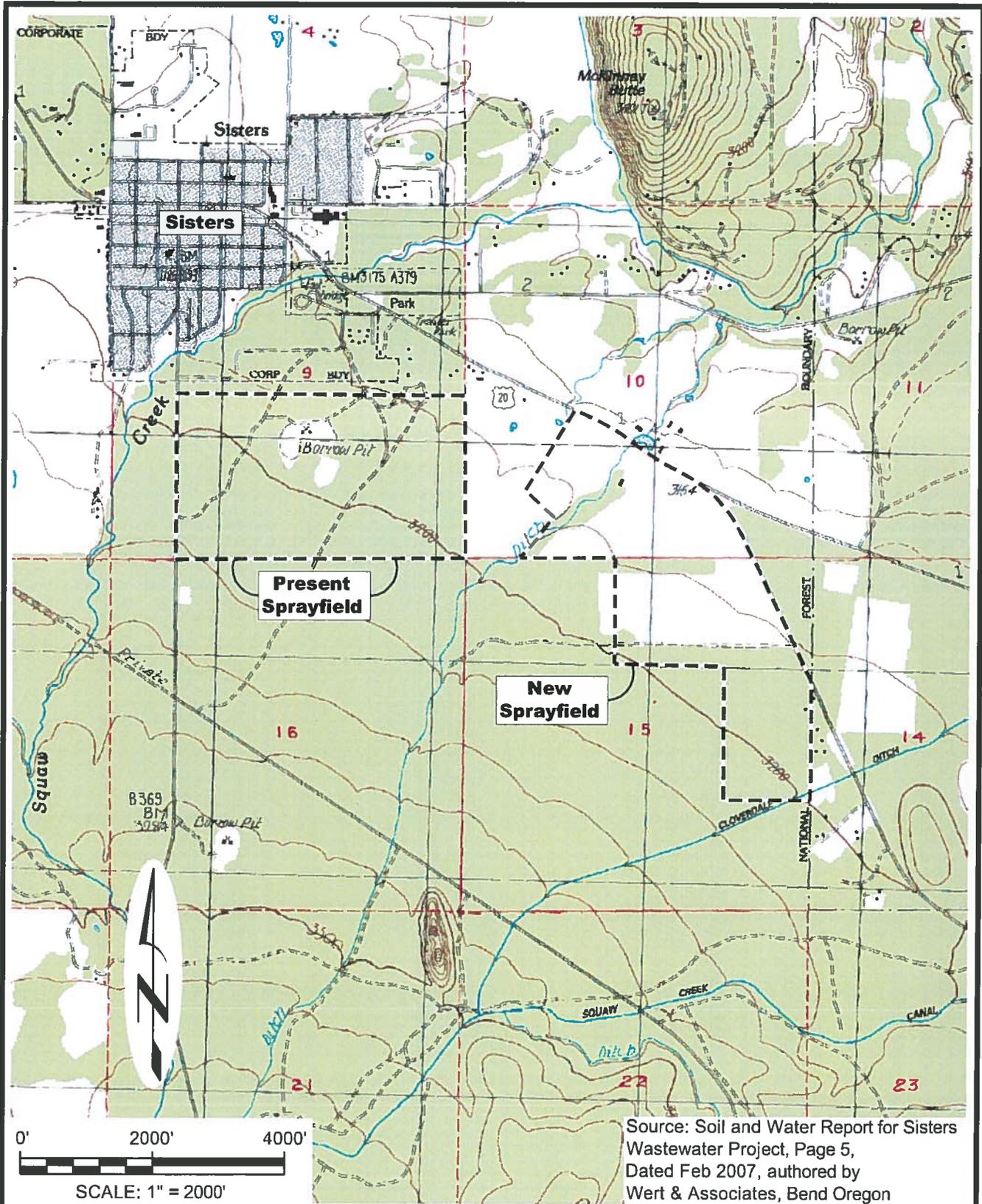
**Representative of winter planted cereal grains, according to OSU personnel.

Based on the above data, the likely choices for the site are hay and grasses, including alfalfa hay, grass hay and pasture grass. Pasture grass would likely allow for more application of treated effluent with the longest application period. The “design” application rate for the irrigation system will depend on how the City wishes to manage the site. Management options are discussed further in subsequent sections of this report.

Irrigation Constraints

The report by Wert & Associates, Inc. *Soil and Water Reuse Report for Sisters Wastewater Project, Sisters, Oregon*, February 2007 (Wert), noted varying soil types across the site with the potential for high seasonal ground water in some areas. Irrigation periods in the spring may be limited in these areas. A map showing these potential limited irrigation areas are shown on the attached Figure 5. Consideration of irrigation timing should account for potential high ground water conditions in these areas during the spring season. The soil types A, E and I identified by Wert, as shown on Figure 5, have potential for seasonal high water tables above a depth of 40 inches below the ground surface.

Additionally, Wert identified areas that have been previously used for irrigation and harvest of crops where surface soils have been cleared of gravel and cobble-sized rocks. These areas are referred to by Wert as the “Present Sprayfield”. This area has been irrigated with wheel lines in the past and would likely not need modification to the soil horizon for sprinkler irrigation by wheel lines or pivots. The identified sprayfield areas are shown on the attached Figure 6 that was presented in Wert.



G:\11000\1138 Lazy Z\101\Cad\Water\W1138101_F1_Site 08:10 05/24/2013 SS

NEWTON
CONSULTANTS INC.
 Earth, Water and Rock Specialists
 Ph. 541 504-9960 Fax 541 504-9961

Wert Identified Sprayfield Locations
 Lazy 'Z' Evaluation
 Sisters, Deschutes County, Oregon

DESIGNED BY: J. Newton	DRAWN BY: S.Schenck	DATE: MAY 2013	PROJECT NO. 1138-101	FIGURE 6
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WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Areas identified by Wert and referred to as “New Sprayfield” have been flood irrigated in the past for pasture. Apparently, gravel and cobble-sized rocks have not been removed from this area. Irrigation in this area could likely be done for pasture with hand lines or pivots (minimal rock removal may be required to allow for efficient travel of the pivot wheel tracks). Cultivation of a harvested crop could be impeded by gravel and cobble-sized rocks.

Economic Considerations

Production Costs

OSU personnel provided estimated costs to produce alfalfa hay and grass hay on a per acre basis annually. The estimated cost³ to produce alfalfa hay is \$135 per ton of alfalfa harvested; the estimated cost to produce grass hay is \$155 per ton of grass hay harvested (OSU stated that although timothy hay was not specifically estimated for the cost to produce, that its cost to produce would likely be similar to grass hay). These estimated costs are based on an OSU-calculated value in 2008 dollars. Based on an average rate of inflation between 2008 and 2012 of approximately 6.6%⁴; the enterprise cost may have risen from \$135 per ton harvested for alfalfa to \$144; and from \$155 per ton harvested for grass hay to \$165.

OSU is currently conducting a study on the nitrogen uptake requirements for grass crops. This study is currently underway and nearing completion by OSU and may be useful to allow for a beneficial balance of nitrogen in effluent water and fertilizer introduced nitrogen. The results of this OSU study could allow for a reduction in the required fertilizer applied to the Site and subsequently reduce fertilizer costs.

Market Value

OSU provided current and expected market value ranges for alfalfa hay and grass hay based on winter 2012-2013 pricing. Currently alfalfa hay pricing for beef cattle is typically \$180 to \$200 per ton; grass hay pricing is typically \$230 to \$250 per ton. Current pricing of timothy hay was estimated by OSU to typically range \$250 to \$300 per ton.

The Central Oregon Hay Report (COHR) is available online and updated and released weekly on Thursday and reports the price range for alfalfa and orchard grass (includes grass hay and pasture grasses), the website is:

http://www.ams.usda.gov/mnreports/ml_gr313.txt

³ OSU referred this as the “enterprise cost”, which includes all input costs to grow and harvest a grass crop; including, but not limited to, soil preparation, seed, fertilizer, maintenance, irrigation and harvest.

⁴ Data Source: Organization for Economic Cooperation and Development,
http://stats.oecd.org/Index.aspx?DatasetCode=MEI_PRICES.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

The current reported range for alfalfa as of the February 14, 2013 COHR is \$220 to \$250 per ton (good to premium grade); orchard grass is listed as \$245 to \$250 per ton (premium grade only shown); oat (cereal grain) is \$145 per ton (fair grade only shown); timothy hay is not reported on the COHR.

Condition & Yield of Harvested Crops

Regarding the condition of possible harvested crops from the Lazy Z lands and the potential for marketability, OSU and an agri-business consultant (Richard Zimmerlee) were contacted to further investigate the potential value of harvested crops. Harvested feed crops, as discussed above, can vary depending on the nutrient capacity of the crop and also the general nature of the crop. Based on the above stated average sale price of harvested crops, cereal grains tend to bring the lowest value on a per ton basis; whereas, grass hay, alfalfa hay and timothy hay tend to bring greater value on a per ton basis.

Variability in the condition of the harvested crop will have an effect related to the market value as well (this was stated by both OSU staff and Mr. Zimmerlee); which includes weed potential, nutrients contained within the crop, size and condition of crop heads, etc. The general condition of the crop will likely dictate the potential sale, with domestic markets being more tolerant of moderate to lower quality feed crops, and international markets requiring premium quality feed crops. Generally, international feed crop markets maintain higher crop values.

Crop Nutrient Uptake

Discussions were conducted with OSU staff to ascertain further limitations that could affect marketability arising from the use of effluent water for irrigation, considering that the City of Redmond in the past has had some difficulty with cultivation and sale of crops grown from irrigated effluent. OSU worked with Redmond to conduct chemical analysis of alfalfa hay cultivated from effluent irrigated crop. This work found the crops to have elevated levels of nitrate. OSU stated that the nature of effluent irrigation containing nitrogen can concentrate nitrate in the feed crop, adversely affecting its marketability.

Limits on the marketability of feed crop with elevated nitrate, according to OSU staff, can limit the sale of the feed material and exclude cows and cattle that have a low tolerance for nitrate. OSU stated that horses have a higher tolerance for elevated nitrate in feed and, if feed crops display elevated nitrate at levels that could preclude cattle or cows, it could limit the marketability of feed crops for horses, or other similar nitrate tolerant livestock-or, if possible attempt to control nitrate build-up in harvested crops to allow for more wide acceptance of livestock that could accept the harvested crop.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Available Feed Crop Markets

Discussion was held with OSU regarding timothy hay based on its potential for high value crop production. OSU stated that timothy hay has a limited market based on its tendency for high calorie and carbohydrate content. Based on the high calories and carbohydrates the best markets for timothy hay, generally, are feed stores and horse race tracks-establishments that catering to working animals or livestock that may benefit from higher caloric and carbohydrate rich feed.

Deschutes County Soil and Water Conservation District Input

Deschutes County Soil and Water Conservation District (DCSWCD) was contacted to obtain information relative to crop selection and agricultural budget information. Discussion with Rex Barber of the DCSWCD indicated that the DCSWCD could not provide any specific information relative to the Lazy Z lands. However, Mr. Barber owns and operates a large agricultural farm near Lower Bridge on the Deschutes River approximately 5 miles west of Terrebonne, Oregon. His experience and knowledge in this regard brought hands-on information relative to cultivation of crops at the Lazy Z lands and the potential to market crops grown with treated effluent. Mr. Barber indicated, in his opinion, that the likely market for crops grown from treated effluent would be narrow, consisting mainly of hay or alfalfa hay crops. Regulatory limitations on crops only for non-human consumption would limit the ability to grow a larger variety of crops at the Lazy Z lands.

International Agri-Business Consultant Input

Discussion was held with Richard Zimmerlee, an international agri-business consultant, to investigate the potential for marketing crops grown from treated effluent. Mr. Zimmerlee has over 40 years of experience in managing and marketing agricultural crops, including international contracting and sales of specialized animal feed crops. Also discussed with Mr. Zimmerlee were additional potential business opportunities that could be authorized under ODEQ OARs for effluent reuse water.

The discussions indicate several limitations apply to crops grown from effluent reuse water versus fresh water. Although animal feed crops are authorized under ODEQ OARs, Mr. Zimmerlee stated that dairy cow farmers would resist the use of effluent-irrigated livestock feed, and that feed grown from such water would likely incur a 25% to 50% reduction in sale prices from the going rate of comparable crops grown from fresh water. These restrictions and limitations may further reduce the potential sale of feed crops grown on the Lazy Z lands.

Additional agricultural opportunities beyond grown-for-sale crops were discussed with Mr. Zimmerlee, including potential for a transitional nursery. A transitional nursery is typically an intermittent nursery used to acclimate nursery stock (ornamental trees, flowering plants, etc.) to

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

local conditions for plants grown in different climates. The viability of a transitional nursery is contingent on general economic conditions, in that, transitional nurseries are commonly associated with building of new residential and commercial sites that consume landscape plants, trees, etc. A transitional nursery may be of some benefit on a limited basis to provide for the City of Sisters Parks and streetscape tree establishment programs.

Constructed Wetlands

ODEQ would likely only allow lined wetlands without an extensive ground water analysis. The agency's ground water quality protection rules require point sources to employ the highest and best practicable methods to prevent the movement of pollutants to ground water. A lined wetland may be viable from a regulatory standpoint, but much less so from an economic standpoint.

According to evaporation data in Wert, 51.7 inches/year of evaporation should be expected, on average, in Sisters. These data were derived from U.S. Department of Commerce-National Oceanic and Atmospheric Science Department. This is assumed to be pan evaporation. Actual evaporation from a shallow lake or pond is expected to be between 70% and 80% of the pan evaporation. Using a percentage of 70%, then, the actual annual evaporation for a constructed wetland would be 36.2 inches per year.

Currently, the City produces about 183 acre-feet of effluent and, in 2033 is estimated to 361 acre-feet. The following table shows the estimated acreage and cost for wetlands required to dispose of current and estimated 2033 quantities of effluent.

Table 6. Estimated Acreage and Cost for Wetlands

Year	Wetland Acreage Required, Acres	Estimated Construction Cost, \$
2013	64.7	\$2,521,691
2033	119.7	\$4,668,361

Conclusions

Based upon the following summary of information, the best cropping option for the Lazy Z lands is a fodder crop, primarily a grass hay crop.

1. **Regulatory Aspect:** Allowable crops for irrigation with Class D recycled water as imposed by Oregon Administrative Rules (OAR) 340-055 are: fodder, fiber, seed crops not intended for human ingestion, or commercial timber, firewood, ornamental nursery stock, Christmas trees, sod, or pasture for animals.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

2. **Site Conditions Aspect:** (location, elevation, soil types, shallow seasonal ground water) Based on the site conditions the Lazy Z property is suitable for irrigation of crops with limitations for areas to be irrigated by the potential for seasonal high ground water. Additional limits based on the amount of gravel to cobble-sized rock in surface soils may limit the areas that could allow cultivation of a harvest crop, however, do not limit these gravel and cobble areas from being irrigable for pasture. Additional limits of Lazy Z property for crop irrigation may be complicated by farming the lands during spring start up or harvest periods when a farmer may not require irrigation water, requiring Sisters to store treated effluent until crops require irrigation water.
3. **Economics Aspect:** The discussions with Mr. Zimmerlee indicates that a reduction in market value of harvested crops from the Site could be incurred in the range of 25 to 50% below the going rate for feed crops. Further limitations are foreseeable based on the available market for feed based on the end use (i.e. dairy cows would not likely purchase effluent irrigated feed crops for dairy cow feed; elevated nitrate in feed crop could further limit livestock that could accept the feed crop). Additional limits on crop irrigation and harvest may be reflected by obstacles the City of Redmond, Oregon has had to address. Redmond has been conducting crop irrigation with effluent since the mid-1990's and for several years has found it difficult to lease the land to be farmed-complicating the City's ability to use effluent for agronomic reuse purposes. Redmond has had periods of elevated nitrate in feed crops that limits the marketability of harvested crops and sale value.
4. **Crop Nutrient Aspect:** The potential for feed crops harvested from the Lazy Z property to have elevated levels of nitrate in the feed if not managed properly, as an identified concern from OSU staff regarding effluent irrigated feed crops, can have a significant impact on the marketability of harvested feed crops. Based on this limitation, additional laboratory testing of crops grown on Lazy Z lands to determine the nutrient condition during the growing season could allow for a greater control of crops and improved marketability. Additional laboratory testing may contribute to additional costs for crop cultivation and may require a more stringent fertilizer application program to maintain proper nutrient balance in feed crops grown on the Lazy Z lands.
5. **Crop Variability/Rotation:** Based on the variable growing seasons of cereal grains and timothy hay, it may be viable to cultivate a mix of crops on the Lazy Z lands to maximize allowable areas for irrigation and crop harvest potential. With the potential of early season shallow ground water on areas of the Lazy Z lands, a later-maturing crop (such as late maturing timothy hay) may be appropriate for these lands, maintaining a longer growing season without more intensive initial irrigation. During the early portion of the irrigation season, the areas without shallow seasonal ground water to be planted with a cereal grain that would take irrigation water as early as practicable, while being limited in duration by the extent of the total growing season.

OPPORTUNITIES AND TIMING – CONVERTING SURFACE WATER RIGHTS TO INSTREAM RIGHTS

Opportunities to Convert Surface Water Right to Instream Rights

For the last ten to fifteen years, there has been significant interest in restoring instream flows to Whychus Creek. Like many streams in the Deschutes Basin, Whychus Creek is over-appropriated, meaning during certain times of the year the amount of water in the stream is less than the sum of water use authorizations. Generally, during dry summer months, only water rights issued before 1895 are fully met in Whychus Creek.

Historically, Oregon Department of Fish and Wildlife’s instream water right (ISWR) has served as an informal goal for both stream flow and water quality purposes. The ODFW ISWR is based on temperature criteria for redband trout (18 degrees) and current data show that it closely correlates with the minimum flow necessary to achieve these temperature criteria in Sisters. Due to a very junior priority date, the ODFW ISWR’s are not met. To realize meaningful flow restoration in Whychus Creek, senior water rights must be transferred instream temporarily or permanently either through lease, purchase, or through an allocation of conserved water through the State’s Conserved Water Program.

Table 7. Whychus Creek Instream Water Rights

Whychus Creek Instream Water Rights															
Source	From	To	Priority Date	Instream Rates (cfs)											
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Whychus Cr	Indian Ford Creek	Mouth	10/11/1990	33	33	50	50	50	33	33	33	33	33	33	
Whychus Cr	S. Fk Whychus	Indian Ford Creek	10/11/1990	30	20	20	20	20	20	20	20	30	50	30	30

Fisheries provide the primary driver for flow restoration in Whychus Creek. Low stream flows limit habitat availability and fish movement. Water quality provides the second driver for flow restoration in Whychus Creek. Whychus Creek upstream of river mile 21 is listed as water quality limited for temperature. Low stream flow is a major factor contributing to temperature impairments in this reach. Public interest in restoring flows increased with the recent reintroduction of summer steelhead and spring Chinook above the Pelton Round Butte Dam Complex on the mainstem Deschutes River and into Whychus Creek. As part of their new Federal Energy Regulatory Commission license to operate the dam complex, Portland General Electric and the Confederated Tribes of the Warm Springs Reservation are facilitating fish passage and are investing in upstream restoration to increase the likelihood of success. Multiple partners in the basin are heavily invested in ensuring the success of the reintroduction. In addition, summer steelhead is listed as a threatened species under the Endangered Species Act. Historically, Whychus was an important tributary for steelhead in the Deschutes Basin.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Another driver for instream flow transactions in the Deschutes Basin is the State's Ground water Mitigation Program, established in 2002. In 1998, a United States Geological Services Ground water Study confirmed that ground water and surface water in the study area within the Deschutes Basin are directly linked, and that the removal of ground water will ultimately diminish stream flow. In response, OWRD established the Deschutes Basin Ground water Mitigation Program, which requires "mitigation" for all new ground water permits in the study area. Mitigation is typically generated by transferring existing surface water rights instream. This has created a new demand, varying throughout the basin, for instream flow transactions that can generate temporary and permanent ground water mitigation credits.

Transactions and Market Characterization

Over the last twelve years, there have been approximately 445 acres of Whychus and tributary irrigation water rights transferred permanently instream. About half of these water rights were transferred purely for restoration purposes, and half generated permanent mitigation credits. The mitigation transfers were generally to provide landowners the opportunity to pump ground water under a new permit. To our knowledge, permanent mitigation credits were not sold to other buyers.

On a temporary basis, the DRC annually leases instream 1,150-1,400 acres of Whychus and tributary water rights. A large percentage of this is leased from Three Sisters Irrigation Districts from farmers who choose not to use water in a certain year. Approximately 250 of these leased acres produce temporary mitigation credits. In addition, the Three Sisters Irrigation District has implemented an aggressive program of water conservation, transferring 8,500 acre-feet of water from 15 conserved water projects.

There are several funders actively financing instream restoration in Whychus Creek, including the Pelton Fund, the Oregon Watershed Enhancement Board, and the BPA/National Fish and Wildlife Foundation's Columbia Water Transactions Program. The Pelton Fund was set up specifically to provide habitat restoration funds to support the Confederated Tribes of the Warm Springs Reservation and Portland General Electric's reintroduction of anadromous fish. This Fund has a limited duration, and will likely be spent out in the next five to ten years. The DRC aims to meet its initial streamflow restoration goal of 33 cfs in Whychus Creek below the confluence of Indian Fork Creek in the next five or so years. While it is likely that there will still be public investment in instream restoration in Whychus Creek, it may become a less robust market in five to ten years. The market for mitigation credits will continue to be tied to development and growth demands.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Types of Transactions Available

There are several “instream transactions” that can be utilized to add value to the City’s Lazy Z water rights while irrigating the Lazy Z property with effluent. There are both permanent and temporary transactions that are available.

Permanent Transactions

Permanent instream transfers allow for water rights, subject to transfer, to be placed instream. This mechanism allows the “new” instream water right to retain the priority of the originating water right. As the City’s Lazy Z water rights are senior in priority, the ensuing instream rights would also be senior and therefore of high value. Water right transfers, including instream, are a relatively lengthy process as the water rights are thoroughly examined to verify use, ownership, enlargement and potential injury to holders of existing water rights on the system. The process can take anywhere from nine months to several years.

Water conserved from an efficiency project, known as an Allocation of Conserved Water, generates a new water right that can be transferred instream or on-farm like any water right subject to transfer, or some of the water can be used to firm-up a deficient water right. Allocations of Conserved Water automatically protect a portion of the subject water right, minimum 25 % instream, but an applicant can choose to transfer up to 100 % of the conserved water instream.

Temporary Transactions

Instream leasing is a mechanism to place water instream temporarily (1 to 5 years) as a beneficial use. Instream leases can be renewed an indefinite number of times. Under a lease, the water right is never severed from the land so the right automatically reverts to the authorized place of use when the lease is expired or cancelled by the applicant. Leasing instream is a relatively quick process with applications generally being approved within a couple of months.

Split-season leasing is another temporary transaction that can be used to place water instream. This transaction allows the water right holder to protect the right instream for a portion of the season of use and apply water on-farm for a portion of the season of use. This is a useful mechanism but requires the applicant to measure and report the water use regularly throughout the season; this condition often creates a barrier to water right holders choosing this path.

Time-limited instream transfers allow the water right holder to place the water right instream for any period of time, generally for periods greater than a lease would be established for, i.e. 10 to 50+ years. A benefit of a time-limited transfer is that the water right holder can protect the water

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

instream for a significant amount of time yet still remain the water right holder when the transfer expires. Unlike a lease, a time-limited instream transfer cannot be terminated unless conditions are written into the transfer ahead of time.

Since the City holds a ground water permit that requires mitigation under the Deschutes Basin Ground water Mitigation Program it may choose to use some portion of the Lazy Z water rights for mitigation. Currently, permanent mitigation credits can be generated from permanent instream transfers and temporary mitigation can be generated through instream leasing, time-limited transfers and potentially through split-season leasing. Any temporary credits generated must be through the DRC mitigation bank and currently those temporary credits have an annual fee of \$105 per credit.

Timing of Opportunities

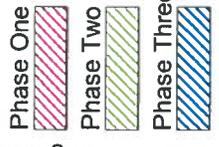
According to the analysis of effluent available for irrigation detailed earlier in this report, it is anticipated that there will be 128 acre-feet (AF) of effluent available in 2013. This volume, 128 AF, is the volume available under Case 1 (See Table 3), where the City continues to irrigate the forest and dikes at half the rate of current irrigation and moves the other half of the water to the Lazy Z. If applied on the City's Lazy Z property, this volume could irrigate approximately 51.2 acres applied at a rate of 2.5 AF per acre. This could allow the City to remove the equivalent number of acres of surface water irrigation from the land and protect the water instream either permanently or temporarily.

Through this feasibility study, 3 phases have been identified as likely group targets for effluent application and water right removal (see Figure 7). In each phase the mandatory set-back for irrigating with effluent was mapped and the new acreage footprint calculated. Figure 7 shows this phasing without the water rights overlay. When calculating the number of acres the City will have available for irrigating with effluent, the acreage totals accounted for the set-backs required for effluent irrigation. For example, Phase I has a total surface water right footprint of 53.3 acres, once the set-backs are accounted for there are 48.84 acres available for the City to apply effluent. Table 8 summarizes water rights and available acreage by phase.

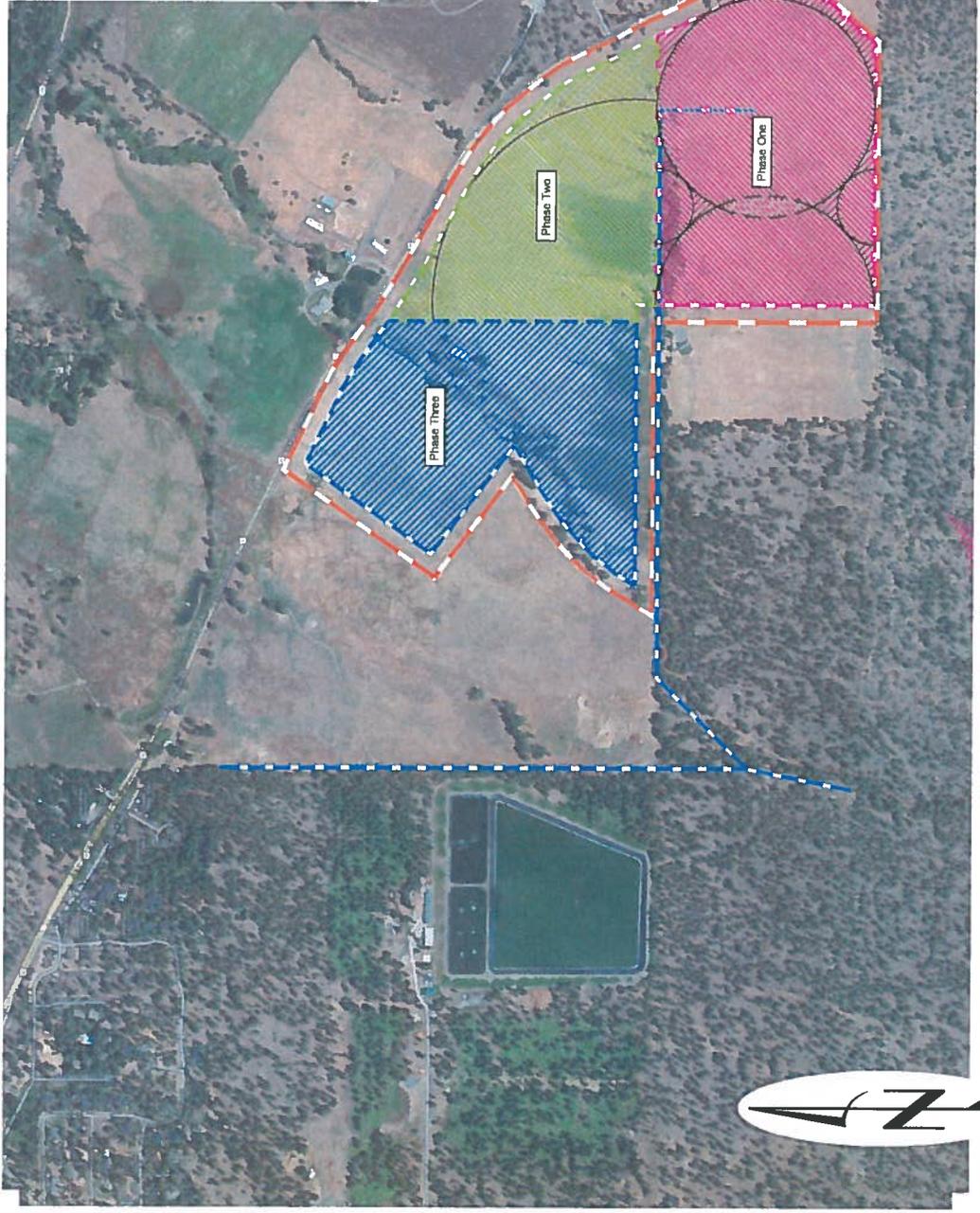
Phase I is an area that the City identified as the most readily available for application of effluent due to existing infrastructure; this area has approximately 53.3 acres of senior Whychus Creek water rights appurtenant to it. Accounting for the mandatory set-backs, there are approximately 48.84 acres available to irrigate with effluent. Applying irrigation at a volume of 2.5 AF/acre allows for 122.1 AF of effluent irrigation on the 48.84 acres. The projected available effluent for 2013, 128 AF, is more than sufficient for irrigating Phase I.

Phase	Total Acres	Circle Irrigation	K Lines
Phase One	52 Ac	48 Ac	4 Ac
Phase Two	38 Ac	32 Ac	6 Ac
Phase Three	46 Ac	n/a	46 Ac
Total:	136 Ac	80 Ac	56 Ac

Areas Covered by Circle Pivot Irrigation



Areas Covered by K Line Irrigation



NEWTON CONSULTANTS INC.
 Earth, Water and Rock Specialists
 Ph: 541 504-9960 Fax: 541 504-9961

DESIGNED BY:
D. Newton

DRAWN BY:
S. Schenck

DATE:
MAY 2013

PROJECT NO.
1138-101

FIGURE
7

Task 4; Irrigation Mechanisms Scenarios - Phases 1-3
Lazy 'Z' Evaluation
Sisters, Deschutes County, Oregon

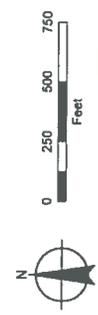
Township 15 South, Range 10 East (W.M.)



Lazy Z Proposed Phasing City of Sisters

- LEGEND**
- Proposed Phasing
 - Phase 1
 - Phase 2
 - Water Right Certificates
 - 82875 S (GW)
 - 83355 (1880)
 - 85254 S (GW)
 - 85388 (1880)
 - 85391 (1880)
 - 85392 (1886)
 - 86824 (1880)
 - 86828 (1881)
 - 86828 (1880)
 - 87346 S (GW)
 - 87347 S (GW)
 - All Other Features
 - City of Sisters UGB
 - Tax Lots
 - Uncle John Ditch
 - Existing Pipeline
 - PLSS Section
 - PLSS QQ Section

Figure 8



GSI
Water Solutions, Inc.

MAP NOTES:
 1. Data Sources: Dechutes Co GIS, Dechutes River Conservancy, OGC

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
 Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 8. Water Rights and Available Acreage by Phase

<i>Phase 1 Water Rights – Primary</i>						
	Water Right	Acres of Surface Water Rights	Priority Date	Rate (cfs)	Volume (AF) 5 AF/acre	Acres Available for Effluent Irrigation *
<i>Primary Irrigation</i>	c.86828 (T-11318/CW-71)	10.8	1880	0.32	54.0	8.95
	c.86826 (T-11318/CW-71)	35.5	1881	0.71	177.5	33.29
	c.85392 (T-11318/CW-71)	7.0	1886	0.14	35.0	6.60
		53.3			1.17	266.5
<i>Phase 2 Water Rights - Primary</i>						
	Water Right	Acres of Surface Water Rights	Priority Date	Rate (cfs)	Volume (AF) 5 AF/acre	Acres Available for Effluent Irrigation
<i>Primary Irrigation</i>	c.83355 (T-11318/CW-71)	30.0	1880	0.62	150.0	27.37
	c.86828 (T-11318/CW-71)	7.2	1880	0.23	36.0	5.78
	c.85389 (T-11318/CW-71)	2.5	1880	0.08	12.5	1.23
	c.86824 (T-11318/CW-71)	3.0	1880	0.06	15.0	3.00
		42.7			0.99	213.5
<i>Phase 3 Water Rights - Primary</i>						
	Water Right	Acres of Surface Water Rights	Priority Date	Rate (cfs)	Volume (AF) 5 AF/acre	Acres Available for Effluent Irrigation
<i>Primary Irrigation</i>	c.86824 (T-11318/CW-71)	56.5	1880	1.13	282.5	46.50
	c.85391 (T-11318/CW-71)	3.0	1880	0.1	15	1.29
		59.5			1.23	297.5
Total:		155.5		3.39	777.5	134.01

*Acreage accounts for required set-backs

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Phase II has approximately 42.7 acres of irrigation water rights; with the mandatory set-backs, there are approximately 37.38 acres available for effluent application. Applied at a rate of 2.5 AF/acre, 93.45 AF would accommodate irrigation of Phase II. According to the estimated available effluent under Case 1 (refer to Table 3 on), somewhere between 2023 and 2028 the City would have enough effluent to water the entirety of Phases I and II without the use of appurtenant surface water rights.

In Phase III, there are approximately 59.5 acres of irrigation water rights. This equals approximately 47.79 acres available for effluent application, accounting for mandatory set-backs. The effluent needed to irrigate this phase (based on 2.5 AF/acre) is approximately 119.48 AF. The projections for available effluent end in 2033 and estimate that 294 AF of effluent will be available for irrigating on the City's Lazy Z property at that point (Table 3, Case 1). Accounting for effluent used to irrigate Phases I and II, there will be approximately 78.45 AF of effluent available to irrigate Phase III in 2033; that equates to 65 % of the acreage in Phase III available for irrigating with effluent.

If the City chooses to permanently remove their surface water rights from the Lazy Z property as effluent becomes available, it will important to do so in a strategic manner. It would be prudent to remove water rights in portions large enough that it makes financial sense for potential restoration funders, for example, greater than 20 acres in the transaction. The phasing outlined in this report is based on current and future planned infrastructure locations and an approximately even split of appurtenant surface water rights. If water rights are to be removed it can occur in different parcel sizes than identified in the current phasing or they can be removed prior to sufficient effluent being available for irrigation, if the City chooses.

EFFLUENT IRRIGATION MECHANISMS

Purpose and Data Sources

Effluent irrigation can be accomplished in a number of ways. Considerations in selecting a method of irrigation generally include type of crop, whether a crop is harvested or grazed, labor and cost of conducting irrigation, operation and maintenance requirements, and regulatory restraints on application of effluent to irrigated area. This section describes evaluation of alternative mechanisms for irrigation of Lazy Z lands with treated effluent.

The evaluation included consideration of irrigation information from several sources including the following:

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

- Oregon Administrative Rule (OAR) 340-055-0022 and 340-055-0025(2) (d);
- John Rowley, Nelson Irrigation Company, Walla Walla, Washington;
- Central Oregon pump and irrigation contractors familiar with the Site area and likely choices for commercially available irrigation equipment.

Regulatory Limitations Relative to Irrigation Mechanisms

OAR 340-055-0022 of the regulations pertaining to the use of recycled water has the following requirements for Ground water Quality Protection:

Recycled water will not be authorized for use unless all groundwater quality protection requirements in OAR chapter 340, division 40 are met. The requirements in OAR chapter 340, division 40 are considered to be met if the wastewater treatment system owner demonstrates recycled water will be used or land applied in a manner and at a rate that minimizes the movement of contaminants to groundwater and does not adversely impact groundwater quality.

Generally, ODEQ has determined that the movement of contaminants to ground water will be minimized if recycled water is applied in a uniform manner at agronomic rates. ODEQ is unlikely to accept flood irrigation as providing a uniform application rate; recycled water must be applied via spray or drip irrigation.

OAR 340-055-0025(2)(d) states “If Class B, C, or D, or non-disinfected recycled water is to be used for irrigation, a recycled water use plan must include a description of site management practices including, but not limited to, the timing of application and methods used to mitigate potential aerosol drift.”

Evaluation Criteria - Irrigation Mechanisms

Considering the available volume of treated effluent and discussions with the City, the crops preferred for irrigation on the Lazy Z lands are harvestable hay/alfalfa/grass and poplar trees. Evaluation of irrigation mechanisms includes consideration of these crop types.

The following table lists the basic design considerations for the Lazy Z lands irrigation system and the basis for those considerations.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 9. Basic Design Considerations for Irrigation System

Design Consideration	Design Basis
General Irrigation	
Cost Effective	Obviously, the City wishes to maintain its cost for disposing of its effluent as low as possible.
Low Operation/Maintenance	The City has limited staff for operating its sewerage facility; it needs to minimize the amount of time staff spends operating and maintaining its irrigation system.
Very uniform application.	In order to avoid groundwater contamination pursuant to DEQ rules and to provide sufficient water to all areas under cultivation, the recycled water needs to be applied uniformly at agronomic rates.
Unlikely to plug	The City stores effluent during the non-irrigation season and into parts of the irrigation season. During this storage period, the effluent will grow algae that could plug the irrigation nozzles. Nozzle need to be designed to avoid plugging which otherwise would cause non-uniform application of recycled water.
Flexible. i.e. expandable, adaptable to odd site shapes.	It is likely that the irrigation system will be installed in segments as additional areas become cultivated. Recycled water will gradually replace areas covered by existing water rights which may cover odd shapes. The irrigation system will need to be able to adapt to these new areas and shapes.
Unlikely to cause drift	Some irrigation systems could cause recycled water to be carried off the irrigation site during windy conditions. DEQ rules require that this be avoided.
Resistant to freezing problems.	Even during the growing season in Sisters, nights and mornings frequently are subject to sub-freezing conditions. The irrigation system must not be damaged and be able to operate under these conditions.
Additional Considerations for Poplar Irrigation	
Easily removable or protected during harvest	During tree harvesting, the irrigation system must be removable or otherwise be able to be protected.
Uniform application within tree columns	As the trees mature, tree trunks could block or impair the ability to provide a uniform application of recycled water. These system must be able to provide a uniform application to all trees.

Effluent Irrigation Mechanisms

Based on the above criteria for irrigation mechanisms relative to agronomic land application of treated effluent, the following types of irrigation equipment could apply to the Lazy Z lands:

- **Hand Lines:** composed primarily of relatively light weight aluminum pipes with a single sprinkler head on each pipe segment and coupled together at each end with simple self-locking coupler ends to allow for modular lengths of continuous (straight) hand lines; can be coupled with angle sections to make simple turns. Disadvantages: unless sufficient hand lines are provided to cover the entire irrigation area, the lines must be manually moved, perhaps several times a day. In any case, if hand lines were provide to cover the entire area they would require manual labor to move the lines for crop rotation or for crop harvesting; after harvest is complete hand

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

lines must be replaced for continued crop irrigation; and susceptibility of livestock or wildlife knocking over the sprinkler risers.

- Large Gun Sprinklers on hose reels: large gun sprinklers distribute water over relatively long distances with high trajectories. The high trajectories have a high potential to cause air borne water droplets that would likely drift on to adjacent properties. It is likely that ODEQ would require an increased buffer distance if it allowed large gun sprinklers. For this reason, this irrigation mechanism is not recommended.
- Wheel Lines: composed primarily of lightweight aluminum pipes with a single sprinkler head on each pipe segment mounted on an aluminum spoke wheel to allow for easy traverse of series of wheel lines across a relatively level field. Each end is coupled together with simple self-locking coupler ends to allow for modular lengths of continuous (straight) wheel lines. Disadvantages: wheel lines require an irrigable field to be relatively flat and square or rectangular in shape and have minimal rocks; wheel lines tend to be very susceptible to wind movement and disruption of irrigation application.
- Circle Pivot: composed of large rubber wheel sections of overhead pipe with drop sprinklers that rotate about a center point (or pivot). A circle pivot can be operated to move across fields with moderate slope with clear wheel tracks. The one advantage to a circle pivot is that it requires minimal manual labor to operate. The disadvantages to circle pivots include high cost of installation, and, to irrigate field configuration other than a circle, it must be combined with other methods (hand lines, K Lines, etc.) to irrigate corners or areas not traversable by the circle pivot.
- Permanent Set Lines: may be composed of underground pipe installation with surface exposure of permanent riser sprinklers, or automated pop-up sprinklers, or individually installed 'plug-in' sprinklers. Disadvantages to permanent set lines are that, during plowing/disking of fields or during harvest, permanent set lines would likely be damaged and could lead to significant maintenance on an annual basis.
- Removable Set Lines: these are composed primarily a hand lines or *K Lines* (see below). Disadvantages to removable set lines are they need to be moved out of the way of equipment during harvest, field plowing/disking and reset prior to continued irrigation. K Lines can be moved with a vehicle and do not have the significant labor required to move and set hand lines.
- K Lines: composed of a non-rigid hose that connects a string of sprinklers mounted in self-contained polymer pods that can be moved with a vehicle (i.e. ATV, tractor, pickup truck). Standard length includes 5 sprinkler pods and can be coupled to make a continuous string of up to 10 sprinkler pods in a single K Line string. K Lines,

having sprinkler pods, provide protection from livestock or wildlife rubbing or knocking the pods out of position for irrigation.

Sprinkler heads for each of the above mechanisms are anticipated to be impact or rotary type sprinklers. These types of sprinklers are typical for these types of mechanisms.

Sprinklers

Impact Sprinklers

The basic operation of an impact sprinkler is relatively simple. As water leaves the sprinkler nozzle it comes in contact with a spring-loaded drive arm. This arm is shoved aside by the force of the water. The spring then returns the arm to its original position and it again comes into contact with the water and also a stop or shoulder on the sprinkler body. The impact against the shoulder causes the entire head assembly (and sprinkler stream) to rotate slightly. This constant impact and movement will cause the head to rotate a complete circle and slowly water the entire area within that circle. In addition, each time the water makes contact with the sprinkler arm, a small amount of “splash” is created that falls near the sprinkler head.

Advantages to impact sprinklers are uniform coverage of the area to be irrigated and with most impact sprinklers made of brass or stainless steel bodies, the sprinklers tend to have a long service life. Interchangeable nozzles within the sprinkler head allows for variability in the irrigation water volume and adjustability for varied input water pressure.

Disadvantages of impact sprinklers are the potential for high maintenance cost related to the exposed nature of the rotation mechanism with possible operation impedance by debris or contact with vegetation, and corrosion or deterioration of the rotation mechanism causing failure of the sprinkler head. Additionally, if an impact sprinkler becomes entangled with debris or becomes clogged, disabling rotation, an impact sprinkler will tend to spray in a single direction. If left unrepaired, this can cause oversaturation or erosion of soil in area of water impact.

Rotary Sprinklers

Rotary sprinklers (or more specifically, gear-driven rotary sprinklers), operate by water turning a small turbine (water wheel or fan) in the base of the unit which drives a series of gears that cause the head to rotate. The gear drive mechanism is protected from soil and debris by a screen.

The advantage of the Nelson rotary sprinkler is that the sprinkler heads can be fed by polyethylene pipe laterals or portable pipes including aluminum, polyethylene or PVC which would allow the sprinkler system to be removed during harvesting of poplar trees, if they are the chosen crop. Additionally, rotary sprinklers have the gear-driven portion (the unit within the

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

sprinkler that allows for sprinkler rotation) enclosed within the sprinkler providing protection from clogging or impacted by external debris.

Some potential drawbacks may come with these sprinklers. Nelson Irrigation Company (Nelson) of Walla Walla, Washington manufactures and sells rotary sprinkler heads of various types. Discussion with Nelson indicates they do not have experience with use of the rotary sprinklers to irrigate recycled water with high concentrations of algae. In addition, there could be problems during freezing conditions. According to John Rowley, "if the irrigation water temperature in use is greater the 55 degrees F, the R2000 will resist Rotator failure in most conditions. If the water temperature is below 40 degrees F, in some of the conditions, there will be freezing up of the sprinkler and rotation failure. Overall the R2000 will resist rotation failure in freezing temperatures if water is above 55 degrees and there are low winds. Wind speed is also an important factor, High winds (greater than 7 MPH) will cause rotation failure in freezing temps."

Sprinkler Options Summary

Before considering a sprinkler system, it is recommended that a small set be purchased and installed on an existing irrigation site for a season. This would allow the City to determine if nozzle plugging and sprinkler freezing would be a problem, as sprinklers of all types may be subject to potential freezing conditions.

The poplar plantation at Woodburn, Oregon uses the R-10 sprinkler heads. John Rowley of Nelson, recommends the R-2000 sprinkler head, which is also rotary, because it can be fitted with a one-eighth inch nozzle which may be less prone to plugging due to algal concentrations in the recycled water. This head would apply recycled water at 0.4 inches/hour.

Based on discussions with other municipalities that conduct effluent irrigation, rotary sprinklers were identified as a likely best choice for sprinkler irrigation of effluent.

Conclusions

Based upon the following summary of information, and discussions with City of Sisters personnel, irrigation mechanisms with minimal labor to operate are preferred. With that in mind, limitations on irrigation mechanisms for either hay/alfalfa/grass or poplar trees, distinct irrigation mechanisms are described below:

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Hay/Alfalfa/Grass

Irrigation mechanisms that are best applied to a hay/alfalfa/grass crop would be circle pivots, K Lines, and permanent set lines (permanent set lines will only work on a harvested crop if in-ground sprinklers are mounted outside of the harvest area, as harvest equipment or plow/disking of the field would likely damage the equipment). The K Lines would likely be a best choice for ease of movement to irrigate the corner areas not irrigable by circle pivots.

Poplar Trees

Irrigation Mechanisms that are best applied to a poplar tree crop would be had lines or K Lines. With the harvest duration of poplar trees being on the order of 9 to 12 years, K Lines could be pulled into and out of position with an ATV, tractor, etc. and set for the crop duration. Hand lines could be laid in rows and removed prior to tree harvest; however, wildlife may knock the sprinkler risers requiring periodic attention to reset the sprinkler risers.

COST ANALYSIS – IRRIGATION MECHANISMS

Identified Irrigation Mechanisms

A generalized cost estimate has been prepared based on the irrigation mechanisms identified under the section *Cost Analysis – Irrigation Mechanisms*. Newton conduct research for installation costs of irrigation mechanisms from Cascade Pump and Irrigation of Bend, Oregon. The estimated costs for irrigation mechanisms included the following key items below:

- Discussions with City of Sisters personnel on irrigation equipment that requires minimal supervision and maintenance cost;
- Capital costs to for initial purchase and installation of irrigation equipment based on the phase scenario included on the attached Table 10 7;
- Estimates of annualized power demands to operate the system;
- Potential annual operation and maintenance cost;
- Cost improvements provided by HGE, Inc. to allow for delivery of effluent irrigation water to each project phase (see table below):

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 10. Reuse Improvements *

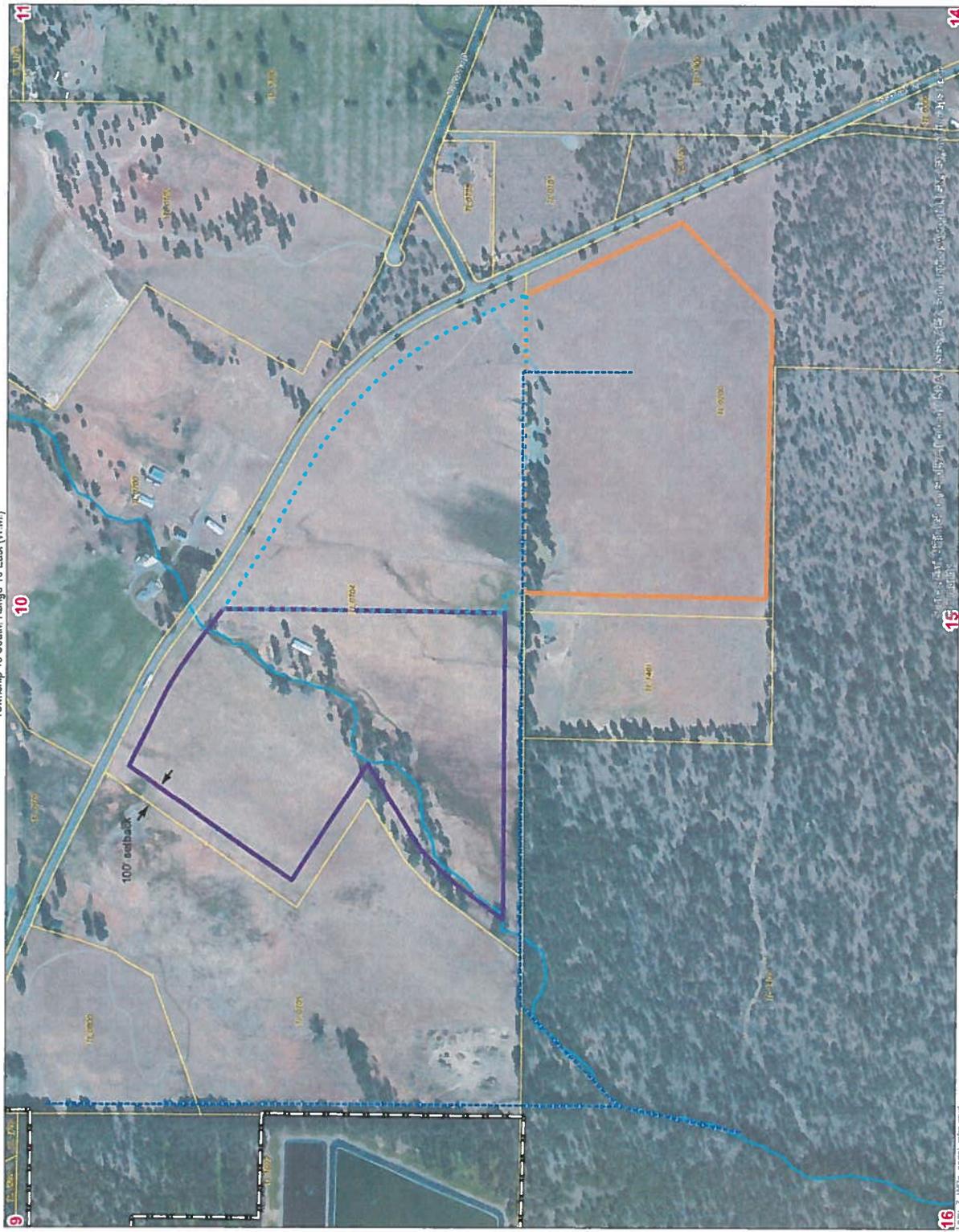
<u>Phase I</u>	
Mobilization	\$32,600
Clearing and Grubbing	\$3,500
Gravel Roadway Construction 3,250 ft.	\$65,000
Excavation and Class 3 BF, 3,250 ft.	\$81,250
Rock Excavation	\$5,000
Foundation Stabilization, 120 CY	\$3,600
18" HDPE Force Main, 3,250 ft.	\$121,875
18" Culvert Installation	\$2,500
Forcemain Appurtenances	\$42,700
Aggregate Base and Surfacing, 20 CY	\$600
Total Phase I	\$358,625
<u>Phase II**</u>	
Irrigation Line Controllers	\$13,333
Conduit	\$13,333
SCADA Modifications	\$13,333
Total Phase II	\$400,000
<u>Engineering Contingencies</u>	\$150,000
PROJECT TOTAL	\$908,625
<small>*Values for the reuse improvements were provided by HGE, Inc. in a letter to Paul Bertagna, Sisters Public Works Director, dated May 6, 2013. **Phase II cost was provided as a lump sum value and was divided equally among each component. The cost will likely change extensively depending on equipment desired, conduit lengths, and the extent of SCADA modifications.</small>	

Preferred Irrigation Mechanisms

The rate of recycled water application is limited to the agronomic requirement of the crop. Exceeding the agronomic rate creates the potential for waste water to migrate into the ground water and cause contamination. The agronomic rate varies based upon the type of crop, the time of year, and actual weather conditions which are impossible to predict from year to year. The irrigation system on the Lazy Z Ranch should include a system to measure soil moisture content so that application rates can be adjusted as needed based upon actual conditions. Irrigation of Hay/Alfalfa/Grass

Irrigation of hay/alfalfa/grass crops has been estimated in each phase of the project, with a specific layout of likely irrigation methods presented on the attached Figure 9. In this scenario the primary areas for irrigation of phase 1 and phase 2 have been provided, with the potential cost for irrigation of phase 3 being based on the average per acre cost of phases 1 and 2.

Township 15 South, Range 10 East (W.M.)



Lazy Z Existing Infrastructure and Proposed Phasing City of Sisters

- LEGEND**
- Proposed Phasing
 - Phase 1
 - Phase 2
 - Phase 3
 - All Other Features
 - City of Sisters UGB
 - Tax Lots
 - Uncle John Ditch
 - Existing Pipeline



MAP NOTES:
 Data Source: Deschutes Co GIS, Deschutes River Conservancy, GSI
 GSI
 Water Solutions, Inc.

Figure 9

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Irrigation mechanisms to irrigate a hay/alfalfa/grass crop need to be easily moved from the irrigation field to allow for crop harvest, which can occur between 2 to 6 times annually. Emphasis on minimal maintenance and ease of removal and resetting of the irrigation system was necessary. The mechanisms identified for the primary areas within the phases are circle pivots, with K Lines being used to fill in the small areas that a circle pivot could not accommodate.

Based on this scenario of circle pivots and K Lines to provide irrigation for a hay/alfalfa/grass crop, the following cost summary table was developed:

Table 11. Cost Summary for Irrigation of Hay/Alfalfa/Grass

Phase 1				
Irrigation Mechanism	Acres	Cost/Acre	Total Cost	Annualized O & M*
Circle Pivots(4)	48	\$6,854.00	\$328,992.00	\$16,449.60
K Lines	4	\$6,060.00	\$24,240.00	\$8,544.00
Reuse Improvements (HGE, Inc)			\$433,625.00	
Summary Phase 1		\$6,457.00	\$786,857.00	\$24,993.60
Phase 2				
Irrigation Mechanism	Acres	Cost/Acre	Total Cost	Annualized O & M*
Circle Pivots (1)	32	\$3,906.00	\$124,992.00	\$6,249.60
K Lines	6	\$6,060.00	\$36,360.00	\$9,756.00
Reuse Improvements (HGE, Inc)			\$475,000.00	
Summary Phase 2		\$4,983.00	\$636,352.00	\$16,005.60
Phase 3				
Irrigation Mechanism	Acres	Cost/Acre	Total Cost	Annualized O & M**
Circle Pivots	46	\$5,720.00	\$727,417.93	\$20,499.60
K Lines				
Summary Phase 3		\$5,720.00	\$727,417.93	\$20,499.60
<small>*Annualized O & M costs are based on an annual equipment cost of maintenance & repair of approximately 5% of materials cost. Labor to operate irrigation of hand lines is based on 1 person 2 hours per day 7 days per week for 140 day irrigation season at a pay rate of \$30/hour/person. Four annual harvest removal and reset costs (assumes 4 crop cuttings per irrigation season) are assumed to require 2 persons 8 hours for removal, and 2 persons 8 hours for re-set of hand lines for each of the four harvest events. Labor to operate irrigation with K Lines is based on 1 person 1 hour per day 7 days per week for 140 day irrigation season at a pay rate of \$30/hour/person. Four annual harvest removal and reset costs of K Lines (assumes 4 crop cuttings per irrigation season) is assumed to require 1 person 8 hours for removal; and 1 persons 8 hours for re-set of hand lines.</small>				
<small>**Annualized O & M costs are based on an average Annual O & M for Phases 1 and 2 above.</small>				
<small>NOTE: Costs for irrigation equipment and installation are based on estimates provided by Cascade Pump and Irrigation of Bend, Oregon based on similar acreage size projects where applicable.</small>				

The above costs were evaluated on a per acre cost for each phase of effluent irrigation. The cost per acre associated with circle pivots changes between phase 1 and phase 2 based on the portions of partial pivots and the added cost for installation of each circle pivot center.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

The potential for phase 3 equipment costs could be off set if the pivot track from the phase 2 pivot could be extended to allow pivot rotation across the phase boundary to phase 3.

The estimated annual power cost per phase is shown in the table below assuming a cost of \$0.06 per kilowatt-hour (KwH):

Table 12. Estimated Annual Power Cost for Irrigation (Hay/Alfalfa/Grass)

Estimated Annual Power Cost for Irrigation		
Phase 1		
Irrigation Mechanism	Acres	Cost @ \$0.06/KwH
Circle Pivots(4)	48	\$6,854.00
K Lines	4	\$193.00
Summary Phase 1		\$7,047.00
Phase 2		
Irrigation Mechanism	Acres	Cost
Circle Pivots (1)	32	\$3,527.00
K Lines	6	\$386.00
Summary Phase 2		\$3,913.00
Phase 3		
Irrigation Mechanism	Acres	Cost
Circle Pivots	46	\$5,601.78
K Lines		
Summary Phase 3		\$5,601.78

Irrigation of Poplar Trees

Irrigation of a poplar tree crop has been estimated in each phase of the project, with a generalized layout of likely irrigation methods based on the acreage of each irrigable phase as shown on the attached Figure 7. In this scenario the primary areas for irrigation of phase 1 and phase 2 have been provided, with the potential cost for irrigation of phase 3 being based on the average per acre cost of phases 1 and 2.

Irrigation mechanisms to irrigate a poplar tree crop need only be removable for harvest on a likely 9 to 12 year cycle. During harvest, the entire irrigation system should be removed, and then replaced after tree crop harvest. Emphasis on minimal maintenance and complete removal and resetting of the irrigation system was necessary. The mechanisms identified for the primary areas within the phases are hand lines or K Lines.

Based on this scenario of hand lines or K Lines to provide irrigation for a poplar tree crop, the following cost summary table was developed:

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 13. Cost Summary for Irrigation of Poplar Tree Crop

Phase 1				
Irrigation Mechanism	Acres	Cost/Acre	Total Cost	Annualized O & M*
Hand Lines	52	\$2,250.00	\$117,000.00	\$16,650.00
K Lines		\$6,060.00	\$315,120.00	\$7,695.60
Reuse Improvements (HGE, Inc)			\$433,625.00	
Summary Phase 1		\$4,155.00	\$865,745.00	\$24,345.60
Phase 2				
Irrigation Mechanism	Acres	Cost/Acre	Total Cost	Annualized O & M*
Hand Lines	38	\$2,250.00	\$85,500.00	\$15,075.00
K Lines		\$6,060.00	\$230,280.00	\$16,914.00
Reuse Improvements (HGE, Inc)			\$475,000.00	
Summary Phase 2		\$4,155.00	\$790,780.00	\$31,989.00
Phase 3				
Irrigation Mechanism	Acres	Cost/Acre	Total Cost	Annualized O & M*
Hand Lines	46	\$2,250.00	\$103,500.00	\$15,975.00
K Lines		\$6,060.00	\$278,760.00	\$6,793.80
Summary Phase 3		\$2,250.00	\$846,668.33	\$11,384.40

*Annualized O & M costs are based on an annual equipment cost of maintenance & repair of approximately 5% of materials cost. Labor to operate irrigation of hand lines is based on 1 person 2 hours per day 7 days per week for 180 day irrigation season at a pay rate of \$30/hour/person. A single harvest removal and reset cost (approximately once every 9-12 years) is assumed to require 2 persons 8 hours for removal; and 2 persons 8 hours for re-set of hand lines. Labor to operate irrigation with K Lines is based on 1 person 1 hour per day 7 days per week for 180 day irrigation season at a pay rate of \$30/hour/person. A single harvest removal and reset cost of K Lines (approximately once every 9-12 years) is assumed to require 1 person 8 hours for removal; and 1 persons 8 hours for re-set of hand lines. Single poplar harvest event is not included in the Annualized O & M cost above

NOTE: Costs for irrigation equipment and installation are based on estimates provided by Cascade Pump and Irrigation of Bend, Oregon based on similar acreage size projects where applicable.

The above costs were evaluated on a per acre cost for each phase of effluent irrigation.

The estimated annual power cost per phase is shown in the table below assuming a cost of \$0.06 per kilowatt-hour (KwH):

Table 14. Estimated Annual Power Cost for Irrigation (Poplar Trees)

Estimated Annual Power Cost for Irrigation		
Phase 1		
Irrigation Mechanism	Acres	Cost @ \$0.06/KwH
Hand or K Lines	48	\$1,932.84
Summary Phase 1		\$1,932.84
Phase 2		
Irrigation Mechanism	Acres	Cost
Hand or K Lines	32	\$1,352.94
Summary Phase 2		\$1,352.94
Phase 3		
Irrigation Mechanism	Acres	Cost
Hand or K Lines	46	\$1,546.26
Summary Phase 3		\$1,546.26

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
 Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 15. Water Rights and Available Acreage by Phase
 City of Sisters: Lazy Z Water Re-Use Study (2013)

<i>Phase 1 Water Rights - Primary</i>						
	Water Right	Acres of Surface Water Rights	Priority Date	Rate (cfs)	Volume (AF) 5 AF/acre	Acres Available for Effluent Irrigation *
<i>Primary Irrigation</i>	c.86828 (T-11318/CW-71)	10.8	1880	0.32	54.0	8.95
	c.86826 (T-11318/CW-71)	35.5	1881	0.71	177.5	33.29
	c.85392 (T-11318/CW-71)	7.0	1886	0.14	35.0	6.60
		53.3		1.17	266.5	48.84
<i>Phase 2 Water Rights - Primary</i>						
	Water Right	Acres of Surface Water Rights	Priority Date	Rate (cfs)	Volume (AF) 5 AF/acre	Acres Available for Effluent Irrigation
<i>Primary Irrigation</i>	c.83355 (T-11318/CW-71)	30.0	1880	0.62	150.0	27.37
	c.86828 (T-11318/CW-71)	7.2	1880	0.23	36.0	5.78
	c.85389 (T-11318/CW-71)	2.5	1880	0.08	12.5	1.23
	c.86824 (T-11318/CW-71)	3.0	1880	0.06	15.0	3.00
		42.7		0.99	213.5	37.38
<i>Phase 3 Water Rights - Primary</i>						
	Water Right	Acres of Surface Water Rights	Priority Date	Rate (cfs)	Volume (AF) 5 AF/acre	Acres Available for Effluent Irrigation
<i>Primary Irrigation</i>	c.86824 (T-11318/CW-71)	56.5	1880	1.13	282.5	46.50
	c.85391 (T-11318/CW-71)	3.0	1880	0.1	15	1.29
		59.5		1.23	297.5	47.79
Total:		155.5		3.39	777.5	134.01

*Acreage accounts for required set-backs

FINANCING OPPORTUNITIES – CONVERSION OF SURFACE WATER RIGHTS TO INSTREAM RIGHTS

Valuation & Feasibility of Transactional Opportunities

This section provides some historical information on water transactions and a range of estimates for potential transactions the City may consider. The valuation of water contains many variables and needs to be looked at on a case-by-case basis. Important variables include specifics of the water rights in question, including location, priority date, rate and duty (allowable application volume per-acre over an irrigation season), as well as current market demand for the water. In some cases, third-party appraisals are required. Thus, this discussion should be viewed as a tool for the City to consider their options, not as a firm valuation of water rights. Extensive due diligence is required as part of individual water transactions. This section also briefly discusses the current feasibility and utility of each opportunity.

Permanent Transactions

Permanent Restoration Transfer

Several Whychus Creek surface water rights have been acquired over the last several years within the range of \$4,500-\$6,500/acre. The value of surface water rights for restoration are heavily-dependent on the specifics of the water right, including point of diversion and return flow from source stream, priority date, rate and duty. It is also contingent on what a restoration funder is willing to pay to purchase the water rights, based on variables like how important the outcome is to the funder and the price of other options available to generate the water instream. Any permanent purchase of water rights requires extensive due diligence on the transferability of the right and its value. While permanent transfers can take several years to get finalized through the State, it is possible to get paid up-front upon execution of a purchase agreement with a funder.

There is a well-defined and active market for permanent restoration transfers in Whychus Creek. It is anticipated that funders exist in the near term to invest in this activity. In the next decade, as restoration interests get closer to reaching the current instream water right target in Whychus Creek, and as the Pelton Fund gets spent out, this market may decline. Permanent restoration transfers represent the highest value opportunity for the City.

As a policy, Three Sisters Irrigation District does not allow district water rights to exit the district, including permanent instream transfers. In 2001, the owners of the Lazy Z Ranch (Lazy Z Partners, LLC) entered into an agreement with the Three Sisters Irrigation District to include 442 irrigated acres within the property into the irrigation district's service area. This "Inclusion

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Agreement” also allowed for 201.2 acres of water rights, within the 442 acre area, to be excluded from the irrigation district. To date, 63 acres have been “excluded” from the irrigation district which leaves 138.2 acres remaining that are available to be removed from the irrigation district. Thus, the City presently has the ability to exclude 138.2 of its 155.5 acres from the irrigation district, opening up the potential to permanently transfer those water rights instream. Further conversation with the district would be required to assess the feasibility of excluding the remaining 17.3 acres of water rights on the City’s Lazy Z property.

Permanent Mitigation Transfer

No data on the acquisition of permanent mitigation exists to our knowledge. Several landowners have transferred surface water rights instream to generate permanent mitigation credits, but to our knowledge those mitigation credits have not been sold to mitigation buyers.

While there is not currently an active market for permanent instream transactions that result in mitigation credits in Whychus Creek, transferring Lazy Z water rights instream for its own mitigation needs may be a cost-effective way for the City to fulfill its own mitigation obligations. The City would need to consider its projected mitigation obligation, assess the costs of alternative ways to meet these needs, and consider the opportunity cost of holding onto the water rights.

Allocation of Conserved Water

Restoration funders have invested in Allocation of Conserved Water projects within Three Sisters Irrigation District. OWRD requires that 25% of the savings are protected as an instream water right. Restoration funders can invest in efficiency projects to protect a higher percentage of the conserved water instream.

Attracting conservation investment by restoration funders as part of a long-term effluent irrigation plan, however, is uncertain. Potential restoration buyers will likely question the value of investing up-front in infrastructure to irrigate more efficiently with surface water when that water may ultimately be transferred instream. The cost of setting up a surface water sprinkler irrigation system in advance of an effluent system would also need to be considered.

The USDA Farm Bill has an EQIP Program that is designed to cost-share with landowners on on-farm efficiency projects. While that program has been successfully used in Three Sisters Irrigation District, municipalities are not eligible to apply to the EQIP program.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Temporary Transactions

Temporary Instream Transfer (10-50+ years)

To date, there has been no investment by restoration funders in temporary instream transfers in Whychus Creek. The level of interest from restoration funders in this type of transaction is uncertain. A temporary transfer would likely attract greater investment than an annual lease because it ensures water is instream for a longer period of time. Because it provides no assurances, however, that the water will be permanently protected instream, it would likely not approach the value of a permanent instream transfer. Funders would most likely value this approach more highly if it played a functional role within a longer-term restoration strategy in Whychus Creek.

This approach would build in long-term flexibility for the City to make future decisions about its surface water rights, but the interest in and value of the water would be markedly less than a permanent instream transfer due to the future uncertainty of the water.

Instream Leasing

The Deschutes River Conservancy actively funds leasing in Whychus Creek, and pays \$7/acre-foot for water that is protected instream. Because Whychus Creek is over-appropriated, the actual volume of water protected instream per acre of irrigation varies widely by priority date. Depending on the priority dates of the water rights the DRC has leased historically, the payment has ranged from \$21-\$38/acre. For the purposes of this report, based on the priority dates of the City's Lazy Z water rights, we estimate that the City would receive at least 5 acre-feet per acre, or \$35/acre. The DRC is unable to pay public entities for leased water. If, however, the City submitted a lease as a temporary mitigation project, the DRC could compensate for the lease.

District patrons who lease instream are still obligated to pay annual assessments to the Three Sisters Irrigation District. These assessments are based on the acre-feet per acre delivered on-farm, or protected instream in the case of instream leases. Thus, the City may choose to lease less than 5 AF/acre instream, which would reduce the City's assessment, but would also reduce the potential lease payment.

The DRC has done split-season leases with Three Sisters Irrigation District, and pays the same \$7/acre foot for water protected instream. Because the water is leased for only part of the season, the compensation is lower than a full-season lease. However, since the DRC is unable to generate temporary mitigation credits from split-season leases, it would be unable to compensate the City for a split-season lease. The City would also incur additional costs with a split-season lease because the OWRD requires weekly monitoring and measurement of water use.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Instream leasing maximizes the City's flexibility with its surface water rights, and protects the beneficial use of the water rights, however does not provide significant offset to operating costs.

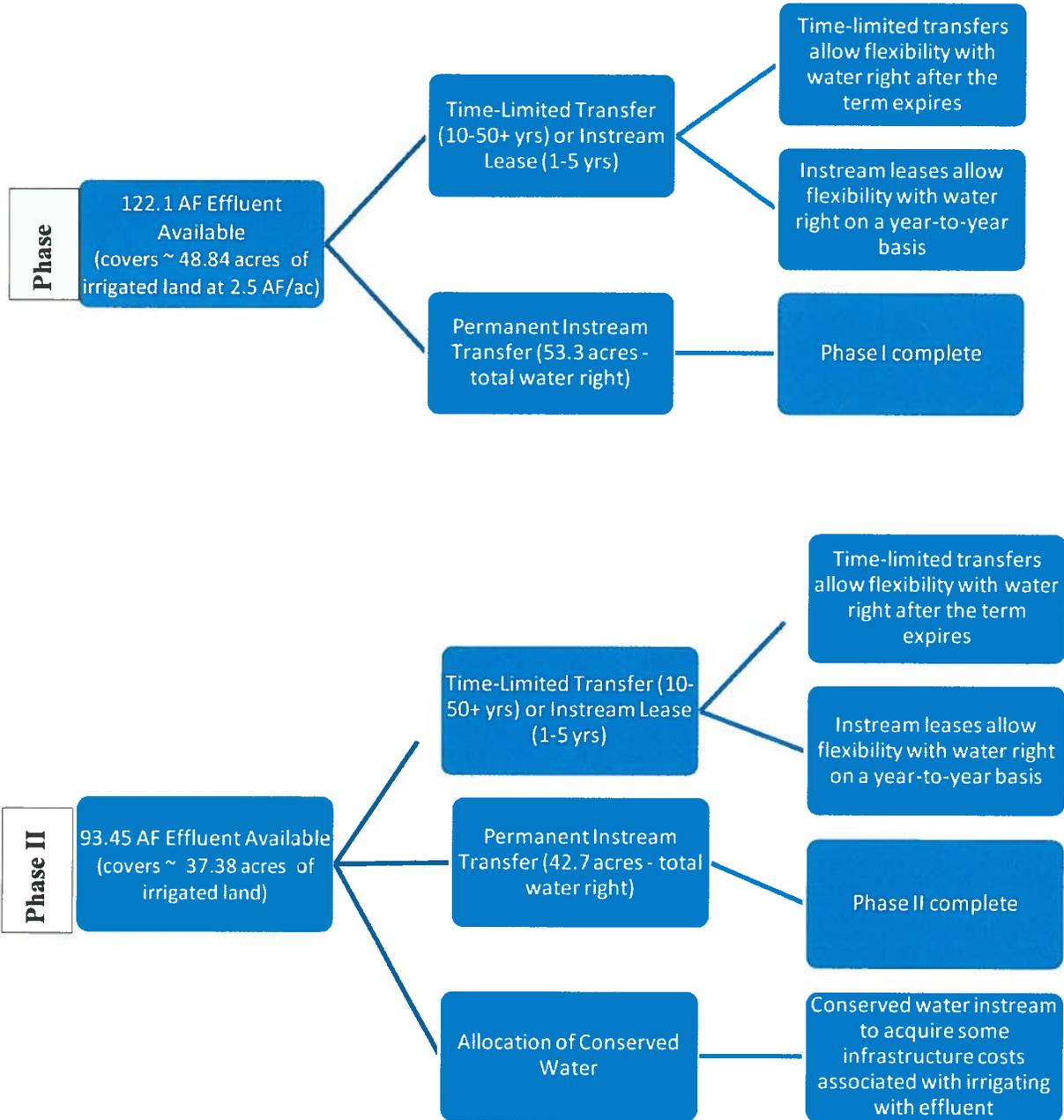
Summary

A permanent restoration transfer of Lazy Z water rights is the highest-value opportunity for the City with a high certainty of funding, particularly in the next five years. A permanent mitigation transfer could satisfy potential mitigation obligations, but would not generate revenue to offset infrastructure and operating costs associated with the effluent irrigation system. A time-limited transfer may generate some revenue, but the level is uncertain and, from the perspective of restoration funders, would likely depend on the utility of the transfer within a long-term restoration strategy. Instream leasing and split-season leasing offers flexibility with water rights on an annual basis, and protects the beneficial use of the water rights. It does not, however, generate significant financial value to offset operating costs, and may not have utility as a long-term solution once effluent irrigation is in place.

Figure 10 diagrams potential water transaction pathways for Phases I and II.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Figure 10. Potential Transaction Pathways for Phases I and II



WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

Table 16 summarizes capital costs from Tables 12, 13 and 14 above and potential value of different water transaction opportunities by phase.

Table 16. Summary of Capital Costs and Potential Benefits

	Costs		Benefits			
	Infrastructure		Lease ⁵	Split-Season Lease	Restoration Transfer	Temporary Transfer
	Hay	Poplar				
Phase I (48.84 acres)	\$786,857	\$865,745	\$1,026-\$1,709	0	\$219,780-\$317,460	No data
Phase II (37.38 acres)	\$636,352	\$749,780	\$785-\$1,308	0	\$168,210- \$242,970	No data
Phase III (47.79 acres)	\$727,417	\$846,668	\$1,004-\$1,673	0	\$215,055- \$310,635	No data
Total	\$2,150,626	\$2,503,193	\$2,815-\$4,690	0	\$603,045- \$871,065	No data

Conclusion

Over time the City of Sisters will need to expand its waste water disposal capacity onto its Lazy Z property. This study examines the regulatory framework, mechanics, and timeline of such a transition and evaluates to what extent transferring the City’s Lazy Z water rights instream can off-set the required infrastructure improvements.

The study estimates that 128 acre-feet of effluent are presently available for transition to irrigation on the Lazy Z. This will increase incrementally to 294 acre-feet by 2033. Hay, poplars, and ornamental nursery stock were identified as the most suitable crops for this property. Irrigation infrastructure for these crops was recommended and cost estimates for the systems supplied.

The study identified three phases, or areas of the property, for transition to effluent irrigation. Phase I (49 acres) could be transitioned with existing effluent. By 2033, effluent is projected to be available to cover all of Phases I & II (86 acres) and 65% of Phase III (48 acres). These phases are currently covered with 155.5 acres of senior Whychus Creek water rights. There are

⁵ The DRC pays \$7/AF. This range is based on \$3 AF/acre and \$5 AF/acre leased.

WASTEWATER REUSE AND CONSERVATION PROJECT PLANNING STUDY
Transitioning Irrigation From The Lazy Z Property From Surface Water To Treated Effluent

several permanent and temporary water transactions the City could pursue with these surface water rights. Permanent instream transfers for restoration are the highest value opportunity for the City that could help offset costs of effluent irrigation. Permanent instream transfers for mitigation could be used to meet mitigation obligations associated with one of the City's ground water permits. Instream leases or temporary transfers retain flexibility with the water rights and could provide temporary mitigation credits but do not generate significant revenue to offset operating costs.

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year November 2014
 Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year December 2014
 System Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:															
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM				
		Grab	Comp. X	Grab	Comp. X	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	MPN MF	MPN MF	MPN MF			
		Flow	Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	lbs	mg/L	Total	Fecal	E.coli
		mg/L	lbs	mg/L	lbs	mg/L	%	lbs	mg/L	%	lbs	mg/L			lbs	mg/L	CFU/100 ml				
11	1	.179																			
	2	.189																			
	3	.166																			
	4	.171																			
	5	.173																			
	6	.173																			
	7	.177	291	430	200	295															
	8	.174																			
	9	.185																			
	10	.185																			
	11	.180																			
	12	.182																			
	13	.181																			
	14	.182	307	466	212	322															
	15	.199																			
	16	.204																			
	17	.196																			
	18	.187																			
	19	.188																			
	20	.177																			
	21	.212	315	557	191	338															
	22	.191																			
	23	.188																			
	24	.185																			
	25	.183																			
	26	.185																			
	27	.164																			
	28	.201	331	555	199	334															
	29	.199																			
	30	.211																			
TOTAL		5.567	1244	2008	802	1289															
DAILY MAX		.166	291	430	191	295															
DAILY MAX		.212	331	557	212	338															
WEEKLY AVG. MAX		.185	311	502	201	322															
MONTHLY AVG.		.185	311	502	201	322															
DAILY LIMITS																					
WEEKLY LIMITS																					
MONTHLY LIMITS																					

Effluent OFF
for season

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year December 2014
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 System Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Operator Certification

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836 I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242 I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:																
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM					
		Grab	Comp.	Grab	Comp.	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	MPN	MPN	MPN				
		Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen			Total	Fecal	E.-coli		
Flow	mol.	lbs	mol.	lbs	mol.	%	lbs	mol.	%	lbs					lbs	mol.				CFU/100 ml		
12	1	.179																				
	2	.179																				
	3	.178																				
	4	.174																				
	5	.172	224	321	103	148																
	6	.187																				
	7	.191																				
	8	.172																				
	9	.172																				
	10	.177																				
	11	.179																				
	12	.180	293	590	177	266																
	13	.183																				
	14	.187																				
	15	.175																				
	16	.179																				
	17	.177																				
	18	.180																				
	19	.185	312	481	181	279																
	20	.222																				
	21	.193																				
	22	.189																				
	23	.186																				
	24	.186																				
	25	.156																				
	26	.197	343	565	190	325																
	27	.188																				
	28	.202																				
	29	.223																				
	30	.264																				
	31	.225																				
TOTAL		5.033	272	157	659	1018																
DAILY MIN.		.156	224	321	103	148																
DAILY MAX.		.254	393	590	198	329																
WEEKLY AVE.		.188	318	489	165	255																
WEEKLY MAX.		.188	318	489	165	255																
DAILY LIMITS																						
WEEKLY LIMITS																						
MONTHLY LIMITS																						

O / F for Season

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year January 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year February 2015
 System Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Operator Certification

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836 I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242 I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:															
Month	Day	Flow	BOD		TSS		BOD			TSS			NUTRIENTS				CHLORINE		COLIFORM		
			Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	Used	Total Residual	Total	Fecal	E-coli
			mol	lbs	mol	lbs	mol	%	lbs	mol	%	lbs	mol				lbs	mol	CFU/100 ml		
1	1	.225																			
	2	.233	378	734	178	346															
	3	.216																			
	4	.209																			
	5	.180																			
	6	.178																			
	7	.177																			
	8	.172	354	508	138	198															
	9	.177																			
	10	.188																			
	11	.183																			
	12	.180																			
	13	.176																			
	14	.173																			
	15	.178																			
	16	.182	393	597	190	288															
	17	.205																			
	18	.187																			
	19	.181																			
	20	.171																			
	21	.165																			
	22	.161																			
	23	.172	351	504	181	260															
	24	.175																			
	25	.185																			
	26	.172																			
	27	.168																			
	28	.167																			
	29	.168																			
	30	.180	372	558	164	246															
	31	.180																			
TOTAL		5.664	1848	2901	851	1338															
DAILY AVE.		.161	351	504	138	198															
DAILY MAX.		.233	393	597	190	288															
WEEKLY AVE. MAX.		.182	370	580	170	268															
MONTHLY AVE.		.182	370	580	170	268															
LIMITS																					
Y. LIMITS																					
MONTHLY LIMITS																					

O A F F O R Season

Handwritten checkmarks and scribbles in the effluent columns.

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year March 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year April 2015
 Item Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Operator Certification

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836 I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242 I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:															
Month	Day	Flow	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM			
			Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	Used	Total Residual	Total	Fecal	E-coli
			mg/l	lbs	mg/l	lbs	mg/l	%	lbs	mg/l	%	lbs	mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	CFU/100 ml	CFU/100 ml	CFU/100 ml
3	1	.184																			
	2	.184																			
	3	.181																			
	4	.175																			
	5	.172																			
	6	.172	422	605	190	273															
	7	.182																			
	8	.197																			
	9	.182																			
	10	.177																			
	11	.172																			
	12	.182																			
	13	.185	294	484	144	222															
	14	.202																			
	15	.205																			
	16	.189																			
	17	.180																			
	18	.178																			
	19	.189																			
	20	.194	339	548	171	277															
	21	.201																			
	22	.196																			
	23	.194																			
	24	.182																			
	25	.193																			
	26	.178																			
	27	.256	373	796	194	414															
	28	.200																			
	29	.179																			
	30	.169																			
	31	.166																			
TOTAL		5.796	1428	2403	699	1146															
DAILY MIN.		.172	294	454	144	222															
DAILY MAX.		.256	422	796	194	414															
WQLY. AVG. 90%		.187	357	601	175	287															
MONTHLY AVG.		.187	357	601	175	287															
LIMITS																					
-J. LIMITS																					
MONTHLY LIMITS																					

OFF FOR
SEASON

V V V

I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS REPORT AND THAT TO THE BEST OF MY KNOWLEDGE SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE.

X *Douglas McIntosh*
 Authorized Signature

Date
 4-6-15

Notes:

Mail Original To: Oregon DEQ, Bend Office
 475 NE Bellevue Drive, Suite 110
 Bend, OR 97701

Name (print) *Douglas McIntosh*

LAGOON AND POLISHING POND				RECLAIMED WATER	SEWER SYS. BYPASS	MAINTENANCE ACTIVITIES (CHECK OFF ACTIVITY UPON COMPLETION)							LOG Regarding breakdowns, bypassing, odors, complaints, etc.
Primary Depth	Secondary Depth	Perimeter Inspection	Quantity Irrigated	Flow	Duration	Solids Transported to Other WWT	Test Dosing Pumps/Alarms	Inspect Filter Screens	Check Pumps for Accurate Cycle	Inspect Monitoring Ponds	Inspect & Maintain Dist. Mechanisms	Inspect Dosing Tank	
9.1	9	Pond 3	10.5	X									
				X				X					6.70
				X				X					7.26
				X				X					7.01
				X				X					7.36
				X				X					7.13
				X	↑	↑		X					7.04
				X	↑	↑		X					6.82
				X	0	0		X					7.00
				X				X					7.01
				X	↓	↓		X					7.09
				X				X					7.13
				X				X					7.00
				X				X					7.07
			11.5	X				X					
TOTAL													
DAILY MINIMUM													
DAILY MAXIMUM													
WEEKLY AVERAGE MAXIMUM													
MONTHLY AVERAGE													
DAILY LIMITS													
WEEKLY LIMITS													
MONTHLY LIMITS													

Influent P.H.

0.04

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Siskiers Phone Number 541-419-2561 From - Month & Year April 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year May 2015
 System Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Operator Certification

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836 I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242 I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:															
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM				
		Grab	Comp. <input checked="" type="checkbox"/>	Grab	Comp. <input checked="" type="checkbox"/>	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	MPN MF	MPN MF	MPN MF			
		Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	lbs	mol/L	Total	Focal	E.coli	
		mol/L	lbs	mol/L	lbs	mol/L	%	lbs	mol/L	%	lbs	mol/L			lbs	mol/L	CFU/100 ml				
4	1	.166																			
	2	.167																			
	3	.170	437	619	190	269															
	4	.178																			
	5	.172																			
	6	.183																			
	7	.175																			
	8	.177																			
	9	.182																			
	10	.141	443	705	220	350															
	11	.187																			
	12	.197																			
	13	.191																			
	14	.183													1.2	6.2					
	15	.192													5	5.0			0		
	16	.186													6	8.0					
	17	.183	414	831	198	302			19	70	6				7	3.8					
	18	.195													6	2.8					
	19	.196													5	3.1					
	20	.178													4	2.8					
	21	.179													9	0					
	22	.179													6	0			0		
	23	.188													3	0					
	24	.185	438	675	172	265			21	88	7				9	5.0					
	25	.191													6	1.7					
	26	.196													6	1.8					
	27	.185													4	1.4					
	28	.179													6	1.3					
	29	.169													6	1.8			0		
	30	.196													5	2.1					
TOTAL		5.466	1732	2630	780	1186			40		13				94.2	40					
DAILY MIN		.166	414	619	172	265			19		6				1.2	0					
DAILY MAX		.196	443	805	220	350			21		7				9	5.0					
WQLY AVG. MAX		.182	433	657	195	296			20		7				6	2.5					
DAILY AVG.		.182	433	657	195	296			20		7				6	2.5			62	1	
DAILY LIMITS																					
WQLY LIMITS																					
MONTHLY LIMITS																				62	126

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year May 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year June 2015
 System Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Operator Certification

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836 I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242 I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:																
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS				CHLORINE		COLIFORM				
		Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	Used	Total Residual	Total	Fecal	E. coli		
		mg/L	lbs	mg/L	lbs	mg/L	%	lbs	mg/L	%	lbs	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 ml	CFU/100 ml	CFU/100 ml	
5	1	.185	424	654	110	169											3	1.0				
	2	.186															18	1.4				
	3	.189															6	1.6				
	4	.186															3	1.2				
	5	.180															3	1.5				
	6	.184															3	1.0				
	7	.189															6	1.1			0	
	8	.191	256	407	190	302											6	1.8				
	9	.206															6	1.2				
	10	.195															6	1.9				
	11	.193															6	1.0				
	12	.179															6	1.1				
	13	.182															6	1.8				
	14	.186															5	1.7			0	
	15	.182	249	377	89	135											6	1.5				
	16	.186															18	1.2				
	17	.186															18	.8				
	18	.186															3	.10				
	19	.185															3	.15				
	20	.196															7	1.1				
	21	.191															6	1.7			0	
	22	.208	325	563	210	364											6	1.6				
	23	.219															6	1.8				
	24	.225															6	1.0				
	25	.234															6	1.4				
	26	.202															6	1.1				
	27	.199															6	1.4				
	28	.199															6	1.3			0	
	29	.201	729	559	201	341											6	1.2				
	30	.206															6	1.9				
	31	.210															6	1.5				
TOTAL		5.85	1583	2560	800	1311											210	39.15				
DAILY MEAN		.179	249	377	89	135											3	.8				
DAILY MAX		.234	424	654	210	364											18	1.8				
WEEKLY AVG. MAX.		.188	316	512	160	262											2	1.2				
MONTHLY AVG.		.188	316	512	160	262											7	1.2			6.1 1	
DAILY LIMITS																						
WEEKLY LIMITS																						
ACTUAL LIMITS																						6.1 1.2

I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS REPORT AND THAT TO THE BEST OF MY KNOWLEDGE SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE.

X *Douglas McIntosh*
 Authorized Signature

Date
 6-15-15

Notes:

Mail Original To: Oregon DEQ, Bend Office
 475 NE Bellevue Drive, Suite 110
 Bend, OR 97701

Name (print) *Douglas McIntosh*

LAGOON AND POLISHING POND			RECLAIMED WATER	SEWER SYS. BYPASS	MAINTENANCE ACTIVITIES (CHECK OFF ACTIVITY UPON COMPLETION)							Influent P.H.	LOG Regarding breakdowns, bypassing, odors, complaints, etc.		
Primary Depth	Secondary Depth	Perimeter Inspection	Quantity Irrigated	Flow	Duration	Solids Transported to Other WWT	Test Dosing Pumps/Alarms	Inspect Blamp Screens	Check Pumps for Accurate Cycle	Inspect Monitoring Ponds	Inspect & Maintain Dist. Mechanisms			Inspect Dosing Tank	
9.1	9.12	Pond 3	Dike forest	Gal.	Hrs.										
			.11					X				X	7.00		
			.11					X				X			
			.11					X				X	7.02		
			.11					X				X	7.05		
			.11					X				X	7.00		
			.11					X				X			
			.11					X				X	6.98		
			.11					X				X	7.03		
			.12 .08					X				X	7.27		
			.13 .11					X				X			
			.13 .12					X				X			
			.13 .11					X				X	6.96		
			.13 .11					X				X			
			.16 .12					X				X	7.00		
			.16 .12					X				X	7.06		
			.16 .12					X				X			
			.16 .12					X				X			
			.16 .10					X				X	6.99		
			.16 .10					X				X			
			.16 .10					X				X	6.87		
			.16 .09					X				X			
			.16 .10					X				X	7.03		
			.16 .10					X				X			
			.16 .11					X				X			
			4.1	1.91								TOTAL			
			.11	.08								DAILY MINIMUM			
			.16	.12								DAILY MAXIMUM			
			.13	.10								WEEKLY AVERAGE MAXIMUM			
			.13	.10								MONTHLY AVERAGE			
										DAILY LIMITS					
										WEEKLY LIMITS					
										MONTHLY LIMITS					

Effluent P.H.
7.21
7.19
7.21
7.13
7.31
7.11
6.93
6.97
7.04
7.08
7.18
6.94
6.94

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year June 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year July 2014
 System Type Dom. Sewage lagoons Population Served 2038 County Deschutes

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836T
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242L

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:																
		Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM			
				Grab	Comp.	Grab	Comp.	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	MPN	MPN	MPN		
				Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen			Ammonia Nitrogen	Nitrate Nitrogen	MF	MF	MF
Flow	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	Used	Total Residual	Total	Fecal	E.coli					
		mo/l	lbs	mo/l	lbs	mo/l	%	lbs	mo/l	%	lbs	mo/l			lbs	mo/l	CFU/100 ml					
6	1	.190														7.5	1.0					
	2	.195														6	1.1					
	3	.200														4	1.0					
	4	.200														20	1.5					
	5	.212	379	899	108	191										6	1.4			4.1		
	6	.214														7	1.2					
	7	.238														9	1.7					
	8	.208														8	2.1					
	9	.217														6	5.0					
	10	.220														6	3.8					
	11	.222														6	2.6					
	12	.238	346	678	165	323										6	1.9			0		
	13	.238														6	1.6					
	14	.248														6	1.7					
	15	.223														18	1.3					
	16	.213														9	1.5					
	17	.213														0	1.6					
	18	.215														7	1.0					
	19	.224	368	687	85	159										0	1.3			2.3		
	20	.219														6	1.6					
	21	.219														15	1.4					
	22	.212														3	1.3					
	23	.211														7	1.4					
	24	.211														6	1.5					
	25	.221														6	1.6					
	26	.214	351	626	133	237										6	1.4			11.0		
	27	.222														6	1.5					
	28	.219														6	1.4					
	29	.214														6	1.1					
	30	.209														6	2.7					
TOTAL		6496	1404	2590	491	910										2025	51.2					
DAILY MAX		.190	379	899	85	159										0	1.0					
DAILY MAX		.248	368	678	165	323										20	5.0					
WEEKLY AVG. MAX		.216	351	647	122	227										6.75	1.7					
WEEKLY AVG.		.216	351	647	122	227										6.75	1.7			6.9	4.25	
DAILY LIMITS																						
WEEKLY LIMITS																						
MONTHLY LIMITS																					6.9	12.6

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year July 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year Aug 2015
 Permit Type Dom. Sewage Lagoons Population Served 2078 County Deschutes

Collection sys. class F Principal operator name (print) Douglas McIntosh Certification No. & grade 11836F
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:													
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM		
		Grab	Comp. K	Grab	Comp. K	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	MPH MF	MPH MF	MPH MF	
		Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	lbs	mol/L	Total	Fecal
		mg/L	lbs	mg/L	lbs	mg/L	%	lbs	mg/L	%	lbs	mg/L			lbs	mol/L	CFU/100 ml		
7	1	.217													6	2.7			
	2	.214													6	1.4			
	3	.228	339	644	130	247									7	1.2			0
	4	.205													8	1.4			
	5	.226													6	1.5			
	6	.222													6	1.1			
	7	.224													6	1.7			
	8	.222													4	1.4			
	9	.234													11	1.6			
	10	.240	351	702	176	352									6	1.3			0
	11	.246													7	1.5			
	12	.223													10	1.0			
	13	.222													6	1.3			
	14	.209													6	.9			
	15	.207													6	1.1			
	16	.211													6	1.6			
	17	.221	352	687	200	368									6	1.9			3.2
	18	.228													7	1.3			
	19	.226													6	1.5			
	20	.224													6	1.4			
	21	.222													8	1.1			
	22	.219													7	1.2			
	23	.220													7	1.5			
	24	.224	366	683	188	351									6	1.4			0
	25	.223													6	1.2			
	26	.218													6	1.3			
	27	.221													6	1.4			
	28	.220													6	1.5			
	29	.216													6	1.6			
	30	.217													6	1.7			
	31	.214	385	687	161	287									6	1.5			6.1
TOTAL		.6248	1803	3387	855	1428													
DAILY MIN.		.205	339	644	130	247													
DAILY MAX.		.246	385	702	200	368													
WPLY. AVG. MAX.		.220	360	676	171	297													
MTHLY. AVG.		.220	360	676	171	297													
DAILY LIMITS																			6 M 1.8
MTHLY. LIMITS																			6 M 1.8

I CERTIFY THAT I AM FAMILIAR WITH THE INFORMATION CONTAINED IN THIS REPORT AND TO THE BEST OF MY KNOWLEDGE SUCH INFORMATION IS TRUE, COMPLETE AND ACCURATE

X *Douglas McIntosh*
 Authorized Signature

Date
 9-8-15

Douglas McIntosh
 Name (print)

Notes:

Mail Original To: Oregon DEQ, Bend Office
 476 NE Bellevue Drive, Suite 110
 Bend, OR 97701

LAGOON AND POLISHING POND				RECLAIMED WATER		SEWER SYS. BYPASS		MAINTENANCE ACTIVITIES (CHECK OFF ACTIVITY UPON COMPLETION)							Effluent P.H.	LOG Regarding breakdowns, bypassing, odors, complaints, etc.
Primary Depth	Secondary Depth	Pond 3	Perimeter Inspection	Quantity Irrigated	Forest	Flow	Duration	Solids Transported to Other WWTF	Test Dosing Pumps/Alarms	Inspect Pump Screens	Check Pumps for Accurate Cycle	Inspect Monitoring Ponds	Inspect & Maintain Dist. Mechanisms	Inspect Dosing Tank		
9.1	9	7	X	.28	.16					X				X		
			X	.28	.16					X				X		
			X	.28	.16					X				X	6.88	6.61
			X	.28	.16					X				X	6.71	6.60
			X	.28	.12					X				X	6.84	6.73
			X	.28	.12					X				X		
			X	.28	.12					X				X	6.93	6.81
			X	.25	.12					X				X	6.83	6.69
			X	.25	.12					X				X	6.98	6.93
			X	.25	.12					X				X		
			X	.25	.12					X				X	7.00	6.9
			X	.25	.13					X				X	6.91	6.88
			X	.25	.13					X				X		
			X	.25	.13					X				X	6.80	6.97
			X	.25	.13					X				X		
			X	.006	.13					X				X	7.11	6.97
			X	0	0					X				X		
			X	.24	.12					X				X	7.06	7.01
			X	.24	.12					X				X		
			X	.24	.12					X				X	6.99	7.08
			X	.24	.12					X				X		
			X	.24	.12					X				X	7.02	6.89
				2.496	3.87											
				.28	0											
				.24	.16											
				.24	.12											
				.24	.12											

Effluent P.H.

6.61
6.60
6.73
6.81
6.69
6.93
6.9
6.88
6.97
6.97
7.01
7.08
6.89

TOTAL
 DAILY MINIMUM
 DAILY MAXIMUM
 WEEKLY AVERAGE MAXIMUM
 MONTHLY AVERAGE
 DAILY LIMITS
 WEEKLY LIMITS
 MONTHLY LIMITS

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year Sept 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year Oct 2015
 System Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Collection sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 11836 I
 Treatment sys. class I Principal operator name (print) Douglas McIntosh Certification No. & grade 12242 I

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:													
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS			CHLORINE		COLIFORM		
		Grab	Comp.	Grab	Comp.	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	MPN MF	MPN MF	MPN MF	
		Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	lbs	mol/L	Total	Fecal
Flow	mg/L	lbs	mg/L	lbs	mg/L	%	lbs	mg/L	%	lbs	mg/L	mg/L	mg/L	mg/L	mg/L	mg/L	CFU/100 ml		
9	1	.195													5	3.5			
	2	.197													7.5	2.6			
	3	.196													6	2.8			0
	4	.196	397	648	202	330									3	2.6			
	5	.197													6	2.1			
	6	.207													6	2.7			
	7	.209													6	4.0			
	8	.219													6	2.3			
	9	.193													6	2.0			
	10	.206													6	2.3			0
	11	.226	375	706	199	375									10	3.4			
	12	.226													5	3.2			
	13	.225													5	2.1			
	14	.210													5	1.9			
	15	.205													6	2.1			
	16	.205													6	2.0			
	17	.206													6	2.2			0
	18	.201	338	566	189	316									3	1.5			
	19	.203													5	2.3			
	20	.206													5	2.1			
	21	.194													6	2.3			
	22	.196													6	2.7			
	23	.195													3	2.4			
	24	.196													5	1.4			0
	25	.201	341	571	191	320									5	1.8			
	26	.205													6	1.3			
	27	.200													6	1.5			
	28	.192													6	1.1			
	29	.189													6	1.4			
	30	.186													6	1.3			
TOTAL		6082	1451	2491	781	1341									166.5	276.7			
DAILY MIN.		.186	338	566	189	316									3	1.1			
DAILY MAX.		.226	397	706	202	375									10	4.0			
WQLY. AVG. MAX.		.202	362	622	195	335									6	2.3			
MTHLY. AVG.		.202	362	622	195	335									6	2.3		6M	1
DAILY LIMITS																			
WQLY. LIMITS																			
MTHLY. LIMITS																		6M	126

WPCF Discharge Monitoring Report - Oregon Department of Environmental Quality

Facility Name City of Sisters Phone Number 541-419-2561 From - Month & Year OCT 2015
 DEQ Permit No. 101799 DEQ File No./Facility ID 81850 To - Month & Year Nov 2015
 am Type Dom. Sewage Lagoons Population Served 2038 County Deschutes

Operator Certification

Collection sys. class I Principal operator name (print) Douglas McEntosh Certification No. & grade 11836 L
 Treatment sys. class I Principal operator name (print) Douglas McEntosh Certification No. & grade 12242 F

DATE		INFLUENT				EFFLUENT - Identify outfall number (e.g. 001, 002) or sampling location:														
Month	Day	BOD		TSS		BOD			TSS			NUTRIENTS				CHLORINE		COLIFORM		
		Grab	Comp.	Grab	Comp.	Grab	Composite	Grab	Composite	Grab	Composite	Grab	Composite	Used	Total Residual	NPN MF	NPN 1/2F	E. coli MF		
		Concentration	Loading	Concentration	Loading	Concentration	Removal	Loading	Concentration	Removal	Loading	Total Phosphorous	Total Kjeldahl Nitrogen	Ammonia Nitrogen	Nitrate Nitrogen	lbs.	mol/L	Total	Fecal	E. coli
		mol/L	lbs.	mol/L	lbs.	mol/L	%	lbs.	mol/L	%	lbs.	mol/L				lbs.	mol/L	CFU/100 ml		
10	1	.192														6	1.9			0
	2	.185	338	521	210	324										6	1.7			
	3	.191														6	1.8			
	4	.204														6	1.9			
	5	.187														0	1.7			
	6	.175														6	1.8			
	7	.180														3	1.6			
	8	.196														9	1.8			0
	9	.198	305	504	195	322										3	1.6			
	10	.205														6	1.7			
	11	.200														6	1.7			
	12	.193																		
	13	.176																		
	14	.181																		
	15	.181																		
	16	.180	320	480	189	284														
	17	.192																		
	18	.180																		
	19	.177																		
	20	.168																		
	21	.179																		
	22	.174																		
	23	.193	210	338	141	227														
	24	.183																		
	25	.188																		
	26	.180																		
	27	.173																		
	28	.172																		
	29	.179																		
	30	.173	349	504	140	202														
	31	.186																		
TOTAL		5.726	1522	2342	875	1359										57	17.9			
DAILY MAX		.173	210	338	140	202										0	1.3			
DAILY MIN		.205	349	521	210	324										9	1.9			
WQLY. AVG. MAX		.184	304	469	175	272										5	1.6			
WQLY. AVG. MIN		.181	304	469	175	272										5	1.6			6-1 1
/ LIMITS																				
WQLY. LIMITS																				
WQLY. LIMITS																				6-1 126

Expiration Date: December 31, 2025
Permit Number: 101779
File Number: 81850
Page 1 of 13 Pages

WATER POLLUTION CONTROL FACILITIES PERMIT

Department of Environmental Quality
475 NE Bellevue Dr. Suite 110, Bend, OR 97701
Telephone: 541-388-6146
(541) 388-6146
Issued pursuant to ORS 468B.050

ISSUED TO:

City of Sisters
P.O. Box 39
Sisters, OR 97759

SOURCES COVERED BY THIS PERMIT:

<u>Type of Waste</u>	<u>Outfall Number</u>	<u>Method of Disposal</u>
Domestic Sewage	001	Recycled Water Reuse

SYSTEM TYPE AND LOCATION:

Domestic Sewage Lagoons
912 S. Locust Street
T15S, R10 EWM, S09; TL 1002
Longitude -121.538480;
Latitude 44.280506
Sisters, Oregon

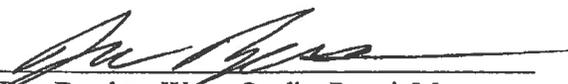
RIVER BASIN INFORMATION:

Basin: Deschutes
Sub-Basin: Upper Deschutes
LLID: 1213357444600-20.47-N
County: Deschutes
Nearest surface stream which would receive waste if it were to discharge: Whychus Creek formally called Squaw Creek

Treatment System Class: I
Collection System Class: II

Issued in response to Application No. 968002 received December 17, 2010.

This permit is issued based on the land use findings in the permit record.


Don Butcher, Water Quality Permit Manager
Eastern Region

January 22, 2016
Date

PERMITTED ACTIVITIES

Until this permit expires or is modified or revoked, the permittee is authorized to construct, install, modify, or operate a wastewater collection, treatment, control and disposal system in conformance with all the requirements, limitations, and conditions set forth in the attached schedules as follows:

	Page
Schedule A - Waste Disposal Limitations	2
Schedule B - Minimum Monitoring and Reporting Requirements.....	3-4
Schedule C - Compliance Conditions and Schedules	5
Schedule D - Special Conditions	6-8
Schedule E - Not Applicable.....	--
Schedule F - General Conditions	9-13

All direct a discharge to surface waters is prohibited.

SCHEDULE A

Waste Disposal Limitations

1. The permittee is authorized to construct, operate, and maintain wastewater collection, treatment and disposal systems to serve the City of Sisters in accordance with the conditions set forth in this permit.
2. The wastewater collections, treatment and land application system must not be hydraulically or organically loaded in excess of their respective, DEQ approved design capacities. At full build-out, however, the annual average daily influent flow must not exceed 0.38 MGD.
3. All wastewater treatment and disposal systems must be operated in compliance with the following conditions:
 - a. No discharge to state waters is permitted. All wastewater must be stored and treated for disposal by land application following sound irrigation practices.
 - b. Recycled Wastewater
 - i. Prior to land application of the recycled water, it must receive at least Class D treatment as defined in OAR 340-055. Class D recycled water must not exceed a 30-day log mean of 126 E. coli organisms per 100 milliliters and 406 E. coli organisms per 100 milliliters in any single sample. Class C recycled water must not exceed a 7 day median of 23 organisms/100 milliliters and no two consecutive samples must exceed 240 organisms/100 milliliters.
 - ii. Irrigation must conform to a Recycled Water Use Plan approved by DEQ and meet the required setbacks as defined in OAR 340-055.
 - iii. The City of Sisters must restrict public access to the reuse site(s) for the protection of public health.
 - iv. Treated effluent may only be irrigated on land between April 1 through October 31 for dissipation by evapotranspiration and controlled seepage by following sound irrigation practices unless otherwise approved in writing by DEQ.
 - v. Recycled water equipment must be operated so as to prevent:
 - (A) Prolonged ponding of treated recycled water on the ground surface;
 - (B) Surface runoff or subsurface drainage through drainage tile;
 - (C) The creation of odors, fly and mosquito breeding or other nuisance conditions;
 - (D) The overloading of land with nutrients, organics, or other pollutant parameters; and
 - (E) Impairment of existing or potential beneficial uses of groundwater.
 - (F) Until otherwise approved in writing by the Department via a revised reclaimed water use plan, treated effluent must only be reused on Class D beneficial uses.
4. The storage lagoon must be lowered sufficiently by the end of the irrigation season to ensure maximum practicable storage capacity during the non-irrigation months.
5. The permittee must, during all times of treatment and disposal, provide personnel whose primary responsibilities are to assure the continuous performance of the disposal system in accordance with the conditions of this permit.
6. No activities must be conducted that could cause an adverse impact on existing or potential beneficial uses of groundwater. All wastewater and process related residuals must be managed and disposed in a manner that will prevent a violation of the Groundwater Quality Protection Rules (OAR 340-040).

SCHEDULE B

1. System Monitoring Requirements

The permittee must monitor the operation and efficiency of all treatment and disposal facilities. Sampling and measurements taken as required herein must be representative of the nature of the wastewater, and must be taken under normal operating conditions. Unless otherwise agreed to in writing by the Department of Environmental Quality, data collected, and submitted must include but not necessarily be limited to the following parameters and minimum frequencies:

a. Influent Monitoring and Reporting Requirements

Table B 1: Influent Monitoring

Item or Parameter	Time Period	Minimum Frequency	Sample Type/Required Action	Report
Total Flow (MGD)	Year-round	Daily	Measurement	Daily totals Monthly maximum Monthly minimum Monthly average Monthly total
Flow Meter Verification	Year-round	Annually	Verification	Completed or not completed (Pass, Fail)
BOD ₅ and TSS (mg/L)	Year-round	Weekly	Composite	Monthly averages Weekly values
pH (S.U.)	Year-round	3/week	Grab	Monthly maximum Monthly minimum Monthly average

b. Recycled Water Monitoring Requirements:

Table B2: Recycled Water Monitoring

Item or Parameter	Minimum Frequency	Sample Type/Required Action
Total Flow (MGD) or Quantity Irrigated (in/ac)	Daily	Measurement
Flow Meter Calibration	Annually	Verification
Chlorine, Total Residual (mg/L)	Daily	Grab
pH	3/Week	Grab
E. coli Bacteria	1/Week	Grab*
Total Coliform	1/Week	Grab*
Total P and Total N	Annually	Grab
Annual Irrigation		

*The permittee is only required to sample for either E. coli or total coliform, but not both for an individual use. If the permittee is irrigating on crops requiring only Class D quality effluent, E. coli must be monitored. If the permittee irrigates/reuses effluent for Class C uses, total coliform must be monitored.

2. Reporting Procedures

- a. Monitoring results must be reported on DEQ approved forms. Reports must be submitted to DEQ's Eastern Region – Bend office by the 15th day of the following month.
- b. State monitoring reports must identify the name, certificate classification and grade level of each principal operator designated by the permittee as responsible for supervising the wastewater collection and treatment systems during the reporting period. Monitoring reports must also identify each system classification as found on page one of this permit.
- c. Monitoring reports must also include a record of the quantity and method of use of all sludge removed from the treatment facility and a record of all applicable equipment breakdowns and bypassing.
- d. The laboratory used by the permittee to analyze samples must have a quality assurance/quality control (QA/QC) program to verify the accuracy of sample analysis. If QA/QC requirements are not met for any analysis, the results must be included in the report, but not used in calculations required by this permit. When possible, the permittee must re-sample in a timely manner for parameters failing the QA/QC requirements, analyze the samples, and report the results.
- e. By no later than January 15 of each year, the permittee must submit to DEQ an annual report describing the effectiveness of the recycle water system to comply with the approved recycle water use plan, the rules of Division 55, and the limitations and conditions of this permit applicable to reuse of recycled water. The review is to provide a summary of land application conducted at each site which is adequate to demonstrate that reuse water was applied agronomically and/or hydraulic loading rates, and that required site management practices were followed.

SCHEDULE C

Compliance Conditions and Schedules

- a. Within 180 days the permittee must update their recycled water use plan for DEQ approval. A recycled water use plan must describe how the wastewater treatment system owner will comply with OAR 340-055 (refer to OAR 340-055-0025).
- b. The permittee is expected to meet the compliance date that have been established in this schedule. Either prior to or no later than 14 days following any lapsed compliance date, the permittee shall submit to the Department a notice of compliance or noncompliance with the established schedule. The Director or his authorized representative may revise a schedule of compliance if he determines good and valid cause resulting from events over which the permittee has little or no control.

SCHEDULE D

Special Conditions

1. Prior to constructing or modifying any wastewater control facilities, detailed plans and specifications shall be approved in writing by DEQ. After approval of the plans, all construction shall be in strict conformance with the plans unless otherwise approved in writing by DEQ.
2. Within 6 months of such time as the sewage lagoons require removal of accumulated biosolids, the permittee shall submit a biosolids management plan that complies with the Department's biosolids management regulations as established in OAR 340-50.
3. This permit may be modified to incorporate any applicable standard for sewage sludge use or disposal promulgated under section 405(d) of the Clean Water Act, if the standard for sewage sludge use or disposal is more stringent than any requirements for sludge use or disposal in the permit, or controls a pollutant or practice not limited in this permit.
4. The permittee must, during all times of disposal, provide personnel to ensure the continuous performance of the disposal system within the limitations of this permit. In the event that any condition of this permit or DEQ rules are violated, the permittee must immediately take action to correct the violation and to notify DEQ **within 24 hours** at: DEQ's Eastern Region Water Quality Program Office (541) 388-6146.

Response: In response to a notification, DEQ may conduct an investigation to evaluate the nature and extent of the problem, and may require additional corrective actions, as necessary. Compliance with this requirement does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit or the resulting liability for failure to comply.

5. All materials and equipment, including but not limited to tanks, pumps, controls, valves, etc. must be installed, operated, and maintained in accordance with manufacturer's minimum specifications.
6. The permittee must immediately notify the DEQ Bend office (phone 388-6146) of any occurrence of surfacing sewage so corrective action can be coordinated between the permittee and DEQ. When the DEQ offices are not open, the permittee must report the incident to the Oregon Emergency Response System (phone 1-800-452-0311).
7. **Emergency Response and Public Notification Plan**
 - a. The permittee must develop, and maintain and implement an Emergency Response and Public Notification Plan (the Plan) per Schedule F, Section B, and Conditions 5 & 6. The permit holder must develop the plan within six months of permit issuance and update the Plan annually to ensure that telephone and email contact information for applicable public agencies are current and accurate. An updated copy of the plan must be kept on file at the wastewater treatment facility for Department review. The latest plan revision date must be listed on the Plan cover along with the reviewer's initials or signature.

8. Recycled Water Use Plan

- a. In order to distribute recycled water for reuse, the permittee must develop, have and maintain and implement a DEQ-approved Recycled Water Use Plan meeting the requirements in OAR 340-055-0025. The permittee must submit substantial modifications to an existing plan to DEQ for approval at least 60 days prior to making the proposed changes. Conditions in the Plan are enforceable requirements under this permit.

9. The permittee must meet the requirements for use of recycled water under Division 55, including the following:

- a. All recycled water must be managed in accordance with the approved Recycled Water Use Plan. No substantial changes must be made in the approved plan without written approval by DEQ.
- b. The permittee must notify DEQ within 24 hours if it is determined that the treated effluent is being used in a manner not in compliance with OAR 340-055. When the DEQ offices are not open, the permittee must report the incident of noncompliance to the Oregon Emergency Response System (Telephone Number 1-800-452-0311).
- c. No recycled water must be made available to a person proposing to recycle unless that person certifies in writing that they have read and understand the provisions in Division 55. This written certification must be kept on file by the sewage treatment system owner and be made available to DEQ for inspection.
- e. Treated effluent must not be irrigated on ground that is frozen, snow-covered, or saturated with water. The volume of irrigated effluent and its total nitrogen loading must not exceed that established in a DEQ-approved recycled water use plan.
- f. Unless otherwise approved in writing by DEQ, a vegetative cover must be maintained on the land irrigation area at all times. Vegetation is to be periodically cut and removed to ensure maximum evapotranspiration and nutrient capture.

10. Operator Certification

The permittee must comply with Oregon Administrative Rules (OAR), Chapter 340, Division 49, "Regulations Pertaining To Certification of Wastewater System Operator Personnel" and designate a supervisor whose certification corresponds with the classification of the collection and/or treatment system as specified on page 1 of this permit.

a. Definitions

- i. "Supervise" means to have full and active responsibility for the daily onsite technical operation of a wastewater treatment system or wastewater collection system.
- ii. "Supervisor" or "designated operator", means the operator delegated authority by the permittee for establishing and executing the specific practice and procedures for operating the wastewater treatment system or wastewater collection system in accordance with the policies of the owner of the system and any permit requirements.
- iii. "Shift Supervisor" means the operator delegated authority by the permittee for executing the specific practice and procedures for operating the wastewater treatment

system or wastewater collection system when the system is operated on more than one daily shift.

- iv. "System" includes both the collection system and the treatment systems.
 - b. The permittee must have its system supervised by one or more operators who hold a valid certificate for the type of wastewater treatment or wastewater collection system, and at a grade equal to or greater than the wastewater system's classification as specified on page 1 of this permit.
 - c. The permittee's wastewater system may not be without the designated supervisor for more than 30 days. During this period, there must be another person available to supervisor who is certified at no more than one grade lower than the classification of the wastewater system. The permittee must delegate authority to this operator to supervise the operation of the system.
 - d. If the wastewater system has more than one daily shift, the permittee must have another properly certified operator available to supervisor operation of the system. Each shift supervisor, if any, must be certified at no more than one grade lower than the system classification.
 - e. The permittee is not required to have a supervisor on site at all times; however, the supervisor must be available to the permittee and operator at all times.
 - f. The permittee must notify DEQ in writing of the name of the system supervisor. The permittee may replace or re-designate the system supervisor with another properly certified operator at any time and must notify DEQ in writing within 30 days of replacement or re-designation of operator in charge. As of this writing, the notice of replacement or re-designation must be sent to Water Quality Division, Operator Certification Program, 2020 SW 4th Avenue, Suite 400, Portland, OR 97201. This address may be updated in writing by DEQ during the term of this permit.
 - g. When compliance with paragraph (c) of Item 8 in this section is not possible or practicable because the system supervisor is not available or the position is vacated unexpectedly, and another certified operator is not qualified to assume supervisory responsibility, the Director may grant a time extension for compliance with the requirements in response to a written request from the system owner. The Director will not grant an extension longer than 120 days unless the system owner documents the existence of extraordinary circumstances.
11. DEQ may reopen the Schedules in this permit, if necessary, to include new or revised conditions.
 12. If warranted, at any time, DEQ may evaluate the need for or require a full assessment of the facility's impact on groundwater quality.

SCHEDULE F

WPCF GENERAL CONDITIONS – DOMESTIC FACILITIES

SECTION A. STANDARD CONDITIONS

1. Duty to Comply with Permit

The permittee must comply with all conditions of this permit. Failure to comply with any permit condition is a violation of Oregon Revised Statutes (ORS) 468B.025 and grounds for an enforcement action. Failure to comply is also grounds for the Department to modify, revoke, or deny renewal of a permit.

2. Property Rights and Other Legal Requirements

Issuance of this permit does not convey any property rights of any sort, or any exclusive privilege, or authorize any injury to persons or property or invasion of any other rights, or any infringement of federal, tribal, state, or local laws or regulations.

3. Liability

The Department of Environmental Quality or its officers, agents, or employees may not sustain any liability on account of the issuance of this permit or on account of the construction or maintenance of facilities or systems because of this permit.

4. Permit Actions

After notice by the Department, this permit may be modified, suspended, or revoked in whole or in part during its term for cause including but not limited to the following:

- a. Violation of any term or condition of this permit, any applicable rule or statute, or any order of the Commission;
- b. Obtaining this permit by misrepresentation or failure to disclose fully all relevant facts.

5. Transfer of Permit

This permit may not be transferred to a third party without prior written approval from the Department. The Department may approve transfers where the transferee acquires a property interest in the permitted activity and agrees in writing to fully comply with all the terms and conditions of this permit and the rules of the Commission. A transfer application and filing fee must be submitted to the Department.

6. Permit Fees

The permittee must pay the fees required by Oregon Administrative Rules.

SECTION B. OPERATION AND MAINTENANCE OF POLLUTION CONTROLS

1. Proper Operation and Maintenance

At all times the permittee must maintain in good working order and properly operate as efficiently as possible all treatment or control facilities or systems installed or used by the permittee to comply with the terms and conditions of this permit.

2. Standard Operation and Maintenance

All waste collection, control, treatment, and disposal facilities or systems must be operated in a manner consistent with the following:

- a. At all times, all facilities or systems must be operated as efficiently as possible in a manner that will prevent discharges, health hazards, and nuisance conditions.
- b. All screenings, grit, and sludge must be disposed of in a manner approved by the Department to prevent any pollutant from the materials from reaching waters of the state, creating a public health hazard, or causing a nuisance condition.
- c. Bypassing untreated waste is generally prohibited. Bypassing may not occur without prior written permission from the Department except where unavoidable to prevent loss of life, personal injury, or severe property damage.

3. Noncompliance and Notification Procedures

If the permittee is unable to comply with conditions of this permit because of surfacing sewage; a breakdown of equipment, facilities or systems; an accident caused by human error or negligence; or any other cause such as an act of nature, the permittee must:

- a. Immediately take action to stop, contain, and clean up the unauthorized discharges and correct the problem.
- b. Immediately notify the Department's Regional office so that an investigation can be made to evaluate the impact and the corrective actions taken, and to determine any additional action that must be taken.
- c. Within 5 days of the time the permittee becomes aware of the circumstances, the permittee must submit to the Department a detailed written report describing the breakdown, the actual quantity and quality of waste discharged, corrective action taken, steps taken to prevent a recurrence, and any other pertinent information.

Compliance with these requirements does not relieve the permittee from responsibility to maintain continuous compliance with the conditions of this permit or liability for failure to comply.

4. Wastewater System Personnel

The permittee must provide an adequate operating staff that is duly qualified to carry out the operation, maintenance, and monitoring requirements to assure continuous compliance with the conditions of this permit.

5. Public Notification of Effluent Violation or Overflow

If effluent limitations specified in this permit are exceeded or an overflow occurs that threatens public health, the permittee must take such steps as are necessary to alert the public, health agencies and other affected entities (e.g., public water systems) about the extent and nature of the discharge in accordance with the notification procedures developed under General Condition B.6. Such steps may include, but are not limited to, posting of the river at access points and other places, news releases, and paid announcements on radio and television.

6. Emergency Response and Public Notification Plan

The permittee must develop and implement an emergency response and public notification plan that identifies measures to protect public health from overflows, bypasses or upsets that may endanger public health. At a minimum the plan must include mechanisms to:

- a. Ensure that the permittee is aware (to the greatest extent possible) of such events;
- b. Ensure notification of appropriate personnel and ensure that they are immediately dispatched for investigation and response;
- c. Ensure immediate notification to the public, health agencies, and other affected public entities (including public water systems). The overflow response plan must identify the public health and other officials who will receive immediate notification;
- d. Ensure that appropriate personnel are aware of and follow the plan and are appropriately trained;
- e. Provide emergency operations; and
- f. Ensure that DEQ is notified of the public notification steps taken.

SECTION C. MONITORING AND RECORDS

1. **Inspection and Entry**

The permittee must at all reasonable times allow authorized representatives of the Department to:

- a. Enter upon the permittee's premises where a waste source or disposal system is located or where any records are required to be kept under the terms and conditions of this permit;
- b. Have access to and copy any records required by this permit;
- c. Inspect any treatment or disposal system, practices, operations, monitoring equipment, or monitoring method regulated or required by this permit; or
- d. Sample or monitor any substances or permit parameters at any location at reasonable times for the purpose of assuring permit compliance or as otherwise authorized by state law...

2. **Averaging of Measurements**

Calculations of averages of measurements required for all parameters except bacteria must use an arithmetic mean; bacteria must be averaged as specified in the permit.

3. **Monitoring Procedures**

Monitoring must be conducted according to test procedures specified in the most recent edition of **Standard Methods for the Examination of Water and Wastewater**, unless other test procedures have been approved in writing by the Department and specified in this permit.

4. **Representative Sampling**

Sampling and measurements taken as required herein must be representative of the volume and nature of the monitored discharge when discharging or land applying. Monitoring points must not be changed without notification to and the approval of DEQ.

5. **Retention of Records**

The permittee must retain records of all monitoring and maintenance information, including all calibrations, copies of all reports required by this permit, and records of all data used to complete the application for this permit, for a period of at least 3 years from the date of the sample, measurement, report or application. The Department may extend this period at any time.

SECTION D. REPORTING REQUIREMENTS

1. **Plan Submittal**

Pursuant to Oregon Revised Statute 468B.055, unless specifically exempted by rule, construction, installation, or modification of disposal systems, treatment works, or sewerage systems may not commence until plans and specifications are submitted to and approved in writing by the Department. All construction, installation, or modification shall be in strict conformance with the Department's written approval of the plans.

2. **Change in Discharge**

Whenever a facility expansion, production increase, or process modification is expected to result in a change in the character of pollutants to be discharged or in a new or increased discharge that will exceed the conditions of this permit, a new application must be submitted together with the necessary reports, plans, and specifications for the proposed changes. A change may not be made until plans have been approved and a new permit or permit modification has been issued.

3. Signatory Requirements

All applications, reports, or information submitted to the Department must be signed and certified by the official applicant of record (owner) or authorized designee.

4. Twenty-Four Hour Reporting

The permittee must report any noncompliance that may endanger health or the environment. Any information must be provided orally (by telephone) to DEQ or to the Oregon Emergency Response System (1-800-452-0311) as specified below within 24 hours from the time the permittee becomes aware of the circumstances.

a. Overflows.

(1) Oral Reporting within 24 hours.

- i. For overflows other than basement backups, the following information must be reported to the Oregon Emergency Response System (OERS) at 1-800-452-0311. For basement backups, this information should be reported directly to DEQ.
 - a) The location of the overflow;
 - b) The receiving water (if there is one);
 - c) An estimate of the volume of the overflow;
 - d) A description of the sewer system component from which the release occurred (e.g., manhole, constructed overflow pipe, crack in pipe); and
 - e) The estimated date and time when the overflow began and stopped or will be stopped.
- ii. The following information must be reported to the Department's Regional office within 24 hours, or during normal business hours, whichever is first:
 - a) The OERS incident number (if applicable) along with a brief description of the event.

(2) Written reporting within 5 days.

- i. The following information must be provided in writing to the Department's Regional office within 5 days of the time the permittee becomes aware of the overflow:
 - a) The OERS incident number (if applicable);
 - b) The cause or suspected cause of the overflow;
 - c) Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the overflow and a schedule of major milestones for those steps;
 - d) Steps taken or planned to mitigate the impact(s) of the overflow and a schedule of major milestones for those steps; and
 - e) (for storm-related overflows) The rainfall intensity (inches/hour) and duration of the storm associated with the overflow.

The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

b. Other instances of noncompliance.

(1) The following instances of noncompliance must be reported:

- i. Any unanticipated bypass that exceeds any effluent limitation in this permit;
- ii. Any upset that exceeds any effluent limitation in this permit;
- iii. Violation of maximum daily discharge limitation for any of the pollutants listed by the Department in this permit; and
- iv. Any noncompliance that may endanger human health or the environment.

(2) During normal business hours, the Department's Regional office must be called. Outside of normal business hours, the Department must be contacted at 1-800-452-0311 (Oregon Emergency Response System).

(3) A written submission must be provided within 5 days of the time the permittee becomes aware of the circumstances. The written submission must contain:

- i. A description of the noncompliance and its cause;
- ii. The period of noncompliance, including exact dates and times;
- iii. The estimated time noncompliance is expected to continue if it has not been corrected;
- iv. Steps taken or planned to reduce, eliminate, and prevent reoccurrence of the noncompliance; and
- v. Public notification steps taken, pursuant to General Condition B.6.

(4) The Department may waive the written report on a case-by-case basis if the oral report has been received within 24 hours.

SECTION E. DEFINITIONS

1. *BOD₅* means five-day biochemical oxygen demand.
2. *TSS* means total suspended solids.
3. *FC* means fecal coliform bacteria.
4. *NH₃-N* means Ammonia Nitrogen.
5. *NO₃-N* means Nitrate Nitrogen.
6. *NO₂-N* means Nitrite Nitrogen.
7. *TKN* means Total Kjeldahl Nitrogen.
8. *Cl* means Chloride.
9. *TN* means Total Nitrogen.
10. "*Bacteria*" includes but is not limited to fecal coliform bacteria, total coliform bacteria, and *E. coli* bacteria.
11. *Total residual chlorine* means combined chlorine forms plus free residual chlorine.
12. *mg/l* means milligrams per liter.
13. *ug/l* means micrograms per liter.
14. *kg* means kilograms.
15. *GPD* means gallons per day.
16. *MGD* means million gallons per day.
17. *Grab sample* means an individual discrete sample collected over a period of time not to exceed 15 minutes.
18. *Composite sample* means a combination of samples collected, generally at equal flow or time intervals over a 24-hour period.
19. *Week* means a calendar week of Sunday through Saturday.
20. *Month* means a calendar month.
21. *Quarter* means January through March, April through June, July through September, or October through December.

**DEQ**State of Oregon
Department of
Environmental
Quality

Permit Evaluation Report

Oregon Department of Environmental Quality
Eastern Region – Bend Office
475 NE Bellevue Drive, Suite 110
Bend, OR 97701

Permittee:	City of Sisters P.O. Box 39 Sisters, OR 97759
File Information:	File Number: 81850 Permit Number: 101779 Expiration Date: December 31, 2025
Source Contact:	Paul Bertagna 541-323-5212
Facility Name & Location:	Sisters Wastewater Treatment Plant 912 S. Locust Street; Sisters OR 97759 T15S, R10EWM, S09; Tax Lot 1002 and 1002A1 Longitude -121.538480; Latitude 44.280506 Deschutes County
LLID:	LLID: 1213357444600-20.47-N
Receiving Stream/Basin:	Whychus Creek (no discharge) – formally called Squaw Creek; USGS Deschutes Basin; Upper Deschutes Sub-basin
Proposed Action:	Issue Permit Application Number: 968002 Date Received: December 17, 2010
Source Category:	Domestic
Sources Covered:	Domestic Sewage Lagoon and Irrigation Reuse
Permit Type:	WPCF-Domestic
Permit Writer:	Lawrence Brown REHS Environmental Health Specialist Date Prepared: November 13, 2015

Introduction

The City of Sisters operates a domestic sewage wastewater collection and treatment system under a DEQ Water Pollution Control Facility (WPCF) permit #101779 which was last issued on July 12, 2005. This permit has an expiration date of February 28, 2011. However, because DEQ received a timely WPCF permit renewal application from the City of Sisters their permit remains in effect pursuant to OAR 340-045-0040.

In response to the City of Sisters permit renewal application, I have drafted a proposed permit for permit issuance. My evaluation report describes any concerns as well as permit requirements for effluent limitations, monitoring and reporting, compliance schedules, and special conditions necessary to carry out state and federal law.

Land Use Approval

On file is a signed land use compatibility statement from the Deschutes County Planning Department dated July 26, 1999 for a municipal wastewater treatment facility indicating that the use is compatible with the Land Conservation and Development Commission-acknowledged comprehensive plan or complies with statewide planning goals.

Wastewater Treatment Facilities Description

The City of Sisters wastewater treatment system consists of a collection system that collects sewage and directs it to various pump stations where sewage is then pumped to a three-cell aerated lagoon system with winter holding capacity. The wastewater treatment plant and effluent reuse site for the City of Sisters is located on the south ½ of Section 9, Township 15 South, Range 10 East of the Willamette Meridian.

Treatment is provided with two 2.41 acre aerated lagoons followed by an 18 acre storage lagoon and 100.3 acres of land utilized for automated land irrigation reuse purposes (88.5 acres of natural forest land and 11.8 acres of lagoon dikes consisting of pasture grass). The land reuse system diverts the majority of the effluent to the natural forest area. Prior to land application of the recycled water to the forest area, it must receive at least Class D treatment as defined in OAR 340-055.

The City of Sisters uses chlorination to meet this treatment level Class D where Class D recycled water must not exceed a 30-day log mean of 126 E. coli organisms per 100 milliliters and no more than 406 E. coli organisms per 100 milliliters in any single sample. With this level of treatment it is required that the site be restricted to public access for public health protection. Managing access and exposure to recycled water is the primary mechanism for protection of public health at reuse sites.

The City is currently limited to the quantity of treated effluent that can be land applied on the existing 100.3 acre land application reuse site. For future increase in flows the City looked at expanding their irrigation reuse sites to include the Lazy Z Ranch. This would allow for expansion of waste water disposal capacity and provide in-stream benefits to Whychus Creek by transferring irrigation water rights back to Whychus Creek.

The City of Sisters then purchased the Lazy Z Ranch property which includes both: T15, R10, S10; TL 704 (105.26 acres) and T15, R10, S15; TL 200 (125.68 acres) for a total of 230.94 acres. However, only TL 200 has received land use approval, to date, from Deschutes County - signed and dated August 6, 2008. The use of effluent on this property was found to be in compliance with applicable local land use regulations.

In November of 2006, DEQ evaluated the Lazy Z Ranch site for the use of recycled water for beneficial purposes. The soils mostly consist of a sandy loam to loamy sand ranging 30 to 45 inches in soil depth. DEQ determined that the site appeared to be suitable for the land application of treated effluent and should be able to support a crop for nutrient removal. However, before using this site the City is required to update their recycled water reuse plan for DEQ approval.

Environmental Issues

The aquifer, which will receive the percolate from the spray field is about 15 feet below the ground surface during the growing season. In review of their recycled water reuse plan and past operations DEQ has determined that the application rates and site management practices for the land application activities are protective of public health and have a low potential for adversely impacting groundwater quality.

Based on DEQ's screening criteria for groundwater review no further groundwater information is needed at this time. However, DEQ may evaluate the need for a full assessment of the facility's impact on groundwater quality at the next permit renewal or sooner if there is any evidence of an adverse impact resulting from the facilities operation or the facility fails to operate in accordance with permit conditions.

Compliance History

The most recent DEQ inspection was conducted on August 25, 2015. The City of Sisters was found to be in compliance with permit conditions. Additionally, no compliance issues have been documented in file for the permit period.

As a permit condition, the permittee must report incidents of noncompliance.

PROPOSED PERMIT LIMITS AND CONDITIONS

Schedule A - Waste Disposal Limitations

No discharge to state waters is permitted. All wastewater is treated in aerated lagoons, stored through the non-irrigation season and irrigated on DEQ approved land application sites following sound irrigation management practices. Additionally, the wastewater collections, treatment and land application system must not be hydraulically or organically loaded in excess of their respective, DEQ approved design capacities. Recycled water must conform to a recycled water use plan approved by DEQ. Prior to land application recycled water must be treated to at least Class D as stipulated in OAR 340-055.

Effluent is irrigated at agronomic rates and only during the irrigation season. In addition, the lagoon cells are lined to prevent leakage. Based upon this, the Department believes the proposed facility will have no adverse impact on groundwater quality and therefore complies with the Department's groundwater protection regulations in OAR 340-40.

Schedule B - Minimum Monitoring and Reporting Requirements

The monitoring requirements of Schedule B are the primary means of ensuring that permit limitations are being met. The monitoring data also provides DEQ with information to evaluate the performance of the wastewater treatment facility. The authority to require periodic reporting by permittee's is included in ORS 468.065(5). The proposed monitoring and reporting requirements are based upon DEQ's monitoring and reporting requirements for similar facilities of this type and size.

Schedule C - Compliance Conditions and Schedules:

DEQ is requesting that the permittee submit an updated water reuse plan for DEQ approval.

Schedule D - Special Conditions:

Prior to constructing new or modifying existing wastewater systems, detailed plans and specifications must be submitted to DEQ for review and approval in writing. Qualified personnel must also be available to operate and maintain the wastewater treatment system to help ensure that the wastewater treatment facility functions as designed. Additionally, this section includes operator certification requirements to assure an appropriate operator for this type of wastewater system. The operator certification level as

listed on the front page of the permit was calculated using DEQ's Certified Operator Determination Worksheet – See Appendix A of this evaluation report. This is a change from the prior permit where the number of people served has increased putting the collection system in a Class II category.

This schedule also contains the normal conditions for facilities that reuse reclaimed wastewater. DEQ is not requiring a biosolids management plan at this time since the system will not routinely remove, treat and dispose of biosolids. A plan will be required, however, at such time as biosolids are needed to be removed from the system.

Schedule F – General Conditions:

This schedule includes conditions and definitions that are applicable to all WPCF permits in Oregon of this type.

Public Participation

The City of Sisters has submitted a complete permit renewal application. DEQ should send the draft permit documents to the applicant for review and comment, and then proceed with a Category II permitting action for public notification.

Response to questions and concerns submitted by Councilor Asson
February 2016

1. Who requires this update? What is the deadline for submission? How will the requiring agency respond to our submission? If there is no deadline, what is the urgency to complete? If the deadline has passed, why was I not informed? What are the consequences of filing late?

This update is not required by OAR or ORS, however, capital projects typically must be in a capital facilities plan to be considered for grant funding. DEQ may provide comment on the capital facilities plan, we intend to share it with them for their review. The urgency to complete the plan is created by the need to begin work on identifying funding sources for needed improvements to the wastewater system prior to operational issues developing, especially those which involve permitted limits such as effluent disposal limits. It should be noted that the DLCD does have a requirement for cities greater than 2,500 population that facilities plan updates are required a minimum of every 7 years.

2. Population growth is pegged at 3.23% per year per a Portland State Study. There are numerous comments in the Plan Update stating that Sisters past growth cycle has exceeded expectations and could do so in the future. The added wording at S.2 recognizes the problem and suggests making update forecasts every five years to ensure the plan continues to meet requirements. How will a recount five years hence ensure anything? How will Council be informed of ongoing conditions in the meantime, i.e., that we are on schedule, ahead or behind schedule? How is Council expected to react five years hence given the outcome?

Influent, effluent, and BOD levels are based on a population projections. If the rate of population growth was to change, the rate of increase in the levels of influent, effluent, and BOD would also change. The thresholds for the timing of improvement projects would then be adjusted to match new projections. Although the City's population is calculated and noted every single year, through both the budget process and Community Development Department assessments, a comparison every 5 years would need to be reviewed to determine if the population exceeds current projected estimates. If estimates are exceeded, then the projections should also include a recalculation for the timing of improvements in the plan. The only council action necessary would be to determine if changes should be made to the plan once the population is re-examined every 5 years. Improvements and expansions to the current system are designed to address growth, these are listed in a Capital Improvement Plan, which in turn, is updated every single year as part of the budget process. Adjustments to address timing for completion of projects can occur during the budget process each and every year.

3. There is no verb in the middle paragraph of S.6. What is the intention regarding SCADA?

This sentence has been revised to indicate that SCADA improvements are recommended.

4. Major needs are set out in the Executive Summary and Introduction sections of the Plan, which are repeated in later sections. They include "Lazy Z must be developed soon- S.4," "Pump Station 5 and Pressure Main 5 should be provided soon to assume (sic) the system meets needs especially if USFS is developed and pump station one fails S.5;" "Wastewater reuse improvements will be required in near future to satisfy increasing resident demand- S.7," There are no clear statements in these sections to quantify WHEN the improvements should take place. In section ten, there is a one-half page schedule which shows fiscal periods when work is expected to take place but the earlier sections are not cross tied

to it. I find it hard to evaluate the timing element under this presentation style and wonder if a reviewing agency might as well. Could that present a problem relative to the Plan Update deadline? Does the City have a detailed work plan that more clearly sets out the likely timing of repairs and improvements and their funding?

The Executive Summary Section is intended to provide a brief overview and background to orient the reader. The detailed schedule of improvements and timing for commencement is contained in the appropriate Chapter (in this case 10). It was never the intent of this document to replicate the detailed information in the Executive Summary. This format is similar to the one used in the 2006 Master Plan which was approved by the then City Council. A description of influent, effluent, and BOD growth, along with thresholds for the timing of needed improvements, is contained in Chapter 10.

5. Section 1.8 Planning Scope is confusing. The opening sentence says the objective is to ESTABLISH a capital plan that meets present and future needs. This implies that a plan has been completed. Yet in sub-points two through six, phrases such as "DEVELOP projected wastewater capacity," "Long range needs WILL BE developed," "Mapping SHALL BE provided," "Alternative costing WILL BE prepared," and "Information WILL BE presented showing design and supporting data." Is this a plan to "provide the City of Sisters with a COMPREHENSIVE wastewater utility planning document through year 2035" as stated in S.1, the opening purpose statement, or is it meant to say that we are just beginning to plan the plan?

The wording "shall be" and "will be" are meant to describe the information that will be presented in subsequent chapters in the plan.

6. Section two suggests the Update Plan prioritizes costs over time to fit financial capacity and take advantage of potential grants. The summary chart at Section 10.4 includes grants as a potential funding source for three different needs totaling over \$1,400,000 in costs. To what extent are grants expected to cover costs?

The extent of grant funding is not known. Once the plan is adopted, and the plan is shared with potential funding agencies, the potential for funding can be determined. The word "Potential" has been added to the funding sources in order to more clearly articulate that these are yet to be determined.

7. Section 2.6 says probable costs are explained in four components. Are the two separate 10% contingency factors two of the four components?

The third and fourth components have been combined, so the text has been revised to indicate three components, rather than four.

8. Section 3.2.1 states that "There are no constructed overflows or bypasses in the system." Does this mean that we don't need them or that they should be added?

Overflows and bypasses are not necessary for the operation of the collection system at this time. Flows are within the capacities of the existing infrastructure.

Response to questions and concerns submitted by Councilor Asson
February 2016

9. Later in Section 3 it says that large aerators are needed when BOD levels rise and that a chlorine pump and a flash mixer is needed. The operating budget should take this into consideration. Which budget year is the likely target for those items? Could this in anyway effect our brew pub operations?

Replacement of the chlorine pump and flash mixer are described in the Disinfection Facilities Section (3.3.4.3). These are a maintenance item and therefore outside of the Master Plan because the work is "a portion of normal plant maintenance procedures, and budget should be provided for the replacement of the aged equipment." This is intended to be part of the operations budget for the Sewer Fund. BOD treatment improvements will not affect brew pub operations. Although the Three Creeks brewery is responsible to pay a portion of the cost for the enlarged aeration improvements.

10. Section 4.7. 3 discusses Sisters' as a residential community with a tourist-based economy and goes on to discuss industrial zoning changes to minimize conflicts. What is the intent of this paragraph? How will industrial property to be treated? Should this paragraph be rephrased to clarify the intent?

Staff has reviewed this section, we do not observe any issue or conflict with current circumstances.

11. Section 8.2.2 says our WPCF permit expired in 2011 and that DEQ issued a draft permit which is anticipated in 2016. There are conditions attached to the renewal. [Refer to question 1] What is our position with DEQ?

The WPCF permit has been issued by DEQ as of January 2016. The City's current position is as a permitted wastewater system operator.

12. Section 8.5.3 includes a sentence which states in part ".....the majority of the purchased site [Lazy Z] APPEARS to meets (sic) Oregon statutes....." The concern is repeated under the recommendation section. Please explain any significant jeopardy behind these comments.

If the site were rejected by DEQ for use as an effluent disposal site, it could not be used for effluent application. At this point the soil testing results have been affirmative for effluent nutrient uptake and there has been no indication that the site will be rejected. Additionally, a Soil and Water Reuse Report, prepared by Wert & Associates in February 2007 stated that the "...DEQ... provided assurance that the 240 acres (Lazy Z) is suitable for reuse water."

13. Section 9.5.2 says that "No sampling or testing of accumulated solids has been conducted to date." Refer to question 5 above adding this information and advise if the plan, as written, will be acceptable [approved] by DEQ?

Yes, the testing of solids beginning in 2018 is within normal time frames (~20 years from pond construction) for measurements for accumulation and it is not anticipated that DEQ would challenge this approach.

14. Section 10.4 is the grand financial summary of the Update Plan. The figures included add to \$4,096,000, \$18,000 less than the \$4,114,000 printed total. This is most likely a transposition error since the difference is divisible by nine. More importantly, only \$1,175,000 or 29% of the expected repairs are

Response to questions and concerns submitted by Councilor Asson
February 2016

scheduled to be completed by 2018. The remaining 71% is scheduled for 2020 or later, essentially beyond the suggested population recount period. The schedule suggests SDC and Grants are a major funding source of costs. Operations are to pay the balance. On the following page at 11.1 is a sentence reading, "It is difficult to finance improvements with grant funding alone and grant funding in general is limited." There is no breakout of SDCs, grants and operating funds. A Sewer Fund budget statement appears at Section 12.1 showing \$851,444 in Revenue for FY 14-15 and expenses totaling \$738,000, a gain of \$112,784. The adopted budget for FY15-16 also shown on this statement projects a gain of \$90,573. Sewer rates are acknowledged to be inequitable in following pages but no indication is made of future rate adjustments. I found little useful information on current or future SDC balances or on conditions for their usage. From my point of view, this presentation is not fulfilling. It needs much work.

The Cost Total has been corrected. This question 14 appears to assume that the intention behind this Master Plan is to comprehensively address all issues from Long Range Planning to actual Sewer Rates. As was clearly explained to Council at a number of meetings, this Master Plan is only part of the process. First staff develops the Master Plan, once adopted, staff works with State agencies to determine how much grant and other funding will be available. Once that funding is determined, staff will create a Capital Improvement Plan (CIP). This CIP will derive what SDCs need to be in order to fund these projects over the analysis period. Once the SDCs are determined, then Sewer Rates can be reviewed and adjusted both for ratepayer equity as well as long term funding of operational repair and maintenance costs. When combined with the Master Plan, the CIP, related SDCs and Sewer Rates should be stable and provide for the long term needs of the community and the maintenance of the system.

AGENDA ITEM SUMMARY



**CITY OF SISTERS
SISTERS CITY COUNCIL**

Meeting Date: February 25, 2016

Staff: Joseph O'Neill

Type: Meeting

Dept: Finance

Subject: Transient Room Tax

Action Requested: Pass Transient Room Tax increase of 0.99%.

Summary: City Council has directed staff to increase City of Sister's portion of Transient Room Tax by 0.99%, from 8% to 8.99%.

The increase would be effective 30 days after adoption.

The Transient Room Tax percentage increase of 0.99% would be allocated between the Sisters Chamber of Commerce 70% and the City of Sisters by 30%.

Attachments

Ordinance 467

Concurrence:

 CM  F&A  CDD  PW

ORDINANCE NO. 467

**AN ORDINANCE REGARDING TRANSIENT ROOM TAX IN THE CITY OF SISTERS
AND INCREASING SAID TAX TO 8.99 PERCENT**

WHEREAS, the City of Sisters Municipal Code was originally adopted on August 9, 1979 via Ordinance No. 108; and,

WHEREAS, Chapter 3, section 3.04.030 sets the tax percentage to be imposed for the privilege of occupancy in any hotel; and,

WHEREAS, a “Hotel” is defined as any structure, or any portion of any structure which is occupied or intended or designed for transient occupancy for 30 days or less, for dwelling, lodging or sleeping purposes, and includes any hotel, inn, tourist home or house, motel, studio hotel, bachelor hotel, lodging house, mobile, manufactured or modular home, condominium, public or private dormitory, fraternity, sorority, public or private club, space in mobile home parks, trailer parks recreational vehicle parks, or similar structure or portion thereof so occupied, provided such occupancy is for less than a 30 day period; and,

WHEREAS, an “Operator” is defined as the person who is proprietor of the hotel in any capacity; and,

WHEREAS, the City Council is desirous of increasing the tax percentage from the current rate of 8:00 % to 8.99%; and,

WHEREAS, the City Council has set a goal of supporting affordable housing in the City of Sisters; and,

WHEREAS, 30% of the additional revenue collected would be used to support affordable housing purposes; and,

WHEREAS, significant outreach to lodging providers has occurred; and,

WHEREAS, the City Council held a public hearing at a regular meeting to provide an opportunity for all community members to provide input on the proposal to increase the transient room tax percentage in the City of Sisters;

NOW, THEREFORE, the City Council of the City of Sisters ordains as follows:

SECTION 1. The Sisters Municipal Code Section 3.04.030 of the Sisters Municipal Code is hereby amended as follows (new text is **bold and underlined** and deleted text is *struck and italicized*):

3.04.030 Tax Imposed: For the privilege of occupancy in any hotel, on or after the effective date of the ordinance codified in this chapter, each transient shall pay a tax in the amount of ~~eight (8)~~ **8.99** percent of the rent charges by the operator. The tax constitutes a debt owned by the transient to the city which is extinguished only by payment to the operator or to the city. The transient shall pay the tax to the operator of the hotel at the time the rent is paid. The operator shall enter the tax on his records when rent is collected if the operator keeps his records on the accrual accounting system basis. If rent is paid in installments, a proportionate share of the tax shall be paid by the transient to the operator with each installment. If for any reason the tax due is not paid to the operator of the hotel, the tax administrator may require that such tax shall be paid directly to the city. In all cases, the rent paid or charged for occupancy shall exclude the sale of any goods, services and commodities, other than the furnishings of rooms, accommodations, and parking space in mobile home parks, trailer parks or **recreational vehicle park**. (Ord_107, 1979; ORD 196, 1987)

SECTION 2. The Ordinance shall take effect thirty (30) days after its approval by the Council and signature by the Mayor.

PASSED by the Common Council of the City of Sisters this 25th day of February, 2016 and APPROVED by the Mayor of the City of Sisters.

Chris Frye, Mayor

ATTEST:

Kathy Nelson, City Recorder

AGENDA ITEM SUMMARY



**CITY OF SISTERS
SISTERS CITY COUNCIL**

Meeting Date: February 25, 2016

Staff: Joseph O'Neill

Type: Meeting

Dept: Finance

Subject: Transient Merchants

Action Requested: Consider Public Event Applications involving transient merchants.

Summary: The Code stipulates no transient merchants are allowed within 100 feet of Cascade Avenue between Pine Street and Locust Street.

For the Sisters Fall Street Festival and Sisters Wild West Show by Central Oregon Shows, the submitted applications are asking to place transient merchants within 100 feet of Cascade Avenue between Pine Street and Locust Street.

Attachments

Concurrence:  CM  F&A  PTD CDD  PW